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STATE OF VERMONT
PUBLIC SERVICE BOARD

Docket No. 6860

Petitions of Vermont Electric Power Company, Inc. and Green Mountain Power Corporation for a Certificate of Public Good authorizing VELCO to construct the so-called Northwest Vermont Reliability Project, said project to include: (1) upgrades at 12 existing VELCO and GMP substations located in Charlotte, Essex, Hartford, New Haven, North Ferrisburg, Poultney, Shelburne, South Burlington, Vergennes, West Rutland, Williamstown, and Williston, Vermont; (2) the construction of a new 345 kV transmission line from West Rutland to New Haven; (3) the construction of a 115 kV transmission line to replace a 34.5 kV and 46 kV transmission line from New Haven to South Burlington; and (4) the reconductoring of a 115 kV transmission line from Williamstown, to Barre, Vermont

PROPOSAL FOR DECISION OF THE VERMONT DEPARTMENT OF PUBLIC SERVICE

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November 24, 2004

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I. Introduction

In this docket, the Vermont Department of Public Service proposes that the Vermont Public Service Board find and conclude as stated below. The organization of this document is as follows: After this introduction, there is a section defining recurring terms used in the document, followed by findings describing the proposed project, proposed findings of fact and conclusions of law under 30 V.S.A. § 248, and a proposed order. This proposal for decision addresses § 248(b)(1) through (4), (b)(5) with respect to aesthetics and public health and safety, (b)(6), (b)(7), (b)(9), and (b)(10). DPS understands that ANR will address the criteria related to natural resources and historic sites.

The NRP is the option that can timely meet the serious reliability issues facing Vermont and can do so cost-effectively and with certainty. With appropriate mitigation and post-certification review procedures, construction of the NRP will not have undue adverse effect under the Section 248 criteria. As demonstrated by the following proposed findings of fact and conclusions of law, DPS proposes that the Board conclude that the NRP promotes the general good of the state and meets the criteria of § 248(b), and issue a CPG requiring the conditions and modifications sought by the Department.

II. Definitions

The following definitions are used in this document:

1. "1994 Plan" means the Vermont Twenty Year Electric Plan issued by DPS pursuant to 30 V.S.A. § 202(e) in December 1994.
2. "ACRPC" means Addison County Regional Planning Commission.
3. "AIPM" means Area Investment Planning Model.
4. "ANR" means the Vermont Agency of Natural Resources.
5. "ARC" means alternative resource configuration.
6. "Board" or "PSB" means Vermont Public Service Board.
7. "Charlotte" means the Town of Charlotte.
8. "Charlotte Reroute" means the reroute described in Finding 21, below.

9. "CLF" means Conservation Law Foundation.
10. "CPG" means Certificate of Public Good under § 248.
11. "CT" means combustion turbine.
12. "CVPS" means Central Vermont Public Service Corporation.
13. "Department" or "DPS" means Vermont Department of Public Service.
14. "Design Details Filing" means the design details testimony and exhibits filed by VELCO in this docket on September 14, 2004.
15. "DG" means distributed generation.
16. "DR" means demand response.
17. "DSM" means demand-side management.
18. "DUP" means distributed utility planning.
19. "EEU" means energy efficiency utility.
20. "EMF" means electric and magnetic fields.
21. "EPRI" means Electric Power Research Institute.
22. "EVT" means Efficiency Vermont.
23. "FERC" means the Federal Energy Regulatory Commission.
24. "Ferrisburg" means the Town of Ferrisburg.
25. "Ferrisburg Reroute" means the reroute described in Finding 19, below.
26. "GMP" means Green Mountain Power Corporation.
27. "ICNIRP" means International Commission on Non-Ionizing Radiation Protection.
28. "IEEE" means Institute of Electrical and Electronics Engineers.
29. "ISO-NE" means the Independent System Operator of New England.
30. "kV" means kilovolt.
31. "kV/m" means kilovolts per meter.
32. "kW" means kilowatt.
33. "kWh" means kilowatt hour.
34. "Meach Cove Reroute" means the reroute described in Finding 27, below.
35. "mG" means milliGauss.

36. "MP" means mile post.
37. "MVA" means mega-volt ampere.
38. "MW" means megawatt.
39. "MWH" means megawatt hour.
40. "NEPOOL" means the New England Power Pool.
41. "NESC" means National Electric Safety Code.
42. "New Haven" means the Town of New Haven.
43. "NPCC" means the Northeast Power Coordinating Council.
44. "NRP" means the Northwest Reliability Project proposed by the Petitioners for Board approval in this docket, as described below in Section III of this document.
45. "Original Proposal" means the NRP as filed on June 5, 2003.
46. "PAR" means phase angle regulator.
47. "Petitioners" means VELCO and GMP.
48. "PTF" means Pool Transmission Facility.
49. "Reroute Filing" means the proposed changes to line routes and other project facilities as filed by VELCO on February 6, 2004.
50. "ROW" means right-of-way.
51. "Section 218c" or "§ 218c" means 30 V.S.A. § 218c.
52. "Section 248" or "§ 248" means 30 V.S.A. § 248.
53. "Shelburne" means the Town of Shelburne.
54. "Shelburne Reroute" means the reroute described in Finding 25, below.
55. "T&D" means transmission and distribution.
56. "VCSE" means Vermont Citizens for Safe Energy.
57. "VDH" means Vermont Department of Health.
58. "VELCO" means Vermont Electric Power Company, Inc.
59. "Vergennes" means the City of Vergennes.
60. "Vergennes Reroute" means the reroute described in Finding 17, below.
61. "West Rutland" means the Town of West Rutland.

III. **Findings of Fact: Project Description**

1. The NRP is a coordinated series of improvements to the VELCO transmission system designed to provide reliable transmission service to the state of Vermont and to the systems with which it interconnects. The principal features of the NRP are a new 345 kV line from West Rutland to New Haven; a new 115 kV line from New Haven to VELCO's Queen City substation (both lines will use existing right-of-way for most of their lengths); reconductoring of the 115 kV Granite to Barre line; new PAR devices at VELCO's Sand Bar[1], Blissville and Granite substations; and new capacitor banks, breakers and other substation upgrades at VELCO's West Rutland, New Haven, Queen City, Essex, Williston, Hartford and Granite substations and at GMP's Vergennes, North Ferrisburg, Charlotte and Shelburne substations. Dunn, pf. at 5; Boers, pf. at 4. The NRP upgrades are designed to permit the system to reliably serve loads up to a 1,200 MW statewide load level. Dunn, pf. at 8.

2. VELCO's estimated NRP cost is $128 million, with approximately $121 million eligible for PTF funding. Of that total cost, Vermont will pay approximately $12 million, with $116 million to be paid by the region. Dunn, pf. at 16. NEPOOL has approved up to $156 million of construction cost for the NRP (in the configuration presented to NEPOOL) as eligible for PTF treatment. Mertens, pf. at 6.

Discussion

Two points on this proposed finding merit discussion. First, as described in Findings 149, 152, and 153, below, DPS contends that VELCO's cost estimate for the NRP is too low. Correcting the overall estimate based on those findings and adding in the cost of the Reroute Filing as stated in the next proposed finding, the total estimated NRP cost is approximately $149 million.

Second, the Department's discussion of PTF funding is for the purpose of stating the facts. DPS advocates approval of the NRP regardless of the availability of such funding.

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[1]Approved by the Board in Docket No. 6852, Order of 9/16/03.

3. There are at least two iterations of the NRP before the Board: the Original Proposal as filed on June 5, 2003 and the so-called Reroute Filing made on February 6, 2004. Dunn, pf. at 5, and supp. pf. at 2. The Reroute Filing adds approximately $1.2 million to the cost of the NRP, of which Vermont will pay approximately $400,000, with the region paying the remaining $800,000. Smith and Litkovitz, supp. pf. at 6; Exhibit DPS-GS&WSL-1 at 1.

West Rutland to New Haven 345 kV line and Associated Substation Upgrades

4. The proposed West Rutland to New Haven 345 kV line would consist of approximately 35.5 miles of new 345 kV transmission line adjacent to the existing 115 kV line from the West Rutland substation to the New Haven substation, passing through the towns of West Rutland, Pittsford, Proctor, Brandon, Leicester, Salisbury, Middlebury and New Haven. The line would be constructed in existing corridor. From West Rutland to Middlebury, the new 345 kV line would be constructed on the west side of the existing 115 kV line. From Middlebury to New Haven, the new line would be constructed on the east side of the existing 115 kV line. Like the existing line, the new line would be built using "H-frame" structures. Under the Original Proposal, these structures would be comprised of two wooden poles approximately 79 feet in height above ground with a horizontal wooden crossarm connecting the two poles near the top. The heights of these structures would be about 27 feet taller than the existing 115 kV line. Average spans would be approximately 800 feet. An existing 46 kV line, presently paralleling the existing 115 kV line for approximately 0.3 miles, would be relocated in kind to the western side of the ROW as needed to allow for construction of the proposed 345 kV line. Dunn, pf. at 8, 10; Boers, pf. at 7.

5. In the Reroute Filing, VELCO proposes to use a range of structure heights on the proposed 345 kV line from West Rutland to New Haven, with the structure heights to be between 61 and 97 feet in height. VELCO now seeks to have a range of pole heights available in order to provide VELCO with flexibility to customize the size of a structure used in a particular location to address a particular concern. For example, one way to address concern about

the visibility of the proposed lines would be to lower the height of the structures where possible. On the 345 kV line, it may be advantageous to use shorter structures and locate the structures next to the existing 115 kV structures in areas where the corridor is highly visible. In some areas it may be desirable to avoid placing poles in sensitive locations (e.g., wetlands). The use of taller poles would enable VELCO to increase span lengths (i.e., distance between the structures) to possibly span a wetland or reduce the number of structures required. Dunn, supp. pf. at 8-9.[2]

6. For all but 1.3 miles of the 35.5 mile length of the proposed 345 kV line, the VELCO ROW is between 250 and 350 feet in width, and no widening of the ROW will be needed to construct the project. In a 1.3 mile section along Halpin Road in north Middlebury and New Haven, VELCO has 150 foot easements. To build the new 345 kV line in this section, VELCO will need to acquire additional easements for an additional 100 feet on the east side of the existing corridor. Dunn, pf. at 10-11.

7. Substation upgrades associated with the proposed West Rutland to New Haven 345 kV line would be at VELCO's West Rutland and New Haven substations. Boers, pf. at 2, 4.

8. VELCO proposes to modify its West Rutland substation, at the junction of Marble and Pleasant Streets, to provide 345 kV service to VELCO's New Haven substation. Modifications to the electrical equipment would consist of the installation of two new 345 kV circuit breakers with associated disconnect switches and bus work. The new breakers would protect the proposed new 345 kV line to New Haven that would be terminated on an existing 345 kV dead-end structure. Three new 345 kV potential transformers would be installed and connected to the 345 kV bus for protective relaying and control purposes. One disconnect switch and three new 345 kV surge arrestors would be installed for the New Haven 345 kV line. The control system would be upgraded to include control panels and cabling for the new line and breakers. All new steel structures, including equipment supports, would be connected to the existing station ground grid. The size of the existing

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[2]In the right context, taller poles may be the appropriate aesthetic option. See Finding 251, below.

site is adequate for the proposed improvements and there will be no earthwork or grading outside of the existing enclosure fence. Boers, pf. at 3.

9. VELCO proposes to modify its New Haven substation, off Vermont Route 17, to receive 345 kV service from VELCO's West Rutland substation, provide 115 kV service to VELCO's Queen City substation (located in the City of South Burlington) and to permit replacement of the 46 kV and 34.5 kV service to GMP's Vergennes, North Ferrisburg, Charlotte and Shelburne substations along the proposed transmission route.

   a. Modifications to the electrical equipment would consist of the addition of a 345 kV yard, expansion of the 115 kV yard, and modification of the 46 kV yard. Boers, pf. at 4-5.

   b. The addition of the 345 kV yard at the New Haven substation would include one disconnect switch and three surge arrestors installed for the West Rutland 345 kV line, which would terminate with two new tubular steel 345 kV dead–end structures. Two additional 345 kV tubular steel dead-end structures would be erected for the future termination of a 345 kV line to Williston. Two new 345 kV circuit breakers and associated disconnect switches would be required for the protection of the West Rutland 345 kV line. Nine new 345 kV potential transformers would be installed and connected to the 345 kV bus for protective relaying and control purposes. A 345 kV/60 MVAR reactor and associated breaker would be installed. Additional 345 kV bus work would be installed to connect two new 345-115 kV transformers. One 345 kV and one 115 kV disconnect switch would also be required for each transformer. Boers, pf. at 5.

   c. At the New Haven substation, the 115 kV yard would be expanded to a six-position ring bus. Additional 115 kV equipment would include four new 115 kV breakers and associated disconnect switches, 115 kV bus work, fifteen 115 kV potential transformers and one station service transformer. The new 115 kV lines to Vergennes, and the 115 kV lines from Middlebury and Williston that loop in and out of the New Haven substation would require five new tubular steel 115 kV

dead-end structures, three line disconnect switches, and nine surge arrestors. Boers, pf. at 5.

d. At the New Haven substation, modification of the 46 kV yard would consist of the installation of a new 115-46 kV emergency backup transformer, 115 kV and 46 kV bus work and switches, one new 46 kV breaker and one 46 kV potential transformer. One bypass switch would be removed from the 46 kV breaker associated with the existing transformer. Boers, pf. at 5.

e. The existing control building at the New Haven substation would be replaced with a building comparable in construction and color, but four times larger. The control system would be completely upgraded to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports, would be connected to an expanded station ground grid. Boers, pf. at 5.

f. The New Haven substation modifications would require expanding the existing substation enclosure fence. The upgraded site would be expanded to approximately 6.80 acres from it current 0.88 acres and require 5.91 acres of improved grading. Of this 5.91-acre expansion, approximately 3.58 acres will be to south of VELCO's existing substation property. Boers, pf. at 6; Exhibit VELCO-DJB-7.

New Haven to Queen City 115 kV line

10. The proposed New Haven to Queen City 115 kV line would consist of approximately 27.1 miles of new 115 kV transmission line to replace an existing subtransmission line from the New Haven substation to the Queen City substation. The existing subtransmission line is comprised of a 46 kV line from New Haven to Vergennes, and a 34.5 kV line from Vergennes to Queen City. The first 1.2 miles of the 6.5 mile long 46 kV line is owned by CVPS. The remainder of the 46 kV line and all of the 34.5 kV line is owned by GMP. The existing line is constructed on single wooden poles and is approximately 35 feet in height. The new 115 kV line would also be built using single wooden pole structures. Under the Original Proposal, most of these structures would be approximately 61 feet in height above

ground. On poles where distribution lines are attached to the existing transmission line, the distribution lines would be transferred to the new transmission poles. Poles with distribution lines attached would be approximately 70 feet in height above ground. Dunn, pf. at 9; DPS-DR-1 at 3.

11. Under the Reroute Filing, VELCO proposes to change the proposed height of the structures on the 115 kV line to between 52 and 75 feet. Dunn, supp. pf. at 8.

12. Under the Reroute Filing, with respect to structure configurations, VELCO proposes, between mileposts 20.2 and 20.91 along the original route of the 115 kV line, to substitute a horizontal configuration on wood H-frame structures for the single pole delta configuration originally proposed. Boers, supp. pf. at 8; Exhibit VELCO-DJB-Supp(1)-23.

13. Under the Original Proposal, the new 115 kV line will pass through the municipalities of New Haven, Waltham, Vergennes, Ferrisburg, Charlotte, Shelburne, and South Burlington. Boers, pf. at 19. Under the Reroute Filing, the proposed 115 kV line will pass through all of those towns but Waltham. Compare Boers, pf. at 19 with Dunn, supp. pf. at 3-9 and VELCO Exhibits TD Supp(1)-1 through -(3).

14. Under the Original Proposal, most of the proposed new 115 kV line would be built in existing corridor, except that VELCO proposes to route two segments in new corridor in Vergennes and Shelburne. VELCO will nonetheless need to acquire 100 foot easements for the entirety of the proposed 115 kV line corridor to replace the existing GMP and CVPS easements. Dunn, pf. at 10, 11.

15. Through the Reroute Filing, its rebuttal testimony, and the Design Details Filing, VELCO has put forward a variety of proposals for the Route 17 crossing at the New Haven substation, which are discussed below at Finding 264.

16. Under the Original Proposal, the first segment of the proposed 115 kV line that would be in new corridor would begin on the north side of the Otter Creek in Vergennes. The existing 34.5 kV line follows Comfort Hill Road north into Ferrisburg where the road name changes to Botsford Road. VELCO is proposing a new, approximately 2.8 mile corridor for the 115 kV line, beginning at the intersection of Comfort Hill and High Street in

Vergennes. The new corridor would head in a northeasterly direction through woodlands and across a pasture until it reaches the railroad tracks owned by the State of Vermont and operated by Vermont Railway. From there the line would head in a northerly direction mostly along the west side of the railroad tracks until the new corridor rejoins with the existing corridor to north of Little Chicago Road. Once the 115 kV line is in service, the existing 34.5 kV line along Comfort Hill and Bostford Road would be removed. Dunn, pf. at 11; Exhibit VELCO TD-5 at 4-5.

17. Under the Reroute Filing, VELCO proposes the so-called "Vergennes Reroute," which is a modification to the 115 kV line route to avoid downtown Vergennes. Specifically, VELCO proposes as its now preferred route to locate the 115 kV line in new corridor next to the railroad tracks from New Haven to Ferrisburg to the northeast corner of Vergennes to a new proposed substation and from there back into Ferrisburg. In addition, the existing 46 kV line from New Haven to Vergennes, which passes through 1.4 miles in Waltham, would be removed. There are several miles of 12.5 kV distribution underbuild (12.5 kV and 46 kV lines on the same pole) on this line. The 12.5 kV distribution would remain. In order to provide service to the existing GMP Vergennes substation, rather than upgrade GMP's existing Vergennes substation to accept 115 kV service as originally proposed, VELCO is proposing to construct a new 115/34.5 kV substation in the northeast corner of Vergennes in the vicinity of Kayhart Crossing. GMP would construct a short section of 34.5 kV transmission line to connect the existing 34.5 kV line to the new substation. Dunn, supp. pf. at 3-4; Boers, supp. pf. at 2-3; Cecchini, supp. pf. at 3.

18. For the majority of the Vergennes reroute, where the new 115 kV line parallels the Vermont railroad, the new line would be constructed 10' outside of the railroad right-of-way, requiring an additional 60' of right-of-way. No significant clearing would be required along the agricultural lands. Where wooded lands are encountered, clearing of the balance of the proposed 100-foot right-of-way is proposed. Away from the railroad, the new 115 kV line includes a proposed 100' wide cleared right-of-way, 50' either side of the line centerline. Boers, supp. pf. at 9.

19. Under the Reroute Filing, VELCO proposes the so-called "Ferrisburg Reroute," which is a modification to the 115 kV line route to avoid residences in the area of Little Chicago Road. Specifically, VELCO is proposing that the new 115 kV line would depart from the railroad corridor at MP 8.9 and head in a northwesterly direction along the edge of a small stream and join the existing GMP corridor near existing pole 392. Heading in a northerly direction, VELCO is proposing to use the existing corridor all the way to where this corridor rejoins the railroad near existing pole 377 (approximately MP 9.75). Dunn, supp. pf. at 6.

20. Along an approximately 0.25 mile stretch where the Ferrisburg Reroute will traverse cross-country, new 100-foot wide ROW will needed, and VELCO proposes clearing such ROW. The remainder of the Ferrisburg Reroute will not require new ROW, but clearing would be required. Boers, supp. pf. at 10.

21. Under the Reroute Filing, VELCO proposes the so-called "Charlotte Reroute." Specifically, VELCO proposes to relocate the new 115 kV line from the railroad to an open field adjacent to the Waldorf School on Ferry Road. VELCO is proposing that the new 115 kV line leave the railroad corridor just south of existing GMP pole 267 (MP 16.5) and head northwesterly for less than 1/10 of a mile to a new pole location. From here the reroute heads in a northerly direction along the edge of an existing line of trees and crosses Ferry Road near the entrance to the commuter rail station parking entrance. The line will then proceed to the new Charlotte substation to be located on the west side of the railroad tracks near existing GMP pole 260 (between MP 16.9 and 17.0). The length of the reroute is approximately .5 miles. Dunn, supp. pf. at 6-7.

22. A new 100-ft right-of-way, cleared 50 ft on either side of the transmission centerline, would be required for the Charlotte Reroute. Boers, supp. pf. at 11.

23. In the Design Details Filing, VELCO presented a third route proposal for the area of the Ferry Road in Charlotte. VELCO Exhibits Dunn/Harr-DD-10, -11. This proposal implements a suggestion made by the DPS in its reroute testimony filed May 20, 2004, which suggestion was adopted by VELCO. Exhibit DPS-DR-10 at 55-59; Boyle, reb. at

15-16. Under this proposal, the 115 kV line would leave the existing corridor south of the Waldorf School and cross over to the east side of the tracks to a pole, and then cross over the tracks back to the west side to a pole between the School and Ferry Road. From this point, the line would span Ferry Road to another pole east of the railroad tracks, and then cross the tracks again to continue north along the west side of the tracks. VELCO Exhibit Dunn/Harr-DD-10. As presented in the Design Details Filing, this VELCO proposal places poles in somewhat different locations and involves more clearing of existing mature trees than DPS originally anticipated. Raphael, design details pf. at 8-9.

Discussion

DPS sets out these basic facts concerning the Ferry Road crossing proposals for completeness of the project description. DPS will address the Ferry Road crossing further in the brief on that crossing presently due on December 17, 2004.

24. Under the Original Proposal, the second segment of the proposed 115 kV line that would be in new corridor would begin just north of the Shelburne substation. The existing 34.5 kV line follows the Ticonderoga Haul Road and passes through the Nature Conservancy area until reaching Bay Road in Shelburne, where it generally parallels the road until reaching the Vermont Railways railroad tracks. At this location, VELCO originally proposed a new, approximately 1.6 mile corridor that would cross the McCabe Brook north of the Shelburne substation and head in an easterly direction along the edge of an open field and behind the vacant Blodgett factory until reaching the Vermont Railways railroad tracks. The proposed corridor would follow the west side of the railroad tracks north until it rejoins the existing corridor at Bay Road in Shelburne. Dunn, pf. at 11-12.

25. Under the Reroute Filing, VELCO proposes the so-called "Shelburne Reroute." Specifically, VELCO proposes to move the proposed corridor for the 115 kV line from the Davis Park neighborhood to the west to property owned by the Meach Cove Real Estate Trust. The new proposed corridor would leave the existing corridor near GMP pole 177 and head in a northwesterly direction along the edge of the McCabe Brook wetland for

approximately .35 miles. At this point the corridor is proposed to head northeast and rejoin the existing corridor near GMP pole 159. VELCO proposes to use its best efforts to avoid placing poles in the wetlands by using structures that would allow VELCO to span the wetlands. VELCO expects the number of poles in or near the wetlands to be reduced under the proposed relocation because the span length for the new construction will be considerably longer than what is used on the present line. The proposed reroute is approximately .5 miles in length. Dunn, supp. pf. at 7-8; Ex. TD-Supp(1)-3.

26. The Shelburne Reroute would be a new section of line, along which a new 100' wide right-of-way, cleared 50' either side of the line centerline, will be necessary. This new ROW is part wooded and part wetland and therefore will likely require special construction techniques. Boers, supp. pf. at 10.

27. With its rebuttal testimony, VELCO proposed a modification to the Shelburne Reroute which is referred to as the "Meach Cove Reroute." Under this modification, the proposed line in the area of the Meach Cove Real Estate Trust Lands in Shelburne would be moved further west from the existing corridor, closer to Limerick Road, higher up on the land away from wetlands associated with McCabe Brook. VELCO Exhibit TD-Reb-3.

Substation Upgrades Associated with the Proposed New Haven to Queen City 115 kV Line

28. As part of the NRP, VELCO proposes modifications to GMP's Vergennes, North Ferrisburg, Charlotte, and Shelburne substations, and to VELCO's Queen City substation. Boers, pf. at 7, 10, 12, 14, 16.

29. Under the Original Proposal, VELCO would modify GMP's Vergennes substation off Mechanic Street in order to upgrade existing 46 kV and 34.5 kV service feeds to 115 kV.

    a. Modifications to the electrical equipment at the Vergennes substation would consist of 115 kV equipment, including a new 115 kV steel lattice box structure, two new 115 kV circuit breakers with associated disconnect switches, one new 115 kV circuit switcher, one new 12.4 kV circuit breaker, and one 115/12.4 kV

transformer. The proposed 115 kV line between the New Haven substation and the North Ferrisburg substation would loop in and out of the substation and would require two new disconnect switches, six new surge arrestors, five new potential transformers, and one station service transformer for protective relaying, control and station AC auxiliary power purposes. Boers, pf. at 8-9.

b. The 12.4 kV side of the Vergenenes substation would require one new 12.4 kV circuit breaker associated with the new transformer, three new potential transformers for revenue metering, 12.4 kV bus work, one 12.4 kV breaker, and one 2.4/12.47 kV transformer for a Vergennes Hydro and Generation line. The existing 12.4 kV structure would remain intact with limited modifications. Boers, pf. at 9.

c. At the Vergennes substation, a new 24 by 30 foot single story control building would be built to house a new control system to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports would be connected to an expanded station ground grid. Boers, pf. at 9.

d. The proposed NRP upgrades to the Vergennes substation would require an expansion of the substation fence. The existing substation fenced area is approximately 0.15 acres. The upgraded site would be expanded to approximately 0.33 acres, requiring 0.18 acres of improved grading. The existing site is bordered on the north by Otter Creek and on the east and south by paved access drives to GMP's hydro units, diesel generators and other facilities. Due to the tight constraints surrounding the existing site, the only available area for expansion is toward the west. Therefore, an existing single story wood-frame structure of historical significance west of the site would have to be moved or removed to accommodate the proposed site expansion. VELCO proposes relocating that structure approximately 77 feet to the west. Boers, pf. at 9-10; Frink, pf. at 15; Exhibit VELCO-DJB-11.

30. Under the Vergennes Reroute proposal, the only change to GMP's substation in Vergennes would be the removal of the 46 kV line from New Haven to Vergennes. 6/10/04 tr., vol. 2

at 10 (Dunn).

31. Under the Reroute Filing, there would a new Kayhart Crossing substation in Vergennes that would accommodate a low profile four-position ring bus, including future 12.47 kV service, and space to accommodate a 115/34.5 kV "mobile substation." Boers, supp. pf. at 3.

    a. New 115 kV equipment would consist of two tubular steel 115 kV line dead-end structures, 115 kV bus support structures, three 115 kV circuit breakers with associated disconnect switches, one normally energized 115/34.5 kV transformer, and one spare (normally de-energized) 115/34.5kV transformer. 115 kV disconnect switches would be located on both the high and low sides of each transformer and one voltage transformer would be connected to the ring bus position where the 115/34.5kV transformers are connected. The proposed 115 kV line between the Ferrisburg Substation and the New Haven Substation would loop in and out of the substation and would include two motor operated disconnect switches, six surge arrestors, and six potential transformers. Boers, supp. pf. at 3.

    b. The 34.5 kV side of the substation would include one tubular steel 34.5 kV line dead-end structure, 34.5 kV bus support structures, one 34.5 kV circuit breaker with associated disconnect switches, three potential transformers for protective relaying and control, and one station service transformer for station AC auxiliary power purposes. Boers, supp. pf. at 3.

    c. A new 24' x 30' single story control building is proposed to house a new control system to include redundant control panels and cabling. All new steel structures, including the control building and equipment supports would be connected to a new station ground grid. Boers, supp. pf. at 3.

    d. The existing property under consideration for the Kayhart Crossing substation is approximately 19 acres with frontage access to Route 22A (Main Street), in the City of Vergennes. The new substation enclosure fence would be approximately 240' by 280', requiring approximately 1.8 acres of improved grading at the rear of

the property. Boers, supp. pf. at 3-4.

32. VELCO proposes to modify the North Ferrisburg substation on Long Point Road to upgrade the 34.5 kV service feed to 115 kV.

a. Modifications to the electrical equipment at the North Ferrisburg substation would consist of 115 kV equipment, including two new tubular steel 115 kV line dead-end structures, 115 kV bus work, one new 115 kV circuit switcher with associated motor operated disconnect switch, and one 115/12.4 kV transformer. The proposed new 115 kV line between the Charlotte and Vergennes substations would loop in and out of the North Ferrisburg substation, and would require two new line disconnect switches and six new surge arrestors as part of the upgrade. Boers, pf. at 10.

b. The 12.4 kV side of the North Ferrisburg substation would require one new 12.4 kV circuit breaker associated with the new transformer, three new potential transformers for revenue metering, and 12.4 kV bus work. The existing 12.4 kV structure would remain intact with limited modifications. Boers, pf. at 10.

c. A new 24 by 24 foot single story control building is proposed to house a new control system to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports would be connected to an expanded station ground grid. Boers, pf. at 10.

d. The proposed NRP upgrades to GMP's North Ferrisburg substation would require expansion beyond the existing substation fence. The existing substation fenced area is approximately 0.09 acres. The upgraded site would be expanded to approximately 0.33 acres, requiring 0.25 acres of improved grading. Boers, pf. at 10-11.

33. Under the Original Proposal, VELCO proposes to modify GMP's Charlotte substation off Ferry Road to upgrade the 34.5 kV service feeds to 115 kV.

a. Modifications to the electrical equipment would consist of 115 kV equipment, including two new tubular steel 115 kV line dead-end structures, 115 kV bus work,

one new 115 kV circuit switcher with associated motor operated disconnect switch, and one 115/12.4 kV transformer. The proposed 115 kV line between the North Ferrisburg and Shelburne substations would loop in and out of the Charlotte substation, and would require two new line disconnect switches and six new surge arrestors as part of the upgrade. Boers, pf. at 13.

b. The 12.4 kV side of the Charlotte substation would include one new 12.4 kV circuit breaker associated with the new transformer, three new potential transformers for revenue metering, and 12.4 kV bus work. The existing 12.4 kV structure would remain intact with limited modifications. Boers, pf. at 13.

c. At the Charlotte substation, a new 24 by 24 foot single story control building is proposed to house a new control system to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports, would be connected to an expanded station ground grid. Boers, pf. at 13.

d. The proposed modifications to the Charlotte substation would require expansion beyond the existing substation fence. The existing substation fenced area is approximately 0.05 acres. The upgraded site would be expanded to approximately 0.39 acres, requiring 0.34 acres of improved grading. Approximately 0.33 acres of the expansion would be outside of GMP's existing property. Boers, pf. at 13.

34. In connection with the Charlotte Reroute, VELCO proposes to move the site of the Charlotte substation to the west side of the railroad tracks approximately 850 feet to the north of the existing site. Dunn, supp. pf. at 11.

35. At the new Charlotte substation site, new 115 kV equipment will consist of two tubular steel 115 kV line dead-end structures, 115 kV bus support 26 structures, one 115 kV circuit switcher, and one 115/12.47 kV transformer. The proposed 115 kV line between the Ferrisburg Substation and the Shelburne Substation will loop in and out of the Charlotte Substation and will require two disconnect switches, six surge arrestors, and one potential transformer. A new 20' x 30' single story sheltered aisle switchgear building will be required to house a new control system to include redundant control panels and cabling,

and 12.47 kV metalclad switchgear consisting of three breakers, six surge arrestors, potential transformers and station service transformer and all associated equipment. All new steel structures, including the switchgear building and equipment supports will be connected to a new station ground grid. The two 12.47 kV service feeds to GMP distribution lines will be routed underground to a riser-pole(s). The existing property under consideration is approximately 1.7 acres. The new substation enclosure fence will be approximately 95' by 175'feet, requiring approximately 0.53 acres of improved grading. Access to the proposed site from Ferry Road will likely be through the recently closed Vermont Railroad commuter station property. Boers, supp. pf. at 4-5.

36. Under the Original Proposal, VELCO proposes to modify GMP's Shelburne substation on Harbor Road to upgrade the 34.5 kV service feeds to 115 kV.

a. Modifications to the electrical equipment would consist of 115 kV equipment, including two new tubular steel 115 kV line dead-end structures, 115 kV bus work, one new 115 kV circuit switcher with associated motor operated disconnect switch, and one 115/12.4 kV transformer. The proposed 115 kV line between VELCO's Queen City substation and GMP's Charlotte substation would loop in and out of the Shelburne substation, and would require two new line disconnect switches and six new surge arrestors as part of the upgrade. Boers, pf. at 14-15.

b. The 12.4 kV side of the Shelburne substation would require one new 12.4 kV circuit breaker associated with the new transformer, three new potential transformers for revenue metering, and 12.4 kV bus work. The existing 12.4 kV structure would remain intact with limited modifications. Boers, pf. at 15.

c. A new 24 by 24 foot single story control building is proposed to house a new control system to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports would be connected to an expanded station ground grid. Boers, pf. at 15.

d. The NRP upgrades to GMP's Shelburne substation would require expansion beyond the existing fence. The existing substation fenced area is approximately

0.10 acres. The upgraded site would be expanded to approximately 0.44 acres, requiring 0.33 acres of improved grading. Approximately 0.27 acres of the expansion would be outside of GMP's existing property. The upper bank of McCabe Brook is approximately 3 feet to 5 feet east of the southeast corner of the existing enclosure fence and flows in a north-northeasterly direction, increasing its distance from the enclosure fence along the east side of the site. The proposed expansion is primarily in a north and westerly direction. Boers, pf. at 15.

37. The Reroute Filing proposes an alternate design for the Shelburne substation to avoid an expansion of the substation to the west. To accomplish this, VELCO proposes to replace the existing 12 kV lattice tower with metal-clad switchgear. The new 12 kV equipment requires a smaller footprint than the existing equipment. With the redesign, the size of the new substation is reduced from approximately 18,000 square feet to approximately 10,600 square feet. Dunn, supp. pf. at 12.

38. At the redesigned Shelburne substation, new 115 kV equipment will consist of two tubular steel 115 kV line dead-end structures, 115 kV bus support structures, one 115 kV circuit switcher, and one 115/12.47 kV transformer. The proposed 115 kV line between the Charlotte Substation and the Queen City Substation will loop in and out of the Shelburne substation and will require two disconnect switches, six surge arrestors, and one potential transformer. A new 20' x 30' single story sheltered aisle switchgear building will be required to house a new control system to include redundant control panels and cabling, and 12.47 kV metalclad switchgear consisting of three breakers, six surge arrestors, potential transformers and station service transformer and all associated equipment. All new steel structures, including the switchgear building and equipment supports will be connected to a new station ground grid. The two 12.47 kV service feeds (lines 53G1 & 53G2) will be routed underground to new riser-pole locations outside of the substation fence. The existing site is approximately 0.10 acres. The proposed redesign will move the southern fence (facing Harbor Road) 34 feet further back off the road than the originally proposed substation. The improvements proposed will require expanding the enclosure

fence approximately 114 feet to the north. The upgraded site will be expanded to approximately 0.46 acres. Boers, supp. pf. at 6.

39. Under the Original Proposal, VELCO proposes to upgrade its Queen City substation to install a second 115 kV service feed from VELCO's New Haven substation.

    a. Modifications to the electrical equipment at the Queen City substation would consist of the expansion of the 115 kV yard to a four-position ring bus. Additional 115 kV equipment would include four new 115 kV breakers and associated disconnect switches, expansion of the 115 kV steel lattice box structure, 115 kV bus work, and six 115 kV potential transformers. The existing 115 kV lines from Williston and the new 115 kV line from Shelburne would terminate on the expanded lattice structures, and require two new line disconnect switches, and six new surge arrestors. The 115/13.8 kV transformer and equipment would be used and remain in place. One of the two existing 115/ 34.5 kV transformers and its associated equipment would be used but would be relocated to a new position within the substation. The backup 115/34.5 kV transformer would no longer be needed and would be removed from this substation. Boers, pf. at 17.

    b. The existing control building would be replaced with a building comparable in construction and color but larger by a factor of four. The control system would be completely upgraded to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports would be connected to an expanded station ground grid. Boers, pf. at 17.

    c. The upgrades to VELCO's Queen City substation would require expansion beyond the existing fence. The existing substation fenced area currently occupies approximately 0.79 acres of a six-acre VELCO parcel. The upgraded site would be expanded to approximately 1.57 acres, requiring 0.78 acres of improved grading, all within the existing VELCO property. Boers, pf. at 18.

40. Under the Reroute Filing, VELCO proposes changes to the Queen City substation design. Rather than route the new 115 kV line along the south side of the substation as originally

proposed, VELCO proposes to reconfigure the layout of the substation modifications to allow the new line to enter the substation from the east within the existing transmission line corridor that has already been cleared of trees. There are no revisions to the electrical equipment needs originally proposed. This modification affects the physical layout of the equipment including the orientation of the control building. As a result, the north-south fence dimension was reduced from 280 feet originally proposed to 260 feet. The reduced substation footprint and relocation of the new 115 kV transmission line will allow the existing row of trees along the south side of the substation to remain in place. Dunn; supp. pf. at 13-15.

Granite to Barre Reconductoring and Granite Substation

41. VELCO proposes to replace the existing 795 Aluminum Covered Steel Reinforced ("ACSR") conductor with new 1272 ACSR conductor between its Granite and Barre substations. This line is approximately 5.6 miles in length. The existing H-frame, two pole wooden structures will be retrofitted with cross bracing to support the larger wire. No new or widened transmission corridor will be needed for this reconductoring. Dunn, pr. at 9, 11.

42. With respect to VELCO's existing Granite substation, VELCO proposes the following, under the Original Proposal:

    a. Expansion of the 115 kV yard to a six-position ring bus, expansion of the 230 kV yard to a three-position ring bus, and the addition of a Flexible Alternating Current Transmission System (FACTS) and four capacitor banks.

    b. Three new 115 kV breakers and associated disconnect switches, 115 kV bus work, and nine new 115 kV potential transformers.

    c. Two capacitor banks with associated 115 kV breakers connected to the Barre and Chelsea 115 kV lines, with the 115 kV lines from Barre and Chelsea to terminate on existing 115 kV dead-end structures.

    d. Two new capacitor banks with associated 115 kV breakers installed on the 115 kV

bus, along with a new 115 kV FACTS will be installed with an associated 115 kV breaker and FACTS building.

e. A new 115/230 kV transformer added to connect to the 230 kV yard, with the existing 115/230 kV transformer remaining in place.

f. Two new 230 kV breakers and associated 10 disconnect switches, 230 kV bus work, three new 230 kV potential transformers and ten new tubular steel 230 kV dead-end structures.

g. A new 230 kV dead-end structure to which the 230 kV Comerford line will attach, and a new 230 kV breaker and a new 230 kV/550 MVA PAR with its associated disconnect switch and two circuit switchers each with a disconnect switch.

h. Doubling the length of the existing control building, using the same material and color, to accommodate new protective equipment.

i. Complete upgrade of the control system to include redundant control panels and cabling.

j. Connection of all new steel structures, including building additions and equipment supports, to an expanded station ground grid.

Boers, pf. at 36-7.

43. Upgrades to VELCO's Granite substation will require expansion of the existing fenced yard. The existing substation yard is approximately 4.72 acres. VELCO proposes to accommodate the modifications by expanding the enclosure fence by 188 feet to the west, which would expand the upgraded yard to approximately 6.66 acres and required approximately 1.94 acres of additional improved grading, all within existing VELCO property. Boers, pf. at 37; VELCO Exhibit DJB-33.

44. In its rebuttal testimony, VELCO revised the Granite substation proposal, within the same footprint as the Original Proposal, to include relocation of 2 capacitor banks to spare positions on the 115 kV bus and to connect each of the 75 MVAR components of the FACTS device at separate bus positions. Under this proposal, the separation of the FACTS device components would be accomplished by using a 115 kV underground

connection, adding approximately $600,000 to the cost of the substation. Dunn., reb. at 14.

45. VELCO's design details testimony includes an updated plan for the Granite substation that depicts the installation of synchronous condensers within a building proposed for the northwest side of the station and the addition of four shield masts for lightning protection. VELCO continues to evaluate the technical aspects of a synchronous condenser installation at Granite. Synchronous condensers are VELCO's preferred technology for the Granite substation. VELCO's design details testimony depicts the installation as fitting within the same footprint as the Original Proposal. Dunn/Harr, design details pf. at 9; VELCO Exhibit Dunn/Harr-DD-20.

Other Project Elements

46. VELCO proposes to expand the Williston substation by approximately .54 acres to install a three position 115 kV ring bus and to add one 115 kV breaker to the two existing breakers. Additional 115 kV equipment will include associated disconnect switches, expansion of the 115 kV steel lattice box structure, 115 kV bus work, and nine 115 kV potential transformers. The existing 115 kV lines from Essex and Queen City, and the new New Haven 115 kV line, will terminate on existing and expanded lattice structures and require three new line disconnect switches. One existing 115 kV breaker and capacitor bank will be relocated. The existing 20 by 20 foot control building will be doubled in length, using the same material and color, to accommodate new protective equipment. The control system will be upgraded to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports will be connected to an expanded station ground grid. The Williston substation is on a 3.9 acre parcel of land owned by VELCO, and the expansion will occur VELCO's existing property. Boers, pf. at 32-3; Dunn/Rowe pf. at 24; VELCO Exhibit TD-6 at 2.

47. VELCO proposes to add a 115 kV breaker on its K24 line at the Essex substation in Williston, with no substation expansion. Modifications to the electrical equipment will include one new 115 kV breaker with an associated disconnect switch and 115 kV bus

work for the existing Berlin 115 kV tap. The control system will be updated. All new steel structures and equipment supports will be connected to the existing ground grid. Boers, pf. at 31-2;VELCO Exhibit TD-6 at 2.

48. VELCO proposes to install a 115 kV, 200 MVA PAR at the Blissville substation in Poultney, with a substation expansion of approximately .17 acres, all within VELCO's existing 3.67 acre property. Modifications to the electrical equipment will include one new 115 kV breaker with associated disconnect switches, three new 115 kV potential transformers, and one new three-phase station service transformer. The 115 kV Whitehall line will attach to a new 115 kV dead-end structure, and will include a new 115 kV breaker and a new 115 kV/ 200 MVA PAR with its associated disconnect switch and two circuit switchers, each with a disconnect switch. The existing control building will be increased in length, using the same material and color, to accommodate new protective equipment. The control system will be upgraded to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports will be connected to an expanded station ground grid. Boers, pf. at 38-9; Dunn/Rowe pf. at 29; VELCO Exhibit TD-6 at 2.

49. VELCO proposes to expand its Hartford substation by approximately .13 acres to install a 115 kV 25 MVAR capacitor bank and three 115 kV breakers, associated disconnect switches, and five new 115 kV potential transformers. The existing control building will be increased in length, using the same material and color, to accommodate new protective equipment. The control system will be upgraded to include redundant control panels and cabling. All new steel structures, including building additions and equipment supports will be connected to an expanded station ground grid. The expansion will be accomplished within VELCO's existing 26-acre property. Boers; pf. at 37-8; Dunn/Rowe pf. at 28; VELCO Exhibit TD-6 at 3.

IV. **Orderly Development of the Region (§ 248(b)(1))**

A. Findings of Fact: Orderly Development Generally

50. The proposed project will not unduly interfere with the orderly development of the region, with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality. This finding is supported by findings 51 through 106, below.

51. The proposed project involves proposed improvements to transmission facilities in the following Vermont communities, using primarily existing electrical corridors:

    a. Within the area of the Rutland Regional Planning Commission ("RRPC") – West Rutland, Proctor, Pittsford, Brandon, and Poultney.

    b. Within the area of the ACRPC – Leicester, Salisbury, Middlebury, New Haven, Waltham (Original Proposal only), Vergennes, and Ferrisburg.

    c. Within the area of the Chittenden County Regional Planning Commission – Charlotte, Shelburne, South Burlington, and Williston.

    d. Within the area of the Central Vermont Regional Planning Commission – Barre Town, Barre City, and Williamstown.

    e. With the area of the Upper Valley/Lake Sunapee Regional Planning Commission – Hartford.

    Dunn/Rowe, pf. at 3.

52. On March 13, 2003, VELCO provided detailed notice to each of the foregoing regional planning commissions and the selectboards and planning commissions of each of the foregoing towns, describing the project plans for each of the towns and regions. Dunn/Rowe, pf. at 6, 7, 8, 9, 12, 14, 15, 17, 18, 20, 21, 23, 25, 27, 28, 29, 30, 32, 37, 40, 42; VELCO Exhibit DR-5.

53. With the possible exception of the ACRPC, the record contains no evidence of any recommendations provided by the planning commissions of the foregoing towns and regions to VELCO and the Board in accordance with 30 V.S.A. § 248(f). ACRPC Exhibits AL-2, AL-3.

B. Findings of Fact: West Rutland through Salisbury

54. Within West Rutland, all proposed project improvements will be within existing VELCO transmission corridor or the existing West Rutland substation. Dunn/Rowe pf. at 4-5.

55. The West Rutland plan indicates that statements in the plan are not to be interpreted as a standard with which "an applicant for any state or local land use permit or approval must comply in order to obtain that permit or approval." The plan excepts from this intent any plan statements "shown in the space provided therefore immediately below," but no such statements are listed "immediately below." VELCO Exhibit DR-4.[3]

56. Within Proctor, all project improvements will be located within existing VELCO corridor. The project will not contravene any land conservation measures contained in Proctor's town plan. Dunn/Rowe, pf. at 6; Rowe, et al., reb. at 26; VELCO Exhibits DR-6, RDGB-Reb-8.

57. Within Pittsford, all project improvements will be located within existing VELCO corridor. The project will not contravene any land conservation measures contained in Pittsford's plan. Dunn/Rowe, pf. at 6-7; Rowe, et al., reb. at 26; VELCO Exhibits DR-7, RDGB-Reb-8.

58. Within Brandon, all project improvements will be located within existing VELCO corridor. The project will not contravene any land conservation measures contained in Brandon's plan. Dunn/Rowe, pf. at 7-8; Rowe, et al., reb. at 26; VELCO Exhibits DR-8, RDGB-Reb-8.

59. Within Leicester, all project improvements will be located within existing VELCO corridor. The project will not contravene any land conservation measures contained in Leicester's plan. Specifically, Leicester's town plan encourages "the siting of new construction to prevent adverse impacts on environmentally sensitive areas or primary agricultural soils." VELCO's environmental consultants have identified environmentally sensitive areas and prime agricultural soils along the entire NRP route, and have

[3]This exhibit is an excerpt of the West Rutland Town Plan. The full plan is available on the web at http://www.wrutland.org/b&c/p&z/townplan.pdf.

recommended mitigation measures, which VELCO will implement. Dunn/Rowe, pf. at 7-9; Rowe, et al., reb. at 26; VELCO Exhibits DR-9, RDGB-Reb-8.

60. Leicester's town plan also encourages "the burying of utility lines whenever feasible." Dunn/Rowe, pf. at 8; VELCO Exhibit DR-9 at 18.

Discussion (Leicester Town Plan)

For two reasons, DPS contends that the provision of the Leicester plan encouraging utility line burial when feasible is inapposite under § 248(b)(1). First, the provision reasonably is not a "land conservation measure" within the meaning of § 248(b)(1) because it encourages burial regardless of whether the land under which the line is to be buried will be conserved or developed (e.g., buried under a road).

Second, this plan provision is not cognizable as "recommendation" of the planning commission within the meaning of § 248(b)(1) because it is a general part of the town plan and not specific recommendation of the Leicester planning commission issued pursuant to § 248(f). DPS will discuss this argument further below, at the conclusion of this section on § 248(b)(1).

In the alternative, the technical and economic feasibility of burial are addressed below in the findings and conclusions below, under § 248(b)(5), of the Quechee test and the aesthetic impacts of the NRP. Such discussion is incorporated by reference.

61. Within Salisbury, all project improvements will be located within existing VELCO corridor. The project will not contravene any land conservation measures contained in Salisbury's plan. Dunn/Rowe, pf. at 9; Rowe, et al., reb. at 26; VELCO Exhibits DR-10, RDGB-Reb-8.

C. Findings of Fact: Middlebury

62. Within Middlebury, all project improvements will be located within existing VELCO corridor. Middlebury's plan favors use of existing corridors and consolidation, where possible to avoid the need for additional transmission corridors, and states: "There should

not be any new major transmission corridors planned throughout the Town." The project will not contravene any land conservation measures contained in Middlebury's plan. Dunn/Rowe, pf. at 10-11; Rowe, et al., reb. at 26; VELCO Exhibits DR-11, RDGB-Reb-8.

63. Middlebury's plan also contains the following provision:

> In order for this project to conform with Middlebury's Town Plan, the following standards must be met:
>
> 1. The project shall clearly benefit and be necessary for Vermonters.
> 2. The project must include adequate mitigation, including modified design, tree planting, and where necessary, compensation for the effects upon the property values of adjacent owners.
> 3. VELCO and the PSB must assure that any electromagnetic effects, right-of-way maintenance by herbicides or other health and environmental hazards, present or future, are adequately minimized and corrected.
> 4. Proposed aesthetic recommendations at public highway crossings must be developed through site visits and local public hearings.

Dunn/Rowe pf. at 10.

Discussion (Middlebury Town Plan)

For several reasons, DPS contends that the foregoing provision from the Middlebury plan is inapposite under § 248(b)(1). First, the provision posits conformance with the plan, but § 248(b)(1) does not require *conformance* with the plan of an affected municipality; it requires "due consideration" of the "land conservation measures" within such a plan. As the Supreme Court has stated, "due consideration" means that municipal enactments in this area are "advisory rather than controlling." City of South Burlington v. Vt. Electric Power Co., 133 Vt. 438, 447 (1975).

Second, none of the four "standards" listed reasonably constitutes a "land conservation measure" because none of them is directed toward land conservation. For example, requiring that a project benefit Vermonters does not promote the conservation of land. Similarly, land is not

conserved by requiring that there be adequate mitigation and compensation to adjoining property owners, that health and environmental hazards are appropriately addressed, or that aesthetic recommendations are developed for public highway crossings.

Third, the "standards" from the Middlebury plan are not recommendations concerning the NRP developed through the process outlined in § 248(f). Instead, they are statements in a plan developed in response to the possibility of a different project, known as the Northwest Interconnect Project. Dunn/Rowe pf. at 10; DPS-DR-10 at 94. DPS will address further below the relationship of §§ 248(b)(1) and 248(f).

Fourth, in a number of specific respects, the "standards" exceed the statutory authority of Middlebury. For example, Title 24's statutes concerning the adoption of town plans do not provide Middlebury with authority to require, through its plan, that VELCO pay compensation to landowners, and Middlebury's plan cites no independent authority under which it could do so. See, e.g., 24 V.S.A. § 4382. Indeed, the authority to award compensation to a landowner for condemnation of property rights by a utility is committed by state law to the Board, which must do so under a statutory process separate from § 248. 30 V.S.A. § 112. Similarly, those statutes do not enable Middlebury to require a local hearing process for the project outside of the Board's process under § 248, and a Board approval under § 248 preempts the local zoning process. 24 V.S.A. § 4382; City of South Burlington, 133 Vt. at 447.

In the alternative, DPS would contend that the first standard is met, as discussed below under § 248(b)(2) (need) and (4) (economic benefit to state); that the second standard is met, as addressed below in the discussion of aesthetics under § 248(b)(5) [4]; that the third standard is met, as addressed below in the discussion of EMF and conformance with the NESC under § 248(b)(5); and that the development of designs for public highway crossings as part of the Board's post-certification process, discussed below in Section XIV, should be deemed sufficient to meet the

[4]DPS does not argue that the concept of compensation to property owners for effects on property values is met by the NRP proposal; VELCO does not propose such compensation. DPS instead stands on its arguments that Middlebury lacks authority to require compensation and that any compensation due must be determined in a condemnation proceeding under 30 V.S.A. § 110 et seq.

fourth standard. Further, under 30 V.S.A. § 112, compensation will be paid to any property owner whose land is condemned for purposes of the NRP.

D. Findings of Fact: New Haven

64. Within New Haven, as modified by the Reroute Filing, project improvements include:

a. Construction of approximately 5.1 miles of 345 kV transmission line, located east of and parallel to the existing VELCO 115 kV line, within the existing utility corridor, extending from the Middlebury town line north to VELCO's New Haven substation.

b. Expansion of the New Haven substation to accommodate a new 345 kV yard, an expanded 115 kV yard, and modifications to the 46 kV yard.

c. Replacement of CVPS' existing 1.3 mile long 46 kV subtransmission line, that runs northwest from VELCO's New Haven substation to the former White Pigment Plant, with a new VELCO 115 kV single pole transmission line.

d. Replacement of a portion of GMP's existing 46 kV subtransmission line, that runs northwest, mostly along the railroad, from the former White Pigment Plant to the point where GMP's existing line turns toward Waltham, with a new VELCO 115 kV single pole transmission line.

e. Removal of the existing GMP 46 kV line from New Haven to Vergennes, except where 12.5 kV distribution underbuild must remain.

f. Construction of new 115 kV single pole transmission along the railroad tracks from the point where GMP's existing line turn towards Waltham to the New Haven border.

Dunn/Rowe pf. at 12-13; Dunn, supp. pf. at 3; Boers, supp. pf. at 9; VELCO Exhibits TD-5 and TD Supp(1)-1.

65. The project will not contravene any land conservation measures contained in New Haven's plan. Dunn/Rowe pf. at 12-14; Rowe, et al., reb. at 26; VELCO Exhibits DR-12, RDGB-Reb-8.

66. New Haven's plan, adopted in 2000, states that the zoning bylaws need to be updated to include, among other things, the following:

> A system to discourage new public utility expansion, including, but not limited to, expanded/upgraded electric transmission facilities, that may have an adverse impact on viable agricultural operations and environmentally sensitive areas, which poses health risks to citizens, which poses threats to property or property values, or which degrades scenic corridors and existing aesthetics.

VELCO Exhibit DR-12. New Haven's planning commission voted in December 2003 to "reaffirm" this "implementation clause." Hall Exhibit 3. New Haven has provided no evidence that this clause has in fact been implemented. See, e.g., Hall pf. and Hall Exhibits 1-3.

Discussion (New Haven town plan)

DPS respectfully submits that the foregoing provision is inapposite under § 248(b)(1) for three reasons. First, it is not a specific plan policy applicable to a project; instead, it is a call for implementation of zoning bylaws to discourage utility expansion and upgrades. New Haven has not implemented such zoning bylaws and so there is no such system in place to apply to the NRP. New Haven's planning commission may have "reaffirmed" this clause of the plan recently, but the fact remains that the called-for zoning bylaws do not exist. Even if they did exist, they would be beyond New Haven's authority. 24 V.S.A. § 4413(b).

Second, this provision is not a land conversation measure. It does not provide specific guidance on the conservation of land. Instead, it is a call for a system of bylaws that does not presently exist.

Third, this provision is not a specific recommendation concerning the NRP developed through the process outlined in § 248(f). Instead, it is a general call for a system of bylaws that predates by several years VELCO's NRP mailing to New Haven and, as stated above, has never been implemented by New Haven. DPS will address further below the relationship of §§ 248(b)(1) and 248(f).

67. In 2000, at town meeting, New Haven approved a resolution that stated: "Shall the Selectmen of New Haven be directed and authorized to take all steps within their proper authority to prevent the expansion of VELCO Electric Transmission facilities within the township?" Hall Exhibit 1.

Discussion (New Haven town meeting resolution)

For two reasons, DPS contends that the foregoing resolution is inapposite under § 248(b)(1). First, it is not a land conversation measure contained within New Haven's plan. It is not in the plan at all. Nor does it address land conservation.

Second, the resolution is not a specific recommendation concerning the NRP developed through the process outlined in § 248(f). Instead, it is a general resolution that predates by several years VELCO's NRP mailing to New Haven. DPS will address further below the relationship of §§ 248(b)(1) and 248(f).

E. Findings of Fact: Ferrisburg

68. Within Ferrisburg, as modified by the Reroute Filing, project improvements include:

a. Construction of new 115 kV single pole transmission line along the railroad tracks from the New Haven border to the eastern boundary of the City of Vergennes.

b. Construction of new 115 kV single pole transmission line coming across the northern boundary of the City of Vergennes to the railroad tracks, then along the railroad tracks to the point where the Ferrisburg Reroute, described in Finding 19, above, begins.

c. Construction of new 115 kV single pole transmission along the route of the Ferrisburg Reroute described in Finding 19, above.

d. Along the railroad tracks from the end of the so-called Ferrisburg Reroute to the Charlotte border, replacement of GMP's existing 34.5 kV line with single pole 115 kV transmission line.

e. Expansion of the existing GMP substation located on the north side of Long Point Road in the Village of North Ferrisburg, to upgrade the 34.5 kV services to 115 kV.

Dunn/Rowe pf. at 17; Dunn, supp. pf. at 3-4, 6; Boers, supp. pf. at 9-10; VELCO Exhibits TD-5 and TD Supp(1)-1.

69. The project will not contravene any land conservation measures contained in Ferrisburg's plan. Dunn/Rowe pf. at 18; Gilman/Briggs supp. pf. at 3-4; Rowe, et al., reb. at 26; VELCO Exhibits DR-15, RDGB-Reb-8.

70. Ferrisburg's plan contains the following provision: "[The] Zoning By-Laws will be amended to limit development and establish setback requirements around important natural resources. The Town will also include regulations and requirements pertaining to transmission and telecommunication towers to protect the Town's character and resources - natural, historical and scenic." Dunn/Rowe pf. at 18; VELCO Exhibit DR-15. There is no evidence in the record that Ferrisburg has implemented this provision by enacting the called-for zoning bylaws.

Discussion (Ferrisburg town plan)

For two reasons, DPS contends that the foregoing provision is inapposite under § 248(b)(1). First, it is not a land conversation measure. It does not provide specific guidance on the conservation of land. Instead, it is a call for a system of bylaws the existence of which is not supported by the evidence.

Second, the provision is not a specific recommendation concerning the NRP developed through the process outlined in § 248(f). Instead, it is a general resolution that predates by several years VELCO's NRP mailing to New Haven. DPS will address further below the relationship of §§ 248(b)(1) and 248(f).

F. Findings of Fact: Vergennes

71. Within Vergennes, as modified by the Reroute Filing, project improvements will include:

a. New single pole 115 kV transmission corridor running along the railroad tracks

from the eastern border with Ferrisburg to a point where the new corridor diverges from the railroad tracks to run overland to the new substation proposed in the vicinity of Kayhart Crossing, then from the new substation to the northern border with Ferrisburg. Dunn, supp. pf. at 3-4, 9-10; Boers, supp. pf. at 9; VELCO Exhibit TD-Supp(1)-1.

b. A new 115/34.5 kV substation in the vicinity of Kayhart Crossing, as described in Findings 17 and 31, above.

c. New 34.5 kV line from the new substation into the City of Vergennes, as described in Finding 17, above.

72. The project will not contravene any land conservation measures contained with the Vergennes municipal plan. Dunn/Rowe, pf. at 16-17; Rowe, et al., reb. at 26; VELCO Exhibits DR-14, RDGB-Reb-8.

73. The City of Vergennes supports the project as amended by the Reroute Filing. Perry, supp. pf. at 3; Vergennes Exhibit RP-5. The City seeks that the Board will impose appropriate conditions in any CPG that it may issue to VELCO to ensure that the aesthetic value of the Kayhart Crossing area is protected. Perry, supp. pf. at 5.

Discussion

DPS will discuss below, under the aesthetics criterion, the issue of aesthetic impacts and mitigation measures for the Kayhart Crossing area.

G. Findings of Fact: Charlotte

74. Within Charlotte, project improvements will include:

a. Replacement of approximately 6.3 miles of GMP's existing 34.5 kV subtransmission line with a single pole 115 kV transmission line. Dunn/Rowe pf. at 18-19. Most of this line will be in existing corridor except to the extent the Board approves a proposal for the Ferry Road crossing that includes new corridor. See, e.g., Findings 14, 21, 22, and 23, above.

b. Under the Reroute Proposal, construction of a new substation as described in

Findings 34 and 35, above.

75. The NRP will not cause additional development in Charlotte that would not conform to the zoning bylaws. 3/3/04 tr. at 26 (Bloch) (Vol. 1).

76. The only area identified in Charlotte where the NRP may prevent development in accordance with the zoning bylaws is in the area of Ferry Road crossing, which may become a growth center, with village expansion in this area in a pedestrian-oriented manner as well as for retail uses. The proposed transmission line could have a negative effect on the desirability of the area for the potential village expansion. 3/3/04 tr. at 27-8 (Bloch) (Vol. 1).

77. The project will not contravene any land conservation measures in the Charlotte plan. Dunn/Rowe pf. at 18-20; Rowe, et al., reb. at 26; VELCO Exhibits DR-16, RDGB-Reb-8.

78. The Charlotte plan contains the following:

a. In Section 1.1, a vision to maintain and enhance "the scenic beauty and open land of the Town through protection of working farmland and the creation of conservation areas" and to preserve the Town's "unique environmental and cultural resources through both regulatory and non-regulatory actions."

b. In Section 2 (Goals for the Future of the Town), the following goals and objectives:

Goal 1. To maintain and protect Charlotte's Rural Character and Heritage.

> Objective 1.2. Preserve the quality of the landscape through the protection of open land, panoramic views of the Green Mountains, Lake Champlain and Adirondack Mountains, the rural night sky, and valuable natural resources.
>
> Objective 1.3. Preserve the small town character in the villages and rural areas.

Goal 2. To direct and manage growth in the Town.

> Objective 2.6. Manage growth and development to be in harmony and scale with the rural character, historic pattern, and quality of settlement in the Town.

> Goal 4. To encourage sound conservation practices in land and water uses and provide a healthy environment for people, plants and animals.
>
> > Objective 4.3. Protect valuable wildlife habitat, wetlands, productive or unique forestlands, and natural areas.
> >
> > Objective 4.6. Limit development in areas of the Town where significant environmental and natural resources are located and promote development away from those areas.

c. In Section 4.4.4, the Charlotte plan identifies as "significant resources" in the Rural District around Ferry Road "open space and scenic vistas, especially in the center and western parts of the Town," and "the conservation and aesthetic value of roadside environments."

d. Charlotte has inventoried significant environments; these inventories are incomplete. Map 12 of the Charlotte Plan shows significant views to the east. Map 13 of the Charlotte Plan shows roads with high scenic or conservation values.

i. Map 13 shows Greenbush Road to be a "most scenic road."

ii. Map 13 shows only one "wildlife value area" in the vicinity of the proposed NRP route near Greenbush Road.

Bloch, pf. at 3-4; Charlotte Exhibits DB-3 and DB-4.

79. The Charlotte plan also contains the following:

a. In Chapter 4 of the Charlotte Town Plan, Section 4.4.6 - Special Features:

> Ubiquitous overhead utility lines for power, telephone and cable television have the impact of diminishing the Town's scenic vistas, views and general landscape quality. These are important services, but the vision for an aesthetically beautiful Charlotte includes the replacement of overhead lines with underground lines and requires the installation of new lines underground. It is the objective of the Town that all utilities will be underground.

b. In Chapter 5, Section 5.8, Community Facilities and Services, paragraph 5.8.12,

Utility Distribution Policies:

Policy 1. New or replacement electrical, telephone, cable and other utility lines, are encouraged to be located underground. In particular, the Town seeks to protect public roads with high scenic value by placing utility transmission lines underground. Placing transmission lines underground reduces their negative impacts to the landscape and potentially reduces long term maintenance costs.

Policy 2. The Town supports co-location of utility lines in existing rights of way in order to reduce impacts to scenery. New utility transmission line infrastructure should be located within existing rights of way unless the greater public good is better served by placing them elsewhere.

Policy 3. The Town will continue to require underground utility lines within subdivisions as a condition of approval.

c. In Chapter 5, Section 5.8, Community Facilities and Services, paragraph 5.8.12, Utility Distribution Strategies: "The Town will explore ways to encourage underground placement of utility transmission lines, including, installation of empty conduit during road construction and re-construction projects."

VELCO Exhibit DR-16; Bloch, pf. at 5-6; Charlotte Exhibit DB-2.

80. On page 77, the Charlotte plan, at the beginning of section 5, states:

> This section of the Plan lays out the policies and strategies which the Town hopes will accomplish the vision, goals and objectives described earlier. As was stated in the Introduction to the Plan, "policies" are meant to be used to review and guide development proposals, while "strategies" are meant to guide discussion, and will need further action to be enacted, for example by amending the Zoning Bylaws or through the work of a Town committee.

Charlotte Exhibit DB-2 at 77.

81. Findings 78 through 80, above, contain the provisions specifically cited and discussed by

Charlotte town planner Dean Bloch in his direct testimony on compliance with § 248(b)(1). With respect specifically to Section 5 of the plan, Mr. Bloch cites only the provisions quoted in Finding 79.b and .c, above.

82. Charlotte's plan allows, in determining whether to bury utility lines, consideration of the costs of such burial and the impacts of such burial on the provision of reliable electric service. Exhibit DPS-Cross-93; 3/3/04 tr. at 26 (Bloch) (vol. 1).

Discussion (Charlotte Town Plan)

For several reasons, DPS contends that the provisions of the Charlotte plan quoted in Findings 78 through 80, above, are inapposite under § 248(b)(1). First, these plan provisions are not cognizable as "recommendations" of the planning commission within the meaning of § 248(b)(1) because they are a part of the town plan and not specific recommendation of the Charlotte planning commission issued pursuant to § 248(f). DPS will discuss this argument further below, at the conclusion of this section on § 248(b)(1).

Second, based on the language of the Charlotte plan itself, the only provisions among those cited in Findings 78 through 80 that have regulatory effect are the "utility distribution policies" cited in Finding 79.b, above. As quoted in Finding 80, above, the Charlotte plan specifically states that Section 5 of the plan lays out the policies and strategies to accomplish the visions and goals stated earlier in the plan, and that it is the policies that are "meant to be used to review and guide development proposals," while the strategies require "further action to be enacted."

Section 5.8.12 is the part of Section 5 of the Charlotte plan that lays out the town's utility policies. It is the only policy provision of the Charlotte plan cited by Mr. Bloch.

The other provisions cited by Mr. Bloch that are quoted in Findings 78 and 79.a, above, address the visions, goals, and objectives of Charlotte. They do not have regulatory effect under the Charlotte plan's own language. Further, and separately, they do not constitute "land conservation measures" within the meaning of § 248(b)(1) because: (a) many of them do not address the conservation of land; and (b) none of them constitutes a specific *measure* to conserve land, but rather they identify resources to be protected and state general goals and aspirations regarding those resources. Such a ruling is consistent with the case law of the Vermont Supreme

Court under Act 250, which has ruled that, in determining conformance with a town plan, it is the plan's specific policies and not the general goals which have to be met. In re John A. Russell Corp., __ Vt. __, 838 A.2d 906, 913 (2003).

Similarly, the utility distribution strategies cited by Mr. Bloch and quoted in Finding 80.c, above, do not have regulatory effect because, as the plan states, further action is required to bring them to fruition. Moreover, and separately, the strategies identified do not constitute "land conservation measures" within the meaning of § 248(b)(1) because they address the burial of transmission lines rather than conservation of land, and the burial would be regardless of the whether the protected land is or is not to be conserved.

Turning to the operative section of the Charlotte plan that lays out its utility distribution policies (within Section 5.8.12), one sees that while under the language of the plan this section has regulatory effect, the section itself contains no land conservation measures and does not address land conservation. Instead, the section seeks burial of line or use of existing corridor regardless of whether the land under which the line is to be buried will be conserved or developed (e.g., buried under a road).

In the alternative, the issue of burial is addressed below in the findings and conclusions, under § 248(b)(5), of the Quechee test and the aesthetic impacts of the NRP. Such discussion is incorporated by reference. The Department further would point that the use of existing corridor throughout most of Charlotte is consistent with Policy 2 quoted in Finding 79.b, above.

H. Findings of Fact: Shelburne

83. Within Shelburne, project improvements include:

a. Under the Original Proposal, replacement of approximately 2.4 miles of GMP's existing 34.5 kV subtransmission line, running from the Charlotte town line in existing corridor north to the substation, with a new single pole 115 kV transmission line. Under the Shelburne Reroute or Meach Cove Reroute proposals described in Findings 25 and 27, above, approximately half a mile of this stretch of line would be moved to new corridor west of the existing corridor.

b. Expansion of the existing GMP substation located on Harbor Road to upgrade the 34.5 kV service feed to 115 kV.

c. Replacement of 3.2 miles of GMP's existing 34.5 kV subtransmission line north of the substation, with a new single pole 115 kV transmission line. As noted in Finding 24, above, an alternate route is proposed for this section of new corridor to avoid impacts to the Nature Conservancy area and to residential development along the Shelburne Harbor and Bay Road. The new line will exit the expanded substation from the north, and proceed east to join the railroad ROW at the southern boundary of the Nature Conservancy property. The new 115 kV line will then follow the railroad for approximately 1.1 miles, to a point on Bay Road where the railroad meets the existing 34.5 kV line.

Dunn/Rowe pf. at 20-21; Dunn, supp. pf. at 7-8; Ex. TD-Supp(1)-3; see also Findings 25 and 27, above, and testimony and exhibits cited therein.

84. There is no evidence in the record that the NRP will cause additional development in Shelburne that will not be in conformance with the town's zoning bylaws. When asked this question, the town planner stated that he had not analyzed the growth impacts of the NRP. 3/3/04 tr. at 80 (Pierce) (vol. 1).

85. The only specifically identified manner in which the NRP may prevent development in Shelburne in accordance with the zoning bylaws is the prevention of rural residential development, that might otherwise occur, due to the presence of taller poles. Appropriate aesthetic mitigation measures would reduce that concern. 3/3/04 tr. at 81-2 (Pierce) (vol. 1).[5]

86. The project will not contravene any land conservation measures in the Shelburne plan. Dunn/Rowe pf. at 20-21; Rowe, et al., reb. at 17; VELCO Exhibits DR-17, RDGB-Reb-8.

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[5]When asked if his concerns about the NRP's impact on the western gateway to the village involved the prevention of development at the western edge of the village, Mr. Pierce did not affirm that the prevention of development was related to his concerns, instead stating that his concerns were with the specific impact of the substation upgrade on the western gateway. 3/3/04 tr. at 80-81 (Pierce) (vol. 1).

87. The Shelburne plan states that it contains "Goal, Objective, and Proposal & Strategy Statements which will guide the future of the community." It states that "goals" are "broadly based statements intended to set forth the general principles which will govern all future land use decisions." It states that "objectives set more specific directions that guide actions." It also states that "proposals and strategies are some of the possible courses of action available to the Town to implement the goals and objectives." Shelburne Exhibit DLP-3 at 3.

88. The Shelburne plan contains the following statements alleged by Shelburne witness Dean Pierce to be contravened by the NRP (see Pierce, pf. at 6-9):

a. "There shall be no development which would cause alterations to the Town's open lands, shorelines, ridgelines or roadside views in such a way that would intrude upon or diminish the scenic beauty of Shelburne." This statement is an objective of the Shelburne plan. Shelburne Exhibit DLP-3 at 13.

Discussion

This objective of the Shelburne plan does not constitute a land conservation measure within the meaning of § 248(b)(1) because it is targeted to protecting scenic beauty regardless of whether the land to be protected is or is not conserved. Under this provision, an alteration to open land would be allowed, and the open land potentially not kept as open, as long as the alteration does not intrude upon or diminish the scenic beauty of Shelburne.

In the alternative, if this objective is considered a land conservation measure, then in giving "due consideration" to the objective under § 248(b)(1), the Board should consider that the objective as written is overly strict in relation to the language of § 248(b)(1). That language speaks to whether a project will "unduly interfere" with orderly development, but this objective of the Shelburne plan seeks to prohibit *any* adverse effect on scenic beauty in the specifically identified parts of town regardless of whether that effect is undue. DPS-Cross-95; 3/3/04 tr. at 25 (Pierce) (vol. 1). Since the legislature used the word "unduly," the legislative intent under § 248(b)(1) is not a standard of no interference with orderly development. In considering the objective, the Board should apply this legislative intent and deem the objective to require no undue

intrusion upon or diminishment of scenic beauty in the specified parts of Shelburne. Further, since the provision refers to the issue of scenic beauty, the Board should consider it met if the aesthetics criterion is met by the project. In this regard, DPS incorporates its discussion below under the aesthetics criterion.

b. "To preserve and enhance the role of the village as the center for the town of Shelburne, and preserve those qualities which make it unique." This is a goal of the plan. Shelburne Exhibit DLP-3 at 6.

Discussion

This plan goal does not constitute a land conservation measure within the meaning of § 248(b)(1) for two separate reasons. First, by definition under Shelburne's own plan language, it is a broad statement of general principle. It is a vision statement rather than a specific measure. Second, it does not specifically discuss the conservation of land but rather the preservation of the village as a center for Shelburne, which principle presumably applies regardless of whether land is or is not to be conserved.

c. "In order to reinforce and enhance the visual and functional cohesiveness of the Village as the central element of Shelburne, the Town should strive to implement the overall recommendations of the Shelburne Village Plan, 1988, Research & Evaluation Specialists of Vermont, Alexander/Truex/de Groot." This is an objective of the Shelburne plan. Shelburne Exhibit DLP-3 at 6. The 1988 Shelburne Village plan has not been put in evidence. Mr. Pierce testifies that the Shelburne Village Plan notes that the character of the Village relies on the natural vegetation around the Village and the more formalized tree plantings of home owners, that the Plan identifies several "village entry areas," and that the Plan states that these areas not be developed in a way that undermines their roles in "announcing entry to the village." Pierce, pf. at 7-8.

Discussion

This objective of the Shelburne plan, namely, that the Town should "strive to implement" recommendations of a 1988 Shelburne village plan, is not on its face a land conservation measure under § 248(b)(1). It does not on its own terms related to the conservation of land. Similarly, the only provisions of the Shelburne village plan in evidence, those cited by Mr. Pierce and described above, do not discuss or require the conservation of land. Instead, they allow the development of village entry areas as long as the entry role of those areas is not undermined. Moreover, this objective of the Shelburne town plan is phrased in terms of the Town's "striving to implement" the recommendations of the village plan rather than as a specific policy which development projects must meet.

d. "Distinct and recognizable entrances to the Village shall be maintained which differentiate the Village from areas surrounding it." Shelburne Exhibit DLP-3 at 7.

Discussion

As with the provisions addressed immediately above in Finding 88.c, this provision does not constitute a land conservation measure under § 248(b)(1). It does not relate to the conservation of land. See discussion following Finding 88.c, above.

e. "Structure the Town's Zoning Bylaws to insure that any subdivision or development of property identified as part of a visually significant area is designed to minimize disruption of the view to the greatest extent possible. This might be achieved through selective designation of building locations, roads, utility lines, and the overall pattern of the subdivision. Conditions may be established with regard to the addition, protection, elimination, or management of vegetation as a means of maintaining views and aesthetic features and the specific designing of structures." Shelburne Exhibit DLP-3 at 16. Mr. Pierce claims in his testimony that the project is "at odds" with this objective of the Shelburne plan. Pierce, pf. at 8.

Discussion

This provision does not constitute a land conservation measure under § 248(b)(1). It is instead an aspirational statement: It is a call to structure the town's zoning bylaws to minimize disruption from view, with suggestions for how such minimizing might be accomplished. It is not in and of itself a requirement placed on development.[6] Further, and separately, it addresses minimizing view disruption rather than the conservation of land.

In the alternative, DPS contends that due consideration to this objective of the Shelburne plan is given through review, under § 248(b)(5), of the Quechee test and the aesthetic impacts of the NRP. The Department's discussion of that criterion below is incorporated by reference.

f. "Views in areas which are gateways into Shelburne and into the Village shall be preserved through techniques cited above." Shelburne Exhibit DLP-3 at 16.

Discussion

This objective does not constitute a land conservation measure under § 248(b)(1). It does not address the conservation of land but rather the preservation of views in gateway areas. This view protection would be regardless of whether the land within or which can be seen from the gateway area is to be conserved. In the alternative, the DPS contends that due consideration is given to this objective of the Shelburne plan through review, under § 248(b)(5), of the Quechee test and the aesthetic impacts of the NRP. The Department's discussion of that criterion below is incorporated by reference.

g. "To preserve and protect sites, structures, areas, and objects of historical, cultural, architectural or archeological significance to the Town of Shelburne." This is a goal of the Shelburne plan. Shelburne Exhibit DLP-3 at 17.

Discussion

This plan goal does not constitute a land conservation measure within the meaning of §

[6]Thus, whether or not the objective is a land conservation measure, the project cannot be "at odds" with the objective, since the objective is a call for changes to the zoning bylaws rather than a requirement placed on development.

248(b)(1) because, by definition under Shelburne's own plan language, it is a broad statement of general principle. It is a vision statement rather than a specific measure. Moreover, under the Supreme Court's Act 250 case law, the language of this goal would not constitute an enforceable "specific policy" because it is a "broad policy statement" phrased as a "nonregulatory abstraction." Russell, 838 A.2d at 912. In the alternative, the Department contends that "due consideration" to this goal is given by reviewing the proposed project under the historic sites criterion of § 248(b)(5).

h. "Conserve historic and cultural resources included, but not limited to, the resources identified on the Historic Resources Map and Archeological Sensitivity Map through the adoption of measures for the protection of historic sites, structures, objects and areas." This is an objective of the Shelburne plan. Shelburne Exhibit DLP-3 at 17.

i. Neither Shelburne nor any other party has placed the referenced maps in evidence. See generally prefiled direct testimony of Pierce, Henderson-King and Lalley, and Dunn and Rowe, rebuttal testimony of Henry and Boyle, and "rebuttal" testimony of Pritchett; VELCO Exhibits DR-17 and Cross-Ehrlich-2, and Shelburne Exhibit DLP-3.

ii. The testimonies of Henderson-King and Pritchett, while noting that the Shelburne plan cites Shelburne Museum, Shelburne Farms and the former Bostwick Farm as important cultural resources, do not state whether these properties are on the maps referenced in this objective of the plan. Henderson-King and Lalley, pf. at 15, 24-5, 35, 37; Pritchett, "rebuttal" at 19-20.

iii. Henderson-King and Lalley provide their own map of Shelburne's "cultural and recreational resources" but do not state whether the maps referenced in this Shelburne plan objective are the source for their own map. Shelburne Exhibit GHK/KL-4. In contrast, these witnesses also provide a map of

"Shelburne Significant Views" for which they do cite the Shelburne plan as source. Shelburne Exhibit GHK/KL-6. Since the witnesses actively cite the Shelburne plan as a source for another map, the absence of such a citation on their cultural resources map casts doubt on whether the Shelburne plan's historic and archeological resources maps are the source of the witnesses' cultural resource map. Compare Shelburne Exhibits GHK/KL-4 and -6.

Discussion

This Shelburne plan objective addresses land conservation, namely the conservation of historic and cultural resources, through the adoption of measures to protect them. The resources are stated to be listed on a map which VELCO, Shelburne, and VCSE – the parties who have provided the testimony on historic resource impact in Shelburne – inexplicably have not seen fit to provide the Board. Thus it is difficult for the Board to determine, on this record, the full scope of resources to which this objective refers. Moreover, the objective itself calls for adoption of measures to protect the historic and cultural resources without specifying what measures should be taken. Thus the objective, while addressing land conservation, falls short of being specific enough to constitute a "measure" under § 248(b)(1).

In the alternative, if the Board considers the foregoing objective a land conservation measure, the Department contends the Board should give it "due consideration" in the following manner, in view of the gaps identified above in applying the objective: (1) based on the consistent testimony that Shelburne Farms, Shelburne Museum, and the former Bostwick Farm are cultural resources under the Shelburne plan, the Board should deem them to be listed on the Shelburne plan maps referenced in this objective, and (2) the Board should consider the plan's objective to protect historic and cultural resources in Shelburne fulfilled by the review and analysis of the impacts of the NRP on historic sites in Shelburne under the historic sites criterion of § 248(b)(5).

i. "To provide necessary public utilities, facilities and services to meet the needs of the community and ensure the orderly, safe and environmentally acceptable

conversion of developable lands." This is a goal of the Shelburne plan. Exhibit DLP-3 at 21.

Discussion

This plan goal does not constitute a land conservation measure within the meaning of § 248(b)(1) because, by definition under Shelburne's own plan language, it is a broad statement of general principle. It is a vision statement rather than a specific measure. Moreover, under the Supreme Court's Act 250 case law, the language of this goal would not constitute an enforceable "specific policy" because it is a "broad policy statement" phrased as a "nonregulatory abstraction." Russell, 838 A.2d at 912.

Discussion (Shelburne town plan)

In addition to the Department's comments above concerning whether the plan provisions advanced by Mr. Pierce constitute "land conservation measures" within the meaning of § 248(b)(1), the Department contends these provisions do not constitute "recommendations of the municipal . . . planning commission" under § 248(b)(1) because they are statements in a generally applicable plan rather than recommendations specific to the NRP developed pursuant to § 248(f). DPS will discuss this argument further below, at the conclusion of this section on § 248(b)(1).

I. Findings of Fact: South Burlington

89. Within South Burlington, project improvements include:

a. Replacement of approximately 1.2 miles of GMP's existing 34.5 kV line located in the railroad right-of-way from the Shelburne town line to the existing GMP Queen City substation, with a single pole 115 kV transmission line. Just north of the Shelburne town line, VELCO's 115 kV Queen City to Williston line is currently co-located on tubular steel poles with GMP's 34.5 kV line for approximately 0.6 miles. For this portion of the route, the 34.5 kV line will be replaced with a 115 kV line, utilizing the existing structures.

b. Expansion of VELCO's Queen City substation as described in Finding 40, above

(as proposed under the Reroute Filing).

Dunn/Rowe pf. at 22; Dunn; supp. pf. at 13-15; Boers, supp. pf. at 7.

90. The project will not contravene any land conservation measures in the South Burlington plan. Dunn/Rowe pf. at 21-3; Rowe, et al., reb. at 17; VELCO Exhibits DR-18, RDGB-Reb-8.

91. The South Burlington plan contains the following provision:

> Future utility lines, including power as well as phone and cable TV, are encouraged to be underground. Only if there is appropriate screening and unusually severe conditions that make undergrounding prohibitively expensive, should waivers for the above ground utilities be considered. Future transmission lines should be confined to existing utility corridors, and placed underground if possible.

VELCO Exhibit DR-18.

Discussion (South Burlington city plan)

For two reasons, DPS contends that the above provision of the South Burlington city plan is inapposite under § 248(b)(1). First, the provision reasonably is not a "land conservation measure" within the meaning of § 248(b)(1) because it encourages burial regardless of whether the land under which the line is to be buried will be conserved or developed (e.g., buried under a road).

Second, this plan provision is not cognizable as "recommendation" of the planning commission within the meaning of § 248(b)(1) because it is a general part of the town plan and not specific recommendation of the South Burlington planning commission concerning the NRP issued pursuant to § 248(f). DPS will discuss this argument further below, at the conclusion of this section on § 248(b)(1).

In the alternative, the economic feasibility and appropriateness of burial is addressed below in the discussion, under § 248(b)(5), of the Quechee test and the aesthetic impacts of the NRP. Such discussion is incorporated by reference. DPS also notes that, within South Burlington, the NRP will utilize existing corridor, as sought by the South Burlington city plan.

J. Findings of Fact: Williston

92. Within Williston, project improvements include the substation expansions described in Findings 46 and 47, above. No new transmission lines will be installed. Dunn/Rowe, pf. at 23-25.

93. The project will not contravene any land conservation measures in the Williston plan. Dunn/Rowe pf. at 25; Rowe, et al., reb. at 17; VELCO Exhibits DR-19, RDGB-Reb-8.

94. The Williston town plan states:

> New electric and gas service lines that are installed by developers should be located underground. Additionally, the Town should encourage replacement of existing overhead lines with underground service. Particular priority should be given to areas of visual or historic importance, such as Williston Village and the commercial center surrounding Taft Corners. The Town should establish, as part of its Capital Budget and Program, a fund to pay a portion of the cost of converting overhead lines to underground.

VELCO Exhibit DR-19 at 90.

Discussion (Williston town plan)

For two reasons, DPS contends that the provision of the above provision of the Williston town plan is inapposite under § 248(b)(1). First, the provision reasonably is not a "land conservation measure" within the meaning of § 248(b)(1) because it encourages burial regardless of whether the land under which the line is to be buried will be conserved or developed (e.g., buried under a road).

Second, this plan provision is not cognizable as "recommendation" of the planning commission within the meaning of § 248(b)(1) because it is a general part of the town plan and not specific recommendation of the South Burlington planning commission concerning the NRP issued pursuant to § 248(f). DPS will discuss this argument further below, at the conclusion of this section on § 248(b)(1).

In the alternative, the NRP proposes no transmission lines for Williston and therefore the NRP does not contravene this plan provision.

K. Findings of Fact: Barre City and Town, Williamstown

95. Within the City of Barre, VELCO will reconductor approximately 0.2 miles of existing 115 kV transmission line, located in the western section of the city. The NRP does not include changes at the VELCO Barre City substation. The proposed NRP improvements are not inconsistent with the Barre city plan. Dunn/Rowe pf. at 26; Rowe, et al., reb. at 17; VELCO Exhibits DR-20, RDGB-Reb-8.

96. Within the Town of Barre, VELCO will reconductor approximately 2.8 miles of existing 115 kV transmission line, running from the Barre City line to the Williamstown line. The proposed NRP improvements are not inconsistent with the Barre town plan. Dunn/Rowe pf. at 26-7; Rowe, et al., reb. at 17; VELCO Exhibits DR-21, RDGB-Reb-8.

97. Within Williamstown, project improvements include:

a. Reconductoring approximately 2.7 miles of VELCO's existing 5.6 mile, 115 kV Barre-Granite transmission line, running from the Barre town line to the Granite substation.

b. Expansion of the Granite substation to accommodate, as described in Findings 42 through 45, above.

98. The proposed NRP improvements are not inconsistent with the Williamstown Town Plan. Dunn/Rowe pf. at 27; Rowe, et al., reb. at 17; VELCO Exhibits DR-22, RDGB-Reb-8.

L. Findings of Fact: Hartford

99. Within Hartford, NRP improvements include the addition of three 115 kV breakers, a capacitor bank, and associated equipment at VELCO's Hartford substation to improve system reliability. No line upgrades are planned. Dunn/Rowe pf. at 28.

100. The project will not contravene any land conservation measures in the Hartford plan. Dunn/Rowe pf. at 28-9; Rowe, et al., reb. at 17; VELCO Exhibits DR-22, RDGB-Reb-8.

101. The Hartford plan contains the following: "When designing new utility corridors, utilize existing utility corridors, where possible, and avoid undue adverse effect on the aesthetics or habitat of an area (using the "Quechee Test"), particularly as viewed from Routes 5, 14,

4, I-91, and I-89." VELCO Exhibit DR-23.

102. The NRP changes are proposed at an existing, remote substation, not visible from Route 5 or I-91. The substation is not visible from any of the surrounding roads or from any residences, which limits any potential adverse aesthetic impact. Dunn/Rowe pf. at 29.

Discussion (Hartford town plan)

While it is debatable whether the Hartford plan provision quoted in Finding 101, above constitutes a "land conservation measure" within the meaning of § 248(b)(1), the terms of the provision are met by the NRP.

M. Findings of Fact: Poultney

103. Within Poultney, NRP improvements are at the Blissville substation, and include a 115 kV/ 350 MVA PAR device with breaker and two line breakers to improve reliability by controlling power flow between the VELCO and Niagara Mohawk transmission systems. Dunn/Rowe pf. at 29.

104. The project will not contravene any land conservation measures in Poultney's plan. Dunn/Rowe pf. at 29-30; Rowe, et al., reb. at 17; VELCO Exhibits DR-24, RDGB-Reb-8.

N. Findings of Fact: ACRPC Resolutions

105. On March 12, 2003, the ACRPC passed a resolution which "requests that, as part of considering the request for a Certificate of Public Good for any electric transmission lines in Vermont, that the Public Service Board consider the impact of electric and magnetic fields on human health both in the design and in the siting of power lines." This resolution does not name the NRP specifically, but states that it was made in the context of "increases in population and demand for electricity in northwest Vermont [that] may increase the likelihood of expansion of existing electric facilities within the Addison Region."

106. On December 10, 2003, the ACRPC passed a resolution in which it requested that the Board "consider" the following:

    1. Pursuant to 30 V.S.A. § 248(b)(1), investigate whether the proposed project is reasonably sized to provide the necessary reliability without

overburdening the area. Specifically, is the proposed addition of the 345 kV corridor from Rutland to New Haven necessary or could reliability be achieved in a more cost effective or aesthetic manner by improving the existing 115 kV corridor with a second 115 kV line?

2. Pursuant to 30 V.S.A. § 248(b)(2), investigate whether locally based generation, efficiency-based options or other alternatives exist that could provide moderately priced power and provide jobs improving the region's economy.
3. Pursuant to 30 V.S.A. § 248(b)(4), ensure that the analysis of impacts uses an economic model that includes societal costs, including losses in property value resulting from proximity to the corridor and property tax consequences to municipalities stemming from that lost value; and also the negative economic impacts from degradation of the scenic corridor.
4. Pursuant to 30 V.S.A. § 248(b)(5), investigate and impose mitigation options on a town-by-town basis, applying similar solutions to similar population densities, viewsheds or other circumstances.
    a. Corridor modification. Provide for special mitigation in specified historic districts or areas of specific aesthetic significance, including consideration of under grounding lines, or moving the corridor or substation location to other areas exhibiting less impact.
    b. Stipulated Local Mitigation Plan. Requiring the applicant to commit to a localized aesthetic mitigation process for each municipality that requires stipulations to mutually agreed upon measures including:
        i. Plantings at road crossings within transmission right-of-way, town road right-of-way and, with consent, upon land of private individuals bordering the transmission corridor;
        ii. Reducing cutting of existing vegetation wherever feasible;
        iii. Locating construction staging areas and committing to mitigating measures surrounding construction prior to actual construction;
        iv. Consolidating lines, modifying pole designs, configurations or the type of poles used;
        v. Providing compensation to towns and individuals for economic losses caused by the transmission route;
        vi. Providing for other special mitigation measures, including under grounding in specified historic districts or areas of specific aesthetic significance.

O. Conclusions of Law: Orderly Development

The Department will discuss each of the following in turn: (1) the meaning of the orderly development and its general relationship to local requirements, (2) the relationship of the orderly

development criterion to § 248(f), and (3) application of the criterion to the project.

1. Meaning of § 248(b)(1)

The focus of Section 248(b)(1) is on preventing "undue" interference with the orderliness of development. A project can only fail this criterion if (1) it will *interfere* with orderly development and (2) it will do so *unduly*. The statute provides that the Board must find that the NRP:

> [W]ill not unduly interfere with the orderly development of the region with due consideration having been given to the recommendations of the municipal and regional planning commissions, the recommendations of the municipal legislative bodies, and the land conservation measures contained in the plan of any affected municipality.

30 V.S.A. § 248(b)(1).

In contrast to Act 250, this statute does not require conformance with the local and regional plans. Compare 10 V.S.A. § 6086(a)(10) with 30 V.S.A. § 248(b)(1). As the Vermont Supreme Court has ruled, this means that municipal enactments in this area are "advisory rather than controlling." City of South Burlington, 133 Vt. at 447.

Instead of requiring local and regional plan conformance, the General Assembly has specified that the Board should give "due consideration" to the recommendations of various local and regional entities and to the land conservation measures in the local plan.

The Department submits that the phrase "due consideration" should be interpreted in light of the principle expressed in § 248(a), the promotion of "the general good of the *state*." (Emphasis added.) That is to say, under this statute consideration should be given to local priorities and requirements, but these priorities and requirements are advisory and the needs of the state's electric delivery system and the solutions thereto are controlling.

The foregoing difference between Act 250's and Section 248's treatment of local or regional plans supports this interpretation. In Act 250, a proposed project, whatever need it serves (statewide, regional, or local) can be rejected if it fails to fulfill the requirements of a local or regional plan. 10 V.S.A. § 6086(a)(10). But in Section 248, the legislature chose to place

primacy on the needs of the state's electric delivery system and *not* to require that projects serving the general good of the state be denied if they fail to meet a local requirement.

Legislative history of Section 248 also supports this interpretation. During the 1987-88 legislative session, the General Assembly was considering the incorporation of, and ultimately did incorporate, many of the Act 250 criteria into Section 248. At that time, the General Assembly could have incorporated Act 250's requirement for conformance with local and regional plans, but chose not to do so, instead amending § 248(b)(1) to its current form. 30 V.S.A. § 248(b)(1), (5); 1987 Vt. Laws No. 273 § 1 (Adj. Sess.).

Further, during the course of that session, in taking testimony on pending utility bills, the Senate Finance Committee heard from several witnesses who testified against that adoption of a requirement for local and regional plan conformance from Act 250 would be inconsistent with § 248(b)(1) and would be problematic for projects of statewide significance. For example, on March 24, 1987 then-DPS Commissioner Gerald Tarrant discussed with the Senate Finance Committee the issue of Act 250's requirement for conformance with local and regional plans and stated: "I think the Public Service Board is going to comment on that and I don't disagree with that concern. I think when you deal with statewide issues you have to keep it on a statewide basis and not regionalize it or localize it to any great extent." Tr., Vt. Senate Finance Comm. at 2-3 (March 24, 1987). Later that same day, then-PSB General Counsel Thomas Wies stated to that same legislative committee:

> One of the criteria in Act 250 was that development must comply with local and regional plans. Whereas, the way the law reads now, in fact, the way this draft reads, it would continue to read under subsection (b)(1) that due consideration has been given to local and regional recommendations. Those two would seem to be inconsistent and I think the inconsistency would have to be reconciled. I would also agree that when you are talking about a project with statewide significance, you probably would not want to have the possibility of having held hostage to purely local concerns.

Id. at 13. Given the results of that legislative session, it appears that the General Assembly incorporated the concerns of these witnesses in crafting the adoption of Act 250 criteria into Section 248.

Accordingly, in applying § 248(b)(1), the Board's focus must be on the question of undue

interference with orderly development, and consideration, within the context of statewide electric system needs, must be given to "land conservation measures" within the applicable local plan and the "recommendations" of various local and regional bodies.

The meaning to be ascribed to "land conservation measures" is straightforward. Those measures are specific policies in the local plan designed to conserve land. Cf. Russell, 838 A.2d at 912 (Court will give effect to specific policies contained in a local plan and not to "nonregulatory abstraction").

The meaning of the term "recommendations" in § 248(b)(1) is addressed immediately below.

2. The Relationship of the Orderly Development Criterion to § 248(f)

The Department contends that the phrase "*the* recommendations of the municipal and regional planning commissions" under § 248(b)(1) (emphasis added) must be interpreted to refer to those recommendations developed under § 248(f), which requires § 248 applicants to provide plans to those commissions no later than 45 days prior to application to the Board and for those commissions to make any recommendations to the Board and applicant at least seven days prior to the filing of the application with the Board. Section 248(f) states:

> However, plans for the construction of such a facility within the state must be submitted by the petitioner to the municipal and regional planning commissions no less than 45 days prior to application for a certificate of public good under this section, unless the municipal and regional planning commissions shall waive such requirement. Such municipal or regional planning commission may hold a public hearing on the proposed plans. Such commissions shall make *recommendations*, if any, to the public service board and to the petitioner at least 7 days prior to filing of the petition with the public service board.

(Emphasis added.) The Department submits that the phrase "the recommendations" in § 248(b)(1) is intended to require Board consideration of the recommendations made under § 248(f), since it would make little sense for the General Assembly to establish the process under § 248(f) and have no provision for consideration by the Board of the recommendations made pursuant to that process. Moreover, § 248(f) is the only location besides § 248(b)(1) in which municipal and regional

recommendations are mentioned. Statutes that are *in pari materia* must be read together as part of a unified statutory scheme. State v. Harty, 147 Vt. 400, 402 (1986).

3. Application to NRP

Applying the foregoing principles to the NRP, it is clear that it is highly unlikely to interfere with orderly development or to do so unduly. As DPS witness Mertens states in his direct testimony on the issue, the majority of the proposed lines are in existing transmission corridors, and the substation work is largely at existing sites. Mertens, pf. at 23.[7] The development as it exists in the affected towns and regions has co-existed with transmission corridor for decades now, without evidence of undue interference.

The likelihood appears small that the NRP will interfere with the orderliness of development through causing additional development not in compliance with zoning bylaws. There is no evidence in the record that would support a conclusion that such interference will occur. Indeed, the zoning bylaws will continue to exist if the NRP is approved and regulate the occurrence of any such development. Moreover, when asked about whether the NRP would cause development not in compliance with zoning bylaws, Charlotte's town planner, Dean Bloch, testified in the negative. 3/3/04 tr. at 26 (Bloch) (Vol. 1). When asked the same question, Shelburne's town planner, Dean Pierce, stated that he had not analyzed the growth impacts of the NRP. 3/3/04 tr. at 80 (Pierce) (vol. 1). He did not assert there would be such an impact. Nor would such an impact – if any – in Shelburne or the other affected towns be reasonably likely to be undue given the presence of a transmission corridor presently in the towns.

The likelihood also appears small that the NRP will interfere with the orderliness of development through preventing other development in compliance with zoning bylaws. There is little evidence in the record that would support a conclusion that such interference will occur, and what evidence there is raises the issue of aesthetics. Specifically, when asked about this issue,

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[7]While the Reroute Filing proposes more new corridor and new substation than the Original Proposal, this statement of Mr. Mertens, made concerning the Original Proposal, still holds true for the Reroute Filing.

Charlotte town planner Bloch indicated only that, for Charlotte, the proposed transmission line could have a negative effect on the desirability of the Ferry Road area for the proposed village expansion. 3/3/04 tr. at 27-8 (Bloch) (Vol. 1). As there are already overhead transmission and distribution lines in this area (see Finding 267, below), the Department submits that the underlying issue is the incremental impact of the increased pole heights in the transmission line corridor, an issue that is one of aesthetic impact. Similarly, when asked about the issue of the NRP's preventing development in compliance with zoning bylaws, Shelburne planner Pierce cited the prevention of rural residential development, that might otherwise occur, due to the presence of taller poles, and conceded that appropriate aesthetic mitigation measures would reduce that concern. 3/3/04 tr. at 81-2 (Pierce) (vol. 1).

If the issue with respect to the NRP's interference with orderly development is one of aesthetic impacts, then the adequacy of proposed aesthetic mitigation, as analyzed through the Quechee test under the aesthetics criterion, is the appropriate way to address the issue. In other words, solving the aesthetic impacts through appropriate mitigation in compliance with the Quechee test should prevent any undue interference with orderly development due to aesthetic impacts. Therefore, if the Board makes an affirmative finding under the aesthetics criterion, then that will be sufficient to address the aesthetic issue as it pertains to the orderly development criterion.

Turning to the question of giving due consideration to the recommendations of the various local and regional entities, the most striking fact is that, with the possible exception of the ACRPC, the evidence discloses no such recommendations issued under § 248(f). As indicated in Finding 52, above, VELCO sent detailed notice describing the project plans to the affected towns and regions on March 13, 2003, yet the record is remarkably devoid of recommendations by those affected entities issued within the 38-day period provided under that section (or, for that matter, issued at all). General statements in town and regional plans do not constitute such recommendations: § 248(f) provides for a process whereby notice is given and recommendations are made with respect to a specific project. Further, § 248(b)(1) requires consideration of the land conservation measures in the local plan but does not provide for consideration of any other

measures in a local plan or any measures in the regional plan. The Department's position, therefore, is that while town and regional plans may be relevant to other criteria (e.g., provisions of them may qualify as written community standards under the Quechee test), their provisions do not constitute the recommendations contemplated by §§ 248(b)(1) and 248(f).

Leaving aside for the moment the ACRPC, the import of the absence of recommendations issued under § 248(f) for the other towns and regions is that there are no recommendations for the Board to consider under § 248(b)(1). As indicated above, the General Assembly has provided a special process under § 248(f) for affected towns and regions to provide recommendations to the Board and, if those recommendations are issued, gives them a special statutory status by requiring the Board to give them due consideration. Towns and regions may, under § 248(f), elect not to provide such recommendations, but if they make that election, then there is an absence of recommendations for the Board to consider under § 248(b)(1). The towns and regions cannot later in the proceeding make recommendations and claim for those recommendations the special statutory status afforded by the orderly development criterion.

The Department does not intend, by this argument, to claim that the absence of recommendations prevents a town or regional body from participating in a § 248 proceeding or providing other evidence relevant to the criteria of § 248(b). The Department's point is narrowly confined to the question of whether there are local and regional recommendations in the record that qualify for due consideration under § 248(b)(1), and with the exception of the ACRPC, the Department's argument is that there are none.

DPS will turn now to the ACRPC, which has formally issued two resolutions in this matter, one on March 12, 2003 and the other on December 10, 2003, and discuss each resolution in turn.

The March 12, 2003 resolution was issued one day prior to VELCO's issuance of detailed notice and therefore one can argue it does not qualify as a recommendation under § 248(f). However, the Department believes that the Board should deem the ACRPC's resolution of December 10, 2003 to be a recommendation under §§ 248(b)(1) and (f). While the resolution itself does not mention the phrase "Northwest Reliability Project," it is clearly addressed toward a likely proposal for expansion of transmission facilities in the Addison region to address increases

in population and electric demand in northwest Vermont. Further, it was issued just three months before the NRP was filed and therefore should, in that context, be considered specific to the project.

Giving due consideration to the ACRPC's March 2003 resolution, one sees that it asks the Board to consider, as part of this request for a CPG, the impact of EMF on human health both in the design and siting of the proposed transmission lines. As is plain from the evidence and arguments filed in this docket, this issue is otherwise before the Board which will consider it. In this regard, the Department incorporates its discussion below of the EMF issue under § 248(b)(5) (health and safety).

The Department proposes a different conclusion with respect to the ACRPC's resolution of December 10, 2003. Since it was issued approximately six months after the application was filed with the Board, it does not constitute a recommendation under §§ 248(b)(1) and (f). This conclusion means that the resolution does not affect whether the Board makes a positive finding under § 248(b)(1). It does not mean the ACRPC is prohibited from pursuing the issues listed in the resolution (which essentially asks the Board to consider various issues) as they are pertinent to the other criteria of § 248(b).[8]

The remaining issue under § 248(b)(1) is the due consideration of land conservation measures in the applicable local plans. As stated earlier, the statutory language specifically refers to "the land conservation measures contained in the plan of any affected municipality" and nowhere mentions the regional plan. Therefore, the regional plans do not have statutory standing under § 248(b)(1).

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[8]DPS notes that one of the issues in the ACRPC's resolution of December 10, 2003 involves providing compensation to towns and landowners for economic losses caused by the transmission route. As to losses to towns, the Department's position is that the Board may only provide such compensation where it finds an unreasonable burden on the towns under 10 V.S.A. §§ 6086(a)(6) (educational services) and (7) (local governmental services), and that the evidence is insufficient to support such a conclusion. As to compensation to individual property owners, that is an issue which will be addressed in future proceedings under 30 V.S.A. § 112 and such an award is not available under § 248, which addresses the general good of the state and does not address compensation to individuals. 30 V.S.A. § 248(a).

One point that stands out concerning the local plans at issue in this docket is that they contain few if any provisions that actually are land conservation measures. As detailed in the foregoing findings of fact and associated discussion (which is incorporated by reference), many of the provisions at issue do not focus on the conservation of land. Instead, they focus on various values such as protection of public health or minimizing impacts to aesthetics and scenic beauty. These values are important and potentially relevant to other criteria of § 248(b), but they are also different from land conservation. Take aesthetics and scenic beauty specifically. While one can argue that a goal of such provisions is to preserve the scenic qualities of an area, the provisions at issue typically seek to protect those qualities regardless of the development or conservation of the land which will benefit from the protection or the land which forms the view. For example, as set out in Finding 79.b., above, Charlotte's plan contains a policy encouraging all new or replacement utility lines to be underground, with particular emphasis on protecting "public roads with high scenic value by placing utility transmission lines underground." This policy does not distinguish among lands to be protected according to whether they are developed or conserved, and it explicitly attempts to protect developed lands such as public roads. The policy also does not distinguish among the views to be protected according to whether the land that forms the views itself can be developed or is to be conserved.

Another point that stands out concerning the plan provisions placed in issue is that, even where they do address land conservation, they lack the specificity that would enable calling them "measures." For example, Shelburne's objective to "conserve historic and cultural resources" identified on maps attached to its plan (quoted fully in Finding 88.h, above) addresses land conservation but, rather than stating specific measures to protect those resources, *calls* for the adoption of such measures. This non-specificity makes it difficult to qualify this provision as a "measure,"[9] a term which inherently connotes specificity. In this regard, the Department emphasizes, as it has above, the Vermont Supreme Court's clear message under Act 250 case law

[9]Also, as set out in Finding 88.h, above, neither Shelburne nor any other party has put the maps referred to in the Shelburne plan in evidence, thus adding an additional lack of specificity to the provision for the purposes of this docket.

to give effect only to specific policies in town plans. Russell, 838 A.2d at 913. If the Court, in the context of a statute that requires conformance with town plans, only applies those plan provisions that set out specific policies, then *a fortiori* the same principle of specificity should apply under a statute that requires "due consideration" of land conservation "measures" within such plans.

In the alternative to the foregoing application of § 248(b)(1) to the NRP, the Department contends that due consideration is given to the local and regional recommendations and plan provisions placed at issue through review of the project's compliance with the remaining criteria of § 248(b). As detailed in the foregoing findings of fact, except for the question of compensation to individual landowners (which DPS contends is not cognizable under § 248), the concerns explicated in the plan provisions and resolutions at issue relate to matters that are considered elsewhere under § 248(b). Examples include, but are not necessarily limited to, potential impacts on aesthetics, scenic beauty, historic sites, and public health. See, e.g., Findings 63 (Middlebury town plan - aesthetics, health hazards), 79.b (Charlotte town plan - aesthetics), and 88.h (Shelburne town plan - historic sites), above. Each of these matters is separately considered by the Board under § 248(b)(5). The Department incorporates by reference its findings and conclusions under § 248(b)(5) below and contends that such discussion supports an affirmative finding under § 248(b)(1).

V. **Need (§ 248(b)(2))**

107. The proposed project is required to meet the present and future demand for services which could not otherwise be provided in a more cost effective manner through energy conservation programs and measures and energy efficiency and load management measures. This finding is supported by findings __ through __, below.

A. Findings of Fact: Applicable Reliability Criteria

108. The Restated New England Power Pool Agreement (the "Restated NEPOOL Agreement" or 4 "RNA"), requires that VELCO's system meet the design and operating reliability

criteria of NEPOOL and the NPCC. These criteria require that the northeast interconnected bulk power supply system have sufficient transmission capacity to serve forecasted loads under representative contingencies identified in the criteria, and they apply after any one critical element has already been lost. VELCO Planning Panel, pf. at 3, 12.

109. Section 3.0 of NEPOOL Procedure No. 3 and Section 5.0 of the NPCC Document A-2, both state that system testing should be performed after any critical facility (not limited to generators or HVDC ties) has already been lost:

> The New England interconnected bulk power supply system shall be designed with sufficient transmission capacity to integrate all resources and serve area loads... after any critical generator, transmission circuit, transformer, phase angle regulating transformer, HVDC pole, series or shunt compensating device has already been lost, assuming that the area resources and power flows are adjusted between outages, using all appropriate reserve resources available in ten minutes and where applicable, any phase angle regulator control, and HVDC control.

VELCO Planning Panel, pf. at 12.

110. The second paragraph of section 3.0 of NEPOOL Procedure No. 3 states that testing needs to be performed with the system reasonably stressed in terms of applicable transfers, load and resources:

> With due allowance for generator maintenance and forced outages, design studies will assume power flow conditions with applicable transfers, load and resource conditions that reasonably stress the system. Transfers of power to and from another Area, as well as within New England, shall be considered in the design of inter-Area and intra-Area transmission facilities.

VELCO Planning Panel, pf. at 13.

111. NEPOOL is an association of entities that are engaged in the electric power business in New England. The NEPOOL members, referred to as Participants, include investor-owned utility systems, municipal and consumer-owned systems, joint marketing agencies, power marketers, load aggregators, generation owners and end users. Smith, pf. at 11

112. The NPCC is an organization whose mission is to promote the reliable and efficient

operation of the interconnected bulk power systems in northeastern North America through the establishment of criteria, coordination of system planning, design and operations, and assessment of compliance with such criteria. Smith, pf. at 11.

113. The essential concept embraced by NPCC standards involves designing and operating power systems in a manner that maintains stable and secure operation, after experiencing a contingency, even at a time when the system is already in a degraded state from the loss of a major transmission element or other major resource. This concept is often referred to as the "N - 2 criteria." This criteria, when observed over the last 40 years, has resulted in highly reliable operation of power systems within the NPCC region. Smith and Litkovitz, reb. at 3.

114. The NPCC membership agreement requires all NPCC members to design and operate their bulk power systems in full compliance with the NPCC Criteria Guides and Procedures. The NPCC's membership includes, though is not limited to, ISO-NE and all of the transmission owners in the northeast United States, including VELCO. The NPCC also requires each member to notify the Council of any changes that are planned that could impact compliance with the standards. Smith and Litkovitz, reb. at 3.

115. The NPCC, through its Reliability Compliance and Enforcement Program, measures standards' compliance and issues sanctions for any instance of non-compliance. Sanctions imposed by the NPCC are letters to appropriate parties. The parties that become addressees of a given letter depend on the level of non-compliance. As the level of non-compliance increases, the addressees increase in number and importance and range from functional group managers to State and Provincial regulatory agencies, to the NERC President, FERC, DOE, and State Governors and Legislatures. Smith and Litkovitz, reb. at 3.

116. The threat of non-compliance letters to various public officials appears to be effective. In recent years the number of non-compliance incidents have been reduced to zero. Starting in 2001, there have been zero operational and planning non-compliance incidents. Only a diminishing number of bulk power system protection maintenance incidents of non-

compliance persisted through 2002. In 2003, there were zero incidents of non-compliance. Smith and Litkovitz, reb. at 4.

117. The relevant NEPOOL standards are specified in NEPOOL Planning Procedure 3, Reliability Standards for the New England Power Pool.[10] These standards essentially embrace all of the NPCC and North American Electric Reliability Council (NERC) standards, but go one step further with regard to applicability. While NPCC standards are applied to bulk power systems, and address "inter Area" impacts (here the NPCC uses the term "Area" to refer to major areas such as New Brunswick, New England and New York), the NEPOOL standards apply to much smaller geographic areas, i.e., to loads within New England, such as the area of northwest Vermont. Smith and Litkovitz, reb. at 4.

Discussion

In Docket No. 6479, the Board relied on the regional reliability standards of NEPOOL and the NPCC in finding that the then-proposed Rutland Regional Reliability Project ("RRRP") meets § 248(b)(2) and in approving that project. Docket No. 6479, Order of Aug. 1, 2001 at 14.

118. NEPOOL, through its participants, supports the funding of projects required to bring member's transmission systems up to NEPOOL's standards. Smith and Litkovitz, reb. at 4.

119. Considering the potential, as detailed in Finding 122 below and following, for widespread severe electrical problems in northwestern part of the state, which represents approximately one half of Vermont's summer peak load, it is prudent for VELCO to design and operate its transmission system in full compliance with NEPOOL and NPCC criteria. These criteria essentially embody uniform standards of "good utility practice" with regard

[10]NEPOOL's Planning Procedure 3 states that "the interconnected bulk supply system shall be designed with sufficient transmission capacity to integrate all resources and serve area loads under conditions noted in sections 3.1 and 3.2" where Sections 3.1 and 3.2 define stability and steady state assessment contingency conditions. See VELCO Exhibit Planning - 9.

to reliability that are applied to the bulk power systems of New England and northeastern North America. It makes little sense to subject half of Vermont's electrical load (and possibly more) to reliability standards that are lower than those applied to other loads connected to the bulk electrical system of northeastern North America. Smith, pf. at 12.

120. DPS witnesses Smith and Litkovitz advocate using these standards based on the risk to the system if they are not used of a major disturbance or event causing widespread problems in Vermont. 7/30/04 tr. at 142-43 (Smith and Litkovitz) (vol. 2).

121. NEPOOL operating criteria embrace the same first contingency requirements as the design criteria. As a result, a whole range of measures will be taken in the event of a contingency ranging from dispatch of out-of-merit generation through voltage reduction and arming of load shedding schemes to avoid the possibility of substantial loss of load and possibly other events including thermal overloads, voltage collapse (blackouts), voltage sags, and generation tripping which in turn may have a cascading impact on the interconnected transmission system. Smith, pf. at 12.

B. Findings of Fact: Vermont Transmission System Deficiencies Addressed by the NRP

122. The VELCO transmission system depends on the availability of two important transmission elements. These elements are the PV20 circuit connected to the New York Power Authority's (NYPA's) substation at Plattsburgh and the Highgate converter connected to the Transenergie network of Quebec. These elements, by their very nature, are prone to experiencing long term outages. The Highgate converter is susceptible to a valve hall fire which could require six months or more to repair. During such an outage, the facility would be totally unavailable to the VELCO transmission system in northwestern Vermont. The PV20 circuit, providing VELCO with a 115 kV connection to NYPA's Plattsburgh substation, constitutes the strongest transmission tie to northwestern Vermont. This PV20 circuit contains both submarine and buried cable sections, which upon failure, will require several weeks or longer to reconfigure or repair. Should either of these vital transmission elements be unavailable, under a set of reasonable local generation assumptions and

summer load levels, a trip of any of several key circuits connected to NW Vermont will cause either severe voltage problems in the area or overloads of remaining circuits supplying the area. Smith pf. at 8.

123. The Vermont system does not meet the planning standards stated in Findings 108 above, and following, at load levels that have already been reached. System performance studies reveal that the unavailability of a critical resource in Vermont can cause severe thermal and voltage problems, leaving northwestern Vermont and other areas in and outside of Vermont exposed. VELCO Planning Panel at 3.

124. Should either of the long term outages described in Finding 122, above, happen, followed by any of a number of probable first contingencies at today's load levels and under a reasonable set of generation assumptions, widespread problems will occur due to the inability or "weakness" of the remaining transmission lines to support the load. The area of impact is likely to include all of northwest Vermont and possibly extend further into Vermont. The impacts caused by the contingency include severe sags and possible collapse of voltage. Severe sags down to roughly 85% and below will cause extensive tripping of "customer side" residential, commercial and industrial equipment. Voltage collapse will cause complete loss of load over the area impacted. Restoration from the voltage collapse situation is a complicated process requiring times of up to 24 hours before service can be fully restored to all customers. Smith, pf. at 9.

125. As used in Finding 124, above, the phrase "probable first contingencies" refers to any likely event that may occur in normal day-to-day operation of the transmission system and its interconnected equipment that alters the transmission path. An example would be a fault due to lightning causing an insulator flashover or possibly an insulator failure. Additional probable contingencies include failures of transformers, bus sections, and circuit breakers. In addition, the failure of a circuit breaker to clear a fault on a transmission element, requiring operation of a backup clearing system, is also considered to be a probable contingency. Smith, pf. at 10.

126. VELCO used reasonable generation assumptions in its transmission planning studies.

Regarding generation in northwestern Vermont, it is reasonable to assume in system studies, as VELCO did, the availability of the McNeil generating station in Burlington due to its design and proven reliability. However, it is not reasonable to assume (and VELCO did not assume) that the existing local combustion turbines or small diesel generating units will be available on a daily basis, at a high duty cycle, and for extended periods. It is reasonable, however, to assume, as VELCO did, that these units are available in reserve as a backup in the event that the McNeil unit trips. With regard to local hydroelectric units, during summer heavy load periods, this hydro power is often limited so it can not be counted upon as a substantial available resource. Smith, pf. at 8; VELCO Planning Panel, pf. at 18-20.

127. One assumption used by VELCO, that MVA loading remains constant, does not reflect characteristic behavior of the loads connected to the system, and therefore results in VELCO's overstating the likelihood of widespread blackouts. This assumption implies that, during a system event, all equipment remains connected to the system and that it draws constant real and reactive power as the voltage sags, based on the idea that voltage regulators on the distribution side of the system boost voltage so as to remain constant. In reality, regulators have limits; therefore voltage at the customer side eventually sags thereby reducing the power drain on the transmission system. In addition, at reduced voltages, some sensitive customer equipment including air conditioners, computers, motor contacters and manufacturing tools trip thus causing a further reduction in the loading of the transmission system. Substantial involuntary customer load shedding occurred during the blackout events of August 14, 2003 without widespread blackouts in Vermont. Smith, pf. at 10; DPS-Cross-5.

128. While VELCO's assessment of the likelihood of widespread blackouts may be overstated, the loss of customer side equipment cited above has widespread adverse impact on Vermont's residential, commercial and industrial customers and should be avoided. VELCO's use of constant MVA load models provides a good indication that substantial voltage problems will evolve to an extent that will cause widespread hardship. It is this

undesirable hardship of customer-side involuntary load shedding that in many cases will be arrested. Voltages will likely sag below values on the order of 85% of nominal on a widespread basis before most of the load relief occurs. Further, there also are situations, although less likely than anticipated by the analysis models in use by VELCO, where widespread voltage collapse could occur. Voltage collapse is an even more undesirable situation in that area load loss is total and restoration becomes a lengthy process requiring up to 24 hours. Smith, pf. at 11.

129. ISO-NE, the organization charged by FERC with ensuring the reliability of the New England regional transmission system, has indicated that the "Northwest Vermont area faces serious reliability problems due to weak interconnections with the bulk transmission system and a lack of generating resources and distributed resources in the region." Dunn, pf. at 6 (quotation in the testimony).

130. ISO-NE identifies the load pocket in the Northwest Vermont area as particularly at risk for service interruption due to the relative scarcity of local generation and weak interconnections with the New England transmission system. ISO-NE points out that the "situation is critical today, the condition is expected to worsen considerably with continued load growth." Mertens, pf. at 6 (quotation in the testimony).

131. The reinforcements required to meet today's loads include the PV20 PAR, the Blissville PAR, the 115 kV circuit from New Haven to the Queen City substation, reconductoring of the Granite to Barre 115 kV circuit, the Granite PAR, the first phase of Granite STATCOM (dynamic voltage support), and a 230/115 kV transformer plus fixed capacitors at Granite. This group of upgrades comprises over roughly 2/3 of the estimated project cost. Smith, pf. at 9.

132. If reliability is inadequate at today's load levels, it will only be worse at higher load levels, including the load level of up to 1200 MW which the NRP will reliably serve. Higher load levels will relate to more hours of exposure plus extension of the set of likely contingencies that can cause a severe problem. Smith, pf. at 8, 9.

133. At an 1100 MW load level, assuming that all of the upgrades referenced in Finding 131,

above, the Northern Loop Project approved in Docket No. 6792, and various New Hampshire upgrades described in the testimony (Y-138 line closed, Fitzwilliam 345/115 kV transformer, and associated southwest New Hampshire 115 kV line reconductoring) are in-service, the Vermont system will still experience voltage instability for loss of the PV-20 line, and approach voltage instability for any contingency involving the 340 line (Vermont Yankee to Coolidge 345 kV). Loss of PV-20 also will also cause the Barre to Berlin 115 kV line and the K-30 line (West Rutland to Middlebury 115 kV) to be at or near 100% of long-term thermal emergency ratings ("LTE"). If one of the assumed upgrades described above is not in-service (e.g., the Northern Loop Project or the New Hampshire projects) then these risks are significant at today's load levels. Planning Panel, pf. at 25; VELCO Exhibit Planning 6 at 12.

134. Assuming that the other elements of the NRP are in place and the Northern Loop Project and New Hampshire projects are in-service, the additional elements of the NRP needed to serve higher load levels up to 1200 MW include the additional 345 kV circuit from West Rutland to New Haven and additional dynamic voltage support at the Granite substation. Smith pf. at 9; Planning Panel, pf. at 24-5.

135. Potential elements of the NRP that could be deferred and still reliably serve load at some reduced levels are: (a) elimination of the second 75 MVAR unit of the Granite STATCOM resulting in a reduced capability to 1140 MW; and (b) elimination of the 345 kV line from West Rutland to New Haven resulting in a reduced capability to 1100 MW. The next stage of reduction would be the elimination of the first 75 MVAR unit of Granite STATCOM which would reduce the capability to today's load levels. All other elements of the NRP are required to serve today's load levels. Smith, pf. at 13-14.

136. VELCO's planning study assumes ideal conditions which allow for the deferral of the most expensive upgrades until last. However, this idealized sequence ignores real-world issues such as construction constraints, ROW acquisition delays, and the maintenance of system reliability during construction. These issues are addressed by VELCO in its overview of the actual proposed construction sequence, which places construction of the 345 kV line as

one of the first items in the project sequence. Smith and Litkovitz, reb. at 5; exhibit RJ-2.

137. A substantial Vermont transmission upgrade is needed to reliably serve Vermont load levels up to 1200 MW. Smith, pf. at 8.

138. ISO-NE has identified the NRP as one of two high priority projects that need to be completed. The NRP was first recommended in the RTEP2002 report, which means the problem was identified and elevated for scrutiny prior to 2001. ISO-NE has since recommended that all the components of the NRP be "completed as soon as practical" (RTEP03 Report 9/23/03). NEPOOL has endorsed this conclusion by approving $156 million of construction as eligible for PTF treatment. Mertens, pf. at 6.

139. Based on the construction schedule and load forecast in VELCO's testimony, a potential supply shortfall for NW Vermont (approximately 89 MW in 2005) may occur prior to construction of the NRP. Because NEPOOL historically applies the relevant reliability criterion to the ISO-NE region rather than just a "load pocket" such as NW Vermont, it is not clear that action to resolve this problem is needed to meet NEPOOL reliability criteria. Still, from a practical viewpoint, given the wrong circumstances – such as a fire at Highgate while the PV 20 PAR is unavailable, the shortfall could result in a disruption to the system. Mertens, pf. at 9-11.

140. Initial construction of the 345 kV line carries with it a reasonable likelihood of addressing contingencies in the near-term, including correcting the supply deficiency identified in VELCO's testimony; however, VELCO has not supplied additional information confirming this result. Smith and Litkovitz, reb. at 6; Mertens, reb. at 12.

141. Given the supply shortfall described previously, the PSB should require VELCO to:

    a. Evaluate whether temporary or permanent generation should be incorporated into the NRP plan given historical and expected market rules and consider:

        i. What is the availability of generation on short notice due to emergent conditions through 2007?

        ii. Given the regular shortages forecast, resolve how should shortfalls be effectively addressed.

iii. Identify various contract options and counter parties when evaluating generation proposals, including involving VGS and using generation as an economic development tool where appropriate.

b. In the event the cost/benefit study argues against acquiring generation, and given VELCO's obligation to be poised to respond to component losses within 30 minutes:

i. Heighten emergency preparedness planning (including running drills).

ii. Develop detailed contingency plans to assure an organized and effective fast response results in the event of the loss of Highgate or PV20 as contemplated in VELCO's system failure scenario.

iii. As detailed in ISO-NE's OP 4 procedures, consider the inclusion of local and ISO-NE load response programs in emergency preparedness.

Mertens, pf. at 11-12.

C. Findings of Fact: The NRP as the Appropriate Transmission Solution

1. Meeting the Need

142. Considering the detailed level of analysis performed, and the amount of independent review, the NRP design resulting from these studies will meet the need to reliably and efficiently serve load levels up to 1200 MW in the presence of an extended outage of any single element or source, including the Highgate converter or the PV20 circuit. VELCO has studied scenarios in detail, using industry standard analysis and modeling tools, and the best comprehensive system model available. This model includes a detailed model of projected Vermont loads based on information provided by the Department. In addition, it models interconnected systems of northeastern United States with various probable power transfer scenarios. With regard to contingency simulation, VELCO has simulated all possible likely first contingencies including line trips, breaker failures, stuck breakers and bus faults with the backdrop of an unavailability of the Highgate or PV20 sources. Included in this analysis is a critical load level analysis in which load levels are increased to a

point where the system fails due to a contingency and the appropriate element is added to remedy this failure. In addition, reliability and stability analyses performed by VELCO have been subject to two independent reviews: (a) detailed peer review and approval by the appropriate NEPOOL task forces comprised of industry experts and (b) an in-depth independent review by George Smith, a transmission planner with extensive experience retained by the DPS. Smith, pf. at 1-3, 12-13; Mertens, pf. at 5-7.

143. The NRP's ability to serve statewide load levels up to 1200 MW is subject to one qualification, which is that the 1200 MW level relates to an extended outage of the Highgate source. Should the PV20 source suffer an extended outage, the NRP configuration will reliably serve loads up to approximately 1165 MW. Comparing the outage scenarios of the two critical elements, the Highgate converter extended outage is likely to extend for 6 months or longer whereas the PV20 extended outage (complete unavailability of the circuit) is likely to extend for 2 to 3 weeks. Therefore, it is more reasonable to focus on the Highgate outage and the resulting ability of the NRP to serve 1200 MW of load. Smith, pf. at 13.

144. With the assumption that the projects referenced in Finding 133, above, are in place, the New Haven to West Rutland 345 kV line is needed at an 1,100 MW load level to increase the overall transmission system strength and also to directly address the issue of overloaded transmission lines going into northwest Vermont. Voltage instability concerns due to contingencies involving the 340 line do not resurface until approximately 1,140 MW, at which time the Granite dynamic var device would be expanded to provide further dynamic reactive control in the Vermont system. Planning Panel, pf. at 25.

145. The West Rutland to New Haven 345 kV line, if constructed early in the NRP construction sequence, also provides the following benefits:

    a. Among the elements comprising the NRP, the 345 kV line is by far the single most important element in strengthening the system feeding northwest Vermont. This is due to the impedance reduction that results by extending 345 kV some 35 miles further north from West Rutland towards northwest Vermont. This extension would

substantially enhance the ability of the transmission system to withstand contingencies that occur simultaneously with construction outages.

b. This line parallels the existing 115 kV path from West Rutland to New Haven thus enabling construction outages for line and substation work along this 115 kV path, including the work that would be required at the line's terminations at West Rutland and New Haven.

c. Should an extended outage of the Highgate Converter or the PV20 line or another major element occur in the near term, the added strength afforded by completing the 345 kV line early-on potentially would provide the ability to withstand most, if not all, normal contingencies, depending on the load level at the time.

Smith and Litkovitz, reb. at 5-6.

146. A 1200 MW peak load level is a reasonable design goal at this time for a transmission solution to Vermont's transmission system deficiencies. Vermont's summer peak in 2003 was 1002 MW; if one adds in approximately 30 MW for VELCO's Conn Valley load in order to keep the figure comparable to the other MW figures used in VELCO's planning studies, the figure becomes 1032 MW. Thus, using a 1200 MW parameter allows VELCO to design a transmission solution for the existing and forecasted deficiencies that provides a reasonable cushion for future load growth but is not so large as to preclude other future options (e.g., locally sited generation, new power supply contracts, additional DSM) or cause a significant risk that transmission capacity is overbuilt. DPS-Cross-6 (generally); 6/15/04 tr. at 53 (McIntyre) (vol. 2) (Vermont summer peak 2003); VELCO Technical Panel, reb. at 6 (Conn Valley load adjustment).

Discussion

Two points concerning this proposed finding deserve discussion. First, when state peak load level figures are mentioned in this docket, it is important to ensure that apples are compared to apples. VELCO's planning studies added roughly 30 to 35 MW to the DPS load forecast to account for VELCO's Conn Valley load. VELCO Technical Panel, reb. at 6 (Conn Valley load adjustment). This assumption necessarily means that, under VELCO's planning studies, when the

NRP is being judged to meet a 1200 MW load level, that level also includes the Conn Valley load.

Second, when Vermont's 2003 summer peak is adjusted by the Conn Valley load, the result is uncomfortably close to the 1100 MW load level associated with the 345 kV line (assuming other system improvements are in place as stated above). Vermont's summer peak demand grew by 84 MW in the three years ending in 2002. VELCO Planning Panel, pf. at 15.

2. Least-Cost Transmission Approach: Design and Cost of NRP

147. The NRP as proposed by VELCO represents a least cost transmission design approach in solving the identified reliability problems. The basic substation and line configurations proposed by VELCO meet basic reliability standards without "over-design" or "gold plating." These designs are consistent with those used in the rest of New England to avoid multiple outages due to single equipment failures such as "stuck breakers" or bus faults. This level of contingency design is consistent with practices across northeastern United States and within the NPCC coordinating region. There is an exception where VELCO's design as originally proposed falls below generally accepted standards, and this exception, regarding the 115 kV capacitor and STATCOM connections at Granite, is discussed below in Findings 153, 217 and 218. In addition, VELCO's subsequent indication that it prefers to use synchronous condensers is cause for concern. Smith pf. at 14, design details pf. at 2.

Discussion

Mr. Smith is an expert electric transmission system planner and therefore qualified to testify on whether a particular transmission option is least-cost among transmission options. Smith, pf. at 1. DPS objected to questions of Messrs. Smith and Litkovitz during the rebuttal hearings that pertained to a least-cost comparison of a transmission option to non-transmission options such as DSM or DG on the grounds that these other alternatives are beyond their expertise. 7/30/04 tr. at 74 (Adler) (vol. 2).

148. None of VELCO's cost estimates for the NRP appears to be too high. However, in two respects they appear to be too low: (a) the 345 kV line from West Rutland to New Haven,

and (b) the estimates for the Granite substation additions. Smith, pf. at 15.

149. VELCO's estimated cost for the 35.5 mile line section of 345 kV line from West Rutland to New Haven (refer to VELCO's direct testimony, Exhibit TD-21) is approximately $13.8 million. The per mile cost is therefore on the order of $390,000 per mile. A better estimate would be more on the order of $550,000 to $650,000 per mile. This may constitute an adder on the order of $7.5 million to the estimated cost of the NRP. Smith, pf. at 16-17.

150. The estimates for the Granite substation, under the Original Proposal, are too low for three reasons: (a) there is inadequate footprint allocation for both stages of a STATCOM; (b) the cost estimate for a STATCOM appears too low; and (c) the configuration proposed by VELCO for connecting the reactive support to the 115 kV system is inadequate. Smith, pf. at 15.

151. With regard to the footprint allocation at Granite:

a. A review of VELCO's drawing 213-6000 D (refer to VELCO Exhibit DJB-33) indicates that approximately 22,400 sq. ft. is allocated for a +/- 150 MVAR STATCOM device. This area is roughly the same footprint that is required for the existing +/- 75 MVAR STATCOM at Essex (refer to VELCO Exhibit DJB-26), where minimizing the footprint was a major concern. VELCO's proposed layout for Granite, assuming installation of STATCOM technology, is inadequate. Smith, pf. at 15; Smith and Litkovitz, surreb. at 6-7.

b. Minimizing the footprint at Granite may limit the selection of available technologies (STATCOM, SVC or synchronous condensers) and/or configurations (modularity, redundancy, component sizing) which could further impact cost in a competitive bidding environment as well as limit performance, reliability and maintainability. The footprint allocation should allow for potential use of any applicable technologies that meet the functional requirements. Smith, pf. at 15; Smith and Litkovitz, surreb. at 7.

c. If the Granite substation needs to expand further than currently proposed, a potential

option exists to expand to the northwest, potentially including the property of Gelinas, who actually resides approximately a half mile away. Expanding in this direction does not appear to present insurmountable construction obstacles and would reduce the impact of the expansion on nearby property owners, including particularly Dexter and Gagnon, who live close to the substation and in whose direction the substation is presently proposed to expand and would otherwise be likely to further expand. Dexter, reb. at 1; 7/30/04 tr. at 78-9 (Dexter) (vol. 1).

152. With regard to the cost estimate for a Granite STATCOM, the "turnkey" cost estimate provided by VELCO in discovery is $15 million for a +/-150 MVAR device. A better rough estimate for the "turnkey cost" of this size device is on the order of $27 million, based on actual experience with the Essex STATCOM project. This estimate assumes use of solid state flexible alternating current transmission system (FACTS) technology employing power electronics; either STATCOM or static var compensator (SVC) type devices using the same footprint as the existing Essex STATCOM. VELCO's estimate is $100/kVAR ($15M for 150 MVAR), while the experience-based estimate is $180/kVAR ($27M for 150 MVAR). ISO-NE and the Connecticut utilities recently estimated the cost of 900 MVAR of STATCOM devices at $250M ($278/kVAR) for the proposed southwest Connecticut project. Smith, pf. at 15-16; Smith and Litkovitz, surreb. at 7.

153. With regard to the configuration for connecting reactive support to the 115 kV system, the original configuration, as proposed by VELCO, was inadequate from a reliability and maintainability perspective in that 225 MVARs were to be connected to a single bus and that +/-150 MVARs of STATCOM were to be connected by a single breaker. Smith, pf. at 16.

a. In response to concerns raised by DPS, VELCO revised the original configuration to relocate 2 capacitor banks to spare positions on the 115 kV bus and to connect each of the 75 MVAR components of the FACTS device at separate bus positions. Dunn, reb. at 14; VELCO Exhibit TD Reb-6.

b. Use of a 115 kV underground connection at Granite should be considered only as a

last resort, due to cost and reliability concerns. Smith and Litkovitz, surreb. at 7.

Discussion

The implications of the originally proposed configuration for connecting reactive support to the 115 kV system are discussed in further detail below under the reliability and stability criterion, § 248(b)(3). The Board should order VELCO not to install such originally proposed configuration and, prior to construction, to comply with Finding 153.b, above and to explore the feasibility of constructing any further expansion (beyond that currently proposed) to the northwest rather than toward Dexter and Gagnon.

154. VELCO's indication, in its design details testimony filed September 14, 2004, that it prefers installation of synchronous condensers is cause for concern since there do not appear to be any permanent installations of synchronous condensers at transmission stations 115 kV and above in the northeast and because it is not clear that it offers the least-cost solution with regard to life cycle costs. Smith, design details pf. at 2.

Discussion

The issue of VELCO's stated preference for synchronous condensers at Granite substation raises serious concerns that are discussed further below in Findings 219 through 221, below. DPS incorporates by reference those findings and the discussion following them below, under the stability and reliability criterion, § 248(b)(3). DPS contends that, for the Granite design to comply with § 248(b)(2), VELCO must be required as a CPG condition to select the least-cost option for this technology in accordance with the Department's recommendations stated in Findings 220 and 221, below.

3. Least-Cost Transmission Approach: Transmission Alternatives

155. Principal transmission alternatives to the whole NRP considered and analyzed by VELCO include: (a) upgrading the PV20 circuit to 230 kV; (b) making the Highgate Converter redundant; and (c) using 115 kV for the added new circuit from West Rutland to New Haven. Smith, pf. at 17; VELCO Exhibit Planning 8.

156. The alternatives of upgrading the PV20 circuit to 230 kV and making the Highgate converter redundant would provide coverage for extended outages of the Highgate converter. However, when one considers extended outages of the PV20 circuit, neither of these alternatives provide the desired reliability coverage required. Upgrading the PV20 to 230 kV only strengthens this source and provides no backup for its extended outage. To do this, the PV20's existing 115 kV circuit from Plattsburgh would have to be retained. Retaining that circuit would present some substantial challenges regarding cost, aesthetic and environmental impacts. Making the Highgate Converter redundant also does not provide backup for extended outages of the PV20. Smith, pf. at 17-18.

157. The alternative of using 115 kV for the added new circuit from West Rutland New Haven would avoid constructing 345 kV facilities, but would require the same other upgrades as the NRP, and would require a 16-mile 115 kV line from Granite to Middlesex, which primarily mitigates a voltage instability concern caused by loss of any of the line sections from Granite to Middlesex. This alternative is roughly $3 million more than the NRP and results in potential environmental concerns due to an additional 16-mile line in the Granite-Essex corridor. This alternative also would fail to provide a platform for future upgrades to achieve 1400 or 1500 MW system capabilities should they be needed. VELCO Exhibit Planning-8; Smith, pf. at 18.

158. In addition to alternatives considered by VELCO, DPS witness George Smith considered the possibility of using 230 kV instead of 345 kV line in the West Rutland to New Haven corridor. Under such an alternative, one could convert the existing 115 kV H frame to 230 kV by modifying the insulation system and possibly the structures and adding a separate set of structures, from West Rutland to New Haven, with a 115 kV single pole delta configuration next to the 230 kV. Smith, pf. at 29. The 230 kV likely would work electrically but is not the least-cost transmission approach. Smith, pf. at 29; 7/30/04 tr. at 73 (Smith) (vol. 2). Several reasons support this conclusion:

    a. If 230 kV is utilized, additional system reinforcements beyond those proposed for the NRP likely would be required to achieve a 1200 MW state-wide load serving

capability. In this regard, the 230 kV option would require added elements of some type, probably a 16 mile line from Granite to Middlesex. The cost of substituting 230 kV for 345 kV within the West Rutland to New Haven corridor is roughly the same, and thus with the added cost of additional elements would appear unlikely to be the least-cost transmission approach. Smith, pf. at 29; Smith and Litkovitz, reb. at 7; 7/30/04 tr. at 72-73 (Smith) (vol. 2).

Discussion

The Department contends not only that Mr. Smith's opinion is correct that the 230 kV option is not the least-cost *transmission* approach, but also contends as a matter of legal argument that the basis for the opinion self-evidently undermines the notion, apparently advanced by New Haven, that there is somehow a need to compare this option to non-transmission alternatives. That is to say, if the 230 kV option would be more costly than the 345 kV option, then the likelihood is that the 230 kV option would be more costly in comparison to non-transmission alternatives than would the 345 kV option.

b. Utilizing 230 kV would require additional voltage transformation, from 345 kV to 230 kV, at the West Rutland substation. Upgrading the West Rutland substation to accommodate 230 kV would be costly, especially given existing geographic and space constraints at this site. Smith, pf. at 29; Smith and Litkovitz, reb. at 7.

c. A 230 kV circuit would have higher impedance, and therefore higher losses, than a 345 kV circuit. In this regard, the proposed construction at 345 kV utilizes bundled (two conductors per phase) 954 kcmil ACSR. A 230 kV configuration that would utilize this corridor's existing 115 kV structures would likely be limited to single 954 ACSR conductor per phase due to the mechanical limitations of these structures. The resultant losses on the 230 kV circuit would be over four times as great as the losses of a 345 kV circuit. Smith and Litkovitz, reb. at 7-8.

d. Use of 230 kV would limit the load serving capability of future system expansions, potentially requiring that the 230 kV facilities be torn down in order to construct new elements. Smith, pf. at 29; Smith and Litkovitz, reb. at 8; 3/5/04 tr. at 147-48,

254 (Smith).

e. The lower impedance of 345 kV provides substantially more strength to northwest Vermont than could be obtained from a 230 kV circuit. This added system strength would enhance voltage stability and minimize the impact of contingencies. As a result, the severity of voltage dips and sags experienced by customers following contingencies would be diminished. The added system strength would also lower the likelihood of contingencies leading to generator trips and the momentary loss of the Essex STATCOM and the Highgate Converter. The added stability provided to generation, the Essex STATCOM, and the Highgate Converter would lower the likelihood of multiple contingencies that could have severe area-wide impacts. Smith and Litkovitz, reb. at 8.

f. The lower impedance of a 345 kV circuit would benefit loads in western and central Vermont. Specifically, an important contingency on the VELCO system is the loss of the 345 kV source from the south; particularly the loss of the 345 kV line from Vermont Yankee to Coolidge. In the event of this contingency, the lower impedance afforded by the 345 kV circuit from West Rutland to New Haven would provide a stronger connection to northern sources thereby benefitting loads in the Rutland and Middlebury areas. Smith and Litkovitz, reb. at 8.

159. Mr. Smith also considered an alternative under which the new 115 kV circuit required for reliability is routed through the existing VELCO corridor from New Haven to Queen City via VELCO's Williston substation. In this scenario, the existing 34.5 kV circuit would be rebuilt using larger conductor to more reliably serve the four distribution substations in the New Haven to Queen City corridor. Smith pf. at 19. As shown on Exhibit DPS-GS&WSL-1, the net cost of the VELCO 115 kV proposal under the Reroute Filing is approximately $20.3 million and of this alternative is roughly $15.9 million. Exhibit DPS-GS&WSL-1 at 1.[11] However, this alternative is not the best choice for several reasons:

[11]An earlier version of this exhibit, which compares costs of alternatives respect the 115
(continued...)

a. VELCO's 115 kV proposal efficiently solves multiple electrical problems with one 115 kV circuit replacing the existing 46 kV circuit from New Haven to Vergennes and the 34.5 kV circuit from Vergennes to Queen City. This 115 kV addition benefits the VELCO system by extending the needed "fifth transmission path" from the termination of the 34.5 kV line at New Haven, north to the constrained northwest Vermont area. Smith, pf. at 20.

Discussion

A significant drawback of installing the 115 kV line in the New Haven to Williston corridor today is that it carries the potential of leading to a situation in which three transmission paths serve northern Vermont from the south: two along the New Haven to Williston corridor and one from New Haven to Queen City.

b. The alternative would provide inferior reliability to GMP and BED. Exhibit DPS-GS&WSL-1 at 1, 2; Exhibit DPS-Cross-11.

c. VELCO's proposed 115 kV circuit uses single pole construction to minimize impact and corridor requirements. Smith pf. at 20.

d. Reconductoring the 34.5 kV line under this scenario and present NESC requirements would require poles approximately 50 to 60 feet in height. These poles would be more similar to the 115 kV proposal than the existing 35-foot poles on the New Haven to Queen City corridor. Exhibit DPS-Cross-11.

e. Because of the reconductoring, the alternative likely would involve the same ROW/easement cost, condemnation, and litigation issues as VELCO's 115 kV proposal. Exhibit DPS-GS&WSL-1 at 4.

Discussion

One reason to consider the New Haven to Williston to Queen City alternative was the aesthetic and other issues raised regarding the proposed 115 kV New Haven to Queen City line.

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[11](...continued)
kV New Haven to Queen City line, was submitted as Exhibit DPS-Cross-10. The version cited in the above finding is the better version to use because it includes the Reroute Filing.

Smith, pf. at 18. However, with the reconductoring of the existing line associated with that corridor, one sees that those issues do not disappear for the corridor: The reconductoring would result in taller poles and, potentially, litigation, easement costs and the need for condemnation proceedings. Further, a second set of poles in the New Haven to Williston corridor would affect additional communities.

f. Under the VELCO 115 kV proposal, the existing distribution substations along this corridor are modified to "step down" voltage from 115 kV to the distribution level. This enables all loads on the corridor to be fed for loss of supply at either end, a situation that can not be achieved with the present 34.5 kV configuration at today's load levels. It also reduces transmission losses whose costs are presently born by GMP and CVPS customers. Smith, pf. at 20.

g. Should another transmission line be required in the future to extend the 345 kV further north to join the 230 kV circuit from either Plattsburgh and/or Granite, the 115 kV circuit in the New Haven to Williston corridor could be removed and replaced by an EHV circuit resulting in only one transmission circuit between New Haven and Williston in the New Haven to Williston corridor. This is due to the fact that the existing 115 kV circuit could be removed and replaced with the 345 kV circuit. Smith pf. at 20.

160. Good transmission planning should consider the future and see if the pieces that are being placed to meet some near-term or intermediate need will then be useful beyond that point with other upgrades as opposed to planning a bridge to nowhere that would have to be torn down and replaced by a completely different element. 3/5/04 tr. at 147-48 (Smith).

Discussion

Contrary to arguments DPS expects some other parties to make, least-cost planning includes the common-sense notion of considering whether the design of a project will create additional costs, should future upgrades be needed, that could have been avoided through the design of the current project. The Board has on numerous occasions approved projects under §

248 that are sized in such a way as to address potential future needs, as evidenced by the following decisions (among others): (a) In re Petition of VELCO, Docket No. 5778, Order of March 12, 1996 at 5-7 (approved the underground segment of the PV20 circuit to be constructed at 230 kV, but operated at 115 kV, against the event that someday the entire PV20 circuit would need to be converted to 230 kV); (b) In re Petition of VELCO, Order of Aug. 8, 1984 at 51 (approval of a 345 kV transmission facility in Highgate and Franklin to be operated at 120 kV); and (c) In re Petition of VELCO, Order of Sep. 10, 1979 at 10 (approval of 345 kV line from Coolidge to West Rutland) and In re Petition of VELCO, Order of April 26, 1982 at 1 (stating that the 345 kV Coolidge to West Rutland line was to be operated initially at 115 kV).

D. Findings of Fact: NRP in Comparison to Non-Transmission Alternatives

1. Timely Delivery of the Needed Resources

161. With respect to the potentially deferrable portions of the NRP (the 345 kV line and the second STATCOM at Granite), under the load forecast used by VELCO, the 345 kV line will need to be in place to meet future load growth-related need[12] as early as 2006 and the second Granite STATCOM as early as 2008. VELCO Planning Panel, pf. at 17; see Finding 135, above, for load levels associated with these elements and supporting citation.

162. The load forecast used by VELCO for the NRP was the DPS statewide load forecast of August 5, 2002, adjusted by adding the Conn Valley contribution to VELCO's system peak and subtracting estimated load reductions from continuation of existing EVT and BED DSM programs. Conn Valley is electrically tied to VELCO's system and must be accounted for in VELCO's planning. VELCO Planning Panel, pf. at 17; VELCO Technical Panel, reb. at 6.

163. The load forecast used by VELCO, with the adjustments it made, is and remains reasonable for use in this docket for several reasons:

a. The load forecast was the product of an end use model, a sound load forecasting

[12]The 345 kV line also meets needs related to project construction and, potentially, resolve a short-term reliability issue as stated in Findings 136, 140 and 145, above.

methodology, which builds the peak "from the ground up" by looking at each sector of the economy (residential, commercial, industrial), each end use in each of those sectors, the equipment that is used in each of those end uses, the efficiency of that equipment, and the forecasted number of devices and pattern of usage, and then puts these factors together and comes up with total consumption. 6/15/04 tr. at 64-5 (McIntyre) (vol. 2); Exhibit CLF-35 at 13, 34 (McIntyre deposition – quoted text may be found on page 34.)

b. With respect to summer peak 2003, the load forecast was within a half percent of accuracy even though that summer was cooler than average and economic growth was slower in 2002 and 2003 than predicted when the forecast was completed. This result is well within a reasonable margin of error, for a well-done end use forecast, of plus or minus three percent. 6/15/04 tr. at 52, 54, 56, 58 (McIntyre) (vol. 2).

c. The 2003 CELT reference case, included in the NEPOOL April 2003 CELT forecast, posits reaching an 1100 MW load level in Vermont by 2005 and a 1200 MW load level by 2010. The 2004 CELT reference case projects somewhat slower growth, but still projects Vermont's reaching the 1100 MW load level in 2005 or 2006, with 1200 MW reached by 2012 or 2013. Montalvo, reb. at 7.

d. The most recent economic projections for Vermont in the record (May 2004) show an upward revision in forecasted growth rates over forecasts from 2003. Significantly higher growth for Vermont real gross state product are predicted over what occurred in 2003. Although risks to this improved outlook remain, the outlook is a reflection of improvement in the U.S. economy, a strong 2004 construction season in Vermont, and stabilization in the State's previously hard-hit industrial sector. 6/15/04 tr. at 61 (McIntyre) (vol. 2); DPS-Cross-117 at 1, 7 (table 2).

e. For a project such as the NRP, the lead time needed for approval, equipment procurement and construction is measured in terms of multiple years. Planning

Panel, pf. at 25.

Discussion

The Department respectfully submits that, as Mr. McIntyre acknowledged, he and the DPS did a "good job" on the forecast at the time it was completed in 2002. 6/15/04 tr. at 54 (vol. 2). The Department also submits that, given the lead time necessary for a project of this magnitude, necessitating years of planning, review, procurement and approval, that such forecast should continue to be used unless there is a compelling reason to re-do the forecast – not just, again to use Mr. McIntyre's words, a few "pink flags" (6/15/04 tr. at 10, vol. 2). Any lower standard would severely reduce the chances that any project to solve a reliability problem (whether transmission or not) would get beyond the forecasting stage, since uncertainties regarding a forecast can always be raised and economic growth rarely behaves exactly as expected. The Department further submits that the record to date suggests that the forecast remains sound and that, if there is any tendency to overpredict, the result will be a delay in reaching the 1100 MW load level that is well within the lead time necessary to plan, review and implement a project to address that load level. For example, even if an 1100 MW load level is not reached until sometime between summer 2007 and summer 2009 (a point which DPS does not concede), the amount of time between now and reaching that level would be only 2.5 to 4.5 years, which is not much time to develop and implement *any* project of the necessary magnitude.

164. DSM is unlikely to be an effective solution within the necessary time frame to address Vermont's need to increase system capacity. Mertens, pf. at 8; Welch, pf. at 5. DSM entails a significant risk that it would not deliver the peak savings and reliability needed. Mertens, pf. at 5.

165. VELCO's ARC 5 includes the acquisition of approximately 74 MW of DSM-based peak demand savings, in combination with 120 MW of CTs. VELCO Exhibit MDM-2 at 83. The concept of acquiring a level of 74 MW of peak demand savings through DSM as soon as summer 2006, or even within any of the time frames asserted in this docket for potentially reaching an 1,100 MW load level, is difficult to sustain:

a. To achieve summer capacity savings greater than Burlington Electric Department's current summer load (65.4 MW as of July 3, 2002) from efficiency programs within the needed time period is unprecedented. Such a level of sustained aggressive targeted DSM has not been implemented elsewhere. Welch, pf. at 6.

b. CLF, which asserts through Paul Chernick a claim that the need date for the 345 kV line "is more likely 2010, or 2011"[13] was unable, when asked in 2003 during discovery, to identify a single energy efficiency program or set of energy efficiency programs that achieved 73 MW or more of transmission capacity savings within a period of eight years or less. Chernick, pf. at 15; DPS-Cross-57.

Discussion

The Department discusses ARC 5 as an example of the magnitude of DSM savings required. One could construct an example in which *more* energy efficiency is sought, and in fact VELCO has been criticized by some for not doing so. Yet an alternative scenario involving more DSM will mean it is harder to obtain the needed peak savings in the necessary time frame, not easier. The provision of reliable electric service to Vermont ratepayers should not be gambled on a set of DSM programs the magnitude of which is without precedent.

166. Once acquired, the certainty that efficiency and conservation resources are available on demand is lower than traditional resources. Mertens, pf. at 9.

167. It is unlikely that additional load reduction strategies of the magnitude required to replace the NRP could be obtained. Welch, pf. at 6. Vermont currently utilizes numerous interruptible contracts already to reduce the summer peak. Welch, pf. at 7. While progress had been over the last four years toward increasing Vermont's participation in ISO-NE DR

[13]Mr. Chernick's statement, from page 15 of his testimony, claims to be based on the NEPOOL April 2003 CELT forecast but is inconsistent with other discussion of that forecast in his own testimony and exhibits of CLF. He states on page 13, and CLF puts forward in Exhibit CLF-PLC 2 at 14 and Exhibit CLF-32, a claim that the NEPOOL 2003 CELT forecast posits Vermont's reaching a summer peak demand of 1090 MW in 2008 and 1110 MW in 2009. If true, this would place reaching an 1100 MW load level well before 2010 or 2011.

programs, the result to date is approximately 13.1 MW in 2004. The timing and amount of DR available in Vermont is not likely to close Vermont's forecasted transmission supply gap. Mertens, reb. at 9.

168. Given the magnitude of the apparent immediate transmission capacity need, DSM is not a robust option for deferring or avoiding the NRP or any of its major components. Welch, pf. at 8.

169. Generation is unlikely to be an effective solution within the necessary time frame to address Vermont's need to increase system capacity. Mertens, pf. at 8.

170. Substantial amounts of generation resources, either standing alone or in combination with other options such as DSM, would be needed, as evidenced by the alternatives to which VELCO compared the NRP: ARC 1 (180 MW of CTs and 15 MW of DG), ARC 2 (90 MW combined-cycle and 120 MW of CTs), ARC 3 (150 MW combined-cycle and 120 MW of CTs), ARC 4 (200 MW of combined cycle and 120 MW of CTs), ARC 5 (120 MW of CTs plus DSM), and ARC 6 (150 MW of CTs plus DR and DSM). VELCO Exhibit MDM-2 at 3-4; Montalvo, reb. at 14.

171. Generation alternatives would be difficult to site and permit. Mertens, pf. at 5. There are few ideal sites for generation; all require extensive improvements. VELCO Exhibit MDM-2 at 9. Further, effective implementation would require private investors and entrepreneurs to be attracted and satisfied that a viable business case exists for them. Mertens, pf. at 8.

2. Cost Comparison

172. The NRP has been examined under two different economic analyses: (a) the deterministic approach used by LaCapra Associates and (b) the probabilistic approach used by Jonathan Lesser of the DPS. VELCO Exhibit MDM-2; Lesser, pf. at 13, 35.

(a) LaCapra Analysis

173. The LaCapra analysis begins, in essence, by laying out an expected future: It characterizes

northwest Vermont's resource needs based in significant part on an analysis of expected peak demands. It also assesses the characteristics of the existing supply and demand-side resources, and the capabilities of the existing transmission system. VELCO Exhibit MDM-2 at 14.

174. After pre-screening generation options on the basis of whether they are technically or economically feasible, the LaCapra analysis proceeds with a detailed assessment of the economics of those supply resources (both utility scale and distributed generation) that remained after pre-screening to determine which supply technologies will form the component parts of proposed alternative resource configurations. This information is combined with DSM savings potential and program cost data to develop a set of alternative resource configurations to test against the NRP. VELCO Exhibit MDM-2 at 14-15.

175. For each ARC and for the NRP, the following costs were compared on a net present value basis (2005-2016, with 2005 present value), (1) the option's carrying costs, (2) the net variable costs to serve Vermont's load, and (3) net societal costs. Each of these costs is calculated and summed under base DSM case load conditions. The ARC with the lowest total societal cost and the NRP are then tested and compared under a series of stress cases to evaluate their relative performance under other potential scenarios. VELCO Exhibit MDM-2 at 15.

176. The LaCapra analysis is based in part on an analysis of DSM potential resources performed by Optimal Energy, Inc. VELCO Exhibit MDM-2 at 45. The OEI analysis is reasonable and adequate for its task. Welch, pf. at 5.

177. OEI's analysis reflects an average cost per saved summer coincident peak kW of about $3,500/kW for efficiency resources beyond what is expected to be provided by EVT and BED from current activities. For the inner and metro zone only, the cost is estimated at $3,352/kW. Comparable EVT and BED existing activities are expected to cost $2,227/kW and $1,855/kW respectively over the 10 year planning horizon. Current EVT and BED activities are less costly because they focus primarily on the so-called "lost

opportunity" markets. That is, the existing programs are designed to acquire efficiency resources at the time of new construction, equipment purchase, and other market activities. It is less expensive to purchase efficiency at the time of new construction or equipment purchase than to increase the efficiency of existing buildings or equipment. Not only are the measure costs higher, but it is generally more difficult to persuade a consumer to change out existing working equipment for a more efficient option. This results in additional non-measure costs that increase the overall cost of acquiring the efficiency resource. Welch, pf. at 3.

178. Because the implementation of options, including that which may appear best on a *proforma* basis, carry uncertainties, the LaCapra analysis also addresses non-economic variables which affect whether a particular option is, in fact, the most robust means of meeting Northwest Vermont's needs. VELCO Exhibit MDM-2 at 15.

179. The results of the LaCapra analysis for its base case, in total societal costs without regard to PTF, present valued in 2005 dollars, were: (1) NRP, $1.272 billion; (2) ARC 1, $1.311 billion, (3) ARC 2, $1.307 billion; (4) ARC 4, $1.276 billion, and (5) $1.206 billion. VELCO Exhibit MDM-2 at 4.

180. Further analysis by LaCapra filed with VELCO's rebuttal testimony, adding ARC 6 and assuming higher crude oil prices, presents the following results for total societal costs, without regard to PTF, and again present valued in 2005 dollars: (1) NRP, $1.387 billion, (2) ARC 5, $1.307 billion, and (3) ARC 6, $1.417 billion. Montalvo, reb. at 16-17; VELCO Exhibit MDM-Reb-6 at 1.

181. By way of comparison, the installed cost of the NRP is estimated to be $149 million (based on Findings 2, 3, 149, 152, and 153, above). The installed cost of ARC 1 is estimated to be $225 million, ARC 4 to be $340 million, and ARC 5 to be $389 million. VELCO Exhibit MDM-2 at 8 (all figures from that exhibit except the NRP – please see referenced findings).

182. The LaCapra analysis estimates the present value of carrying charges for options, for a 2005-2016 time frame, to be: (1) NRP, $94.2 million, (2) ARC 1, $185.7 million, (3)

ARC 4, $294.1 million, and (4) ARC 5, $306.7 million. VELCO Exhibit MDM-2 at 8.

183. Based on the figures stated in Findings 179 and 180, above, ARC 5's total societal costs are approximately 5 to 6 percent lower than the NRP, with the other ARCs having higher total societal costs than the NRP. The main reason for this result is the large societal benefits (principally avoided distribution and power purchase costs) that accrue to the DSM component of ARC 5. Montalvo, pf. at 11. The transmission benefits of efficiency programs are small compared to the energy, avoided generation, and distribution capacity, and non-electric fossil fuel and water savings. Welch, pf. at 4.

184. The LaCapra analysis is subject to load growth uncertainty. Lesser, pf. at 13; 7/27/04 tr. at 46 (Montalvo) (vol. 1). In addition, the LaCapra analysis's calculation of the costs of each alternative is subject to fuel price uncertainty. VELCO Exhibit MDM-2 at 70; Montalvo, reb. at 18; 7/27/04 tr. at 46 (Montalvo) (vol. 1).

185. It is difficult to quantify an exact margin of error for the La Capra analysis. There are distributions around all the various inputs to the analysis. 7/27/04 tr. at 47 (Montalvo) (vol. 1).

186. The cost estimates presented by LaCapra are expected values. One should not put a tighter confidence interval around the expected values than plus or minus 20 percent, given the uncertainties of fuel price forecasts and the fact that 10 to 20 percent swings in the capital costs of items are known to occur. 7/27/04 tr. at 46-48 (Montalvo) (vol. 1).

187. To test the base case results, LaCapra ran various stress cases that changed parameters such as fuel prices and load growth. Under one high fuel price case, for example, the NRP had a total societal cost of $1.338 billion and ARC 5 a total societal cost of $1.279 billion. Under a low load growth case – in which the 1,100 MW load level is not reached until 2011 – the NRP had a total societal cost of $1.025 billion and ARC 5 a total societal cost of $1.034 billion. Montalvo, pf. at 10; VELCO Exhibit MDM-2 at 5, 73-4.

188. The results of the LaCapra analysis show that, under a low load growth scenario, the economics are such that pursuit of any alternative to the NRP would result in higher total societal costs. That is, the slower the load growth, the more economic the NRP is,

compared to the alternatives on a total societal basis. Montalvo, reb. at 9.

(b) Lesser Analysis

189. Relying solely on deterministic load growth scenarios for sensitivity studies does not incorporate the dynamism of peak load growth in important ways. First, it is unlikely that peak load growth will continuously follow any one given "scenario." Rather, load growth is more likely to vary as the underlying economic drivers change, and those drivers are often cyclic. Second, none of the least-cost alternatives identified under any specific scenario may be the least expected cost. Lesser, pf. at 35.

190. Dr. Lesser performed an analysis of the NRP using EPRI's AIPM, which was designed to evaluate DUP alternatives. Essentially, Dr. Lesser's analysis seeks to determine the set of capacity investments over time that results in the least-expected cost, given uncertainty over future peak load growth. The analysis produces a result that is stated to be the least-expected-cost investment that should be pursued first, and a series of contingent investments that should be performed subsequently, based on realized outcomes of load growth uncertainty. The AIPM also produces a ranking of the relative expected economic costs of installing different alternatives first. Further, the AIPM produces a least-expected-cost combination of capacity investments, rather than requiring the user to pre-select specific portfolios manually. Lesser, pf. at 16-17.

191. Fundamentally, the AIPM compares the value of flexibility associated with installing smaller capacity investments (akin to a "just-in-time" production approach) with the value of scale economies achieved by installing larger capacity increments. The analytical question is how best to value flexibility when future capacity growth is uncertain. The AIPM directly incorporates the value of flexibility by incorporating uncertainty into assessing at what point in the future will load growth result in the need for new capacity investment. The AIPM incorporates this uncertainty by using a Markov-chain model. In essence, a Markov-chain model assumes that loads vary by moving between different

states, such as between "Low-growth trend" and "High-growth trend" states, and that the time spent (duration) in individual states is also uncertain. Lesser, pf. at 17, 19.

192. The AIPM evaluates potential capacity investments today and then, given each, evaluates the "time to the next decision." For example, if the 100 MW investment were installed today and loads continued to grow at 10 MW per year, the time to the next decision would be 10 years. For that decision point, the model would evaluate the feasible investment alternatives, and future load growth, and move on the next needed decision, and so forth. Lesser, pf. at 19.

193. It would be reasonable to use the AIPM as a sensitivity analysis to see whether options selected under a least cost analysis that was based on an end use forecast are robust, assuming there is a way to translate the output of an end use model into AIPM inputs. 6/15/04 tr. at 78 (McIntyre) (vol. 2).

194. In performing his AIPM analysis, Dr. Lesser constructed load scenarios so that the mean load growth would mimic the forecast peak load growth assumed by VELCO, which as stated above was based on the DPS end use forecast. Lesser, pf. at 32.

195. The scenarios constructed by Dr. Lesser around the forecasted peak load growth assumed by VELCO included a Lowest Growth, Average Growth, and Highest Growth scenarios, with growth rates and probability distribution of load growth informed by historic peak load growth rates. Lesser, pf. at 32.

196. Dr. Lesser also constructed an additional set of three scenarios based on a lower overall probability distribution of load growth, and to accomplish this he took the initial set of scenarios and reduced average growth for each of them, the maximum growth that could occur in any given scenario, and the probability of a high growth scenario. Lesser, pf. at 33,

197. Dr. Lesser's analysis focused on the deferrable portions of the NRP and modeled them against generation and DSM alternatives that also would increase peak capacity in northwest Vermont. Lesser, pf. at 23.

198. Dr. Lesser initially performed his analysis using VELCO cost assumptions for the

transmission components and performed sensitivity studies by increasing the costs of the 345 kV line and potential second STATCOM consistent with the Department's expectation of higher costs for those components of the NRP. Lesser, pf. at 24-5.

199. The generation alternatives considered in the analysis included 25 and 50 MW CT, 25 MW DG, and 100, 150 and 200 MW combined cycle alternatives. Lesser, pf. at 25.

200. Dr. Lesser also incorporated the DSM resource incorporated by LaCapra into ARC 5; however, he separated the DSM resource into five distinct blocks, which could be installed in sequence. Doing so increases the inherent flexibility of the DSM resource by not forcing DSM to be committed to an "all or nothing" basis. Lesser, pf. at 25.

201. Unlike the LaCapra analysis, Dr. Lesser's analysis did not impose specific resource portfolios but allowed the AIPM to select an optimally timed resource portfolio. Lesser, pf. at 45.

202. Using VELCO's assumed costs, Dr. Lesser's analysis results in the least-cost societal alternative's being an investment path that incorporates the three components of the NRP that increase peak load capacity (Granite PAR + STAT1, 345 kV, STAT2). Under the analysis, this path has a 30 percent lower expected present value societal cost than the next best alternative, which is an investment path beginning with installation of 25 MW of distributed generation (DG). Lesser, pf. at 38.

203. Dr. Lesser ran a sensitivity analysis assuming higher summer avoided system energy costs, and the results were unchanged. Lesser, pf. at 43.

204. Dr. Lesser ran a sensitivity analysis using higher costs for the 345 kV line and potential second STATCOM at Granite. The results showed the least-cost initial investment to be the Granite PAR and potential initial STATCOM, and, in the mean and high load growth scenarios, the next investment would be the 345 kV line. In a low load growth scenario, the results were that the next investment would be a CT, with a 95 percent probability that the 345 kV line would be the next least-expected-cost investment within a year of the CT. Lesser, pf. at 44; Exhibit DPS-JAL-8.

205. Dr. Lesser ran analyses using both the 10 percent discount rate used by VELCO and a societal discount rate of 3 percent. In both cases, the NRP was the least-expected cost investment. Lesser, pf. at 38, 42.

206. Dr. Lesser's initial analysis included the capacity and on-peak energy benefits of DSM alternatives. Subsequently, Dr. Lesser performed an analysis which incorporated the off-peak costs avoided by DSM. To do so, Dr. Lesser developed a reasonable approximation based on the ratio of peak to off-peak energy savings and the ration of peak system energy costs to off-peak system energy costs. Dr. Lesser applied the ratio to the avoided system energy price assumed in his initial analysis, thereby increasing that value to account for off-peak system benefits of DSM. Exhibit CLF-41 at 1, 4-6.

207. Dr. Lesser re-ran the AIPM as part of this subsequent analysis that included off-peak DSM benefits, with the following results:

a. The least-expected cost path remained unchanged from the original base-case results.

b. An alternative case was run that combined higher initial peak energy prices of $60/MWh, instead of the base-case value of $45/MWh; higher NRP 345kV and STATCOM component costs as developed by DPS witness George Smith, and the use of a societal discount rate. The optimal path continued to be to begin with the Granite PAR and initial potential STATCOM, and then a 95 percent probability of subsequently installing the 345 kV line.

c. An analysis was performed that requires the entire quantity of DSM savings shown in the OEI report to be selected first. The net effect is to install all of the DSM and then install the NRP. Thus, this could be considered a full-deferral case. The analysis showed that the expected NPV cost of this strategy is over five times higher than the base case result.

Exhibit CLF-41 at 6.

(c) Risk Adjustment and Environmental Cost Adders

208. Neither the LaCapra nor the Lesser analysis uses the Docket 5270 10 percent risk adjustment for DSM. See VELCO Exhibit MDM-2 generally; Exhibit CLF 41 at 7.

209. This non-use of the DSM risk adjustment is appropriate. While DSM may have risk

mitigating advantages in comparison to energy supply, the reliability of DSM as a capacity alternative in this case is subject to greater uncertainty than other alternatives including distributed generation. One issue is the risk that implementation of the DSM programs identified in the OEI study would not achieve the estimated savings, or achieve them in the assumed time frame. One should recognize that the risk mitigation that DSM poses for energy supply is effectively netted out by the additional risk posed by DSM from a peak reliability standpoint. Exhibit CLF-41 at 7.

210. The LaCapra analysis monetizes external environmental based on the $7 per MWh value agreed upon in the Docket 5980 settlement for system-wide energy efficiency programs. The LaCapra analysis assumed that the total external environmental costs associated with a gas-fired combined cycle plant are approximately $7 per MWh. Relative costs of emissions of SO_2, NO_x, and CO_2 on a $/ton basis were derived from the Department's "Power to Save" document, and the values were scaled in accordance with the foregoing Docket 5980 externality settlement value. VELCO Exhibit MDM-2 at 65-6.

211. The Lesser analysis utilizes the same environmental cost adders as the LaCapra analysis. Lesser, pf. at 37.

3. VELCO Planning

212. Review of VELCO's planning for this project gives rise to concerns about its planning process. These concerns are not material to the project and do not affect the conclusions reached. It would be inappropriate to consider them further in this docket. If they merit further consideration, such consideration should take place in a separate docket. Mertens, pf. at 23.

E. Conclusions of Law: Need

1. Meeting the Need

Section 248(b)(2) is more than a cost comparison statute. It requires that the NRP and any alternatives actually meet the need. Specifically, § 248(b)(2) states that the Board must find that

the NRP "is required to the *meet the need* for present and future demand for service *which could not otherwise be provided*" more cost-effectively by alternatives. (Emphasis supplied.) The need in this case is time-related, and if alternatives cannot meet the need in a timely manner, then that fact alone is sufficient to demonstrate compliance with § 248(b)(2). As the Board stated in the Hydro-Quebec contract approval decision, "the law requires that we determine whether those [alternative] measures could, if undertaken, avoid the need for the purchase by 'otherwise providing' the energy services that the purchase is designed to provide." In re Application of Twenty-four Electric Utilities, Docket No. 5330, Order of Oct. 12, 1990 at 79, citing 30 V.S.A. § 248(b)(2).

As indicated in the foregoing findings and associated discussion, the NRP is required to meet the need for present and future demand for service. It can do so in a timely manner. Provided the Board promulgates the conditions sought by the Department regarding installation of least-cost VAR technology at Granite (see Findings 220 and 221, below), the NRP is the least-cost transmission approach to meet the need.

In contrast, non-transmission alternatives will not meet the need identified above in a timely manner. If the time frame is two years until the 1,100 MW load level associated with the 345 kV line is reached, then achieving 74 MW[14] or more in peak demand savings through load reductions, whether by DSM or DR, within that time frame is not credible. And even if the time frame is longer, the likelihood of achieving such unprecedented levels of peak demand savings in a time frame of several years is not significantly increased.

Similarly, it is highly doubtful that in Vermont one could develop projects for, site and permit hundreds of MW of generation within the required time frame. Just on the issue of permitting alone, if the generation is in the form of large CT facilities, then many local and environmental concerns would likely arise and create significant obstacles to rapid approval or even approval at all. The current proceeding itself is evidence of how difficult achieving

[14]This figure assumes that DSM is performed in concert with some other measures, such as generation. Given the MW numbers used for the ARCs studied by VELCO, the DSM figure would have to rise considerably if DSM alone is used. See VELCO Exhibit MDM-2 at 3-4.

approval of a major utility project can be, and one can easily believe that regional and local concerns with siting large generation facilities in Vermont would be at least as heartfelt and intense as in the current case, if not more. Further, if the facilities are small DG facilities only, then one is looking at dozens and dozens of such smaller projects in order to provide the number of needed MW, and the scenario becomes unwieldy and improbable.

2. Cost-Effectiveness under § 248(b)(2)

The Department contends that the Board has the discretion under § 248(b)(2) with respect to how cost-effectiveness is determined and that, in determining cost-effectiveness, the Board may and should consider the results of least-cost analysis and the environmental costs of options, as well as other reasonable factors bearing on cost-effectiveness and the choice of options, whether or not from a societal perspective.

Section 248(b)(2) permits the Board to use any reasonable test to determine cost-effectiveness because it does not state a specific test. It simply requires the Board to judge the cost-effectiveness of the proposed project and other options, leaving the test to be applied to the Board's expert judgment.

In this regard, the reference contained in § 248(b)(2) to DSM programs under § 218c does not require that the Board use a societal test in the sense of assessing the costs and benefits without regard to who pays. Section 218c nowhere uses the term "societal" but rather requires a life cycle cost analysis that includes "environmental and economic costs." The statute does not state how environmental and economic costs are to be included. Given the absence of a specification of how "economic costs" are to be included, the statute *permits* the use of a societal test in performing a life-cycle cost analysis, but does not *require* it. Customer-oriented economic costs theoretically could satisfy § 218c, if environmental costs were also considered.

Further, § 218c does not require that the Board always choose the option which has the lowest life cycle cost. Instead, it requires a reasonable balancing of all relevant factors. As the Board stated in Docket No. 6777:

> The least-cost provision of 30 V.S.A. § 218c does not require that the Board always choose the option that has the lowest total life-cycle cost. It requires a

> reasonable balancing of all factors including the magnitude of the initial investment and the timing of these investments, to achieve the optimum long-term benefits to Vermont ratepayers *without short-term costs that are unacceptable.*

In re DPS Request to Reduce the Amount Collected Via the Energy Efficiency Charge in 2003, Docket No. 6777, Order of Dec. 30, 2002 at 9 (emphasis added).[15]

The reference in §248(b)(2) to § 218c does suggest that VELCO is incorrect when it claims (in a memorandum to the Board dated March 26, 2004) that § 248(b)(2)'s use of the phrase "cost-effective" means the Board can only consider "tangible economic benefits" and therefore cannot consider environmental costs. By referencing § 218c, the General Assembly requires testing of the NRP against, among other things, programs developed pursuant to a statute that explicitly requires consideration of environmental costs. It would make little sense for the General Assembly to require an apples to oranges comparison by mandating that one side of the equation consider environmental costs and the other side not consider those costs. VELCO's construction leads to irrational results, contrary to the presumption that the General Assembly does not intend an interpretation that would lead to such results. Braun v. Board of Dental Examiners, 167 Vt. 110, 117 (1997). Moreover, VELCO's argument would mean that the Board cannot consider intangible economic benefits associated with reliability, despite the statutory legislative policy statement that the provision of energy services should be made, to the greatest extent practicable, in a manner that is both reliable and environmentally sound. 30 V.S.A. § 202a.

VELCO's reliance on the Hydro-Quebec contract approval decision for its argument is misplaced. That decision does not support any limitation on the consideration of the environmental impacts of an in-state facility such as the NRP. The relevant holding from that decision rests, in the first instance, on a determination that the General Assembly intends the specifically enumerated environmental criteria of § 248(b) to apply "with respect to an in-state facility." Docket No. 5330, Order of Oct. 12, 1990 at 45, citing 30 V.S.A. § 248(b)(1) and (5). In

[15]While Chairman Dworkin dissented from the result reached in that decision, the Chairman's dissent states no disagreement with the above description of § 218c. Docket No. 6777, Order of 12/30/02 at 30.

the case of the Hydro-Quebec contract, the relevant facilities were out-of-state, and therefore the environmental criteria of § 248(b) did not apply. The NRP, however, involves in-state facilities, and those criteria do apply.

In the second instance, the Hydro-Quebec decision specifically treats § 248(a) and (b) as separate enabling statutes. Id. at 45-6. Since § 248(a) provides the Board with separate statutory authority to look at factors affecting the "general good of the state," the Board concluded that, notwithstanding the inapplicability of the environmental criteria of § 248(b), it could review environmental impacts of out-of-state facilities under § 248(a) but only to the extent those impacts affect the state. Id. at 47. Again, the NRP involves in-state facilities, so the Board's consideration of the environmental impacts of the NRP is not bounded by § 248(a).

3. Application to NRP

The cost-effectiveness of the NRP has been subjected to two different societal cost analyses. One is the more deterministic analysis proffered by LaCapra Associates and the other is the probabilistic analysis offered by Dr. Lesser.

Each of these analysis types has strengths and weaknesses and each analysis was performed reasonably in this case. But it is not the central point of this docket to establish a particular analysis method. Rather, the question the Board should ask itself is whether the NRP or a different option appears robust under a range of cost-effectiveness tests and scenarios, given a reasonable balancing of the relevant factors. The answer, the Department respectfully suggests, is that the NRP is the robust option most likely cost-effectively to meet the need.

If one takes the LaCapra analysis as a starting point, one sees that the various options considered result in a very close call. Under that analysis, the NRP is the least-cost on a societal basis of all the options but one, and that one is ARC 5. The difference, however, between the NRP and ARC 5 is about five or six percent, much less than the approximate confidence level of plus or minus 20 percent that the study's author states he would put on the analysis results.

Importantly, LaCapra's low load growth stress case indicates that, if load growth is less rapid than expected, the NRP becomes more cost-effective than ARC 5. This is a strong reason

not to move ahead with ARC 5, because it is only in a low load growth case that ARC 5, which consists of generation and DSM, has a hope of possibly meeting the need addressed by the NRP.[16] If the load grows as expected in the DPS 2002 forecast or more rapidly, sufficient time will not exist for ARC 5 to meet that need.

If one uses Dr. Lesser's analysis as a sensitivity rather than a stand-alone analysis, one sees confirmation that the NRP is the robust option. It is reasonable to use Dr. Lesser's analysis as a sensitivity analysis because Dr. Lesser used as his base case load growth that mimics the DPS 2002 end use forecast which informed the LaCapra analysis. In addition, Dr. Lesser revised his initial analysis to account for off-peak benefits of DSM, as did the LaCapra analysis.

When probabilistic techniques were applied to try to account for the uncertainty in load growth and the fact that such growth may move over time among different states, the results strongly favored the NRP. Only in a low load growth scenario did this result change at all, and that change was not to go forward with ARC 5 or any DSM-related solution. Instead, in that scenario, the installation of a PAR and potential STATCOM at Granite are followed by a CT, with a 95 percent probability that the 345 kV line would be the next least-expected-cost investment within a year of the CT.

Consideration of other relevant cost-effectiveness factors reinforces the choice of the NRP. For example, the LaCapra analysis shows an installed cost of $389 million for ARC 5, compared with the Department's estimate of $149 million for the NRP. This difference in installed costs of more than 2.5 times carries with it the concern of unacceptable short-term impacts discussed by the Board in Docket No. 6777. Indeed, the additional $240 million in combined generation and efficiency spending in this docket should raise that concern to an exceptionally high level. Further, the concern is accentuated by the difference in magnitude in applicable total carrying charges estimated by LaCapra Associates: $94.2 million for the NRP and $306.7 million for ARC 5. Even spread out over a financing term, this difference will have serious impacts in the short- and intermediate-term.

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[16]This argument is in the alternative. As stated above, the Department does not believe that ARC 5 is likely actually to meet the need even in low load growth cases suggested by CLF.

Given the foregoing, the uncertainty of effectively implementing ARC 5 or an option involving similar resources in the necessary time frame, and the uncertainty that efficiency and conservation resources are available on demand, the Board should come to a favorable conclusion for the NRP under § 248(b)(2).

4. Externalities

VELCO's use of environmental cost adders scaled to the Docket 5980 settlement values is reasonable and consistent with current practice as evidenced by orders applicable to the EEU and to DUP. DPS will discuss relevant prior Board orders, VELCO's environmental adders in light of those orders, and other externalities that parties urge upon the Board.

In Docket No. 5270, the Board established a rebuttable presumption of a five percent externalities adder for use by the distribution utilities to represent the environmental costs of supply when comparing those costs to DSM. In re Least Cost Investments, Energy Efficiency, Conservation, and Management of Demand for Energy, 111 P.U.R. 4th 427, 434 (Vt. Pub. Svc. Bd. 1990).

In Docket No. 5980, the Board approved a settlement in which the 0.7 cents per kWh was agreed upon as a value "to replace the five percent mark-up on avoided costs (set by the Board in Docket 5270) as a rebuttable presumption for system-wide programs only . . . ." In re Energy Efficiency Plan, 196 P.U.R. 4th at 507 (Vt. Pub. Svc. Board 1999). Under the approved settlement, adders for fuel-consuming end-use efficiency measures were to be developed based on those originally contained in the Department's energy efficiency plan – which was "The Power to Save." Id. at 480, 507. The externality provisions of the settlement were to be non-precedential as to supply purchases and DUP. Id. at 507.

In Docket No. 6290, the Board approved a settlement which, in relevant part, attached environmental externality values for use in DUP. These values are non-precedential for other uses. In re Establishment of Guidelines for Distributed Utility Planning, Docket No. 6290, Order of Jan. 15, 2003 at 13, 14. The attachment to the approved settlement states: "Externalities per pound and per MWh were calculated based on *Power to Save*, then scaled back linearly to total

the $7-per-MWh value stipulated by the parties in the DN 5980 Settlement." See Approved Docket 6290 Memorandum of Understanding, Attachment A-3 (Oct. 10. 2002). The attachment shows the scaled results for a large gas combined cycle unit to be $7/MWh. Id.

Thus, on the issue of externalities, VELCO in its analysis followed the path blazed by the Board, DPS and other parties in prior dockets. Despite its argument that § 248(b)(2) does not allow consideration of environmental costs, VELCO included environmental cost adders, in accordance with the goal enunciated in Docket No. 5270 to promote the inclusion of such an adder in utility decision-making. VELCO based its adders on the replacement to the Docket 5270 adder agreed upon and approved in Docket No. 5980. Specifically, as was done in the Docket No. 6290 settlement for DUP, VELCO used the 5980 settlement externalities value as a base and, after deriving externality adders for various pollutants based on the Department's original proposal pertaining the establishment of an efficiency utility and DUP guidelines, scaled those adders to the 5980 settlement value.

Some parties argue that VELCO should have done more but provide little in the way of substantive alternative externality values. For example, VCSE, through witness Matthew Wilson, raises a bundle of claims: Mr. Wilson disputes a lack of land use and water quality values in the externalities adder, but offers no alternative values. He disputes the source data from the *Power to Save* used by LaCapra, but offers no alternative source data. He disputes the use of only three air pollutants, but offers no values for the other pollutants. He claims the NRP may result in "property-based externalities" but offers no values for the Board to use and is unable to cite a single study in which significant property value impacts occur due to the upgrade of an existing transmission line. Importantly, he offers no basis on which the Board could conclude that the outcome of the cost comparison would be different if it pursued the development of reasonable and defensible values in these areas. Wilson pf. at 7-8, 12; Exhibits DPS-Cross-73, -74, -75, -79, -80, -81, -82.

With respect to property-based externalities specifically, the Department contends that the evidence does not persuasively support a claim of significant general impact of the NRP on

property values.[17] As discussed below under the findings of fact regarding aesthetic impacts, the area through which the NRP will travel contains existing transmission corridors. The logical inference from this fact is that the existing market values already account for the presence of these lines. Moreover, no party has been able to find or adduce a single study that specifically concerns the property value impact of an upgrade of existing transmission lines, much less produce a study that shows that such an upgrade will have an significant or undue effect. See, e.g., Lesser, pf. at 48, and Exhibits DPS-Cross-81 and DPS-Cross-89. Thus, arguments concerning a substantial general impact on property values or consequent effect on town tax revenues do little more than raise a question, the answer to which is that a significant impact is unlikely.

In Docket No. 5270, the Board specifically eschewed the approach of simply casting doubt on externality values used. Instead, it placed the burden on a challenger to substantiate its claim. It indicated that, in future proceedings, "Simply stating that the value is actually higher or lower will not, however, make it so." It directed that parties may seek to "*substantiate* higher or lower values . . . ." In re Least Cost Investments, 111 P.U.R. 4th at 434 (emphasis added).

Further, there has been no prior development by the Board of externality adders in the areas suggested by VCSE and other parties. As the Board is aware, the issue of externalities in utility decision-making is a complex and difficult one that has had a long and litigated history in which jurisdiction, methodologies and values have been subject to dispute. See, e.g., Dockets No. 5270, 5611, and 5980. There is no reason to believe that adding *more* areas of externalities will be somehow be less subject to disagreement; instead, adding more areas could consume significant time and party resources.

In addition, if consideration of externalities in Board proceedings is to be expanded, that expansion should be comprehensive and include all externalities. For example, it should include the external benefits of reliable electric service.

In light of the foregoing, the Department submits that the Board should deem VELCO's use of externality adders, based on those previously established for DSM programs, adequate for the

[17]Under 30 V.S.A. § 112, compensation will be afforded to individual property owners for land condemned for use in the NRP.

purpose of the cost comparison in this docket. Given the important reliability needs of Vermont's ratepayers, the NRP should not be subjected to development and implementation of adders that the Board and Department have not previously established. In this regard, the Board has discretion to control the order of its business within the bounds established by statute. In re Green Mountain Power Corp., 147 Vt. 509, 516 (1986).

5. Petitioners' Least-Cost Planning

In its order of April 21, 2004 in this docket on a motion by New Haven to require VELCO, GMP and ISO-NE to seek regional cost support, the Board stated:

> We expressly request the parties to address in their final briefs the appropriate course of action should the Board find that (1) the Petitioners have failed to adequately pursue cost-effective non-transmission alternatives, and (2) there is now insufficient time to implement such alternatives without subjecting Vermont electric customers to unacceptable reliability risks.

The Department's direct response to this request is simple and straightforward: *If* the Board reaches such conclusions, it should issue a CPG for NRP and, as stated in Hans Mertens' prefiled direct testimony at 23, open a docket for consideration of addressing and correcting flaws in VELCO's least-cost planning and implementation.

The Department does not agree, however, that the Board should make the first finding from the quoted passage. Further, the Department contests that the Board has jurisdiction in this proceeding to make a finding concerning the adequacy of Petitioners' prior conduct in pursuing or not pursuing non-transmission alternatives or to impose conditions or other remedies on the basis of such a finding.

This case is limited to the issues relevant under § 248. As acknowledged by the Board's prehearing conference and order issued on August 18, 2003, this case is about a petition under that statute. There is no other substantive statute under which this case is proceeding. The Board's notices of hearing, for example, cite only 30 V.S.A. §§ 10 and 248, and § 10 is a procedural statute concerning service of process and notice of hearing.

The substantive issues under § 248 are, essentially, twofold: (a) whether, under § 248(a), the NRP will promote the general good of the state, and (b) whether the NRP meets the criteria

enumerated in § 248(b).

If, as the Department believes is the case, it is true that as of today only the NRP can timely meet the need, then the Petitioners' course of conduct regarding pursuit of least-cost transmission alternatives is irrelevant to whether the *project* promotes the general good of the state or meets the criteria of § 248(b). It does not make a difference, for approval under § 248, whether a more prompt action might have resulted in a non-transmission solution that could cost-effectively and timely meet the need. Even if true, such a circumstance would not change the fact that as of today only the NRP can timely meet the need and would not make more or less probable the NRP's promoting the general good of the state or satisfying the § 248(b) criteria. And if – as the Department does not concede – the opposite circumstance is true, and as of today non-transmission alternatives can timely meet the need, then the Petitioners' prior conduct respecting least-cost planning similarly has no effect on the issues under § 248.

The Department respectfully contends, therefore, that the issue raised by the Board is beyond the scope of § 248 and the Board lacks jurisdiction to consider it in this proceeding. In this regard, the Board is a body exercising special and statutory powers as to which nothing is presumed in favor of its jurisdiction. Trybulski v. Bellows Falls, 112 Vt. 1, 7 (1941).

The Department's position is not that the Board should do nothing. If it is concerned about the Petitioner's course of conduct with regard to least cost planning, it should open a docket under appropriate statutory authority to consider that course of conduct and any attendant issues related to future least-cost planning, with clear notice to the parties as to exactly what the issues are and full opportunity to be heard on them.

Finally, the Department does believe that the Board should make the second finding discussed in the quoted passage, which is supported by the evidence: There is not now time to implement non-transmission alternatives to the NRP without subjecting Vermonters to unacceptable reliability risks.

VI. **System Stability and Reliability (§ 248(b)(3))**

A. Findings of Fact: Stability and Reliability

213. The proposed project will not adversely affect system stability and reliability; in fact, the proposed project will enhance system stability and reliability, provided the Department's recommendations concerning the Granite substation are followed. This finding is supported by Findings 107 through 160, above, and 214 through 220, below.

214. In general, VELCO's proposed NRP design will provide adequate reliability. In the design of the NRP, VELCO has studied scenarios in detail, using industry standard analysis and modeling tools, and the best comprehensive system model available. This model includes a detailed model of projected Vermont loads based on information from the Department. In addition, it models interconnected systems of northeastern United States and Canada with various probable power transfer scenarios. With regard to contingency simulation, VELCO has simulated all possible likely first contingencies including line trips, breaker failures, stuck breakers and bus faults with the backdrop of an unavailability of the Highgate or PV20 sources. In addition, reliability and stability analyses performed by VELCO have been given detailed peer review and approval by the appropriate NEPOOL task forces comprised of industry experts. Smith, pf. at 30-1.

215. While, under the Reroute Filing, reliability to Vergennes will be lower than under the Original Proposal, the proposed reroute will result in a higher level of reliability than Vergennes has today. The proposed radial supply to Vergennes will result in fewer outages than that expected by the present-day configuration and GMP has made provisions to further enhance the reliability of the 1.6 mile 34.5 kV supply to the Vergennes substation. Further, while dual transmission supplies to substations are ideal, it is not at all unusual for substations serving load in Vermont to be supplied by radial subtransmission lines. In the case of GMP alone, at least 12 substation are supplied radially. Even when dual transmission supplies are present, several instances within Vermont exist where such systems are not capable of supplying peak loads following contingencies. Smith and Litkovitz, supp. pf. at 5-6.

216. Outages on the radial supply to Vergennes proposed under the Reroute Filing would have no impact on the other substations supplied by the 115 kV path from New Haven to Queen

City and would have no impact on the overall operation of the bulk transmission system. Smith and Litkovitz, supp. pf. at 5-6.

217. As noted earlier, with respect to the Original Proposal for the Granite Substation, the proposed configuration for reactive support potentially could have a negative impact on reliability. Under that proposal: (a) 225 MVARs, comprised of 75 MVARs of fixed capacitors and 150 MVARs of STATCOM, are all connected to a single 115 kV bus; and (b) 150 MVARs of STATCOM reactive support is connected to this bus with a single 115 kV breaker. Under stressed conditions, loss of 225 MVARs of reactive support due to a single contingency could have severe adverse impact on voltages in the area. This proposed design did not constitute good utility practice and was inconsistent with the other proposed NRP additions and similar applications elsewhere in New England. Any modifications to remedy these shortcomings, if deferred to the future, will be difficult and much more costly. Smith, pf. at 31.

218. VELCO revised the reactive support configuration as described in Finding 153.a, above. This change in the configuration agreed to by VELCO is necessary to achieve good utility practice, be maintainable, and meet any special needs that may arise beyond the immediate design scenario of the NRP. However, VELCO should comply with the recommendations stated in Finding 153.b, above. Smith and Litkovitz, surreb. at 6, 7-8.

219. VELCO states in its design details testimony that it prefers the installation of synchronous condensers at the Granite substation as the technology for providing needed dynamic reactive power to the system. As stated in Finding 154, above, this statement is cause for concern for reasons of potential reliability impacts and purchase of least-cost technology. Careful attention should be given to the specification and selection of the dynamic VAR device at Granite. A reliable source of 150 MVARs (+/- 75 MVARs) of dynamic VAR support is required at Granite to maintain system reliability.[18] This device also impacts

[18]This installation of 150 MVAR would be the first stage of dynamic VAR support planned for Granite. Smith, design details pf. at 2.

system power quality and has the potential for significant power losses.[19] Smith, design details pf. at 1-2.

220. VELCO should take the following actions in selecting the appropriate, least-cost dynamic VAR technology for Granite:

a. VELCO should perform a detailed analysis to determine the suitability of synchronous condensers for this transmission application, specifically to determine if there are any "fatal flaws" regarding technical performance.

b. VELCO should develop a functional specification for *each* of the various applicable technologies and request detailed quotes for a specified modular configuration. The applicable technologies would include synchronous condensers (assuming no fatal flaws were found) and FACTS devices including static var compensators (SVCs) and static compensators (STATCOMs). The specifications would require, at a minimum, dynamic response characteristics, guaranteed losses (under likely operational profiles), installed cost, the cost of spare parts and/or modules, footprint requirements, guaranteed maximum noise levels, operational and maintenance requirements, the manufacturer's experience with transmission applications, predicted response to faults (power quality), predicted interaction with nearby FACTS and high-voltage direct current (HVDC) installations,[20] conditions under which gate blocks or machine trips are likely to occur, and the vendor's capability to perform system simulations. Smith, design details pf. at 2-3.

221. During the process set out in Finding 220, above, special studies would be required: (a) to evaluate the impact (either positive or negative) of a device's dynamic response on nearby customers; and (b) to evaluate the interaction of the device on nearby rotating

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[19]This device would become even more critical if, in the future, the Highgate source were to be lost entirely, for example, due to the elimination of contract flows from Hydro Quebec. Smith, design details pf. at 2.

[20]These would include the STATCOM at Essex, the Highgate converter, and the Phase I HVDC terminal at Comerford, New Hampshire. Smith, design details pf. at 3.

machines, FACTS devices and HVDC installations. Several approaches are possible to perform these studies. One approach would be for VELCO (or its consultant) to perform preliminary studies to assist in developing the specification. Then the vendor, if it has the capability, could perform additional studies during the design process, with oversight by VELCO. If the vendor does not have the capability, then it would be up to VELCO to perform the studies. In any event, the cost of required studies would be a consideration in the technology and vendor selection process. Smith, design details pf. at 3.

222. With regard to the architecture proposed by VELCO for the proposed installation in its Design Details Filing, VELCO has divided the installation into two 75 MVAR sections, each section connected to separate ring bus positions through separate step-up transformers. Each 75 MVAR section is comprised of two modules, presumably 37.5 MVAR each. This architecture maintains the availability of 75 MVARs in the event of a transformer failure. With a spare transformer on site, full capability could be restored within a day or so. Further, this architecture maintains the availability of 112.5 MVAR (75 MVAR + 37.5 MVAR) in the event of the failure of a single module. In general, this is an appropriate architecture for this application. However, given the importance of this installation to system reliability, VELCO should consider the use of three 25 MVAR modules per section, thereby ensuring that 125 MVARs (75 MVAR + 25 MVAR + 25 MVAR) is available upon failure of any one module. Finally, regardless of the number of modules ultimately employed, consideration should be given to the procurement of a spare, on-site module to ensure rapid recovery to the full 150 MVAR capability upon failure of any single module. Smith, design details pf. at 3-4.

223. Stability of the system with addition of the NRP will be enhanced in two ways. First, voltage stability will be improved due to the addition of the dynamic support provided by the STATCOM addition at Granite plus the added stiffness provided by the 345 kV line addition from West Rutland to New Haven. Angular stability of interconnected Vermont generators will be enhanced by the added stiffness afforded by the 345 kV addition. The added voltage stability noted above will also reduce reactive demands on generation

during contingency conditions thereby reducing the chances of their tripping during severe contingencies. Smith, pf. at 32.

B. Conclusions of Law: Stability and Reliability

Section 248(b)(3) requires the Board to find that the NRP "will not adversely affect system stability and reliability." But for the problems noted by the Department with the Granite substation proposal, the NRP as a whole will enhance system stability and reliability and therefore meets this criterion. Further, the Granite substation will meet this criterion if the Board conditions the CPG to require VELCO to comply with the Department's recommendations stated at Findings 153.b (with associated discussion), 220, and 221, above.

VII. Economic Benefit to the State and Residents (§ 248(b)(4))

A. Findings of Fact: Economic Benefit

224. The NRP will result in an economic benefit to the state and its residents. This finding is supported by Findings 225 through 233, below.

225. The NRP provides the least-cost alternative for timely providing the needed support for the Vermont transmission system. This finding is supported by Findings 107 through 212, above.

226. The NRP provides the necessary stability and reliability benefits to reduce the possibility of the potentially serious economic consequences that would be caused by loss of load in northwest Vermont. This finding is supported by Findings 107 through 160, above.

227. The economic impact of a long term outage can be significant because of the local business impact (e.g. high quality, reliable power is unavailable for manufacturing), the need to dispatch out of merit generation, and other consequences associated with the impaired operation of the system during the outage which have the potential to limit economic dispatch of supplies and drive up congestion costs, which would be paid by Vermont. Mertens, pf. rebuttal at 4.

228. The improved reliability provided by the NRP will reduce Vermont's exposure to outages

that would have large economic impacts on the business community through lost production. Dunn, pf. at 13; Exhibit TD-20; Ventriss, pf. at 2-3 and Exhibit LV-1; Smith, pf. at 8-10.

229. The improved reliability provided by the NRP is important to attracting and retaining businesses and supporting a healthy business climate in Vermont. Dunn, pf. at 13; Exhibit TD-20; Ventriss, pf. at 2 and Exhibit LV-1.

230. Construction of the NRP will reduce Vermont's exposure to the congestion costs that Vermont must pay under current market rules. Dunn, pf. at 13; Exhibit MDM-2; Montalvo and Mallory, pf. at 8-9.

231. The NRP will provide Vermont with increased access to the wholesale electric market and the associated increase in market options to choose from, such as renewable generation located outside of northwest Vermont or new, efficient gas plants. Dunn, pf. at 13-14; Smith, pf. at 14.

232. The NRP will reduce the need to run more costly generation alternatives out-of-merit to support the transmission grid. Dunn, pf. at 13-14; Mertens, pf. at 7.

233. The NRP will improve Vermont's system peak capacity, which will provide certainty to the question of electric delivery. Mertens, pf. at 15; Lesser, pf. at 49.

B. Conclusions of Law: Economic Benefit

Section 248(b)(4) requires the Board to find that the proposed project "will result in an economic benefit to the state and its residents." An important economic benefit of the NRP is the needed stability and reliability for the Vermont transmission system that the NRP will provide, as discussed in Section VI, above. Another important economic benefit is that the NRP represents the least cost alternative to timely provide the required level of reliability, as discussed in Section V, above.

The economic benefits of the NRP to Vermont and its residents flows from the numerous advantages of a robust transmission system. A reliable source of electricity to meet demand provides a stable basis for economic growth and encourages a healthy business climate in the

state. In addition, the NRP will permit Vermont utilities to expand their access to wholesale markets, reduce their reliance on out-of-merit generation in times of peak demand, and reduce congestion costs, which Vermonters must pay under the present market rules. In addition, the NRP will provide economic benefits through the reducing the economic harm that could result from power outages caused by an insufficient transmission system. Therefore, the NRP provides economic benefits to the state and its residents as required by § 248(b)(4).

VIII. Aesthetics, Historic Sites and Water Purity, the Natural Environment and Public Health and Safety (§ 248(b)(5))

234. The NRP will not have an undue adverse affect on aesthetics, historic sites, and water purity, the natural environment and the public health and safety. This finding is supported by Findings 235 through 375, below, and by the evidence pertinent to the criteria specified in 10 V.S.A. §§ 1424a(d) and 6086(a)(1) through (8) and (9)(K).

Discussion

Under § 248(b)(5) in this brief, the Department will address the issues of aesthetics, noise, potential EMF impacts on health and medical devices and physical safety of the proposed lines. However, with respect to historic sites and natural resource criteria and issues under § 248(b)(5), DPS refers the Board to ANR's brief.

A. Scenic or Natural Beauty of the Area, Aesthetics (10 V.S.A. § 6086(a)(1)(8))

235. The proposed project will not have an undue adverse effect on the scenic or natural beauty of the area, or upon aesthetics. This finding is supported by Findings 236 through 343, below.

1. Findings of Fact: Project Context

236. This is a regional project which begins in the northern, forested foothills of the Taconic Range and continues through Rutland County and within the Otter Creek Watershed to the

Champlain Valley beginning in Brandon, north to South Burlington. The Champlain Valley locale includes sweeping views to both the Adirondacks and the western foothills and slopes of the Green Mountains. This section is characterized by smaller villages, farmlands and agricultural uses as well as rural residential land uses. Exhibit DPS-DR-1 at 3.

237. The scenic and aesthetic resources of this region are characterized somewhat by a postcard contained in the report of DPS witness David Raphael. The postcard is distributed by the Middlebury Area Land Trust with the exhortation "Save the View." It is looking west in New Haven towards the Green Mountains, with rolling pastures and woodland patches and farmsteads in the fore- and mid-ground. The patchwork of wooded areas and open lands, the roads (such as Route 7 and Route 17) which travel along heights of land, and the consequent long distance views, are characteristic of this region. Exhibit DPS-DR-1 at 3.

238. Also part of this region are existing transmission corridors, including a 115 kV corridor. The above-described postcard includes a view of an H frame transmission line structure, highlighting the fact that to some extent, Vermonters are, as a population, inured to the presence of power lines, both distribution and transmission. Exhibit DPS-DR-1 at 3, 5.

239. The proposed 345 kV line follows the existing 115kV line corridor throughout the entire route from West Rutland to New Haven. This existing route is generally in rural forested or open areas. The existing transmission line is an H-frame construction with towers at 52 feet height and approximately 15 feet width between the two poles on the structure. The corridor will require a clearing in the right-of-way of approximately 250 feet. Exhibits DPS-DR-1 at 3; VELCO Exhibit DJB-8.

240. The proposed 115kV line upgrade from New Haven to Queen City replaces an existing 46kV and 34.5kV line in many areas. However, under both the Original Proposal and to a greater extent the Reroute Filing, new routing of the proposed 115kV line occurs in areas where transmission lines do not currently exist. Exhibit DPS-DR-1 at 3; see also the findings of fact, above, under Section III (project description), New Haven to Queen City 115 kV line.

241. Under the Original Proposal, one section of the proposed 34.5 kV to 115kV upgrade passes

through the historic Village of Vergennes and its Otter Creek basin. North of this area the line and corridor continue through agricultural lands and rural residential uses, eventually following a railroad corridor for about 13 miles into Shelburne. Exhibit DPS-DR-1 at 3.

242. Once the line reaches Shelburne, the nature of the corridor and its context changes, with a more densely settled, almost suburban type land use pattern, with a mix of commercial, recreational, residential and industrial land uses. Exhibit DPS-DR-1 at 3.

243. Under the Original Proposal, the final 2.5 mile section parallels a rail line in close proximity to residences. Exhibit DPS-DR-1 at 3-4.

244. In the region, there are often long distant views with the classic Vermont pastoral qualities and mountain backdrops. Throughout the project area there are numerous road crossings and sections which parallel what are considered to be some scenic roads and viewsheds. There are also locally sensitive open spaces and land uses. Exhibit DPS-DR-1 at 4.

245. A landscape includes all elements which presently exist. A transmission line and other elements are part of the existing landscape, and all of these elements must be considered. DPS-Cross-43.

2. Findings of Fact: Analysis of Project Impact and Mitigation Recommendations

246. The entire project as it extends through Addison County can never be seen all at once except possibly from an airplane. The entirety of the VELCO ROW in Middlebury cannot be seen all at once except possibly from an airplane or a ridgeline in the Green Mountain National Forest. There are no vantage points from which a viewer on the ground will see the entirety of the New Haven portion of the NRP. The entirety of the Ferrisburg portion of the project cannot be seen from any vantage point in Ferrisburg. There are no locations in Charlotte from which the entire Charlotte portion of the project can be viewed at one time. There is no evidence of a location in Shelburne from which a viewer could see the entirety of the Shelburne portion of the project. DPS-Cross-44 (Vissering); DPS-Cross-49 (Vissering); DPS-Cross-98 (New Haven); 6/11/04 tr. at 124 (Watkins) (vol. 1); DPS-Cross-123 (Donovan); 2/12/04 tr. at 44-45 (Henderson-King/Lalley) (vol. 2).

Discussion

Based on the foregoing, the Board should find that there is no location from which a ground-based viewer can see the whole of the NRP and that, but for the possibility in Middlebury that a viewer from a distant Green Mountain ridgeline might see the VELCO ROW, no locations exist in the affected towns and regions from which a viewer might see the whole of the town's or region's portion of the NRP.

These facts may be obvious but they need to be stated because they have at least two areas of significance. First, they demonstrate the lack of persuasive value in broad statements that the NRP will have an undue adverse effect on aesthetics, such as the claim by James Donovan for Charlotte that the "entire length of the proposed power line in Charlotte would offend the sensibilities of the average person." Donovan, Charlotte pf. at 14. As the Board is aware, one important question asked under the Quechee test is: "Where can the project be seen from?" In re Quechee Lakes Corp., 1986 WL 58689 at 19 (Vt.Env.Bd, Jan. 13, 1986). If the entirety of the project cannot be seen from any vantage point, then it is unlikely in the extreme that the entirety of the project will have an undue adverse effect on aesthetics and scenic beauty. The same logic applies where, in a given town or region, one cannot view from any single point that portion of the NRP which will be in the town or region.

Second, these facts underscore the importance, for a utility line, of evaluating the whole length of the line to determine what portions will be visually prominent and what areas along the line are visually sensitive, with the goal being to identify those locations in which the proposed line poses impacts to aesthetics and scenic beauty. Of all the aesthetic witnesses in this docket, it is the Department's witness David Raphael who first and best performed this task. See Findings 247 and 248, below. While other witnesses may later have attempted to follow Mr. Raphael's lead and offered assessments identifying the locations of visual impact concern in a particular town or region, it is Mr. Raphael's analysis that provides the most comprehensive identification and assessment of those locations for the NRP.

247. Mr. Raphael's methodology included visual and cartographic analysis, research and

review. His analysis assesses the project's visibility and potential for visual and aesthetic impacts, with a focus on viewsheds from major federal, state or local roads, relationships to nearby areas of public interest, high scenic value and/or official designation as a cultural, aesthetic or recreational facility or resource, road crossings and locations that involve individual residences or residential areas. He used on-site and field study to reinforce analysis and findings. His conclusions address the criteria set forth in the Quechee decision, as developed by the Vermont Environmental Board, for aesthetic analysis and conclusions. Exhibit DPS-DR-1 at 1.

248. Mr. Raphael analyzed the NRP on a section-by-section basis. In doing so, Mr. Raphael identified areas with long distant views and classic Vermont pastoral qualities and mountain backdrops, numerous road crossings and sections which parallel scenic roads and viewsheds, and locally sensitive open spaces and land uses. Mr. Raphael considered these locations to be aesthetically sensitive areas and addressed them in detail in a section by section analysis. Mr. Raphael's report also contains a section that identifies and recommends mitigation for areas of aesthetic sensitivity with a potential for undue adverse impact. Exhibit DPS-DR-1 at 1, 4, 8-31, 33-133.

249. Mr. Raphael's overall conclusion is that, as proposed, in some locations the NRP will have an undue adverse effect on aesthetics. These locations are discussed in the findings below. For each such location, Mr. Raphael recommends mitigation measures sufficient to ensure that the NRP's effect on aesthetics will not be unduly adverse. Mr. Raphael also concludes that, as to other locations, the NRP will not have an undue adverse effect on aesthetics. Exhibit DPS-DR-1 at 1.

250. A limitation on Mr. Raphael's analysis is that final design plans showing such items as pole placement have not been submitted for much of the NRP. Exhibit DPS-DR-1 at 4. In addition, VELCO has not presently submitted detail for areas where it proposes selective clearing showing where that clearing will occur and intends to do so with its final design plans. 7/29/04 tr. at 101-02 (Boyle) (vol. 1).

251. VELCO should be required to respond to Mr. Raphael's recommendations with more

detailed mitigation measures designed specifically for the areas delineated. Planting plans with plant materials of sufficient size and number, as well as pole placements and other measures will need to be part of this next step to ensure that an undue adverse impact will not result from this project. Single pole structures are recommended in several places. In some locations, pole heights need to be lowered to mitigate the impact of tall poles on the landscape. In other locations, pole heights need to be increased to reduce the clutter and impacts of poles on the landscape and the width of the cleared section of corridor. Exhibit DPS-DR-1 at 8, 10, 18.

252. Post-certification review of the NRP should include a requirement, for areas that are aesthetically sensitive, that VELCO stake and delineate in the field the pole locations and corridor locations, and what vegetation will stay and what will be cut in a given location. 11/9/04 tr. at 92-3 (Raphael) (vol. 2).

253. To ensure that the NRP will not result in an on undue adverse impact aesthetics and scenic beauty, DPS urges the Board to approve the NRP with a requirement that VELCO comply with Mr. Raphael's recommendations, as discussed immediately below. Mertens, pf. at 16; 11/9/04 tr. at 119 (Raphael) (vol. 2).

(a) <u>West Rutland to Pittsford (345 kV Line)</u>

254. Miles 0.0 to Mile 5.0 (West Rutland, Proctor, Pittsford):

a. Whipple Hollow Road is a sensitive and scenic area. Whipple Hollow Road has a continuous viewshed of natural wooded hillsides coupled with open lands in the foreground.

b. This area has been identified as a sensitive, scenic and important area for West Rutland, and lands on which the corridor is located and adjacent to form a conservation district.

c. The widening of the corridor and subsequent cut on the hillside will substantially impact the appearance of the corridor and its cut on the hillside. This cut will be particularly noticeable in the areas with steeper slopes. The corridor will be

widened from approximately 150 feet of cleared land to an overall corridor clearing width of a minimum of 250 feet. The corridor width could increase to perhaps 275 -300 feet, and it appears that this has already happened in some locations along VELCO ROWs. Corridors often widen more than the cut area from wind throw, as well as tree loss due to sun scald and exposure. Exhibit DPS-DR-2, a line of sight section from Whipple Hollow Road, demonstrates that with the slope of the hillside, the additional clearing will expose to view as much as 75 feet of a "stripe" and up to half of the new structure. This new structure along with the existing structure will add more poles and clutter.

d. The change which will result from the increased width of the clearing in and of itself is negative and adverse. The increase of the clearing will be visible from Whipple Hollow Road, particularly the observation of a stripe in the landscape during the winter. With the additional visibility of the corridor and the towers, the project will result in a less harmonious condition, and less of a fit with the landscape. Taken together, and without effective mitigation, this section of the line, will result in an undue adverse impact to the scenic character of the area. VELCO's proposal for selective clearing will not sufficiently mitigate the increased clearing.

e. To satisfy the Quechee analysis, both of the following are required:

   i. A single pole configuration, albeit higher, is needed to reduce the clearing for the corridor and the subsequent extent of the cut down the hill. The increased height of the single structure, which could be of naturally weathering Corten steel, would not be visible above the ridgeline, since the corridor is below the height of land to the east. Even with the proposed conductors in a horizontal array, a single pole configuration with vertical conductors will not appreciably change the view of the line because from the typical viewing distance and with the backdrop, the actual lines themselves are not overly visible.

   ii. Selective clearing and some additional plantings where the buffer is thin to

allow as much buffer to remain (particularly near pole structures), will also help to mitigate the visual change.

f. As a separate option, reconstructing the existing 115kV as single pole line would also be a desirable mitigation measure and actually allow both lines to be within the existing corridor.

Exhibits DPS-DR-1 at 9-10, DPS-DR-2; 9/22/04 tr. at 46-7 (Raphael) (vol. 1).

255. Miles 5.5 to 5.6 Whipple Hollow Road Crossing (Pittsford):

a. While the area in the vicinity of Whipple Hollow Road and the Florence Substation is not a densely settled area, this crossing of Whipple Hollow Road will impact a scenic area. The qualities cited in the previous stretch of the corridor are present all along Whipple Hollow Road and extend into this area of Pittsford. With the addition of more massive structures close to the roadside, the cumulative amount of utility infrastructure will result in an adverse impact. This area requires extensive landscape mitigation, without which an undue adverse impact will result. Moreover, VELCO's proposal for selective clearing means that one does not know, after clearing, what planting will be left. DPS-DR-1 at 10; Raphael, surreb. at 2.

b. To avoid an undue adverse impact in this location, VELCO should take all of the following mitigating actions:

i. Set the poles back from the Whipple Hollow Road crossing where currently a structure sits right next to the road. Exhibit DPS-DR-1 at 10-11. VELCO witness Terry Boyle agrees with this step and in rebuttal testimony offered pole locations for the new line set back from the road. Boyle, reb. at 4; VELCO Exhibit TJB-Reb-1-2.

ii. Create a short hedgerow or use street type plantings to "plug" the road crossing on either side, de-emphasizing both the poles and the crossing. This recommendation has not been and must be implemented by VELCO. Exhibit DPS-DR-1 at 11; Boyle, reb. at 4-5; Raphael, surreb. at 2.

iii. Providing additional screening for the substation, perhaps along the access

road to the facility. VELCO has not and must be required to implement this recommendation. In situations such as these additional screening is warranted because the addition of more structures with the second set of lines increases the visual impact and the degradation of the character of the area when added to the poles and structures which already exist. Exhibit DPS-DR-1 at 11; Raphael, surreb. at 2.

(b) Brandon to Salisbury (345 kV Line)

256. Mile 12.1 Otter Creek Crossing at Champlain Street/Route 73 (Brandon):

a. This crossing is over and through a scenic river corridor and in the vicinity of a well traveled road with riverbank, meadow and hillside viewsheds. The addition of the second larger pole structure will create an adverse impact through a more visual intrusion to this landscape, which is, except for the existing line, a beautiful, undeveloped river valley landscape. This additional pole and associated lines as well as the clearing required will not fit within this landscape. The change in the landscape in this well traveled corridor will shock the daily traveler initially upon seeing it. Exhibit DPS-DR-1 at 11.

b. VELCO, in its rebuttal testimony, adopted mitigation measures proposed by Mr. Raphael to ensure that no undue adverse effect will result:

i. Setting existing and proposed poles back from the road to the north; and

ii. Creating a short hedgerow as well as river bank plantings derivative of surrounding species on Otter Creek in the vicinity of the "cut."

Exhibit DPS-DR-1 at 11; Boyle, reb. at 5; VELCO Exhibit TJB-Reb-1-3; Raphael, surreb. at 2.

c. The relocation of structure 145, shown as a potential relocation by Mr. Boyle, is important to achieving adequate mitigation and should be required by the Board. Raphael, surreb. at 2.

257. Miles 13.6 to 14.0, Vicinity of Arnold District Road (Brandon):

a. This is a highly scenic area with a rolling pastoral landscape and open views. Historic buildings are in the vicinity complement the overall nature of this area as classic Vermont landscape. The addition of the new poles and corridor with the increase in the width of the cut will adversely impact this area. Without sufficient mitigation, the impact will be undue adverse. Exhibit DPS-DR-1 at 12.

b. All of the following mitigation measures are necessary and effective to avoid an undue adverse conclusion: Ensuring that existing and proposed poles are relocated/located back from the roadside and the cut descending from the north is screened with hedgerows. Street tree planting would complement the fenceline and distract and buffer the viewer from the line's impact. Exhibit DPS-DR-1 at 12.

c. VELCO's rebuttal testimony does not fully implement the foregoing recommendations. At Arnold District Road the proposed mitigation shown on TJB1-4 does not go far enough to the north. The plantings should be large tree plantings (not apple trees) continued to the north on both sides of the road, for approximately another 150 to 200 feet. Raphael, surreb. at 2.

258. Mile 16.2 to 16.7 Leicester-Whiting Road (Leicester):

a. The area in the vicinity of the Leicester-Whiting Road, a highly traveled road, is open and agricultural in character. As with many of the road crossings in this section, the additional lines and H-frame poles approximately 27 feet higher will create a cumulative and adverse impact that is excessive and out of harmony with the surroundings. Compliance with the Quechee test can be achieved with sufficient mitigation. Exhibit DPS-DR-1 at 12.

b. A section of hedgerow planting adjacent to the corridor crossing and trees lining the road as in the classic row of maples along many a Vermont road will collectively address the mitigation requirements. The screening of the side by side pole assemblies is warranted to avoid an undue adverse determination. Screening should be either at the poles to soften their presence, or off site with permission from landowners. Exhibit DPS-DR-1 at 12.

c. VELCO's rebuttal testimony does not correctly implement the foregoing recommendations.

i. The proposed use of shrubs will not satisfactorily screen the towers so close to the road. Two alternatives would be: 1) use columnar trees or 2) move the distribution poles off the road to allow for full street trees.

ii. Minimal mitigation is shown on the north side of the road.

iii. Proposed street tree planting should be extended further to the west to effectively screen the views of the existing and proposed H-frame structures.

Raphael, surreb. at 3.

259. Mile 18.0 to 20.0, Vicinity of Route 7, including West Salisbury Road (Leicester/West Salisbury):

a. This area is the first section in this part of the corridor along Route 7 (Miles 18.5 to 19.9). An open wetland and meadow landscape will be impacted. This area is an important wetland and wildlife environment adjacent to the Brandon Swamp Wildlife Management Area. Currently, the 115 kV line constitutes an intrusion into the Route 7 viewshed. The addition of the second set of structures and lines will result in a considerable additional impact that exacerbates the fact that the corridor runs through the middle of the open space and is an interruption in the sweep and flow of this landscape with its foreground and mid-ground presence. Exhibit DPS-DR-1 at 13.

b. Additionally, the crossing of West Salisbury Road will undermine the pastoral and aesthetic qualities of this open, managed area. These additions will further contrast with the aesthetic qualities of this highly visible section and will result in an adverse impact. As proposed, the doubling of pole structures will be offensive to the average person because the additional visual intrusion will add to the impact on the scenic and natural qualities of the area. This factor, without sufficient mitigation, will result in an undue adverse impact. Exhibit DPS-DR-1 at 13.

c. As depicted in VELCO's design details filing, VELCO's proposed plantings along Route 7 south of the West Salisbury Road intersection and north of the same intersection are insufficient mitigation to avoid an undue adverse impact. In the immediate vicinity of the intersection and on West Salisbury Road, the mitigation measures proposed are sufficient to avoid an undue adverse impact.

i. The plantings along Route 7, both south and north of the intersection, will be less effective, particularly in winter, in sufficiently screening the two sets of poles and associated elements, particularly along the lengthier stretch of the highway south of the intersection. Further, VELCO's Exhibit TJB DD-2, Section 1-H3 shows extensive gaps in the plantings.

ii. The street tree plantings around the intersection work more effectively, as shown in VELCO Exhibit TJB DD-2, Section 1-D3; in this short section effective mitigation to satisfy Quechee has been achieved.

Raphael, design details pf. at 2-3.

d. An undue adverse impact can be avoided by relocating both lines through this area so that they are closer to the edge of the open area along the treeline or through patches of woodlands to provide screening. This would provide an effective backdrop for even the double set of poles. Any tangent structures could be located to the north of W. Salisbury Road and effectively screened using willow type plantings. The relocation option includes poles 207 to 226. Exhibit DPS-DR-1 at 13; Raphael, surreb. at 3, design details pf. at 3.

260. Mile 20.5 to 20.9 at Kelly Cross Road (Salisbury):

a. The sections of the corridor next to the residences along Kelly Cross Road and running parallel to the Salisbury Elementary School are both very sensitive areas and warrant consideration of several mitigation measures. There is an existing hedgerow along the current transmission corridor which, in part, screens the school from the existing corridor. If some of this is lost, as VELCO indicates it will be, and the vegetation removed from the areas around the houses, a dramatic and

untoward change will occur resulting in an undue, adverse impact. Exhibit DPS-DR-1 at 14.

b. Implementation of both of the following mitigation measures will enable this section to comply with the Quechee test:

i. Retention of the existing hedgerow at the school, extending it and adding evergreens; and

ii. Extensive new screening and hedgerow plantings both along the road to "plug" it and adjacent to the residences.

Exhibit DPS-DR-1 at 14.

c. The mitigation proposed by VELCO in its rebuttal testimony does not appropriately implement the foregoing recommendations. Exhibit TJB-Reb-7 indicates that plantings useful for screening under the current corridor are going to be removed. It is difficult to understand why VELCO proposes hedgerows elsewhere (e.g. at Leicester-Whiting, Exhibit TJB-Reb-1-5) but not here. Hedgerow plantings would be useful mitigation in this location. Raphael, surreb. at 3-4.

(c) Middlebury to New Haven (345 kV Line)

261. Mile 24.5 to Mile 24.9, Route 125/East Main St. crossing and "gateway" to a designated Vermont Scenic Highway and East Middlebury Village (Middlebury):

a. This area is well traveled and an important gateway to the Green Mountain National Forest and recreation areas, including Middlebury College's Breadloaf Campus and Snow Bowl Ski Area. Middlebury has planted trees along this section, which leads directly to one of Vermont's three designated scenic roads that begins within a mile from this point. There is also a memorial monument in the vicinity of Route 125. Exhibit DPS-DR-1 at 14.

b. Currently the area suffers aesthetically from the presence of the existing corridor as well as distribution lines. Its open nature with the mountain ridge beyond is sensitive to an increase in utility line construction, and any loss of existing

vegetation also will have an adverse impact. This area cannot absorb much more in the way of visual intrusions before they cause a noticeable distraction from the potential scenic experience. The addition of a new line creates a cumulative impact that is adverse and will be offensive to the average viewer. The increase in visual clutter will further deteriorate this area and, without sufficient mitigation, will result in an undue adverse determination. Exhibit DPS-DR-1 at 14-15.

c. With two qualifications, it appears that the mitigation for this area offered in VELCO's design details testimony is sufficient to avoid an undue adverse impact. The view and impacts looking east as one travels Route 125 are the most important view, as it is this orientation and travel route that constitutes a gateway to a scenic region. Based on the design detail provided, it seems apparent that this view will be improved, particularly if the vegetative plug remains in front of the new pole on the south side of 125, with the single existing 115 kV structure on the north side (rather than an additional new 345 kV structure), and with the undergrounding of the distribution lines. Raphael, surreb. at 3-4.

d. The first qualification is the need for a more panoramic view and simulation on Route 125 heading both west and east in order to fully ascertain the effectiveness of this mitigation approach. Raphael, surreb. at 3.

e. The second qualification is the proposed riser structure. VELCO should consider setting this back further from the road to reduce its prominence and visibility. Raphael, surreb. at 3.

Discussion

Given the qualifications stated by Mr. Raphael concerning his opinion on the Routes 125/7 intersection in East Middlebury, DPS urges the Board to give conditional approval to the alternative advanced by VELCO in its design details testimony that includes burial of distribution lines, with the conditions being that: (a) this area will be further reviewed in a post-certification proceeding; (b) in such proceeding, VELCO shall provide the panoramic view and simulation called for by Mr. Raphael; and (c) VELCO shall set the proposed riser structure further back from

the road unless, in such proceeding, it persuades the Board that Quechee is otherwise met.

262. Miles 28.5 to 31.1, Painter and Halpin Roads (Middlebury/New Haven):

a. Between Miles 28.5 and 29.0 the proposed line crosses Painter Road. The same sensitivity and concerns exist here as they do for many road crossings, as the line will emerge from a wooded section at mile 28.6 and continue to the perpendicular crossing. The line then continues north and begins to parallel Halpin Road prior to its crossing at Mile 30.1. At Mile 31.1 the line crosses River Road in New Haven and travels through a visually sensitive area of open cultivated lands as it then crosses the New Haven River. Exhibit DPS-DR-1 at 15.

b. The addition of the higher line with a massive pole will add to the existing disharmony and further impact the open and residential character of this area. This will result in an adverse impact and, without sufficient mitigation, an undue adverse effect will occur. Exhibit DPS-DR-1 at 15-16.

c. Mitigation measures to take in this area which, taken collectively, will satisfy the Quechee test include:

i. Matching poles which create some degree of order and repetition.

ii. Keeping pole structures set back from crossings.

iii. Creating hedgerow and/or evergreen "plugs" at the crossings.

iv. Setting up some street tree and possibly hedgerow plantings and individual screens at particular properties as necessary to suitably alleviate the visual impact in the sections adjacent to and crossing both Halpin Road and River Road in particular. Near to Halpin Road just south of the town line between New Haven and Middlebury there is the potential for substantial visual impact to three or four homes in the vicinity. The existing hedgerow on Halpin Rd. should be reinforced. Hedgerows along driveways and in back yards may help to deflect, in part, the visual impact by providing alternative elements in the landscape that distract from the presence of the lines and

towers. These mitigation measures will need to be carefully located with the involvement and consent of landowners.

v. Along River Road a hedgerow along the north side of the road for .2 to .3 miles is needed to change the focus of the viewer and partially screen the line.

Exhibit DPS-DR-1 at 15-16.

d. As to Painter Road, VELCO's response in its rebuttal testimony to the foregoing recommendations is insufficient. The Painter Road crossing requires hedgerows or evergreen plugs. Again, there are some locations where VELCO has agreed that planting hedgerows is effective (such as along Route 7, at Leicester-Whiting Road) and yet there are other areas like this location where it resists that approach. Raphael, surreb. at 4.

e. As to Halpin Road, VELCO's response in its rebuttal testimony generally follows the foregoing mitigation recommendations, except that there is no indication of screen plantings for individual back yards or at the crossing of the driveway, and such plantings should be proposed. Raphael, surreb. at 4-5.

f. As to River Road, VELCO's response in its rebuttal testimony to the foregoing recommendations is insufficient. Street tree plantings are needed to mitigate the view of the transmission line and corridor. In this regard, VELCO's concerns on the issue of plantings in agricultural fields are overstated:

i. The plantings proposed can be at the edge of the ROW and can be designed in a manner so as to not lose any appreciable arable land.

ii. Any loss of maneuverability for farm vehicles would be minor and the benefit of the aesthetic mitigation would outweigh any such loss.

Raphael, surreb. at 5.

263. Mile 35.0 to the New Haven Substation (New Haven):

a. At the crossing of Town Hill Road, which serves as a gateway to New Haven Village, the existing transmission line and the presence of several distribution lines

make for a cluttered roadside which will be exacerbated by the addition of a second, larger set of poles and conductors. From here the corridor continues to the New Haven substation through an open area which includes currently or formerly cultivated fields. The current transmission lines are visually prominent and the substation is out of character with the existing open agricultural landscape. Exhibit DPS-DR-1 at 16-17.

b. The substation will be expanded substantially. The substation itself today is less visually intrusive due to its size and scale but the proposed substation will have over five times the footprint. The line and expanded substation visible from Town Line Road will have an adverse impact. The substation's visual exposure to Route 17 will increase from approximately 200 feet to 600 feet in the horizontal dimension. The acreage required increases from 0.9 acres to almost 6 acres. Additionally, the vertical dimension will be altered with the addition of a number of new trestle type elements over 80 feet tall where presently the existing structures are only as high as 25'. This height is over triple the current height and will present a substantial and adverse visual impact. The substation's impact will be undue unless sufficient mitigation measures are implemented. Exhibit DPS-DR-1 at 16-17, 20.

c. Sufficient mitigation measures, all of which must be implemented to avoid an undue adverse determination include:

   i. Screening along individual properties is warranted in the Hunt Road vicinity. One potential mitigation option for this entire section would be to go to a new single pole with short enough spans and a particular clustered conductor array to prevent it from being much higher than the existing line; or two side by side single poles as more ideal above ground mitigation option. This would limit the right of way impacts and begin to partially address proximity issues to homes.

   ii. Roadside screening and hedgerows are warranted along the crossings and

near to them on both Hunt and Town Hill Road.

iii. Adequate mitigation of the substation will also require screening on its south and north sides with natural, gradual and gentle rises feathered into the surrounding landscaping and rising high enough to provide a suitable platform for establishing vegetative screening of the new expanded substation footprint and higher structures. A mixed, deep and dense hedgerow employing large caliper deciduous trees and suitably sized evergreens (10-12' and 12-14' minimum to begin with) planted on these rises will effectively mitigate the visual impact of the substation. Single species plantings should be avoided.

iv. On the north side of the substation, a natural, gradual and gentle rise should be constructed, which could start 100 feet in front of the substation and slowly increase to a height of four or five feet, with a steep drop on the substation side. This could be done outside of the root system and the canopy of the existing trees so that the trees could be protected.

v. Mitigation of the substation must be in concert with adequate mitigation of the 115 kV line proposed to come out of the substation and cross Route 17. See Finding 264, below.

Exhibit DPS-DR-1 at 16-17, 20; Exhibit DPS-DR-3; Raphael, surreb. at 6, design details at 4-5; 11/12/04 tr. at 107-08 (Raphael) (vol. 2).

d. The alternate substation location for the 345 kV facilities proposed by VELCO, and the alternate substation location proposed by New Haven, from an aesthetic would be preferable and easier to mitigate, but it does not appear that there would be a significant aesthetic gain or reduction of aesthetic impacts. Such proposals should be measured against their cost. The proposed expanded substation at the existing site can be adequately mitigated with the measures discussed above. Raphael, surreb. at 6-7, 13.

(d) New Haven to Ferrisburg (115 kV Line)

264. Mile 0.0 and the Vicinity of Route 17 and the New Haven Substation to Mile 0.4 (New Haven):

a. This area is a well traveled gateway to both New Haven Village and the Green Mountains, with highly valued scenic views both the Green Mountains and the Adirondacks. A scenic panorama emerges as the traveler heads west along this high point in the Town, and the open views are substantially undermined by the presence of transmission corridors and pole structures. Exhibit DPS-DR-1 at 19; Raphael, design details pf. at 6.

b. With respect to the proposed 115 kV line exiting the New Haven substation, the proposed higher (from 35 feet to 61 feet under the Original Proposal) and larger single pole structure, in concert with existing 115kV, will have a substantial impact as well to the height of land environment as the line approaches and crosses along Vermont Route 17. If this upgrade is constructed, the cumulative impact of the higher poles adjacent to the roadway and the expanded New Haven Substation will offend the sensibilities of the average person. Exhibit DPS-DR-1 at 19; Raphael, design details pf. at 6-7.

c. An undue adverse determination can be avoided in this location through the relocation of both the existing and proposed 115 kV lines to allow the view to "breathe" and not be compromised at the height of land of Route 17. The lines should be relocated to the west, within 50-75 feet of the existing treeline to take advantage of the treeline's backgrounding potential. Exhibit DPS-DR-1 at 19; Exhibit DPS-DR-4; Raphael, design details pf. at 7.

d. VELCO's proposal, in the Reroute Filing, to move to a side by side placement is not an improvement. The viewer will not see the benefit of this alteration and, if anything, it will present more of the towers and their mass to the viewer and add more structures to the open space. The matching of poles has better effect when looking at the line from a perpendicular perspective rather than head on. Further,

the overall impact on the skyline view is one of more structure, and more transmission elements in the landscape and viewshed. Two H-Frames side by side cross a threshold of size and scale which makes them much more evident and visually occupy more space. Exhibit DPS-DR-10 at 6.

e. VELCO's proposal, in its rebuttal and design details testimony, to move the proposed 115 kV line to the west is insufficient because it proposes to leave the existing 115 kV line in place. Under this proposal, traveling west, the viewer would experience the first line and its visual intrusion, and then within a matter of seconds at a speed of 45 to 50 miles per hour, the second line would be readily apparent along with its visual impact. By separating the corridors into two locations, the impacts have been extended over a longer distance, with 800 feet of visibility along Route 17 and an impact on the traveler for a longer period of time than would otherwise be necessary. Even with the poles set back further from the highway at the top of the rise, the mitigation will not be effective. Raphael, surreb. at 7-8, design details pf. at 7.

f. The proposal to relocate only the proposed 115 kV line also is insufficient because the proposal places the proposed line 200 feet away from the existing treeline and thus does not take advantage of the treeline's backgrounding potential. Raphael, design details pf. at 7.

Discussion

The Department urges the Board to require VELCO to relocate the existing and proposed 115 kV lines at the New Haven substation/Route 17 crossing as recommended by Mr. Raphael. While such relocation will entail additional cost, the cost would be on the same order of magnitude as for construction of new corridor, rather than the significantly greater expense of burial.

265. Mile 3.0 (approximately) to Mile 7.0 (approximately) (Vergennes/Ferrisburg): The Vergennes Reroute Proposal is a distinct improvement over the initial proposal insofar as

it avoids the Otter Creek Basin and the neighborhoods between the basin and the Comfort Hill area, locations that had the potential for an undue adverse impact from the NRP under Quechee. Exhibit DPS-DR-10 at 8.

Discussion

The Department's discussion of Vergennes and Ferrisburg addresses and advocates the NRP proposal as modified by the Reroute Filing. The Department believes such proposal is superior to the Original Proposal and should be adopted by the Board. Because Mr. Raphael did not find any areas of undue adverse impact along the Vergennes Reroute or the Ferrisburg Reroute, this brief does not address specific locations along these reroutes, except for the proposed Kayhart Crossing substation. DPS does recommend that VELCO implement the mitigation measures cited as desirable for those areas by Mr. Raphael. See Exhibit DPS-DR-10 at 14-35.

Should the Original Proposal through Vergennes and Ferrisburg's Little Chicago Road be required by the Board, the Department contends the Board should require the mitigation measures recommended by Mr. Raphael. See DPS-DR-1 at 20-24.

266. Mile 7.0 (approximately) to 13.3, including the Ferrisburg Substation, Little Chicago Road, and the Slang (Vergennes/Ferrisburg):

a. At the Kayhart Crossing substation, recommended mitigation measures include screening, long spans, and careful pole placement to the periphery of the driver's view. Exhibit DPS-DR-10 at 31.

b. The Ferrisburg Reroute (Little Chicago Road) represents an improvement because it has less impact on residences. Exhibit DPS-DR-10 at 8.

c. The road crossing at Long Point Road adjacent to the Ferrisburg Substation is aesthetically sensitive and, without appropriate mitigation, will result in an undue, adverse aesthetic impact. Exhibit DPS-DR-1 at 24.

i. The substation will be expanded 0.33 acres with some additional new structures. Improved screening is appropriate here for both the substation and the routing around the existing substation. Exhibit DPS-DR-1 at 24.

ii. The line corridor alignment along the railroad right of way is an improvement, but at the crossings and at the substation sufficient mitigation must be employed to avoid an undue determination. Exhibit DPS-DR-1 at 24.

iii. Sufficient mitigation measures to achieve compliance with the Quechee test include the following:

(1) Maintenance of as much of the existing vegetation as possible. Some offsite screening should occur west of the substation and east and west of Long Point Road, and will require property owner permission particularly at the substation and at Long Point Road.

(2) Substation screening on all sides is necessary along with plantings as Long Point Road approaches the corridor from either direction.

(3) At road crossings, provide judicious and well placed screening to distract and buffer the viewer from the impacts of the poles, lines and substation.

Exhibit DPS-DR-1 at 24-5.

iv. VELCO's rebuttal testimony does not completely implement the foregoing recommendations. Street tree plantings along the road in both directions, and on both sides of the road, are not proposed. There are no plantings proposed except at the substation itself and along the railroad. The proposed row of cedars on the east side of the railroad right of way will address concerns for westbound travelers and their view, but roadside plantings on the west side as one approaches the substation and corridor are still needed, as well as at the substation site itself. Raphael, surreb. at 8.

d. With respect to the Slang, adequate mitigation would be achieved through careful execution of the setback of new poles proposed in the Design Details Filing, reduction of the extent of the proposed clearing to retain more existing vegetation to provide screening, pole height reductions, and the addition of native plantings along

the banks, which will de-emphasize the pole structures and eventually screen them from boaters, who are low in the water to begin with. It will be important to know exactly how much existing vegetation will be removed and how much will be retained. The most critical point will be the additional plantings along the banks. Raphael, design details pf. at 8; 11/9/04 tr. at 62-65 (Raphael) (vol. 2).

(e) Charlotte to Mile 21 in Shelburne (115 kV Line)

267. Mile 13.3 to Mile 20 (Charlotte):

a. Under the Original Proposal, the railroad alignment continues through Charlotte and into Shelburne. A continuous planting buffer, which exists in many stretches along the rail line, helps to soften the visual impact of the existing line. Road crossings in this area are sensitive and there are other areas which warrant mitigation. Removal of the existing 34.5 kV transmission line to accommodate the new, higher, line may result in wider clearings in some locations and will have a visual impact to adjacent residences and other uses and at some road crossings.

b. The sensitive areas in this part of the corridor include:

i. The Thompson's Point Road crossing.

ii. The area around the Charlotte Train Station and the Waldorf School, at the crossing of Ferry Road, with its nearby residences, conserved lands of the Knowles Farm, potential West Village area, and proposed recreation path. This is an important road traveled by many visitors to the state as it leads to the ferry; it is also a gateway to the village. Distribution lines presently clutter the landscape in this area.

iii. The line corridor in the vicinity of and crossing Greenbush Road, a scenic road.

iv. Scenic areas and preserved lands located to the west of Route 7, particularly the scenic overlook as well as to conserved lands west of Greenbush Road. The proposed heights of the new poles and conductors

will also cause the line to be visible from these areas.

Exhibit DPS-DR-1 at 25, 103; Exhibit DPS-DR-10 at 6; Bloch, reb. at 1-2 (Knowles Farm).

Discussion

Below, the Department proposes findings regarding aesthetic mitigation for the above-described sensitive areas, with the exception of the Ferry Road crossing near the Waldorf School. The design details hearings for that crossing are yet to occur and, by order of October 21, 2004, briefs on the Ferry Road crossing are due on December 17, 2004. The Department will address mitigation for the crossing at that time.

268. At Thompson's Point Road, sufficient mitigation to meet the Quechee test includes setting the poles back from the crossing with perpendicular screening along the roadside and street tree plantings as a distraction and buffer. VELCO's response to this recommendation, contained in its rebuttal testimony, is satisfactory only in part because of the lack of street trees, which should be planted on both sides of the road. Exhibit DPS-DR-1 at 26; Raphael, surreb. at 8.

269. As to the Charlotte substation, under the Original Proposal, the Quechee test will be met if the Board requires suitable screening to address the footprint increase of 0.39 acres and the expansion to the north and west. VELCO should use a mix of species and some irregularity in plant placement as opposed to purely linear and single species planting plans. Exhibit DPS-DR-1 at 26.

270. The proposal, under the Reroute Filing, to move the Charlotte Substation is an improvement because it takes the substation and its associated elements off of the roadside where it is highly visible and an intrusion on the aesthetic character of the neighborhood. A restoration plan for the current substation site, if it is abandoned, needs to be developed. However, the proposal would create some visual impacts for the residences on Lynrick Road. An undue adverse effect on these residences can be avoided through proper screening and appropriate measures to address any lighting impacts. Exhibit DPS-DR-10

at 6; 6/17/04 tr. at 82-3 (Raphael) (vol. 1).

Discussion

DPS includes proposed findings on the Charlotte substation because it understands that the Ferry Road crossing is a subject of the design details phase and the substation is not. To the extent evidence is submitted concerning the location of the Charlotte substation during the upcoming hearings on Ferry Road issues, DPS reserves the right to address such evidence in its briefs on those issues.

271. In the area of Greenbush Road and the nearby conserved lands:

a. The visual impact can be mitigated by setting the poles back from the crossing, and planting screening at the crossing and along the road, and pole placement and if necessary lowering pole heights to reduce interference with the view of the Adirondack panorama and pole visibility from the Demeter Farm. Exhibit DPS-DR-1 at 26; Raphael surreb. at 8.

b. In its rebuttal testimony, VELCO implements Mr. Raphael's overall recommendations. However, a critical concern here is placing poles so as to minimize their visibility from the Demeter Park view from the brow of the hill west of Route 7. This placement need to be planned on paper and then confirmed in the field with a means of testing actual proposed pole locations to ensure that screening or buffering that exists is used to the fullest extent possible. Raphael, surreb. at 8-9.

Discussion

The Department urges the Board to include, as an express part of post-certification review, careful focus on pole heights and placement in the area of Greenbush Road, including the planning and field confirmation recommended by Mr. Raphael.

272. Mile 20 to 21, including Bostwick Road bridge (Charlotte/Shelburne):

a. This mile long stretch of the corridor continues to follow the rail line into

Shelburne and includes a sensitive crossing at Bostwick Road which will result in an adverse impact determination to the scenic and gateway quality of the area. Appropriate mitigation is necessary. Exhibit DPS-DR-1 at 26-7.

b. With one reservation, discussed immediately below, VELCO in its Design Details Filing has prepared an effective mitigation plan for this area, which includes a combination of distribution line burial and street tree plantings. Raphael, design details pf. at 11.

c. Additional work is required to mitigate the potential effect of clearing on Meach Cove Road's east side at Bostwick Road. Tree retention should be maximized in this area, with exceptions made if necessary to standard practice for ROW clearing width and the removal of critical buffering trees. The health of the trees should be assessed by a qualified arborist and analysis made of how trees and branches fall. Tree removal should be limited to diseased or otherwise compromised trees and if necessary critical screen trees should be cabled or guyed to keep them from falling onto the conductors. VELCO should consider a "vegetative plug" or screening at Meach Cove Road's east side at Bostwick Road. Raphael, design details pf. at 11.

d. At the bridge, the line does not unduly affect the westward view of travelers, as they do not really have the broad expanse of the view until they have cleared the bridge, because of orientation and vegetation on either side. Raphael, design details pf. at 11.

e. Traveling northeast along Bostwick Road, there are lines of existing small trees which effectively mitigate the current line and will continue to do so if the upgrade is constructed. Raphael, surreb. at 9.

f. While the upgrade as proposed will result in an adverse impact, the following will result in avoidance of undue adverse impact: careful pole placement, lower pole heights, retention of as much vegetation at the edge of corridor as possible, the presence of background vegetation and other landscape elements in the corridor, and proposed plantings. Raphael, design details pf. at 12.

273. Throughout this section of the corridor, it will be important to maintain as much of the existing vegetation as possible. Exhibit DPS-DR-1 at 26.

(f) Shelburne (Mile 21 to 24) (115 kV Line)

274. The corridor will be located in a densely developed area with many residences, a school, a park, open space, and other land uses. Exhibit DPS-DR-1 at 27.

275. Under the Original Proposal, at Mile 21.0 the route of the corridor leaves the rail line ROW edge and proceeds through a mixed landscape to a point at mile 21.5 where it crosses McCabe Brook and enters a densely settled and developed area. It then continues through to Mile 22.3. Within this area, serious impacts will accrue from higher poles and additional clearing in the vicinity of Heritage and Fletcher Lanes and the road just to the north. The increase in pole height, the resultant loss of existing mature vegetation and the lack of sufficient mitigation measures in this area all combine to suggest an undue adverse impact. The change is substantive enough to offend not just the residents, but a reasonable average person observing the before and after conditions. Exhibit DPS-DR-1 at 27-28.

276. From an aesthetic perspective, the Shelburne Reroute would constitute appropriate mitigation to the impacts of the Original Proposal stated in Finding 275, above, because its takes the line away from the densely settled neighborhood adjacent to Davis Park. However, the Shelburne Reroute raises significant concerns respecting wetland impact. Exhibit DPS-DR-10 at 8; Quackenbush, pf. at 3.

277. Like the Shelburne Reroute, the Meach Cove Reroute is west of the Heritage and Fletcher Lane area and therefore moves the line away from these residences. See Finding 27, above.

278. The Meach Cove Reroute is the preferred alternative. The visual impacts of that reroute will not be unduly adverse provided that appropriate mitigation measures are taken, including careful pole placement, reduced pole heights, adequate screening, and careful clearing of existing vegetation. The least amount of clearing that is absolutely necessary must be enforced to ensure that the visual impact will be minimized. 6/17/04 tr. at 85-6

(Raphael) (vol. 1); Raphael, surreb. at 9, 14.

279. VELCO proposes to use lower pole heights along the Meach Cove Reroute, which will reduce any impacts to Shelburne Museum and Shelburne Farms. Boyle, reb. at 17.

280. There is no visual effect on any building or structure at Shelburne Farms. Henry and Boyle, reb. at 3.

281. Visibility of the proposed 115 kV line from the Ticonderoga at the Shelburne Museum will be minimal. Exhibit VELCO-Cross-Ehrlich 2 at 56.

282. By Mile 22.3 a new corridor location is established which has some benefits but also some significant impacts, especially to open space along Depot Road where an important agricultural landscape exists, helping to define the edge of Shelburne Village.

a. At mile 22.3,the line heads easterly along an existing treeline at the edge of cropland; it runs along the field edge to Mile 22.7. This is a highly sensitive area because it is an open undeveloped agricultural area, which counters and buffers the denser development to the east, west and south.

b. The substation at Mile 22.1 also will be expanded. The existing substation of .10 acres will be increased substantially to almost half an acre. As proposed under the Reroute Filing, the expansion represents no significant change from the original proposal, although there is less impact to the Haul Road.

c. Due to the change in character and the visual intrusion of new lines where they were not in the section from mile 22.1 to mile 22.8, this proposal will offend the sensibilities of a reasonable person and must be mitigated to avoid an undue determination.

d. Once the proposed line rejoins the rail corridor (mile 22.8) this section has substantially less impact due to the fact that it is along the existing corridor, travels past industrial uses, and is not visible from highly used areas. This assessment considers that there is a natural area adjacent to this stretch of corridor.

Exhibit DPS-DR-1 at 27-9; Exhibit DPS-DR-10 at 8.

283. At Mile 23.8, the corridor will have an adverse affect on an existing residential area off of

Bay Road and then cross Bay Road where it will be closest to the shore of Lake Champlain. This is not a highly scenic area and the existing context does include an array of existing poles and wires associated with transmission and distribution lines. However, with the cumulative development and its impact on the residential and lakeshore character of the area, the transmission line if built will exceed the threshold of undue adverse unless sufficient mitigation is required. Exhibit DPS-DR-1 at 29; Raphael, design details pf. at 12.

284. In addition to the Meach Cove Reroute discussed above, mitigation measures necessary to meet the Quechee test in this section of the proposed corridor include:

a. Use compact configurations to lower pole heights to 51 or 46 feet. This would be desirable even if it meant more poles. Reducing the number of poles in certain instances is a positive improvement, but not at the expense of such higher and more massive structures when they are very close to the viewer or within 50 to 60 feet of the viewer or a residence.

b. Place poles so that they are not directly in front of residences.

c. Retain or replant buffer vegetation.

d. Between Mile 22.3 and 22.7, using the compact configurations to lower pole heights would constitute a vast improvement and allow the treeline to "catch up" with the heights of the poles in a shorter time span, allowing sufficient backgrounding and eventually avoiding the skylighting effect. Darker pole colors will also be needed in this stretch of corridor.

e. At the substation, sufficient screening is necessary to reduce its presence in the landscape. VELCO's proposal for the substation contained in its rebuttal testimony (VELCO Exhibit TJBA-Reb-2-6) is sufficient with the qualification that large street trees should be planted in this location.

f. In the vicinity of Turtle Lane, place poles carefully to reduce visual impacts, locating them away from the traveled area, buildings and outdoor spaces.

g. At Bay Road, bury the distribution lines and install the mitigation plantings as

proposed by VELCO in the Design Details Filing (distribution burial option). Exhibit DPS-DR-1 at 28-9; Raphael, surreb. at 9, design details pf. at 12.

285. Screening will be desirable to reduce the visual impact to the view from the Arbors development across the meadow. DPS-DR-10 at 47; Raphael, surreb. at 14.

(g) Shelburne to South Burlington (Miles 24 to 27.1) (115 kV Line)

286. In this section, the line will follow the existing transmission line and railroad corridors. It traverses mixed industrial/commercial and residential development areas. Road crossings are a concern, particularly in the vicinity of Champlain Drive, Wild Rose Court to Windmill Bay Road and the mobile home court beyond. Bartlett Bay Road crossing is also sensitive; however, because this is primarily an industrial area, the potential impacts are lessened. There also is the potential for impacts behind some of the residential projects such as the Landings and the Shelburne Bay Assisted Living Complex. There will be adverse impacts with increased pole heights and the visibility of the conductors. Exhibit DPS-DR-1 at 29-30.

287. This area has long had a utility and transportation corridor running through it. The height of the poles will not increase where they are currently visible from the Lake. The visual impact from the Lake, although of concern, is lessened by the fact that this is not a pristine or natural area. While recreational opportunities on the Lake represent a significant public resource, this area has long been densely developed and the view from the water includes those existing visual conditions along the eastern shore of Shelburne Bay. Exhibit DPS-DR-1 at 30.

288. The Queen City substation is slated to double in size from approximately 0.8 acres to 1.5 and this expansion will result in an adverse impact, particularly with the lack of proposed screening. Exhibit DPS-DR-1 at 30.

289. VELCO's rebuttal testimony does not demonstrate sufficient screen plantings at the Queen City substation. Raphael, surreb. at 10.

290. The following mitigation measures are necessary to avoid an undue adverse determination

in this area:

a. Throughout this section sufficient screening and sensitive pole placement is warranted to avoid blocking views and offending residents. Poles should not be near road ends.

b. Vegetative "plugs" or screening should be installed where possible at road crossings. Pole setbacks are also important.

c. Carefully placed and/or constructed berms and plantings should be installed at residential sites where apartments, multifamily or condominium units are present. Coupled with plantings, these berms could hide poles, focus views and distract the viewer from the impacts of the line darker pole colors and should also help de-emphasize the structures.

d. Extensive and creatively laid out screen plantings at the Queen City Substation on at least three sides should be installed to screen the substation from the traveled way.

Exhibit DPS-DR-1 at 30-1.

(h) Granite Substation

291. The Granite Substation will be expanded from 4.7 acres to 6 acres with the increased footprint expanding to the southwest. The additional structures will not be higher than the existing elements at approximately 65 feet. An existing screen of primarily deciduous vegetation will be lost with the new footprint expansion and will increase the visibility of the substation for residents to the south on Baptist Street. Exhibit DPS-DR-1 at 131.

292. The increase in size is significant, and has an adverse visual impact. Mitigation is warranted. If implemented, the mitigation measures discussed immediately below will ensure that the expansion does not result in an undue adverse impact on aesthetics. VELCO should install a more dense and mixed height screen of plantings to the south and east. VELCO should install, if permission is granted, on-site screening at the nearby private residences to alleviate the increased visual impact of the substation. This is particularly

the case with regard to the nearest residence where screening along the property line such as a dense hedgerow would be partially effective. Exhibit DPS-DR-1 at 131.

293. With respect to the Granite substation, VELCO plans to install an earthen berm with a stockade fence on the south side of the substation. VELCO will move the proposed retention pond closer to the station in order save existing trees to the south. Also, VELCO and affected property owners are working to reach agreement on adequate mitigation and VELCO will be submitting a further plan for proposed aesthetic mitigation for the Granite substation based on discussions with the affected property owners. 11/8/04 tr. at 11-12, 15 (Gagnon), 26, 34, 36-7 (Dunn) (vol. 1) and at 42-3 (Boyle) (vol. 2).

294. The Board should assess the effectiveness of aesthetic and noise mitigation measures at the Granite substation after they are installed. VELCO will perform additional mitigation if necessary. 11/8/04 tr. at 16 (Gagnon), 34 (Dunn) (vo1. 1).

3. Findings of Fact: Overhead Mitigation Design Alternatives and Plantings

295. With respect to the 115 kV line design, options exist that are variations on the single pole design proposed by VELCO that could be used to address aesthetic impacts where needed:

a. Option 1 includes reducing the span length or length between the structures. If one assumes that the 61 foot poles contained in the Original Proposal correspond to a span distance of 430 feet, reducing the span to 300 feet, with no other changes, can reduce the required pole height pole height to 55 feet, a reduction of 6 feet.

b. Option 2 includes reduction in pole height above the topmost phase conductor attachment. In areas where spans are 300 feet or less, for both delta and vertical configurations, an additional 4 feet of pole could be eliminated above the brace attachment of the top insulator. VELCO's proposed design, as shown in the Design Details Filing, extends the pole approximately 4½ feet above this attachment. Where longer span lengths are used, this distance allows clearance for wind induced galloping and conductor motion due to ice release. This distance also allows ample shielding for lightning protection. Reducing the height above the top

attachment by 4 feet would change the lightning shield angle from approximately 30 degrees to approximately 45 degrees. While a 45 degree shield angle offers somewhat less lightning protection than a 30 degree shield angle, 45 degrees is the level employed on the H-frame construction presently used on most of the VELCO system. Given that the VELCO system experiences lightning outages on the order of one per mile per 100 years, the increased shield angle, for a few spans in selected areas, should not have a significant adverse impact on reliability.

c. Option 3 includes reduction of the vertical distance between the conductors on the same side of the pole for delta configured structures. Where spans will be 300 feet or smaller, there is less concern with conductor motion due to wind induced galloping and ice release. In these situations, for the proposed delta configurations, the vertical distance between the conductors on the same side of the pole can be reduced from 15 feet to 8 feet, thereby providing an additional pole height reduction of 7 feet.

d. Options 1 through 3 can be combined on the same structures if they are delta configuration. Options 1 and 2 can be combined on the same vertical configuration structures.

e. Option 4 is increasing the pole height, thereby increasing the height of conductors above the ground, if needed, to reduce the removal of trees needed for visual screening.

f. Option 5 is using Corten steel poles where pole color is important and can provide long term consistency of color where it is important to blend with the surrounding view.

Smith, pf. at 23-4, design details pf. at 4-5; Towns Cross Exhibits 320, 321.

296. The foregoing Options 2 and 3 for 115 kV structure design can be applied over short segments of the line. Application of Options 2 and 3 to large sections of the line from New Haven to Queen City could have an adverse effect on reliability and is therefore discouraged. These options should be applied only to those particular sections where

aesthetic mitigation requires the lowest possible pole heights. Before implementation of Options 2 and 3, studies should be done related to ice unloading, wind galloping, and lightning protection. Smith, pf. at 25; Towns Cross Exhibit 320; 11/9/04 tr. at 14 (Smith) (vol. 2).

297. Where reduction of corridor width on the 345 kV line is necessary to address aesthetic impacts, several alternatives are available (examples and possible configurations shown on Exhibit DPS-GS-2):

a. Option 1 is to reduce the clearance between the new proposed 345 kV H-frame and the existing 115 kV circuit. By more closely spacing the circuits, a reduction of up to 25 ft. in corridor expansion can be achieved while maintaining the low profile H frame design. Cost would not be affected. A possible disadvantage that requires further investigation is the impact on maintenance. Option 1 is recommended for either limited sections or more extensive portions of the line since there is no significant cost impact. Attention would need be paid to impact on maintenance procedures.

b. Option 2 is to use a single pole delta configuration for the 345 kV circuit. The required corridor expansion is reduced by on the order of 60 feet (40 feet additional required). This amount of corridor reduction assumes a level terrain cross section perpendicular to the line. Assuming spans are the same as for H frame, pole height is significantly higher. The added pole height could be reduced by shortening the spans. Estimated cost will be somewhat higher than for the proposed configuration. Danger trees will require additional consideration. Option 2 is recommended for specific locations where further corridor reduction is desired.

c. Option 3 is to use a single pole vertical configuration for the 345 kV circuit. The required corridor expansion is reduced by on the order of 90 feet (10 feet additional required). This amount of corridor reduction assumes a level terrain cross section perpendicular to the line. The corridor expansion is reduced by

approximately 90 feet but pole heights are even greater than those of the immediately preceding option. Due to its added pole height, and cost, Option 3 is not recommended except for locations where only a few structures are required.

d. Option 4 is to use a single pole delta configuration for the 345 kV circuit and rebuild the 115 kV circuit to a single pole delta configuration. This configuration potentially eliminates the need to widen the corridor while providing the reduced pole height of Option 2 above. Matching spans could be used if desired. The 115 kV circuit would resemble that proposed by VELCO for the New Haven to Queen City corridor. There would be an added cost impact on the order of $250,000 per mile over Options 2 and 3. Where substantial corridor reduction and/or aesthetic improvement is needed, Option 4 is recommended on a limited basis due to its substantial cost impact.

Smith, pf. at 26-9.

298. The foregoing 345 kV design options can be applied to some portions of the circuit while retaining the proposed design for the other portions. Smith, pf. at 28.

299. Non-specular conductor is available from the major manufacturers of aerial bare conductor. The non-specular properties of the conductor are obtained by utilizing an acid wash after stranding. This process accelerates the dulling of the conductor finish which is otherwise caused by exposure to the elements in the first year or two after installation. There appear to be no problems with the installation, operation, maintenance or life span of the non-specular conductor. According to Alcan, a major conductor manufacturer, the estimated cost premium for non-specular conductor ranges from of 2% to 3%, depending on conductor size. Smith and Litkovitz; reb. at 15.

300. Mr. Raphael's report includes a Plant Materials Guide, offered as an adjunct to the mitigation measures proposed above. Where vegetative screening is proposed as part of the mitigation options offered by the DPS, Mr. Raphael's list of planting options should be used in order to provide a wider range of options for effective landscaping. The plant materials listed in the guide will offer more diversity, and more options with regard to

height and density for screening, buffering and habitat values, than those offered by VELCO. Exhibit DPS-DR-1 at 147.

301. VELCO should explore the use of cultivars of the listed species to provide options where screening is required but height is an issue. For example, cultivars of Thuja Occidentalis, such as the 'Techny' variety, provide screening but typically will only grow to a height of 15 feet. Exhibit DPS-DR-1 at 147.

302. VELCO needs to employ the tallest shrubs possible where screening is proposed under lines. Examples are discussed in the Plant Materials Guide and Mr. Raphael's surrebuttal testimony. Exhibit DPS-DR-1 at 147-49; Raphael, surreb. at 10-11.

303. VELCO's proposal, in its rebuttal testimony, for a one year plant guarantee is not sufficient. As the plantings are critical components of the mitigation measures being proposed, VELCO must provide assurance that they will be established satisfactorily and maintained over time. VELCO should establish a relationship with a contractor who will monitor and oversee the success and establishment of plantings. VELCO should be responsible over the lifetime of the NRP for ensuring that the mitigation measures put in place are effective for the life of the project. Raphael, surreb. at 10; 9/22/04 tr. at 36-40 (Raphael) (vol. 1).

4. Findings of Fact: Lighting

304. With the expansion of existing and construction of new substations and consequent increase in fixtures, lighting is of concern with regard to those substations located in the vicinity of residential areas such as Charlotte (in the proposed reroute option), Ferrisburg and Queen City. The Shelburne and New Haven substation expansions are in locations where increased lighting will be potentially visible in the immediate environs and sky. The proposed Granite Substation is in a particularly rural area with no existing street lighting. DPS-DR-10 at 61.

305. VELCO should install sufficient screening coupled with non-reflective ground surface material that will minimize light trespass and night sky glow to an acceptable level in the

adjacent neighborhood. DPS-DR-10 at 62.

306. VELCO should employ reduced lighting levels (wattage), and aggressive cutoff technology, as well as light source shielding, to ensure that the methods employed will minimize light trespass and night sky glow to an acceptable level in the adjacent neighborhood. DPS-DR-10 at 62.

307. Based on the photometric plans submitted with the Design Details Filing, light trespass at the New Haven will be kept to a minimum and the distance from any potential viewers, along with existing and proposed screening, will be sufficient to address visibility and glare. Raphael, design details pf. at 6.

308. At the Granite substation, residences are much closer than the New Haven substation, and there is less screening. As additional plans are submitted for the Granite substation are submitted, lighting for this substation should be further reviewed. Raphael, design details pf. at 13.

309. In emergency situations when additional lighting is necessary, VELCO should take reasonable steps to shield lights from residences near a substation. Raphael, design details pf. at 6.

5. Findings of Fact: Noise

310. Noise mitigation is important and controlling noise is relatively easy to engineer. DPS recommends that the PSB require: (a) VELCO to perform pre- and post-construction noise analysis at all substations and other noise generators; (b) VELCO to include and implement appropriate noise mitigation measures in its NRP design. Mertens, pf. at 19.

311. VELCO specifically should provide, to both the Board and the Department before substation construction: (a) the baseline noise measurements at all of the NRP substations; (b) estimates of noise levels that could be expected after the project is constructed; and (c) VELCO's evaluation as to whether noise mitigation is required at any of the substations and the plans for undertaking this mitigation, including relevant sound level specifications for equipment including transformers, PARs, and dynamic reactive devices. In addition,

the Board should require post-construction noise measurements at substations as well as specified locations external to the substations to ensure that design specifications have been met. Further, the Board should retain jurisdiction to require VELCO to take all reasonable steps to address noise impacts and concerns raised by the public. Smith, pf. at 34-5.

312. VELCO's proposals, contained in its Design Details Filing, for mitigating noise at substations appear to be reasonable. Similar measures should be taken, as necessary, at the other NRP substation expansions. VELCO's proposals, however, are based on noise level projections. Therefore, once construction is completed and the substations are in operation, it would be appropriate for VELCO to verify the expected sound levels and to perform further mitigation as may be necessary. Smith, design details, pf. at 6.

313. Actual sound measurements should be taken, before and after construction, at the homes of potentially affected parties such as the Dexters and Gagnons (Granite substation). Dexter, design details pf. at 1.

Discussion

The Department urges the Board to require VELCO to take the steps, for all substations and noise generators, identified in the foregoing findings of fact. Reference also is made to Finding 294, above, which addresses additional assessment of the effectiveness of noise mitigation at Granite.

The suggested pre-construction analyses should inform post-certification review and potentially lead to specific noise mitigation requirements. The post-construction measurements should help the Board to verify whether the noise impacts are as expected and whether mitigation is sufficient.

Further, the Board should retain jurisdiction, for the life of the project, to require additional noise mitigation after opportunity for hearing.

6. Findings of Fact: Undergrounding of Transmission Lines

314. Under that portion of the Quechee analysis that asks, "Has the Applicant failed to take

generally available mitigating steps which a reasonable person would take to improve the harmony of the proposed project with its surroundings," a reasonable person would consider the costs and effects of proposed mitigation measures, include the cost of burial and the potential impact of burial on reliability of electric service. DPS-Cross-41 (Henderson-King); DPS-Cross-50 (Vissering), DPS-Cross-123 (Donovan).

315. Because of the significantly higher construction costs that Vermonters will be obligated to pay, including the cost of designing an underground system to reduce the potential for degrading the reliability of the bulk system, DPS supports using undergrounding as a solution for transmission lines only when other measures to mitigate aesthetic impacts are not viable. Mertens, reb. at 10.

316. Where two mitigation measures are sufficient to address a project's aesthetic impact, but one is far more expensive than the other, a reasonable person would opt for the least expensive effective measure to accomplish the mitigation necessary. Raphael, surreb. at 15.

317. With respect to burial of the proposed 115 kV line, to assure adequate system reliability, a four-cable system is preferred over a three-cable system. In the case of a three-cable system, failure of one cable can result in an extended circuit outage of up to two weeks (or even longer if sufficient spare parts are not on hand). The NRP, as presently designed, accounts for two extended outages, namely an outage of the Highgate converter and an outage of the PV20 transmission line. Use of a three-cable installation as part of the NRP would introduce a third extended outage scenario, one that was not considered in the proposed design of the NRP. To accommodate a third extended outage, a redesign of the NRP would be required possibly resulting in even further transmission additions. However, installation of a four-cable system on the proposed 115 kV line, in which an installed spare cable could quickly be connected in the place of a failed cable, could lead to circuit restoration times comparable to those of an overhead line. For this reason, a four-cable system must be considered a minimum configuration for undergrounding any portion of the proposed 115 kV line. Before proceeding with any underground solution, a detailed

engineering study would be required to ensure that adequate reliability and electrical performance would be achieved. This study would include verifying the feasibility of an expedient reconnection process with careful attention given to sheath bonding connections. Smith and Litkovitz, supp. pf. at 8-9.

318. A concern with reliability of buried transmission line is the ability to reclose. For overhead lines, when a temporary outage occurs, for example due to a lightning strike, automatic reclosing of circuit breakers would restore the line to service in a matter of seconds. Smith and Litkovitz, supp. pf. at 9-10.

319. Some utilities allow one reclosure on a 115-kV XLPE-insulated cable line that has an adequately sized shield/sheath assembly and proper bonding and grounding connections, and where the cable section is a small percentage of total line length, for example a 500-foot section as a dip for an airport runway in a 10-mile overhead line. A small percentage should be viewed as under a few percent of line length. In the proposed Vermont 115 kV undergrounding, approximately 33% of the segment is proposed to be undergrounded and this exceeds the reasonable limits. Additionally, utilities have ongoing concerns about manhole covers lifting during faults; a reclosing would increase that possibility - and the gases developed during the first fault might make the amount of released energy greater during the reclosing. Williams, surreb. at 6-7.

320. Applying reclosure to proposals to bury a total of approximately 33 percent of VELCO's proposed 115 kV line would not be good practice. Since the Vermont project would not be a good application for reclosing a circuit, every time the line trips, it would be necessary to investigate the cause and insure the failure was not in the cable section, before reclosing.

    a. One reclosing could be allowed if the underground 115 kV portion is a small percentage of the line length, e.g. 500 feet in ten miles as described above for a 115-kV system, if the cable shield/sheath bonding system is adequately sized, if it were certain that the controls in the substations would permit only one reclosing, and if the line does not have manholes located in populated areas.

    b. If the underground 115 kV sections were a significant length – more than a half mile

> – or in a populated area, reclosing is not recommended unless reliable relaying is present to verify that the failure was not in the cable section. This relaying requires current transformers, potential transformers, reliable communications, a power supply and a small enclosure to house the equipment, at every transition. Further, this equipment and enclosure must be placed within a fenced-in area at every transition that does not already occur within a substation. The simple transition structure that otherwise could be used for a 115-kV line would not be appropriate for this application.

Williams, surreb. at 7-8.

321. With respect to the 115 kV line, with careful engineering,[21] further expenditures, and the willingness to trade simple transition structures for more elaborate fenced-in areas containing a building and more equipment, reclosing could safely be performed for faults on the overhead sections of hybrid lines. If such reclosing could be performed, and a four-cable system were employed, this would resolve DPS concerns with the reliability of a 115kV hybrid line. Smith and Litkovitz, surreb. at 9.

322. VELCO's cost estimate of $2.9 million per mile for a 115 kV four-cable system is reasonable. This estimate includes use of a conductor size that would provide the same contingency overload capacity as the conductor to be used for the proposed overhead construction, and provisions for engineering cost, ROW clearing cost, sales tax on materials, and contingency. However, these estimates may be understated in that they do not include potential cost adders that could be required following a detailed engineering study. For example, if boring technology were required to minimize wetland or water course impacts or if special considerations were required for construction in railroad ROW, costs for this undergrounding would necessarily increase. Smith and Litkovitz,

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[21]Included in the engineering considerations is the fact that the introduction of cable into a transmission system can cause resonances and transient phenomena that can stress other electrical components in the system and cause harmful effects to customer loads. A detailed analysis would be required to determine any mitigative measures that may be required to ensure reliable performance of the interconnected system. Smith and Litkovitz, surreb. at 9.

supplemental pf. at 8.

323. Conductor size of the buried section should not be the limiting factor in the backbone transmission system. Where such a limit exists, typically at a future point one has to upgrade the limiting factor at significantly higher expense. 6/14/04 tr. at 72 (Smith) (vol. 2).

324. Between them, Charlotte and Shelburne seek burial of approximately 8.7 miles of the proposed 115 kV line. Aabo, pf. at 5; Dates, pf. at 3. Additional 115 kV burial is sought by New Haven and Ferrisburg. Exhibit NH Vissering-Reb-1 at 4; Donovan, design details pf. at 3.

Discussion

8.7 miles of transmission line burial at $2.9 million per mile is approximately $25 million.

325. Based on a chart supplied by VELCO with the Reroute Filing, the cost of the proposed overhead 115 kV construction is approximately $277,000 per mile. Dunn, supp. pf. at 15.

Discussion

8.7 miles of overhead transmission at $277,000 per mile is approximately $2.4 million. The Charlotte and Shelburne 115 kV undergrounding alone could therefore add roughly $22.6 million to Vermont's share of the NRP cost.

326. As to the reliability of buried 345 kV line, failure of a cable section or a splice can take a month or longer to repair; that outage time is generally considered too long for a major 345-kV transmission line and almost always represents an unacceptable solution.

a. In a 500 MVA XLPE design installed in ducts, installing a fourth conductor the full length, splicing and terminating the conductor, and making advance provisions for connecting it to replace a failed phase, will permit restoring the line to service quickly, within an 8-hour period. The line can then operate at full capacity until a scheduled outage can be taken to repair the failed cable or splice.

b. In a 1500 MVA XLPE design installed in ducts, two lines (two cables per phase)

would be required for that case, since a single line cannot carry 1500 MVA. Power transfer would be limited to somewhat more than 750 MVA if one line were out of service for a month. If one cable failed, it would take the utility as long as eight hours to identify the failed cable, remove that line from service, and re-energize the unfailed line. This time could be reduced by installing monitoring equipment and disconnects; this would add costs not included in 345 kV cost estimates provided in this case.

c. The foregoing does not apply to directly-buried cable, the failure of which would probably take longer than a month to repair, especially in wetland areas where access would be difficult.

Williams, surreb. at 5-6.

327. There is very little experience with 345-kV XLPE-insulated cables in this country; reclosing on this voltage cable is not recommended at all until more experience is gained with operating XLPE-insulated cables at this voltage. Williams, surreb. at 7.

328. In the absence of reclosure on a 345 kV line containing both overhead and underground sections, the result would be a system that is not as reliable as an all-overhead construction. Where reclosing is not permitted, faults that otherwise would result in outages of just a few seconds would now result in the loss of a line for several hours so that VELCO operators could determine whether the fault originated in the overhead or underground sections of the line. This change in reliability to the most important element of the NRP, together with the electrical characteristics of underground cable, would result in the need for further system studies and likely would result in the need for VELCO to reapply to NEPOOL for Section 18.4 approval. Further studies and a re-application for Section 18.4 approval would likely result in the delay of construction of the 345 kV line and could result in the need for additional elements to the NRP to satisfy reliability criteria. Smith and Litkovitz; surreb. at 5-6.

329. For burying approximately 1.5 miles of 345 kV line in the area of West Salisbury Road in Salisbury, an estimated cost for a 500 MVA design is approximately $6.8 million and for a

1500 MVA design is approximately $9.8 million. These estimates are based on a brief conceptual design using less costly XLPE cables and a minimal transition station design and excluding potential costs for directional drilling or other methods to account for the wetlands that exist in the area and potential archeological sites. Williams, surreb. at 3-4.

330. For burying approximately .5 miles of 345 kV line at the Routes 125/7 intersection in East Middlebury, an estimated cost for a 500 MVA design is approximately $4.1 million and for a 1500 MVA design is approximately $5.1 million. These estimates are based on a brief conceptual design using less costly XLPE cables and a minimal transition station design. This estimate assumes using a directional drill. Williams, surreb. at 4-5.

Discussion

When contrasted to Mr. Smith's estimate of roughly $600,00 per mile for 345 kV overhead, two miles of 345 kV burial as above could add approximately $10 to $14 million to the Vermont share of the NRP cost. With the 115 kV undergrounding proposed, this brings the potential additional Vermont cost for undergrounding to the neighborhood of approximately $35 to $40 million, and potentially more.

331. The minimal transition station design used in the foregoing 345 kV burial estimates conceptually would consist of fenced areas, a minimum 75 by 75 feet, requiring road access and requiring connection of alarms for the fluid levels in the terminations. Typically, a deadend structure would be installed on the overhead line, and leads installed to connect to the terminations that would be installed on substation-type structures in the station. Lightning arresters and removable links would be installed. These stations are large and could be difficult to site. Williams, surreb. at 4.

332. DPS used 500 MVA and 1500 MVA for conceptual 345 kV burial designs for the following reasons. First, an underground system rated for 500 MVA would likely have sufficient thermal capability to provide transmission service to northwest Vermont under the most severe contingencies. Second, 1500 MVA is a level that matches the thermal capability of the overhead 345 kV line, thereby preventing an underground section from

becoming the limiting element of the circuit. These levels were chosen as starting points for conceptual designs. The ultimate choice for the thermal capability of underground sections would require further analysis. Smith and Litkovitz, surreb. at 4-5.

7. Findings of Fact: Town and Regional Plan Provisions

333. The town plan provisions discussed in Section IV, above, concerning orderly development, are incorporated by reference. The section sets out additional town and regional plan provisions raised by parties.

334. The Rutland Regional Plan includes the following on energy goals:

Goal 2: To encourage the placement of energy facilities and transmission infrastructure in a manner consistent with local and regional goals and policies.

> Policy 1: Encourage the multipurpose use of existing utility corridors and the placement of proposed new or extended infrastructure in existing corridors, wherever possible.
>
> Policy 2: Support local efforts to include policies on the location and aesthetic impact of energy facilities and transmission infrastructure in their town plans.
>
> Implementation Statement 1: Encourage and promote the use of existing utility corridors, whenever possible, for the placement of transmission lines.
>
> Implementation Statement 2: Encourage towns to place necessary additional corridors along existing infrastructure and within designated, urban, town, village, commercial, and industrial land uses.
>
> Implementation Statement 3: Encourage the location of substations in areas suited for them, i.e., industrial areas or areas planned for industrial use, whenever practicable. When not practicable, the facilities should be sited as unobtrusively as possible.

Goal 3: For aesthetic and safety concerns, and for continuity of service, encourage the underground placement of energy and communication lines where possible and economically practicable.

Exhibit DPS-DR-1 at 136.

Discussion

These provisions, in speaking to encouraging and supporting meeting broad goals, do not state standards specific enough to constitute, within the meaning of the Quechee test, a clear written community standard intended to preserve the aesthetics or scenic beauty of the area because they do not designate specific resources or provide specific guidance in project design. In re Halnon, CPG-NM-25, Order of March 15, 2001 at 21. In any case, the NRP is consistent with this provision because it proposes to locate the facilities in Rutland County in existing corridors and at existing substations. Moreover, as shown above, burying 345 kV line is not "economically practicable" and raises reliability issues.

335. The West Rutland town plan states:

> West Rutland lies in a valley that provides many opportunities for scenic vistas along the mountainsides surrounding the town. In WR, almost the entire western side has a slope classification greater than 25%. In the northeast part there are also slopes greater than 25% as well as a few small areas located in the southeast part of town. These many hillside views provide a sense of enclosure to this community. . . . Protect mountain tops and ridgelines with development restrictions such as zoning and subdivision regulations utilizing a ridge overlay district or specific ridgeline zoning.

Exhibit DPS-DR-1 at 136-37.

Discussion

This provision designates the steep slopes of the mountainsides and ridge tops surrounding the town as scenic areas and seeks their protection through zoning and subdivision regulations. There is no evidence in this case that such regulations have been instituted by West Rutland. In any case, if the NRP in this area is constructed as sought by the DPS, the intent of this provision will be met because the widening of the corridor on the slopes of West Rutland will be minimized.

336. The Addison County Regional Plan includes the following statements on energy goals and policies:

4. Reduce pressures upon agricultural lands and preserve rural life-styles by discouraging large increments of growth and by resisting the construction of any new major powerplant which has as its primary purpose the provision of energy service to large urban markets in Vermont or in other states. . . .

6. Discourage the construction of electric transmission lines in excess of 34.5kV.

7. Ensure that adequate consideration is given by the Public Service Board (PSB) to the interests of the Region prior to the issuance of any PSB permit involving he location of new bulk energy transmission facilities within the Addison Region for any energy source.

8. Any future energy planning studies or energy proposals that may result in projects having an impact on the Region must adequately address the interests of the Region.

Exhibit DPS-DR-1 at 137.

Discussion

These policies do not constitute clear written community standards regarding aesthetics. In fact, they do not address aesthetics. Moreover, even if one construes them to address that subject matter in some implicit way, they still not do not designate specific scenic areas or provide specific guidance on project design.

337. Middlebury's plan emphasizes that the "essential element of Middlebury's two village centers is their human scale," stating that such scale is "vital to Middlebury's sense of human community." The plan states: "When applied to buildings and development, human scale means that the proportions of structures and component parts, the means of access and circulation and the character and impression given to the user or observer are inviting and do not overwhelm or intimidate." Exhibit Middlebury FD-4 at 1-2. Middlebury and its witness Jean Vissering agree that this provision is the only one in Middlebury's plan or zoning bylaws that constitutes a clear, written community standard regarding aesthetics. DPS-Cross-46 and attachment thereto.

Discussion

The NRP does not contravene this provision. It does not pass through either of Middlebury's village centers, which are the places emphasized in Middlebury's plan for promotion of human scale.

338. Ferrisburg currently has no written standards for preserving aesthetic resources. Donovan, supp. pf. at 11.

339. The Chittenden County Regional Plan states at § 4.12:

> The Commission believes that placing electrical and telephone transmission lines underground reduces negative impacts to the landscape while reducing long-term maintenance costs. New or replacement electrical or telephone transmission lines should be encouraged to be located underground. Utilities are encouraged to either relocate existing transmission lines in otherwise undeveloped corridors such that they are colocated or to place them underground.

Henderson-King and Lalley, pf. at 40; DPS-Cross-39.

340. The term "encouraged" as used in § 4.12 the Chittenden County Regional Plan can be understood to refer to supporting or fostering; it is not complete and unconditional. DPS-Cross-39.

341. The Chittenden County Regional Plan states at § 4.13 that the Commission should "[w]ork with all levels of government to bury existing transmission lines when they are replaced, if economically feasible." DPS-Cross-39.

Discussion

The foregoing Regional Plan provisions constitute a clear written community standard intended to preserve aesthetics by using existing corridors and by promoting burial of transmission lines. The Board should note that, in their testimony discussing this regional plan, the aesthetic witnesses for Shelburne omitted the second sentence of § 4.12 in their prefiled testimony and, in the cross exhibit cited, stated that the omission was by oversight.

The Chittenden County Regional Plan does not, however, constitute an unconditional standard: It "encourages" colocation or burial but does not, as admitted by the Shelburne witnesses, impose an absolute requirement. In fact, the Regional Plan expressly acknowledges the

need to consider the economic feasibility of undergrounding.

The Department contends that the NRP's use primarily of existing corridor is consistent with the intent of the Regional Plan and that, where new corridor is being used under the Reroute Filing, such use is being done to reduce the aesthetic impacts of the NRP, which is the underlying goal of the Regional Plan. Further, DPS contends that its proposed "burial as last resort" option – which is based on the high cost of transmission line burial – is consistent with the Regional Plan's intent to consider economic feasibility when burying transmission lines.

342. The Shelburne Plan contains the following objectives, in addition to those cited above under orderly development at Finding 88, cited by Shelburne witnesses under the Quechee test:

a. "Locations within the Town that contain important natural resources, including, but not limited to productive agricultural soils and forests, significant natural areas, critical wildlife habitat, wetlands, aquifer recharge areas, important views, ridgelines and shorelines shall be identified and protected from unwise development."

b. "Resources identified on the Natural Resources Inventory Map, Agricultural Souls Map, Significant Views Map, and LaPlatte Greenway Map shall be conserved to the greatest extent reasonably possible in the course of review and approval of land subdivision and development applications."

c. "The quality of Lake Champlain as a water resource and natural area, a place for recreation and as a scenic resource shall be protected."

d. Exhibit GHK/KL-6 is a map of "Shelburne Significant Views" said to be based on the Shelburne plan's significant views map.

Henderson-King and Lalley at 37-8.

Discussion

Taken together, the parts of these provisions that address views and scenic resources

approach the creation of clear written community standard intended to preserve aesthetics and scenic beauty. They refer to a map that identifies significant views and seek to protect those views, including the views from Lake Champlain. However, they fall short of specifying exactly how the views shall be protected or defining what constitutes "unwise development." Thus, they fail to reach the level of clarity needed to be a standard.

In any case, the NRP, with the Department's recommended mitigation measures, complies with these provisions, which do not mandate burial, but rather seek to protect scenic views to the greatest extent "reasonably possible." The Department contends that this goal is not an absolute goal and allows for consideration of the serious cost issues attendant to transmission line burial. Therefore, it is consistent with the Shelburne plan to employ burial only when all available mitigation measures for overhead construction have been shown not to provide adequate mitigation. The Department believes that its proposed mitigation, which addresses the aesthetically sensitive areas in Shelburne including the view from Lake Champlain, reasonably protects those areas.

343. In reaching his opinion, Mr. Raphael surveyed the plans of the affected towns and regions. None state specific standards that would be violated by the NRP proposal. Exhibit DPS-DR-1 at 135.

8. Conclusions of Law: Aesthetics and Scenic Beauty

Section 248 requires that the Board conclude that the NRP "will not have an undue adverse effect on esthetics . . . , with due consideration having been given to" 10 V.S.A. § 6086(a)(8), the Act 250 criterion that requires that a project "will not have an undue adverse effect on the scenic or natural beauty of the area, aesthetics . . . ." 30 V.S.A. § 248(b)(5).[22]

(a) The Quechee Test as Applied by the Board

[22]The two different spellings of aesthetics appear in the statutes.

In making aesthetic determinations, the Board relies on the Environmental Board's so-called "Quechee" test, albeit with the caveat that the Board will consider the societal benefits of a proposed generation or transmission project. In re VELCO Northern Loop Project, Docket No. 6792, Order of 7/27/03 at 27-8; In re Stowe Electric Dept., Docket No. 6793, Order of 5/5/03 at 12.

The Quechee test contemplates a two-step analysis. First, one determines whether the project will have an adverse effect on aesthetics and scenic beauty by examining the "fit" or harmony the project with the existing context, including but not limited to consideration of the nature of the project's surroundings, the places from which it can be seen, and the impact of the project on open space. Quechee Lakes Corp., 1986 WL 58689 at 18-19.

Second, if the project will have an adverse effect, then one examines whether that effect will be undue. Under the Quechee test, an adverse effect is undue if a positive conclusion is reached on any one of the following questions:

> 1) Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic, natural beauty of the area? Such standards may, for example, be set forth in the local or regional plan, or be adopted in the creation of an historic design district, or be incorporated into a municipal or State scenic road designation. If the Board or Commissions find that such standards do exist, and that the project as designed would violate those standards, the adverse impact would be undue.
>
> 2) Does the project offend the sensibilities of the average person? The Legislature has directed the Commissions and this Board, composed of lay people from many different communities within Vermont, to determine what is acceptable in terms of new developments' impact on aesthetics and scenic and natural beauty. If our sensibilities are, collectively, offended by a project, its impact under Criterion 8 is undue. It is not enough that we might prefer to see a different design or style of building, or that we might prefer a different type of land use, but that the project, when viewed as a whole, is offensive or shocking, because it is out of character with its surroundings, or significantly diminishes the scenic qualities of the area.
>
> 3) Has the Applicant failed to take generally available mitigating steps *which a reasonable person would take to improve the harmony of the proposed project with its surroundings*? Such steps may include selection of less obtrusive colors and building materials, implementation of a landscaping plan, selection of a less obtrusive building site within the project area, or reduction of the mass or density

of a project.

Id. at 19-20 (emphasis added).

Based upon analysis of Environmental Board precedent, this Board has stated that clear written community standards regarding aesthetics must designate specific aesthetic resources or provide specific guidance in project design. In re Halnon, CPG-NM-25, Order of March 15, 2001 at 21.

This Board has further stated that its analysis of whether a particular project will have an "undue" adverse effect under the three standards discussed above "will be significantly informed by overall societal benefits of the project." Docket No. 6792, Order of 7/17/03 at 28.

(b) Adverse Impact

The Board's analysis of whether the NRP fits into the existing context must include weighing of several factors:

- For most of the proposed route, the context includes existing transmission corridor and substations, as well as distribution lines;
- Much of the route is highly scenic notwithstanding the presence of the existing electric facilities;
- The NRP primarily uses existing corridor and, where it departs from such corridor in areas such as the Meach Cove Reroute, does so to avoid impacts to residences;
- The project, as a line that runs across the landscape which cannot all be seen at once, needs to analyzed on a section-by-section basis; and
- Depending on the context, the incremental or cumulative impacts of the proposed changes can have a negative visual effect.

The visual impact analysis supplied by the Department addresses all of these factors and concludes that in some locations the NRP will have an adverse impact. For those locations at which the Department's consultant also found the NRP to have an "undue" adverse impact, descriptions of those locations and the adverse impact are contained in the proposed findings above.

The Department has not briefed locations found by Mr. Raphael to be adverse but not undue because it considers its goal, as evidenced by the statutory language, to be one of assuring the reasonable protection of the public from an "undue" adverse effect on aesthetics consistent with meeting the public's need for reliable electric service. Mr. Raphael's analysis of these areas is available to the Board via Exhibits DPS-DR-1 and -DR-10. DPS notes that, in many of these locations, Mr. Raphael has set out mitigation that would be desirable, though not required, and that VELCO has come forward with responsive mitigation proposals.

(c) "Undue"

With respect to the "undue" prong of the Quechee test, the Department will address in turn each of the three questions described above.

(1) Community Standard

Many of the town and regional plan provisions proffered in this proceeding do not constitute clear written community standards intended to preserve aesthetics or scenic beauty because they do not designate specific resources to be protected or state how they should be protected, or because they do not provide specific guidance in project design. The Department will provide examples intended to be illustrative and not exhaustive. To begin with, New Haven's plan, quoted at Finding 66, above, does not state specific resources to be protected or provide clear guidance on the project should be designed. Instead, it speaks to implementing a system, which New Haven has not put in place, to discourage utility line expansion for, among other reasons, potential aesthetic impacts generally. There is no clear standard here to apply.

Similarly, the provisions of Middlebury's plan quoted at Finding 63, above, are not clear standards because they call for "adequate mitigation" without providing specifics on what is adequate beyond a general call for modified design and tree planting, and seek a process for deciding on mitigation rather than providing specific guidance on project design.

Further, statements that contain broad goals and visions do not constitute clear standards within the meaning of the Quechee test. Examples include broad statements such as Charlotte's

goal "to maintain and protect Charlotte's Rural Character and Heritage" and objective to "preserve the small town character in the villages and rural areas" (see Finding 78, above) and Shelburne's goal "to preserve and protect sites, structures, areas, and objects of historical, cultural, architectural or archeological significance to the Town of Shelburne" (see Finding 88, above). These are statements of vision rather than specific standards.

Other town and regional plan provisions that constitute written community standards will be met by the NRP as proposed or with the mitigation proposed by DPS. For example, the NRP avoids the existing village centers in Middlebury, thereby complying with the Middlebury plan's "human scale" provision cited in Finding 337, above, which emphasizes preserving human scale of development in those centers. Similarly, with the mitigation measures proposed by the Department, the NRP will meet the Shelburne plan's objective that "Views in areas which are gateways into Shelburne and into the Village shall be preserved through techniques cited above." See Findings 88 and 284, above.

The Board should either reject or construe as requiring no "undue" impact the Shelburne plan's statement that "There shall be no development which would cause alterations to the Town's open lands, shorelines, ridgelines or roadside views in such a way that would intrude upon or diminish the scenic beauty of Shelburne." See Finding 88, above. While this provision speaks to specific scenic resources, read literally it establishes a standard of "zero"impact on aesthetics and thus goes beyond the statutory authority of 30 V.S.A. § 248(b)(5) and 10 V.S.A. § 6086(a)(8), which allow adverse effects on aesthetics provided that those effects are not undue. The Department respectfully submits that neither Shelburne nor the Board has authority under these statutes to establish a standard of *no* adverse effect on aesthetic or scenic beauty. DPS contends that, with the mitigation it recommends, reasonable protection from undue impacts of the NRP will be afforded to the scenic resources discussed in this Shelburne plan provision.

The various town and regional plan provisions that address undergrounding provide guidance on project design but are not absolute and their application requires judgment by the decision-maker. These provisions "encourage" undergrounding and allow for consideration of feasibility issues such as cost and potential reliability impacts. Examples include the Leicester

plan (Finding 60, above, encouraging burial where feasible), the South Burlington plan (Finding 91, above, encouraging transmission line burial if possible), and the Chittenden County Regional Plan (Findings 339 and 341, above, encouraging undergrounding and exploration of feasibility). Even the Charlotte plan, which contains perhaps the strongest language on utility line burial, uses the term "encourage" undergrounding in the operative section of the plan (the utility distribution policies), and Charlotte's planner agrees that the plan allows for consideration of cost and potential reliability impacts of burial. See Findings 79.b and 82, above.

Because these undergrounding provisions require judgment by the decision-maker, the Department contends that, in applying these provisions, the Board must and should consider the aesthetic impacts of the NRP and the high costs and potential reliability impacts of burial. Such consideration also is consistent with Board precedent, cited above, under which the Board's review of the "undue" prong of the Quechee analysis is informed by the societal benefits of the proposed project, because these benefits are potentially diminished if costs become excessive or reliability is compromised.

The Department further contends that, in making its judgment respecting these undergrounding provisions, the Board should apply the standard advocated by the Department: Because of its high cost, burial should be the option of last resort, after exhausting all overhead mitigation opportunities and determining that they are not sufficient to mitigate the adverse impact on a particular aesthetic resource, and after concluding that burial in a particular area will not compromise the reliability benefits of the NRP or reliability of the Vermont electric system.

As indicated by the foregoing findings of fact and discussed further below under the mitigation step of the Quechee analysis, the Department argues that it has proposal provides adequate mitigation for the aesthetic impacts of the NRP and that burial should not be required by the Board, with the possible exception of Ferry Road in Charlotte, which is on a separate briefing schedule. The Department incorporates by reference its discussion below under the mitigation step of the Quechee analysis.

In addition, the Board should not require burial of any part the 345 kV line for the separate reason that, as shown in the foregoing findings of fact, equivalent reliability to the proposed

overhead configuration is not achievable. Burial of 345 kV line would compromise the reliability benefits of the NRP and the reliability of the Vermont electric system.

(2) "Offensive to the Average Person"

The issue under this part of the Quechee test is whether the Board itself, charged with the determination of whether a project has undue adverse effect, believes that the average person will be offended or shocked. It is not a question of whether a project is popular or unpopular for the area in which it is proposed. In re McShinsky, 153 Vt. 586, 592-93 (1990). Further, it is not enough under this part of the test that the Board might prefer a different design. Rather, the question is whether the level of intrusion into the character of the area is so significant that the average person would be offended. Quechee Lakes Corp., 1986 WL 58689 at 19-20.

For most locations of the proposed NRP, it is unlikely that the project would shock or offend the average person because of the ubiquity of transmission and distribution lines in the landscape and the existence of transmission lines currently in the affected areas. Indeed, the evidence shows that even with those existing lines, several portions of the proposed corridor are considered to be highly scenic.

Nonetheless, there are a number of locations where the incremental or cumulative impacts of the NRP will be so significant that the average person would be offended. Those locations are addressed in the foregoing findings of fact. For each of these locations, the Department proposes mitigation that it contends is sufficient to reduce the incremental or cumulative impacts to a level at which the average person will not be offended or shocked, and DPS urges the Board to require VELCO to comply with those mitigation recommendations.

(3) Mitigating Steps

The Quechee test does not require an applicant to take any and all mitigating steps. As emphasized above, the test requires an applicant to take (a) generally available mitigating steps (b) which a reasonable person would take to improve the harmony of the proposed project with its surroundings. Quechee Lakes Corp., 1986 WL 58689 at 20.

The Department emphasizes this language because it contends that the Environmental Board used these words advisedly, and that they show an intent to review not whether a particular step is reasonable in the abstract but rather whether a generally available step is reasonable under the specific circumstances and context. To contend otherwise, and state that this part of the test simply requires taking reasonable mitigating steps, does not give full effect to the language used by the Board because the phrases "generally available" and "person would take" become surplusage. Cf. Worker's Compensation Division v. Hodgdon, 171 Vt. 526, 528 (2000) (mem.) (Court will not construe statutory language as mere surplusage).

The Department therefore contends that the standard advanced by the Department – utility line burial as the option of last resort due its cost and potential reliability impacts – gives full effect to the Quechee test. Simply put, because of the dramatic cost difference and potential reliability impacts,[23] a reasonable person would not take the step of burying a transmission line unless no other options are satisfactory mitigation under the particular circumstances. 2/13/04 tr. at 127-8 (Raphael) (vol. 2); Raphael, surreb. at 15.

The Board should adopt the standard advocated by the Department as its approach toward transmission line undergrounding. This approach protects Vermont ratepayers from unnecessary costs and potential reliability impacts by limiting transmission line burial to areas in which it is the only viable solution to the impact of the project. At the same time, it provides for consideration of the aesthetic value of a resource and the quantum of impacts to that resource, since it requires that the mitigation for the overhead line be judged adequate.

The construction cost differential between undergrounding and overhead is truly dramatic. As shown above, for a 345 kV line, burying a mile and half segment could cost between roughly $7 million and $10 million, in contrast to approximately $900,000 for overhead construction. (See Finding 149, above, for 345 kV line per mile cost estimate.) For a 115 kV line that is constructed

[23]As stated earlier, the standard advocated by the Department also includes achieving equivalent reliability. As indicated in the foregoing findings of fact, equivalent reliability to 345 kV overhead construction is not achievable for 345 kV burial. In the situation of 115 kV burial, equivalent reliability can be achieved, at significant cost.

to provide equivalent reliability to overhead, the cost is approximately $2.9 million per mile in contrast to roughly $280,000 per mile.

In contrast, the mitigation measures suggested by the Department are related to overhead construction and therefore the cost should be on the same order of magnitude as that construction. These measures include, but are not necessarily limited to, relocating lines, using different structure configurations, planting street trees, and installing other mitigation plantings. These measures may add to the cost of an overhead line, but they are variations on overhead construction and, in contrast to burial, are thus not likely to be five or ten times the cost per mile of VELCO's proposal. For example, the cost of relocating a line should not be that significantly different from the cost of constructing new corridor.

ROW and litigation costs are not likely to diminish significantly the significant cost differential between buried and overhead transmission line. In considering this matter, the Board should separate the cost of ROW itself from the cost of litigation to obtain the ROW. With respect to ROW cost alone, the fair market value of the ROW should be similar in magnitude whether the ROW is to be purchased for underground or overhead. In each scenario, the utility has to purchase rights to a strip of land running across the landscape, with the underground ROW being narrower. It is difficult to imagine the change in width causing the ROW price difference to make a large dent in the overall cost differential between the underground and overhead transmission lines. Further, in the case of the 115 kV line, easement litigation costs would have to approach $1.5 million or more per mile before they begin to add enough to that cost differential to make the cost of overhead approach the cost of undergrounding, even under the estimates put forward by Charlotte and Shelburne. In the case of a 345 kV line, the easement litigation costs would have to be higher still to approach the amount of the underground/overhead cost differential. There is no persuasive reason why the litigation costs should be that much if the need for the project has been determined and the question is simply one of determining just compensation.

The Department advocates a full range of mitigation measures to mitigate the aesthetic impacts of the NRP, from plantings to structure design changes to route relocations. These mitigation measures provide reasonable protection from aesthetic impacts while ensuring that

Vermont ratepayers do not bear unnecessary costs and that the NRP achieves the necessary level of reliability. The Board should adopt the mitigation measures proposed by the DPS and order VELCO to comply with them, and on such basis reach a positive conclusion under the aesthetics criterion.

B. Public Health and Safety (§ 248(b)(5))

1. Findings of Fact: Public Health and Safety

344. The NRP will not have an undue adverse effect on public health and safety. The NRP can be safely constructed and will not impose an undue adverse affect on the public health or safety from electric or magnetic fields. This finding is supported by Findings 345 through 375, below.

345. The NRP will enhance public health and safety by ensuring that safe reliable power will be available. The NRP will make Vermont's transmission system reliable up to 1,200 MW and will prevent outages that could present serious risks to public health and safety. Smith, pf. at 8-10; Dunn, pf. at 12-13. This finding is supported by Findings 107 through 160, above.

346. Underground installation of transmission lines will require a substantial investment of both time and money over that required for overhead construction. This finding is supported by Findings 314 through 332, above.

347. EMF of concern in this proceeding refers to 60 Hertz time-varying electric and magnetic fields produced by power lines. Magnetic power fields are measured in Gauss or milliGauss (mG) and electric power frequency fields are measured in Volts or kiloVolts (kV) per meter. Exhibit DPS-VDH-3 at 4; Valberg pf. at 3-5.

348. There are no federal standards for occupational and residential exposure to EMF. Exhibit DPS-VDH-3 at 4; Valberg pf. at 16.

349. There are no state standards for public exposure to EMF in Vermont. The DPS 1994 Plan recommends a policy of prudent avoidance, which means adopting policies that limit exposure to EMF whenever that can be accomplished for a small investment of money and

effort. 1994 Plan at 5-12.

350. The VDH recommends that Vermont's policy of prudent avoidance of EMF be continued. DPS-VDH-3 at 47.

351. There are no health-based standards for EMF in any state. New York and Florida have both established guidelines for EMF that are designed to limit maximum EMF exposure to the levels produced by power lines already in operation and they are not health-based. The New York EMF guideline for a 345kV power line is 200 mG for magnetic fields and 1.6 kV/m for electric fields at the edge of the ROW and 11.8 kV/m on the ROW and 7.0 kV/meter on the ROW for highway crossings when the line is operating at its maximum continuous current. The Florida EMF guideline for power lines less than 230 kV, including 115kV lines, is 150 mG and 2.0 kV/m at the edge of the ROW and 8 kV/m on the ROW when the line is operating at its maximum continuous current. Electric field guidelines have been established by Minnesota (8 kV/m on ROW), Montana (7 kV/m on ROW and 1 kV/m at edge of ROW), New Jersey (3 kV/m at edge of ROW) and Oregon (9.0 kV/m on the ROW), but those states have not established guidelines for magnetic fields. Exhibit DPS-VDH-3 at 4; Valberg pf. at 17-18 (as supplemented in 3/9/04 filing).

352. Germany adopted a national rule on EMF exposure for the general public limiting the electric power frequency field to 5 kV/m and magnetic power frequency field to 1000 mG. Exhibit DPS-VDH-3 at 4.

353. The ICNIRP established a health-based EMF public exposure level of 833 mG and 4.2 kV/m. The United Kingdom National Radiological Protection Board adopted the ICNIRP guidelines. Exhibit DPS-VDH-3 at 4; Valberg, pf. at 17.

354. The IEEE guideline for EMF general public, continuous exposure is 9,040 mG and 5.0 kV/m. Exhibit DPS-VDH-3 at 4; Valberg, pf. at 17.

355. EMF exist naturally on earth and are also produced by man-made devices. The earth's magnetic field in North America is a steady field of approximately 570 mG. The magnetic fields of man-made devices vary widely. EMF from common appliances such as a clothes dryer measures up to 3 mG at a distance of 4 inches and an electric can opener measures up

to 4000 mG at the same distance. Other common devices such as fluorescent lamps, ranges, electric tools, and vacuum cleaners produce magnetic fields in the range of 40-300 mG at distances of one foot during operation. Exhibit DPS-VDH-3 at 8; Valberg pf. at 4-5.

356. Typical magnetic power fields in the home average 0.6 mG and range from 0.1 to 4 mG over a period of a day. Typical electric power frequency fields in the home range from 0 to 0.01kV/m. Exhibit DPS-VDH-3 at 4.

357. The EMF levels from power lines vary according to the load on the line and distance from measurement. In times of peak demand, the lines may carry substantially higher loads than on average and cause the lines to reach maximum sag allowed by the NESC, which shortens the distance to the measuring point and results in a higher EMF level. Thus, projected EMF at maximum continuous loading provide the highest expected EMF levels. Exhibit DPS-VDH-3 at 12; Exhibit DPS-VDH-5 at 6; Valberg, pf. at 5; 6/16/04 tr. at 76-78 (Crist and White) (vol. 1).

358. Magnetic field levels from power lines may be reduced by increasing the voltage, which requires less current, and therefore results in reduced magnetic field levels. Exhibit DPS-VDH-3 at 47; 2/23/04 tr. at 33-34 (Valberg) (vol. 2).

359. EMF from power lines may be reduced through the configuration of the conductors to create cancellation. Exhibit DPS-VDH-3 at 47; 2/23/04 tr. at 33-34 (Valberg) (vol. 2).

360. EMF is reduced by increasing distance from the power lines. The EMF strength decreases approximately as the inverse of the square of the distance. For example, if a person moves from 2 feet to 4 feet away from a source, then the field strength decreases by a factor of 4. Spending less time near the source also reduces the cumulative exposure. Exhibit DPS-VDH-3 at 12.

361. Due to expected increases in load from year-to-year, the projected magnetic field levels in the first year of the NRP are expected to be lower than in 2012, since the current on the lines is expected to increase during that time. Exhibit DPS-VDH-3 at 24-25 and Appendix A.

362. The electric fields are easily shielded by conducting objects such as houses, trees, and human skin and do not change with increasing load on the power lines. Exhibit DPS-VDH-3 at 11.

363. The relationship between EMF and human health effects has been studied extensively over the last several decades both in the United States and internationally. Nevertheless, there remains insufficient scientific evidence to establish a direct cause and effect relationship between exposure to EMF from power lines and adverse health effects. Although some studies have shown a weak association, many of those studies have not been successfully replicated. There is no consensus in the scientific community either about: a) whether EMF from power lines could cause human health effects; or b) the biological mechanism by which EMF from power lines would cause human health effects. Although there are some scientists who believe it is not necessary, and there is no universal consensus on the issue, there appears to be at least a general consensus in the scientific community that a policy of prudent avoidance is reasonable. Exhibit DPS-VDH-3 at 7, 8 -21, 49-52; Valberg pf. at 6-16, 23; Del Pizzo pf. at 22-25; Wartenberg, pf. at 9-10; 2/24/04 tr. at 22 (Del Pizzo) (vol. 1).

364. In analyzing EMF exposure levels projected to result from the NRP, and in the absence of federal or state health-based standards, it is appropriate to apply first the strictest available guidelines, those of New York and Florida, which are designed to maintain the status quo in those states and, if those levels would be exceeded, to apply the health-based ICNIRP standards as a basis for judging whether adverse health affects would be expected from the projected EMF levels. If the Florida, New York and the ICNIRP guidelines are exceeded, then it is appropriate to require mitigation to reduce the EMF levels to a level below at least one of these applicable guidelines. Exhibit DPS-VDH-3 at 4; Exhibit DPS-VDH-6 at 7-8.

365. The VDH calculations of EMF for both overhead construction and for underground installation provide reliable projections of the highest levels of EMF exposure expected along the NRP corridor under conditions of both average loading and maximum continuous

loading. Exhibit DPS-VDH-3 at 24 and Appendices A-B; Exhibit DPS-VDH-5 at 5-6 and Appendices C-D; Exhibit DPS-VDH-6 at 8-9 and Appendices E-J; 6/16/04 tr. at 76-78 (Crist and White) (vol. 1).

366. The projected magnetic field levels for overhead construction of the entire corridor of the NRP from West Rutland to Queen City are below the Florida and New York guidelines in most cases and are below the health-based ICNIRP guidelines for all segments. Exhibit DPS-VDH-3, Appendix B, Tables 1- 4 (for West Rutland to New Haven corridor); Exhibit DPS-VDH-5, Appendix D, Tables 1-4 (for New Haven to Queen City corridor).[24] a.The projected magnetic field levels for the West Rutland to New Haven corridor with average loading will be below the Florida, New York and ICNIRP guidelines both at the edge of the ROW (range: 3.3 mG in 2006 to 5 mG in 2012) and directly under the lines (range: 28 mG in 2006 to 41 mG in 2012). Exhibit DPS-VDH-3, Appendix B, Tables 1- 2.

b. The projected magnetic field levels for the West Rutland to New Haven corridor with maximum loading at the edge of the ROW (76 mG) will be below the Florida, New York and ICNIRP guidelines. Exhibit DPS-VDH-3, Appendix B, Table 3.

c. The projected magnetic field levels for the West Rutland to New Haven corridor with maximum loading directly under the power lines (599 - 601 mG) will be below the ICNIRP standards, but will exceed the stricter Florida and New York guidelines for magnetic fields (which are established for levels at the edge of the ROW and not for levels directly under the lines). Exhibit DPS-VDH-3 at 4 and Appendix B, Table 3.

d. The projected magnetic field levels for the New Haven to Queen City corridor with average loading both at the edge of the ROW (range: 14 mG in 2006 to 47 mG in 2012) and directly under the lines (range: 15 mG in 2006 to 47 in 2012) will be

[24]The appendices to DPS-VDH-3 relative to the New Haven to Queen City corridor were updated with new data and specific information relating to pole and line configurations for that segment from VELCO in its Reroute Filing. Therefore, for the New Haven to Queen City corridor the more precise EMF projections contained in the appendices to DPS-VDH-5 should be used.

below the Florida, New York and ICNIRP guidelines. Exhibit DPS-VDH-5, Appendix D, Tables 1-2.

e. The projected magnetic field levels for the New Haven and Queen City corridor with maximum loading both at the edge of the ROW (range: 183 mG to 286 mG) and directly under the lines (range: 223 mG to 286 mG) will be below the ICNIRP standards, but will exceed the stricter Florida and New York guidelines for magnetic fields (which are established for levels at the edge of the ROW and not for levels directly under the lines), except that at the edge of the ROW between poles 51 and 58 (189 mG) and also for the corridors described in the Reroute Filing in Vergennes, Little Chicago Road, Charlotte and Shelburne (all projected to be 183 mG) the magnetic field levels will not exceed the New York guidelines. Exhibit DPS-VDH-5, Appendix D, Table 3.

367. With the NRP, the projected magnetic field levels will be well below the Florida, New York and ICNIRP guidelines at identified homes near the ROW at average loading along the West Rutland to New Haven corridor. The projected magnetic field levels at those homes and businesses is below 4 mG. DPS-VDH-3, Appendix B, Table 6.

368. With the NRP, the projected magnetic field levels will be well below the Florida, New York and ICNIRP guidelines at identified homes and businesses near the ROW at average loading along the New Haven to Queen City corridor. As shown in Exhibit DPS-VDH-5, Appendix D, Table 6:

a. The projected magnetic field level is below 4 mG at many identified homes and businesses in 2006 and in 2012.

b. Approximately 16 homes and businesses will have magnetic field levels of 4 mG or more in 2006 (range: 4.4 mG to 7.7 mG).

c. Approximately 21 homes and businesses will have magnetic field levels of 4 mG or more in 2012 (range: 4.3 to 12 mG).

d. The highest projected magnetic field levels for a home or business will be 12 mG in 2006 and 16 mG in 2012.

369. The projected magnetic field levels are expected to decrease with the NRP, as compared to the expected magnetic field levels from existing transmission lines along some segments of the NRP corridor, and increase along other segments. The expected reduction in magnetic fields is a result of the increased voltage on the new lines (which reduces EMF), the increased distance from the line (because the new lines will be higher off the ground), and also due to line configuration. Exhibit DPS-VDH-3 at 12, 47 and Appendix B, Tables 1-3; Exhibit DPS-VDH-5 and Appendix D, Tables 1-3; tr. 2/23/04 tr. at 33-34 (Valberg) (vol. 2).

a. The West Rutland to New Haven corridor will have reduced magnetic fields in 2006 through 2012 at average loading both directly under the lines and at the edge of the ROW. Exhibit DPS-VDH-3 and Appendix B, Tables 1-2.

b. The West Rutland to New Haven corridor will have increased magnetic field levels in 2006 through 2012 at maximum loading both directly under the lines and at the edge of the ROW, due to the increased load capacity of the new lines, as compared to the existing lines. Exhibit DPS-VDH-3 and Appendix B, Table 3.

c. The New Haven to Queen City pole 51 corridor will have increased magnetic field levels in 2006 through 2012 at average loading and maximum loading both directly under the lines and at the edge of the ROW, due to the increased load capacity of the new lines, as compared to the existing lines. Exhibit DPS-VDH-5 and Appendix D, Tables 1-3.

d. The Queen City pole 51 to Queen City substation corridor will have decreased magnetic field levels at average loading both directly under the lines and at the edge of the ROW and increased magnetic field levels with maximum loading. Exhibit DPS-VDH-5 and Appendix D, Tables 1-3.

370. The projected magnetic field levels for underground installation of the duct bank at a depth of 28 inches will be below the Florida, New York and/or the health-based ICNIRP

guidelines in most cases.[25] However, at maximum continuous loading, directly over the cables, the projected magnetic field level will exceed the ICNIRP standards at ground level, which was modeled to represent the exposure of a child to the EMF and may pose a public health hazard for children in particular. Therefore, mitigation is necessary for any underground installation to assure the EMF level at ground level is below the ICNIRP standards. Exposure to magnetic fields from underground installation can be mitigated, and reduced below the ICNIRP standards, through such measures as restricting use of the corridor directly over the cable or installing a layer of ferro-magnetic material as shielding above the concrete duct bank. Exhibit DPS-VDH-6 at 7-8 and Appendices G-I.

371. The projected electric field levels along the West Rutland to New Haven corridor are projected to be below the Florida, New York and health-based ICNIRP guidelines at the edge of the ROW. However, directly under the lines, the electric field is projected to exceed the ICNIRP standard, but remain below the New York electric field guideline for highway crossings directly under power lines. There are only three residences shown on the orthophotos provided by VELCO near the corridor along this segment of the NRP and they are each at sufficient distance from the corridor that the electric field will be below the ICNIRP standards at those residences. Exhibit DPS-VDH-3 at 7 and Appendix B, Table 4.

372. The projected electric field levels along the New Haven to Queen City corridor are projected to be below the Florida, New York and/or health-based ICNIRP guidelines both at the edge of the ROW and directly under the lines. Exhibit DPS-VDH-5 and Appendix D, Table 4.

373. The potential for adverse impacts on medical devices from power line electric fields has not been established. While manufacturers of certain medical devices, such as insulin

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[25]The VDH also calculated projected EMF levels from an underground duct installed at a depth of 6 inches. This was done to represent the worst case scenario and is not intended to support underground installation at that minimal depth. DPS-VDH-6; 7/27/04 tr. at 123-124 (Crist and White) (vol. 2).

pumps, provide precautionary statements that include high-voltage power lines, there is insufficient scientific evidence to establish a direct cause and effect relationship between exposure to electric fields from power lines and adverse impacts on medical devices. Further, despite the ubiquitous nature of public exposure to electric fields from power lines, there is no evidence in the scientific literature of actual cases of medical devices malfunctioning as a result of exposure to 60 Hertz electric fields from power lines. The Food and Drug Administration has not issued safety alerts, public health advisories, or notices addressing potential medical device interference from power line electric fields. VELCO Exhibit Valberg Reb-1; Simmons, pf. at 6-7.

374. The NRP will be constructed to meet NESC standards and therefore will meet public safety standards. In addition, in the New Haven to Queen City corridor, new infrastructure will replace existing components that, in some instances, are forty or more years old and approaching the end of their useful lives. This new infrastructure should make the NRP in this segment less susceptible to failure, and thereby improve public safety. Smith, pf. at 33-34.

375. The physical safety of the transmission lines is also assured by VELCO's maintenance and monitoring practices. VELCO employs a four-year tree trimming cycle for its transmission system. This tree trimming cycle is the most aggressive cycle used by any Vermont electric utility and would minimize the occurrence of damage to the lines from adjacent trees. VELCO patrols its transmission lines on a regular basis. The patrols include infrared surveillance of the lines which detect "hot spots" which are an indication of incipient failure of mechanical connections. As such, VELCO is able to promptly identify and repair any deficiencies it finds in order to limit the occurrence of component failures. VELCO monitors its lines automatically with state-of-the-art relays and protection systems. These systems are fully redundant and, if needed, switch off the power to a fallen line in fractions of a second. Smith, pf. at 33-34.

2. Conclusions of Law: Public Health and Safety

Section 248(b)(5) requires the Board to find that the proposed project will not have an undue adverse effect on public health and safety. Three specific areas of potential adverse impact on public health and safety were raised in the proceedings: 1) potential health affects from EMF, 2) potential interference with medical devices from electric fields, and 3) whether the transmission lines pose a threat to physical safety.

Concerns have been raised by some of the parties in this proceeding, and also in public hearings and through written public comments, about whether EMF from the NRP could have adverse health impacts on children, in particular, or other residents or inhabitants of buildings near the transmission corridor and whether electric fields could have adverse impacts on medical devices. The record in this docket provides a solid foundation for examination of these concerns and includes projected EMF and electric field levels for each segment of the NRP for overhead construction and also projections for underground installation.[26] The Board should conclude that there is no public health or safety reason to require underground installation of the NRP. The Board should further conclude that overhead installation of the NRP will not pose an undue adverse impact on public health and safety as a result of electric or magnetic fields from the power lines.

EMF exist in nature and also as a result of man-made devices, including electric appliances and power lines.[27] We live with EMF everyday. Typical EMF levels in the home range from 0.1 mG to 4 mG (magnetic fields) and from 0 to 0.01 kV/m (electric fields) throughout a day. EMF from common appliances such as a clothes dryer measures up to 3 mG at a distance of

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[26]Exhibit DPS-VDH-3; Exhibit DPS-VDH-5; Exhibit DPS-VDH-6.

[27]"Electric fields and magnetic fields exist wherever there is electric power. Electric fields depend on the electric charge present and are measured in volts per meter. As the voltage of an electric line increases, the strength of the electric field surrounding that line increases. Magnetic fields result from the motion of charge (current) and are measured in Gauss (G), or the more commonly milliGauss (mG). As the current carried by an electric line increases, the strength of the magnetic field surrounding that line increases. Taken together, these fields are referred to as electromagnetic fields (EMF)." 1994 Plan at 5-12.

4 inches and an electric can opener measures up to 4000 mG at the same distance. Other common devices, such as fluorescent lamps, ranges, electric tools, and vacuum cleaners, produce magnetic fields in the range of 40-300 mG at distances of one foot during operation.

The EMF of concern in this proceeding are those produced by 60 Hertz power lines. The EMF levels vary according to the load on the line and distance from measurement. In times of peak demand, the lines may carry substantially higher loads than on average and cause the lines to reach maximum sag, which shortens the distance to the measuring point and results in a higher EMF level. Thus, projected EMF at maximum continuous loading provide the highest expected EMF levels. Because the amount of load on the lines is expected to increase in coming years, so too will the projected EMF levels increase in future years. However, in some areas along the NRP corridor, the EMF levels are expected to decrease from levels expected from the existing transmission lines due to the increased voltage on the line, which requires less current, and therefore results in less EMF.

There is no federal standard and the State of Vermont has not adopted any standards for EMF exposure from power lines. Numerous other states have declined to establish EMF guidelines.[28] Florida and New York do have guidelines that are not health-based, but are designed to maintain the status quo, and therefore do provide some guidance. In addition, the ICNIRP has established health-based standards for public exposure to EMF.

VDH reviewed the available standards and first compared the projected levels along the NRP corridor to the strictest applicable guidelines applied in Florida and New York. If the projections exceeded those levels, VDH compared the projected NRP EMF levels to the health-based ICNIRP guidelines. While the numbers vary along the corridor, in all cases the EMF levels projected along the NRP corridor for overhead construction are less than the ICNIRP guidelines and in most cases are below the stricter Florida and New York guidelines as well. Therefore, VDH did not recommend any mitigation of EMF for overhead construction, but due to the remaining uncertainty from the scientific literature, did recommend that Vermont continue its

[28]Exhibit DPS-VDH-3 at 19-21.

policy of prudent avoidance. The approach adopted by VDH is fully consistent with the current state of the scientific literature, the evidence in the record and the current Vermont policy and therefore should be adopted by the Board.

The DPS addressed EMF in its 1994 Plan and recommended a policy of prudent avoidance. As used in the 1994 Plan, at 5-12, the policy of prudent avoidance means:

> [A]doption of policies that limit magnetic field exposure whenever this can be done for a small investment of money and effort. Prudent avoidance argues that a sufficient basis for concern does exist but not enough is presently known to justify large investments for avoiding magnetic field exposure. Under this approach, large expenditures would not be made until research provides a clearer picture of the existence and magnitude of the risks involved.

The 1994 Plan, at 5-13, further concluded that:

> Given the present uncertainties about EMF and human health, Vermont's policy should strike a reasonable balance between avoiding potential harm and the attendant costs and risks. To take absolutely no action at this time is not commensurate with the evidence that some risk may exist. Similarly, adopting aggressive measures now would most likely be costly and disruptive, and may ultimately turn out to be ineffective. Aggressive measures taken at this time could be ineffective for two key reasons. First, research could ultimately show that the risks to human health from magnetic fields are nonexistent or very small. Second, knowledge gained on the dose-response of magnetic fields could show that the measures that were taken to limit exposures were inappropriate or ineffective.

Although scientists have continued to vigorously study potential human health effects from EMF emitted by high voltage power lines since the 1994 Plan was adopted by the DPS, substantial uncertainties remain. The ample evidence introduced into the record in this case provides a good representation of the state of the science and range of opinions on this issue. One very well qualified expert recommended that, due to the lack of evidence of any health effects from EMF, greater public health benefits would be achieved by deploying public resources on non-EMF related health concerns.[29] Conversely, another very well qualified expert concluded that it would

[29]Valberg, pf. at 22-26.

be prudent, for children especially, to avoid EMF exposure levels greater than 2 mG and that, in his opinion, EMF increase the risk of childhood leukemia, as well as the risk of adult leukemia, adult brain cancer, Lou Gehrig's disease and miscarriage.[30] Those two opinions on opposite ends of the spectrum represent a level of certainty for which there is no general consensus in the scientific community. Rather, most scientific studies conclude that there is insufficient evidence to establish that EMF cause human health effects, yet recognize that some studies have shown a weak association. Although there are some scientists who believe it is not necessary, and there is no universal consensus on the issue, there appears to be at least a general consensus in the scientific community that a policy of prudent avoidance is reasonable.[31] For these reasons, it is appropriate for Vermont to continue its policy of prudent avoidance and the Board should do so explicitly.

Similarly, although manufacturers of some medical devices, such as insulin pumps, issue precautionary warnings that include high-voltage transmission lines, there is no scientific evidence or reported actual case studies that demonstrate that exposure to electric fields from power lines interferes with the functioning of medical devices. Additionally, despite the ubiquitous presence of power lines in our society, the FDA has not issued any warnings, alerts or notices.

The projected EMF levels from overhead construction of the NRP are below the ICNIRP standards along the entire corridor and in most segments also below the stricter Florida and New York guidelines. Thus, there is no evidence that the projected EMF levels will pose an undue adverse impact on public health or safety.

The policy of prudent avoidance suggests that EMF exposure should be limited whenever this can be achieved for a small investment of money and effort. Prudent avoidance strategies could include such design modifications as increasing the distance from the power lines with taller poles or a line configuration that either increases distance or creates cancellation effects. Some parties have advocated that the transmission lines should be undergrounded for public health and safety reasons. However, the cost of undergrounding transmission lines, as compared to the cost

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[30]Del Pizzo, pf. at 19-20.

[31]Exhibit DPS-VDH-3 at 8-19.

of overhead construction simply cannot be construed to constitute a "small investment of money and effort." Quite to the contrary, underground installation of transmission lines requires a substantial commitment of money. See Sections VIII.A. 6 and 8(c)(3), above. Therefore, the Board should conclude that undergrounding the NRP lines is not consistent with the policy of prudent avoidance.

If, for any reason, the Board approves underground installation of power lines, it should condition such installation on the implementation of appropriate mitigation measures to assure that EMF levels at ground level do not exceed ICNIRP standards. In addition, because a public health hazard could result from underground transmission line burial, the Board should require post-certification review of any mitigation measures to assure that they function as anticipated.

The Board recently addressed the issue of EMF in the Northern Loop decision and responded to concerns expressed at public hearing about potential health impacts from increased EMF as a result of that transmission upgrade project. Docket 6792, Order of 7/17/03 at 32-33. In that case, the Board relied on a 1999 study conducted by the National Institute of Environmental Health Sciences ("NIEHS")[32] that found that the scientific evidence was "insufficient to warrant aggressive regulatory concern." The Board also relied on testimony that the EMF levels from the Northern Loop Project would not exceed the standards set by other states and noting that Vermont has no state standards for EMF levels.[33] The Board concluded that although the potential health impacts of EMF are unclear, the benefits of increased reliability in the Vermont transmission system are clear and, therefore, on balance, the construction of the Northern Loop project will promote the public good.

Although the record in this docket contains substantial evidence on EMF, the state of the science remains insufficient to establish a cause and effect relationship between EMF and adverse health effects and the conclusions of the Board in the Northern Loop decision remain well

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[32]Docket 6792, Order of 7/17/03 at 32-33 and n.2 citing, National Institute of Environmental Health Sciences, Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields, NIH Publication No. 99-4493. 1999, at 36.

[33]Docket 6792, Order of 7/17/03 at 32-33 and n. 3.

grounded. The evidence in the record as a whole clearly demonstrates the numerous and significant benefits of the NRP in terms of increased reliability of the Vermont transmission system, including the prevention of outages that could present serious risks to public health and safety. The substantial evidence in the record regarding EMF supports continuation of the Vermont policy of prudent avoidance, but also demonstrates no further regulatory action is required at this time.

Finally, the Board should require VELCO to construct the NRP to meet NESC standards in the CPG. Construction to meet NESC standards will assure the project will meet public safety standards, as well as the requirements of Board Rule 3.500. Additionally VELCO's maintenance and monitoring practices provide assurance that the NRP will be constructed and operated safely.

Therefore, the NRP will not impose undue adverse impacts on the public health and safety and will promote the public good.

IX. Consistency with Resource Selection Principles in Approved Least-Cost Plan (§ 248(b)(6))

376. The NRP is consistent with least-cost planning principles. This finding is supported by Findings 107 through 212, above, and the associated conclusions of law under § 248(b)(2).

Conclusion of Law

Section 248(b)(6) requires that the Board conclude that, "with respect to purchases, investments, or construction by a company, is consistent with the principles for resource selection expressed in that company's approved least cost integrated plan . . . ."

The Board previously has ruled that a company which does not have an approved least-cost integrated plan must, to obtain a CPG under § 248, demonstrate that the proposed project is consistent with the principles of least-cost integrated resource planning. In re Citizens Utilities Co. (Baldwin Hydro), Docket No. 5737, Order of April 17, 1995 at 16, 30.

To date, the Board has not required VELCO to have a least-cost integrated plan because VELCO is a non-distribution utility whose capital expenditures are already subject to Board

review. Docket No. 5778, Order of March 12, 1996 at 22.

Therefore, under this criterion, the standard to be applied to the NRP is whether it is consistent with the principles of least-cost planning. The Department contends that the findings of fact and conclusions of law, above, respecting § 248(b)(2), support an affirmative conclusion under this standard.

X. **Compliance with DPS Twenty-Year Plan (§ 248(b)(7))**

A. Findings of Fact: Compliance with 1994 Plan

377. The NRP is in compliance with the electric energy plan approved by the DPS under section 202 of title, or there exists good cause to permit the NRP. This finding is supported by Findings107 through 212, above, Findings 235 through 375, above, and Findings 378 through 394, below.

378. In determining compliance with this criterion, the Board takes notice of the 1994 Plan. Order of 8/9/04 at 5.

379. To determine whether the NRP complies with the least-cost provisions of the 1994 Plan, one should determine whether the NRP complies with least-cost planning principles. 8/4/04 tr. at 59-60 (Parker) (vol. 1).

380. In determining compliance with the least-cost planning provisions of the 1994 Plan, the Department considered two analyses in the record of this docket: the analysis supplied by LaCapra Associates and the analysis supplied by Dr. Lesser. 9/22/04 tr. at 117 (Litkovitz) (vol. 2).

381. In determining compliance with the EMF provisions of the 1994 Plan, DPS relied on the testimony of VDH. 9/22/04 tr. at 118 (Litkovitz) (vol. 2).

382. Mr. Litkovitz, the Department's electrical engineer, concluded that the NRP complies with the relevant engineering and transmission requirements of the 1994 Plan. Smith and Litkovitz, surreb. at 4.

Discussion

The findings below detail Mr. Litkovitz's analysis of compliance with the relevant

engineering and transmission requirements of the 1994 Plan. With respect to the above-referenced least-cost planning analyses and VDH testimony, please see the findings and conclusions above under §§ 248(b)(2) and 248(b)(5).

383. Among the primary goals described in the 1994 Plan is the provision of efficient electric service (pages 1-1, 5-19 to 5-23). Specifically, the 1994 Plan discusses various methods by which transmission and distribution systems can be planned and operated to lower line losses. Among the most effective strategies for lowering line losses is to increase the voltage levels of existing transmission paths. The proposed NRP would accomplish this goal along two separate paths. First, the corridor between West Rutland and New Haven, which presently contains a 115 kV line, would be upgraded with the addition of a 345 kV transmission line. Second, the 46 kV and 34.5 kV lines between New Haven and Queen City would be removed and replaced by a 115 kV transmission line. Both of the proposed transmission lines would result in lower line losses on the VELCO system. Exhibit DPS-GES&WSL-2 at 1.

384. The 1994 Plan states that bulk transmission planning must address current and future constraints for the import and export of power (page 5-5). The proposed NRP would help accomplish this goal by relieving transmission congestion in the northwest section of the state. This would allow for the importation of lower cost generation and the lowering of congestion costs. Exhibit DPS-GES&WSL-2 at 1-2.

385. The 1994 Plan calls for electric service that is reliable, i.e., service to customers with minimal interruptions in terms of frequency and duration (pages 1-1, 1-7 to 1-8, 5-6 to 5-8). The primary purpose of the proposed NRP is to enhance the reliability of the transmission grid in Vermont, especially in the northwest portion of the state; to reduce the likelihood of outages; and to reduce the likelihood of voltage collapse which could result in outages over a relatively wide area. As indicated in the findings of fact under § 248(b)(2), the proposed NRP is the best strategy in which to obtain this desired reliability. Exhibit DPS-GES&WSL-2 at 2.

386. The 1994 Plan calls for the protection of public health and safety in the distribution of electric energy (page 1-3). With regard to construction safety standards, VELCO would construct the electric facilities of the proposed NRP in a manner consistent with the NESC. This meets the standard for safety established by the Public Service Board in its Rule 3.500. Safety issues with respect to electromagnetic fields are addressed under § 248(b)(5), above, and in Finding 390, below. Exhibit DPS-GES&WSL-2 at 2.

387. The 1994 Plan calls for the careful consideration of overall visual aesthetics when constructing and locating electric lines. As indicated in the findings of fact and conclusions above, pertaining to aesthetics under § 248(b)(5), aesthetic criteria will be met on the condition that VELCO construct the elements of the NRP in a manner consistent with the recommendations contained in the testimony of Department witness David Raphael. Exhibit DPS-GES&WSL-2 at 2.

388. The 1994 Plan calls for the provision of electric service with minimal impairments in power quality (pages 1-1, 5-8 to 5-12). The concept of power quality goes beyond the basic considerations of outage frequency and outage duration and accounts for measures of voltage variation including sags, undervoltage and overvoltage conditions, surges, and harmonic distortion. The proposed NRP would enhance power quality of the grid in several ways. For example, the extension of 345 kV north to New Haven would provide for a "stiffer" system, i.e., a system less vulnerable to voltage sags following contingencies. Also, installation of a dynamic VAR device at the Granite substation would help ensure that low voltage conditions are avoided following contingencies. Exhibit DPS-GES&WSL-2 at 2-3.

389. The 1994 Plan calls for transmission planning to employ Geographic Information Systems ("GIS") formats (pages 5-13 to 5-14, 8-3 to 8-4). GIS is an electronic system that allows users to collect, manage, and analyze large volumes of geographical data and associated descriptive information. VELCO employed GIS in its planning of the NRP. Exhibit DPS-GES&WSL-2 at 3.

390. The 1994 Plan calls for the prudent avoidance of electromagnetic fields from transmission

lines (1-7, 5-12 to 5-13, 8-3). Based on the findings of fact proposed above under § 248(b)(5), the proposed NRP is not inconsistent with this provision. Exhibit DPS-GES&WSL-2 at 3.

391. The 1994 Plan calls for improvements to the bulk transmission system to utilize existing transmission corridors to the fullest extent possible (pages 5-19, 8-13). The majority of transmission lines in the proposed NRP would be constructed within existing corridors. The only significant deviation from this principle would be the Vergennes Reroute that VELCO has proposed in order to avoid substantial aesthetic impacts in the Vergennes downtown and river basin areas. Exhibit DPS-GES&WSL-2 at 3.

392. The 1994 Plan calls for upgrading existing transmission facilities to accommodate higher power transfer levels as the preferred method of increasing transmission capacity (pages 5-19, 8-13). The proposed NRP utilizes this strategy where feasible, namely in the New Haven to Queen City corridor where existing 46 kV and 34.5 kV subtransmission lines are removed and replaced with a new 115 kV transmission line. Exhibit DPS-GES&WSL-2 at 3.

393. The 1994 Plan calls for transmission equipment to be acquired in a least-cost manner taking into consideration life-cycle energy loss costs (pages 8-11 to 8-12). Specifically, for the NRP, this would be the acquisition of conductors and transformers. VELCO proposes to use 1272 ACSR conductor for the proposed transmission lines. These are large conductors sized to meet system and contingency conditions that might arise over the next 30 to 40 years. It is highly unlikely that the cost of acquiring and mechanically supporting a larger size conductor that 1272 ACSR would be cost-effective on the basis of incremental loss savings. With regard to transformers, VELCO has traditionally purchased its transformers using a methodology that accounts for cost of transformer losses. The 1994 Plan's requirement for least-cost equipment acquisition would be met on the condition that VELCO continue this practice for transformer acquisition. Exhibit DPS-GES&WSL-2 at 4.

Discussion

DPS requests that the Board include the above-referenced condition regarding least-cost

transformer acquisition in issuing a CPG for the NRP.

394. The 1994 Plan calls for consideration of the use of high power electronic control devices, often referred to as FACTS devices, as a method of controlling transmission system voltage and stability following contingencies (page 5-20). The proposed NRP does consider the use of such devices, namely a static compensator or STATCOM, as part of the proposed Granite substation upgrade. VELCO has testified in this proceeding that it will evaluate the use of both a STATCOM and a more traditional device known as a synchronous condenser at this location. Exhibit DPS-GES&WSL-2 at 4.

B. Conclusions of Law: Compliance with 1994 Plan

Based on the foregoing findings of fact, including those incorporated from the above §§ 248(b)(2) (need) and (5) (aesthetics and public health and safety), the Board should conclude that the NRP complies with the 1994 Plan.

In this regard, the Department submits that the NRP's compliance with the 1994 Plan's least-cost planning provisions is determined based on whether the NRP complies with least-cost planning principles. CLF's witness Parker agrees. 8/4/04 tr. at 59-60 (Parker) (vol. 1). Thus, while DPS and CLF may not agree on the reasoning underlying that conclusion, or on the outcome of the application of least-cost planning principles to the NRP, there appears to be agreement on the narrow point of how one determines compliance with the least-cost planning provisions of the 1994 Plan.

On October 6, 2004, the Board took administrative notice of the Department's determination of consistency with the 1994 Plan under 30 V.S.A. § 202(f). Consistent with that order, the Board should note in its final order that it took such notice, but should not take the determination for the truth of the matter asserted. Rather, the Board should make an independent

determination in accordance with the proposed findings above.[34]

XI. Waste to Energy (§ 248(b)(9))

Section 248(b)(9) requires that the Board find, "with respect to a waste to energy facility," that the facility "is included in a solid waste management plan adopted pursuant to 24 V.S.A. § 2202a, which is consistent with the state solid waste management plan . . . ." This criterion is inapplicable because the NRP is not a waste to energy facility.

XII. Existing Transmission Facilities (§ 248)(b)(10)

395. The NRP can be served economically by existing or planned transmission facilities without undue adverse effect on Vermont utilities or customers. This finding is supported by Findings 213 through 220, above.

XIII. Comments of the Public

Many members of the public commented on this proceeding, in public hearings, in e-mails, in written comments and through signed petitions. The major concerns expressed in public comments were also the major issues addressed by the parties in the formal hearings. Under Vermont law, the Board must base its decision on evidence presented by the parties in the formal hearings. However, public comments play an important role and in this case, the substantial identity of areas of concern raised by the public and presented by the parties provides assurance that the proceedings have provided a thorough examination of the issues.

Following is a summary of the major concerns raised by the public in comments. When an issue was addressed by the numerous and varied parties in the formal proceedings, references to

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[34]DPS notes that the record of this case in fact contains, already subject to cross-examination, the bulk of the information used by the DPS in determining consistency with the 1994 Plan: the LaCapra analysis, Dr. Lesser's analysis, the VDH testimony, Mr. Raphael's testimony, and Mr. Litkovitz's analysis. 9/22/04 tr. at 117-18 (Litkovitz) (vol. 2); Exhibit DPS-GES&WSL-2 (containing Mr. Litkovitz's analysis and referring to testimony in this proceeding of the VDH and Mr. Raphael).

the section above where that issue is addressed are provided.

(1) *The need for the NRP.* Comments were received in support of the project citing the need for reliable electric service and the economic benefit to the state generally and businesses and hospitals in particular. Other comments in opposition to the project questioned whether the project is indeed needed.

After careful evaluation of the evidence both in support of, and in opposition to, the need for the project, the record demonstrates that the NRP is needed and will promote the public good. See Section V, above.

(2) *Non-transmission alternatives to the NRP.* Many comments were received in support of non-transmission alternatives, such as demand-side management, distributed generation, and renewable energy sources, to meet the electric service needs of Vermont that the NRP seeks to address. A few comments were also received questioning whether non-transmission alternatives could be employed in time to satisfy the current and future demand for electricity in northwest Vermont.

Close examination of the extensive evidence on these subjects presented by the parties in the record demonstrates that non-transmission alternatives are unlikely to be capable of being deployed in sufficient time to satisfy the electric needs of Vermont. See Section V.D, above.

(3) *Impact of the NRP on aesthetics.* Many of the comments expressed concern that the project would have significant adverse aesthetic impacts on the scenic qualities of Vermont. In this regard, many comments were received recommending rerouting and undergrounding of the NRP to mitigate the aesthetic impacts in certain areas deemed to have particular scenic qualities. A few comments suggested that the costs of mitigation measures should be balanced against the resulting impact on electric rates.

The parties presented substantial evidence and testimony from six aesthetics experts regarding the aesthetic impacts of the project. Careful weighing of the evidence demonstrates that the project can be constructed without imposing an undue adverse impact on aesthetics, provided the Board imposes specific conditions for mitigating the aesthetic impacts in designated areas and also establishes certain requirements for post-CPG review to assure that the mitigation measures

employed function as anticipated. See Section VIII.A, above.

(4) *Impact of the NRP on the environment.* Comments were received expressing concern about the impacts on the environment, including concerns regarding the impact on sensitive natural areas, pollution and herbicide use in the corridor right-of-way. The evidence in the record demonstrates that the project can be constructed without imposing an undue adverse impact on the environment, provided the Board imposes specific conditions for mitigating environmental impacts and also establishes certain requirements for post-CPG review to assure that the mitigation measures employed function as anticipated. See Proposed Findings of Fact and Conclusions of Law submitted by ANR.

(5) *The health impacts of EMF resulting from the NRP*. Many comments were received expressing concern about the potential health impacts from EMF, especially with regard to potential affects on children of magnetic fields and the potential impacts on medical devices from electric fields. Many of the comments urged installation of the transmission lines underground to mitigate potential health impacts of the NRP, especially in areas near schools and residences.

The evidence in the record demonstrates that the project can be constructed without imposing an undue adverse impact on public health and safety. See Section VIII.B., above.

(6) *Impact on tourism.* Some comments expressed concern that the NRP could impact tourism through impacts on the aesthetic or scenic qualities of Vermont. The evidence in the record demonstrates that implementation of appropriate aesthetic mitigation measures will assure that the project does not have an undue adverse impact on aesthetics and those mitigation measures will correspondingly assure that the project will have no undue adverse impact on tourism. See Section VIII.A, above.

(7) *Electric rates.* Comments were received expressing concern over potential increases in electric rates due to the cost of the NRP, and other comments suggested conversely that the impact on electric rates is of less concern than mitigation of the aesthetic and potential health impacts of the transmission line, such as through underground installation. The evidence in the record demonstrates that the NRP is the least cost alternative to meet the need for reliable electric service, assuring the impact on electric rates is no more than necessary. The NRP also involves

substantially lower capital costs than non-transmission alternatives and therefore likely has less impact on electric rates. Additionally, implementation of aesthetic mitigation measures for overhead construction of the NRP assures that costly underground installation is not required, further controlling electric rates. Only in instances where mitigation measures for overhead construction cannot meet the Quechee test, should costly underground installation be deployed, and such installation must achieve equivalent reliability to overhead. See Sections V.C through E and VIII.A.3 and 6, above.

(8) *Noise and light impacts.* Some comments expressed concern that nearby residences would experience adverse impacts from noise and light, particularly in the vicinity of the substations. Concern was also expressed about the potential noise from the transmission lines in areas near residences. The evidence in the record demonstrates that noise and light impacts from substations will be mitigated. See Sections VIII.A. 4 through 5, above.

(9) *Impact on conserved lands.* Comments were received expressing concern that the NRP could negatively impact certain conserved lands along the proposed corridor. The record demonstrates that the NRP will not unduly interfere with conserved lands or have an undue adverse impact on them with respect to aesthetics. See Sections IV and VIII.A., above.

(10) *Property values and impact on property tax revenues.* Many comments were received expressing concern that property values in the areas along the NRP corridor would be reduced by the presence of the transmission lines. Additionally, some comments expressed concern that construction of the NRP will depress property values in some towns and result in reduced property tax revenues. The evidence in the record does not support these concerns. See Section V.E.4, above.

(11) *Costs of Easements versus Costs of Underground.* Some comments argued that the costs to acquire the necessary ROW easements for overhead construction of the NRP, including the costs of associated litigation, could be comparable to the costs of undergrounding the transmission line in certain areas, particularly areas that are densely populated and highly scenic. The evidence in the record suggests that ROW and litigation costs are not likely to diminish significantly the dramatic cost differential of transmission line burial. See Section VIII.A.8.(c)(3), above.

(12) *Northwest interconnection*. Several comments expressed concern that the NRP is intended to increase VELCO profits by providing a pathway for delivering power from Quebec or New York State to southern New England, rather than for the purposes described in the VELCO petition to meet Vermont's electric reliability needs. The credible evidence does not support these concerns. The NRP adds new components to Vermont's transmission system in order to meet Vermont's current and future electric needs. In any event, VELCO's rates are regulated and the company is permitted to earn a return on its investments. Further, the addition of the components of the NRP to Vermont's transmission system is insufficient to provide the transmission pathway the comments suggest. Finally, the Board can only approve the project if it meets the statutory criteria, as demonstrated by the evidence in the record. See Mertens, pf. at 7; 2/26/04 tr. at 69-74 (Wies) (vol. 2).

(13) *NRP burdens and benefits*. Comments expressed concerns that the burdens of the NRP will be borne primarily by those living outside Chittenden County, but that the benefits of the NRP will be primarily realized by those living in Chittenden County. The increased reliability of the Vermont transmission system afforded by the NRP provides economic and other benefits to all Vermonters, not just those residents and businesses in northwest Vermont, and is consistent with the orderly development of the region throughout the NRP corridor. See Sections IV and VII, above. See also Docket 6792, Order of 7/17/03 at 32.

(14) *Regulation of VELCO*. Some comments expressed concern that if the NRP is approved that VELCO will be managed by outside entities, regulated by a federal entity and will no longer be regulated by the Board. There is simply no basis for these concerns. The NRP adds additional components to the existing Vermont transmission system. Board approval of the NRP will in no way change the federal or state regulatory oversight of VELCO.

XIV. **Post-Certification Review**

The design details hearings confirm the importance of those details in evaluating the site-specific impacts of the NRP on aesthetics and natural resources. The Board should approve the NRP subject to post-certification review procedures that include engineering review of final

design plans and review of those plans for aesthetic, natural resource, and other site-specific impacts. The Board has the authority to employ such a procedure rather than to require preparation of detailed and costly final plans for an entire project prior to issuance of a CPG. In re Vermont Elec. Power Co., Inc., 131 Vt. 427, 434-435 (1973); In re Petition of Twenty-Four Vermont Utilities, 159 Vt. 339 (1992).

Given the size and complexity of the NRP and the consequent expense of preparing and revising final plans, the potential impact to parties, and the need for timely meeting Vermont's reliability needs, the Board should not only use a post-certification review procedure, but also should, in crafting such a procedure, strive to strike a reasonable balance between the need for timely construction of the project to assure reliability and the need to allow for the participation of the affected towns and regions and property owners and assure the facilities are appropriately designed and mitigated to address project impacts.

This is no easy task. Below, the Department sets out a proposal for a post-certification procedure that attempts to strike that reasonable balance. However, the Department does not pretend that it, or any one party, necessarily has the correct answer to the question of how best to design a post-certification procedure for a project that, for Vermont, is of unique size and scope. DPS will review the proposals of other parties contained in their briefs and, to the extent it believes necessary, address this issue further in reply.

The steps suggested by DPS for post-certification review are as follows:

1. Filings by VELCO. VELCO should file final design plans for segments and components of the NRP on a series of dates keyed to VELCO's proposed construction schedule. These design plans at minimum should show proposed locations and design details for all facilities, proposed clearing, proposed noise mitigation, and proposed aesthetic mitigation. The filings should also conform to the recommendations contained in proposed Finding 251, above. To set the schedule for VELCO filings, the Board should require VELCO to file, within two weeks of issuing a CPG, VELCO's proposal for the dates on which it will make these filings. This schedule should be subject to party review and comment and Board approval, which must occur prior to commencement of construction on the given segment or component. See below for further schedule

discussion.

2. Granite Substation. VELCO's filing for the Granite substation should include VELCO's least-cost analysis and proposal for dynamic reactive technology at the Granite substation, in conformance with proposed Findings 220 and 221, above, as well as specific plans for aesthetic and noise mitigation resulting from the current discussions with nearby property owners. Lighting should be addressed in accordance with Finding 308, above.

3. E. Middlebury and Greenbush Road (Charlotte). VELCO's filings for the Routes 125/7 intersection in East Middlebury and for Greenbush Road in Charlotte should conform to the discussion following Findings 261 and 271, above.

4. Staking Final Design and Mitigation in the Field. At the time it files final design plans for a given segment or component of the NRP, VELCO should stake in the field its final design and proposed mitigation for all substations, road crossings, and other areas determined to be sensitive by the Board within that segment or component. In this regard, those sensitive areas should at a minimum include each area in which Mr. Raphael concluded that an undue adverse impact would result in the absence of sufficient mitigation, as detailed in the above findings of fact. The sensitive areas also should include any other area that a party convinces the Board is sensitive for reasons of potential aesthetic or natural resource impacts. For these locations, VELCO also should develop digital representations of the final layout to assist in the field review process. Once VELCO completes the staking, it should notify the Board, DPS, the affected town(s) and region(s), and any existing intervenors whose interests are directly affected by the facilities within the given segment or component. Examples of such directly affected intervenors would be those over whose property a transmission line would cross or those who own or reside on property from which the proposed facilities may be visible.

5. Time-frame for Review. Parties affected by a given segment should be given a time-frame for field inspections and review of and comment on final designs. This time-frame should be set via a status conference held by a hearing officer after each VELCO filing is made according the schedule discussed earlier, so that the time-frame is informed by actual consideration of the filing. Alternatively, following submission of VELCO's proposal for when it

will file the final design plans, a status conference could be held to discuss setting a default time table for review of each segment or component.

6. Negotiation of Design Changes with VELCO. Within the time-frame for review of final designs, parties affected by a given segment should attempt to negotiate design changes with VELCO. Any agreements would be filed with the Board for approval.

7. Facilitated or Mediated Dispute Resolution. Where direct negotiation does not resolve disputes, parties could be required to attend a session with a facilitator or mediator retained by the Board, with costs allocated to VELCO under 30 V.S.A. § 21, and to work in good faith with the facilitator or mediator to resolve their differences. The facilitator or mediator would issue a report of the session stating any agreements reached and remaining differences. Any agreements reached would be subject to Board approval. Since the facilitator would work directly with the parties, the facilitator would not participate in Board deliberations or directly advise the Board.

8. Dispute Resolution by Board. Where disputes are not resolved by direct or facilitated negotiation, parties affected by a given segment would be able to file comments with a Board hearing officer, who may hold a hearing upon a determination that substantial issues are raised requiring a hearing. The hearing officer would be appointed specifically for the purpose of rapidly resolving disputes arising in post-certification review. If necessary, the hearing officer would be retained from outside existing staff with costs allocated to VELCO under 30 V.S.A. § 21. The Board would set aside a specific day or days in its calendar, measured in a time frame from the date on which final design plans for a given segment are filed, for hearing any oral arguments and deciding any protests of hearing officer decisions.

9. Standard for Post-Certification Review. The Department proposes that the standard for post-certification review should be whether the final design plans are consistent with the Board's approval and whether the proposed plans and mitigation function as anticipated. In this regard, the Board should clearly state, in its decisions, its expectations for the effectiveness of design and mitigation.

XV. **Order**

1. Based on the foregoing findings of fact and conclusions of law, the NRP will promote the general good of the state pursuant to 30 V.S.A. § 248(a) if approved with the conditions, modifications, and pre-construction post-certification review procedure recommended by the DPS, and is so approved.

2. This NRP approval is for the NRP as modified by the Reroute Filing[35], except that the Shelburne Reroute is not approved and the Meach Cove Reroute is approved. The modifications to the Shelburne substation associated with the Shelburne Reroute are approved subject to the Department's recommended mitigation and post-certification review. The Granite substation, as modified in the Design Details Filing, is approved subject to the Department's recommendations regarding: a) the analysis of the suitability of synchronous condensers; b) development of functional specifications for each applicable dynamic reactive power technology; and c) consideration of 25 MVAR modules rather than the proposed 37.5 MVAR modules. The Granite substation approval also is subject to submittal of further plans, in conjunction with post-certification review, that address these matters and concerns of nearby property owners.

3. The Board should require VELCO to comply with the conditions and modifications recommended by the DPS in the foregoing proposed findings of fact and conclusions of law.

Dated at Montpelier, Vermont this 24th day of November, 2004.

Respectfully submitted,

VERMONT DEPARTMENT OF PUBLIC SERVICE

By:_____

[35]DPS does not, by this sentence, intend to advocate approval of the Charlotte Reroute, which it will address further in the briefs concerning the Ferry Road crossing, and thus the Charlotte Reroute is an exception to the sentence.

Aaron Adler, Special Counsel
Dixie Henry, Special Counsel