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January 22, 2009

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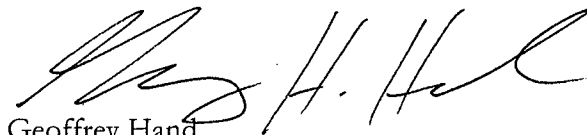
Re: Docket No. 7250 – Deerfield Wind Project

Dear Mrs. Hudson:

Please find enclosed for filing in the above-referenced matter Deerfield Wind, LLC's Proposed Findings of Fact and Order.

Thank you for your attention to this matter.

Sincerely,



Geoffrey Hand  
SHEMS DUNKIEL KASSEL & SAUNDERS PLLC

Enclosures

cc: Service List

**STATE OF VERMONT  
PUBLIC SERVICE BOARD**

Docket No. 7250

Amended Petition of Deerfield Wind, LLC for a certificate )  
of public good authorizing it to construct and operate 17 turbine, )  
34 to 35.7 MW wind generation facility, and associated transmission )  
and interconnection facilities, on approximately 80 acres in the )  
Green Mountain National Forest, located in Searsburg and )  
Readsboro, Vermont, with 7 turbines to be placed on the east side )  
of Route 8 on the same ridgeline as the existing GMP Searsburg )  
wind facility (Eastern Project Area), and 10 turbines along the )  
ridgeline to the west of Route 8 in the northwesterly orientation )  
(Western Project Area) )

**CERTIFICATE OF SERVICE**

I, Clara Cavitt, certify that on January 22, 2009, I forwarded copies of Deerfield Wind, LLC's *Proposed Findings of Fact and Order* to the attached service list by first-class mail and e-mail as indicated below:

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Dated at Burlington, Vermont, January 22, 2009.

by:

  
\_\_\_\_\_  
Clara Cavitt

**STATE OF VERMONT  
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ridgeline to the west of Route 8 in the northwesterly orientation )  
(Western Project Area) )

**DEERFIELD WIND, LLC'S  
PROPOSED FINDINGS OF FACT AND ORDER**

**January 22, 2009**

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NOW COMES Deerfield Wind, LLC (“Deerfield Wind”) and submits these Proposed Findings of Fact and Order concerning its Amended Petition to the Public Service Board (“Board”) for a Certificate of Public Good (“CPG”), pursuant to 30 V.S.A. § 248(a) authorizing the construction and operation of a 30 MW wind generation facility, consisting of 15 wind turbines and associated transmission and interconnection facilities, in the Towns of Searsburg and Readsboro, Vermont, known as the Deerfield Wind Project (“Project”).

## **I. INTRODUCTION**

The Deerfield Wind Project, like any complicated section 248 project, requires the Board to make important public policy choices to achieve the State’s energy goals. To make these choices in the context of competing and sometimes divergent State policy objectives, the Board must weigh the Project’s costs against its benefits. As the evidence shows, the balance here clearly favors the Project.

This Project represents an important opportunity for Vermont’s energy future. Major supply contracts with Vermont Yankee and Hydro-Quebec are due to expire this decade. The environmental impacts of fossil fuel combustion are widely acknowledged and of significant concern to the public and policymakers. The Legislature has provided clear direction that renewable energy must play a major role in meeting our energy needs, including all net growth in energy demand. And the public-at-large supports construction of appropriately sited wind energy projects in Vermont to meet these environmental and energy goals, goals that transcend Vermont’s borders to the New England region and beyond. Such projects must, of course, meet the specific requirements of 30 V.S.A. § 248 and also the general requirement that they promote the good of the State.

The benefits of the Deerfield Wind Project are substantial. The Project will emit no greenhouse gasses or other environmental pollutants and will displace emissions from existing generating plants. It will provide a sustainable energy source with fixed production costs over very long periods of time; at least one-third of the Project's energy output will likely be sold to Vermont utilities at a fixed price, thereby providing long-term economic benefits. It will generate enough electricity to meet the needs of over 12,500 homes. And, the Project will be a renewable resource that generates not just electricity, but temporary and permanent jobs, income, tax revenues and wealth for Vermonters.

Of course, realizing these benefits comes at some cost. Because of the nature of the wind resource in Vermont, wind projects must be located on ridgelines. The ridgelines best suited for development are generally high elevation, somewhat remote locations. As a result, it is not uncommon for such projects to involve some impacts to aesthetic and environmental resources. Indeed, each previous wind project proposed in Vermont required the Board to confront such conflicts and consider whether the trade-offs in each case were appropriate, keeping the broader public interest in mind. This Project is no different.

Many aspects of this project area make it uniquely well-suited to development as a commercial wind resource. It is immediately adjacent to an existing wind power facility and will rely in part on the infrastructure already in place, thereby reducing the potential environmental (and aesthetic) impacts. The topography in the area is such that there are few close range views of the Project and views from important public locations are limited and generally at a great distance from the Project. The wind resource in the area is substantial and well-documented, and the location is well removed from residences and areas of high human activity, thereby limiting the potential for public health or safety impacts.

The fact that the Project is located in the Green Mountain National Forest also provides unique public benefits. Although some parties in this proceeding have implied that the National Forest is a conserved resource that is off-limits to all development, this is not at all the case. On the contrary, it is, quite simply, a working landscape; a national resource that Congress has determined should be put to various multiple uses in a manner that best promotes the national public good. One of those recognized multiple uses is the development of energy resources, including renewable energy generation of the type proposed here. Congress has recently directed the Secretary of Interior to encourage development of as much as 10,000 MW of renewable energy on public land. The U.S. Forest Service has given careful consideration to areas of the Green Mountain National Forest that may be appropriate for such development, and has identified the Project location as generally appropriate for wind development in the 2006 Forest Plan.

On the other hand, certain features of the project area make it less desirable for development. Chief among those features is the fact that the area to be impacted contains several hundred beech trees, which local bears utilize as a food resource when beech nuts are available. Deerfield Wind recognizes the concerns associated with the Project's impact on this habitat and has taken every feasible and reasonable step to minimize the Project's potential impact to the habitat, while still maintaining a project that is economically viable and can actually be constructed. The remaining unavoidable impacts are relatively small when compared to the significant amount of high quality bear habitat in this area. And to the extent that the Project will have an impact on this habitat, Deerfield Wind is committed to mitigate these direct impacts and has committed to work with the USFS to try to provide additional benefits to the local bear population through changes to management practices in the project area. These actions will help ensure that the Project as a whole does not have an undue adverse impact on bear habitat.

Under section 248, the Board looks carefully at site-specific and even regional impacts of utility infrastructure projects – *public service* projects – like this one, and balances societal benefits against those impacts. In its wisdom, the Legislature required the Board to give “due consideration” to certain regulatory standards – such as criteria from Act 250 – but it did not import all such standards, and strict compliance is not required. In this case, the Board must consider each specific section 248 criteria, but ultimately must determine whether the Project’s myriad public benefits outweigh the Project’s potential impacts (including its impact on bear habitat) such that the Project will promote the general public good of the State. The evidence discussed below demonstrates that the Project will meet this standard; it complies with all of the section 248 criteria and on balance the Project’s benefits outweigh its impacts. The Board should approve the Project.

## **II. PROCEDURAL BACKGROUND**

The Project is being reviewed under both state and federal regulatory standards.

### **Public Service Board Review**

1. On August 11, 2005, Deerfield Wind sent advance notice to the Towns of Searsburg and Readsboro and the Windham and Bennington County Regional Commissions, pursuant to 30 V.S.A. § 248(f), of its intention to file a section 248 petition requesting approval of an up to 45 MW wind electrical generation project to be located in the Towns of Searsburg and Readsboro, Vermont. Copies of the notice were also provided to all towns within a ten-mile radius and to adjoining landowners.
2. On January 8, 2007, Deerfield Wind filed with the Board a section 248 Petition with supporting materials, requesting conceptual approval for the up to 45 MW project. The Petition and supporting materials were served on the statutory parties pursuant to 30 V.S.A. §

248(a)(4)(C). A copy of the Petition was sent to all towns within a ten-mile radius of the Project. Notice of the filing of the application was sent to adjoining landowners.

3. On March 9, 2007, the Board issued an Order directing Deerfield Wind to file an amended proposal containing additional detail to allow for review.
4. On July 30, 2007, Deerfield Wind filed with the Board supplemental testimony and exhibits requesting approval of a revised 34 MW, 17-turbine project. The testimony and exhibits were served on the statutory parties pursuant to 30 V.S.A. § 248(a)(4)(C). In addition, a copy of the materials was sent to all towns within a ten-mile radius of the Project, and notice of the filing was sent to adjoining landowners. The Board requested that Deerfield Wind file an amendment to its Petition. On August 15, 2007 Deerfield Wind filed its Amended Petition with the Board covering the changes detailed in the July 30, 2007 supplemental testimony. Notice was provided to statutory parties, ten-mile towns, and adjoining landowners.
5. On September 6, 2007, the Board conducted a prehearing conference and on September 20, 2007 issued a Prehearing Conference Memorandum and Schedule.
6. On October 2, 2007, the Board conducted a site visit and held a public hearing in this matter.
7. On July 3, 2008, Deerfield Wind filed its prefiled rebuttal testimony and exhibits, in which it revised the Project, reducing the total number of turbines from 17 to 15 (and therefore the Project's capacity from 34 MW to 30 MW).
8. On September 9, 2008, in accordance with the schedule, Deerfield Wind filed with the Board a request for live sur-surrebuttal testimony and prefiled sur-surrebuttal exhibits.

9. On September 22, 2008 the Board began technical hearings. The Board granted the *Joint Motion to Suspend Hearings* filed by Industrial Wind Action Group, Thomas Shea, Save Vermont Ridgelines, Duncan Cable Television, and Clifford and Diana Duncan.
10. On November 5, 2008, Deerfield Wind prefiled the sur-surrebuttal testimony and exhibits that it had previously requested to present live at the technical hearings.
11. On December 1-5, and December 9-12, 2008, the Board conducted technical hearings.
12. A number of statutory parties appeared and participated in this case, including the Vermont Department of Public Service, the Vermont Agency of Natural Resources, and the Vermont Division of Historic Preservation. In addition, the Board granted several other entities permissive intervention on specific issues, as reflected in Appendix A.
13. The parties conducted multiple rounds of discovery throughout the case.
14. During the course of these proceedings, the Board made various rulings concerning discovery disputes and evidentiary objections.

#### Federal Review of the Deerfield Wind Project

15. The Project is proposed on portions of the Green Mountain National Forest ("GMNF") and is subject to a separate federal regulatory review process conducted by the United States Forest Service ("USFS"). The USFS is presently reviewing the proposal under relevant federal laws and regulations, including among others, the National Forestry Management Act ("NFMA") and the National Environmental Policy Act ("NEPA"). Zimmerman pf. at 22; Draft Environmental Impact Statement ("DEIS")<sup>1</sup> at 3.

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<sup>1</sup> At the December 2 and 12, 2008 technical hearings, the Board agreed to take judicial notice

16. Use of the GMNF for commercial activities requires a "Special Use" permit. Deerfield Wind submitted a proposal for special use authorization in March of 2004. The USFS is evaluating Deerfield Wind's proposal, in part, pursuant to a Congressional directive for the Secretary of the Interior to seek to approve facilities generating an additional 10,000 megawatts of renewable energy on public land by 2015. DEIS at 5 (citing Energy Policy Act of 2005, § 211, P.L. 109-58 (Aug. 8, 2005)).
  17. The USFS may issue Special Use permits for industrial and commercial purposes. The duration of the permit is up to 30 years and for no more than 80 acres. 36 C.F.R. §251.53.
  18. Federal review of a Special Use proposal is a multi-stage process that begins with an initial and secondary screening. A proposed project must meet the specific initial and secondary screening criteria before the USFS may formally accept a Special Use Application and may proceed to a detailed review of the project under NEPA. Zimmerman pf. at 24-25; DEIS at 3.
  19. The USFS has already conducted the initial and secondary screening for the Project and has concluded, among other things, that the Project:
    - Is consistent with the laws, regulations, orders, and policies establishing or governing National Forest System ("NFS") lands, with other applicable Federal laws, and with applicable State and local health and sanitation laws;
    - Is consistent or can be made consistent with standards and guidelines in the applicable forest land and resource management plan prepared under the NFMA and 36 CFR part 219;
    - Will not pose any serious or substantial risk to public health or safety; and
- 

of the DEIS, subject to the condition that it also receive all public comments on the DEIS that were submitted to the USFS. Deerfield Wind subsequently filed the public comments on December 17th.

- Will not unreasonably conflict or interfere with administrative uses by the Forest Service, other scheduled or authorized existing uses of the National Forest System, or use of adjacent to non-National Forest System lands;

Zimmerman pf. at 24-25; Exh. DFLD-JZ-7; Exh. DFLD-JZ-8; DEIS at 3.

20. The USFS also specifically concluded that the Project is in the national public interest.

Zimmerman pf. at 24-25; Exh. DFLD-JZ-7; Exh. DFLD-JZ-8

21. The USFS formally accepted Deerfield Wind's Special Use Application in November of 2004 and determined that NEPA requires the preparation of an Environmental Impact Statement ("EIS"). A Draft Environmental Impact Statement ("DEIS") was issued in September 2008. The USFS accepted public comments on the DEIS from the date it was issued until November 30, 2008. Zimmerman pf. at 23; DEIS at 3.

22. Pursuant to the NEPA, the U.S. Forest Service is required to evaluate and analyze the socio-economic and environmental impacts of all reasonable alternatives to the project proposed. 40 C.F.R. § 1502.14.

23. The USFS is evaluating Deerfield Wind's proposal, in part, pursuant to a Congressional directive for the Secretary of the Interior to seek to approve facilities generating an additional 10,000 megawatts of renewable energy on public land by 2015. DEIS at 5 (citing Energy Policy Act of 2005, § 211, P.L. 109-58 (Aug. 8, 2005)).

24. The DEIS evaluates four alternatives:

- The Proposed Action -- the 17-turbine proposal submitted to the Board in January 2008;
- Alternative 1 -- No Action;
- Alternative 2 -- Reduced Turbines on the Western Project Site -- a total of 14 turbines, 7 on the Eastern Project Site and 7 on the Western Project Site; and

- Alternative 3 -- Turbines on the Eastern Project Site Only.

DEIS at 31-33.

25. The DEIS Alternative 2 -- Reduced Turbines on the Western Project Site is substantially similar to the revised 15-turbine project currently before the Public Service Board. The only difference between the two layouts is that the revised 15-turbine project includes one more turbine on the western ridge. Tr. 12/2/08 at 52:9-53:3 (Habig).
26. The USFS is required to evaluate the Project's compliance with the Green Mountain National Land & Resource Management Plan ("GMNF LRMP" or "Forest Plan"). DEIS at 10-11.
27. The GMNF Forest Plan is the federal land use planning document that identifies and determines the general suitability of GMNF lands for various multiple uses. It was last amended in 2006. *See* 2006 GMNF Forest Plan.<sup>2</sup> The Plan sets out the general goals and objectives for the Green Mountain National Forest, establishes forest-wide standards and guidelines for activities in the Forest, and divides the entire forest into eighteen different Management Areas. As stated in the Forest Plan,

The overarching goal for the management of the Green Mountain National Forest . . . [is to] . . . provide for a wide range of uses and activities in an ecologically, socially and economically sustainable way.

GMNF Forest Plan at 11. Among other goals and objectives, the Plan specifically seeks to "[p]rovide opportunities for renewable energy use and development." *Id.* at 15. It also seeks to "[m]aintain and restore quality, amount, and distribution of habitats to produce viable and sustainable populations of native and desirable non-native plants and animals." *Id.* at 10.

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<sup>2</sup> At the December 2, 2008 technical hearings, the Board agreed to take judicial notice of the Forest Plan and the Final EIS for the Forest Plan.

28. The Project will be located in the “Diverse Forest Use” Management Area, which emphasizes a wide variety of forest uses. DEIS at 10-11.
29. The Final Environmental Impact Statement (“FEIS”) for the GMNF Forest Plan specifically considered the suitability of locating wind energy facilities in certain management areas and in certain locations in the Green Mountain National Forest, including the location where the Project is proposed. *See* GMNF Forest Plan FEIS at 3-293 to 3-301. The USFS determined that wind power development is appropriate in “Diverse Forest Use” areas. *See id* at 3-296 (“the following management areas allow wind development and communication site development: diverse forest use. . .”).
30. It is anticipated that the Final EIS for the Project will be issued after the Board issues its decision in this Docket. Zimmerman pf. at 23.

### **III. BACKGROUND AND OVERVIEW OF THE PROJECT**

31. Deerfield Wind, LLC is a Delaware limited liability company registered in Vermont, with its principal offices in Portland, Oregon. Zimmerman pf. at 2.
32. Deerfield Wind was created in 2004 with the sole purpose of owning the assets associated with the development of the Deerfield Wind Project by the principals of PPM Energy, Inc., a Delaware limited liability company, with its principal offices located in Portland, Oregon. Zimmerman pf. at 2.
33. In the time since Deerfield Wind initially filed its 248 Petition, its parent company, PPM Energy, was acquired by Iberdrola and renamed Iberdrola Renewables. Zimmerman supplemental pf. at 5-6.

34. Deerfield Wind is a company as defined by 30 V.S.A. § 201, and as such is subject to the Board's jurisdiction pursuant to 30 V.S.A. § 203. Petition at 1.
35. Deerfield Wind filed with the Federal Energy Regulatory Commission (FERC) a *Notice of Self-Certification of Qualifying Facility Status For A Small Power Production Facility*, pursuant to 18 C.F.R. § 292.207(a). FERC acknowledged receipt of the notice, with no further action required. Zimmerman pf. at 30-31; Exh. DFLD-JZ-11.
36. Deerfield Wind is not seeking approval of a mandatory power purchase agreement pursuant to PSB Rule 4.100 for any of the Project's power capacity.

#### Project Description

37. The Project consists of the construction and operation of a wind generation project with a nameplate capacity of 30 MW, to be located in the towns of Searsburg and Readsboro in Bennington County, Vermont. The Project will utilize fifteen (15) 2.0 MW turbines. The turbine array will be situated on two ridges that generally trend in a north-south orientation and that lie, respectively, to the east and west of State Route 8. The ridges where the wind turbines are to be installed are entirely within the Green Mountain National Forest and range in elevation between 2,700 feet and 3,120 feet. Habig, Goland & Cherian ("Habig Panel") reb. at 3-4; Zimmerman pf. at 6; Exh. DFLD-JZ-30a-b.
38. The turbines and other project infrastructure will be located as depicted in the revised site plans, subject to any micro-siting or other changes that occur during the post-CPG implementation process. Deerfield Wind intends to micro-site turbines, roads, and other infrastructure to the extent possible during construction to further avoid impacts to bear-scarred beech trees where possible. Habig Panel reb. at 11; tr. 12/2/08 at 26-28, 40-41 (Habig); Exh. DFLD-JK-11 (Revised).

39. The existing Searsburg Wind Power Facility (“Searsburg facility”), owned by Green Mountain Power Corporation (“GMP”) and located on private land, is adjacent to the proposed eastern project area to its north. Existing access roads and other infrastructure associated with GMP’s plant extend to the base of the hill. The Project will upgrade and share the use of some of GMP’s privately owned facilities. To the north of the western project area, access roads will be built through public and private lands to join with a short section of existing town road (Putnam Road), before joining with State Route 8. Private lands that will be needed for the Project are currently used for wind power generation in the eastern project area, and for timber harvesting in the western project area. Neither of these uses will be diminished by the Project. Zimmerman pf. at 6-7.
40. Deerfield Wind selected this site as being highly favorable for the development of a wind electric generation facility within the region based on a number of factors: a) the site’s superior and well-documented wind resources; b) the amount of land area available; c) the compatibility of wind development with existing uses of this land; d) the site’s low potential for significant environmental impacts; e) the presence of existing access roads, transmission lines, and the existing Searsburg facility nearby; and f) adequate electrical capacity on existing transmission lines. Zimmerman pf. at 8.
41. The process of selecting this site for a wind generation facility began over twenty years ago when GMP screened and examined potential sites in Vermont for their suitability for commercial wind power facilities. Screening for such factors as wind resource, proximity to existing infrastructure, as well as acceptable environmental impacts, resulted in this site being identified as the most attractive in Vermont. Subsequent assessments of these factors confirm this ranking. Since the initial selection process, the exceptional wind resource has been further

documented and understood. In addition, actual performance data from GMP's Searsburg facility over the past nine years provides empirical evidence that the wind resource and resulting power production potential, of this site over the long-term is quite good and well-documented. Zimmerman pf. at 8-9.

42. Deerfield Wind considered repowering the existing GMP facility, or replacing its turbines with larger, modern turbines. Because larger turbines would require greater spacing, the site could only accommodate three new 2.0 MW turbines, or a 6 MW nameplate capacity, equal to that of the current facility. Furthermore, Deerfield Wind understood that GMP was not interested in repowering in the near term and wished to retain ownership of the Searsburg facility. Tr. 12/1/08 at 275:17-277:14 (Habig).
43. Deerfield Wind utilized a hierarchical screening process that was applied to many potential sites. The screening process involved two overarching project objectives: 1) to build a commercially viable project adjacent to the existing Searsburg facility to help meet the region's current and future need for renewable wind power energy, and 2) to develop a commercially viable wind power facility in a manner that avoids or minimizes conflicts with surrounding land uses and minimizes the overall environmental impacts of the project. Zimmerman pf. at 9-11.
44. Deerfield Wind determined the proposed site to be the most feasible location. Other locations considered, but rejected, include:
  - Mount Snow/Haystack: Potential land use conflict.
  - Glastenbury-Western Foothill: Less attractive wind resource, limited site capacity, and increased visual impact from Appalachian and Long Trails.

- Upland areas in Southern Woodford/Eastern Stamford: Undocumented wind resources and longer distance from existing infrastructure.

Zimmerman pf. at 11; tr. 12/11/08 at 27:17-29:13 (Zimmerman).

45. Scientific surveys, done in connection with the permitting of the Searsburg facility, determined that the level of public acceptance for wind power in this region of the state is quite good.

First-hand experience with the local citizens and town officials agrees with these findings.

Zimmerman pf. at 9; Exh. DFLD-JZ-14.

46. Deerfield has gathered comprehensive, long-term wind resource data for the Project from the on-site meteorological towers. Altogether, data from eight different measurement stations within the eastern and western project areas was collected and analyzed. Long-term records indicate that in the range of commercially-available turbine hub heights, annual average wind speeds in the project area are in the Class 5 (16.8 – 17.9 mph) to Class 6 (18.0 – 19.7 mph) range.

Zimmerman pf. at 28; Exh. DFLD-JZ-10.

47. Commercial wind projects in Vermont must be located on high elevation ridgelines, where the wind is sufficient, to be economically viable. Zimmerman pf. at 45.

#### Energy Production and Capacity Factor

48. The expected annual net energy production of the revised 15-turbine project (30 MW nameplate capacity) will average 92,500 MWh, or a net capacity factor of 35.2%. Habig Panel sur-surreb. at

2; tr. 12/9/08 at 9:22 (Kavet).

49. The Project's expected annual energy production will be equivalent to the energy demands of over 12,500 homes. Tr. 12/9/08 at 9:24-10:2 (Kavet).

50. An analysis to estimate the Project's gross energy production and net capacity factor was performed by qualified meteorologists with specialization in assessing wind resources. Habig Panel reb. at 16.
51. Deerfield Wind followed industry-standard practice to estimate the gross energy production. It considered wind speed and direction data collected at the site over many years. It inputted this data, along with data describing site topography and ground cover, to a computer model that calculates average hub height wind speed at each turbine location. Hub height wind speeds were then correlated to the turbine manufacturer's power curve. Habig Panel reb. at 15-16.
52. Deerfield Wind's estimates of the Project's net capacity factor appropriately accounted for loss factors including array losses – reduction in wind speed at some turbines caused by upwind turbines; electrical loss – physical resistance in collection lines and transformers; availability – an allowance for planned and unplanned maintenance; icing – allowance for shut-down during icing conditions; and high wind hysteresis – allowance for high wind shut-down events. Habig Panel reb. at 15-16.
53. The capacity factor used by Deerfield Wind in its filings in this proceeding is the same figure the company has used in its calculations to estimate the Project's financial return and establish power pricing. Deerfield Wind has no incentive to overstate the Project's capacity factor. Tr. 12/2/08 at 50: 6-16 (Habig).
54. Iberdrola Renewables has a procurement group with many years of experience that selects turbines based on their design review, meetings with vendors, review of safety features, and the turbines' field history. Additionally, there is independent certification by International Electrotechnical Commission (IEC), an international standards body that certifies turbines and

runs them through a variety of performance and safety tests. Tr. 12/1/08 at 257:21-258:6 (Habig); tr. 12/1/08 at 263:5-16 (Habig).

55. An independent third party reviewed the Gamesa turbines' power curves. Tr. 12/1/08 at 256:23-257:2 (Cherian)
56. Deerfield Wind's estimated operational availability of 97 percent is backed by the warranty agreement with suppliers. Tr. 12/1/08 at 135:16-19, 139:3-9 (Cherian)
57. Deerfield Wind has estimated potential power line losses based on experience. Given the short average distance to the substation, an estimate of 2% is conservative. Habig Panel reb. at 17-18; tr. 12/2/08 at 30:2-31:9 (Habig).
58. The revised 15-turbine project is likely to perform as well or better than any other potential wind development in Vermont. Lamont reb. at 2.
59. The contention of Save Vermont Ridgelines' consultant (Thomas Hewson) that the Project's capacity factor may be overstated is unsubstantiated. Mr. Hewson did not review the wind data Deerfield Wind collected at the Project site, although it was available to him. Tr. 12/9/08 at 173: 18-21, 174: 12-16 (Hewson). Mr. Hewson's reference to the performance of other wind generation facilities in various parts of the northeastern United States was uninformative. Mr. Hewson did not identify the wind resources at these other facilities, the turbine models used, or elevation. Tr. 12/9/08 at 176: 2-25, 177: 1-7 (Hewson). In the absence of information regarding these key variables that influence a wind generation facility's performance, the performance of other facilities is meaningless to predict the likely performance of the revised 15-turbine project. Zimmerman reb. at 7-10.

Revisions to the Project

60. Deerfield revised the Project three times during the section 248 proceeding. The initial Petition described the Project as a 30 to 45 MW facility with 15 to 24 turbines. Zimmerman pf. at 12; Exhs. DFLD-JZ-4a-b and DFLD-JK-2.
61. The first revision, in July 2007, specified that the Project would be a 17-turbine, 34 MW facility, and further described the type and location of turbines, project roads, and the substation. This first revision was made pursuant to a March 9, 2007 determination by the Board that further specificity was necessary. Zimmerman suppl. pf. at 1-7; Exhs. DFLD-JZ-Rev4, DFLD-JZ-Rev5a-b, DFLD-JK-Rev2.
62. The second revision, in December 2007, changed the turbine type from Gamesa G87s to Gamesa G80s, moved the substation from the north to the south of the existing 69kV transmission line in the western project area, and increased the size of the proposed Operations & Maintenance (O&M) Building to approximately 4,000 square feet. Zimmerman 2<sup>nd</sup> suppl. pf. at 1-4; Exh. DFLD-JK-Rev 2 (sheets CS113-114).
63. The third and final revision, in July 2008, reduced by two the total number of turbines proposed in the western project area, for a total of 15 turbines with a nameplate capacity of 30 MW. This revision also altered the layouts of proposed access roads and collection lines, and changed the proposed turbines to a mix of Gamesa G80s and G87s. Habig Panel reb. at 4-7; Exhs. DFLD-JZ-30a-b, DFLD-JK-11 (Revised).
64. The principal differences between the original January 2007 layout, the July 2007 layout, December 2007 layout, and the current July 2008 layout can be summarized as follows:
- a. Specifying Gamesa G80 and G87 2.0 MW turbines,.

- b. Reducing the number of turbines from as many as 24, down to 17, down to 15, and thus reducing the Project's capacity from a maximum of 45 MW to 30MW.
- c. Eliminating the three southern-most turbines in the western project area and adding an additional turbine on the northern end of the western project area.
- d. Making the project footprint more compact, and thus reducing the potential impacts to wetlands, streams, bear and other wildlife habitat (including habitat fragmentation).
- e. Reducing the amount of new roads, including ridgeline roads.
- f. Making the project layout more compact, and thus reducing the limited overall noise and visual impacts.

See citations, *supra*.

65. The primary changes to the turbine layout and design of the access roads occurred in the western project area and were principally designed to reduce the potential for impacts to black bear habitat that have been identified by witnesses for the Agency of Natural Resources and Save Vermont Ridgelines, notwithstanding the disagreement of Deerfield Wind's bear experts on the extent of such impacts. Habig Panel reb. at 3-4.

### Project Elements

#### Wind turbines

66. Deerfield intends to use a combination of Gamesa G80 and G87 2.0 MW turbines. The two turbine models are identical with the exception of the length of the rotor blades. Turbines with 80-meter rotors (Gamesa G80) are now planned for the five windiest sites in the eastern project area (E1, E4-E7), as specified by the turbine manufacturer. Slightly longer 87-meter rotors (Gamesa G87) will be used on the remaining ten turbines sited at locations with lower (albeit still strong) wind speeds and/or turbulence. It is possible, but not likely, that Deerfield would seek

to use a different turbine given the rapid changes in wind turbine technology and the severe supply limitations on turbines over the next few years. Habig Panel reb. at 4-5; Exh. DFLD-JZ-30a; Vissering/Buscher reb. at 2; tr. 12/1/08 at 275:9-11 (Habig).

67. The turbines are three-blade, horizontal axis, upwind wind turbines. All of the turbines will use the same tower, which is 76.2 meters (250 feet) in height, with a hub height of approximately 78 meters (256 feet). The two rotor diameters now specified are 80 meters (262 feet) for the G80 and 87 meters (285 feet) for the G87. Total height of the G80s and G87s (to tip of blade in vertical position) is 389 feet and 401 feet, respectively. Zimmerman pf. at 13; Habig Panel reb. at 5; tr. 12/11/08 at 165:25-166:3 (Vissering/Buscher).
68. Each wind turbine is comprised of three components: the tower, the nacelle, and the rotor blades. The turbines will be supported by a conical tubular steel tower, which at its widest dimension is approximately 16 feet in diameter and will taper to just below the nacelle. The turbine towers will be painted a neutral color. The towers will be brought to the site in sections, then mounted on a reinforced concrete foundation. The tower is topped by a nacelle, which houses the main mechanical components of the turbine. The interior of the towers can be accessed in order to maintain turbine components in the nacelle via an interior ladder. The rotor blades are made of fiberglass reinforced with epoxy resin. The individual rotor blades are capable of being “pitched” (rotated along their longitudinal axis) to enable them to operate efficiently at varying wind speeds. In addition, the rotors’ variable speed transmissions allow the turbines to operate more efficiently over a wider range of wind speeds. Zimmerman pf. at 12-15; Habig Panel 4-5; Exhs. DFLD-JZ-Rev5a and DFLD-JZ-27.
69. The G80 and G87 turbines have been in use since 2002 and feature a design nearly identical to Micon and Vestas turbines from earlier years. Tr. 12/1/08 at 275:2-7 (Habig).

70. Modern turbines, including the Gamesa G87 and G80, contain specialized features to reduce the real potential effect of lightning strikes and to protect the interior workings of the turbines, including lightning arrestor tips, grounding provisions, and other features. Furthermore, if lightning were to strike a turbine, the most likely target would be the rotor blades. Tr. 12/1/08 at 143:3-9 (Habig); tr. 12/1/08 at 144: 4-145:23 (Cherian); Exhs. DFLD-JZ-27 and DFLD-JZ-Rev5a.
71. Meteorological Towers: The existing meteorological towers in the eastern and western project areas are temporary in nature and will need to be removed during construction. After the new turbines are installed, it is anticipated that one permanent measurement tower will be reinstalled at the hub-height of the wind turbines, near the middle of the turbines in the western project area. The exact location for this tower will depend on the final configuration for the turbines, but it will be sited upwind of the turbines as determined by Deerfield's meteorologist. The new tower will be of open lattice design and will be self supporting, eliminating the use of guy wires and corresponding clearing, thereby reducing its impact on birds and minimizing wildlife habitat alteration. It may include lighting if recommended by the FAA. Zimmerman pf. at 29.
72. Transformers. Each turbine will have an associated step-up transformer to increase the nominal generated voltage of 690V to 34.5 kV. In the G80 and G87, the transformer is housed within the nacelle, not on the ground. Zimmerman pf. at 15; Estey pf. at 4; Exh. DFLD-JZ-Rev5a at 5; Exh. DFLD-JZ-27 at 5.
73. The main interconnection transformer will have an ONAN/ONFA/ONFA rating of 21/28/35 MVA. Estey suppl. pf. at 2.
74. Electrical Collection Lines. A 34.5 kV electrical gathering system will be built in each project area to deliver the energy from the turbine arrays to a substation to be built adjacent to the

existing 69 kV line. The collector circuit and turbine communication cables will run underground along the ridgeline in a trench approximately one meter deep, installed during construction beside or underneath the new access and service roads. The above-ground electrical lines between the substation and existing transmission line, and across Route 8 connecting the western project area to the eastern project area, will be installed as Hendrix-style overhead lines on poles approximately 35 to 45 feet high, running alongside the access roads. The existing overhead line between the Searsburg facility and the Sleepy Hollow Substation will be rebuilt to accommodate both the existing and the new collector system lines. Zimmerman pf. at 15-16; Estey pf. at 4-5; Exh. DFLD-DE-Rev4.

75. Substation. Electrical energy collected at 34.5 kV will be transformed to 69 kV by a substation to be constructed as part of the Project. At the substation, the Project's 34.5 kV electrical connection circuit will be connected to switchgear and 34.5 – 69 kV transformers before connecting to the existing 69 kV transmission line through a so-called three-ring bus. This facility will be constructed adjacent to the existing National Grid/VELCO 69 kV "Y25N" line. Zimmerman suppl. pf. at 2-3; Exhs. DFLD-JZ-30a, DFLD-JK-11 (sheet CS113).

#### Other Equipment

76. Additional maintenance equipment, storage space, and operations functions will be located in a roughly 4,000 square foot, metal-framed building. Zimmerman pf. at 20; Zimmerman 2<sup>nd</sup> suppl. pf. at 3; Exh. DFLD-JK-11 (Revised) (Sheet 114).
77. The operations and maintenance building will be metal frame construction with neutral/non-reflective coloration. An on-site waste disposal system and water supply well will be provided. In addition, a storage yard of approximately three acres will be maintained adjacent to the building. Zimmerman pf. at 20-21.

78. Deerfield Wind's lighting plan for the July 2008 revised layout calls for six of the 15 turbines to be lit at night with red strobe lights. This plan represents a reduction in lighting from the 7 or 8 turbines that would have been lit under the 17-turbine layout. The FAA has not yet made a determination on the revised plan. Habig Panel reb. at 6; Zimmerman suppl. pf. at 6; Exh. DFLD-HGC-4.

Transport Route.

79. Deerfield Wind's consultants have prepared a transportation plan for the Project. Exh. DFLD-HGC-5.

80. The preferred transport route starts at the Interstate 91 exit at Route 9 in Brattleboro, proceeds west along Route 9 for 25.5 miles through Brattleboro/West Brattleboro, Marlboro, Wilmington, and Searsburg, then south along Route 8 to the Project access roads. The route is on the Vermont Truck Network for 25.5 miles; only the 2.5-mile segment on Route 8 is off the Truck Network. Exh. DFLD-HGC-5 at 5-6, Appendix A.

81. At its peak during month five of construction, the Project will generate an average of 37 vehicular round trips per day, or less than five roundtrips per hour. Approximately eight trips, the bulk in specialized vehicles, will be required to deliver the components of each turbine, including one trip for each of the four tower sections. During operations, the Project will generate approximately five trips per day. Exh. DFLD-HGC-5 at 3-4; Zimmerman pf. at 61.

Internal Roads

82. The Project will include a total of 4.9 miles of new roads and modified existing roads. Tr. 12/2/08 at 206 (Krzanowski); *see also*, Krzanowski reb. at 1-4, Exh. DFLD-JK-11 (Revised), Exh. DFLD-JZ-30a.

83. Ridge (crane) roads will be twenty-two (22) feet wide on tangents and thirty-six (36) feet wide on curves. Access (haul) roads will be sixteen (16) feet wide on tangents and thirty-six (36) feet wide on curves. Krzanowski reb. at 1; Exh. DFLD-JK-11 (Revised).
84. Since filing the original Petition in January 2007, Deerfield Wind has redesigned the ridge roads to reduce the amount of direct impact to bear-scarred beech. The road width has been decreased by 42% through the use of a more expensive narrow track crane that requires a 22-foot (rather than a 38-foot) road. Habig Panel reb. at 6; tr. 12/2/08 at 43-44 (Goland).
85. The Searsburg facility's access road will be used to gain access to the ridgeline and the new ridge road to be constructed in the eastern project area. It will require some modification to allow the transport of larger equipment, such as the widening of the riding surface of the road to approximately 16 feet from the present riding width of 13 feet, and possible modification to the right angle turn at the base of the road, in the vicinity of the Sleepy Hollow substation. The intersection of the GMP access road with Sleepy Hollow Road may also need slight modifications to allow for the passage of the large equipment components and transport vehicles. Zimmerman pf. at 18; Krzanowski pf. at 20; Exh. DFLD-JK-11 (Revised) (sheets 115-116).
86. Beginning at the southerly end of the present Searsburg facility road, at the top of the hill, a new ridge road will be constructed through the eastern project area. Though this road is designed to have a cleared riding surface during construction of up to 22 feet to accommodate the cranes, the riding surface will be maintained at 16 feet after construction and until the time that it is necessary to use it for equipment replacement or other purposes. Zimmerman pf. at 18; Krzanowski reb. at 1; Exh. DFLD-JK-11 (Revised) (sheets 115-117, 101-104).

87. A new access road and ridge road will be constructed in the western project area. The ridge road's specifications for riding width will be the same as that for the eastern project area. This road will connect to State Route 8 by roughly following the route of an existing logging trail and Forest Service easement, to Putnam Road (Searsburg Town Road #2). The junction of the present Putnam Road and Route 8 will need to be widened and re-graded. Zimmerman pf. at 19; Kraznowski pf. at 19-20; Kraznowski reb. at 3; Exh. DFLD-JK-11 (Revised) (sheet 105-108, 113-114).
88. Roads will be all-weather and will be designed in accordance with USFS standards, applicable Vermont standards, and relevant engineering principles including standards for slope, materials, erosion control and safety pullouts relative to the weight and size of equipment that must be transported over them. Where possible, the graveled riding surface after construction will be reduced to approximately 16 feet wide for routine maintenance over the long-term. Revegetation to a lesser width also dovetails with a larger goal to cooperate with both Forest Service and Vermont goals regarding forest and animal management. Growth on revegetated embankments would be similar to the vegetation growth in the existing soils on top of boulders and ledge. Zimmerman pf. at 19-20; Krzanowski pf. at 6, 10-13; Krzanowski reb. at 28-29; Habig Panel reb. at 28-29.

#### Land Clearing and Construction Activities

89. A total of 79.5 acres on public land will be cleared during construction. Tr. 12/1/2008 at 54:22-55:2 (Habig).
90. The submitted plans illustrate stockpile locations for materials intended for re-use, such as loams and crushed/ripped stone. The O&M area will provide additional space for stockpiling

materials and equipment, and coordinating operations across the site. Krzanowski pf. at 28; *see also* Exh. DFLD-JK-11 (Revised) (sheet 114).

91. Construction of the Project will commence with site clearing of the existing vegetative cover in areas required to support road and foundation construction, to be followed in parallel fashion by installation of erosion control barriers, diversion dikes and check dams, excavation of subsoil and rock, building embankments to subgrade, installation of pavement on top of embankments, installation of loam on embankments, finishing of turbine assembly, application of loam to wide roads and interceptor ditches, seed and mulch to stabilize, and continued monitoring of the site. Construction of O&M building and substation will follow. Krzanowski pf. at 23-25.
92. The eastern and western project areas will be constructed concurrently, including clearing and road construction. Turbine assembly (with completed roads) is expected to start on one ridge, then move to the other, given potential crane availability issues. To that end, the roadway completion may be staggered to be ready when needed. Krzanowski pf. at 28.
93. Construction work will be done in a phased manner that reduces erosion potential and assures work productivity. The construction of the Project will occur over a nine-month period during a single construction season. Constructing the Project in one season rather than two will have fewer environmental impacts. Nelson/Reinhart reb. at 5; Zimmerman pf. at 32; tr. 12/2/08 at 253:11-22 (Kerlinger).
94. Blasting may be required as a last resort for foundation construction. Blasting would involve a pre-blast survey coordinated between landowners, the blasting firm's geotechnical engineering firm and the insurer. The geotechnical engineering firm would initiate seismograph monitoring and potential test shots may be conducted to assess the existing ground conditions; this

approach would allow determination of minimum blasting loads and optimal shot timing sequences. These initial assessments would also consider application of mats, a concern where material may be thrown toward dwellings or use areas, and how drill holes are packed for the shots. There would be landowner notification of blasting shots, warning sirens, and radio communication controls. Weather permitting; shots would typically go off at noon or day's end. Krzanowski pf. at 27.

95. Regulations preclude on-site storage of explosives for blasting (dynamite or ammonium nitrate). These materials would be brought to the site as needed. Per ordinary industry practice and applicable regulations, the blasting company will pursue all licenses and bonding. Krzanowski pf. at 27.

#### Project Operations

96. The Project will directly employ 2.5 permanent staff people to operate and maintain the plant. Exh. DFLD-TK-2 at 3; tr. 12/9/08 at 41:23-25 (Kavet).
97. A centralized Supervisory Control and Data Acquisition (SCADA) system will monitor the condition of Project equipment, alert service technicians to any fault or alarm conditions, record and sort data, and allow remote control of the turbines. Zimmerman pf. at 33.
98. Controlled (gated) year-round access to the project facilities will be maintained so operators can monitor the facilities and equipment and quickly respond to any unforeseen condition that might impact the efficiency of the turbines or safety of the operations staff or the public. Public access to the turbine sites will be limited in accordance with the conditions established in the Special Use Authorization issued by the USFS and any CPG requirements. Zimmerman pf. at 34.
99. There are no known hiking trails, motorized trails, or recreational sites in the near vicinity, nor is there any high amount of public use of the area for the proposed facility. Back-country hikers

are known to use parts of the eastern project area in the summer but apparently no trail system is used. Zimmerman pf. at 34.

100. Deerfield Wind expects to work with the USFS, with input from the public and the appropriate state agency(s) to identify and refine measures to ensure that the facility is operated in a manner that is both safe and consistent with the management objectives of the surrounding national forest land. Such measures may include, if appropriate and consistent with USFS management objectives: posting the property with signs warning the public of potential safety issues, such as high voltage warning signs on turbines; gating the access roads to discourage unintended use; and the use of plantings to further prevent unintended use of the access road. Deerfield Wind anticipates implementing a public access control plan similar to the management plan in place for the Searsburg facility. To the extent that the public may have a right of access over portions of the premises on which the wind turbines are located, Deerfield Wind would limit public access by signage when safety concerns warrant such limitation, such as during periods of icing conditions. Permissions for site access by the general public will be addressed on a case-by-case basis by Deerfield Wind, following, where practical, the procedures presented in the public access control plan. Zimmerman pf. at 35; Zimmerman reb. at 6.

101. The DEIS recommends imposing an “administrative closure order” to close the proposed wind facility roads and surrounding ridge-top areas adjacent to and underneath the turbines to all public uses, including foot traffic, unless specifically authorized. DEIS at 277.

102. The Project’s access roads will be gated so that only service vehicles and authorized personnel may drive to the turbine sites. The use of double gates would also be appropriate in

some locations. Gating roads will include measures to prohibit ATV or other unauthorized access. Tr. 12/2/08 at 156:9-12 (Goland); tr. 12/12/08 at 205:20-206:5 (Goland).

103. Access to the National Forest lands is managed by the U.S. Forest Service, not Deerfield Wind. Deerfield Wind will work with the U.S. Forest Service, with input from the public, to ensure the facility is operated in a manner that is both safe and consistent with management objectives for surrounding National Forest land. Deerfield Wind anticipates developing a public access management plan similar to the plan currently in effect for the existing Searsburg facility. Habig Panel reb. at 33.

#### Decommissioning

104. The Project will be operated efficiently over its useful life, with proper maintenance and refurbishment of certain components as required. If properly maintained, the major equipment components (e.g., rotor blades, generators etc.) are designed to have useful lives of twenty to thirty years before a major overhaul or rebuild (repowering) is considered. In the event that repowering is not cost effective or permission to use the federal land on which the Project is constructed is withdrawn, the facility would be dismantled and removed, and the site would be restored to pre-construction conditions as much as is practical. Zimmerman pf. at 35-36.
105. Decommissioning would consist of the following: all turbines, including the blades, nacelles and towers, will be disassembled and transported off site for reclamation and sale. All of the transformers would also be transported off-site for reuse or reclamation. The overhead power collection conductors and the power poles would be removed. All underground infrastructure at depths less than two feet below grade would be removed. All underground infrastructure at depths greater than two feet below finished grade would be abandoned in place. Areas where

subsurface components are removed would be filled, graded to match adjacent contours, and re-seeded, stabilized with an appropriate seed mix, and allowed to re-vegetate naturally.

Zimmerman pf. at 35-36; Exh. DFLD-HGC-2.

106. Excavating and removing the Project's underground collector line could be more intrusive than leaving the line buried. Tr. 12/2/08 at 25:25-26:15 (Habig).
107. Deerfield estimated the cost of decommissioning in July 2007 for the former 17-turbine layout. Exh. DFLD-JZ-Rev12. That estimate remains reasonable although conservative, given that Deerfield Wind has agreed not to consider scrap or resale value of project equipment and that the number of turbines has decreased from 17 to 15. Habig Panel reb. at 24; tr. 12/1/08 at 148, 158-159 (Habig, Cherian).
108. Deerfield Wind has prepared a detailed Decommissioning Plan. *See* Exh. DFLD-HGC-2. The Plan is in all material respects the same as the decommissioning plan approved by the Board as a post-CPG filing in the Sheffield Wind Project proceeding. No party has filed any testimony, either positive or negative, concerning the Decommissioning Plan.
109. The Decommissioning Plan calls for the establishment of a Decommissioning Fund, to be funded by a Letter of Credit or other appropriate financial security. The Plan also calls for the Fund to be increased over time to account for inflation. Exh. DFLD-HGC-2 at 2; Zimmerman pf. at 37.
110. Under the Decommissioning Plan, the size of the Fund will not take into account salvage or resale value of any project components. Exh. DFLD-HGC-2 at 1; Habig Panel sur-surreb. at 5-6.
111. Wind generation facilities have high up-front capital requirements and low operating costs relative to most other electric generating facilities. Consequently, the risk that the revised 15-

turbine project will be decommissioned before the end of its useful life is remote. Once the Project is built, it is very likely to be operated, since the generation cost per megawatt of power produced will be well below any reasonable forecast of alternative power sources that require fuel inputs to operate. Kavet reb. at 21.

112. Notwithstanding the low risk that the Project would need to be decommissioned prior to the end of its useful life, the Decommissioning Plan provides that the Decommissioning Fund will be established prior to the commencement of construction. Exh. DFLD-HGC-2 at 2.

### **Discussion on Decommissioning**

The circumstances warranting future decommissioning and the establishment of a Decommissioning Fund are essentially the same as those considered by the Board for the UPC-Sheffield Wind Project. *Amended Petition of UPC Vermont Wind, LLC*, Docket 7156, Final Order of 8/8/2007 at 107-110. The Deerfield Wind Project does not present any unique issues with respect to decommissioning that would necessitate a different approach. Consequently, Deerfield Wind has already prepared a Decommissioning Plan that is consistent with the post-CPG plan approved by the Board in the UPC case, in order to avoid the need for a post-CPG filing in this proceeding.<sup>3</sup>

No other party has offered an estimate of the cost of decommissioning the Project. Nor is there any evidence that Deerfield's cost estimate is unreasonable or inaccurate.

Deerfield Wind proposes the following CPG Condition regarding Decommissioning:

Deerfield Wind shall implement the Decommissioning Plan submitted as Exh. DFLD-HGC-2. The decommissioning plan may allow the fund to grow as the construction process proceeds such that the funding level is commensurate with the

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<sup>3</sup> In general, Deerfield Wind believes that the number of post-CPG compliance filings should be minimized as much as feasible through submission of relevant documentation during the pre-approval evidentiary proceedings, in order to keep the post-CPG process limited in scope and duration and not delay the construction and operation of the Project.

costs of removing infrastructure in place. The amount of the fund may not net out the projected salvage value of the infrastructure.

If actual power production falls below 65% of projected production during any consecutive two-year period, a decommissioning review is initiated; however, if Deerfield Wind can demonstrate that it has entered into stably priced power contracts with Vermont utilities through which a substantial amount of power is to be sold at stable prices, the Board may reduce the decommissioning trigger to as low as 50%.

#### Agreements with the Towns of Readsboro and Searsburg

113. Deerfield Wind entered into an agreement with the Town of Searsburg dated April 8, 2008, and an agreement with the Town of Readsboro dated August 20, 2008, each concerning the Project. Exh. Searsburg-SF-1; Exh. DFLD-HGC-6.
114. The agreements each address tax and supplemental payments, communication protocols, remediation of construction impacts, potential impacts to private property, decommissioning, noise monitoring, fire protection services, and other contractual terms. Exh. Searsburg-SF-1; Exh. DFLD-HGC-6.
115. Deerfield Wind will make guaranteed annual payments to Readsboro of \$154,000, and higher payments should the calculation of property taxes exceed \$154,000 at any point during the life of the Project. Deerfield Wind will make guaranteed annual payments to Searsburg of \$240,000, and higher payments should the calculation of property taxes exceed \$240,000 at any point during the life of the Project. Exh. DFLD-HGC-6 at ¶ 1; Exh. Searsburg-SF-1 at ¶ 1.
116. Each of the agreements provides: “The Town and Deerfield Wind agree to ask that the PSB include the full terms of this Agreement, by reference or otherwise, in any Order or CPG authorizing construction of the Project and agree that this Agreement may be enforced by the PSB as a condition of construction and operation of the Project and further agree that the state

and federal courts situated in the State of Vermont have jurisdiction over the Parties to entertain and decide any and all actions that may arise under or in connection with this Agreement.” Exh. DFLD-HGC-6 at ¶ 13; Exh. Searsburg-SF-1 at ¶ 13.

#### **IV. SECTION 248 CRITERIA**

##### **30 V.S.A. § 248(b)(1) – ORDERLY DEVELOPMENT OF THE REGION**

117. The Project will not unduly interfere with the orderly development of the region, and will not cause any direct impacts on the capacity of the region to develop. This Finding is supported by Findings 118 to 152 below.
118. The Project will be located in the towns of Readsboro and Searsburg. Other towns within the ten-mile radius include Bennington, Dover, Halifax, Marlboro, Pownal, Shaftsbury, Stamford, Stratton, Whittingham, Wilmington, and Woodford. Zimmerman pf. at 46.
119. Deerfield Wind provided a 45-day advance notice of its plan to file a 248 Petition to the Windham Regional Planning Commission, the Searsburg Selectboard, the Readsboro Selectboard and the Readsboro Planning Commission. In addition, in August 2005, Deerfield Wind sent a notice of its plans to all town selectboards and planning commissions within a ten-mile radius of the Project. The Windham Regional Planning Commission filed a list of comments compiled during a public meeting. None of the towns submitted comments to the Board as a result of these notices. Zimmerman pf. at 42-43.
120. Deerfield Wind has assessed the potential visual, noise, economic and environmental impacts of the Project on the host towns. None of these factors will cause the Project to unduly interfere with the orderly development of the region. Zimmerman pf. at 46.

121. The only potential impacts that could extend beyond the host towns to other towns within a ten-mile radius of the Project are visual and economic impacts. With respect to aesthetics, the Project will not have an undue adverse visual effect on the natural and scenic qualities of the area, including views from other towns within the ten-mile radius. With respect to potential economic impacts, there are likely to be a number of positive impacts on the development of the region, which may provide benefits to both the host towns and other surrounding towns. Thus, the Project will not unduly interfere with orderly development within the ten-mile towns.

Zimmerman pf. at 46-47.

122. The Project should have a positive impact on regional development. The Project will add a substantial tax base in the region and enhance power reliability in the region by adding a local generation source. During construction, the Project will, to the extent possible, use local services and goods. Local goods and services will be consumed during construction and operation. During the operating period, the Project will provide site technician jobs.

Zimmerman pf. at 47; Kavet reb. at 3-5; Exh. DFLD-TK-2 at 4.

123. The Project will not cause an undue burden on public roadways or other types of municipal or state services or infrastructure. It will not utilize land or resources that are otherwise needed or planned for other forms of development within the region. Zimmerman pf. at 40.

124. There is no indication that the Project will have any negative effects on local property values. Statistically based studies of the impacts of wind projects found no effect on property values.

Zimmerman pf. at 48; Exhs. DFLD-JZ-14 and DFLD-JZ-25; Kavet reb. at 11-16; tr. 12/9/08 at 34:11-25 (Kavet). *See also*, Findings 203-207, *infra*.

125. There is no indication that the Project will have any negative effects on tourism. On the contrary, experience from the Searsburg facility suggests that the Project will have a positive

effect. There is a steady stream of visitors to the pull-off area constructed at the intersection of Sleepy Hollow Road and State Route 8. The number of visitors to the Searsburg facility increases substantially during the foliage season and includes tour busses. The level of interest in this facility remains very high, with no discernable reduction in visitors over time. Zimmerman pf. at 48; Kavet reb. at 6-11.

126. The Project will be constructed on not more than 80 acres of federal land out of the tens of thousands of acres of surrounding GMNF lands. These lands are managed by the USFS under the comprehensive LRMP Forest Plan. The current LRMP for the GMNF was finalized in February 2006. A goal of the forest-wide management direction for the GMNF is to “provide opportunities for renewable energy use and development.” The Plan divides the Green Mountain National Forest into several Management Areas (MA). The proposed project is located within an area designated as MA Diverse Forest Use, which emphasizes a variety of forest uses. The proposal is consistent with the development, level of disturbance, and actions expected in MA Diverse Forest Use. The management prescription for this designation allows for non-recreational special uses, including wind power development. Zimmerman pf. at 40-41.
127. The Vermont Department of Public Service concurred that the Project will not unduly interfere with the orderly development of the region. Ide pf. (adopted by Lamont) at 5.

Town of Searsburg

128. After Deerfield Wind filed its Petition in this proceeding, the Searsburg Selectboard entered into negotiations with Deerfield Wind to discuss an agreement governing relations between the Town and the Petitioners. Florence pf. (adopted by Kenney) at 3-4.

129. The negotiations included discussions about accountability, use of town roads, mitigation payments, tax valuation, and concerns about noise, property damage, and decommissioning. Florence pf. (adopted by Kenney) at 4.
130. During the annual Searsburg Town Meeting, held on March 3, 2008, a vote was taken on the proposed Project. The town of Searsburg has a population of 72. The vote included 45 residents and resulted in a vote of 29 in favor and 16 opposed. Florence pf. (adopted by Kenney) at 5-6.
131. At the time of the vote there was a tentative agreement between Searsburg and Deerfield Wind. The agreement included payments to the Town of \$240,000 annually, comprised of both property tax and supplemental payments. Florence pf. (adopted by Kenney) at 5.
132. The Searsburg Selectboard and Deerfield Wind executed a formal agreement on April 8, 2008. The Agreement will provide the Town with fixed annual payments and also includes provisions on decommissioning, noise, cooperation by the parties, warranties, insurance, and other miscellaneous items. Florence pf. (adopted by Kenney) at 6-11.
133. Searsburg does not have a Town Plan. Vissering/Buscher pf. at 17.

Town of Readsboro

134. Deerfield Wind and the Town of Readsboro have also entered into a formal Agreement governing relations between the Project and the Town. The Agreement was signed by the Town in mid-August 2008, then by Deerfield Wind on or about August 20<sup>th</sup>, and forwarded back to the Town on August 28<sup>th</sup>. Habig sur-surreb. at 6-7; Exh. DFLD-HGC-6.
135. The principal provisions of the Agreement address tax and other supplemental payments, and a communication and review process as the Project goes forward to final planning, construction and operation. The Agreement will effectively provide the Town with guaranteed

annual payments of \$154,000, and higher should the calculation of property taxes exceed \$154,000 at any point during the life of the Project. The Agreement also has provisions on decommissioning, noise, cooperation by the parties, warranties, insurance, and other miscellaneous items. Habig sur-surreb. at 6-7.

136. The Readsboro Town Plan was adopted on August 25, 2005. The Plan notes several areas of aesthetic value to the Town but does not contain any specific land conservation provisions that apply to the Project lands. The Plan also recognizes the potential for a wind energy project within the GMNF, but provides no specific determinations or guidance with respect to the aesthetic impacts of the Project, except that the impacts must be carefully considered. Zimmerman pf. at 44-45; Vissering/Buscher pf. at 21; Exh. DFLD-JV/MB-6.

137. The Project will not violate any clear written community standards articulated in the Readsboro Town Plan and it will not pose an undue adverse impact on the aesthetics of the surrounding area. Vissering/Buscher pf. at 21.

#### Town of Wilmington

138. The Project is not located in the Town of Wilmington. Exh. DFLD-JZ-30a.

139. The Project will not have a negative impact on the overall property values or tourism in the Town of Wilmington. See Findings 203-212 below under section 248(b)(4).

140. The Project will not have an undue adverse affect on aesthetics or scenic and natural beauty within Wilmington. See Finding 420, *infra*; See generally, Discussion on Aesthetics (Visual) -- §6086(a)(8), *infra*.

141. The Wilmington Town Plan only applies to development activities within the Town's borders. Exh. Wilmington 12 at ¶ 3. The Plan therefore does not apply to the Project.

142. Even if the Wilmington Town Plan was considered to apply, the Project is consistent with the Town's goals for tourism and recreation. Vissering/Buscher reb. at 38.

Windham Regional Planning Commission

143. Section 248 requires the Board to give "due consideration" to any recommendations of the Regional Planning Commission. Section (b)(1) does not however, require strict "compliance" with a regional plan, as might be required under criterion 10 of Act 250. Zimmerman pf. at 45; Vissering/Buscher reb. at 40.

144. The Project will not conflict with any of the Plan's general or specific provisions and it will not violate any clear written community standards articulated in the Plan. Zimmerman pf. at 45; Vissering/Buscher pf. at 21-22.

145. The Regional Plan provides little discussion on siting electric generation facilities and less on siting wind power facilities. The Regional Plan does state a goal of "reducing the Region's dependence on outside energy sources" by providing a local source of renewable energy. The Project directly addresses this goal. Zimmerman pf. at 45; Vissering/Buscher pf. at 22.

146. The Project is also consistent with the Plan's individual land use policies. The Project will be consistent with policies #1-4 listed under Soils and Topography. Policy #1 states: "Avoid intensive development (other than recreational trails and ski lifts) in areas predominated by slopes exceeding 25 percent or above 2,500 feet in elevation." This is not an express prohibition on development above 2,500 feet, and recognizes that some types of development, such as ski areas, must be built in areas with slopes in excess of 25 percent or above 2,500 feet. Like ski areas, wind energy projects in Vermont generally must be located on higher elevation. At the same time, the Project will be constructed in a manner to prevent undue soil erosion that might

occur on steep slopes. Vissering/Buscher reb. at 41; *see also* Nelson/Reinhart reb. at 5-6; Krzanowski pf. at 39-40.

147. The Project will be consistent with Policy #3 of the Regional Plan related to scenic resources, lighting and illumination. Policy #3 addresses scale, siting, and design, and encourages management of new development in a way that protects high quality scenic landscapes and scenic corridors. The Plan does not identify the scenic landscapes or scenic corridors to be protected, and does not define what actions may or may not enhance the scenic landscape. As a result, it is difficult to conclude that this section of the Plan specifically applies to the area of the Project. The Project has been well-sited in a manner that preserves the area's major scenic attributes. While the Project would be visible from the Route 9 Scenic Byway, it will not degrade the scenic qualities of that resource. The Project would be seen over a very small portion of this highway, only portions of the Project would be visible, and it would not be visible along the more scenic portions of the route, nor would it interfere with views of important visual resources or focal points. Moreover, the existing Searsburg facility is featured prominently on one of several informational markers along Route 9 that were installed as a part of the Scenic Byway program, and in the same way the Project may add a positive element to the Route 9 Scenic Byway. Vissering/Buscher reb. at 42.

148. Scenic Resource Policies #4, #5, and #6 are even more general in nature than Policy #3. Policy #4 seeks to minimize visual impacts of communication towers and other high-elevation or ridgeline structures through co-location, design, siting, and color choice. By locating the Project in conjunction with the existing Searsburg facility, the aesthetic impacts have been significantly reduced. Also, the white turbines are appropriate for the context. This policy further recommends that such structures be designed and sited so that they do not require

nighttime illumination. Strict adherence to this recommendation would appear to preclude all utility scale wind facilities and many modern communication and cell towers, contrary to other language in the Regional Plan. Vissering/Buscher reb. at 42-43. The policy is also internally inconsistent with Policy #5, which requires minimizing lighting to the level absolutely necessary for the safety of persons and property. The Project can be inconsistent with a single policy and still not interfere with the orderly development of the region. Tr. 12/11/08 at 172-173 (Vissering).

149. The Project complies with Policy #5, which indicates that lighting should be minimized to a level absolutely necessary for the safety and security of persons and property. Deerfield Wind has proposed the minimum amount of nighttime lighting necessary under FAA guidelines. Six out of the fifteen turbines will have nighttime lighting, but the lights are small and relatively unobtrusive, especially from distant locations such as in Wilmington. Vissering/Buscher reb. at 43; Habig Panel reb. at 6; Exh. DFLD-HGC-4; tr. 12/2/08 at 23-24 (Goland).

150. Policy #6 recommends that lighting not be directly visible from public roads, adjacent residences or distant vantage points, and that lighting is generally shielded. Turbine lights are designed to be visible primarily from above, so that intensities are greatly diminished below -1°. Vissering/Buscher reb. at 43.

151. Policy #7 discourages exterior area illumination, especially of regionally prominent features and landscapes, and encourages lighting that does not “significantly reduce” the natural appearance of the nighttime landscape or distract from the night time horizon or sky. The lighting of the Project will comply with this policy as it would be visible from very few locations and at a considerable distance from most viewing areas. It will not illuminate the surrounding landscape or contribute to sky glow. Nor will it significantly reduce the natural appearance of

the nighttime landscape, or unreasonably detract from the overall nighttime horizon in the area.

Vissering/Buscher reb. at 43.

152. The Project will also comply with Policies #8 and #9 as it will utilize existing roads where possible – the GMP access road to the eastern string and Putnam Road/private road to the western string. Any new roads will be largely hidden from public view and will be screened to the greatest extent practicable. Vissering/Buscher reb. at 43-44.

**Discussion on Section 248(b)(1) -- Orderly Development of the Region**

Section 248(b)(1) requires the Board to find that the Project:

[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 strict conformance with local and regional plans, but rather directs the Board to give “due consideration” to the recommendations of local and regional entities, and to “land conservation measures” in the local municipal plan. *Compare* 10 V.S.A. § 6086(a)(10) *with* 30 V.S.A. § 248(b)(1). As the Vermont Supreme Court has ruled, in the context of Section 248, municipal enactments are “advisory rather than controlling.” *City of South Burlington v. Vermont Elec. Power Company*, 133 Vt. 438, 447 (1975). The Board itself has previously held that giving “due consideration” to town plans is not akin to giving veto power to any town over a project subject to section 248; rather, it is one of a number of factors that the Board must take into account and balance in determining whether the project would serve the public good.

The Host Towns

The Project is located exclusively in the Towns of Searsburg and Readsboro. Searsburg has no town plan, and the Readsboro Town Plan has no specific land conservation provisions that would apply to the Project.

Neither town made recommendations to the Board during the 45-day notice period. Since the filing of the Petition, the Selectboards of both towns have entered into agreements with Deerfield Wind concerning financial payments, construction impacts, noise, decommissioning, and other project-related issues. As reflected in the agreements, the legislative bodies of both towns now support the Project, and Searsburg conducted a recent town vote which confirms that support.

#### Non-Host Towns

The Town of Wilmington is the only non-host town that has participated in this proceeding. The Project is not physically located in Wilmington, and as the Town itself concedes, the Town Plan only applies to development activities within its own borders. *See* Exh. Wilmington-12 at ¶ 3. Consistent with the Board's holding in the UPC-Sheffield case, the Wilmington Town Plan does not apply in this proceeding:

Since the Sutton Town Plan is not applicable beyond the borders of the town, there is no basis for applying the objectives of the Town Plan.

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If we applied the Sutton Town Plan to our review under the Quechee test in this case, we would need to apply the town plans of any municipality that has a view of a proposed project, a policy that has not been applied by any other regulatory body in Vermont. Additionally, if the town plans of neighboring municipalities were considered in planning decisions, it would undermine the municipal planning process by allowing municipalities to make planning decisions for neighboring towns.

*Amended Petition of UPC Vermont Wind, LLC, Docket #7156, Final Order (8/8/2007) at 68-69.*

With respect to impacts to the Town of Wilmington more generally, irrespective of the applicability of the Town Plan, the Project will not unduly interfere with orderly development within Wilmington.

In terms of visual impacts, the Project will not affect the one specific scenic resource identified in the Wilmington Town Plan – Haystack Mountain – as, from Wilmington, this feature is viewed while facing opposite the direction to the Project. More generally, views of the Project from Wilmington will be distant – four to six miles away. Views from primary roads, backroads, the village center, and other areas are limited to very limited. Where views would exist, they would often be similar to existing views of the Searsburg turbines, for example from the eastern shore of Harriman. Overall, views of the Project will not be undue, and will not interfere with orderly development within the Town. Further, as discussed in more detail below under section 248(b)(4), there is no empirical or anecdotal evidence that the visual impacts of this wind project will negatively affect tourism or property values, or the resulting tax base within Wilmington that could arguably affect future development within the town. *See*, Finding 185, *infra*. On the contrary, the experience with the Searsburg facility is that a wind project does not cause such negative affects within the region.

#### Windham Regional Plan

The Project satisfies the general directives in the Plan. As with most regional plans, the Plan sets forth general guidelines and recommendations for assessing development proposals in the region. Its terms are not specific and mandatory and it does not compel a particular outcome in this case.

The Regional Plan provides little discussion on siting electric generation facilities and less on siting wind power facilities. However, the Project does directly address the Plan's stated goal of

“reducing the Region’s dependence on outside energy sources” by providing a local source of renewable energy. The Plan does contain other more specific provisions that, for example, discourage development in areas of steep slopes and elevations above 2,500 feet, and recommend against the use of nighttime lighting of structures in order to prevent sky glow. These provisions are not express prohibitions but rather are advisory and must be read in conjunction with other provisions of the Plan.

As detailed in the findings, the Project must by necessity be located in high elevation areas to be commercially viable, similar to ski areas. Deerfield Wind has designed the Project to address the environmental challenges associated with development on steep slopes. With respect to lighting, Deerfield Wind has proposed the minimum amount of turbine lighting that would satisfy FAA guidelines. The proposed lighting will be red strobe lights on fewer than half of the turbines, and this type of lighting is of an intensity and direction that would not cause sky glow, illuminate the sky, or otherwise significantly reduce the nighttime landscape.

Finally, it is worth noting that the Board previously considered the provisions of a substantially similar version of the Windham Regional Plan during its review of the Searsburg facility in 1996 (Docket 5823). Recognizing that “any economically viable commercial scale wind development must be sited at high elevation and topographically prominent locations to intercept useful quantities of wind energy,” the Board concluded that the Searsburg project complied with the Regional Plan because it had been sited to minimize the impacts of the facility to the extent possible. *Searsburg*, Docket 5823, Order of 5/16/96 at 28 (¶ 38). The Project proposed here has similarly been designed to minimize impacts to the extent possible.

Taken together, the evidence indicates that the Project will not unduly interfere with the orderly development of the region, but rather will contribute to its future orderly development. On

balance, the benefits of the Project substantially outweigh the limited impacts. The Project will be a net economic benefit to the State of Vermont and the region. It will provide a source of stable renewable energy in the region. The Project will be visible from some locations in the region, but the aesthetic impact will not be unduly adverse, and will not so negatively affect the character of the surrounding area as to impede the orderly development of the region. Consequently, the Project satisfies section 248 (b)(1).

Deerfield Wind also incorporates by reference its arguments regarding potential federal preemption of the Board's application of section 248(b)(1) to a project located on the Green Mountain National Forest.

**30 V.S.A. § 248(b)(2) – NEED FOR THE PROJECT**

On January 15, 2009, Deerfield Wind filed with the Board a request for certification of the revised 15-turbine project as a "SPEED project" pursuant to Board rules implementing the Sustainably Priced Energy Enterprise Development ("SPEED") program created under 30 V.S.A. § 8005. If the Board approves this request and issues a certification, then Deerfield Wind is not required to demonstrate compliance with section 248(b)(2).

Deerfield Wind requested SPEED project certification under Board Rules 4.304 and 4.305, which together provide for SPEED certification of new in-state generation facilities that produce renewable energy, specifically including wind facilities. PSB Rules 4.304, 4.305. A developer may request such certification "at any time, including after construction of the facility." PSB Rule 4.305.

Privately-financed projects like the revised 15-turbine project are not required to demonstrate compliance with section 248(b)(2) if they obtain SPEED certification:

A facility that has been certified as a SPEED project, and that is not financed directly or indirectly through investments backed by ratepayers of a Vermont utility other than power contracts, need not demonstrate compliance with 30 V.S.A. § 248(b)(2).

PSB Rule 4.312(A).

Pending the Board's determination of Deerfield Wind's request for SPEED certification, Deerfield Wind offers the following proposed findings and conclusions under section 248(b)(2).

\* \* \*

153. The proposed facility is "required to meet the need for present and future demand for service 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." 30 V.S.A. § 248(b)(2). This finding is supported by Findings 154-168 below.

154. Deerfield Wind is not a regulated distribution utility under Vermont law and is not required, nor does it have the ability, to deliver energy conservation programs and load management measures to Vermont electricity consumers. To the extent that this provision is intended to protect ratepayers by ensuring that utilities are making sound investments that are both necessary and cost-effective, those concerns do not present themselves here. Deerfield Wind is a private company that is paying for the development, permitting, construction, financing and operation of this project. It is Deerfield Wind, not Vermont ratepayers, that bears the risk of these investments. Zimmerman pf. at 4-6; Zimmerman suppl. pf. at 5-6.

155. Vermont currently relies on major contracts with Hydro-Quebec and Vermont Yankee for approximately two-thirds of its electricity. These contracts are due to expire within the next decade. Hausman pf. at 3.

156. Vermont utilities and ratepayers need to obtain new fixed-price, long-term contracts to support a reasonably diversified supply portfolio in the future. Id. The 2005 Vermont Electric

Plan lists “ensur[ing] that Vermont’s overall energy portfolio is sufficiently diverse” among the state’s major energy priorities. Exh. DFLD-TK-2 at 20.

157. Wind-generated power can replace baseload resources to some degree. Green Mountain Power Corporation (“GMP”), for instance, would consider power that it purchases from the revised 15-turbine project as replacement for a substantial portion of power purchased from baseload sources such as the Vermont Yankee plant. Tr. 12/9/08 at 142: 8-15 (Smith).
158. The revised 15-turbine project will produce an average of 92,500 MWh per year, which could meet the power demand of more than 12,500 Vermont homes. Exh. DFLD-TK-2 at 2; tr. 12/9/08 at 9: 22, 10:1 (Kavet).
159. The Board must consider the need for power throughout the New England region in reviewing the revised 15-turbine project under section 248(b)(2) because Vermont is located within a single, centrally-dispatched wholesale electricity market operated by ISO New England. The availability of power anywhere in the region affects electricity prices throughout the region. Hausman pf. at 4.
160. According to the ISO New England 2007 Regional System Plan, regional peak demand for electricity through 2016 is expected to grow at a compound annual rate of 1.7% per year, or about 500 MW per year. Exh. DFLD-TK-2 at 22.
161. There is also a strong and increasing regional demand specifically for new renewable generation that cannot be satisfied by efficiency or conservation programs. Renewable portfolio standards now implemented in many New England states drive a strong demand for Renewable

Energy Credits (“REC”). Hausman pf. at 3; Thomas pf. at 2-3 (adopted by Lamont – see Lamont reb. at 1)<sup>4</sup>; tr. 12/9/08 at 91:9-25, 92:10-16 (Hausman).

162. Projections recently performed by representatives of New England states including Vermont for two projected years – 2016 and 2020 – found that currently proposed renewable generation projects will be insufficient to meet current regional renewable portfolio standards in those years. Tr. 12/9/08 at 265:3-24 (Lamont). Similarly, the 2007 ISO New England Regional Plan stated that all projects then in the ISO Generator Queue, which included the Deerfield Wind Project, would meet only 81% of the need for new renewable generation in 2016. Exh. DFLD-TK-2 at 23.

163. Vermont’s Act 61 established the goal of meeting statewide incremental load growth between Jan.1, 2005 and Jan. 1, 2012 with renewable resources. If utilities are unable to meet this incremental demand with renewable resources, mandatory provisions will require development of additional renewable resources. 30 V.S.A. § 8004; Hausman pf. at 3.

164. Act 61 also established Vermont’s Sustainably Priced Energy Enterprise Development (“SPEED”) program. In 2008, Vermont established the statutory goal that 20 percent of total statewide electric retail sales before July 1, 2017 shall be generated by “SPEED resources,” including new renewable resources. 30 V.S.A. § 8005(d)(2).

165. The Project would address the Vermont Act 61 requirement as well as the broader regional demand for renewable energy. It would produce one REC for every MW of energy it generates. These RECs would qualify to satisfy renewable portfolio standards in any state in the New England region. Hausman pf. at 4.

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<sup>4</sup> Hereinafter cited as “Thomas/Lamont pf. at \_\_\_”

166. The need for the Project is confirmed by Deerfield Wind's power sale negotiations with GMP. GMP and Deerfield Wind have executed a Letter of Intent ("LOI") to negotiate a power purchase agreement (PPA) for 10 MW of the Project at a fixed price (identified in the LOI) for a 15 year term. Exh. DFLD-HGC-9; Exh. DFLD-HGC-10 (conf.) (includes the price term).
167. The purchase of Project power is an important opportunity for GMP for several reasons: (i) it is consistent with GMP's commitment to leadership in providing clean, renewable energy sources; (ii) it is consistent with GMP's 2007 IRP, which identifies renewable generation (including wind) as a priority supply resource for the company; (iii) it will help GMP comply with provisions of Vermont Act 61; (iv) GMP is seeking to secure new sources of emission-free power to potentially replace power it now buys from Vermont Yankee and Hydro Quebec; (v) GMP believes that increased reliance on stably-priced renewable resources will reduce long-term economic risk to ratepayers by hedging against the price volatility of fossil-fuel based power; (vi) over the long term, GMP aims to develop a portfolio comprised of 10-20 percent renewables. Smith pf. at 4-5; tr. 12/9/08 at 116:11-12, 118:14-16 (Smith).
168. The Project will meet the local and regional need for new power generation from renewable resources, and will add desirable diversity to Vermont's portfolio by providing a local source of stably-priced, clean and reliable power. See Findings 154-167, *supra*.

**Discussion of Section 248(b)(2) – Need for the Project**

Under section 248(b)(2) the Board must find that a 248 project, is required to meet the need for present and future demand for service 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, including but not limited to those developed pursuant to the provisions of sections 209(d), 218c, and 218(b) of this title.

By its terms, this provision applies to petitioners such as retail utilities that are required to implement conservation and load-management measures – not to independently-owned merchant plants such as this Project. The Board has recognized this, and applied a different standard to merchant plants. *See, Petition of Entergy Nuclear Vermont Yankee, LLC* (hereinafter “*Petition of Entergy*”), Docket No. 6812, Final Order of 3/15/2004. In the Entergy case, the Board applied a loose “need” standard in part because of the absence of risk to ratepayers. “Because Vermont Yankee is a merchant plant, ratepayers and consumers are not exposed to investment risk from the proposed uprate modifications.” *Id.* at 20. The Board concluded that there was “a reasonable likelihood of providing energy at market prices which will result in the uprate power being used.” *Id.* at 20.

It is well established that “need” under the section 248(b)(2) standard includes both need specifically for renewable power, and regional need throughout New England. Board decisions also acknowledge that energy conservation and efficiency programs cannot sufficiently address need for renewable power to satisfy state renewable portfolio standards. The Board recently found that a proposed 40 MW wind generation facility satisfied section 248(b)(2) on grounds that “the Project would contribute to both Vermont and the region’s need for renewable power, a need that cannot be met through energy efficiency, conservation, or load management measures.” *Amended Petition of UPC Vermont Wind, LLC*, Docket 7156, Final Order of 8/8/2007 at 29. In *Petition of Entergy*, the Board found that “the general good of the state’ standard includes a recognition of the value to Vermont of the benefits to the entire New England Power Pool,” and thus approved the proposed uprate even though it was “not required for the purpose of serving load within the state of Vermont.” *Petition of Entergy* at 21-22.

The Project undoubtedly meets the “need” criterion, as the Board has applied it to merchant-plants. Under the terms of the letter of intent between Deerfield Wind and GMP, the parties are

negotiating a PPA for one-third of the power generated by the Project to be sold to a Vermont utility under a long-term fixed-price contract. Such a contract would further Vermont's statutory and policy goals to increase portfolio diversity, hedge Vermont ratepayers against fuel price volatility, and increase renewable generation. *See* 2005 Vermont Electric Plan; 30 V.S.A. §§ 8001, 8005. There are ample findings to demonstrate that the Project is needed to satisfy a significant unmet regional demand for renewable energy generation, reflected in part by the market for renewable energy credits. Finally, the investment risk is not borne by ratepayers in the State, but by Deerfield Wind. The "need" criterion is therefore satisfied.

**30 V.S.A. § 248(b)(3) – SYSTEM STABILITY AND RELIABILITY**

169. The Project will not "adversely affect system stability and reliability." This finding is supported by Findings 170-182 below.
170. All findings under Section III above regarding the Project's substation, electrical collection lines and other electrical equipment are incorporated herein by reference.
171. The wind turbines, transformers, and power lines will utilize a number of systems to isolate the Project from the power grid in the event of equipment failure. The wind turbines will be disconnected from the transmission line in the event of ground faults, phase faults, over-current, under and over voltage, under and over frequency, and system imbalance. In addition, the turbines have power electronics which provide soft-start capability to reduce starting surges, to ride through short-term voltage dips, and to provide or consume reactive power to improve voltage regulation on the 69 kV transmission system. Zimmerman pf. at 51.
172. The Project will be interconnected to the National Grid/VELCO 69 kV "Y25N" transmission line via a three-breaker ring bus configuration which will improve reliability of the

transmission line. Control and protection systems for the Project will be designed and installed consistent with the transmission line owners' recommendations after consultation with Deerfield Wind. Estey pf. at 10.

173. A Feasibility Study (January 2006) and System Impact Study (SIS) (January 2008) were prepared for the originally-proposed 45 MW project by National Grid and the New England Independent System Operator (ISO-NE). The Feasibility Study consists of a steady state (load flow) analysis, and includes voltage, thermal, and system protection analyses. The SIS consists of a stability analysis. The studies were conducted in accordance with the NEPOOL Reliability Standards and the NEPOOL Minimum Interconnection Standards. Exhs. DFLD-DE-9 and-11; Zimmerman pf. at 50-51.

174. The Feasibility Study found that the 69 kV transmission lines were generally adequate to accommodate the Project, and the Project would not create significant pre- or post-contingency voltage violations. Estey pf. at 8.

175. The Feasibility Study also found that: (i) under certain contingency situations, the loss of the Y25N connection between the Project and Bennington could cause the 69 kV line "J10" between Adams and Deerfield Hydro No. 5 to experience a significant overload condition. The solution to this condition is to upgrade line J10; (ii) a need exists for VELCO to upgrade its portion of Y25N. VELCO is already in the process of upgrading this line and has determined that the additional upgrade could be accomplished at no incremental costs; and (iii) the Bennington transformer could possibly reach a loading of 100.3% of its capability. VELCO determined that the potential overload on the Bennington transformer is not a concern and does not need to be addressed. Estey pf. at 8.

176. With respect to the planned substation, the Feasibility Study found that a second substation (a three ring bus) would be required at the interconnection point with the existing 69 kV line. The alternative of directly interconnecting at the existing Sleepy Hollow (GMP) Substation was determined to be infeasible. Exh. DFLD-DE-9 at 9-10; Estey pf. at 10.
177. The SIS concluded that the ISO-NE system would remain stable for all of the contingencies simulated, and would be compliant with performance requirements for wind projects under FERC Order 661A. Exh. DFLD-DE-11 at v.
178. A final SIS for the revised project is expected in April 2009. Tr. 12/1/08 at 51 (Habig).
179. Deerfield Wind's consulting electrical engineer, David Estey, has substantial experience with power system impact analyses, providing technical support, interpreting results of simulations, and assisting with the compilation of numerous system steady state and stability studies. Exh. DFLD-DE-1; Estey pf. at 1.
180. Mr. Estey testified that typically, reliability and stability impacts resulting from the addition of a generation facility are significantly influenced by project size. With a reduction in MW capacity from the originally proposed project, the revised 15-turbine project will have no more of an impact than the original proposal. Thus, his conclusion on the project revisions is that there continues to be no adverse affect on system stability and reliability. Estey suppl. pf. at 3.
181. Mr. Estey concluded that the Project as revised can meet all necessary standards of stability and reliability, based upon: the Feasibility Study, the January 2008 SIS, the reduced project size from 45 MW to 30 MW, discussions with the transmission line owners and ISO-NE, and his experience. Estey pf. at 10; Estey suppl. pf. at 3; tr. 12/1/08 at 225-226 (Estey).
182. ISO-NE will require Deerfield Wind to be responsible for the cost of any transmission system modifications needed to accommodate the load generated by the Project, should the final

SIS conclude that such modifications are needed. As a result, the Project will not adversely affect system stability and reliability. Zimmerman pf. at 50; Habig Panel reb. at 25.

**Discussion on Section 248(b)(3) – System Stability and Reliability**

The evidence in the record demonstrates that the Project will comply with section 248(b)(3). There is no evidence to the contrary. Although ISO-NE has not finalized the system impact study for the revised 15-turbine project, an earlier study for the previously-proposed 45 MW project demonstrates that the Project can be built without adversely impacting system stability and reliability. Moreover, it is undisputed that National Grid (the transmission line owner) and ISO-NE (the electrical system operator) will not allow Deerfield Wind to interconnect the Project until the issue has been resolved to their satisfaction, at Deerfield Wind's expense. Consequently, the Project will not pose an undue adverse impact to system stability and reliability.

The Board was confronted with a similar set of circumstances in the UPC-Sheffield Wind Project proceeding, where the System Impact Study was not finalized at the time of the decision. The Board found that UPC had submitted evidence that the project would not adversely affect system stability and reliability, and that ISO-NE would not permit the project to interconnect with the transmission system until UPC had implemented any necessary measures. As a result, the Board permitted the final SIS and interconnection plans to be submitted as a post-CPG compliance filing. *See Amended Petition of UPC Vermont Wind* Docket 7156, Order of 8/8/07 at 30-31.

Deerfield Wind has provided the same type of evidence in this case as was provided in the UPC case, and thus the Board's holding in UPC should apply. Deerfield Wind thus proposes the following CPG condition, which is substantially similar to that imposed by the Board in UPC:

Deerfield Wind shall submit the final ISIS study (Interconnection System Impact Study) and interconnection and substation plans to the Board for review and approval prior to construction. Deerfield Wind shall implement the system modifications that ISO New

England Inc. determines should be borne by the Project to ensure no adverse effect to system stability and reliability.

**30 V.S.A. § 248(b)(4) – ECONOMIC BENEFIT TO THE STATE**

183. The revised 15-turbine project “will result in an economic benefit to the state and its residents.” This finding is supported by Findings 184-238 below.
184. The Project will have significant economic and fiscal benefits for the State of Vermont, Bennington County and the Towns of Searsburg and Readsboro as the host municipalities. These benefits include the creation of new jobs, increased tax revenue, and other direct and indirect benefits (including, for example, reduced air emissions). Exh. DFLD-TK-2 at 3; Hausman pf. at 6.
185. Deerfield Wind’s economic consultant (Thomas Kavet) performed an analysis using a regional input/output and econometric model (REDYN). Based on this analysis, the Project is expected to result in the following economic gains:
- \$15 million in State economic output during the construction/development phase;
  - \$850,000 in ongoing annual disposable income gains;
  - More than \$750,000 in State General and Transportation Funds during the construction/development phase, and \$4 million over the 20 year life of the Project;
  - Direct State and local property tax payments of approximately \$700,000 per year, including Education Fund property taxes pursuant to 32 V.S.A. § 5402c – Wind-powered electric generating facilities tax;
  - Federal land lease payments of about \$210,000 per year;
  - Employment gains in the State of approximately 250 jobs during construction – about half of these in Bennington and Windham counties; and

- 9 jobs during the operational phase – at least 5 of these expected to be in Bennington and Windham counties.

Exh. DFLD-TK-2 at 4.

186. Deerfield Wind entered into an agreement with the Town of Searsburg whereby Deerfield Wind will make guaranteed annual payments to the Town of \$240,000 (local taxes and mitigation payments combined). Exh. Searsburg-SF-1. This sum represents a payment of more than \$2,500 per resident per year, based on the estimated 2006 Town population, and roughly equal to the Town's entire current annual budget. Exh. DFLD-TK-2 at 4; Florence (adopted by Kenney) pf. at 6-7.
187. Deerfield Wind entered into an agreement with the Town of Readsboro whereby Deerfield Wind will make guaranteed annual payments to the Town of \$154,000 (local taxes and mitigation payments combined), and higher payments in any year in which the calculation of property taxes exceeds \$154,000 during the life of the Project. Exh. DFLD-HGC-6.
188. Income and related economic metrics for both Readsboro and Searsburg are well below State and County averages. Consequently, the economic benefits of the Project have enhanced fiscal, economic, and social value. Exh. DFLD-TK-2 at 4.

#### Power agreements

189. Deerfield Wind and GMP have executed a Letter of Intent (LOI) to negotiate a power purchase agreement (PPA). Exh. DFLD-HGC-9; Exh. DFLD-HGC-10 (conf.). The LOI specifies the material terms to be negotiated, including duration, price, and quantity. Annually for 15 years, GMP would buy a 10MW vertical slice of the Project, representing one third of the Project's anticipated output. Exh. DFLD-HGC-9. The price would be fixed at a rate stated in the confidential version of the LOI filed under seal. Exh. DFLD-HGC-10 (conf.).

190. A long-term fixed-price contract for sale of the Project's output would provide a substantial economic benefit to Vermont ratepayers as a hedge against volatile fossil fuel prices and escalating air emission costs. Thomas/ Lamont pf. at 7-9; Exh. DFLD-EZ-2 at 3; Hausman reb. at 7-8; Smith pf. at 4.
191. The contemplated power contract is consistent with both prudent procurement practice and Vermont's statutory renewable energy goals, which favor "affordable, long-term, stably priced renewable energy contracts that mitigate market price fluctuations for Vermonters." 30 V.S.A. § 8001; Exh. DFLD-EH-2 at 3.
192. GMP has acquired power from several renewable energy resources – the Moretown landfill gas facility, the McNeil Generating Station emissions reduction program, and several farm methane projects. These projects do not yet meet the 5% threshold established by statute. Tr. 12/9/08 at 133:4-135:4 (Smith).
193. By creating more discrete segmentation of one of southern Vermont's transmission lines, the interconnection of the Project will create a reliability benefit to GMP. Tr. 12/9/08 at 138:16-24 (Smith).

Avoided emissions

194. ISO New England generally dispatches generating units in economic merit order – that is, in order of increasing operating costs per MWh produced. The addition of new resources with low operating costs, such as wind, therefore has the effect of reducing the output of the least efficient unit(s), referred to as the marginal unit(s). Exh. DFLD-EZ-2 at 9. The marginal unit in the New England region is typically a fossil-fuel fired plant, likely natural gas fired. *Id.* at 9-10.

195. Deerfield Wind's estimates of the revised 15-turbine project's gross energy production and net capacity factor underlie calculations of the Project's avoided air emissions benefits. Exh. DFLD-EH-2 at 11; tr. 12/9/08 at 69: 6-20 (Hausman). See Findings 48-59, *supra*.

196. The Project will displace fossil fuel generation and reduce the emission of air pollutants that result from fossil fuel generation. Reasonable estimates of avoided emissions are as follows:

<b>Table 1 Displaced Emissions (tons/yr)</b>	
Years 1 through 4	
<b>NOx</b>	92
<b>SO<sub>2</sub></b>	251
<b>CO<sub>2</sub></b>	65,437
Years 5 through 7	
<b>NOx</b>	63
<b>SO<sub>2</sub></b>	137
<b>CO<sub>2</sub></b>	56,769
Year 8 and beyond	
<b>NOx</b>	32
<b>SO<sub>2</sub></b>	23
<b>CO<sub>2</sub></b>	48,102

Exh. DFLD-EH-2 at 8-12; Hausman reb. at 2; tr. 12/9/08 at 69: 6-20 (Hausman).

197. The annual monetized value of avoided air emissions resulting from the Project ranges between approximately \$0.6 million and \$1.1 million, calculated using standards articulated by the Board in Dockets 5270 and 5980 for quantifying avoided externalities resulting from demand-side management projects. Hausman pf. at 6.

198. Vermont has ratified an agreement among the New England states called the Regional Greenhouse Gas Initiative ("RGGI"). Under RGGI, CO<sub>2</sub> emissions from the electric sector are capped at a specified level. In order to emit CO<sub>2</sub>, a fuel burning facility will have to purchase a certificate allowing it to do so. Thomas/ Lamont pf. at 4.

199. The real benefit of a non-emitting source under RGGI is that it will lower the price for emissions certificates, which will make it easier to meet targets and may result, in the long run, in policymakers reacting more favorably to lowering the emissions cap and reducing the number of certificates issued within the region. Thomas/ Lamont pf. at 4-5; Hausman reb. at 3-5.
200. If new renewable generation facilities are not constructed, it will be much more difficult and expensive to meet the RGGI cap. Construction of new wind generation is a low-cost means of meeting the cap. Tr. 12/9/08 at 161: 2-7 (High).
201. Both demand-side management and wind generation are part of a strategy to reduce air emissions and greenhouse gases. To drastically reduce greenhouse gas emissions, both demand-side efficiency and renewable, non-emitting energy generation are essential; a choice between one approach or the other is insufficient. Tr. 12/9/08 at 152:3-153:8 (High).
202. If renewable generation facilities are not constructed, meeting the RGGI cap will be much more difficult and much more expensive. Renewables, particularly wind, represent one of the lowest-cost approaches to meeting the cap. Tr. 12/9/08 at 160:22-161:17 (High).

Property values and tourism

203. There is no empirical basis to assume that the revised 15-turbine project will have any negative impacts to aggregate town, county-wide, or regional real property values. Kavet reb. at 11-16; tr. 12/9/08 at 34:11-25 (Kavet).
204. The most rigorous published study to date of the impacts of wind generation facilities on property values is an analysis initially performed at Bard College by Ben Hoen, which reviewed 280 home sales within a five mile area surrounding the Fenner wind farm in New York. This initial Hoen study found no statistically significant relationship between either proximity to or visibility of the windfarm and the sale price of homes, even in the case of homes within a mile of

the facility, or that sold immediately following the announcement and construction of the windfarm. Kavet reb. at 12-13.

205. Hoen and Ryan Wiser are currently extending the initial Hoen study via analyses of other wind facility sites under the auspices of the Lawrence Berkeley National Laboratory. Preliminary findings based on analysis of 3,638 property transactions in the vicinity of six wind generation facilities have confirmed the results of the initial study. Kavet reb. at 12-13; Exh. DFLD-TK-3.

206. One of the likely reasons that wind turbines do not diminish property values is that not all people agree that views of wind turbines are undesirable; some find wind turbine views attractive. Kavet reb. at 14.

207. Witnesses for the Town of Wilmington expressed concern regarding the Project's impacts on property values in the Town. Wilmington concedes, however, that its witnesses did not produce or rely upon any data or studies on the impact of existing wind projects on property values. Exh. Wilmington-12 at ¶¶ 4-6. Nor did Wilmington establish that the existing Searsburg wind facility has reduced the value of Wilmington properties from which it can be seen. Rather, Wilmington has acknowledged that for tax purposes it does not reduce the appraised value of properties that have views of the Searsburg turbines; it does not maintain records of which properties have such views; and that no Wilmington taxpayer has appealed his property tax assessment based on visibility of the Searsburg turbines. Exh. Wilmington-12 at ¶ 7.

208. There is no empirical basis upon which to expect a significant adjustment – positive or negative – to likely tourism visitation or expenditures at the town, county, or regional levels as a result of the Revised 15 Turbine Project. Kavet reb. at 6-11.

209. Witnesses for the Town of Wilmington expressed concerns about potential impacts to the tourist economy, but Wilmington concedes that its witnesses did not produce or rely upon any

data or studies on the impacts of existing wind generation facilities on tourism. Exh.

Wilmington-12 at ¶ 4.

210. There is a significant amount of winter ski-related tourism in the vicinity of the proposed Project. The Mr. Snow/ Haystack ski area in Dover is a dominant tourist attraction. Nearly 60% of all meals, rooms, and alcohol expenditures in Dover and Wilmington occur between December and March, nearly double the statewide average. Kavet reb. at 9.

211. This tilt towards winter tourism is significant in that, as a class of tourists, skiers are among the most concerned with the effects of global warming and among the most receptive to the benefits of wind power. Kavet reb. at 9-10; Exh. DFLD-TK-4 at 21-22, 25-26.

212. There is considerable evidence that a number of wind farms in the U.S. and abroad, including the Searsburg facility, have become tourist attractions. In the absence of formal plans to promote the proposed Deerfield Project as a tourist destination, however, there is no indication that it will have any measurable impact on aggregate tourism visitation or expenditures in the region. Kavet reb. at 7-8.

#### Broadcast Interference – Duncan Cable TV Service

213. Duncan Cable TV Service's ("DCTV") headend facility is located in the Town of Wilmington, more than 8 miles away from the closest Project turbine. Exh. DFLD-LP-2 at 2.

214. Deerfield Wind's consultant (Les Polisky of Comsearch) evaluated the likelihood that the Project will cause material interference to reception at the DCTV headend. Mr. Polisky considered three types of interference that a wind generation facility can theoretically cause: electro-static interference, electro-magnetic interference, and electro-mechanical interference. Polisky reb. at 3-5.

215. Mr. Polisky has over 40 years of experience in the field of electromagnetic interference and the evaluation of radiation hazards. He joined Comsearch in 1980 and pioneered the company's electromagnetic interference measurement, radiation safety, and wind energy service programs. He holds Bachelor of Science and Master of Science degrees in electrical engineering. Polisky reb. at 1; Exh. DFLD-LP-1.
216. Electro-static interference is caused only when extremely high voltages, normally greater than 100,000 Volts, are in very close proximity (within less than 1,000 feet) to the affected device. Polisky reb. at 3. The Project wind turbines will be located more than eight miles from the DCTV headend, and produce voltages of less than 1,000 Volts, converted by the transformer in the turbine nacelle to 34,500 Volts. At that distance and voltage, the Project will not cause electro-static interference at the DCTV headend. Polisky reb. at 3.
217. Devices that can cause electromagnetic interference are regulated by the Federal Communications Commission ("FCC"). FCC regulations mandate emission limits stated at a distance of 3 meters or approximately 10 feet. The Project's wind turbine generators must comply with these FCC rules. Even if electromagnetic emissions from all Project wind turbine generators reach the FCC rule limits, the emission levels at the DCTV headend earth station antennas more than eight miles away would be many orders of magnitude below the sensitivity of the earth station receivers. Polisky reb. at 5; tr. 12/3/08 at 77: 10-13 (Polisky).
218. Electro-mechanical interference is caused by the physical obstruction of the broadcast signal. Polisky reb. at 4. Given the location of the Project relative to the DCTV headend, Project turbines could physically obstruct broadcast signals received at the headend only in one 18.5 degree sector from relative azimuths of 262.5° - 281°. Polisky reb. at 7; Exh. DFLD-LP-2 at 5.

219. None of the satellites from which the DCTV headend receives signals transmit in the 18.5 degree sector in which physical obstruction of signals could occur. The Project therefore will not cause electro-mechanical interference with reception at the headend of any signals from satellites. Polisky reb. at 8-9; Exh. DFLD-LP-3; Chase pf. at 6.
220. DCTV receives off-air transmissions from the Boston, Massachusetts and Albany, New York areas. Duncan pf. at 2. Off-air transmissions from Albany may be within the 18.5 degree sector in which physical obstruction of signals could occur, as Albany is located at approximately 263 degrees relative azimuth from the DCTV facility. Chase pf. at 4.
221. Physical obstruction of TV signals by turbines in this 18.5 degree sector could cause a maximum signal attenuation of 2.5 dB. This figure was calculated by Mr. Polisky based on pre-build and post-build measurements taken by Comsearch at multiple wind generation facility sites. Polisky reb. at 4, 9; Exh. DFLD-LP-2 at 5.
222. Mr. Polisky calculated the "signal margin" at the DCTV headend, meaning the amount by which signal levels received at the headend exceed the minimum level required to provide quality rebroadcast service. DCTV's signal margins are estimated at 30 dB for UHF service, 32 dB for high-VHF service, and 31 dB for low-VHF service. Tr. 12/3/08 at 121:5-8 (Polisky); Exh. DFLD-LP-2 at 4-5.
223. Mr. Polisky did not take field measurements of signal levels at the DCTV headend. Tr. 12/3/08 at 121:12 (Polisky). DCTV's signal levels were calculated based on assumptions regarding the likely configuration of the DCTV system. Tr. 12/3/08 at 66: 4-11 (Polisky).
224. Mr. Polisky calculated DCTV signal levels using very accurate methods that have long been accepted and repeatedly proven accurate in the telecommunications industry. Tr. 12/3/08 at 93:9-21 (Polisky). Field measurements Comsearch has taken at multiple wind generation

facilities further confirm the accuracy of his methods. Tr. 12/3/08 at 93:22-25, 94:1-14, 122:5-7 (Polisky).

225. Mr. Polisky's estimates of DCTV signal levels are also consistent with his industry knowledge, specifically the fact that TV cable systems are typically configured with at least a 20 dB margin. Tr. 12/3/08 at 68: 19-25, 69: 1-8 (Polisky).
226. Given DCTV's comfortable signal margins, the potential 2.5 dB attenuation of signals transmitted over-the-air from the Albany, NY area will have no measurable effect on the quality of these signals as received at the DCTV headend. Polisky reb. at 7-8; Chase pf. at 5.
227. The impact of any electromechanical interference caused by the revised 15-turbine project will be reduced in February 2009 when all off-air TV broadcast signals are converted to digital modulation as required by federal law. Analog modulated TV signals are more sensitive to electromechanical interference than digital modulated TV signals, which are more robust. Polisky reb. at 4; tr. 12/3/08 at 70: 15-21, 71:11-12 (Polisky).
228. During the transition to digital, some stations may temporarily operate at reduced power levels, but will revert to operation at full licensed power after the transition is complete. Tr. 12/3/08 at 96:14-25, 123: 6, 11-12 (Polisky); Exh. DFLD-LP-4.
229. In the very unlikely event that the revised 15-turbine project does cause material interference to reception at the DCTV headend, remediation is possible by commercially practicable means, and could be accomplished within a few days to a few weeks. Means of remediation include installation of larger antennas, more sensitive receivers, or new facilities to receive services from satellite broadcasts; the installation of a signal repeater outside the 18.5 degree zone of potential interference; or the use of an independent microwave or fiber private channel. Chase pf. at 7; tr.

12/3/08 at 111:16-24 (Polisky). Deerfield Wind is willing and intends to perform remediation as necessary. Tr. 12/12/08 at 195-197 (Goland).

230. Although Mr. Polisky is very confident that his calculations of DCTV signal levels and margins are accurate, he acknowledges that pre-construction measurements of DCTV signal levels would be useful to establish a baseline that Deerfield Wind and DCTV could reference post-construction to determine whether any reported reception problems at the headend are caused by the Project. Tr. 12/3/08 at 58:6-18, 116:5 (Polisky). Deerfield Wind is willing to perform such a preconstruction baseline study and would accept a permit condition requiring it to do so. Tr. 12/12/08 at 196:1-8 (Goland).

#### TV Interference - Residential

231. Mr. Polisky also assessed whether the revised 15-turbine project will cause interference with off-air television reception at residences in the vicinity of the Project. Polisky reb. at 3-5.
232. All residences are located at least one-half mile from the proposed Project, outside the range of electro-static and electro-magnetic interference. No residence will experience electro-static or electro-magnetic interference. Polisky reb. at 3, 5; *see*, Findings 216-217, *supra*.
233. It is possible that some residences in close proximity to the revised 15-turbine project (within 1-2 miles) will experience electro-mechanical interference with off-air television reception of one or two channels. Polisky reb. at 4; tr. 12/3/08 at 108:12-15, 109:4-19 (Polisky).
234. Typical residential reception equipment is different from and less powerful than that used at a cable headend. Residential equipment is also typically less effectively configured. A residence would typically receive a lower signal level than a cable TV headend in the same location. Tr. 12/3/08 at 62:17-21, 68: 4-6, 80: 3-8, 106: 12-25, 108: 11-22 (Polisky).

235. Any interference to residential reception that does occur can be mitigated by, for instance, repositioning antennas, or upgrading antennas and cables. Polisky reb. at 7; tr. 12/3/08 at 109:10-13 (Polisky); tr. 12/3/08 at 162:10-18, 171:17-20 (Chase). Deerfield Wind is willing and intends to perform such remediation as necessary. Tr. 12/12/08 at 195-197 (Goland).
236. Approximately 200 complaints of interference with residential off-air television reception have been reported to the Maple Ridge Wind Facility ("Maple Ridge"), which is located in Lowville, New York and part-owned by Deerfield Wind's parent company, Iberdrola Renewables. Tr. 12/1/08 at 238: 1-9, 242:24 (Goland); tr. 12/1/08 at 233: 9-16 (Habig).<sup>5</sup>
237. Maple Ridge responded to each complaint of reception problems, but made no attempt to confirm that the wind facility was the cause of any reported reception problem. Tr. 12/1/08 at 243:1-5, 243:15-19 (Goland).
238. The Maple Ridge experience is not predictive of what might occur in the vicinity of the revised 15-turbine project. This is both because the cause of reported reception problems at Maple Ridge was never determined, and because Maple Ridge is much larger than the revised 15-turbine project. Maple Ridge consists of 196 turbines distributed over 20,000 acres of land. Tr. 12/2/08 49:25, 50:1 (Goland); tr. 12/3/08 113:20-25 (Polisky); Polisky reb. at 6.

#### **Discussion on Section 248(b)(4) – Economic Benefit to the State**

The evidence in the record demonstrates that the revised 15-turbine project will provide an economic benefit to Vermont and its ratepayers, and thus comply with section 248(b)(4).

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<sup>5</sup> The Maple Ridge Wind facility is co-owned by Iberdrola Renewables and Horizon Wind Energy, although this is not entirely clear in the record. See <http://www.mapleridgewind.com/profac.htm>.

The Project will provide tax revenues, financial benefits to a Vermont utility purchasing Project power, jobs, cost-savings from reduced air emissions, and other direct and indirect economic benefits during construction and operation. The benefits will amount to tens of millions of dollars in State economic output, disposable income gains, state and local tax revenues, and other payments. *See Findings 184-202, supra.*

Under the terms of the LOI, the Project would provide power to GMP at a long term fixed price, hedging GMP's portfolio against fossil fuel price volatility, and thereby capturing what the Board has termed "a primary [economic] benefit of wind generation facilities – price stability." *Amended Petition of UPC Vermont Wind, LLC, Docket No. 7156, Order of 8/8/2007 at 38.* If fossil fuel prices increase over the term of the contract, the contract may reduce GMP's cost of service. Any savings to GMP should be passed on to its ratepayers. The Project thus advances Vermont's statutory renewable energy goals, which favor "affordable, long-term, stably priced renewable energy contracts that mitigate market price fluctuations for Vermonters." 30 V.S.A. § 8001.

The Project will also provide clean air benefits. The societal savings from the reduced air emissions are estimated to range between \$0.6 – \$1.1 million per year, using a method for valuing the societal cost of air emissions that the Board has employed in past cases. Although the RGGI has altered the landscape in terms of how CO<sub>2</sub> emissions will be accounted for in the coming years, it remains the case that fossil fuel generation will be displaced when the wind project produces power, thus reducing CO<sub>2</sub> and other pollutants, and producing a tangible benefit for Vermont.

There is no evidence that the Project will cause a negative impact to real property values or to tourism. Concerns expressed by the non-host town of Wilmington and individuals who participated in this case were not supported by any analysis or empirical evidence. The most rigorous studies available to date demonstrate that wind projects have not negatively impacted

property values. There is no empirical evidence that wind projects reduce tourism visitation or expenditure. The experience of the Searsburg facility over the past 10 years is informative – that facility has served as a tourist draw and there has been no documented decline in property values.

There is no evidence that the Project will cause financial harm to DCTV or its customers by interfering with television signal reception at the DCTV headend facility in Wilmington. DCTV's concerns regarding interference at its headend were unsubstantiated. The study performed by Deerfield Wind's consultant, a highly-experienced engineer in the telecommunications field, was analytically sound and demonstrated that the Project will not cause interference at the DCTV headend. Any interference that does occur at the DCTV headend can be remediated by commercially practicable means within a reasonable time.

To the extent that the Project may cause interference with off-air reception of one or two television channels at residences in close proximity to the Project, such interference can be remediated quickly by commercially practicable means.

The Board has previously held that “the law does not set out how much economic benefit there should be, but rather simply directs that there be an economic benefit.” *Petition of Entergy Nuclear Vermont Yankee, LLC*, Docket No. 6812, Order of 3/5/04 at 45. In this case, there is ample evidence of multiple economic benefits. The Project could be an important stimulant to the local economy, and will certainly improve the economic health of the region and state. The Board recently issued a CPG to a 40 megawatt wind generation facility in Sheffield, Vermont that demonstrated economic benefits very similar in type and magnitude to those the revised 15-turbine project will produce. *See, Amended Petition of UPC Vermont Wind, LLC* at 31-35.

The *UPC Vermont Wind* applicant's proposed power purchase agreements were market-based, whereas Deerfield Wind's LOI with GMP includes a fixed-price which the parties intend to

use as a basis to negotiate a final PPA.<sup>6</sup> The Board expressed a strong preference for stably priced contracts in the UPC case. *Id.* at 38.

Section 248(b)(4) is satisfied. Deerfield Wind proposes that the Board require two CPG conditions related to this criterion. The first concerns the sale of Project power, as follows:

Deerfield Wind shall use best efforts to enter into long-term, stably priced power contracts with Vermont utilities for at least 30% of the Project's power output, including but not limited to offering Vermont utilities the right of first refusal on such power contracts. Deerfield Wind shall provide an update of any negotiations with Vermont utilities 90 days after the date of this Order. Prior to commencement of construction, Deerfield Wind shall file any such contracts entered into with Vermont utilities for Board review to determine if the contracts contain appropriate terms and conditions, including price stability, to promote the general good of the State of Vermont. Along with the contracts, Deerfield Wind must also file an explanation as to how the contracts promote the general good of the state. If, after good-faith negotiations on the part of Deerfield Wind and the utilities, Deerfield Wind cannot obtain in-state power contracts as specified above, it may file a statement explaining why an agreement cannot be reached and why the Board should modify or remove this requirement.

The second CPG condition Deerfield Wind proposes requires Deerfield Wind to perform a pre-construction baseline study of DCTV signal levels, and to remediate any interference with television signal reception at either the DCTV headend facility or private residences that is caused by the revised 15-turbine project. This condition should read as follows:

Prior to commencement of construction, Deerfield Wind will conduct a study to measure signal levels at the Duncan Cable TV Service (DCTV) headend facility in Wilmington, Vermont, and provide a copy of this study to the Board, the Department of Public Service, and DCTV.

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<sup>6</sup> The status of the power contracts here is directly comparable to the situation in the UPC case. UPC Vermont Wind had reached a Memorandum of Understanding with the Vermont Electric Cooperative, in which the parties stated their intent to negotiate a power purchase contract containing identified terms. *See, Amended Petition of UPC Vermont Wind, LLC, Exh. UPC-CRV-8.* UPC Vermont Wind also represented that it had "discussed an arrangement" similar to that reflected in its VEC MOU with Central Vermont Public Service. *Id.* at 35.

Deerfield Wind will remediate any material interference at the DCTV headend facility that is caused by operation of the Project. Within three weeks of receipt of a complaint, Deerfield Wind will complete an interference measurement study for the DCTV headend facility, and provide a copy of this study to DCTV, the Department of Public Service, and the Board. Deerfield Wind may seek an extension of this timeframe for good cause. If the interference measurement study demonstrates that the Project is causing material interference at the DCTV headend facility, Deerfield Wind will at the same time provide a plan and schedule to remediate any material interference to DCTV, the Department of Public Service and the Board. Deerfield Wind and DCTV shall make good faith efforts to resolve amongst themselves any disputes concerning the methodology for investigating or remediating a complaint, or the timeframe for completion of remediation. Unresolved disputes may be taken to the Board for resolution.

During operation of the Project, Deerfield Wind shall investigate complaints of Project-related interference with television broadcast signals received at any residence. Deerfield Wind will use commercially practicable efforts to remediate material interference experienced at any residence affected by the Project. Deerfield Wind and the affected homeowner(s) shall make good faith efforts to resolve amongst themselves any disputes concerning the methodology for investigation or remediating a complaint, or the timeframe for completion of remediation. Unresolved disputes may be taken to the Board for resolution.

**30 V.S.A. § 248(b)(5) and (8) – OUTSTANDING RESOURCE WATERS, ACT 250**

**CRITERIA, AND PUBLIC HEALTH AND SAFETY**

**A. Outstanding Resource Waters – 10 V.S.A. § 1424a(d)**

239. There are no Outstanding Resource Waters on the Project site or in any adjacent areas, based upon the list published by the Vermont Natural Resources Board, Water Resources Panel. Zimmerman pf. at 56; Exh. DFLD-MLS-3 at 20.

**B. Air Pollution – 10 V.S.A. § 6086(a)(1)**

240. The Project will not result in undue air pollution. This Finding is supported by Findings 241-251 below.

241. The wind turbines will not generate any air pollutants. Accordingly, operation of the Project will not require an air pollution control permit from ANR. Zimmerman pf. at 56.

242. The Project will displace fossil-fuel fired generation in the New England region and thereby result in avoided emission of air pollutants, such as NO<sub>x</sub>, SO<sub>2</sub> and CO<sub>2</sub>. *See*, Findings 194-202, *supra*.

243. Water will be used for dust control during project construction. Krzanowski pf. at 63.

#### Noise as an Air Pollutant

244. Findings 444-494 (Aesthetics – Noise) are incorporated herein by reference.

245. The wind turbines will generate noise levels that will not exceed any health-based standards. Kaliski reb. at 1-3; *see* Exh. DFLD-JZ-32a-b.

246. The Towns of Searsburg and Readsboro have not promulgated quantitative community noise standards, and there are no state regulatory noise standards that apply to the Project. Exh. DFLD-KK-4 at 3-4.

247. The estimated noise levels for the Project were compared to guidelines established by the United States Environmental Protection Agency (EPA) for protection of human health and welfare with an adequate margin of safety. The EPA guideline is 55 dBA (day-night level). Exh. DFLD-KK-4 at 3-4.

248. The World Health Organization's (WHO) guidelines recommend a daytime limit of 50 dBA (16 hour average) to protect against moderate annoyance and an 8-hour nightly average of 45 dBA to protect against indoor sleep disturbance. These are both exterior levels. The WHO nighttime guideline as expressed as an interior level is 30 dBA, which accounts for a 15 dBA sound reduction from the building with windows open. Kaliski pf. at 5; Exh. DFLD-KK-4 at 3.

249. The highest modeled exterior sound level from the Project would be 40 dBA at one property east of the northernmost turbine (part of the project site and under agreement with Deerfield Wind). Kaliski reb. at 3; Exh. DFLD-KK-5 (Figure 22); *See also* Exh.DFLD-JZ-32a.
250. The highest modeled exterior sound level from the Project at a non-participating residence would be 38 dBA. Ex. DFLD-JX-32a.
251. The sound levels from Project operation will be below the EPA and WHO noise guidelines and thus will not create an undue adverse impact on human health. *See* Findings above and Kaliski reb. at 4; Exh. DFLD-KK-4 at 34.

**Discussion on Air Pollution (10 V.S.A §6086(a)(1))**

The Project will not cause any undue air pollution. Air emissions in the region will be reduced by operation of this renewable energy project, and construction-related pollutants from the Project – fugitive dust – will be controlled and will only occur for a short period of time.

With respect to noise, under Environmental Board precedent noise is considered air pollution under criterion 1 where its occurrence may cause adverse health effect, i.e., impacts rising above annoyance and aggravation to cause adverse health effects such as hearing damage. *Re: Vermont RSA Limited Partnership*, DR #441, Memorandum of Decision at 2 (5/11/05) (string citations omitted). Welfare impacts are considered under Criterion 8. *Re: City of Montpelier and Ellery E. & Jennifer D. Packard*, #5W0840-6-WFP, Order at 21 (5/22/00). There is no indication in this case that the Project will pose adverse health effects. Deerfield has performed noise modeling which demonstrates that the EPA and WHO guidelines designed to protect human health (including effects due to sleep disturbance) will be met, with an ample margin of safety. There is no evidence to the contrary.

**C. Water, Waste, and Wetland-related Issues – 10 V.S.A § 6086(a)(1)-(4)**

(1) Stormwater and Water Quality

252. The Project will not result in undue water pollution, and will meet any applicable regulations regarding stormwater quality and waste disposal. *See* Findings 253-267 below.
253. Of the 27 proposed discharge points, 13 are located above 2,500 feet in elevation and therefore are designated as Class A(1) waters. The Project is not expected to have a negative impact on Class A headwaters. Nelson/Reinhart reb. at 8-9; Exh. DFLD-MLS-3 at 4.
254. Construction and operation of the Project will require federal and state stormwater permits. These permits will be applied for during the final design stage of the Project, after a CPG has been issued. Deerfield's engineers have prepared preliminary plans and a risk evaluation to demonstrate that the Project is fully capable of meeting or exceeding all of the technical standards required to obtain these permits. Nelson/Reinhart reb. at 14.
255. ANR and other parties requested more detailed information concerning stormwater management, streams, and protection of water quality, which was provided by Deerfield Wind in its rebuttal testimony. *See* Nelson/Reinhart rebuttal and Exhs. DFLD-JN/KR-2 and -3. In its surrebuttal testimony, ANR requested further information on three issues related to the construction phase of the Project, which Deerfield subsequently provided to ANR. Exh. DFLD-Cross-MP-1; tr. 12/11/08 at 15-18 (Probasco). Mr. Probasco testified that the detail provided by Deerfield Wind was sufficient at this stage of the permitting process. Tr. 12/11/08 at 17-18, 20 (Probasco).
256. Deerfield's stormwater/water quality consultants (VHB/Pioneer) completed a detailed field assessment of the Project site to assess proposed turbine locations in proximity to mapped resource areas, review potential stormwater treatment practice locations, delineate subwatershed

areas, and determine receiving waters and discharge points. The potential locations of stormwater treatment basins were field-identified and refined based on existing topography, wetland avoidance, and other siting constraints. Nelson/Reinhart reb. at 7, 11; Exh. DFLD-JN/KR-2.

257. With respect to the federal stormwater permit for construction sites, at present Deerfield Wind intends to seek an individual discharge permit (rather than coverage under the NPDES General Permit). This will include an Erosion Prevention and Sediment Control Plan (EPSC) and narrative in conformance with the most recent edition of *The Vermont Standards and Specifications for Erosion Prevention and Sediment Control (2006)*. Nelson/Reinhart reb. at 14.

258. Deerfield Wind has prepared a conceptual EPSC plan for the Project, involving implementation of a phased approach for construction that ultimately limits the extent (in area) of exposed soil open at any one time (e.g., 7 acres). Additionally, the approach involves temporary or permanent stabilization of exposed areas as early as practicable (e.g., within 14 or 21 days of initial disturbance, with exceptions per DEC guidelines). Specific EPSC measures which are intended to be implemented include, but are not limited to:

- a. Up-slope diversion of run-on;
- b. Limits of disturbance barrier fence and flagging;
- c. Silt fence, with and without reinforcement;
- d. Grass- and stone-lined swales;
- e. Stone check dams;
- f. Temporary and permanent stream crossings (e.g., log crossing and culverts);
- g. Rock sandwiches;
- h. Temporary sediment basins;

- i. Temporary and permanent stabilization with seed, mulch/matting, and wood chips; and
- j. Use of vegetative buffers.

Additionally, a Preliminary EPSC Plan narrative includes description of the major construction activities and associated EPSC measures proposed to be implemented at the site through the course of project construction activities. Nelson/Reinhart reb. at 5-6; Exh. DFLD-JN/KR-3.

259. For the operational phase of the Project, the applicable criteria under the Vermont Stormwater Management Rule are Water Quality (WQv), Channel Protection (CPv), Recharge (Rea/Rev), and Overbank Flood (Q10 and Q100). Nelson/Reinhart reb. at 10-11.
260. The stormwater basins are sized and sited to meet applicable criteria. They have been designed to maintain existing drainage areas as closely as possible. Nelson/Reinhart reb. at 12-13; Exh. DFLD-JN/KR2 at 2
261. Based upon HydroCAD hydrologic modeling, there will be no increase in the peak discharge rate at any of the receiving waters for a one-year, ten-year, or one-hundred-year storm event. Nelson/Reinhart reb. at 12; Exh. DFLD-JN/KR-2 at 1.
262. Deerfield Wind has prepared a Spill Prevention Control and Countermeasure Plan (SPCC). The SPCC Plan covers all fluid storage vessels within the Project area, including the nacelles of the wind turbines, the transformers at the base of the towers and at the substation, and the vehicles and temporary containers associated with the construction phase. Nelson/Reinhart reb. at 16-17; Exh. DFLD-HGC-3.
263. If a spill were ever to contact soils, it would be remediated by qualified and properly licensed contractors. Nelson/Reinhart reb. at 17.

264. The Gamesa turbines utilize dry-type generator step-up transformers. The transformer at the substation will have secondary containment in the event of an oil leak or spill. Exh. DFLD-HGC-3 at 2-3, 3-2.
265. Based upon the prior findings, there is no undue risk to environmental resources associated with potential oil spills from transformers.
266. With implementation of the operational phase stormwater treatment practices, the SPCC Plan, and the EPSC Plan, the Project will comply with applicable criteria under the Vermont Water Quality Standards. The Project will also maintain the natural condition of the streams in the vicinity, to the extent feasible. Nelson/Reinhart reb. at 19.
267. ANR's stormwater engineer has determined that the Deerfield Wind's stormwater-related submittals adequately address the apparent challenges for stormwater treatment and design and acknowledged that the level of detail in the plans provides sufficient information at this time in the permitting process. The plans provided meet three of the five VSMM treatment standards (CPv, Q10, and Q100); specific treatment details for the WQv and Rev standards will be addressed in operational phase permit applications. Probasco surreb. at 2; tr. 12/11/08 at 20 (Probasco); Exh. DFLD-JN/KR-2.

(2) Water Conservation

268. Design of the Project "has considered water conservation, incorporates multiple use or recycling where technically and economically practical, utilizes the best available technology for such applications, and provides for continued efficient operation of these systems." See Findings 269-270 below.
269. Water for construction and dust control will be provided by the contractor, most likely from a nearby existing well or the O&M building's well. Using conservative assumptions, such work

will require two trucks per day of 3,000 gallons per truck. Boring equipment for foundation design may require water, however if the work is done in winter, the boring may instead use air to purge soils. Zimmerman pf. at 57; Krzanowski pf. at 62-64.

270. During operations, no running water is needed to maintain the wind turbines and other equipment, and maintenance staff will bring water to the site if necessary. A water supply well will be installed at the O&M building, or will be provided by an existing supply secured by Deerfield Wind. This well will only be used for domestic consumption and sanitary facilities at the O&M building. Zimmerman pf. at 57-58.

(3) Waste Disposal

271. Waste disposal will be handled through private haulers, and will create no burden on local government. Zimmerman pf. at 57.

272. A septic disposal system will be designed and constructed to service the sanitary facilities at the O&M building. Zimmerman pf. at 57.

273. Any hazardous materials needed at this facility will be stored and disposed of in accordance with local and state hazardous waste laws. Any wastes generated at the Project will be hauled off-site for disposal under a U.S. EPA Small Quantity Hazardous Waste License. Zimmerman pf. at 57.

(4) Floodways

274. The Project is not within a floodway or floodway fringe based upon the National Flood Insurance Inventory Maps. There will be no impact to floodways from the proposed Project. Zimmerman pf. at 58; Exh. DFLD-MLS-3 at 5.

(5) Streams

275. Any portion of the Project adjacent to the banks of a stream “will, whenever feasible, maintain the natural condition of the stream, and will not endanger the health, safety, or welfare of the public or of adjoining landowners.” *See* Findings 276-285 below.
276. The entire Project is located within the watershed of the Deerfield River. Nelson/Reinhart reb. at 8; Exh. DFLD-JN/KR-2 (subwatershed map).
277. Using a combination of topographic maps, digital orthophotos, the National Hydrologic Dataset, and field work, Deerfield’s environmental consultants have mapped and classified the streams within the Project area as “Perennial,” “Intermittent,” and “Ephemeral.” Lew-Smith pf. at 7-8; Exh. DFLD-MLS-3 at 5-6; Exh. DFLD-MLS-4a-c.
278. Of the eleven streams Deerfield’s consultants mapped within the Project area, four were classified as Ephemeral, six as Intermittent, and one as Perennial. Lew-Smith pf. at 8.
279. There are four stream crossings planned for the Project. Krzanowski pf. at 3.
280. Design inputs for the Project’s stream crossings include U.S. Forest Service handbooks, Federal Highway Administration guidance documents, and State of Vermont guidelines. The Project’s stream crossings will be “minor culverts” and will be designed to be consistent with FSH 7709.56b and the state’s stream crossing guidelines. Krzanowski pf. at 17.
281. Culverts are proposed for stream crossings and would be designed according to a design storm (25-year as a rule of thumb), where peak flows would not cause erosive conditions through overwhelming the culvert and crossing, thereby minimizing road and ditch erosion. The structures have been minimized in number and length and will be pipe arches or similar design, to enable passage of streamflow, bedload, and aquatic organisms. The culverts will be constructed to match existing slopes and will have stabilized entrances and outlets through hard

bank armoring and/or headwalls. Streamflow around the construction site will be temporarily diverted while the crossing is constructed. Nelson/Reinhart reb. at 15-16.

282. It is expected that there will be no significant impacts to streams from the proposed development. Lew-Smith pf. at 9.

283. The Project includes eighteen stormwater discharge points at streams. Under the Vermont Water Quality Standards (VWQS), ten of the Project's stream discharge points are above 2,500 feet in elevation and are designated as Class A(1) waters. The remaining eight stream discharges occur in waters below 2,500 feet, which are designated as Class B. The streams are designated as cold water fish habitat and are considered as "small high gradient" in terms of the biota criteria of the VWQS. Exh. DFLD-JN/KR-2 at 1; Nelson/Reinhart reb. at 8-9.

284. The Project has been designed to avoid surface water resources to the extent practicable. In locations where streams are crossed or otherwise in close proximity to land disturbance activities, the affected streams will be protected through the appropriate engineering and construction of roads, stormwater systems, and other infrastructure, and implementation of erosion prevention and sediment control measures required under stormwater permits. Zimmerman pf. at 58; Lew-Smith pf. at 8; Exh. DFLD-MLS-3 at 7.

285. The Project will maintain the natural condition of the streams to the extent feasible and will comply with VWQS criteria applicable to waters in the vicinity. Nelson/Reinhart reb. at 19.

(6) Shorelines

286. The Project is not located on or adjacent to a shoreline of any lake, pond, reservoir or river. Zimmerman pf. at 58; Exh. DFLD-MLS-3 at 6.

(7) Wetlands

287. The Project will comply with the Vermont Wetland Rules applicable to Class One and Class Two wetlands, and will not cause undue adverse impacts to regulated (Class One or Two) or non-regulated (Class Three) wetlands. *See* Findings 288-296 below.
288. Wetlands were delineated according to methodology outlined in the 1987 US Army Corps of Engineers Wetland Delineation Manual. For the area initially identified for the original project layout, no Class One or Two wetlands and eleven Class Three wetlands were identified. Five of the Class Three wetlands occurred in the eastern project area, three occurred along the Putnam Road access route, and three along the southern access route. Exh. DFLD-MLS-3 at 8; *see also*, Exh. DFLD-MLS-4a-c.
289. Deerfield Wind's engineering and environmental consultants collaboratively evaluated an alternative route for the proposed road in the eastern project area to ensure minimal impacts to wetlands. While the alternative route would reduce the length of road proximate to the wetland, it would require more substantial fill and gravel width up-gradient of wetlands, causing a greater overall impact to wetlands. Deerfield Wind's consultants concluded that the original road layout best minimized wetland impacts. Krzanowski suppl. pf. at 2-3; Exh. DFLD-JK-Rev5.
290. Deerfield's wetlands consultant subsequently conducted an assessment of the areas involved in the July 2008 revised layout. Five additional Class Three wetlands were identified, none of which lie within the areas of proposed impact. Lew-Smith reb. at 3-4; Exhs. DFLD-MLS-6a-c.
291. ANR requested that Deerfield Wind investigate 4 additional areas within the project site for the presence of wetlands. Deerfield Wind's consultant conducted the necessary field work, and determined that the areas did not contain wetlands. ANR's wetland ecologist concurred. Lew-Smith reb. at 2; Exh. DFLD-MLS-7; Metz surreb. at 1.

292. The functions and values for all identified wetlands were determined using the Vermont Wetland Evaluation Form and based on fieldwork and remote mapping. Lew-Smith pf. at 3.
293. For the July 2008 revised layout, the total area of wetland impacts is expected to be approximately 947 square feet, split between two distinct wetlands: Wetland F located at the base of the access road to the western project area (402 sq. ft. of impact), and Wetland AA at the base of the access road to the eastern project area (545 sq. ft. of impact). Exh. DFLD-MLS-3 at 8; Lew-Smith reb. at 3; Exh. DFLD-MLS-6a-c.
294. The two impacted wetlands are both Class Three and thus not regulated under the Vermont Wetland Rules. Exh. DFLD-MLS-3 at 7-8; Lew-Smith reb. at 3.
295. Wetland F is an isolated seep wetland that has no functional significance. Impacts to it will not lead to adverse water quality impacts. Exh. DFLD-MLS-3; Metz surreb. at 3.
296. Deerfield Wind's consultant and ANR's wetland ecologist have each concluded that the Project will not have an undue adverse impact to wetland resources, including Wetlands AA and F. Lew-Smith reb. at 3-4; Exh. DFLD-MLS-3 at 10-11; Metz surreb. at 2-3.

(8) Sufficiency of Water and Burden on Existing Water Supply

297. There is "sufficient water available for the reasonably foreseeable needs" of the Project. The Project will not "cause an unreasonable burden on an existing water supply, if one is to be utilized." See Findings 298-301 below.
298. Water for dust control during construction will be dispersed from a water truck. This could be filled from a nearby dwelling's water supply, most likely filled at the operations/maintenance building's well. Krzanowski pf. at 62.
299. If water were used for boring equipment, the amount would be on the order of several hundred gallons at a time, spread out over later construction periods. Krzanowski pf. at 64.

300. For operations, Deerfield expects that employees would need approximately 60 gallons per day over the life of the Project. Krzanowski pf. at 64. All these needs can be met with a typical house well, and all indications are that such a well can be drilled on-site and would produce adequate water. Such demand is sufficiently small as to not present an impact to nearby wells. Krzanowski pf. at 64.

301. Deerfield Wind's water quality consultants analyzed the potential impact of the former 17-turbine layout on Thomas Shea's spring-fed water supply. Mr. Shea's water source is located approximately 2,400 feet from any earth disturbance associated with the nearest turbine (W-8) proposed in the 17-turbine layout. The distance far exceeds the likely groundwater recharge area of the spring. Considering the distance and the protocols outline in Deerfield Wind's SPCC Plan, the 17-turbine layout would not have any significant or measurable impact on the water quantity or quality of Mr. Shea's spring. With the removal of the three southernmost western turbines under the Revised 15-turbine layout, no turbines are now proposed upslope of Mr. Shea's spring, further ameliorating any concerns about impacts to his water source. Nelson/Reinhart reb. at 16-17.

(9) Soil Erosion

302. The Project will not "cause unreasonable soil erosion or a reduction in the capacity of the land to hold water so that a dangerous or unhealthy condition may result." See Findings 303 below and Findings 253-267, *supra*.

303. Deerfield has prepared a conceptual EPSC Plan, and will apply for an individual stormwater permit for construction, and a state stormwater permit for operations. The EPSC plan involves implementation of a phased approach for construction that ultimately limits the extent (in area) of exposed soil open at any one time. The final site-specific EPSC Plan will include the use, as

appropriate, of silt fencing, stabilizing disturbed soils, matting, rock sandwiches, vegetative buffers, and other measures. Ongoing stormwater control will utilize stormwater basins and other features as required by the Stormwater Management Rule. Nelson/Reinhart reb. at 4-6, 12, 14; Exh. DFLD-JN/KR-2; Exh. DFLD-JN/KR-3.

**Discussion on Environmental Criteria of 10 V.S.A § 6086(a)(1)-(4)**

Deerfield Wind has conducted the necessary field work and provided detailed information, in part at the behest of ANR and the other parties, concerning water quality, stormwater, water supplies, streams, wetlands, and soil erosion. Deerfield Wind's assessment shows that the Project can be constructed and operated in compliance with state stormwater, water quality, and wetland standards. Deerfield Wind has used an iterative design process to avoid impacts on wetlands and streams, and the final layout has minimal wetland impacts – less than 1,000 square feet, or approximately 0.02 acres. Similarly, only four stream crossing will be required. Moreover, Deerfield Wind's evidence demonstrates that systems will be in place through the SPCC Plan to respond to a spill should it occur and to prevent undue impacts to water resources. The Project will not cause any undue adverse impacts related to water quality, waste disposal, water supplies, wetlands, or other environmental resources. There is no evidence to the contrary.

Consistent with how the Board has handled stormwater permitting issues in other cases – *See Amended Petition of UPC Vermont Wind, LLC* at 48 – Deerfield Wind proposes the following CPG condition:

Deerfield Wind shall submit to the Board its NPDES Stormwater Permit for Construction Sites for the Project prior to the commencement of earth-disturbing construction activities.

Deerfield Wind shall submit to the Board its Vermont operational phase stormwater permit prior to the creation of any new impervious surfaces at the site.

Deerfield Wind shall submit to the Board its wastewater permit for sanitary facilities at the O & M building, prior to constructing that building.

No further action shall be required by the Board with respect to any of these permits, unless the activities approved in those permits represent a substantial change from the plans and material representations previously made by Deerfield Wind to the Board.

**D. Use of Highways, Waterways, Railways, Airports, and Airways – 10 V.S.A § 6086(a)(5)**

304. The Project will not cause unreasonable congestion or unsafe conditions with respect to the use of the highways, waterways, railways, airports and airways, and other means of transportation existing or proposed. *See* Findings 305-327 below.
305. All public roads can handle the expected volume of construction and operational traffic without creating unreasonable congestion or unsafe conditions. Zimmerman pf. at 59. *See* Exh. DFLD-JZ-17.
306. At its peak during month five of construction, the Project will generate an average of 37 vehicular round trips per day, or less than five roundtrips per hour. This level of activity is easily absorbed by the existing local roadway network; therefore, no impacts to the surrounding communities and to the local transportation network are projected due to construction volumes alone. Exh. DFLD-HGC-5 at 3.
307. Approximately eight trips, the bulk in specialized vehicles, will be required to deliver the components of each turbine, including one trip for each of the four tower sections. Exh. DFLD-HGC-5 at 3-4.
308. Adequate space for worker parking and construction vehicles will be available in the area adjacent to the O&M building at the end of Putnam Road. Zimmerman pf. at 59.
309. Operational traffic is expected to be five trips per day. Zimmerman pf. at 61.

310. Project-generated traffic during the operational phase, based upon several employees, is not expected to cause any traffic problems. Exh. DFLD-JZ-17.

Transport Route

311. Deerfield Wind's transport consultant evaluated the transport needs and potential transportation routes for the Project. Exh. DFLD-HGC-5.

312. The preferred access route is from Interstate 91 to Route 9 to Route 8 to the Project site, with the presumed primary movement east to west. This route provides the most direct routing with the fewest impacts to Vermont communities and the environment. Exh. DFLD-HGC-5 at 6-7, 16.

313. Community impacts due to construction traffic volumes are few and insignificant as the traffic volumes involved are absorbed easily by the existing transportation network. Exh. DFLD-HGC-5 at 16.

314. Impacts to roadway intersections to accommodate the turning radii of specialty transport vehicles are minor and addressable via the proposed mitigation measures detailed in Findings 315-323 below. Exh. DFLD-HGC-5 at 16.

315. During construction, Deerfield Wind will address potential traffic issues in Wilmington's commercial center and in developed West Brattleboro by working with VTrans and local officials to schedule loads so as to minimize disruption, and by paying for police details to assist traffic control as necessary. Habig Panel reb. at 28; Exh. DFLD-HGC-5 at 16.

316. Deerfield Wind will review routes, turning movements, and vehicle configurations with VTrans and local officials (including first responders) to minimize disruption of municipal services, local businesses, and travelers. Habig Panel pf. at 28; Exh. DFLD-HGC-5 at 16.

317. If necessary, Deerfield Wind can arrange for police escort for all specialty transport vehicle movements passing in front of the Marlboro Elementary School on Route 9 when the elementary school is in session. Exh. DFLD-HGC-5 at 16.
318. If necessary, Deerfield Wind will employ flagmen during peak periods to direct traffic safely in and out of the Putnam Road and Sleepy Hollow Road intersections with Route 8. Exh. DFLD-HGC-5 at 16.
319. Roadway modifications within the Route 9 and/or Route 8 rights-of-way to accommodate turning movements of special transport vehicles will be designed to State of Vermont highway standards by a Vermont-licensed professional engineer. Exh. DFLD-HGC-5 at 16.
320. If requested by town and/or state officials, all roadway modifications at the intersections will be removed and the areas returned to their prior state following the installation of the wind turbines. All intersections will be photodocumented before and after construction of the proposed modifications, and upon their removal, if so requested. Exh. DFLD-HGC-5 at 16.
321. Deerfield will obtain in advance all required VTrans permits for oversized vehicles. Habig Panel reb. at 28; Exh. DFLD-HGC-5 at 16.
322. All contractors used for construction and transport will be fully licensed and bonded. Habig Panel pf. at 28.
323. Deerfield Wind will pay to repair any damage to town roads caused by construction or other oversized vehicles. Habig Panel reb. at 28; Exh. DFLD-HGC-6 at 4, Exh. Searsburg-SF-1 at 4.

#### FAA Lighting

324. The Project will not cause unreasonable congestion or unsafe conditions with respect to airports and airways. See Findings 325-327 below.

325. Because the turbines are over 200 feet in height, FAA guidelines call for lighting the structures. Zimmerman pf. at 59.
326. Deerfield submitted an updated lighting plan to the FAA for the Revised 15-Turbine Project, proposing that six of the fifteen turbines be lit. The FAA has not yet made a determination on the July 2008 layout. Habig Panel reb. at 6; Exh. DFLD-HGC-4.
327. The FAA's lighting determinations are advisory, not mandatory. However, not following its recommendations could expose Deerfield to significant liability, and project lenders will require that the FAA recommendations are followed. Tr. 12/12/08 at 197-198 (Goland)

**E. Educational Services – 10 V.S.A § 6086(a)(6)**

328. The Project will not cause an unreasonable burden on the ability of a municipality to provide educational services. Zimmerman pf. at 59.
329. The construction phase of the Project will occur over a nine-month period. It is unlikely that temporary construction workers and their families would move to the area due to the Project. Once the Project is operational, it is anticipated that three workers will be devoted to operation and maintenance. These workers may be hired from the existing local workforce. Zimmerman pf. at 60; Exh. DFLD-TK-2 at 3.
330. Deerfield Wind has notified the Towns of Readsboro and Searsburg and the Windham Southwest Supervisory Union School (SWSU) District of the Project. While all Searsburg students attend schools outside of Searsburg in the SWSU district, Readsboro middle and high school students attend the SWSU schools and students in grades K-6 attend the Readsboro Central School. The response from the Superintendent of Schools indicates that the Project should not create any unreasonable burdens. Zimmerman pf. at 60; Exh. DFLD-JZ-20.

**F. Municipal Services – 10 V.S.A § 6086(a)(7)**

Provision of emergency services

331. All Project roads will be of sufficient size and capacity to handle emergency vehicles.

Zimmerman pf. at 61.

332. All appropriate fire and rescue departments were notified of the Project prior to the Petition being submitted to the Board. Written responses confirming that the Project would not pose an undue burden were received from Deerfield Valley Rescue, Inc., Whitingham Ambulance Service Inc., and the Vermont State Police, Shaftsbury Barracks. Verbal responses confirming that the Project would not pose an undue burden were also received from the Readsboro and Wilmington Fire Departments and the Bennington County Sheriff. Zimmerman pf. at 61; Exhs. DFLD-JZ-21 through JZ-23..

333. All technicians at projects owned by Iberdrola Renewables are trained for emergencies, including tower rescue, first aid and CPR. Crews are equipped with tower rescue equipment, first aid kits, and automatic external defibrillators, and fire extinguishers are on company vehicles. Habig Panel reb. at 26-27.

334. Iberdrola Renewables has worked very closely with local fire and police departments at other projects, conducting site reviews of project safety programs and emergency response procedures. The same would occur at this Project at the appropriate juncture, including providing tower rescue training to the local fire department. Habig Panel reb. at 27, 32.

335. Tower rescue training initially would take place at one turbine on a single day during the first year of operation. Subsequent trainings would occur as needed, based upon turnover in the local fire departments. Tr. 12/1/08 at 100-101 (Cherian); tr. 12/2/08 at 53 (Goland).

336. The likelihood of turbine fires is very low. Each turbine and all electrical equipment will be inspected under rigorous commissioning procedures, as well as by the utilities (for grid and system safety), prior to being brought on line. Once turbines are commissioned, qualified personnel will routinely inspect and repair them as necessary pursuant to preventive maintenance schedules. Also, built-in safety and design systems minimize the chance of fire occurring in the turbines or electrical stations. For example, turbines have high temperature sensors and automatically shut down if they begin to overheat. Habig Panel reb. at 32.
337. Iberdrola Renewables currently has over 3,000 megawatts of wind energy capacity installed in the U.S., generated by approximately 2,000 turbines. Over the past ten years the only fire incident at a turbine has been one small electrical fire that resulted in no structural damage. Tr. 12/2/08 at 51:3-7 (Goland).
338. Although an extremely unlikely event, if a fire were to occur inside the nacelle it would be detected by the SCADA system and reported to the project control center where turbine messages are monitored. The turbine would automatically shut down and project personnel would notify local officials and respond as appropriate, pursuant to the detailed emergency procedures that address response to fire and other substation emergencies. Power to the section of the Project with the turbine fire would be disconnected. Habig Panel reb. at 32.
339. A fire in the nacelle would be allowed to burn itself out (with fire control and suppression taking place at ground level), so no specialized fire trucks would need to be deployed to reach the top of the tower. Habig Panel reb. at 33.
340. Deerfield's requirements for fire protection services by local responders do not differ materially from the scope of services required for the existing Searsburg facility. Wilmington's fire protection services have covered the Searsburg facility for more than ten years. There is no

evidence of any problems associated with Wilmington providing emergency services to the Searsburg facility during this time period. Habig Panel reb. at 31.

341. The Town of Searsburg receives fire protection services through the Town of Wilmington, and provides compensation to Wilmington for such services. Habig Panel reb. at 31; Duncan (for Wilmington) pf. at 4; Florence (adopted by Kenney) pf. at 10. Deerfield has agreed to compensate the Town of Searsburg for any incremental fire protection service costs related to the Deerfield facility, should any be incurred. Florence (adopted by Kenney) pf. at 10; Habig Panel reb. at 31; Exh. Searsburg-SF-1 at 8.

342. Deerfield provided the Town of Wilmington with a scope of requirements for fire protection services for the wind facility and has held discussions with town officials regarding fire protection services. The Town never suggested to Deerfield Wind that it would not or could not provide the services or would withdraw from the present Searsburg agreement. To the contrary, Wilmington agreed to respond with a proposal for the incremental services. Habig Panel reb. at 31.

343. If for some reason Wilmington decided to exclude the Project from the fire protection services agreement with Searsburg, Readsboro could provide such services and is a comparable distance from the Project (7-8 miles). Habig Panel reb. at 31.

344. Deerfield has agreed to compensate the Town of Readsboro for any incremental fire protection service costs related to the Deerfield facility, should any be incurred. Exh. DFLD-HGC-6 at 8.

#### Other Municipal Services

345. The private roads accessing the site will not require municipal expenditures for maintenance. Town roads – including Putnam Road and Sleepy Hollow Road, in Searsburg – may require

minor alteration during the construction phase, which would be accomplished at Deerfield Wind's expense. Zimmerman pf. at 60.

346. The Project will provide a net benefit to the towns, in that it will generate local property taxes but require very little in the way of municipal services. Zimmerman pf. at 61.

347. The payments provided for in the agreements between Deerfield Wind and the towns of Searsburg and Readsboro will reduce the burden on taxpayers and will provide a substantial fund to be applied to town projects outside the regular budget. The yearly payments to the Town of Searsburg will be roughly equal to the Town's entire present annual budget. Florence (adopted by Kenney) pf. at 6-7; Exh. DFLD-HGC-6, ¶1; Exh. Searburg-SF-1, ¶1.

348. The agreements between Deerfield Wind and the towns of Searsburg and Readsboro provide the towns with prior review of plans related to town roads, reasonable access to the construction site, and other similar accommodations that will aid the Town in planning for the impacts of construction. Exh. DFLD-HGC-6, ¶2-3; Exh. Searburg-SF-1, ¶2-3.

349. Under the town agreements, Deerfield Wind is responsible at its own expense for promptly repairing any town roads or other town infrastructure damaged as a result of the Project. Exh. DFLD-HGC-6, ¶ 3; Exh. Searburg-SF-1, ¶ 3.

350. The traffic on public roads associated with project operations (approximately five trips per work day) will be minimal; thus, additional maintenance of the town highways should not be necessary. Zimmerman pf. at 61.

351. Waste disposal will be handled through private haulers and will create no burden on local government. Zimmerman pf. at 61.

**Discussion on Municipal Services – 10 V.S.A § 6086(a)(7)**

The evidence demonstrates that the Project will comply with 10 V.S.A. § 6086(a)(7).

First, Findings 304-323, *supra* and the related discussion concerning Act 250 criterion 5 address any potential burdens placed on municipalities due to project-related traffic.

With respect to emergency and other municipal services, the evidence in the record supports a finding that the Project will not create an undue burden on police, fire and rescue services, and will not pose a risk to public health and safety. Although the Project is not expected to require special emergency services from the host towns (or Wilmington), Deerfield Wind has agreed to hold the towns harmless should such services be necessary. Moreover, Deerfield Wind has agreed to reimburse the host towns in the event of any project-related damage to town roads.

**G. Aesthetics (Visual & Noise) – 10 V.S.A § 6086(a)(8)**

(1) Visual

352. The proposed Project will not have an undue adverse impact on the scenic or natural beauty of the area or on aesthetics. This Finding is supported by Findings 352-443 below.

353. Ms. Vissering and Mr. Buscher conducted an extensive analysis to determine visibility of both the original project and the revised 15-turbine project. *See generally*, Vissering/Buscher pf.; Vissering/Buscher reb.

354. In order to evaluate the original Project's potential impacts, Ms. Vissering and Mr. Buscher first prepared a computer-generated viewshed analysis, which looked at potential views within a 10-mile radius. The 10-mile viewshed is appropriate because, while the Project may be visible beyond this distance, the turbines would appear very small and occupy an extremely limited portion of the overall view. Vissering/Buscher pf. at 3-4.

355. Ms. Vissering also field-inventoried public roads, recreation areas, hiking and snowmobile trails, village centers, historic sites, and significant portions of the Aiken Wilderness Area and an

area referred to as Lamb Brook, both located within the Green Mountain National Forest.

During fieldwork, she documented viewpoints with photographs and took notes with regard to viewing distances and characteristics of the views. She also considered views from private residences. However, because private properties could not be individually inventoried, assessments were based upon field analysis of potential views, the viewshed analysis and land cover data. Vissering/Buscher pf. at 3-4.

356. Both experts met with the Searsburg Collaborative Team and Ms. Vissering also met with local officials, and participated in NEPA Scoping Meetings with the US Forest Service as a part of their evaluation of the proposed project. Vissering/Buscher pf. at 3.

357. Ms. Vissering's and Mr. Buscher's initial analysis also included 6 photo simulations of the Project. The simulations included views from: Route 100 approaching Heartwellville from the south (Simulation #2); Route 9 in Woodford looking east (Simulation #3); Route 8 in Searsburg, looking south (Simulation #4); Boyd Hill Road in Wilmington (Simulation #5); Town Hill Road in Whitingham (Simulation #6); and Harriman Reservoir in Wilmington (Simulation #7).  
Vissering/Buscher pf. at 4; Exh. DFLD-JV/MB-5.

358. Ms. Vissering and Mr. Buscher also prepared an initial report for USFS review which evaluated the proposed project under the 1986 Forest Plan. Vissering/Buscher pf. at 3; Exh. DFLD-JV/MB-3.

359. Based on this extensive evaluation, and after considering the relevant factors under the Environmental Board's *Quechee* decision, Ms. Vissering and Mr. Buscher found that the original 24 turbine Project would have an adverse impact on the aesthetics of the area but concluded that the impact would not be unduly adverse. Vissering/Buscher pf. at 20; *See generally*, Vissering/Buscher pf. and attached exhibits.

360. Deerfield Wind subsequently revised the Project several times resulting in the Revised 15-Turbine Project. *See* Findings 2, 4, 7, *supra*.
361. Ms. Vissering and Mr. Buscher conducted additional analysis to evaluate the relative impacts of the Revised 15-turbine Project. They recalculated the viewshed analysis map for the revised layout and also produced an additional viewshed analysis map that takes into account the impact of intervening vegetation. Vissering/Buscher reb. at 3-4; Exhs. DFLD-JV/MB-8a, 8b.
362. In addition they reproduced the original six photo-simulations to represent the changes in the revised layout. They also produced four new simulations from new viewpoints, which were based on simulations requested by the U.S. Forest Service as a part of the concurrent federal environmental review process. Vissering/Buscher reb. at 3; Exh. DFLD-JV/MB-9.
363. Ms. Vissering and Mr. Buscher also conducted additional field work and took additional photographs representing the surrounding area. Vissering/Buscher reb. at 4-5; Exh. DFLD-JV/MB-10.
364. Finally they prepared a revised visual assessment of the Project for the USFS as a part of the federal environmental review process report, which addresses the Project's compliance with the 2006 Forest Plan. Vissering/Buscher reb. at 5; Exh. DFLD-JV/MB-11. The GMNF Plan assessment considers the visual impacts of four different alternatives for the project, as required under federal law. One of those alternatives includes a 14-turbine project which is substantially similar to the revised 15-turbine project proposed in this case. Vissering/Buscher reb. at 5.
365. Visually, the differences between the revised 15-turbine project and previous layouts are minimal, though there would be fewer turbines, which will diminish the aesthetic impacts. The number of turbines along the western ridge was reduced from ten to eight turbines; the number

of turbines along the eastern ridge stayed the same at seven. The spacing between turbines on the western side was also condensed. Vissering/Buscher reb. at 2, 5.

366. Based on their additional analysis Ms. Vissering and Mr. Buscher concluded that the visual impacts of the revised 15-turbine project are similar to the previously proposed projects and would not result in any undue adverse aesthetic impacts. Vissering/Buscher reb. at 2, 5.

367. Mark Kane also conducted a visual assessment of the original Project and the revised 15-turbine project on behalf of the Department of Public Service. Kane pf. at 5-11; Exh DPS-MK-1; Kane reb at 2-8.

368. Mr. Kane's aesthetic assessment used methods of analysis similar to the assessment performed by Ms. Vissering and Mr. Buscher including site visits, photo simulations of the proposed project, and a viewshed analysis of the potential areas of visibility. Kane pf. at 6-7; Exh. DPS-MK-1.

369. These methodologies are appropriate for assessing the visual impacts of the Project and represent accepted practices. Kane pf. at 6.

370. Mr. Kane identified three critical view points, including views from Route 9 in Woodford heading east, views from Route 100 in Heartwellville, and views from Harriman Reservoir in Wilmington. Kane pf. at 6; Exh. DPS-MK-1, Fig. 7.

371. Based on his extensive analysis and site visits Mr. Kane concluded that the Project's visual impacts would be adverse, but would not rise to the level of an undue adverse impact. Kane pf. at 7-11; Kane reb. at 4-8.

### Context of the Area

372. The Project is located in the foothills of the southern Green Mountains. This is a topographically diverse and rugged area with numerous small mountains and hills. Vissering/Buscher pf. at 5.
373. Haystack Mountain forms a significant focal point in the area due to its conical shape and high elevation. Mount Snow is also a prominent feature. The Deerfield River forms the major drainage throughout the valleys between these hills. It has been dammed in several locations to form several significant water bodies including Harriman Reservoir and Somerset Reservoir, which are also important regional focal points. Vissering/Buscher pf. at 5.
374. Several villages are located in the area, primarily in the valleys and many along the Deerfield River. They include Wilmington, Whitingham, Readsboro, Searsburg, Stamford, West Dover, and Woodford. Vissering/Buscher pf. at 5.
375. The Searsburg facility is a major visual element in the region. Exh. DPS-MK-1 at 11. It is visible from many openings throughout the region and is located along an unnamed horizontal ridge. Vissering/Buscher pf. at 5-6.
376. The Project is located along the same ridge as the Searsburg facility, and along a second similar unnamed horizontal ridge to the west. Vissering/Buscher pf. at 5-6.

### Visual Characteristics of the Project

377. Unlike other types of development, wind turbines need to be located on ridgelines and the spinning blades visually reinforce this logical connection to the ridgeline location. Vissering/Buscher pf. at 13.

378. The Project would be located on two ridges that are not among the more prominent ridges or focal points in the region. They are horizontal in form and visually indistinct. Vissering/Buscher pf. at 16.
379. The complex topography and abundant forest cover in the region would make the Project difficult to see from many vantage points. Vissering/Buscher pf. at 16.
380. The Project would be visible from a small percentage of the area within a ten-mile radius of the proposed site, due to topography and vegetative screening. Vissering/Buscher reb. at 15. Exh. DFLD-JV/MB-8a; Exh. DPS-MK-2 at Figure 5b.
381. A maximum of only 2.5% to 3% of the area in the 10-mile viewshed is likely to have year round views of the Project, and in most cases these views include only portions of the Project. Vissering/Buscher reb. at 15; Exh. DFLD-JV/MB-8a.
382. In general, the views of the Project will be relatively short duration and will tend to be either in the background or mid-ground. Exh. DPS-MK-2 at 12.
383. The Project would generally be visible for short durations from public vantage points. Areas within 2-3 miles would have generally fleeting glimpses. Most residences in the immediate vicinity would also have relatively limited views. Exh. DPS-MK-2 at 13.
384. The Project will result in the loss of some open space, primarily within the Green Mountain National Forest. The magnitude of this loss is small, particularly in relationship to the scale of public lands within the vicinity of the project. Exh. DPS-MK-2 at 12.
385. In nearly all views, except for immediate foreground views, there is abundant open space remaining, with the Project occupying only a small part of most views. The scale of the Project remains small within the broad context of the surrounding rural and forest landscapes. Vissering/Buscher pf. at 15.

386. The proposed wind turbines will be the same in form as the existing turbines, although the new turbines will be taller than the existing turbines. Vissering/Buscher pf. at 15.
387. From many vantage points (e.g., Ray Hill and White roads in Wilmington) the two project ridges would appear to be a single, horizontal ridgeline, and the turbines would appear to be a cluster of repeated white forms. This repetition of forms unifies the Project, retains simplicity, and does not create a sense of visual clutter. Vissering/Buscher pf. at 15.
388. The eastern access roads are expected to have only limited, if any, visibility from off site. Vissering/Buscher pf. at 6.
389. The ridge road for the western project area would not be visible from off site. Vissering/Buscher pf. at 6.
390. Electrical collection system poles would be located so that they are within existing wooded areas and, for the most part, screened from view. Additional trees would be planted to screen the roadside poles if necessary. The collector line would be seen briefly crossing Route 8, but dense tree cover west of Route 8 would screen poles from view. Vissering/Buscher pf. at 7; Vissering/Buscher reb. at 19.
391. The substation would be screened from public viewing places by existing vegetation, which will be supplemented with planted vegetation as necessary. Vissering/Buscher pf. at 8.
392. The proposed maintenance building and laydown areas will be screened from public view using existing vegetation supplemented with planted vegetation as necessary. Vissering/Buscher pf. at 8.
393. Under Deerfield Wind's lighting plan for the revised 15-turbine project, six of the fifteen turbines (three on each ridge) will be lit at night. The turbine lights would be oriented upwards with cut-off shielding at  $-1^\circ$  of horizontal. These navigational aids will consist of small, slowly

pulsing red lights. The lights themselves would not be visible from most locations and there would be no perceptible beam of light emitted from these bulbs. They are intended to be seen, but not to light the surrounding area, and thus do not contribute significantly to light pollution or sky glow. Vissering/Buscher reb. at 22; tr. 12/11/08 at 196-197 (Vissering/Buscher).

394. There would be no other permanent lighting associated with the Project with the exception of a motion-activated light at the substation. Vissering/Buscher pf. at 7

395. Turbines, roads, and other infrastructure will occupy less than 80 acres of GMNF land. Only an extremely small part of the cleared area would be visible off site. When viewed from off site, the forest would appear to remain undisturbed while the wind turbines rise above the forest cover. Vissering/Buscher pf. at 13.

396. The public may consider views of wind turbines from roads as a scenic asset. The Route 9/Molly Stark Scenic Byway Management Plan lists the Searsburg facility as a "scenic resource," in recognition of the fact that there is an interest in and an attraction to windpower development as part of our evolving landscape. The Searsburg facility is also a noted feature on one of the Scenic Byway roadside markers. Vissering/Buscher reb. at 28-29; Exh. DFLD-JV/MB-10 (Photos 1, 2, 2a).

397. Use of the G87 turbine in the western project area is a critical aspect of project feasibility and its marginally longer blades will have no impact on the Project's visual impacts. Use of the G87 partially compensates for the loss of two turbines in the western array under the Revised 15-turbine layout by improving the overall capacity factor. The overall difference in height of 7 meters (11.5 feet) amounts to less than a 3% difference and will be imperceptible from most public areas from which the turbines will be visible. Habig Panel surreb. at 2-3; tr. 12/11/08 at 223 (Kane) and 191-192 (Vissering).

398. Use of the G80 in the western project area is not a necessary or reasonable mitigation measure to reduce visual impacts. Habig Panel surreb. at 2-3.

Views of the Project from Roads in the Area

399. There are limited views of the Project from some roads in the Project area. In general these views are short duration. *See* Findings 400-406 below.

400. Route 9: heading west, there are brief views of the existing and proposed projects near the entrance to Molly Stark State Park, and just west of Wilmington village. Heading east there are views of longer duration beginning west of Woodford State Park and intermittently to Bishop Road. These views are primarily of the northern end of the western project area (3.1 miles of potential visibility along 30 miles of road). The turbines are approximately 2.0 miles away from this viewpoint. The context is one in which commercial and residential development is often visible in the foreground (such as the Woodford Mall). Views toward Haystack Mountain, an important regional focal point, remain unobstructed. Vissering/Buscher pf. at 9. Exh. DFLD-JV/MB-9 (Simulation #3).

401. Route 100: There are no views from Route 100 from Dover south to Heartwellville except very brief glimpses east of Wilmington, in Whitingham at Town Hill Road, and at Readsboro Falls; there are views of longer duration around Heartwellville (toward southern end of eastern expansion); there are intermittent brief views heading north from Stamford village toward Heartwellville of eastern project area (2.5 mi. of visibility along 52 mi. of road). Vissering/Buscher pf. at 9; Exh. DFLD-JV/MB-9 (Simulation #2).

402. Route 8: Northern sections of Route 8 in Searsburg have views at close range of existing GMP turbines and the eastern project area turbines would be visible at close range; brief glimpse of western project area turbines would be visible heading north; there will be no views of the

Project south of Crozier cemetery until Heartwellville where Route 8 joins Route 100 (see above) (approximately 1-2 miles of intermittent visibility). Vissering/Buscher pf. at 9; Exh. DFLD-JV/MB-9 (Simulation #4).

403. Ray Hill Road, Wilmington: Intermittent views at right angle along top of ridge (approx. 4 miles away); homes have a greater potential for views. Vissering/Buscher pf. at 10; Exh. DFLD-JV/MB-9 (Simulation #9).

404. Boyd Hill Road, Wilmington: Views toward the existing and some of the proposed eastern turbines primarily near Boyd Farm; project viewed along about 0.5 mile of road (approx. 4 miles away). Vissering/Buscher pf. at 10; Exh. DFLD-JV/MB-9 (Simulation #5).

405. Whites and Stowe Hill Roads, Wilmington: Views toward existing project, as well as the eastern and western turbines across open meadows near intersection of these two roads; Seen at 6-7 mi. away for a total distance of up to approximately 1 mi. Vissering/Buscher pf. at 10; Exh. DFLD-JV/MB-9 (Simulation #8).

406. Town Hill Road, Whitingham: Brief views near top of hill followed by intermittent views to Route 100; existing and proposed eastern turbines would be visible seen at a distance of about 6 miles along about .5 mile of road. Vissering/Buscher pf. at 10; Exh. DFLD-JV/MB-9 (Simulation #6).

Views of the Project from Recreation Areas and Trails in the Area.

407. There would be no views from many of the regions' recreation areas including Woodford State Park, Red Mill Campground Lake Raponda, Molly Stark State Park (except the fire tower), Sherman Reservoir, the 100-Mile View Scenic Area near Mt. Olga, the Catamount Trail along the east side of Harriman Reservoir, or Wilmington's village park. Exh. DFLD-JV-MB-10, photos 11, 21-22).

408. There will be some limited views from some recreation areas and trails in the area. These views are described below.
409. Harriman Reservoir: The Project will be visible from portions of Harriman Reservoir but will not be a dominant feature. From much of the reservoir visibility would be minimal or non-existent, especially on the eastern portion of the water and shoreline. Some of the proposed eastern turbines would be seen intermittently along portions of the eastern edge of the Reservoir and from Ward's Beach, and the Castle Hill and Mountain Mills boat launch areas. (3.5-4.5 miles). From the picnic area at Ward's Beach, portions of up to seven turbines would be visible, many of them partially hidden behind foreground hills Simulation #7 provides an example of views from Harriman Reservoir along the eastern edge in Wilmington. The turbines are approximately 4 miles away from this viewpoint. The turbines are approximately 3.8 miles away from this viewpoint. Only about two to three turbines would be visible from Mountain Mills and Castle Hill boat launches, and would appear lower in elevation than the adjacent foreground hills. Exh. DFLD-JV/MB-9; Vissering/Buscher reb. at 9.
410. Molly Stark State Park: Views from fire tower only; views include 360° panorama seen at a distance of 8 miles. Vissering/Buscher pf. at 10.
411. Whitingham Park and Brigham Young Monument: Views are very limited due to intervening trees; only views are from the far southern edge near outfield of ball field; existing turbines visible also (6.4 miles). Vissering/Buscher pf. at 10.
412. Sadawaga Pond: Views from Sadawaga Pond are at a considerable distance (6 miles) and are seen over only portions of the Pond. There are no views from boat launch, but views along eastern edge of lake primarily toward eastern turbines. This intermittent visibility is within the context of broad panoramas extending for miles that include numerous surrounding mountains.

At such a distance the Project is only a minor part of the overall landscape. The existing turbines are seen from some locations. Vissering/Buscher pf. at 10; Vissering/Buscher reb. at 9.

413. Somerset Reservoir: Views of the project from portions of the southern and western lake are at a considerable distance (7.8-8 miles) and are seen over only portions of this water bodies. This intermittent visibility is within the context of broad panoramas extending for miles that include numerous surrounding mountains. At such a distance the Project is only a minor part of the overall landscape. The existing turbines are seen from some locations. Vissering/Buscher pf. at 11; Vissering/Buscher reb. at 9.

414. Mount Snow: Views from summit toward entire Project including existing turbines at about 6 miles. Vissering/Buscher pf. at 11.

415. Long/Appalachian Trail: Distant views from Glastenbury fire tower (7.7 miles away), a few brief glimpses elsewhere (closest point is 5.1 miles away). Vissering/Buscher pf. at 11.

416. Snowmobile Trails: Limited views through trees in GMNF in areas east of the Aiken Wilderness and in Lamb Brook area. (Seen as close as 0.8 mile through trees). Vissering/Buscher pf. at 11.

#### Village Centers

417. There will also be limited views from some areas near villages in the area. These views (or lack thereof) are described below. Evaluation of potential visual impacts on historic sites is addressed separately below. *See* Findings 418-421, *infra*.

418. There would be no visibility from the villages of Searsburg or Somerset, and none from street level within Stamford village except for a brief glimpse at the northern outskirts at a distance of approximately eight miles away (Photo 24, *DFLD-JV/MB-10*). Vissering/Buscher reb. at 17.

419. There would be no views from Readsboro village, but there would be views from Heartwellville of the eastern turbines (see Simulation #2, Viewpoint 11, *DFLD-JV/MB-9*).  
Vissering/Buscher reb. at 17.
420. The Project would be extremely difficult to see from Wilmington village, and would not be visible from the recreation park in the village or the small park on Lisle Street (Photo 24, *DFLD-JV/MB-10*). A few of the western turbines could be visible from the upper floors of the school, but Haystack Mountain is a dramatic focal point from this area and would be far more dominant. Vissering/Buscher reb. at 16.
421. Some homes in and around Sadawga Pond in Whitingham would have potential limited views of the eastern ridge turbines. Visibility from Whitingham Park is limited since foreground trees block nearly all views. The only open view is from a small area south of the Brigham Young monument (looking at the monument one is facing away from the project).  
Vissering/Buscher reb. at 17.

Green Mountain National Forest (GMNF)

422. There are no open views within either foreground or middleground areas in the Green Mountain National Forest. Views from trails within the GMNF are limited to about a quarter mile of trail within the Lamb Brook Area and any views would be seen through numerous foreground trees during the winter months only. At this time of year the trail is used primarily by snowmobilers, who are not necessarily focused on filtered views through the trees.  
Vissering/Buscher reb. at 12; DEIS at 108-114.
423. Aiken Wilderness Area: Visibility of the Project from Aiken Wilderness will be extremely limited. There will be some limited views in winter through trees from eastern east facing hillsides, but not from hilltops or ponds. Vissering/Buscher pf. at 10-11; DEIS at 111-112.

424. Lamb Brook Area: Some views through trees in winter, and from Dome summit; existing turbines visible in some views. Vissering/Buscher pf. at 12; DEIS at 109-111.
425. Other Adjacent GMNF lands: There will be views in winter through trees along Forest Road 73 (off Route 9) but not from Forest Road 74. There will be no summer views from campsites along Forest Road 73. Vissering/Buscher pf. at 12; DEIS at 111.

### Residences

426. Viewshed and field analyses indicate approximately 2 homes or camps within 0.5 miles of the project site, approximately 51 homes or camps within 1 mile, and 144 homes within 3 miles. Vissering/Buscher pf. at 12.
427. Very few of these homes and camps are likely to have actual visibility of the proposed project. Visibility is most likely from a few homes along Route 8 from which the existing turbines and portions of the eastern project area would be visible; from several homes along Route 9 from which some of the western turbines would be visible, and from about 8 homes in Heartwellville from which all or some of the proposed eastern turbines would be visible. Vissering/Buscher pf. at 12.
428. A few homes or camps in Alpenwald Village, a private development near Heartwellville (2.5-3 miles away), would be able to view portions of the Project through deciduous trees in winter. Vissering/Buscher pf. at 12.
429. There is potential visibility of all or part of the Project from some homes along Ray Hill Road in Wilmington (4.8 miles away), and a few homes along Boyd Hill Road and along the eastern slopes of Harriman Reservoir (4.5 miles away). Other small concentrations of homes with potential for visibility are along White Road and Stowe Hill Roads (6-6.6 miles away) and Town Hill Road in Whitingham (5.6-6.2 miles away). Most of the views would include the

existing turbines with the exception of views from Heartwellville and the Alpenwald development and a few homes along Route 9. These views would all be over relatively long distances (greater than 2.5 miles). Vissering/Buscher pf. at 12-13.

#### Quechee Analysis

430. On balance, the Project will result in an adverse impact on aesthetics (principally because it does not “fit” the character of the area), but the impact will not be unduly adverse.

Vissering/Buscher pf. at 17-23; Vissering/Buscher reb. at 3-4; Kane pf. at 8; Kane reb. at 3.

431. The Project will not violate any clear written community standards intended to preserve the aesthetics or scenic beauty of the area. Vissering/Buscher pf. at 17-19; Vissering/Buscher reb. at 24-29; Kane pf. at 9-11; Kane reb. at 6-9.

432. The Town of Searsburg does not have a town plan or zoning ordinance. Vissering/Buscher pf. at 17.

433. The Readsboro Municipal Plan is comprehensive and addresses a number of issues related to scenic resources within the Town. However, none rise to the level of a specific “clear written community standard.” Vissering/Buscher pf. at 18; Kane pf. at 10; Kane reb. at 7-8.

434. The Windham Regional Plan also does not contain any clear written community standards addressing aesthetics or scenic resources. Vissering/Buscher pf. at 18; Kane pf. at 10; Kane reb. at 7-8.

435. The GMNF Forest Plan does not constitute a clear written community standard.

Vissering/Buscher reb. at 45; Kane pf. at 10; Kane reb. at 7-8. Nevertheless, the proposal conforms with the GMNF Forest Plan. Exhs. DFLD-JZ-7, DFLD-JZ-8.

436. The Wilderness Act does not constitute a clear written community standard.

Vissering/Buscher reb. at 26-27.

437. The U.S. Forest Service's *National Forest Landscape Management Handbook* does not constitute a clear written community standard. Vissering/Buscher reb. at 27.
438. The Vermont Scenic Byway program does not constitute a clear written community standard. Vissering/Buscher reb. at 28.
439. The Project will not shock or offend the average person. Vissering/Buscher pf. at 19. Vissering/Buscher reb. at 30-32; Kane pf. at 9; Kane reb. at 5-6.
440. Deerfield Wind has taken all generally available steps to mitigate the Project's visual impacts.
441. Ms. Vissering and Mr. Buscher worked with Deerfield Wind to evaluate and recommend site design details such as road and power line locations and turbine size and numbers in order to minimize and mitigate visual impacts. Vissering/Buscher pf. at 3.
442. Deerfield Wind has twice reduced the size of the Project, first from a maximum of 24 turbines down to 17 turbines, and then more recently from 17 down to 15 turbines. Both reductions in the size of the Project have reduced the Project's visibility, and have therefore further mitigated the impact of the Project. Vissering/Buscher reb. at 33.
443. Deerfield Wind has also taken other reasonable steps to minimize the impact of the Project.
- a. The Project has been located adjacent to an existing 69kv transmission line in order to reduce the need for extensive new transmission lines.
  - b. The wind turbines will be painted a white or off-white color to more easily blend with the sky under certain conditions.
  - c. There would be minimal visibility of project infrastructure other than the turbines themselves.
  - d. Existing roads would be used where possible with additional roads being of minimum width and having limited or no off-site visibility.

- e. The collector lines would be designed for minimal visibility from Route 8.
- f. Ridgeline power lines would be buried.
- g. The minimum number of lights required by the FAA would be used.

Vissering/Buscher pf. at 20; Vissering/Buscher reb. at 33, 42.

**Discussion on Aesthetics (Visual) – 10 V.S.A §6086(a)(8)**

Section 248(b)(5) requires the Board to find that a project “will not have an undue adverse effect on aesthetics,” after giving due consideration to Act 250 criterion 8. Aesthetics impacts under Act 250 criterion 8 are evaluated under the so-called Quechee analysis, developed in Environmental Board decisions. In applying Section 248(b)(5) to projects before it, the Public Service Board uses the Quechee analysis “for guidance,” but has made clear that its analysis “does not end with the results of the Quechee test.” *Petitions of VELCO and GMP*, Docket 6860, Order of 1/28/05 at 80:

Instead, our assessment of whether a particular project will have an “undue” adverse effect on aesthetics and scenic or natural beauty is “significantly informed by overall societal benefits of the project.”

*Id.* (quoting *In re Northern Loop Project*, Docket 6792, Order of 7/17/03 at 28).

In approving wind generation facilities in particular, the Board has several times made clear that it will balance the significant societal benefits of wind power against its aesthetic impacts. For example, in approving the now-operating 6 MW windfarm in Searsburg, in 1996, the Board stated:

[I]f the state is to develop wind generation as a renewable resource, these types of projects must be located at these very visible, high elevations to capture sufficient wind energy to make them viable economically. We must, then, be willing to allow some intrusion into the visual landscape to be able to reap the benefits of this type of renewable energy.

*Searsburg*, Docket 5823, Order of 5/16/96 at 28 (also stating, “This proposal very clearly brings out the reality that, in terms of our energy choices, all have some significant costs to society.”); *see also In re Petition of Blittersdorf*, CPG NM-11, Order of 5/26/00 at 19 (“[T]he impact of these facilities must

be carefully weighed against the societal benefits.”) The Vermont Legislature recently reaffirmed Vermont’s commitment to the development of renewable energy. Act No. 61 (2005), sec. 1.

Looking at the Quechee analyses performed by the witnesses in this case, it is clear that the Project passes muster under the Quechee test alone. The Board has previously explained its analysis under the Quechee test as follows:

[F]irst, a determination must be made as to whether a project will have an adverse impact on aesthetics and the scenic and natural beauty. In order to find that it will have an adverse impact, a project must be out of character with its surroundings. Specific factors used in making this evaluation include the nature of the project’s surroundings, the compatibility of the project’s design with those surroundings, the suitability of the project’s colors and materials with the immediate environmental, the visibility of the project, and the impact of the project on open space.

The next step of the two-part test, once a conclusion as to the adverse effect of the project has been reached, is to determine whether the adverse effect of the project is “undue.” The adverse effect is considered undue when a positive finding is reached regarding any one of the following factors:

1. Does the project violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area?
2. Have the applicants failed to take generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings?
3. Does the project offend the sensibilities of the average person? Is it offensive or shocking because it is out of character with its surroundings or significantly diminishes the scenic qualities of the area?

Docket 6860, 1/25/05 Order, at 79-80.

In this case, all of the aesthetics experts agreed that the impact of the project is adverse under the first part of Quechee, because the turbines will be out of character with their surroundings. At the same time, the variability of the topography in the area, the extensive forest cover, the alignment of many of the roads in the region, and the location of most villages and other areas of public congregation, combine to decrease the visibility of the Project dramatically from

what it would be, for example, on a prominent peak or ridge in a more open landscape. In fact, the viewshed analyses performed by Ms. Vissering and Mr. Buscher as well as Mr. Kane indicate that the Project will only be visible from a small percent of the area within a 10-mile radius of the Project, likely less than 3% of the total area in the 10-mile radius. In that respect, to the extent possible, the Project has been well sited to minimize potential visual impacts. Nevertheless, turbines of the size proposed, on any ridgeline in Vermont, are “out of character” under step one of the Quechee test. The aesthetic impact of the other elements of the Project – the roadways, the collector lines among the turbines and leading to the substation, and the substation itself, which is to be located immediately adjacent to an existing 69kV transmission line – will not be adverse. The evidence is quite clear that these elements will be barely visible from a very few locations, and not out of character from their surroundings.

While the Project’s aesthetic impacts will be adverse, all of the aesthetic experts in this case agree that the impact will not be undue under the second step of the Quechee test. The Project does not violate a clear, written community standard intended to preserve the aesthetics or scenic beauty of the area because such standards do not exist. The Town of Searsburg has no town plan. The Town of Readsboro does have a town plan, but the experts agree that its provisions do not rise to the level of clear, written community standards which could be applied to this Project. Similarly, the aesthetic experts agree that the Windham Regional Plan does not contain provisions which would constitute clear, written community standards applicable to this Project.

To the extent that the Town of Wilmington argues that its Town Plan should be applied to the Project, that argument must be rejected. *See Amended Petition of UPC Vermont Wind, LLC*, Docket #7156, Final Order (8/8/2007) at 68-69. *See also*, Discussion under Section 248(b)(10), *supra*.

The aesthetic experts also agree that the Project will not shock or offend the average viewer. The Project will be constructed adjacent to the existing Searsburg facility which is already visible from many of the viewpoints from which the Project will be visible. In addition, the majority of the views of the Project are from a distance such that the size would not be overwhelming. Viewed from such distances, the average person would not find the scale of the Project shocking or offensive. The opportunities for close-up views (within 2.5 miles) are limited, and will generally be of short duration and thus will not be shocking or offensive. The turbines will certainly change the view from some locations. Some people will find this offensive. However, Act 250 case law, and this Board's decisions under section 248, make clear that the aesthetics criterion "does not guarantee that views of the landscape will not change."

Finally, Deerfield Wind has taken "generally available mitigating steps which a reasonable person would take to improve the harmony of the project with its surroundings." Those include using colors that will maximize the opportunities for the turbines and blades to blend with the sky, siting the turbines in a manner that clusters them to the greatest extent possible, locating access roads, collector lines, and the substation to minimize the aesthetic impact of the Project and locating the Project in close proximity to an existing 115kV transmission line, thereby reducing the impacts of additional transmission lines. In addition, Deerfield Wind has also reduced the size of and reconfigured the Project over the course of this permitting process in response to concerns expressed by parties, thereby further minimizing impacts. As a result, the Project will not have an undue adverse impact on aesthetics and the scenic or natural beauty of the area.

(2) Noise

444. Project-related sound levels will be below commonly accepted noise standards and thus will not create an undue adverse impact on aesthetics in the community. Kaliski reb. at 4; Exh. DFLD-KK-5. This Finding is supported by Findings 445-494 below.
445. The Gamesa G87 wind turbine has a rated sound power level of 107.5 dB and the G80 has a sound power level of 104.9 dB. Kaliski reb. at 2; Kaliski suppl. pf. at 2.
446. The G80 and G87 turbines feature a noise control system, which permits programming the sound levels according to criteria such as date, time, or wind direction, achieving the goals of both noise compliance and maximum electrical production. Deerfield Wind can deploy the noise system or other operational adjustments if needed to meet the noise limits applicable to the Project. Exh. DFLD-JZ-Rev5a at 5; Exh. DFLD-JZ-27 at 5; tr. 12/1/08 at 282:6-285:6 (Cherian, Habig).
447. Deerfield Wind's noise consultant, RSG, Inc., performed a multi-step noise analysis for this Project: (i) background sound monitoring at seven off-site locations located within approximately 1.5 miles or less of the Project; (ii) modeling of sound levels from the proposed wind turbines in a 12,900 acre area around the site, using an industry-accepted modeling methodology; (iii) modeling of sound levels using one year of wind data from the site met towers; and (iv) comparing the projected sound levels to relevant noise guidelines and standards. Kaliski pf. at 3, 9-10.

Background monitoring program.

448. RSG measured background sound levels at seven sites located within approximately 0.5 to 2 miles of the proposed turbines. At representative sites along VT 8 and VT 9 where residences are located, average hourly sound levels ranged from 40 dBA at night to 60 dBA during the day.

The sound levels were dependent on the diurnal pattern of traffic and background wind speed.

Kaliski pf. at 7-8.

#### Modeling of Project Sound Levels

449. RSG conducted modeling of turbine noise using the standards set forth in the International Organization for Standardization (“ISO”) 9613-2, “Attenuation of Sound during Propagation Outdoors,” as implemented in the Cadna A software program. The ISO standard defines a methodology for predicting sound levels at distant receivers for meteorological conditions favorable to propagation. Kaliski pf. at 7; Exh. DFLD-KK-5 at 25.

450. The ISO modeling methodology assumes a moderate nighttime inversion with winds blowing from the source to the receiver. Kaliski pf. at 7.

451. The “worst-case” scenarios modeled by RSG assumed the wind simultaneously blowing from all sources towards all receivers, e.g., from both the western project area towards homes along Route 8, and from the eastern project area and GMP Searsburg facility towards the same homes on Route 8. As wind does not blow from opposing directions at the same time, this worst-case scenario is not a realistic possibility and overstates potential sound levels. Tr. 12/2/08 at 118, 192-193 (Kaliski).

452. RSG used multiple sources (all of the turbines) and receivers (the entire surrounding area) in modeling sound from the Project. This results in the modeling having a lower margin of error than the +/- 3 dB stated in Table 5 of the ISO 9613-2 standard, which assumes a single source and single receiver. Tr. 12/2/08 at 112-114 (Kaliski).

453. Though RSG did not calculate a confidence interval around its modeled results, they used a margin of error around the manufacturer sound power levels provided by Gamesa. Rather than using the mean level provided by Gamesa, RSG added 1.67 times the standard deviation to

calculate the 95<sup>th</sup> percentile sound power level for the wind turbines. This conservative approach resulted in a sound power level used for modeling that was 2 dB higher than the manufacturer's mean. Tr. 12/2/08 at 117-118 (Kaliski).

454. To achieve more accurate modeling than would otherwise result from use of the standard ISO methodology, RSG based its modeling input parameters on experience gained from a post-construction noise study that it conducted at a wind project in Kansas. RSG determined that the choice of ground attenuation could account for a difference of four to five dB in the modeling results. Kaliski reb. at 8-9; tr. 12/2/08 at 115-116, 121-122 (Kaliski).

455. RSG did not assume that there would be any sound level reductions due to foliage, given that the wind turbines are elevated significantly above the surrounding terrain, and the turbines would operate during the winter when deciduous trees are bare. Kaliski pf. at 8.

456. RSG assumed that the ground along the entire area of the study is "porous" and thus would absorb some sound. The amount of absorption is factored in as part of the ISO 9613-2 algorithm. Kaliski pf. at 8.

457. Topography generally has the greatest impact on sound propagation. The rolling nature of terrain can block the transmission path of the sound and reduce its level. Given the fact that the turbines are elevated on the highest ridges in the area, the amount of terrain reduction is minimized, but still taken into account by the model. Kaliski pf. at 8.

458. Wind has a complicated impact on sound levels. First, wind gradients can increase downwind propagation and decrease upwind propagation. Wind also affects metrological stability. The most stable nighttime conditions, which improve sound propagation, are under light or no winds, when the turbines would operate less. Third, wind affects the sound power of the wind turbine. Under higher wind speeds, the turbine generates more sound. Finally, higher

wind speeds create higher background noise. This can mask the sound levels from the wind turbines, especially for ridgeline winds above 20 mph. Kaliski pf. at 8-9.

#### Sound Modeling Results

459. The highest modeled sound level from the revised 15-turbine project would be 40 dBA.

This level would occur at a single residence east of the northernmost turbine – at the westernmost home on Putnam Road (a property currently under agreement with Deerfield Wind). The highest sound level at a non-participating residence will be 38 dBA. Kaliski reb. at 3; Exh. DFLD-KK-5 at 26-27 (Figure 22); Exh. DFLD-JZ-32a.

460. With the proposed Deerfield Wind project and the Searsburg facility operating concurrently, the combined modeled sound level is 43 dBA at a residence along Route 8. Kaliski reb. at 2; Exh. DFLD-KK-5 at 26, 29 (Figure 24).

461. The modeling demonstrates that the Project, even when combined with the sound from the existing Searsburg turbines, can meet the noise standard of 45 dBA (night) at all nearby residences during times when windows would typically be open, and under the meteorological conditions specified in the ISO 9613-2 standard. Exh. DFLD-KK-5 at 25.

462. Modeling shows that the impact of the existing Searsburg facility at the Thomas Shea residence is 40 dBA, while the proposed Deerfield Wind project alone would be 38 dBA. The combined sound level from both facilities operating would be 42 dBA. Typically, an increase of two dBA would not be perceptible. Tr. 12/2/08 at 70-71 (Kaliski); Kaliski reb. at 7; Exh. DFLD-KK-5 at 26-29 (Figures 22-24).

463. Under most meteorological conditions, the modeled sound levels depicted in Exh. DFLD-KK-5 would be the maximum sound levels at those receivers. Only during rare meteorological conditions or during an icing event would higher sound levels result. Tr. 12/2/08 at 86-88

(Kaliski). As turbines go into automatic shutdown during icing events, higher noise levels would be short in duration. Tr. 12/12/08 at 201 (Goland); tr. 12/2/08 at 92-94 (Kaliski).

464. Sound levels at the base of the turbines will be 60 dB, well below the 85 dB level at which OSHA recommends hearing protection for exposure over approximately eight hours. Tr. 12/2/08 at 152-153 (Kaliski).

#### Supplemental Sound Modeling

465. RSG conducted a second type of modeling to test the accuracy of its ISO modeling. Using 8,760 hours (one full year) of meteorological data derived from the ridgetop meteorological towers in 2005, RSG calculated under what conditions and how frequently the “worst-case” conditions would occur. RSG found that the highest sound levels for the combined Searsburg/Deerfield scenario would occur under neutral to strong inversions with southerly winds. Given that prevailing winds are from the west, the worst-case meteorological condition did not persist over an entire night. Kaliski reb. at 3-4.

466. The results of this analysis show that the highest modeled 8-hour average nighttime sound level was 43 dBA for the combined Searsburg/Deerfield impacts; average nighttime levels between 40 and 43 dBA are expected to occur less than 10% of the year. The Deerfield Wind turbines alone would not result in sound levels exceeding 39 dBA in any 8-hour nighttime period. There were no periods in which the 45 dBA  $Leq_{(8)}$  standard was exceeded. Kaliski reb. at 3-4; Exh. DFLD-KK-5 at 31; tr. 12/2/08 at 190-191 (Kaliski).

#### Modeling Results Compared with Background Levels

467. RSG prepared a comparison of modeled sound levels for the Project and background sound levels. The background sound levels were based on 24-hour average background traffic noise,

combined with modeled levels from the Searsburg turbines. Kaliski 2<sup>nd</sup> suppl. pf. at 3; tr. 12/2/08 at 94-95 (Kaliski); Exh. DFLD-KK-5 at 30 (Figure 25).

468. Project-related sound levels will increase overall background noise (inclusive of background traffic) by less than 3 dBA at all residences. The VTtrans noise policy considers the “Effects of Increase” of 3 dB to be “None.” Exh. DFLD-KK-5 at 30 (Figure 25); Kaliski pf. at 8.

469. Based upon RSG’s background sound monitoring, existing background sound levels are equal to or greater than what the Project will produce. *Compare* Exh. DFLD-KK-4 at 9 (Table 3) *with* Exh. DFLD-KK-5 at 30 (Figure 22).

470. The comparison of sound levels of the Project with a “no-build” scenario (Exh. DFLD-KK-5, figure 25) are conservative and overstate the Project’s contribution to overall sound levels. Tr. 12/2/08 at 184-190 (Kaliski). *Compare* Exh. DFLD-KK-4 at 9 (Table 3) *with* Exh. DFLD-KK-5 at 30 (Figure 22).

#### Noise Limits

471. The Towns of Searsburg and Readsboro have not promulgated quantitative community noise standards, and there are no state regulatory noise standards that apply to the Project. Exh. DFLD-KK-4 at 3-4.

472. The estimated noise levels for the Project were compared to guidelines established by the United States Environmental Protection Agency (EPA) for protection of human health and welfare with an adequate margin of safety. The EPA guideline is 55 dBA (day-night level). Exh. DFLD-KK-4 at 3-4.

473. The World Health Organization’s (WHO) guidelines recommend a daytime limit of 50 dBA (16 hour average) to protect against moderate annoyance and 45 dBA (8 hour average) to protect against indoor sleep disturbance. The WHO standard for instantaneous sound levels that would

disturb sleep is 60 dB. These are all exterior sound limits. Kaliski pf. at 5; Exh. DFLD-KK-4 at 3; tr. 12/2/08 at 148 (Kaliski).

474. The WHO guideline for protection from sleep disturbance -- 45 dBA Ln (exterior) or 30 dBA Ln (interior) -- assumes a reduction of 15 dB between the exterior of a home and an interior bedroom with windows open. This building attenuation factor is the same as that which the EPA provides as a national average for the attenuation of outdoor noise by the exterior shell of a house with windows open. Kaliski reb. at 5; tr. 12/2/08 at 127-128 (Kaliski).

475. Based upon the modeled sound results, the Project would meet the WHO guidelines, whether expressed as exterior or interior sound levels. See Findings, *infra*.

476. Based upon the modeled sound results, the Project would meet the interior sound level standard of 30 dBA  $L_{eq}$ (one-hour average) established by the Board in the UPC Sheffield case (Docket 7156). Tr. 12/2/08 at 126-127 (Kaliski).

477. The WHO guideline related to speech interference – that background sound levels should be below 35 dB for clear speech perception – is meant for situations such as classroom learning. Sound levels of lower than 45 dB would not interfere with conversations or speech perception. Tr. 12/2/08 at 149-150 (Kaliski).

#### Proposed USFS Noise Guideline

478. The USFS has proposed guidelines for wind energy projects on national forest lands, including a noise guideline. The USFS guidelines are draft and could very well change if and when they are finally promulgated. Kaliski reb. at 6; Kaliski surreb. at 4; tr. 12/2/08 at 124 (Kaliski); tr. 12/11/08 at 224-225 (Kane).

479. The National Forest Service draft guideline was written vaguely. The Forest Service has taken public comments on the draft guidelines, and there are a number of comments critical of the guidelines. Tr. 12/11/08 at 224 (Kane).
480. The USFS proposed guideline is a “relative” noise standard which provides that a wind project should not exceed background sound levels by more than 10 db. Kaliski reb. at 5-6; tr. 12/11/08 at 225 (Kane).
481. The WHO and EPA noise guidelines are absolute (or “not-to-exceed”) noise limits.
482. Relative noise standards have not been applied in Act 250 or section 248 cases and raise a number of difficulties in terms of their application to a wind project. Such standards present a moving target in terms of determining compliance and they could lead to results that are not protective and do not comport with the section 248 standard of “no undue adverse effect.” Kaliski surreb. at 3; Kaliski reb. at 6; tr. 12/11/08 at 227 (Kane).
483. The proposed USFS guideline lacks any suggested guidance for what parameter is measured or how it is measured. It is based on background sound levels, but does not specify what statistical measurement for background level (e.g. 24-hour average, 90<sup>th</sup> percentile, 50<sup>th</sup> percentile, etc.) would be used. A background level is impossible to define with certainty at all property lines and residence locations, even with extensive monitoring. The draft guideline also fails to account for the difference in background levels and turbine sound power levels caused by changing wind speeds. In addition, the background sound level is outside the control of a project developer. Therefore, a change in the future background sound level may require the developer to change its project to maintain compliance. Finally, there is no scientific justification for the relative noise standard as it bears no connection to interference with day to day activities (such as sleep disturbance), especially as it applies to residences outside national forest lands.

Kaliski reb. at 6; Kaliski surreb. at 3-5, 5; tr. 12/2/08 at 124-125 (Kaliski); tr. 12/11/08 at 224-228 (Kane).

Noise Complaints, Monitoring, and Operational Issues

484. During operation of the Project, Deerfield would investigate any noise-related complaints and conduct noise monitoring, if necessary, at the affected residences to confirm compliance with the noise limits, in accordance with ANSI standards. Such monitoring can be conducted at the exterior of the affected residence(s) with an appropriate adjustment factor applied to determine the resulting interior sound levels. Any disputes concerning the methodology for investigating noise complaints could be taken to the Board for resolution. Kaliski surreb. at 2; tr. 12/2/08 at 128-129 (Kaliski).
485. Post-operational noise monitoring should be required only if noise complaints actually arise during the operational phase. If this occurs, noise monitoring would be conducted in accordance with accepted practices and standards. It should not be presumed that monitoring must be conducted in the interior of a particular residence. Kaliski surreb. at 2.
486. Testing of compliance to an interior noise standard would require access to the bedrooms of surrounding residences. While this arrangement may be reasonable in response to a specific complaint or enforcement action, it is overly intrusive especially if the applicant is expected to confirm compliance via post-construction sound monitoring. The general practice in Act 250 and section 248 cases of applying outdoor limits rather than indoor limits as noise standards is reasonable since residents are far more likely to permit access to the developer to install monitors outside their bedroom window than inside their bedrooms. Kaliski reb. at 5-6; Kaliski surreb. at 2-3.

487. In the event that the Project exceeds noise standards and mitigation is required, one mitigation option is modification of turbine operations, e.g., for Deerfield Wind to automatically derate turbines at the times when levels are too high. Further mitigation options include retrofitting homes with new windows, doors, or air conditioning that would allow residents to keep their windows closed. Tr. 12/2/08 at 131-132 (Kaliski); Exh. DFLD-JZ-Rev5a at 5; Exh. DFLD-JZ-27 at 5.

#### Tonality and Low Frequency Noise

488. Gamesa provided 1/3 octave band sound power levels for reference wind speeds from 3 m/s to 10 m/s. The data shows that the highest any 1/3 octave band rises above both adjacent bands is 0.6 dB, a level is not indicative of strong pure tones. As a point of reference, the Gamesa G87 wind turbine would meet both Massachusetts and Connecticut tonality standards, which are based on octave and third octave spectra, respectively. Kaliski suppl. pf.at 3.

489. The manufacturer's data indicate that the G80 turbine does not produce any prominent discrete tones as defined by the ANSI standard. Kaliski 2<sup>nd</sup> suppl. pf. at 1.

490. At the closest home, the models show that noise from the turbines below 31.5 Hz will be below the threshold of human hearing and noise at the 63 Hz octave band is well below levels that can create sound-induced building vibrations. Kaliski pf. at 10.

#### Construction and Other Operational Noise

491. Most construction will take place at least 800 m (2,600 feet) away from the nearest residence. At this distance, the loudest pieces of equipment would be a rock drill and wood chipper at 54 dBA and 58 dBA, respectively. The presence of dense vegetation is likely to reduce the levels by roughly another 10 dBA. Due to the setbacks involved and the limited duration of the activities, construction noise should not pose undue quality of life concerns. Kaliski pf. at 10-11.

492. The turbine's transformers would not be readily audible offsite. Kaliski pf. at 11.
493. At the substation to the northwest of the project area, a 34.5 kV/69 kV transformer will be installed. This transformer will be guaranteed to meet the NEMA TR-1 standard (75 dBA) with fans on. It will be designed to meet a noise level of no more than 45 dBA at the nearest residence. Kaliski 2<sup>nd</sup> suppl. pf. at 3; Exh. DFLD-KK-4 at 2; Kaliski pf. at 11.
494. The 34.5 kV and 69 kV transmission lines associated with the Project do not generate any significant noise and are likely to be inaudible. Noise from transmission lines is generally audible under certain conditions for line voltages at and above 500 kV, which is well above what is proposed for Deerfield. Kaliski pf. at 11.

#### **Discussion on Aesthetics (Noise)**

Sound generated by operation of the Project will not have an undue adverse impact on aesthetics. Deerfield Wind's outside noise engineer (RSG, Inc) performed thorough sound monitoring and modeling, based in part on their unique experience evaluating an operating wind project in Kansas. RSG used input assumptions in its sound modeling for the Project that were 6-7 dB higher (more conservative) as compared with typical modeling using the standard ISO methodology. Notwithstanding this conservatism, the modeling results demonstrate that Project sound levels will fall below daytime and nighttime EPA and WHO noise guidelines. The EPA and WHO guidelines are protective of human health and welfare and guard against quality-of-life concerns including sleep disturbance. Moreover, based upon background sound monitoring conducted by RSG at seven discrete locations in the area surrounding the project site, Project-related sound levels will frequently be lower than existing background sound levels. It is worth noting that RSG undertook an additional step of testing the validity of its modeling results by taking a year of actual wind data (2005) from the project site's met tower, and modeling the resulting sound

levels to determine if the noise limits would have been exceeded during any hour within the test year. The results demonstrate that the Project would not exceed the noise limit. There is no credible evidence contradicting RSG's techniques or results.

The modeling results also demonstrate that the Project will meet the noise limit the Board recently established specifically for a wind generation facility -- interior sound level not to exceed 30 dBA (Leq) (one hour average). *See, Amended Petition of UPC Vermont Wind, LLC*, Docket No. 7156, Order of 10/1/2007 at 5-6.

As the Board itself has observed, by setting a specific noise limit as a CPG condition, it is the CPG petitioner, and not the public, that will ultimately bear the risk if the modeling was overly optimistic and actual noise levels are higher. *See* tr. 12/2.08 at 100, 130, 169-170 (Chairman Volz). Should such a situation arise, the Board can enforce the CPG by requiring operational or other changes to bring about compliance. In the extreme, the Board could require turbine shutdowns, CPG suspension, or CPG revocation. There is thus every incentive for Deerfield Wind to present reliable and realistic sound modeling, as it did in this case.

In the unlikely event that during operations the Project does exceed applicable noise limits, Deerfield Wind has presented a reasonable approach to addressing noise-related complaints: conducting sound monitoring as needed at the exterior of the affected residences, and applying accepted attenuation factors to determine the interior sound levels, and thus whether the applicable interior noise limit is exceeded. Sound monitoring within affected homes (including bedrooms) should not be required, due to its inherent invasive nature and privacy concerns. Rather, whether to conduct interior monitoring should be left to the discretion of individual property owners, who can make such arrangements with Deerfield Wind. If monitoring confirms that the noise limits are exceeded, various forms of mitigation can be implemented such as changes to turbine operations

based upon specific time of day, weather, or seasonal conditions, or the retrofitting of homes with insulated windows or air conditioners.

In light of the above, Deerfield Wind proposes the following CPG condition:

Deerfield Wind shall operate the Project so that it emits no prominent discrete tones pursuant to ANSI standards at the receptor locations, and Project-related sound levels at any existing surrounding residences do not exceed 45 dBA (exterior)(Leq)(1hr) or 30 dBA (interior bedrooms)(Leq)(1hr).

The noise limit shall apply to areas of frequent human use during the summer months, including homes, yards, and porches. The noise limit shall not apply to areas that have transient uses such as driveways, trails, and parking areas.

#### **H. Historic and Archaeological Sites - 10 V.S.A § 6086(a)(8)**

495. The Project will not cause undue adverse impacts on historic or archeological resources.

This Finding is supported by Findings 496-520 below.

496. Under the supervision of Hope Luhman, an historical and archeological resources expert, the Louis Berger Group, Inc. (Berger Group) conducted a review of the Project to identify potential impacts to historic buildings, structures, historic districts, historic landscapes and settings, and to known or potential archeological resources. Luhman pf. at 2-4; Exhs. DFLD-HL-1 and HL-2.

#### **Historic Resources**

497. The Project will not have an adverse effect on any of the listed or eligible properties in the Area of Potential Effect (APE). Luhman reb. at 6.

498. There are no direct impacts to any historic resources in the Project's footprint. Luhman pf. at 9-11; DFLD-HL-2.

499. The only potential impacts are indirect visual impacts from historic resources in the viewshed of the Project. Luhman pf. at 9-11; Luhman reb. at 7; DFLD-HL-2.

500. The Berger Group first compiled a list of properties within a ten-mile radius of the Project which are currently listed in or are considered eligible for the National and State Registers of Historic Places. Luhman pf. at 4-6; Luhman reb. at 4.
501. The Berger Group next conducted a field study of historical resources. The survey verified the continued existence of the historic properties identified during the file review and confirmed each property's architectural and historical integrity. The survey also documented each historic resource 50 years and older within the APE not previously inventoried and evaluated for National or State Register eligibility. Luhman pf. at 5; Luhman reb. at 4.
502. Following the initial work to identify eligible properties, the Berger Group submitted the results of its eligibility determination to the Vermont Division for Historic Preservation ("DHP") for review and comment. Luhman reb. at 4; DFLD-HL-6a.
503. After consultation with DHP, 108 properties were deemed "eligible" for listing on the State Register of Historic Places. An assessment was then undertaken to determine whether the Project would have an adverse effect on these properties. The results of the analysis are presented in the *Assessment of Effects* Report. Luhman reb. at 4-5; DFLD-HL-6b.
504. A desktop viewshed analysis indicated that the Project might be visible from some historic properties in the area. However, potential views of the Project from listed or eligible properties are limited by the surrounding vegetation and the topography of the landscape. A majority of the historic resources face away from the project area. From those few properties where the Project may be partially visible, the limited visibility will be at such a great distance that it will have no effect on the qualities and characteristics that make the resource eligible for listing on the State or National Register. Luhman reb. at 7; DFLD-HL-6b; DFLD-HL-6c.

505. Following the July 2008 revisions to the Project, the Berger Group analyzed the revised viewshed for the 15-turbine project and completed additional fieldwork. The viewsheds of the previous 17-turbine project and the revised 15-turbine project are very similar and as a result there were only minor changes in the viewshed. The Berger Group identified 11 additional properties which may be eligible for listing in the National Register and surveyed those properties to assess eligibility/resource evaluations and potential effects. The results of this additional work were provided in the *Architectural Addendum Report* to DHP on July 2, 2008. Luhman reb. at 11-12.

506. The Berger Group applied the evaluation criteria developed by DHP entitled "Criteria for Evaluating the Effect of Proposed Telecommunications Facilities, Transmission Lines, and Wind Power Facilities on Historic Resources" to these resources, assessing whether the installation "would cause significant alteration and deterioration of the setting or character of [the] historic resource." After reviewing and applying these criteria, the Berger Group reached the conclusion that the Project would not have an undue adverse impact on any listed or eligible properties under the criteria. Luhman reb. at 7-8.

#### Archeological Resources

507. The Project will not have an undue adverse impact on archaeological resources in the APE. This Finding is supported by Findings 508-520 below.

508. The Berger Group conducted extensive research and background work to identify potential archaeological resources including examination of archaeological site files, maps, and cultural resource management reports held by the VT DHP. The Berger Group also consulted with David Lacy, Archaeologist with the Green Mountain and Finger Lakes National Forest. Luhman pf. at 4.

509. The Berger Group conducted a field inspection of the APE associated with potential ground disturbance to assess the conditions and note areas of potential concern. Luhman pf. at 4.
510. The Berger Group conducted a Phase IB survey of the Project site consisting of a total of 176 shovel tests. Luhman reb. at 8-9; DFLD-HL-5a.
511. The Berger Group's Phase IB survey did not identify any prehistoric or historical archaeological resources in the project area. Luhman reb. at 8-9.
512. The Berger Group conducted a complete archaeological field reconnaissance of the revised 15-turbine project layout. Twenty-nine additional shovel tests were conducted and no cultural materials or intact cultural deposits were identified. A walkover inspection of the revised Project did not identify any new sensitive areas. Luhman reb. at 11-12; Exh. DFLD-HL-5b.
513. Subsequent to the Berger Group's last field review, a few additional minor changes were made to the Project layout in order to further reduce impacts to bear-scarred beech habitat. As a result there were a few small additional areas in the anticipated clearing limits for the Project. The Berger Group conducted a walkover of these areas. The walkover revealed no new sensitive areas. The Berger Group also conducted supplementary subsurface testing in the area of road revision near turbines W2 and W3. The 13 additional shovel tests revealed no cultural materials or intact cultural deposits. Luhman reb. at 11-13.

#### Deerfield Wind-DHP Stipulation

514. Deerfield Wind and the Vermont Division for Historic Preservation entered into a Stipulation concerning the Project, dated September 18, 2008. Exh. DFLD-HGC-8.
515. DHP reviewed the proposed Deerfield Wind Project's (the "Project") potential effects on historic buildings and structures and on pre-contact and historic archaeological resources pursuant to 30 V.S.A. § 248(b)(5). Exh. DFLD-HGC-8 at 1.

516. DHP also reviewed the Project pursuant to Section 106 of the National Historic Preservation Act (NHPA) because the Project will be undertaken partially on lands owned by the Green Mountain National Forest. Exh. DFLD-HGC-8 at 1.
517. With respect to historic buildings and structures, in addition to the testimony provided by the Louis Berger Group, DHP reviewed the following information: a) *Historical Architectural Investigations Determinations of Eligibility; Deerfield Wind Project; Towns of Searsburg and Readsboro, Bennington County, Vermont* (October 26, 2007) (Exh. DFLD-HL-6a); b) supplemental information provided by Deerfield Wind regarding 25 of the buildings identified within the APE, contained in response to DHP's First Set of Information Requests; c) *Assessment of Effects; Deerfield Wind Project; Towns of Searsburg and Readsboro, Bennington County, Vermont* (June 23, 2008) (Exh. DFLD-HL-6b); and d) *Addendum Report, Historical Architectural Investigations, Determinations of Eligibility and Assessment of Effects, Deerfield Wind Project; Towns of Searsburg and Readsboro, Bennington County, Vermont* (June 27, 2008) (Exh. DFLD-HL-6c). Exh. DFLD-HGC-8 at 2.
518. Based upon DHP's review of the information identified above, DHP concurred with the Louis Berger Group's assessment that the Project will not have an adverse effect on historic buildings and structures. Exh. DFLD-HGC-8 at 2.
519. With respect to archeological resources, in addition to the testimony provided by the Louis Berger Group, DHP reviewed the following information: a) *Deerfield Wind Project Phase IA Archeological Survey and Historic Resource Screening Study* (April 2006) (Exh. DFLD-HL-2); *Archaeological Resource Assessment and Scope of Work, Deerfield Wind Project, Towns of Searsburg and Readsboro, Bennington County, Vermont* (October 9, 2007); an end-of-field letter summarizing the results of the Phase IB survey undertaken in October and November 2007; *Phase IB Archaeological Survey, Deerfield Wind Project, Towns of Searsburg and Readsboro, Bennington County, Vermont*

(December 2007); revised *Phase IB Archaeological Survey, Deerfield Wind Project, Towns of Searsburg and Readsboro, Bennington County, Vermont* (June 13, 2008) (Exh. DFLD-HL-5a); and *Addendum Report Phase IB Archaeological Survey, Deerfield Wind Project, Towns of Searsburg and Readsboro, Bennington County, Vermont* (July 1, 2008) (Exh. DFLD-HL-5b). Exh. DFLD-HGC-8 at 2-3.

520. Based upon DHP's review of the information identified above, DHP concurred with the Louis Berger Group's conclusion that the Project will not have an undue adverse impact on archeological resources in the APE. Exh. DFLD-HGC-8 at 3.

### **Discussion on Historic and Archaeological Sites**

The evidence demonstrates that the Project will not have an undue adverse effect on historic resources. To evaluate a project's impact upon historic sites, a three part analysis is employed: "(a) whether the Project site is or contains an historic site; (b) whether the Project will have an adverse effect on the historic site; and (c) whether any such adverse effect will be undue." *Re: Manchester Commons Associates*, No. 8B0500-EB at 18 (Environmental Board, September 29, 1995).

The Environmental Board has set forth the following standards for determining whether a project has an adverse and undue impact on a historic site:

In evaluating adverse effect on a site, it is central to determine whether a proposed project is in harmony or fits with the historic context of the site. Important guidelines in evaluating this fit include: (1) whether there will be physical destruction, damage, or alteration of those qualities which make the site historic, such as an existing structure, landscape, or setting; and (2) whether the proposed project will have other effects on the historic structure, landscape, or setting which are incongruous or incompatible with the site's historic qualities, including, but not limited to, such effects as isolation of an historic structure from its historic setting, new property uses, or new visual, audible or atmospheric elements.

\* \* \*

The 'undue' quality of an effect on an historic site can be judged in several different ways. A positive conclusion on any one of the following guidelines can lead to a determination that an adverse effect is undue:

a. The failure of an applicant to take generally available mitigating steps which a reasonable person would take to preserve the character of the historic site.

- b. Interference on the part of the proposed project with the ability of the public to interpret or appreciate the historic qualities of the site.
- c. Cumulative effects on the historic qualities of the site by the various components of a proposed project which, when taken together, are so significant that they create an unacceptable impact.
- d. Violation of a clear, written community standard which is intended to preserve the historic qualities of the site.

*Middlebury College.*, No. 9A0177-EB (Environmental Board, May 25, 1999).

In this case there are no direct impacts to any extant historic resources. The only potential impacts are indirect visual impacts from historic resources in the viewshed of the Project. Deerfield Wind has conducted an extensive evaluation of the historic resources within the 10-mile radius of the Project. This extensive analysis demonstrates that the Project will not result in an undue adverse impact under the four *Middlebury* criteria. The Division for Historic Preservation agrees that the Project will not have an undue adverse impact on any of these historic resources.

Deerfield Wind has also conducted an extensive analysis of potential impacts on archeological resources. Deerfield Wind's experts have concluded that the Project will not have an undue adverse impact on any archeological resources, and DHP concurs in that assessment.

#### **J. Rare and Irreplaceable Natural Areas - 10 V.S.A § 6086(a)(8)**

521. The Project will not "cause an undue adverse effect on rare or irreplaceable natural areas."

See Finding 522 below.

522. Based on information from ANR, the U.S. Forest Service, and field work conducted by Deerfield Wind's consulting ecologists/botanists, Michael Lew-Smith and Jeff Parsons, there are no rare or irreplaceable natural areas within the Project area. There are therefore no expected

impacts to these types of areas from the Project. Lew-Smith pf. at 6; Exh. DFLD-MLS-3 at 11-12; Lew-Smith reb. at 4.

**K. Rare, Threatened and Endangered (RTE) and Uncommon Plant Species --**

**10 V.S.A § 6086(a)(8)**

523. Deerfield Wind's consulting ecologist/botanist, Michael Lew-Smith, conducted a rare plant survey on the eastern and western ridgelines. This inventory was conducted during the growing season of 2003. Lew-Smith pf. at 6; *see also* Exh. DFLD-MLS-2 at 6; Exh. DFLD-MLS-3 at 19.
524. A rare plant inventory was also conducted in the growing season of 2006 for the access road off of Putnam Road and the proposed transmission line corridor. Lew-Smith pf. at 6; *see also* Exh. DFLD-MLS-3 at Appendix A.
525. In June 2008, an additional assessment was conducted of new areas involved in the revised 15-turbine project. Lew-Smith reb. at 3.
526. No Vermont or federally listed rare, threatened, or endangered plants were discovered in any of the inventories. In addition, no plants currently tracked by the Vermont Natural Heritage Program were discovered. Therefore, the Project will not have an impact on any such plants. Lew-Smith pf. at 6; Lew-Smith reb. at 3; Exh. DFLD-MLS-8; Exh. DFLD-MLS-3 at 19, Appendix A.

**L. Wildlife (including RTE Species) - 10 V.S.A § 6086(a)(8)(A)**

**General Wildlife Findings**

527. The different habitats present within the project area suggest that a wide variety of animals are present. The fisher, bobcat, coyote, and red and gray fox are all likely present in or near the project area. These predators inhabit both hardwood and coniferous forest in southern

Vermont. The fox and coyote are more likely found in managed forests and near the presence of humans, clearings and roads. The fisher is more likely associated with the wetlands and deeper woods of the Project, while the bobcat likely inhabits all the areas associated with the Project. Parsons pf. at 13.

528. The Eastern cottontail, snowshoe hare, Eastern chipmunk, gray squirrel, red squirrel and flying squirrels are likely inhabitants of the project area or the immediate vicinity. A wide variety of moles, voles, mice, shrews, and weasels likely inhabit the area as well. Although not within the project area, the extensive beaver wetlands near the western project area likely provide habitat for mink, river otter, and American beaver. These areas are over 1500 feet from any of the proposed development. Parsons pf. at 13.

529. The Project is unlikely to have any significant impact on these species. There are no “necessary” habitat elements for any of the above-mentioned species identified in or near the Project area (within a ¼ mile). There is no evidence that the Project will negatively impact these species. Parsons pf. at 13-14.

RTE Wildlife Species (Except Birds and Bats)

530. Deerfield Wind's consulting ecologist, Arrowwood Environmental, conducted an inventory for rare, threatened or endangered species (RTE) in the project area. Field work began in the summer of 2003 and continued into the winter of 2006. Initial field assessments consisted of walking the access roads and turbine strings and an approximate 100-foot radius from the proposed disturbance area. More detailed and extensive assessments were made in areas where resources were present (wetlands, streams, wildlife habitat etc.). Arrowwood spent all or part of 7-8 days conducting field studies at the site. Parsons pf. at 3.

531. No state or federally listed rare, threatened, or endangered species were discovered during this inventory. In addition, no species occurring on the GMNF Regional Forester's Sensitive Species list were discovered during this inventory. Parsons pf. at 14.
532. Arrowwood's inventory found no evidence of the RTE tracked by the USFS within the project area, nor are there known historic or current records of any of the species within the project area. Exh. DFLD-MLS-2 at 12-14.
533. There are no known historic or current records of any of the GMNF Regional Forester's Sensitive Species or Species of Viability Concern in the project area. Exh. DFLD-MLS-2 at 14-23.
534. At ANR's request, an additional inventory was conducted in May 2008 of three wetlands for the presence of four-toed salamander. Rebecca Chalmers, one of the state wetland ecologists and an expert on the species, led the inventory. No individuals of this species were found during the site visit. In addition, Ms. Chalmers indicated that the wetlands surveyed do not support appropriate habitat for this species. Parsons reb. at 2.

#### Deer

535. The Project as designed does not impact necessary wildlife habitat for white-tailed deer. There are no mapped or unmapped deer wintering habitats located within the project area. Parsons pf. at 3.
536. The eastern project area is characterized by spruce-fir forest and could potentially be utilized by deer for winter cover. However, the access road and towers are all located at or above 2800 feet in elevation, and are too high to be utilized by deer in the winter months. Parson pf. at 3.
537. The western project area is nearly all dominated by northern hardwood forest and is not appropriate cover for white-tailed deer in the winter. Throughout the western project area,

deer sign was noted, although it was light and consisted of evidence from use during the spring, summer, and fall months. The nearest Department of Fish and Wildlife mapped deeryard to either the eastern or western project areas is over 1.5 miles away. Parsons pf. at 4.

538. ANR concurs with the assessment of Deerfield Wind's consultants that the Project will not impact necessary habitat for deer. Hammond pf. at 6.

### Moose

539. The Project will not have an undue adverse impact on moose. See Findings 540-551 below.
540. The State of Vermont has not identified any habitat for moose that rises to the level of "necessary wildlife habitat." While certain types of habitat are important to moose, none are identified as decisive to the survival of the population. Parsons reb. at 4.
541. The two most important areas for moose habitat within the project area appear to be the montane forest in the eastern project area and the existing clearcut area in the western project area. Both areas contained moose sign including moose browse, moose scats, and trails. Both of these areas also contained significant amounts of understory growth such as hobblebush, beech and fir. Other moose habitat has been noted in a conifer forest along the southern access route, and in wetlands outside of the project area. Parsons pf. at 4-5; Exhs. DFLD-MLS-6a, DFLD-MLS-6b.
542. Evidence exists of moose in the immediate area surrounding the existing Searsburg wind turbines, and Deerfield Wind's wildlife consultant strongly suspects that moose will continue to use the area around Project turbines as well once they are in operation. Deerfield Wind's consultants have captured images of several moose on remote cameras within 300 feet of operating wind turbines. Parsons pf. at 6.

543. Moose habitat on the western side of Route 8 is of low quality and actual moose utilization of the mapped potential habitat is very limited. Parsons reb. at 3.
544. The forest area to be cleared for the turbines and access roads is not optimal winter moose habitat, and this habitat is not critical or decisive for the survival of the local moose population. To the extent that moose utilize this area now, it is the opinion of Deerfield's wildlife consultant that they will continue to utilize it even after the Project is constructed. Parsons pf. at 5.
545. High quality moose wintering habitat is limited in extent within the project area. The highest quality moose wintering habitat is located near Turbine 1E, to the south and east of the turbine, separated by a treed buffer of about 210-220 feet that will remain in place between any clearing and moose wintering habitat, except as noted in the next finding. The turbine clearing will occur in a conifer-dominated forest that exhibits some use by moose, although only at moderate levels. Parsons pf. at 5; Parsons reb. at 3-4; Exh. DFLD-MLS-6c.
546. The revised 15-turbine layout places the eastern project area road within the edge of the mapped moose habitat on the east side. It is possible that the moose utilizing the habitat located to the east of the proposed Turbine #1E will be indirectly impacted in a relatively narrow band closest to the road. Deerfield Wind intends to take additional micro-siting efforts to adjust the location of the road in this area to avoid any potential impacts to moose to the extent feasible. Parsons reb. at 3-5.
547. If construction were to occur in winter, the result could be displacement of moose from the construction site. The displacement will not be significant. Parsons reb. at 5-6..
548. Operation of the Project will not have a significant impact on the local moose population. There may be a very limited displacement of moose away from the immediate turbine opening

and deeper into the mature spruce-fir forest, but this displacement is not expected to be very large or significant. The noise emitted from the facility will not be sharp or sudden in nature, the human imprint will be relatively minor, and moose will adapt to the turbines. The direct impacts from the road on the east side will be on the edge of the winter habitat and the center of the mapped moose habitat will remain undisturbed. Moose will continue to use this habitat in winter. Parsons pf. at 6; Parsons reb. at 5.

549. As a potential benefit to moose, it is likely that a small amount of additional woody browse will grow along the edge of the road and turbine clearings. Moose may benefit from that food source during the winter months as they do at winter logging operations. It is also likely that moose will utilize the low-traffic gravel roads as travel corridors during periods of deep snow. Parsons pf. at 6; Parsons reb. at 5.

550. Deerfield Wind is willing to implement some operational protocols to address ANR's specific concerns by creating openings in banks along access roads to allow free movement by moose. In the opinion of Deerfield Wind's wildlife consultants the Project will not pose any harm to moose in the area even without this protocol, and a broader forest management plan seems unnecessary from the perspective of moose management. Parsons reb. at 5-6.

551. ANR does not anticipate adverse impacts to moose from the Project during non-winter periods. Hammond pf. at 7

### Bear

552. The Project as proposed and with appropriate conditions will not have an undue adverse impact on bears or bear habitat. *See* Findings 552 to 786 below. The findings on bear issues are divided into several sections including (1) background facts (2) information regarding the

state and local bear population; (3) information regarding regional bear habitat; (4) facts related to the Project's direct impacts; (5) facts related to indirect impacts (or the lack thereof); (6) facts related to the importance of beech to bears, (7) facts related to the sub-criteria of Criterion 8(A); and finally, (8) facts related to ANR's draft bear mitigation guidelines.

#### General Background Facts

553. Deerfield Wind retained two recognized bear experts to evaluate the Project's potential impacts on bears, Jeffrey Wallin and Jeffrey Parsons.
554. Mr. Wallin conducted a thorough investigation into the potential direct and indirect impacts of this Project. His investigation and evaluation was based on field studies, statistical analysis, and literature reviews, as well as his extensive professional experience and knowledge of bear behavior. Wallin pf. at 2-6.
555. Mr. Parsons was retained primarily to investigate the Project's potential indirect impacts on bears (as well as potential impacts on other wildlife species, as described above). His evaluation of indirect impacts on bears was based on his own site review, an extensive literature review of the reported impacts of human facilities and activities on bears, consultation with other bear experts, and his professional experience and knowledge of bear behavior. He also reviewed and relied upon Mr. Wallin's reports and testimony, which document beech stands and wildlife corridors used by bears with and around the project area. Parsons pf. at 2, 7.
556. In 2004 Mr. Wallin prepared a physical site assessment to map bear-scarred beech (BSB) trees within 300 feet surrounding the original conceptual 24-turbine proposal (150 feet on either side of the anticipated turbine string on the eastern and western project areas). Wallin pf. at 3-4; Exh DFLD-JW-2. Additional mapping was conducted in 2006 and 2008 in order to

evaluate the potential impact of the revised 17-turbine project and the revised 15-turbine project. Wallin pf. at 6; Wallin reb. at 1; Exh. DFLD-JW-11a&b.

557. This mapping of BSB within 300 feet of the anticipated 24-turbine project was conducted before actual clearing limits were established and was intended to provide an indication of the amount and location of BSB near the anticipated location of the turbine strings. The count of all BSB within this 300' area was never intended to represent the actual direct impacts of the Project. Tr. 12/5/08 at 49 (Wallin).
558. After completing an initial assessment of BSB in the area immediately adjacent to the proposed turbine strings, an analysis of the density and distribution of BSB in a wider area around the proposed Project was conducted, at the suggestion of the USFS Black Bear Sub-Group for the Deerfield Wind Project. Wallin pf. at 4
559. In conjunction with Dr. David Capen of the University of Vermont wildlife department, Mr. Wallin designed and conducted a random plot study in order to assess BSB in the four GMNF management compartments surrounding the Project. This study evaluated more than eight square miles surrounding the Project (or approximately 9500 acres). Wallin pf. at 4; tr. 12/5/08 at 244 (Hammond).
560. The results of these assessments were statistically analyzed to provide a comparison of BSB prevalence in the four compartments around the eastern and western ridgelines. Wallin pf. at 4; Exh DFLD-JW-3.
561. The statistical analysis indicates that there are approximately 28,800 BSB within the 8+ square miles surrounding the Project. Wallin pf. at 7; Exh DFLD-JW-3.
562. The Project will impact less than 1.4 percent of the BSB in the surrounding 8+ square miles. Wallin reb. at 5.

Information on State Bear Population

563. The population data available from the State indicates that the bear population in Vermont is healthy and growing. The state harvest data is the most reliable data upon which to base any estimate of population size. It indicates that the bear population is large and increasing. Wallin reb. at 5; Exh. DFLD-JW-8.
564. According to the most recent Vermont Black Bear Management Plan for the period between 1997 and 2006, the black bear population in Vermont increased “an estimated 27 percent, to between 4,600 and 5,700 animals statewide.” Wallin reb. at 5; Exh.DFLD-JW-12.
565. The methodology used by the State of Vermont is the standard method for assessing wildlife populations. Tr. 12/5/08 at 237 (Hammond).
566. Mr. Hammond testified that it is not possible to use the genetic population measurement methodology suggested by Dr. Kilpatrick to estimate the state bear population because that methodology cannot be limited to the geographic boundary of Vermont. Tr. 12/5/08 at 236-237 (Hammond).
567. Until 2008 the State bear management policy focused on increasing the bear population. Wallin reb. at 6; Exh. DFLD-JW-12.
568. For the first time the State is now moving away from promoting increased population growth and instead is focusing on ways to remove “surplus bears” in order to prevent additional population growth. Wallin reb. at 6; Exh. DFLD-JW-12.
569. The 2008 State bear management plan explains: “A public opinion survey indicates that Vermonters now support stabilizing bear population levels across all regions of the state. To accomplish this, additional bear management strategies are needed to harvest surplus bears.” Wallin reb. at 6; Exh. DFLD-JW-12.

570. This shift in management towards harvesting “surplus bears” supports the conclusion that the bear population in the State of Vermont is very healthy; it has been increasing over time; and without additional management efforts it will continue to increase. Wallin reb. at 6.
571. This historic and continuing population increase has occurred in the face of increasing development pressures. It has also occurred during a period of very little beech nut production. While the bear population increased approximately 27% from 1997 to 2006, there was only one year of excellent beech nut production (1998), and two years of moderate beech nut production (2000 & 2002). In the remaining years there was little to no beech nut production. Wallin reb. at 6; Exh. DFLD-JW-13a, b.
572. The VT Department of Fish & Wildlife’s (VDFW) map entitled *Black Bear Habitat in Vermont, 1989* shows Bear Production Habitat (“Regions supporting relatively high densities of cub-producing females”) covering roughly 50% of Bennington and Windham Counties. Every town in the two southern counties is represented except Brookline. Wallin reb. at 7.
573. ANR believes there is adequate habitat for the current bear population. Tr. 12/5/08 at 229 (Hammond).
574. Neither the statewide nor regional bear population has reached its biological carrying capacity. Tr. 12/5/08 at 229-230, 245 (Hammond).
575. Dr. Kilpatrick has suggested that the bear populations located in northern Massachusetts and southern Vermont are a single, linked population. Wallin reb. at 17; Kilpatrick pf. at 31.
576. The regional population of bears that may rely on habitat in the project area extends from Vermont Route 11 in the north, south into Massachusetts as far as Interstate 90, and in the west from somewhere in New York to Interstate 91 in the east. Tr. 12/10/08 at 64-65 (Hammond).

577. Contrary to Dr. Kilpatrick's claims, the available data does not suggest that the southern Vermont bear population is unhealthy or otherwise threatened. Wallin reb. at 7.
578. Mr. Hammond has acknowledged that the southern Vermont bear population is not currently at risk or unhealthy. Tr. 12/12/08 at 136 (Hammond); tr. 12/5/08 at 230-231 (Hammond).
579. Historic harvest data in the southern area of the State, particularly around the project area in Wildlife Management Unit P, indicate strong bear harvest levels. The harvest data for the last three available years (2003-2005) are in line with the average harvest rates for this area. Mr. Hammond in his Stratton Study specifically noted that "harvest numbers from [WMU P] have been consistently high without large fluctuations in the age structure that might indicate problems with recruitment or harvest levels that are unsustainable." Wallin reb. at 7; tr. 12/5/08 at 233 (Hammond); Exh. SVR/Wilmington WK-5.
580. The State does not presently have any plans to manage bears on a regional basis, or to manage the southern Vermont population differently. Tr. 12/5/08 at 228; 231; 235-236 (Hammond); Exh. DFLD-JW-12.

Information Regarding the Regional Context of the Project

581. Regional context is important to determining the relative value of any particular type of habitat. A certain habitat type may have greater or lesser value to a population depending on the make-up of the surrounding habitat. In a portion of the state where a particular habitat type is scarce, each acre of that habitat may be critical to the survival of the population in the area; conversely, the same acre of habitat may be less important from a population perspective in regions of the state where the habitat is more common. Wallin reb. at 9.

582. Statewide forestry statistics compiled by the U.S. Department of Agriculture demonstrate that the vast majority of beech in the state is found in the lower southern portions of the State. Wallin reb. at 10.
583. A USFS publication indicates that 74% of the beech in the state is in the southern unit of Vermont. The bottom four counties – Bennington, Windham, Rutland, and Windsor – contain more than 62% of the beech in the entire State. Wallin reb. at 10; *see* Exh. DFLD-JW-14.
584. The USFS report emphasizes that the number of beech trees in Vermont that are 11 inches in diameter or larger has grown more than 50% in the past two decades (since 1983). There is no evidence that high-quality beech habitat is becoming more scarce; to the contrary it appears to be growing. The same report states that the ratio of growth to removal for beech is 1.2:1. Wallin reb. at 10; Exh. DFLD-JW-14.
585. Mr. Wallin's work in and around the project area similarly documents the broad availability of beech in this habitat as well as the extensive amount of beech scarred by bears (approximately 28,800 BSB).
586. Mr. Wallin's study documented that beech composed  $\geq 30\%$  of the forest regeneration over 88% of the 8+ square miles. Wallin reb. at 11.
587. Such a large amount of BSB spread out over such a large area has not been documented in regions outside of southern Vermont. Wallin reb. at 11.
588. Given the general forestry statistics for this section of southern Vermont, there is no reason to believe that other sections of the Green Mountain National Forest in southern Vermont do not contain similar amounts of BSB. USFS biologists have confirmed that beech is widespread across the entire southern section of the GMNF. Wallin reb. at 11; Parsons reb. at 26-27.

589. The USFS keeps information on forest types, including the relative percentages of certain trees, including beech. Parsons reb. at 26.
590. Within a 14.5 km radius of the Project area the USFS reports that 56,829 acres of forest have at least 20% beech (by basal area). Throughout much of this forest, up to 50% of the basal area may consist of beech. Parsons reb. at 27; Exh. DFLD-JP-3
591. The State keeps track of known BSB stands and other mast stands in a GIS database. This information shows a concentration of BSB, particularly on USFS land, which is confirmed by the USFS' own documentation of 71 BSB stands of varying sizes in the area. Parsons reb. at 28; Exh. DFLD-JP-3.
592. The presence of beech trees on private lands undoubtedly occurs in southern Vermont and this region as well. Parsons reb. at 27.
593. The USFS estimates that an average of 5.3 million cubic feet of beech trees are removed from Vermont forests on an annual basis as part of timber activities. Wallin reb. at 26.
594. Based on this estimate more than 53 million cubic feet of beech has likely been removed over the past decade. Wallin reb. at 26. It is likely that hundreds of thousands of individual beech trees are cut each year in the State. Tr. 12/5/08 at 11 (Wallin).
595. Even with these large harvest rates, the volume of beech in the State continues to grow. Wallin reb. at 26. And, despite this removal of beech trees from Vermont forests the Vermont bear population also continues to increase. Wallin reb. at 26.
596. Beech crops are usually in widespread abundance or widespread scarcity (Elowe and Dodge 1989). Wallin reb. at 11.
597. In those years when mast is produced, it is generally sufficient to provide both a fall and spring food source for the bear population. Mr. Wallin has personally observed an abundant

amount of nuts going to “waste” in good mast years, indicating that there is more mast than can be used by the bear population. Wallin reb. at 11.

598. In years of good beech production, female bears will stay in or near their home ranges and will not travel far to reach beech. In years of poor production, they will migrate, but not to an unproductive stand of beech. Wallin reb. at 23-24; Parsons reb. 23; Exh. SVR/Wilmington WK-5 at 36; tr. 12/12/08 at 35 (Hammond).

599. In addition to beech, bears in southern Vermont do have access to alternative sources of hard mast, some of which are not readily available in other areas of the state. Wallin reb. at 18.

600. Southern Vermont has a much larger component of oak and cherry trees than other sections of the State. USFS data indicates that more than 85% of the oak in the State is located in the southern portion of the State, with nearly 40% concentrated in Bennington and Windham counties. Wallin reb. at 16.

601. The State's mast surveys similarly indicate that there is much more oak available in southern Vermont than elsewhere in the State. In fact, the Vermont Department of Fish and Wildlife only tracks oak mast production in southern Vermont. Exh DFLD- JW-13b. Wallin reb. at 16.

602. As confirmed by Mr. Hammond's Stratton Study, bears near the project area likely have to travel to lower elevations to find oak and other masting species, but they readily do this, as long-range forays out of an individual bear's home range are reported throughout much of the black bear's range. (Hammond 2002). Parsons reb. at 22-23.

603. The mesic red oak northern-hardwood forest natural community occurs scattered throughout southern Vermont at elevations below 2500 feet (Thompson and Sorreson, 2000). The lowest elevations near the project area are to the east near Harriman Reservoir, to the west in Woodford, and to the south in Readsboro, Stamford, and in northwestern

Massachusetts. Elevations in these towns range as low as 1400 feet, so occurrences of this natural community containing red oak are likely. In fact, the majority of the forest in the region surrounding the Deerfield Project is under 2500 feet. Parsons reb. at 23.

604. A number of oak stands have been identified in southern Vermont and northern Massachusetts. Michael Lew-Smith used an accepted method to remotely map forest areas where oak are present. Mr. Lew-Smith identified oak trees within the forest canopy within 2 distance classes: 1) 27.5 kilometers from the Project; and 2) 14.5 kilometers from the Project. These stands are within the distances that Mr. Hammond reports observing female black bears traveling in search of food in years of beech mast crop shortages. Parsons reb. at 23-24.
605. Mr. Lew-Smith's analysis identified over 7800 acres of oak-dominated forest stands and oak within the forest communities within the 27.5 kilometer radius of the Project. Parsons reb. at 24.
606. In the area bounded by Route 9 in the north, Bennington to the west, and to Route 2 (MA) and North Adams to the south, nine forest communities or stands where either oak was present or was dominant were located, totaling over 5600 acres. The oak or mixed oak forest stands are located near and north of North Adams, Massachusetts, and in Pownal and Woodford, Vermont. Parsons reb. at 24.
607. The oak and acorn resource from these forests are accessible to black bears in the project area without bears having to cross major roads or having to enter or cross large developed or agricultural landscapes. Parsons reb. at 24.
608. This oak resource as well as other foods such as cherry, apples, and corn crops, are accessible to bears in the project area, and are likely sought-after foods in years of beech mast crop failure. Hammond (2002) found that most female bears in the Stratton study abandoned

their home ranges and took “extended sallies” beyond their normal home ranges during years of summer (late) and fall mast food shortages. Parsons reb. at 25.

609. The oak in the 5600 acres of forest inventoried by Mr. Lew-Smith provides acorns that black bears can feed upon in years of beech mast failure within the region. There are six oak-dominated forest stands located near the Yankee Rowe Nuclear Power Station in western Massachusetts that comprise a large alternative fall mast crop about 16-20 kilometers south of the Project. An over 2000 acre forest stand dominated by oak (or likely dominated by oak), located about 20 kilometers south of the Project just north of North Adams, MA, is also accessible to some bears in the vicinity of the Project. Parsons reb. at 25.
610. The Stratton study estimated that females travel an average of 14.5 km. outside of home ranges to find alternative food when beech crops failed. Parsons reb. at 25.
611. Studies conducted directly south of the project area in northwestern Massachusetts also demonstrate that alternative resources are generally available to bears in this population (Elowe 1987; Elowe and Dodge 1989). Cherry and oak mast was plentiful in the Massachusetts study area and bears actually *preferred* these sources to beech. Wallin reb. at 17.
612. Studies in Maine document that when oak is available to bears the trees are used “extensively by bears” (Hugie 1982). Oak and cherry are also more consistent mast producers than beech, and when each species is available in the habitat, they will thus provide a more reliable source of nutrition than beech. (Hammond 2002; Elowe and Dodge 1989). Wallin reb. at 17.
613. In Maine and Massachusetts female black bears have been reported to travel widely in search of seasonally abundant food sources. Radio-collared female bears have been observed traveling up to 48 km to areas of raspberry and beechnut abundance and males up to 80 km (McLaughlin et al. 1986). These distances are greater than the average distance reported by

Mr. Hammond in Vermont (14.5km). While physical barriers could play a role, the difference may also suggest that female bears in Vermont do not need to travel as far to find requisite concentrated food resources, including food sources other than beech nuts— be they apples, corn, oak, or some other food sources – during beech mast failures. Parsons reb. at 26.

614. Although agricultural resources may be generally less available in southern Vermont than in other sections of the State, there are still agricultural alternatives in the area which likely supplement natural mast sources in years of poor beech mast production. According to the 2002 agricultural census for Vermont, 25% of the total farm land in the State is located in Bennington, Rutland, Windham and Windsor Counties. Wallin reb. at 17-18.

615. Windham and Bennington counties have the second and third most land in orchards, respectively, compared to other counties in the state; together those two counties contain almost 1/3 of the total planted orchard acreage in the State. Wallin reb. at 18.

616. A survey of the contents of bear stomachs conducted by the Vermont Department of Fish and Wildlife found that apples were actually the single most preferred food source throughout the fall from September to November. The same survey found that bears preferred apples to beechnuts in October when both were available. During November researchers “anticipated that mast crops would predominate in the stomachs of November harvested bears, but they did not.” Wallin reb. at 18.

617. The data regarding the amount of beech and oak and other mast sources in southern Vermont contradicts Mr. Hammond and Dr. Kilpatrick’s suggestion that there are limited hard mast resources in Southern Vermont. Wallin reb. 15-19; Parsons reb. at 22-29; Exh. DFLD-JP-3.

618. There is no shortage of available bear habitat in the southern region of Vermont. That fact is confirmed by Mr. Hammond's recognition in the Stratton study that bear harvest numbers from this region "have been consistently high without large fluctuations in the age structure that might indicate problems with recruitment or harvest levels that are unsustainable." Parsons reb. at 29; Exh. SVR/Wilmington-WK-5 at 17.
619. Adding or subtracting a small proportion of beech trees from this overall habitat is unlikely to have a measurable impact on the bear population in southern Vermont. Wallin reb. at 11.
620. The Project is located on the edge of National Forest Service lands. It is closer to Route 8 and Route 9 than the majority of USFS lands in this area. Large sections of the National Forest are far more remote than the location of this Project. Tr. 12/10/08 at 126 (Kilpatrick); Exh. DFLD-JP-3.
621. The State database of known mast stands, which are reflected on Exh. DFLD-JP-3, demonstrate that there are a number of mast stands which are far more isolated from Route 8 and Route 9 than the project area. Tr. 12/10/08 at 127-128 (Kilpatrick); Exh. DFLD-JP-3.

#### Direct Impacts

622. Mr. Wallin's initial evaluation identified approximately 1532 BSB trees within 300 feet of the center line of the original 24-turbine project. Of these, approximately 643 would have been removed by the original project design. Wallin pf. at 6-7.
623. Deerfield Wind has taken efforts to reduce and minimize the Project's potential impacts on BSB. Wallin reb. at 4.
624. In July of 2007, Deerfield Wind revised the Project layout, eliminating seven potential turbines and proposing a total of 17 turbines. The revised 17-turbine layout reduced the Project's potential impact on BSB by 22%, down to approximately 502 BSB. Wallin reb. at 4.

625. Deerfield Wind further reduced the size of the Project a second time in July 2008, primarily to address concerns raised by ANR about impacts on bear habitat. Wallin reb. at 4.
626. The layout for the revised 15-turbine project eliminated the three southern-most wind turbines on the western project area from an area of dense BSB. Wallin reb. at 4.
627. Additional field work identified areas on the western project area that have little or no BSB because of prior USFS timber harvests. The road linking the turbines has been proposed in one of these cleared areas to reduce direct impacts on BSB. The remaining roads were rerouted to fit with the new turbine layout and avoid BSB to the extent practicable. Wallin reb. at 4.
628. As a result of these changes, the revised 15-turbine project has significantly reduced the Project's direct impact on BSB down to approximately 366 trees. This represents a 27% reduction in the direct impact from the previous 17-turbine layout, and more than 43% reduction from the original 24-turbine project layout. Wallin reb. at 5; Exh. DFLD-JW-11a-b.
629. Using the methodology ANR requested in these proceedings, the Project will have a direct impact on approximately 36 acres of bear habitat – 25 acres on the west side, and 9.4 acres on the east side. Tr. 12/5/08 at 52 (Wallin); Exh. DFLD-JW-9A (fig. 3) and 9B. This methodology is substantially different than the methodology ANR used in the previous Sheffield Wind Project proceeding (Docket 7156). Using the methodology advocated by ANR in that proceeding, the Project's direct impacts in this case would be only 9 to 10 acres. Tr. 12/5/08 at 52 (Wallin).
630. Whether the Project will impact a relatively small or relatively large percentage of the available habitat is relevant to an evaluation of whether the Project will have an undue adverse impact on specific habitat. Tr. 12/12/08 at 15-16 (Hammond); tr. 12/10/08 at 67 (Kilpatrick).

631. The revised 15-turbine project will remove less than 1.3 % of the total amount of BSB available on Forest Service land in the 8+ square mile area around the Project. Wallin reb. at 5.
632. Additional bear-scared beech trees are present on private land in the area, and as a result, on a regional basis the Project will actually impact even less than the 1.3% of total BSB in the 8+ square mile area. Tr. 12/5/08 at 17 (Hammond).
633. The amount of beech that may be directly impacted by this Project is very small compared to the total amount of beech available. It is also very small compared to the total amount of beech removed from Vermont forests on an annual basis. Wallin reb. at 26.
634. Given the context of the Project, and the extensive amount of beech in the surrounding forest, removal of this small percentage of beech is unlikely to have any noticeable impact on the bear population in this area. On balance, the evidence suggests that the direct impacts of this Project will be insignificant to the local bear population. Wallin pf. at 7, 13.
635. Those portions of the project area which are cleared including openings around the wind turbines, access roads, and transmission line connector will likely increase potential habitat for a range of fruit-producing plant species which will supplement the available food sources in the area. While probably not extensive, this new source of food would be a benefit to local bear populations and will help increase the diversity of food resources in the area. Wallin pf. at 10; tr. 12/10/08 at 213-214 (Kilpatrick).
636. Mr. Hammond acknowledged that the bear habitat in the eight square miles around the project can support more bears than are presently using the area. Tr. 12/5/08 at 245 (Hammond).
637. The Forest Service has conducted numerous timber cuts in the project area over the past several decades. These cuts included areas which appear to have contained significant bear

scarred beech stands. One 17-acre patch cut can be seen in the southern portion of the western project area. Based on the average density of bear scarred beech in this general area it is likely that this single cut took more than 400 BSB. Tr. 12/5/08 at 48, 53 (Wallin).

638. Dr. Kilpatrick testified that a timber operation which removed 366 BSB in this area would not have an undue adverse impact on bears. Tr. 12/10/08 at 209 (Kilpatrick). He also stated that removing 1.2 to 2.3 % of the BSB within the range of this bear population would not necessarily have an undue adverse impact on the bear population. Tr. 12/10/08 at 77-78 (Kilpatrick).
639. The DEIS notes that biologists the Forest Service consulted believe that the removal of approximately 530 to 540 BSB would not “measurably affect the area’s or the region’s bear population.” DEIS at 272
640. Notwithstanding the above facts, Mr. Hammond believes that cutting just 50 BSB trees in a timber operation in this area would have an undue adverse impact on the local bear population. Tr. 12/12/08 at 21-22 (Hammond).
641. There is currently nothing that would stop the Forest Service from cutting beech trees in a timber harvest on the west side of the Project area. Tr. 12/12/08 at 116-117 (Hammond).
642. Mr. Hammond acknowledged that it would not be possible to detect a change in the local bear population as a result of the direct impacts of the Project using the State’s current methods for assessing bear population levels. Tr. 12/12/08 at 28-31 (Hammond).
643. The impacts of the Project will not result in an increase in bear nuisance behavior. Tr. 12/5/08 at 27 (Wallin). Nuisance activity is tied more to an over-population of bears and the absence of beech mast in those years when beech mast is scarce. Tr. 12/5/08 at 27 (Wallin). Removing only 1.3 percent of the beech in the area is an insignificant volume and will not

have a measureable impact on the amount of mast available in good mast years. Tr. 12/5/08 at 42 (Wallin). The Project will actually increase the diversity and availability of alternative food resources at higher elevations in poor mast years. Wallin pf. at 10; tr. 12/10/08 at 213-214 (Kilpatrick); tr. 12/12/08 at 117 (Hammond).

#### Indirect Impacts

644. The Project will have only limited indirect impacts on bears and bear habitat. See Findings 645 to 699 below.
645. Construction of the Project may temporarily limit use of bear habitat in the surrounding area, but operation of the Project will not have any long-term indirect impacts on bears. Wallin pf. at 9.
646. The best way to understand how bears may utilize habitat around a proposed wind project is to study if bears are actually using habitat around an existing facility. Wallin reb. 32.
647. Mr. Wallin has conducted a series of studies to evaluate the use of habitat around the existing Searsburg facility. Exhs. DFLD-JW-3, DFLD-JW-4, DFLD-JW-5, DFLD-JW-7, DFLD-JW-9a, DFLD-JW-9b, and DFLD-JW-10a-b.
648. These studies indicate that bears are quite capable of acclimating to operating wind turbines. During the period 1995-1997, Mr. Wallin conducted a study of black bear movement in and around the Searsburg facility. The study showed that bear movement declined during the year of construction but rebounded during the first year of operations. Wallin pf. at 9; Exh. DFLD-JW-4.
649. Mr. Wallin has also documented the presence of bears in the immediate vicinity of the Searsburg facility. During a post-construction study of the Searsburg facility, he identified bear hairs snagged on project infrastructure, primarily the utility poles connecting turbines 8-11 to

the substation, and the poles running from the substation to the 69 KV transmission line.

Wallin pf. at 9.

650. Mr. Wallin also documented bear activity at the Searsburg facility during the remote infrared camera studies conducted in 2005 and 2006. These studies clearly demonstrate bears, including a female with a cub, using the area adjacent to the turbines. The turbines at the facility were operating and generating power during many of these photos. Wallin pf. at 9-10; Exhs. DFLD-JW-5, DFLD-JW-7.
651. Mr. Wallin also documented extensive use of beech trees by bears in the vicinity of the existing Searsburg facility. The survey shows that there are approximately 185 bear-scarred beech within ¼ mile of the existing facility that have been used by bears since construction of the facility (including as many as 21 within 1/8 of a mile). Wallin reb. 32; Exh. DFLD-JW-10a.
652. Mr. Wallin also conducted additional bear snag work on and around the existing Searsburg facility. The study documented eight bear snags along the existing project area in the fall of 2006 and also documented fourteen snags in the spring and summer of 2007. Seven separate bears were identified through genetic analysis, including 5 males and 2 females. The sex and individuality of nine other samples could not be determined from the hair available. Many of the samples were concentrated between Turbine 7 and Turbine 8 (1,000 feet separate the two turbines). Other snags were spread out along the entire Searsburg facility, indicating that bears are using most, if not all of the areas immediately adjacent to the Searsburg project. Wallin reb. 33; Exh. DFLD-JW-10b; Exh. DFLD-Cross-WK-6.
653. The literature review conducted by Jeff Parsons supports the conclusion that bears will not be displaced by operation of the Project. Wallin pf. at 10; Parsons pf. at 7; Exh. DFLD-JP-2.

654. The Project will not negatively affect any travel corridors in the area and bears will continue to travel through the project area. Parsons pf. at 7; Wallin pf. at 14.

655. Black bears will also continue to use beech trees near the Project area. Parsons pf. at 7.

656. ANR does not dispute that bears will continue to use the beech trees within ¼ mile of the Project. It is Mr. Hammond's opinion that some bears will continue to use these resources, but that some may be displaced. He does not know how many or what percentage of bears may be displaced. Tr. 12/12/08 at 33 (Hammond).

#### Indirect Impact of Construction Activities

657. Black bears may avoid the project site during construction, due to the lights, sounds, and people associated with construction activity. Parsons pf. at 12.

658. Any displacement associated with construction will be temporary. Permanent displacement as a result of construction would be extremely unlikely. If there are resources that are important to black bear in the area, avoidance of the area will last only as long as construction activities continue. After that, black bears would begin to return to the area, as construction activities switch over to operational conditions, with minimal lighting, few or no loud, sharp noises, very light vehicular traffic, and only occasional visits by people. Parsons pf. at 12.

659. Project operations will not displace bears. Parsons pf. at 12.

660. The access road will be dirt and there is evidence that black bears do not react as negatively to dirt roads as to paved roads. Parsons pf. at 10.

661. During operation of the Project, the road will be gated and the traffic will be greatly restricted. Wind turbine maintenance will require approximately only a few traffic trips per day. Parsons pf. at 10.

662. The traffic volume on roads at which bear avoidance behavior is noted (i.e., avoidance of crossing the road or the habitat near the road) generally occurs only when traffic volumes are greater than 10 cars/day and in many, if not most, cases, hundreds of car/day. Parsons pf. at 10.
663. Studies have found that relatively low traffic volumes are not barriers to most bear movements. Reynolds-Hogland and Mitchell (2007) found that black bears in their study neither preferred nor avoided areas near gated roads at all distances that were investigated. They found that during the fall season as hard mast availability increased, use of these habitats by bears also increased. Parsons reb. at 14; Exh. DFLD-Cross-WK-1 (Reynolds-Hogland and Mitchell Study).
664. The low traffic levels on the Project roads will not impose a barrier to bear travel, and will not fragment the large block of habitat available in the area around the Project. Parsons reb. at 13.
665. Past experience and a review of available literature sources strongly suggest that black bears will also continue to cross this narrow, low traffic volume, dirt road in the future. This is especially true if there is a food resource (such as a beech stand) nearby. Parsons pf. at 12.
666. Dr. Kilpatrick expressed the opinion that the access road itself will have relatively minor impacts. Tr. 12/10/08 at 130 (Kilpatrick).
667. Dr. Kilpatrick expressed the opinion that the level of traffic on the access roads was not expected to produce any particular problems if there were less than 10 vehicle trips per day. Tr. 12/10/08 at 130 (Kilpatrick).
668. He also expressed the opinion that certain conditions, including gating the road, some limited patrols by law enforcement, and some use of remote cameras would be reasonable

measures to mitigate any illegal use of the road by hunters or ATV users. Such conditions would resolve all of Dr. Kilpatrick's concerns regarding the indirect impacts associated with the access road. Tr. 12/10/08 at 134-135 (Kilpatrick).

669. ANR has previously taken the position in a different case that a wind project access road will not displace bears from a beech stand located within several hundred feet of the road so long as access was properly restricted. Tr. 12/12/08 at 44 (Hammond).

670. Mr. Hammond testified that as few as four vehicle trips per day on the Project access road would displace bears. He did not cite any studies or any other evidence to support the claim that such a low volume of traffic may have an impact on bears. Tr. 12/12/08 at 46-49 (Hammond). That position is inconsistent with all of the published literature as well as the expert opinions of Mr. Wallin, Mr. Parsons, and Dr. Kilpatrick.

671. The DEIS notes that the biologists the Forest Service consulted took the position that "after construction is completed, most bears would return to the area within a few weeks to altered landscape, to continue foraging on beech mast when it is plentiful and on other foods when beechnuts are not plentiful, and they should continue moving through the area with minor changes compared to pre-construction conditions." The DEIS further notes that "operation of the Project is not expected to displace most bears from the area and is unlikely to adversely affect the continuing existence of a viable population of black bears in the Project area and surrounding region." DEIS at 277-78.

672. The clearings necessary for the turbine construction will be about 270 feet x 380 feet, some of which will be allowed to re-vegetate with low-growing plants. The turbine blades themselves, in the operational phase, will be the only moving machinery (other than maintenance vehicles) located on the ridgeline. Parsons reb. at 8.

673. The spacing of the clearings for the turbines is such that in long stretches along the ridgeline, the 16 foot roadway will be the only clearing on the ridge. Most of the wooded stretches between turbines will be almost 800 feet long, and some up to 1,400 feet long. Within these long wooded stretches there will be very few impacts to wildlife, primarily limited to the narrow 16-foot road, occasional maintenance vehicles, and the sound of the turbines themselves. Parsons reb. at 8-9.
674. Black bears have poor eyesight and tend to walk with their heads and eyes pointed downwards. Parsons reb. at 11.
675. Because of the nature of the tree canopy there are locations along the string where the turbine blade movements may not be visible at all to bears (those locations with turbines 800 feet apart). Parsons reb. at 11.
676. The sound levels from the turbines will be 55 -60 dB(A) at the towers and within approximately 660 feet adjacent to the towers. This is considered at or below the sound level of normal speech (Bowles, 1995 *In* Knight and Gutzwiller). Beyond approximately 660 feet the sound levels drop to 50-55 dB(A) out to a distance of about 1155 feet. This is roughly the sound level of an idling passenger car and below the range of normal conversation. Parsons reb. at 9; Exh. DFLD-KK-5 at 27; Exh. DFLD-KK-2 at 3.
677. Overall, the sound that is generated by the turbines is not a sharp, crisp sound. Turbine noise does not start and stop rapidly like a person talking; it is not an explosive sound, but instead is a repeating whir of the blades. Parsons reb. at 9.
678. Noise from the Project will be largely stationary (except for the few cars and maintenance personnel present) and black bears are likely to come to this area to feed on beechnuts in fall and spring regardless of the noise. Parsons reb. at 9-10.

679. Bears' strongest attraction to the ridgeline is the presence of food prior to winter dormancy and in the spring. Several studies indicate that deterring animals from important food sources is very hard to accomplish. Bowles (1995) states that "Motivation to find food can make animals tolerant of noise." Parsons reb. at 10.
680. Reynolds et al (2007) reported that adult female bears increased their use of areas near paved roads as hard mast productivity increased and males increased their use near gravel roads as hard mast productivity increased. During the summer in Arkansas, bears showed an affinity to edge habitats such as roads where soft mast was abundant (Smith 1985). Garner (1986) also found fire roads in the Shenandoah N. P. were utilized by female bears during the summer and early fall for the soft mast along these roads. "Every review of the literature on pest control has concluded that one cannot drive animals away from attractive sites with noise over the long run." Bowles (1995) also states that motivations such as hunger that keep animals from paying attention to noise lessen its aversiveness. Bowles goes on to say that studies illustrate that "[i]f mammals are exposed to the same noisy stimulus without harassment, responses decline rapidly." Parsons reb. at 10.
681. Mr. Hammond acknowledged that sound from turbines is not a primary concern. He also acknowledged that there are no studies which indicate that the sound from a wind project would be a problem for bears. Tr. 12/12/08 at 53 (Hammond).
682. Dr. Kilpatrick expressed concerns about the Project's noise impact on bears. However, he has previously acknowledged, and the Board has previously concluded that Dr. Kilpatrick is not a noise expert. Tr. 12/10/08 at 141-146 (Kilpatrick). He also acknowledged that there were no studies indicating that the noise from the Project would displace bears. Tr. 12/10/08 at 148 (Kilpatrick).

683. Dr. Kilpatrick has never visited the project site. He has no direct knowledge of the existing conditions, the types or intensity of activities that presently occur on or around the existing Searsburg facility or the project site, or the existing noise sources. Tr. 12/10/08 at 125 (Kilpatrick).
684. Bears may avoid going near a road where bear hunters with trucks and strike dogs are found. These types of hunter-bear encounters are already present in this area, as hunters are currently utilizing the woods in and around the Project area for running dogs in pursuit of bears. Parsons pf. at 11.
685. Black bears in Vermont adjust their behavior if they are being harassed by bear dogs in their feeding habitats. For example, bears may begin visiting the feeding sites at night when the bear dogs are not present. Parsons pf. at 11.
686. The project area is currently used by hunters and bear dog teams; development of the Project should not increase or otherwise affect this existing use. Because the Project will be located in the National Forest, hunters may be able to access the project area on foot. However, no truck, ATVs or other vehicles associated with hunting will be allowed past the gated entrance. Parsons pf. at 11.
687. All of Mr. Wallin's work indicates that bears continue to utilize the habitat in and around the Searsburg facility. Bears are clearly continuing to make use of bear-scarred beech trees, even well within 1/8 of a mile of the project area. Because of the forest type around the existing Searsburg facility, there are very few beech closer than 1/8 of a mile to the Project. However, bears do continue to climb those trees that are available in that area. Wallin reb. 34.
688. The finding that bears are climbing these trees so close to the Searsburg facility undercuts the assumption that they will avoid habitat within a 1/4 mile of the proposed Project.

Furthermore, the separation distance between the proposed turbines is far greater than the distance between the existing Searsburg turbines, allowing for full use of the habitat in between the turbines. Wallin reb. 34.

689. Dr. Kilpatrick and Mr. Hammond both acknowledged that the evidence presented by Mr. Wallin indicates that bears are utilizing habitat immediately adjacent to operating wind turbines. Tr. 12/12/08 at 65 (Hammond); tr. 12/10/08 at 162 (Kilpatrick).

690. Neither Dr. Kilpatrick nor Mr. Hammond presented any direct evidence to indicate that bears are not using the habitat around the existing Searsburg facility, nor did they present any evidence to indicate that bears are utilizing this habitat less than they were before the facility was constructed. Tr. 12/12/08 at 66 (Hammond); tr. 12/10/08 at 162-163 (Kilpatrick).

691. Mr. Hammond's report "The Effects of Resort and Residential Development on Black Bears in Vermont", states that the avoidance of roads and houses by bears varies depending upon their proximity to preferred food sources, and on the particular human activity associated with the individual development. Parsons reb. at 12; Exh. SVR/Wilmington WK-5 at 81.

692. Human activity at the Project will be greatly controlled. Parsons reb. at 12.

693. The findings of Mr. Hammond's and Mr. Wolfson's study on the use of beech stands near heavily traveled roads and areas of intensive human activity is not directly applicable to the proposed Project. Parsons reb. at 16.

694. Neither Mr. Hammond's study, nor the underlying work by Mr. Wolfson, provide any information about whether or not the beech stands they evaluated were near gated or controlled access roads with low traffic volumes, such as the proposed Project. Parsons reb. at 16.

695. The potential impacts of the Project are dramatically different than the impacts at large ski resorts in Vermont. The Project will have very limited traffic volumes on the access roads and a low level of human activity near the turbines. Wolfson's work did not address gated, low traffic roads; in fact, his roads all had traffic volumes of > 100 cars/day during fall months. Parsons reb. at 16.

696. In addition, unlike the housing developments evaluated by Mr. Wolfson, the proposed Project will not include high levels of human activity and other associated intrusions, such as pets and loud, inconsistent and unpredictable noises. Once it is operational, the Project will not be an area of concentrated human activity. Parsons reb. at 17.

697. ANR's previously accepted a mitigation proposal for the UPC Sheffield Project in part because the Agency acknowledged that the indirect impacts of a wind project would be different from, and easier to control than, impacts associated with residential areas or ski developments. The Agency's expert in that case testified:

Taking into consideration the fact that we do recognize that bears access to and use of these concentrated areas of bear-scarred beech stands, that the effect of a project for this nature may be different by some unknown measure, than say what we typically deal with respect to ski resort development or residential development, that you're able to control some of the main limiting factors that would result in the substantial black bear avoidance of an area, such as regular, frequent presence of humans and all other things that we do in our day-to-day activities or activities associated with guests of resorts. So there is a distinction to be made with respect to a project of this nature and projects that we typically have dealt with with bear habitat such as ski resorts, so that's reflected in this agreement as well.

Tr. 12/12/08 at 103 (Hammond); Exh. DFLD-Cross-FH-5.

698. By carefully restricting and limiting access to the turbine string, the indirect negative impacts from the Project can be minimized. Parsons reb. at 19.

699. Deerfield Wind has agreed to gate the access road, and will limit activity on the project site during the night hours and the early morning/late evening crepuscular periods. Access to the turbine strings by maintenance personnel will be limited. There will be long stretches of the unpaved access road between turbine clearings that will for the most part remain wild. Parsons reb. at 17.

Necessity of Beech Trees for Survival of Bear Population

700. The beech trees that may be affected by this Project are not critical or decisive for the survival of the local or regional bear population. Beech trees do not serve as a reliable source of fall mast, as has been demonstrated over the past several years of poor, to non-existent beechnut crops. Wallin pf. 14-15.

701. Beech trees are generally important for bears in Vermont during good mast years. When a beechnut mast crop occurs, it generally is sufficient to provide both a fall and spring food source with abundant nuts going to waste or germinating. Wallin pf. at 12; Wallin reb. at 9.

702. Beechnuts cannot be relied upon as an exclusive fall food. This is because many years can span between good beechnut crops. Beech is only available in Vermont on an infrequent basis. Some researchers have noted that there may be as many as seven years between good beech nut crops in Vermont. (Wolfson 1992). Wallin pf. at 11-12; Wallin reb. at 12.

703. Bears obtain fall foods from a wide variety of sources, of which beech is just one. Wallin pf. at 15.

704. In years that beech is not available bears must rely on other sources of food. Bears therefore must utilize other more reliable staples in their diet (apples, grapes, a host of herbaceous vegetation, corn, carrion, etc.). Wallin pf. at 12; Wallin reb. at 9.

705. Despite poor beechnut production over the past several years, bear populations have remained robust and are still increasing. Wallin pf. 15.
706. There is no evidence that beech mast is a limiting factor for bear populations in southern Vermont. Wallin reb. 9.
707. Black bears are opportunistic mast feeders that take advantage of heavy soft and hard mast production when and where they become available. Parsons reb. at 21.
708. Research by Elowe and Dodge in an area of Massachusetts have documented that bears rely on a range of foods. The study area for the Elowe and Dodge research is south of and relatively close to the Deerfield project area. Parsons reb. at 20-21.
709. The major mast crops in that study included oak, beech, choke cherry, and black cherry. Beech was most heavily utilized when other mast crops were gone or not available at all. All of these foods, as well as mountain ash, apple trees and berry-producing shrubs are available in the broader project area in varying proportions. Parsons reb. at 20.
710. In the Elowe and Dodge study, mast and other foods were utilized when available and it was the combination of these various hard and soft mast food sources that were found to be important to the black bear. Parsons reb. at 20.
711. Elowe and Dodge (1989) found that the carbohydrate level found in beech nuts is the lowest of all the major foods eaten by bear in their study and cubs were produced in years that corn, red oak, and cherry were available as well as beech. Parsons reb. at 21-22.
712. Elowe and Dodge report that February weights of bears that ate herbaceous fall foods were lower than weights of the same bears that had access to mast crops. These figures include high carbohydrate mast crops such as black and choke cherry as well as fat-rich oak and beech mast. Thus not only fatty mast species but also soft mast producing species were important

foods in Massachusetts. This suggests that bears in that study area have learned not to depend upon just one mast species but have adopted a strategy that makes sense in light of the fact that mast production by different species is spotty year to year. Parsons reb. at 20.

713. The results of Elowe and Dodge (1989) illustrate that black bear in this region take advantage of several available high carbohydrate content and high fat content food resources, likely because mast crops are cyclical and can be very undependable from year to year. Black bear, as evidenced at the Massachusetts study area (located near the Deerfield Wind Project) are not dependent upon a single food source. Parsons reb. at 21.

714. The available evidence suggests that other food sources may be as important as beech. Elowe and Dodge (1989) found that oak mast crops were important and black cherry and choke cherry crops were selected above all other food sources in their study area. Parsons reb. at 22.

715. Elowe and Dodge also found that bears in their study area began extensively feeding on beech nuts only after the cherries were gone or the trees failed to produce. Parsons reb. at 22.

716. It is very possible that the western Massachusetts black bears move between Vermont (perhaps north to the Route 9 area) and northern western Massachusetts. In the project area, there are no major roads or habitat discontinuities between Massachusetts and Vermont. Southern Vermont bears could have access to oak south in Massachusetts. Parsons reb. at 22.

717. Previous researchers have concluded that bear populations are limited by the available food resources in years where food was scarce, i.e., in years of poor mast production. Tr. 12/5/08 at 43-44 (Wallin); Exh. DFLD-JW-RE-1 at 436.

718. This research indicates that the bear population will level off to the population level that can be sustained in years when neither beech nor oak are available. Tr. 12/5/08 at 43-44 (Wallin); tr. 12/12/08 at 70-71 (Hammond); tr. 12/10/08 at 169-170 (Kilpatrick).

No Evidence in Vermont of Increased Cub Production or “Synchronous Reproduction” in Years Following Good Beech Nut Crops.

719. The available scientific literature suggests that if bears were reliant solely upon beech as a source of necessary fall mast there would be a clear indication of that reliance in reproductive success rates. Bears would produce cubs in good beech mast years, when they can meet their nutritional requirements, but would not produce cubs (or would produce fewer cubs) in poor beech mast years when they are unable to meet those requirements. Wallin reb. at 12.

720. Mr. Hammond's research in Stratton indicates that bears in southern Vermont *do not synchronize* cub production to years of good beech mast production. Wallin reb. at 12; tr. 12/12/08 at 72-73 (Hammond).

721. “Synchronous reproduction” – where cub production is synced with good beech mast years – has been documented in other bear populations that rely almost exclusively on beech for fall mast (McLaughlin 1994; Jakubas 2004). Wallin reb. at 12; Exhs. DFLD-Cross-WK-8 and WK-9.

722. According to Mr. Hammond's results, bears produced cubs following both good and bad years of beech nut production. More cubs per sow were produced following *bad* beech mast years than following good beech mast years. Wallin reb. at 12.

723. Elowe and Dodge (1989), whose research was conducted in habitat to the south of this project area, also experienced a greater ratio of cubs per sow during years when beech mast was scarce. Wallin reb. at 12; Board Exh. 1.

724. Much of the research on the relationship between beech nut production and bear reproductive rates has been conducted by a series of researchers on several populations of bears in Maine (Hugie 1982; Mclaughlin 1994; and Jakubas 2004). These studies compared the reproductive success rates of one population of bears that was known to rely almost exclusively on beech nuts for fall mast (the Spectacle Pond population), with the reproductive success rates of another population of bears that had access to a broader range of fall mast sources (the Staceyville population) (Mclaughlin 1994; Jakubas 2004). Wallin reb. at 13; Exhs. DFLD-Cross-WK-8 and WK-9.
725. The area around Spectacle Pond, Maine was 95% forested, and beech was generally the only major source of fall mast available to bears in that area (Hugie 1982). In the Staceyville, Maine area, bears had access to beech in the fall, but also had access to other mast sources. Oak trees were far more common in Staceyville than in Spectacle Pond, and there was some access to agricultural crops in Staceyville as well (Hugie 1982; McLaughlin 1994; and Jakubas 2004). Wallin reb. at 13; Exhs. DFLD-Cross-WK-8 and WK-9.
726. Researchers found a dramatic difference in the reproductive regimes of these two bear populations. In the Spectacle Pond area, where bears were exclusively reliant on beech for fall mast supplies, bear reproduction was closely tied to beech mast production. In years of good beech mast production, most females gave birth to cubs (80% of available females produced cubs). In years of poor mast production, most females did not give birth (only 13% of available females produced cubs) (McLaughlin 1994, Table 3). This phenomenon has generally been described as synchronous reproduction. Studies have shown that bears that do not attain a certain mass threshold will not produce offspring (Jakubas 2004). Wallin reb. at 13-14; Exhs. DFLD-Cross-WK-8 and WK-9.

727. Researchers suspect that bears that do not gain sufficient weight may physiologically prevent embryo implantation when food stores are too low to support themselves and their young during denning (Rogers 1976). Thus, in those locations where beech is the sole source of fall mast, a poor mast crop should result in little or no cub production. Wallin reb. at 14.
728. In the Staceyville area, where bears were not solely reliant on beech and had access to additional sources of fall mast – including oak and agricultural crops – synchronous reproduction was not observed (McLaughlin 1994, Table 3). In that population, bears produced cubs each year irrespective of the actual beech mast production. Wallin reb. at 14.
729. The conclusions of these studies undermine the assumption that bears in southern Vermont rely exclusively on beech mast. Wallin reb. at 14.
730. In comparison to the McLaughlin and Jakubas studies, the southern Vermont bear population more closely resembles the Staceyville, Maine population (adequate alternative food sources, no synchronicity) than the Spectacle Pond population (solely reliant on beech, strong synchronicity). The accepted scientific opinion regarding bear reproduction is that “females must receive adequate nutrition for cub production to occur” (Jakubas 2004). Wallin reb. 14-15; Exh. DFLD-Cross-WK-8.
731. Based on this research, the fact that cubs are produced each year in southern Vermont strongly suggests that there are sufficient, consistent sources of fall foods for bears in this region, irrespective of beech mast production. Wallin reb. 14-15
732. Dr. Kilpatrick and Mr. Hammond both acknowledge that Mr. Hammond’s Stratton study does not show any evidence of synchronization or an increase in cub production following good beechnut years. Tr. 12/12/08 at 73 (Hammond); tr. 12/10/08 at 173 (Kilpatrick).

No Evidence in Vermont of Increased Cub Survival Following Years of Good Beech Nut Production

733. There is no evidence that the cub survival rate increases after years of good beech nut production. The data that is available actually contradicts the assumption that beech nut production plays an important role in increasing cub survivorship in Vermont. Wallin reb. at 20.
734. The only data available on cub survivorship in Vermont is Mr. Hammond's Stratton Study. This study did not find any correlation between cub production and beechnut production. Wallin pf. at 11; Wallin reb. at 20; tr. 12/10/08 at 173 (Kilpatrick).
735. In fact, the results of the Stratton Study show the exact opposite: cub survivorship was actually higher in years following poor beech nut production. Wallin reb. at 20. Following years of poor mast production the cub survival rate was 40 percent; following years of good mast production the cub survival rate was only 15 percent. Tr. 12/5/08 at 83 (Wallin); tr. 12/12/08 at 79-84 (Hammond); Exh. SVR/Wilmington WK-5 at Table 4.2.
736. The same results were documented in the Elowe and Dodge study, which reports that "... in our study, the 2 years of highest cub mortality (9 of 14 and 8 of 12) followed years of very abundant mast and high cub availability. Lowest cub mortality (1 of 6) followed a year when mast crops failed and only females feeding in corn produced cubs." Parsons reb. at 21; Exh. Board-1.
737. Elowe and Dodge further state that "...no [cub] deaths could be attributed to starvation." This study occurred within the same habitat group that Dr. Kilpatrick suggests is linked to the population in the project area. Based on the study of bears in this population, Elowe and

Dodge (1987) ultimately concluded that “fall nutrition does not appear to have a great influence on survival of cubs.” Wallin reb. at 20-21. Exh. Board-1.

738. Bear reproduction cycles in this section of the state strongly indicate that the population is not relying exclusively on beech, and the population has been expanding even during long-term periods of poor beech mast production. Wallin reb. at 18.
739. This evidence contradicts the previous assumption that bear-scarred beech in the region is critical or decisive for the survival of the population in this area. Wallin reb. at 18.
740. It is the availability of these *other* types of alternative fall food sources in the southern section of the state which likely has the greatest influence on the bear population and bear reproductive health. Wallin reb. at 18-19.
741. The preservation, retention, or expansion of alternative natural food sources (other than beech) in southern Vermont is may be more critical to the survival of the species in southern Vermont than additional beech resources. Wallin reb. at 19.
742. Given the amount of beech in this area, and the general forest composition in the region, the stands within the direct impact area do not amount to a rare or exclusive source of mast. There is no indication that the beech stands are unique or irreplaceable from a regional perspective. Wallin pf. at 12.
743. The project area has been subject to extensive cutting activities over the past several decades, both on private and federal land. Much greater beech stand losses likely occurred as a result of logging activities, with no discernable effect on bear populations or harvest rates. Wallin pf. at 12.
744. Even if the larger stand of beech in this area is considered to be necessary wildlife habitat, the Project will not destroy or significantly imperil this habitat. The direct impacts of this

Project are too small, relative to the total available beech in the area, to have a significant impact, and the Project should have little if any indirect impact on the remaining beech trees in the area. Wallin pf. at 15.

745. Even if these trees are removed, a much larger area of beech habitat will survive, and will continue to function as bear habitat. Wallin pf. at 15.

Act 250 Criterion 8(A) Subcriteria

746. Mr. Hammond did not consider the subcriteria of Act 250 Criterion 8(A) prior to offering his testimony. Tr. 12/5/08 at 249 (Hammond).

747. ANR has not offered any testimony or evidence under Subcriterion 1 regarding whether the benefits of the Project outweigh the impacts of the project. Tr. 12/5/08 at 249 (Hammond).

748. The Project will provide significant public benefits including economic, environmental, and other societal benefits. *See* Findings 183-238 (economic benefit), 240-251 (air pollution), 153-168 (need(b)(2)), 876 (b(6)), 885-894 (b(10)).

749. There is no evidence that the Project's impact on bear habitat will have a measurable negative economic or recreational impact. The Project will have an environmental impact but will only remove a small percentage of the beech in the Project area and will not result in a significant impact on the local bear population. Wallin pf. at 7.

750. Mr. Hammond has acknowledged that the Project's direct impacts on the local bear population will not likely be measurable using the State's current method of population measurement (harvest levels). Bears will continue to be present on the landscape and hunters will still have the opportunity to hunt and kill bear in the region. Tr. 12/5/08 at p. 236 (Hammond).

751. The Project will also have some positive benefits for the local bear population by diversifying the available food supply. Wallin pf. at 10; tr. 12/10/08 at 213-214 (Kilpatrick); tr. 12/12/08 at 117 (Hammond).
752. Deerfield Wind has taken all feasible and reasonable steps to prevent or lessen Project's impact on bear habitat. Wallin reb. at 45; Habig Panel reb. at 3, 11-12.
753. Deerfield has twice reduced the total number of turbines proposed on the project, first from a maximum of 24 down to 17, and then again from 17 down to 15. These changes reduced the Project's overall direct impact on beech from 643 to 366, by removing the southern 3 turbines on the western project area from an area of concentrated BSB close to the previously identified corridor crossings along Route 8. The design was also changed to route the transmission line up the western ridge underground so as to avoid BSB. Wallin reb. at 45; Parsons reb. at 6-7; Habig Panel reb. at 3-4, 6, 10-11.
754. With respect to project design and construction activities, Deerfield Wind has placed turbines and project infrastructure in areas with as few BSB as possible while still maintaining an economically viable project that can actually be constructed. Habig Panel reb. at 10-11; Wallin reb. at 45.
755. Deerfield Wind has also committed to a number of other measures to minimize and avoid impacts during construction. Deerfield Wind has committed to use a narrow-track crane, which while more expensive, will not require as much clearing for roads on the ridgelines in areas of identified bear habitat. As a result, the width of ridge roads during construction has been reduced from 38 to 22 feet (and will still be revegetated down to 16 feet after construction). Habig Panel reb. at 6, 10-11; Wallin reb. at 46.

756. Deerfield Wind also intends to micro-site turbines, roads and other infrastructure to the extent possible during construction to further avoid BSB impacts where possible. To the extent possible, Deerfield Wind will also make efforts to limit the amount of straight roadway on each ridge road so that the sight-distance on each ridge road is limited to encourage bear crossings. Habig Panel reb. at 6, 10-11; Wallin reb. at 46; tr. 12/12/08 at 206-207 (Goland).

757. Deerfield Wind has also committed to a series of operations and maintenance protocols to ensure that the Project's impacts after construction will be minimal. Mr. Hammond has testified that restricting human access to the project site is an important factor in limiting the indirect impacts on black bear habitat. Habig Panel reb. at 11; Wallin reb. at 46.

758. To that end, Deerfield Wind has proposed specific controls to minimize the impact of the Project:

- i. Access roads will be gated and access to facility roads will be limited to authorized personnel only. The east-side access road will be double-gated with the existing gate at the beginning of the current GMP road and a second gate at the end of the current GMP access road (at the beginning of the Deerfield Wind access road). The west-side access road will be gated at the beginning of the Deerfield Wind access road and again after the transmission corridor. Deerfield Wind will include measures to prohibit and deter illegal ATV access and other unauthorized access.
- ii. Deerfield Wind will prohibit major scheduled repairs and maintenance activities during fall periods when bear may be using beech trees.
- iii. Deerfield Wind personnel will be restricted from the site during the nighttime hours and during the crepuscular periods that have been shown to be important periods for bear activity (one hour before and after sunrise and sunset), except in emergency situations and during wildlife study periods.
- iv. On-the-ground lighting at the facility will also be limited to motion sensor lights at the substation.

- v. Deerfield Wind will evaluate each access road after construction to determine whether there are any specific bear crossings, and if identified, will take actions to preserve those crossing areas.

Wallin reb. at 46; Habig Panel reb. at 11; tr. 12/12/08 at 206-207 (Goland); *see also*, Parsons reb. at 7.

759. Deerfield Wind will also work to minimize any impacts associated with post-construction wildlife monitoring studies. Post-monitoring bird and bat studies can be managed in a manner to minimize potential indirect impacts on bears. *See*, Findings 836-845.

760. The potential range of on-site mitigation measures in this case is complicated by the fact that the federal government owns and controls both the land on which the Project will be located and surrounding land. This is not a situation in which a private land owner is in the position to implement extensive conservation measures on the land surrounding a proposed project.

Habig Panel reb. at 12.

761. The USFS is the landowner, and the primary bear habitat that may be impacted by the Project is located on USFS land. The USFS is in the process of evaluating the Project under the National Environmental Policy Act and the National Forestry Management Act.

Ultimately, the USFS will make a decision about whether to issue a special use authorization, whether mitigation is necessary, and if so, what types of mitigation may or may not be appropriate. Habig Panel reb. at 12.

762. The vast majority of bear habitat in the general region is already owned and controlled by the USFS, limiting the potential for other mitigation options. Habig Panel reb. at 12.

763. Deerfield Wind has agreed to mitigate direct impacts on a 4-to-1 ratio by conserving comparable bear habitat in the southern Vermont region through conservation easements. Tr. 12/12/08 at 206-209.

764. The acreage of direct impact to be mitigated would be based on the amount of direct impact calculated by Mr. Wallin using ANR's methodology. Tr. 12/12/08 at 206-209 (Goland). That amount is approximately 36 acres. Exh. DFLD-JW-9a(fig. 3) and 9b.
765. Deerfield Wind will work with ANR on the proposed 4-to-1 direct impact mitigation plan. Tr. 12/12/08 at 206-209 (Goland).
766. In addition, Deerfield Wind has requested that the USFS consider specific management changes for the four management compartments surrounding the Project area. Habig Panel reb. at 11-13; tr. 12/12/08 at 205 (Goland).
767. Finally Deerfield Wind has proposed an extensive multi-year pre- and post construction study to evaluate the Project's actual impact on bears in the area. Tr. 12/12/08 at 207 (Goland).
768. The study will include one to two years of pre-construction monitoring, followed by post-construction monitoring. The study will consist of a hair snag study that is designed to evaluate bears' response to the construction and operation of the facility. Tr. 12/12/08 at 207, 211-213 (Goland/Habig).
769. The Project presents an outstanding opportunity to study the effect of wind energy on bear behavior. Tr. 12/12/08 at 132-133 (Hammond).
770. Dr. Kilpatrick testified that a hair snag study would be his first priority if a CPG were granted. Tr. 12/10/08 at 214-215 (Kilpatrick).
771. Deerfield Wind has taken steps to maximize the power production from the revised 15-turbine project by utilizing different length turbine blades (G80s and G87s) in order to increase the Project's capacity factor.

772. Deerfield Wind evaluated other potential project locations on private and USFS land. Other alternative locations were not economically feasible from the perspective of wind resources, proximity to transmission, constructability and other factors. Tr. 12/01/08 at 190-193 (Habig); Zimmerman pf. at 9-11.
773. Deerfield Wind evaluated alternative configurations for the Project in the immediate project area. In particular it evaluated the potential for placing more turbines on the eastern ridge and fewer turbines on the western ridge but due to terrain, constructability, and wind issues the company was unable to locate enough sites on the eastern ridge to create an economically feasible project. Tr. 12/01/08 at 190 (Habig).
774. It is not economically feasible to further reduce the size of the Project. Habig Panel reb. at 11-12.
775. Locating turbines on the eastern ridge only is not an economically feasible alternative and could not be constructed by Deerfield Wind. Habig Panel reb. at 12; tr.12/01/08 at 97-98, 178, 190-193 (Habig).
776. ANR has no basis to believe that the “east-only” Project is actually economically viable. Tr. 12/12/08 at 129-130 (Hammond).
777. Deerfield Wind does not own or control any alternative land in the project area which would allow construction of the facility. Habig Panel reb. at 3.
778. Deerfield Wind does not have an SUP application pending for any other locations on USFS Land. Tr. 12/01/08 at 178 (Habig).
779. ANR has not identified any other alternative locations which are reasonable or feasible. Tr. 12/12/08 at 129 (Hammond).

ANR Guidelines

780. ANR's draft bear mitigation guidelines have never been formally published as rules. Tr. 12/12/08 at 92 (Hammond).
781. The public and outside experts have not had the opportunity to respond to the Agency's draft suggestions for management of bear habitat. Tr. 12/12/08 at 92 (Hammond).
782. ANR has previously acknowledged that the guidelines are only guidelines and are not intended to be applied as standards in an Act 250 proceeding. In previous proceedings ANR affirmatively argued that the "mitigation guidelines for black bear habitat in Vermont are guidelines only and are not intended as a source reference for Act 250." Tr. 12/12/08 at 171 (Hammond); Exh. DFLD-Cross-FH-9 at 1.
783. Other recognized regional bear experts have expressed significant disagreement with ANR concerning the general principles in the Agency's draft guidelines. The Chief Research Biologist for the U.S. Forest Service's Northeastern Forest Station, Richard DeGraaf, has previously expressed concerns with the approach advocated by ANR concerning beech trees. In response to ANR comments on the proposed Lamb Brook timber sale in the Green Mountain National Forest, Mr. DeGraaf questioned the scientific validity of the State's assumptions:

This is all preamble to the state that I question several of the assertions that Doug Blodgett made regarding black bear in southern Vermont. The bottom line is that the taking or leaving of clawed beech trees that are used three of ten years on a few areas in a 5,000 acre block of forest have a vanishing small demographic influence on the bear population compared to the combined effects of a long hunting season including hounds, poaching, vehicle accidents, and disposal of "nuisance" bears.

Bears have home ranges from dozens to hundreds of square miles, are extremely adaptable, readily learn to avoid persecution, can thrive in the face of high human and road densities, are capable of dramatic population

increases and need early successional green vegetation at critical times of year.

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In sum, if Vermont wants to control development and have extensive mature forest for some reason that's fine, but it cannot be justified on the basis of black bear needs. . . I don't know what arguments were made to counter ski area development, but I do know that the lack of data showing black bear (or any species) population response to either residential development or forest management constitutes a really weak position from which to oppose management. If there are no numbers, it isn't science, it's opinion. Some of Doug's opinions on black bear needs and threats to their population from forest management seem to run counter to the experience of other states in the region, counter to research findings expressed by bear biologist I've spoken with, and counter to my own reading and field experience. . . . Black bears are extremely adaptable animals and benefit from even-aged forest management.

DFLD-Cross-FH-4.

784. Mr. Hammond testified that he has a lot of respect for Mr. Degraaf's work. 12/12/08 at 94-96 (Hammond).
785. ANR has applied its guidelines inconsistently in the past. ANR previously allowed impacts to bear habitat classified as RC2 habitat despite the fact that the guidelines supposedly oppose on-site losses of existing habitat value. Tr. 12/12/08 at 169 (Hammond); Exh. DFLD-Cross-FH-8 at 2.
786. ANR also accepted mitigation for impacts to bear habitat in the Sheffield Wind Project that did not conform to the guidelines' recommended 4-to-1 ratio. ANR accepted a mitigation proposal that offered between two or three acres of "necessary wildlife habitat" for every acre of "necessary wildlife habitat" the agency believed would be impacted. Exh. DFLD-Cross-FH-5 at 186-187 (noting that 250 to 300 acres of bear habitat accepted for impacts to 110 acres of habitat); tr. 12/12/08 at 101-102 (Hammond).

**Bear Discussion -- 10 V.S.A § 6086(a)(8)(A)**

The weight of the evidence before the Board demonstrates that construction and operation of the proposed Project will not have an undue adverse impact on bears or bear habitat. section 248(b)(5) requires the Board to make an affirmative finding that the Project will not have “an undue adverse impact. . . on the natural environment,” with “due consideration” being given to several Act 250 criteria, including Criterion 8(A). 30 V.S.A §248(b)(5). Criterion 8A of Act 250 provides that:

(A) Necessary wildlife habitat and endangered species. A permit will not be granted if it is demonstrated by any party opposing the applicant that a development or subdivision will destroy or significantly imperil necessary wildlife habitat or any endangered species, and

(i) the economic, social, cultural, recreational, or other benefit to the public from the development or subdivision will not outweigh the economic, environmental, or recreational loss to the public from the destruction or imperilment of the habitat or species, or

(ii) all feasible and reasonable means of preventing or lessening the destruction, diminution, or imperilment of the habitat or species have not been or will not continue to be applied, or

(iii) a reasonably acceptable alternative site is owned or controlled by the applicant which would allow the development or subdivision to fulfill its intended purpose.

As the Board has previously explained, the phrase “due consideration” in section 248(b)(5) provides the Board latitude in its consideration of Act 250 criteria; the Board is not required to strictly apply Act 250, or any precedent established under Act 250, but rather is simply required to consider the criteria to *inform* its own independent conclusions.<sup>7</sup> For example, within the context of the Board’s “due consideration” of Criterion 8 (aesthetics) under section 248(b)(5) the Board has

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<sup>7</sup> See *Re UPC Wind Management, LLC*, Docket No. 6884, Order of 4/21/2004 (“This Board is thus charged with giving due consideration to the Act 250 aesthetic criterion *in order to inform our determination* of whether a proposed generation or transmission facility will have an undue adverse effect on aesthetics.”) (emphasis added).

explained that it looks to prior Environmental Board opinions “for guidance” but that its analysis of a project’s impact “does not end” with strict application of prior environmental board decisions; rather it is “significantly informed by the overall societal benefits of the project.” *Petitions of VELCO and GMP*, Docket 6860, Order of 1/28/05 at 80 (*quoting In re Northern Loop Project*, Docket 6792, Order of 7/17/03 at 28). Similarly here, the Board’s analysis of whether the Project has an “undue adverse impact on . . . the natural environment” under section 248(b)(5) should not end simply with an application of Environmental Board precedent regarding necessary wildlife habitat. The analysis should likewise be “informed by the overall societal benefits of the project.”

The Applicant has the burden to demonstrate that the Project will not have an undue adverse impact on the natural environment under section 248(b)(5). However, to the extent the Board must give “due consideration” to plain language of Criterion 8(A) that consideration must begin with acknowledgement of the burden of proof under Criterion 8(A). Unlike all of the other Act 250 criteria cited by section 248(b)(5), the plain language of Criterion 8(A) firmly establishes that the parties “opposing the applicant” must demonstrate that the project will destroy or significantly imperil necessary wildlife habitat. If the opposing parties meet this initial burden, they then have the further burden of establishing that at least one of the three sub-criteria is not met. The Vermont Supreme Court has clearly stated that both of these burdens fall squarely on the opposing parties’ shoulders. *In re Southview Associates*, 153 Vt. 171, 174 (1989) (“The permit’s opponents. . . thus have a dual burden: first, to show that the project ‘will destroy or significantly imperil necessary wildlife habitat’. . . ; and second, to prove one of the three statements prefaced by small roman numerals.”). The same allocation of burdens must apply here given the Public Service

Board's obligation to give "due consideration" to all of the plain language in Criterion 8(A).<sup>8</sup>

In this case, the parties opposing the Project have not established that the Project will destroy or significantly imperil necessary wildlife habitat. To the contrary, the weight of the evidence presented to the Board demonstrates that beech is not decisive to the survival of the local bear population. Even if the Board were to find that concentrated areas of bear scarred beech generally meet the definition of necessary wildlife habitat, there is no evidence that removing only 1.3 percent of the available bear scarred beech habitat in the project area will destroy or significantly imperil this broader habitat. Over 28,800 bear scarred beech trees have been documented in the surrounding area; the Project will only remove 366 of those trees. The remaining 28,400+ BSB will still be available to bears in the area and will continue to support the local bear population. Finally, contrary to the suggestion made by other parties in this proceeding, Act 250 does not prohibit projects that may destroy or imperil some necessary wildlife habitat. Rather it requires project opponents to demonstrate that: the benefits of the Project do not outweigh the impacts of the Project; that the Applicant has not taken feasible and reasonable measures to prevent or lessen the impact; and that the Applicant does not own or control alternative locations which would allow the project to fulfill its purpose. Should the Board reach the three sub-criteria under 8(A) – and it need not – the evidence here demonstrates that each of these criteria is met. These issues are discussed further below.

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<sup>8</sup> Unlike other provisions of Act 250 referenced in section 248(b)(5), Criterion 8(A) expressly incorporates the opposing party's burden into the plain language of that section of the statute. In comparison, the plain language of Criterion 8 (aesthetics) does not include any allocation of the burden of proof. 10 V.S.A § 6086(a)(8). The allocation of the burden of proof with respect to Criterion 8 is provided by a separate section of the Act 250 statute, which is not cited in section 248. *See* 10 V.S.A. §6088. Here, the plain language of Criterion 8(A) does expressly allocate the burden to the opponents to establish that the project will destroy necessary wildlife habitat. *See* 10 V.S.A § 6068(a)(8)(A).

1. Bear Scarred Beech is not Necessary Wildlife Habitat for the Southern Vermont Bear Population.

“Necessary wildlife habitat” is defined as “concentrated habitat which is identifiable and is demonstrated as being decisive to the survival of a species of wildlife at any period in its life including breeding and migratory periods.” 10 V.S.A § 6001(12).

The evidence presented to the Board does not demonstrate that beech trees are “decisive” to the survival of the local southern Vermont bear population. Deerfield Wind understands and appreciates that previous Environmental Board cases have reached different conclusions for projects in other areas of Vermont based on different evidence, different testimony, and earlier studies. The fact of the matter is that the science on this issue has evolved since the Environmental Board last considered the question in detail almost 20 years ago in 1989. Current studies evaluating the relationship between bear and beech nut production do not support the previous assumption that beech is “decisive” to the survival of the southern Vermont bear population.

For example, the Environmental Board’s initial conclusion that bear scarred beech was necessary wildlife habitat (in the 1989 Killington case) turned in large part on the assumption that “without adequate fall mast, female bears do not reproduce or they produce weak cubs that may not survive.” *Killington Ltd.* Docket #1R0584-EB-1, Order of 5/11/89 at 21. Mr. Hammond’s Stratton Study, which was completed more than 10 years after the Killington decision does not support this critical assumption. Contrary to the Environmental Board’s previous conclusions, the Stratton Study reports that bears in southern Vermont produced cubs following both good and bad years of beech nut production. There was no evidence in that study that bears increased cub production or synchronized cub production in years following good beech nut crops as compared to years of poor beech nut crops. In fact, more cubs per sow were produced following bad beech mast years than

following good beech mast years. Elowe and Dodge, whose research was conducted in habitat just to the south of this project area, also documented a greater ratio of cubs per sow during years when beech mast was scarce.

The Stratton Study also further documents that there was no increase in cub survival rates following years of good nut production. In fact, a greater percentage of cubs survived in years following poor nut production than following good nut production. Elowe and Dodge similarly documented that the “highest cub mortality followed years of very abundant mast.. . [and] lowest cub mortality followed a year when mast crops failed.” Exh. Board-1 at 967. No witness in this proceeding has cited any studies which actually document an increase in cub survival rates following years of good beech nut production. The results of the studies discussed above contradict the 20-year old assumptions the Environmental Board originally relied on in concluding that beech was decisive to the survival of bear populations.

The recent growth rate of the Vermont bear population also calls into question the assumptions underlying the Environmental Board's original Killington decision. The current State data indicate that the black bear population in Vermont increased “an estimated 27 percent, to between 4,600 and 5,700 animals statewide” between 1997 and 2006. Exh. DFLD-JW-12. Yet during this period there was only one year of excellent beech nut production (1998), and two years of moderate beech nut production (2000 & 2002). In the remaining years there was little to no beech nut production. Thus, despite generally limited beechnut production during this period the bear population not only remained robust but actually increased. Bears must rely on alternative food resources in years of poor mast crops, and this data strongly suggests that bears are finding sufficient alternative food resources.

This conclusion is supported by other published studies that have evaluated the relationship between beech nuts and bear reproduction. The available scientific literature suggests that if bears were reliant solely upon beech as a source of necessary fall mast there would be a clear indication of that reliance in reproductive success rates. Bears would produce cubs in good beech mast years, when they can meet their nutritional requirements, but would not produce cubs (or would produce fewer cubs) in poor beech mast years when they are unable to meet those requirements. Research in Maine conducted by McLaughlin and Jakubas compared the difference in reproductive trends in populations of bears that were not solely reliant on beech trees for fall mast with the reproductive trends of a population of bears that was apparently solely reliant on beech. Those populations of bears which had access to alternative food resources did not demonstrate an increase in cub production following good beech nut years, and did not demonstrate synchronous reproduction tied to beech nut crops. In contrast, the one population of bears which was solely reliant on beech did demonstrate synchronous reproduction. The data available on the southern Vermont bear population does not document such synchronous reproduction, but rather shows steady cub production in both good and bad beech nut years. This evidence indicates that bears in southern Vermont are finding alternative food resources and demonstrates that the population's survival is not tied directly to beech nut production.

Deerfield Wind recognizes ANR's efforts to conserve BSB based upon its belief that BSB trees are important to the Vermont bear population. Nonetheless, the Agency has not presented any specific evidence which demonstrates that beech nuts are "decisive" to the local southern Vermont bear population's survival. To the contrary, all of the available evidence indicates that the local bear population's long-term survival does not depend on the availability of beech nuts. Beech nuts are a sporadic resource and bear cannot rely on the resource each year. In southern Vermont there may

be as many as seven years between good beech nut crops. Bears necessarily must turn to alternative resources in the many years that beech nuts are not available, and the results of the Stratton Study and the general growth trend in the Vermont bear population indicate that bears in southern Vermont do have access to adequate alternative resources. The evidence confirms that there are other alternative sources available to bears in the area, including, among other things, oak, cherry, and apples. Deerfield Wind's experts acknowledge that beech nuts can be important to bear in the years that beech nuts are available. However, Act 250 is not intended to protect each resource that may be important to wildlife species. The standard is higher; the resource must be "decisive" to the survival of the local bear population. There is no reliable evidence that bear scarred beech trees in this region of Vermont are decisive to the survival of the local bear population.

2. The Project Will Not Destroy or Imperil Bear Habitat.

Even if the Board were to conclude that concentrated stands of bear scarred beech trees generally constitute necessary wildlife habitat, the evidence in this docket demonstrates that the Project will not destroy or significantly imperil the extensive stand of bear scarred beech within the Project area.

Deerfield Wind's experts have conducted a detailed evaluation of the bear scarred beech in the Project area. The beech trees which may be removed as a result of this Project are a de minimis portion of a much larger component of American beech that spreads across the surrounding area. Within the four National Forest Service management compartments in the immediate Project Area there are an estimated 28,800 bear-scarred beech trees. The revised 15-turbine project will remove 366 of these trees – less than 1.3 percent of the identified BSB habitat. The Project is located on the edge of these four compartments and is in close proximity to the existing Searsburg facility and

other existing infrastructure including Route 8 and Route 9. There are far more remote portions of the National Forest that contain extensive amounts of beech which will not be impacted by the Project.

Mr. Wallin and Mr. Parsons have presented credible evidence that this limited direct impact will not destroy or significantly imperil the broader habitat. Indeed, the weight of the evidence demonstrates that the direct impacts of the Project will not have a noticeable effect on the size or health of the local bear population. The remaining 28,400+ beech trees that have been identified in this habitat will still be available for bears to use and will continue to support the local bear population. And the experts have acknowledged that there is an even greater amount of beech trees available in this area. With respect to direct impacts even an opposing party's expert, Dr. Kilpatrick has acknowledged that simply removing 366 trees via a timber operation would not have an undue adverse impact on the local bear population. He stated that he would not be concerned about that limited habitat loss if one was looking solely at removal of the trees. The Forest Service's Draft Environmental Impact Statement similarly reports that consulted biologists, including its outside expert bear panel, believed that the direct loss of beech would not "measurably affect the area's or the region's bear population." DEIS at 272.

In fact, the evidence indicates that this same habitat has lost similar amounts of beech in the past several decades with no noticeable impact on the local bear population. The Forest Service has conducted timber harvests in this immediate area. Just one of those timber cuts in the 1980s or 1990s appears to have removed as many as 400 BSB in a 17-acre area that overlaps with the Project-footprint. Despite the removal of this amount of BSB, the bear population in this region has remained healthy and robust. As noted in the Stratton Study, harvest numbers from this region

“have been consistently high without large fluctuations in the age structure that might indicate problems with recruitment or harvest levels that are unsustainable.”

Mr. Hammond has expressed the opinion that cutting as few as 50 BSB trees in a timber operation would have an undue adverse impact on the local bear population. That opinion is not supported by the evidence, particularly given the fact that previous timber operations have likely removed as many as 400 BSB with no measureable effect. Despite his expressed opinion, Mr. Hammond has nevertheless acknowledged that any reduction in the size of the bear population that may occur as a result of this Project's direct impacts would not be measurable using the State's present methods of monitoring the size of the bear population.

Despite the absence of any credible evidence which suggests that such a limited impact will have an undue adverse impact on bears, Deerfield Wind has agreed to mitigate the direct loss of these trees on a 4-to-1 basis by purchasing conservation easements for habitat of comparable value.

The principle area of dispute in these proceedings has focused on whether the Project will have indirect impacts on bear habitat, and if so, the extent and magnitude of such indirect impacts.

ANR, Save Vermont Ridgelines, and the Town of Wilmington argue that the Project will have an indirect impact that displaces bears from habitat within  $\frac{1}{4}$  mile of the Project Area. There is evidence that short-term construction activities may displace bears in the immediate area. However the information before the Board demonstrates that that impact will be temporary. The weight of the evidence does not support the assertion that operation of the facility will displace bears from all habitat within  $\frac{1}{4}$  mile of the Project.

The best way to understand how bears may utilize habitat around an operating wind project is to study similar situations, in particular whether and to what extent bears are actually using habitat around an existing wind project facility. In this case, we are fortunate enough to have an operating

wind project in the immediate vicinity. Studies of this facility provide valuable insight into the bears' actual response to wind projects. Mr. Wallin has conducted several extensive studies of the area around the existing Searsburg facility. He has documented bears traveling through the project area with remote cameras, including photos of female bears with cubs. He has also documented bears traveling immediately adjacent to project roads and wind turbines using barbed wire snag fences. And, most importantly, he has documented use of beech trees adjacent to the facility – many within an 1/8 of a mile and some as close as 260 feet. These studies indicate that bears are quite capable of acclimating to operating wind turbines and that they continue to both travel through the project area and utilize food resources near the Searsburg facility.

Mr. Wallin's research together with the available scientific literature indicate that with appropriate conditions operations at the Project will not result in displacement of bears. Relying on Mr. Wallin's earlier snag studies, the Board previously concluded in the East Haven Project that "evidence from the Searsburg project indicates that bears have not been displaced from the vicinity of the turbines at that location." *EMDC*, Docket 6911, Final Order of 7/17/06 at 63.

Mr. Parsons' opinion and his extensive literature survey support this conclusion. There is no evidence that bears will avoid gated access roads with less than five vehicle trips per day on average. Prior studies have not indicated any bear avoidance of gated roads. Dr. Kilpatrick acknowledged as much as well, and noted that with appropriate controls (including restricted access, limited law enforcement patrols, and remote cameras) his concerns related to indirect impacts from roads would be resolved. Mr. Hammond expressed the opinion that bears may avoid gated roads that have as few as four vehicle trips per day, but could cite no studies or other evidence to support this opinion. But ANR experts have previously taken the position that a gated wind project access road would not displace bears from beech as close as several hundred feet.

Mr. Parsons' research and experience also indicate that the noise from the turbines themselves will not displace bears. It clearly has not done so surrounding the Searsburg turbines. The noise is not the type of sharp unexpected noise that may affect bear behavior but rather is a stationary consistent noise. Mr. Hammond conceded that noise from turbines themselves was not one of his primary concerns. Dr. Kilpatrick has expressed some concerns with noise impacts, but both he and Mr. Hammond acknowledged that there are no studies which would indicate that bears will avoid noise of the type produced by wind turbines. Dr. Kilpatrick expressed similar concerns about noise impacts on wildlife in the East Haven and UPC/Sheffield cases. The Board rejected those concerns in the East Haven case noting that Dr. Kilpatrick himself acknowledged that he is not a noise expert. *EMDC*, Docket 6911, Final Order of 7/17/06 at 63.

The final potential source of indirect impacts relates to human activities on the project site. As described further below, Deerfield Wind has committed to a number of operational controls which will limit the presence of people on the project site during periods that may be important to bear activity (primarily fall and spring periods during or following good beech nut years when bears may be utilizing beech in the area). Access to the project site will be limited and project personnel will be restricted from the facility during evening and crepuscular periods during which bears are most active. Deerfield Wind will also take steps to minimize the impact of any necessary post-construction wildlife monitoring studies, and will take steps to prohibit and discourage illegal ATV access or other unauthorized vehicle access.

ANR, SVR, and the Town of Wilmington have not presented any specific evidence which supports the assertion that bears will be displaced ¼ mile. Mr. Hammond and Dr. Kilpatrick acknowledged that Mr. Wallin's research shows that bears are still using the habitat around the existing Searsburg project and they acknowledged that they did not have any direct evidence which

would indicate that bears are using the habitat less than they were prior to construction of the facility. They also acknowledge that they do not know the extent or magnitude of such impacts if they occur. Mr. Hammond has acknowledged that not all bears will be displaced by the Project and that some bears will acclimate to the Project's presence and continue using the beech within ¼ mile of the project area. He does not know what percentage of bears may avoid the Project area.

The principal basis for Mr. Hammond and Dr. Kilpatrick's opinion that bears will use the habitat less after construction of the facility is research done by Mr. Hammond and Mr. Wolfson on beech stands that were adjacent to areas of concentrated "human activity." The "human activity" evaluated in this research was significantly different than the level of activity that is anticipated here. It focused on beech stands proximate to ski areas, locations that had three or more residences and roads with traffic volumes greater than 100 cars per day.

Mr. Hammond contends that this research is relevant to the present proceeding, but it is clear that the level of activity at the Deerfield Project will be distinct from the types of development evaluated in that study. Indeed, in contrast to Mr. Hammond's present opinion, ANR bear experts have previously acknowledged that a wind project's indirect impacts are different in scope than those associated with ski areas or housing developments. In the UPC/Sheffield case, ANR accepted a mitigation proposal for a wind project that did not comply with the Agency's mitigation guidelines in part because the Agency acknowledged that the indirect impacts of the project would be different from, and easier to control than, impacts associated with residential areas or ski developments.<sup>9</sup> Given the differences between this type of project and the intensive development studied by Mr.

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<sup>9</sup> See also, *Amended Petition of UPC Vermont Wind*, Docket 7156, Final Order of 8/8/07 at 83, Finding 239 ("The wildlife habitat impacts associated with the Project are likely to be more ephemeral than those associated with certain other types of development (i.e., residential construction and ski-area development).") (quoting UPC/ANR stipulation).

Hammond and Mr. Wolfson, that work is not directly applicable to the current situation. Mr. Wallin's research into the impact of the existing Searsburg facility is far more informative as to the extent of the Project's potential impact on bears. It demonstrates that bears will continue to utilize habitat surrounding the Project, including bear-scarred beech adjacent to the facility.

Moreover, to the extent that the Project's indirect impacts can be considered uncertain, Deerfield Wind has offered a number of mitigation measures which, if implemented, will compensate for any limited indirect impacts which may occur. Deerfield Wind has recommended that the Forest Service consider management changes to portions of the eight square miles of habitat surrounding the Project area (more than 9500 acres). These management changes, if implemented, will increase the availability of beech in the surrounding area and will also increase the diversity of food available to bears in the area. Deerfield Wind has also committed to managing the Project area to increase the diversity of bear habitat available along Project access roads. Finally Deerfield Wind has committed to working with ANR to conduct a multi-year bear snag study to further evaluate bears' actual response to the Project's operations.

Based on this information, there is no credible evidence that the Project will destroy or imperil the larger concentration of beech in the Project area. The direct impact is small compared to the available habitat. While the exact extent of the Project's indirect impact is uncertain, the evidence presented in this case indicates that the displacement will not be significant. Bears will continue to utilize the habitat adjacent to the Project and the broader habitat in the eight square miles surrounding the Project area.

Previous Supreme Court and Environmental Board cases have recognized that the relative extent of a Project's impact on the available habitat is an important aspect of determining whether the Project will destroy or significantly imperil necessary wildlife habitat. In both the *Southview* and

the *Killington* case, the Board and the Supreme Court each emphasized that the extent of the Project's impact was significant in part because the project impacted the last remaining habitat of that type in the area. In *Southview*, the Board noted that the impacted deeryard was "the only remaining deeryard in the Stratton area." *Southview Associates*, Docket #2w0634-EB, Order of 6/30/87 at 9. In affirming the Board's decision the Supreme Court similarly emphasized that, "the deeryard on the Southview property is part of the last remaining deeryard in a 10.7 square mile watershed." *In re Southview Associates*, 153 Vt. 171, 178 (1989). In the *Killington* case, the Board concluded that the project would destroy a large wetland and noted that there were "no other comparable wetlands in the area." *Killington Ltd.* Docket #1R0584-EB-1, Order of 5/11/89 at 20. The Supreme Court also emphasized that absence of other wetlands in the area. *In re Killington, LTD*, 159 Vt. 206, 217 (1992).

That is not the case here. As the evidence indicates there is an extensive amount of bear-scarred beech in the broader contiguous area of the National Forest. The vast majority of this habitat will be unaffected by the Project and will remain available to bears in the area. Taken together this evidence demonstrates that the Project will not destroy or imperil the extensive amount of bear habitat in the area – irrespective of whether the Board considers the habitat to be "necessary" or not.

### 3. Criterion 8(A) Sub-Criteria

Deerfield Wind believes that the information before the Board does not demonstrate that the Project will destroy or imperil necessary wildlife habitat. However, should the Board conclude otherwise, it must then consider whether the opponents have met their burden under the three sub-criteria. As discussed further below, they cannot meet that burden.

#### *i. The Public Benefits of the Project Outweigh the Project's Impacts.*

The evidence in this case documents that the Project will produce substantial public benefit. These benefits will outweigh the Project's limited impact on a large area of bear habitat. First, the extensive potential economic benefits of the Project are described in detail above in section 248(b)(4). In sum, the Project will provide tax revenues, financial benefits to a Vermont utility purchasing Project power, jobs, cost-savings from reduced air emissions, and other direct and indirect economic benefits during construction and operation. The benefits will amount to tens of millions of dollars in State economic output, disposable income gains, state and local tax revenues, and other payments. *See* Findings 183 to 238 (economic benefit).

In addition to specific economic benefits, the Project will also provide other important societal benefits by advancing the State Legislative goal of developing a new in-state renewable energy-generating resource. The Vermont Legislature recently reaffirmed Vermont's commitment to the development of renewable energy and outlined the societal benefits associated with development of renewable energy. Act No. 61 (2005), sec. 1. These renewable energy policy goals are codified in 30 V.S.A. § 8001 *et seq.*, which encourages the development of renewable energy resources to meet the State's growing energy demands. In order to achieve these goals the state legislature established the so-called "sustainably priced energy enterprise development program" or SPEED program. Deerfield Wind's project meets the criteria for certification as a SPEED project and thus will help meet an identified need and contribute to the accomplishment of these goals. Among other things, the Project will help diversify New England's energy portfolio, reduce the region's reliance on natural gas and other fossil fuels, and provide stably priced renewable energy to local utilities.

The Project will also help meet specific federal legislative goals regarding the development of renewable energy resources on public land. The Energy Policy Act of 2005 directs the Secretary of

the Interior to seek to approve facilities generating an additional 10,000 megawatts of renewable energy on public land by 2015:

It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity.

Energy Policy Act of 2005, § 211, P.L. 109-58 (Aug. 8, 2005). The Project is proposed on public land and will contribute to accomplishing this congressional directive. The U.S. Forest Service has certified that development of the Project is in the national public interest.

In addition the Project will also provide specific environmental benefits, including among other things, a reduction of air emissions in the region. *See* Findings 184-202, 240-251 *supra*. The Project will also provide some positive benefits for wildlife species, including bear, by diversifying the food resources available to wildlife in the project area.<sup>10</sup>

In comparison to these significant public benefits the Project's impacts will be relatively minor. There is no evidence that the Project's impact on bear habitat will have a measurable economic or recreational impact. The Project will have an environmental impact but will only remove a small percentage of the vast amount of BSB available in the Project area; approximately 1.3 percent. The remaining beech trees will continue to be available for use by bears. Bears will continue to be present on the regional landscape and hunters will still have the opportunity to hunt

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<sup>10</sup> In addition to these identified benefits, the Project will provide the Vermont utilities with benefits, including better sectionalizing capabilities and improved reliability to the existing transmission line. *See* Finding 193 *supra*. It will also provide a benefit under Criterion b(6) by providing GMP with renewable energy resources to help meet the utility's IRP. *See* Finding 876 *supra*.

and kill bear in the region. On balance it is clear that the benefits of the Project will outweigh the limited impact.

This case is unlike other cases that have been evaluated by the Environmental Board and the Supreme Court under the Criterion 8(A) sub-criteria. First, as noted above, unlike in *Southview* and *Killington*, this project will not completely destroy the last remaining amount of bear habitat in the region. To the contrary, the Project will impact only a very small percentage of the significant amount of beech in the area. Moreover, unlike *Southview* and *Killington* the Project's *public benefits* are both significant and well documented. The Board in *Southview* concluded that a housing development did not provide sufficient public benefits to outweigh the impact on the last remaining deeryard in a 10 square-mile area. *Southview Associates*, Docket #2w0634-EB, Order of 6/30/87 at 9-10. The public benefits of a renewable energy project are substantially different in nature and scale than a residential housing development. The Vermont legislature has specifically recognized the societal benefits of such projects. And, as the facts in this case indicate, section 248 electric generation projects, as opposed to Act 250 projects, are inherently about statewide public benefits. In the *Killington* case, the Board concluded that the Project did not satisfy the first sub-criteria because the applicant failed to present any credible evidence of the economic and recreational benefits to the public that would result from the project. *Killington Ltd.* Docket #1R0584-EB-1, Order of 10/21/90 at 23. In this case Deerfield Wind has presented extensive evidence from recognized experts documenting the Project's various public benefits.

*ii. Deerfield Wind Has Taken Feasible and Reasonable Measures to Prevent or Lessen the Project's Impact.*

Deerfield Wind has taken all feasible and reasonable measures to prevent or lessen the Project's impact on bear habitat. Deerfield has twice reduced the size of the Project, first from 24

turbines down to 17, and then again from 17 turbines down to 15. These changes have reduced the Project's overall direct impact on beech trees more than 40% from 643 to 366 BSB. As a part of this redesign, Deerfield Wind has placed turbines and project infrastructure in areas with as few BSB as possible while still maintaining an economically viable project that can actually be constructed. To the extent that the Project impacts can be further minimized through micro-siting, Deerfield has committed to do so where possible. There is also undisputed evidence that further reducing the number of turbines is not economically feasible and is not reasonable. Deerfield Wind has reduced the Project as far as possible while maintaining an economically viable project. The company could not construct a smaller project. The so-called "East-Only" alternative evaluated by the Forest Service in the DEIS is not economically feasible. Deerfield Wind provided both the Forest Service and ANR with extensive documentation demonstrating that the East-Only project could not be constructed. This evidence has not been challenged or refuted by any party in this proceeding.

In addition to redesigning the Project, Deerfield Wind has committed to a number of other measures to minimize and avoid impacts during construction. Deerfield Wind has agreed to use a narrow-track crane, which while more expensive, will not require as much clearing for roads on the ridgelines in areas of identified bear habitat. As a result, the width of ridge roads during construction will be reduced from 38 to 22 feet (and will still be revegetated down to 16 feet after construction). To the extent possible Deerfield Wind will also take efforts to limit the amount of straight-roadway on each ridge road so that the sight-distance on the roads is limited to encourage bear crossings (provided that such adjustments do not result in further loss of beech habitat).

The company has also committed to a series of operations and maintenance protocols to minimize the Project's impacts during operation of the facility. Deerfield Wind proposes to include the follow protocols as conditions in the CPG:

- Access roads will be gated and access to facility roads will be limited to authorized personnel only. The east-side access road will be double-gated with the existing gate at the beginning of the current GMP road and a second gate at the end of the current GMP access road (at the beginning of the Deerfield Wind access road). The west-side access road will be gated at the beginning of the Deerfield Wind access road and again after the transmission corridor. Deerfield Wind will include measures to prohibit and deter illegal ATV access and other unauthorized access.
- Deerfield Wind will prohibit major scheduled repairs and maintenance activities during fall periods when bear may be using beech trees;
- Deerfield Wind personnel will be restricted from the site during the nighttime hours and during the crepuscular periods that have been shown to be important periods for bear activity (one hour before and after sunrise and sunset), except in emergency situations and during wildlife study periods.
- On-the-ground lighting at the facility will also be limited to motion sensor lights at the substation and the O&M building.
- Deerfield Wind will evaluate each access road after construction to determine whether there are any specific bear crossings, and if identified, will take actions to preserve those crossing areas.

Both Deerfield Wind's experts and other experts have testified that these types of operational controls are appropriate and important methods for limiting the Project's potential impacts on bears using habitat adjacent to the facility.

In addition to these specific operational conditions Deerfield Wind has also proposed specific mitigation measures to mitigate the Project's unavoidable impacts. Implementing specific on-site mitigation measures in this case is complicated by the fact that the Federal Government owns and controls both the land on which the Project will be located and surrounding land. This is not a situation in which a private land owner is in the position to implement extensive conservation measures on the land surrounding a proposed project. The Forest Service is in the process of evaluating the Project under the National Environmental Policy Act and the National Forestry

Management Act. Ultimately, the Forest Service will make a decision about whether to issue a special use authorization, whether mitigation is necessary, and if so, what types of mitigation may or may not be appropriate.

Moreover, the vast majority of bear habitat in the general region is already owned and controlled by the Forest Service, limiting the potential for other mitigation options. Nevertheless, Deerfield Wind has agreed to mitigate direct impacts on a 4-to-1 ratio by conserving comparable bear habitat in the southern Vermont region through conservation easements. Deerfield Wind proposes the following CPG conditions concerning off-site mitigation:

- Deerfield Wind will mitigate the Project's direct impacts on bear-scarred beech habitat on a 4-to-1 basis by obtaining conservation easements (or similar instruments that run with the land) on land containing comparable bear habitat in the southern Vermont region.
- The acreage of direct impact to be mitigated will be based on the amount of direct impact calculated by Mr. Wallin using ANR's methodology, as indicated on Exhibits DFLD-JW-9a(fig. 3) and 9b. The estimated total direct impact using this methodology is approximately 36 acres.
- The conservation easements (or similar instruments that run with the land) will be maintained for the life of the Project.
- Deerfield Wind will work with ANR to implement the 4-to-1 direct impact mitigation plan.

With respect to indirect impacts, the evidence before the Board demonstrates that operation of the Project will not displace bears from the ¼-mile area surrounding the facility. As a result, 4-to-1 mitigation for such alleged indirect impacts is neither necessary nor reasonable. Nevertheless, in recognition of the importance of this issue Deerfield Wind has proposed several measures to mitigate any indirect displacement of bears which may occur. First, Deerfield Wind has requested that the U.S. Forest Service consider specific management changes for the four management

compartments surrounding the Project area. The potential management changes Deerfield Wind has requested the Forest Service to consider include:

- Measures to identify other areas of concentrated BSB in the four Forest Service management compartments surrounding the Project, and changes in Forest Service management practices that would preserve or protect these areas;
- Measures to identify other areas of other fall mast sources in the four Forest Service management compartments surrounding the Project, and changes in Forest Service management practices that would preserve or protect these areas;
- Changes to Forest Service management practices that would promote beech recruitment, growth, and regeneration in the four management compartments around the Project;
- Measures to increase the diversity of bear food sources in the four compartments around the Project. This step may include measures to encourage apple tree release and growth; measures to encourage oak tree release and growth, and measures to encourage growth of other important food resources, including Jack-in-the-pulpit, berries, etc.; and
- Measures to identify and preserve important bear crossing corridors on or adjacent to Forest Service land.

Deerfield Wind will work with the Forest Service to encourage implementation of these measures, which, if implemented would apply to more than eight square miles of national forest service land (or more than 9500 acres). These measures could provide significant benefit to the local bear population by diversifying the food available to the bear population and by preserving identifiable stands of beech and other mast. As Mr. Hammond testified there presently are no protections that would prohibit the Forest Service from cutting beech trees in this area. If implemented, these changes in management practices over 9500 acres would represent an outstanding mitigation measure and would more than compensate for any potential indirect impacts,

particularly in light of the fact that the overwhelming evidence in this Docket demonstrates that there will be no indirect impacts.

Second, pending Forest Service approval, Deerfield Wind has agreed to conduct an extensive multi-year pre- and post-construction study to evaluate the Project's actual impact on bears in the area. To implement this commitment, Deerfield Wind proposes the following CPG conditions:

- In the event that Deerfield Wind is able to obtain Forest Service approval, Deerfield Wind will conduct a pre- and post-construction hair snag bear-monitoring program to evaluate the Project's impact on bears.
- The monitoring program will consist of a multi-year hair snag study designed to evaluate bear response to both construction and operation of the facility.
- The program will be designed in coordination with the Forest Service and the Agency of Natural resources and will be designed so as to ensure statistically valid data regarding bear use of the project area before and after construction of the facility.

Taken together these conditions will adequately mitigate the Project's potential impacts.

*iii. Deerfield Wind Does not Own or Control Any Alternative Land.*

The final sub-criterion asks whether “a reasonably acceptable alternative site is owned or controlled by the applicant which would allow the development or subdivision to fulfill its intended purpose.” 10 V.S.A § 6086(a)(8)(A)(iii). It is undisputed in this case that Deerfield Wind does not own or control any alternative land in the Project area that could accomplish the purpose of the Project.

With respect to the specifics of the third sub-criterion, evaluation of other locations on Forest Service land or other private land is not required because the applicant does not own or control those locations. Nevertheless, while not required under section 248 or Act 250 Criterion 8A, Deerfield Wind has evaluated other potential project locations which it does not own or control,

including locations on public and private land. Other alternative locations were not economically feasible for several reasons including wind resources, proximity to transmission, constructability, and other factors. In addition, Deerfield Wind also evaluated alternative configurations for the Project in the immediate Project area. In particular it evaluated the potential for placing more turbines on the eastern ridge and fewer turbines on the western ridge but due to terrain, constructability, and wind resource issues, the company was unable to locate enough sites on the eastern ridge to create an economically feasible project. No other party in this proceeding has presented specific evidence which would establish that there are any feasible alternative locations to accomplish the Project's purpose.

Based on the available evidence the Project satisfies the three sub-criteria. The Project opponents cannot meet their burden to demonstrate that the Project will destroy or imperil necessary wildlife habitat, nor have they demonstrated that the Project does not meet the three sub-criteria. If the Board were to reach this level in the analysis it should conclude that the Project conforms to the requirements of Criterion 8(A) and therefore will not have an undue adverse impact on bear habitat.

However, as noted above, the Board's analysis of the Project's impacts is not constrained only to the provisions of Criterion 8(A); rather the Board must simply give due consideration to the analysis required under this provision of Act 250. Even if the Board were to conclude that the Project does not satisfy the specific requirements of Criterion 8(A) – and the facts do not support that conclusion – the evidence in this case nevertheless still demonstrates that the Project will not have an undue adverse impact on bear habitat. That is particularly the case when the limited nature of the Project's impacts is balanced against the significant public benefits provided by the Project. Based on this evidence, and in light of the conditions proposed by Deerfield Wind, the Board

should conclude that construction and operation of the Project will not have an undue adverse effect on bear or bear habitat.

4. Implications of Federal Preemption Doctrine.

Finally, as the Board is aware, the proposed Project is located on the Green Mountain National Forest and is subject to a separate federal permitting process. Federal ownership and control of the Green Mountain National Forest raises significant potential preemption issues in this Docket. Deerfield Wind has previously briefed this issue and incorporates its preemption brief by reference. In short, Federal law requires the U.S. Forest Service to manage National Forest Service lands for a diverse set of multiple uses, including, among other things energy generation. Congress has granted the U.S. Forest Service specific authority to regulate the many varied uses of National Forest Service land, and in particular to determine the appropriate location for and balance between competing uses, such as energy production and wildlife habitat. Under federal law, the State's authority to regulate the Project's environmental impacts under section 248(b)(5) would be preempted to the extent that the exercise of that authority actually conflicts with federal law or stands as an obstacle to the accomplishment of a Congressional purpose. As outlined in Deerfield Wind's preemption memo, Deerfield Wind believes it is possible for the Board to exercise its jurisdiction over this aspect of the Project without necessarily conflicting with the Forest Service's exercise of its authority, and believes that approval of the Project subject to the conditions outlined above likely would not create such a conflict.

Bird and Bat Species

General Findings

787. Based upon the field surveys and assessments performed by Deerfield Wind's bird and bat experts (Robert Roy of Woodlot/Stantec, Steven Pelletier of Woodlot/Stantec, Wallace

Erickson of WEST, and Paul Kerlinger of Curry & Kerlinger), and the post-construction studies and adaptive management process proposed by Deerfield Wind, the Project will not have an undue adverse impact on bird or bat species. *See* Findings 788-855 below.

788. Deerfield Wind's bird and bat experts have conducted numerous bird and bat studies throughout the Northeast. In their experience, this Project has involved more pre-construction natural resource studies than most other projects, and the combination of these studies makes a stronger assessment possible on this Project than on other projects. Pelletier/Erickson suppl. pf. at 1.
789. Woodlot/Stantec conducted five studies within the Project area: 1) a fall 2004 radar and visual migration study, 2) a spring 2005 radar migration study and bat acoustic study, 3) a fall 2005 radar and bat acoustic survey, 4) a spring 2006 radar and bat acoustic survey, and 5) a summer-fall 2006 bat acoustic survey. Roy/Erickson pf. at 4 (adopted by Pelletier); Exh. DFLD-RR/WE-3, 4, 5, 6, and 7.
790. Dr. Paul Kerlinger conducted field work at the Deerfield Wind site to assess the potential impact of the Project on bird populations. His initial Phase 1 Avian Risk Assessment was followed by a Breeding Bird Survey in 2003 to identify potential listed and threatened species that use the Project habitat. Dr. Kerlinger also produced a Supplement to the Phase I Avian Risk Assessment in 2006. Dr. Kerlinger concluded that the Project will not have an undue adverse impact to any birds due to collision risks, habitat loss, habitat fragmentation, or habitat avoidance. Kerlinger pf. at 4-6 and 18; Exhs. DFLD-PK-4 to PK-6.
791. While some mortality is expected at the Deerfield Wind site, the Project is not expected to have any undue adverse effect on migrating or resident birds because of its size and location, and based upon the experience at other wind projects. The positioning of the turbines does

not appear to be in a major flyway as birds have been observed migrating in a broad front within the Project area. The expected level of impact is extremely small compared to the millions of birds that travel through wind farms each year, and orders of magnitude less than the hundreds of millions of birds that die due to collision with transmission lines, vehicles, buildings, communication towers, and other human-influenced activities. Roy/Erickson pf. at 20-21.

792. Based upon the studies performed by Dr. Kerlinger and Woodlot/Stantec, and the assessment of habitat, there are no known federal or Vermont-listed endangered or threatened avian or bat species at the project site, and the habitat does not appear to be suitable for any listed endangered or threatened avian or bat species. Kerlinger 4-6; Roy/Erickson pf. at 25.
793. The reduced number of turbines in the revised project reduces the potential for collision-related mortality. Fewer turbines represent a decreased risk of collisions. Pelletier/Erickson suppl. pf. at 4.

#### Bats

794. Bat surveys were conducted in the spring of 2005, in the late summer and fall of 2005, in the spring of 2006, and in the summer and fall of 2006. Anabat II detectors were used for all surveys. All detectors were programmed to begin recording just prior to sunset and cease recording after sunrise. Call files were downloaded to a computer for analysis and calculation of detection rates. Roy/Erickson pf. at 22.
795. Woodlot conducted the bat detector studies at multiple locations across the Project site, providing a good sample of the average bat activity at the site. In total, 1,023 detector/nights of data were collected on the project site. Roy/Erickson pf. at 23.

796. In general, the total number of call sequences recorded during each season varied with the two spring season surveys yielding fewer recorded call sequences than the fall surveys. In terms of detection rates, however, each season of survey documented slightly greater activity than the previous season of survey. Overall, the detection rate documented during each season was quite low. Roy/Erickson pf. at 24; Exhs. DFLD-RR/WE-4, 5, 6, and 7.
797. During analysis of the summer-fall 2006 survey data, one call file was identified as potentially that of the eastern small-footed bat (*Myotis leibii*). This was the only call sequence suspected to be of a listed bat species.
798. Arrowwood Environmental subsequently conducted studies of potential bat habitat that focused on the eastern small-footed bat and Indiana bat. The results of this habitat study and field verification by the Vermont Fish and Wildlife Department indicated that there are no eastern small-footed bats in the Project area. Roy/Erickson pf. at 25 and 28-30; Exh. DFLD-MLS-5.
799. Five species and one species group (with up to three species within the group) were documented during the field surveys in the vicinity of the Deerfield Wind Project. These include the silver-haired bat, the hoary bat, red bat/eastern pipistrelle, the big brown bat, and *Myotis* species. Big brown bats and *myotids* were the most commonly recorded bats. Roy/Erickson pf. at 24-27; Darling pf. at 12.
800. ANR's bat expert, Scott Darling, concluded that Deerfield Wind conducted the necessary radar, acoustic, and habitat suitability assessments in order to provide adequate information to determine the level of risk to the various bat species populations. Darling pf. at 14-15.
801. Elimination of two turbines in the revised 15-turbine project will reduce bat fatalities. Darling surreb. at 1.

802. Seventy-five percent of bat fatalities at wind facilities are long range migrants. Tr. 12/03/08 at 43-44 (Pelletier).
803. Bat mortality has been a cause for concern at wind projects in the East. This is exacerbated by the high levels of mortality at some mid-Atlantic projects. However, ANR's bat expert concluded that the level of bat activity as estimated through the acoustic surveys is sufficiently low to determine that the Project does not necessarily pose an undue adverse risk to bats. Darling pf. at 15.
804. Based on the pre-construction work conducted by Woodlot, Arrowwood Environmental, and Scott Darling of ANR, and upon currently available information, the Project is not expected to pose an undue adverse impact to bat populations. At the same time, a degree of uncertainty exists regarding potential impacts to bats. Roy/Erickson pf. at 31; Darling pf. at 15-16; tr. 12/02/08 at 266 (Darling)

#### Raptors

805. Woodlot conduct raptor migration surveys in the fall of 2004 and spring of 2005. Both seasons consisted of hawk watches from the peaks of the western project area and the Searsburg facility. Ten days of surveys were conducted during the fall of 2004 and seven were conducted during the spring of 2005, based on consultation with the USFS and the VFWD. Roy/Erickson pf. at 4-5; Exhs. DFLD-RR/WE-3 and 4.
806. Surveys were based on methods used by the Hawk Migration Association of North America (HMANA). Roy/Erickson pf. at 4-5; Exhs. DFLD-RR/WE-3 and 4.
807. A total of 872 raptors, representing 15 species, were observed during the fall 2004 survey, yielding an observation rate of 7.45 birds/hour. During the spring 2005 survey, 82 raptors

representing 13 species were observed, yielding an observation rate of 0.98 birds/hour.

Roy/Erickson pf. at 6; Exhs. DFLD-SP/WE-3 and 4.

808. The number and species composition of raptors observed flying below and above the approximate maximum height of the proposed turbines was calculated. Roy/Erickson pf. at 5; Pelletier reb. at 3 and 13; Exh. DFLD-SP-8.
809. Overall, radar data depicted a seasonal mean (above ground) flight elevation of 624m at the eastern project site, 624m at the western project area, and 611m above the Low site (fall '04); 523m at the eastern project site and 435m at the western project area (fall '05). The lowest elevation site (Fall '04 Low site) indicates the highest elevation flight, demonstrating that most seasonal migration occurs well above the general terrain in a band between 300m to 600m in elevation. Pelletier reb. at 3 and 13; Exh. DFLD-SP-8.
810. During the fall 2004 survey more raptors were observed at the western project area than at the eastern project area (725 raptors vs. 147 raptors, respectively). While the numbers in the Western project area were substantially higher than numbers in the Eastern project area, the total numbers were still relatively low compared to the HMANA counts. During the fall 2004 surveys, observation rates from other regional counts were 1.5 to 9.4 times greater than those documented at the Project. Pelletier reb. at 2; Roy/Erickson pf. at 7-8.
811. The closest established hawk watch site is situated approximately 35 miles northeast of the Project site at Putney Mountain, VT. A comparison of the same season results shows far fewer raptors were observed at the Project site, even with a similar level of effort between the two sites. A combined total of 872 individuals were observed in fall '04 during 117 observation hours at the Project site while a total of 4,865 individuals were observed during 139 hours at Putney Mountain, VT. This helps clarify that the numbers of raptors observed at

the Project site are actually still quite low and that the Project is not located in a concentrated hawk flyway. Pelletier reb. at 2; Roy/Erickson pf. at 7-8.

812. Broad-winged hawks were by far the most common species observed during the fall 2004 surveys and accounted for 84% of all observations (729 individuals). Approximately 83% of all observations of broad-winged hawks occurred on one day at the western project area when 613 individuals were observed. Therefore, the difference in the total numbers of raptors observed between the western and eastern sites was skewed on a single day when seasonal weather conditions were obviously favorable for broad-winged hawk migration. Pelletier reb. at 2.
813. Raptor mortality at all new wind projects has been relatively low. Studies at newer U.S. wind projects (facilities with turbines on tubular towers with 33-meter rotor diameters and larger) have typically suggested relatively low raptor mortality (0 to 0.1 per MW per year), especially when compared to older wind projects such as the Altamont Pass in California. Roy/Erickson pf. at 8; Pelletier reb. at 3.
814. The risk of raptor mortality at the Project is low, in light of the relatively low raptor migration compared to other sites, the relatively small size of the Project, and the low mortality rates at new wind projects. Consequently, few raptor fatalities are anticipated, and thus the Project will not result in an undue adverse impact to raptor populations. Roy/Erickson pf. at 10; tr. 12/05/08 at 221-222 (Hammond).

#### Birds – Nocturnal Migrants

815. Woodlot conducted five migration studies within the project area between September 2004 and October 2006: 1) a fall 2004 radar and visual migration study, 2) a spring 2005 migration study similar to the previous fall including acoustic monitoring for bats, 3) a fall 2005 radar

and acoustic (Anabat) survey, 4) a spring 2006 radar and acoustic survey, and 5) a summer-fall 2006 acoustic survey. Roy/Erickson pf. at 4; Exhs. DFLD-RR/WE-3, 4, 5, 6, and 7.

816. The fall 2004 survey was conducted over 28 nights from September 16 to October 29, 2004. The spring 2005 survey was conducted on 20 nights from April 28 to May 29, 2005. The fall 2005 survey was conducted on 32 nights between September 2 and November 1, 2005. The spring 2006 survey was conducted on 26 of 30 targeted nights between April 16 and June 9, 2006. Roy/Erickson pf. at 11.

817. The fall 2004 survey was the most comprehensive of the studies because two radars were used to sample three locations. The most significant result of the fall 2004 survey was the indication that bird movement (flight path) over the project area is broad front in nature and that the topography of the project area is probably not directing significant numbers of birds around the ridgelines or through saddles in the ridgelines. This finding is consistent with the general view among avian experts that with some exceptions, night-migrating birds fly in broad front migration patterns. The 2005 and 2006 studies supported the initial finding. Roy/Erickson pf. at 12-14; Exhs. DFLD-SP/WE 3-7.

818. The data collected was used to calculate passage rate (reported as the number of targets/kilometer/hour or t/km/hr), flight direction, and flight altitude of targets. The results were as follows:

Summary of Deerfield radar survey results: 2004 – 2006						
Location	Season	Average Passage Rate	Range in Nightly Passage Rates	Average Flight Direction	Average Flight Height (m)	% Targets < Turbine Height <sup>11</sup>
Existing Facility	Fall 2004	175	7 - 519	194	438	1%
Western Project Area	Fall 2004	193	8 - 1121	223	624	7%
Valley Location	Fall 2004	150	58 - 404	214	503	1%
All 3 sites combined	Fall 2004	178	7 - 1121	212	566	4%
Existing Facility	Spring 2005	404	74 - 973	69	523	6%
Western Project Area	Fall 2005	536	3 - 1736	221	395	17%
Eastern Project Area	Spring 2006	263	5 - 934	58	435	11%

Roy/Erickson pf. at 12; Exh. DFLD-SP-8.

819. In addition to Woodlot's radar surveys, Dr. Kerlinger examined the habitat of the Project site to determine whether it appeared to be important habitat for migrating birds or habitat that could concentrate migrants in the areas where turbines are proposed. His physical examination of the Project area and his literature review suggest that the Project habitat would not attract large numbers of migrants. The habitat at the Deerfield site is not suitable for

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<sup>11</sup> The original maximum turbine height for the Project was 100 m (328'). After the completion of the three seasons of radar surveys, a revised turbine height of 125 m (410') was proposed for the Project. The radar flight height data was re-analyzed to calculate the percent of targets flying below 125 m, rather than 100 m. That reanalysis is represented in Table 2 but is not, however, reflected in the three survey reports (Exhs. DFLD-RR/WE-3, 4, and 5), as the change in turbine height occurred after the reports were issued.

stopovers of large numbers of migrating waterbirds, shorebirds, or raptors. Kerlinger pf. at 9-10.

820. The results from five radar studies on Appalachian ridges show that night migrants do not follow ridges and do not fly at low altitudes over the ridges; rather migration proceeds broad-front over a wide geographic area. These results have been confirmed more recently at sites in New York, Pennsylvania, and Vermont. Kerlinger pf. at 15-16.

821. The result of recent analyses of the effects of FAA lighting on night migrating birds at 17 wind power sites across the United States and Canada reveals that red flashing lights do not attract or disorient night migrating birds. Kerlinger pf. at 16.

822. Despite the variation in passage rates documented by the Woodlot studies, the results reported from the Project area are within the range of other studies. The same can be said for mean flight height. Roy/Erickson pf. at 15.

823. Collision risk has been studied at many locations and information on bird collision fatalities from wind turbines is quite abundant. On average, about 2-4 birds have been found to be killed per turbine per year at wind power facilities in the United States. However, the average at a particular site can range from less than one to somewhat more than seven birds per turbine per year. These fatality rates are not likely to be biologically significant, particularly given the population size of common bird species (hundreds of thousands to tens of millions). Kerlinger pf. at 13.

824. Several dozen different species of birds were involved in the collisions represented by the data such that the numbers of fatalities are therefore divided among many species, as opposed to one or two species. Thus, the numbers of fatalities incurred per species is small, both in absolute numbers and relative to each species population. Kerlinger pf. at 13.

825. Estimates of bird mortality at wind projects is likely to be at least an order of magnitude lower than estimates of mortality from most other sources.

Summary of nation-wide bird mortality estimates		
Structure/Cause	Total Bird Fatalities	Reference
Vehicles	60 - 80 million	1
Building and Windows	98 - 980 million	2
Powerlines	10,000 - 174 million	1
Communication Towers	4 - 50 million	1
Wind Generation Facilities	32,000 - 125,000	1
Agricultural Pesticides	67 million	3
Housecats	100 million	4
1 Erickson <i>et al.</i> 2001, updated to number of MW installed, using mean and upper range of per MW mortality estimates from U.S. studies (NWCC 2004)  2 Klem 1991  3 Pimentel and Acquay 1992  4 Coleman and Temple 1993		

Roy/Erickson pf. at 21.

826. Some mortality is expected at the Project site. However, the Project is not expected to have an undue adverse effect on migrating or resident birds because of its size and location, and because of experience at other wind projects. Roy/Erickson pf. at 20.

827. ANR's biologist, Forrest Hammond, testified that the risk of an undue adverse impact to migrating birds would be small based on the information provided by Deerfield Wind. Mr.

Hammond agreed that any remaining concerns could be addressed through post-construction monitoring and adaptive management if necessary. Tr. 12/05/08 at 221-223 (Hammond).

Breeding Birds

828. A breeding bird nest survey was conducted by Mr. Kerlinger in June and July 2003. Two transects were established along the eastern and western project areas. A total of 32 point-count locations were established along these transects. The surveys were commenced about 30 minutes prior to sunrise. During the surveys, any bird that was heard at a point count location was recorded, as were the distance and direction of each bird from the point count location. Kerlinger pf. at 16-17; Exh. DFLD-PK-3.
829. The survey documented a variety of species common to both mature and second-growth northern hardwood forests. A total of 37 bird species were found at the point count locations and another 16 species were found while driving into the site or while walking to and from the transects. No endangered or threatened species were found on or near the project site. No Bicknell's Thrushes were detected, even while using taped playbacks in the densest areas of balsam fir on the eastern mountaintop. This type of bird community (species composition and abundance) can be found at most sites in Vermont above about 2,500 feet above sea level. Kerlinger pf. at 7-8 and 17; Exh. DFLD-PK-3.
830. The Project habitat does not appear to be suitable for nesting by any federally endangered or threatened species, nor was it judged to be suitable for Vermont listed species. Kerlinger pf. at 8 and 11-12; Exhs. DFLD-PK-3 and 5.
831. Dr. Kerlinger examined the potential for both disturbance and displacement of birds that nest and/or forage at the site, and collision fatalities that may occur at the Deerfield site. The Searsburg facility is the only wind facility where forest-nesting bird impacts have been studied.

That study documented small impacts to those species nesting near the turbines.

Fragmentation does not seem to have greatly impacted the site, and is not expected to be an issue at the Project. Kerlinger pf. at 12; tr. 12/02/2008 at 251 (Kerlinger).

832. It is not likely that many of the nesting birds on site will collide with wind turbine rotors.

Construction of the Project and the presence of new infrastructure may affect resident birds, but those impacts should not be biologically significant. Kerlinger pf. at 18.

833. To address potential impacts on breeding birds, Deerfield Wind will time construction, if feasible, to minimize disturbance to nesting birds. The areas surrounding turbines, meteorology towers, roads, and other infrastructure will be allowed to naturally reforest when construction is complete. Kerlinger pf. at 19; tr. 12/02/08 at 252 (Kerlinger).

834. Some construction activities can occur during nesting, but Deerfield Wind will avoid tree cutting and bulldozing during those time periods. Tr. 12/02/08 at 252-253 (Kerlinger).

835. From an impact perspective, it is better for construction to occur during one season rather than to be split over two seasons. Tr. 12/02/08 at 253:11-22 (Kerlinger).

#### Post Construction Monitoring

836. There are a number of ongoing post-construction bird and bat mortality studies currently underway throughout the northeast, central, and mid-coastal US, with an even larger number anticipated to be initiated over the next two years. Properly designed, they represent an expensive annual undertaking, requiring an extensive amount of regular and often tedious field work, including use of scavenger and searcher efficiency trials to account for the possibility of missed mortality. Pelletier reb. at 13-14.

837. Given the level of effort already underway on a national level, it would be reasonable for Deerfield Wind to conduct mortality studies for two years, with an option to include a third

year – and possibly use of adaptive management techniques – should problems present themselves during the first 2 years. This would allow sufficient time for the wind industry as a whole, along with federal and state agencies, to gather and analyze the collective results of other current and ongoing studies, and to use those data to help avoid and minimize future risk. Kerlinger pf. at 19; Pelletier reb. at 13-14; tr. 12/03/08 at 37 (Pelletier).

838. Deerfield Wind is committed to working with ANR on a post-construction avian and bat fatality plan, and will commit to up to three years (two years plus an optional third year) of post-construction fatality monitoring for birds and bats. Habig Panel reb. at 9-10.
839. As the testimony of Scott Darling for ANR has pointed out, there is no single scientifically verified survey methodology available. Deerfield Wind will work in concert with ANR to ensure that: (i) a third party conducts the studies; (ii) study periods cover both spring and fall migration; (iii) scavenging rates and searcher efficiency controls are established for each period of study; (iv) scientifically and statistically valid survey protocols are employed based on the best available scientific information; (v) the methodology minimally impacts other natural resources within the project area including bear and moose habitat; and (vi) ANR reviews the study results at the end of each study year. Habig Panel reb. at 9-10.
840. ANR's witness Darling is confident that Deerfield Wind will agree on the necessary elements of an adequate post-construction monitoring plan. He also acknowledged that Iberdrola's avian and bat protection plan is being developed in a responsible manner. Darling surreb. at 2; tr. 12/02/08 at 268-270 (Darling).
841. A seven day search interval should be adequate. This was found to be appropriate at the Maple Ridge study after statistical analysis and was approved by the US Fish and Wildlife Service, the New York State Department of Environmental Conservation, and the New York

State Audubon Society. Tr. 12/02/08 at 223-225 (Kerlinger); tr. 12/3/08 at 14: 20-25, 15: 1-2, 9-10 (Pelletier).

842. ANR witnesses have raised the concern that post-construction monitoring of birds and bats at the Deerfield Wind site could potentially impact bear use of the area. Tr. 12/05/08 at 223-224 (Hammond).

843. Bird/bat mortality studies can and will be designed to minimize impacts to bears, including the following:

- Conducting the fatality searches for bats and birds at the same time;
- Using the same field researchers during both studies;
- If possible, the studies will use the same search design;
- If possible, searches will be timed so that they avoid the crepuscular period;
- If necessary the studies will not use dogs (for searcher efficiency tests); and
- If possible, studies will be focused in years or seasons where expected bear use is at a minimum.

12/05/08 at 135-136 (Hammond); tr. 12/05/08 at 144 (Parsons).

844. ANR recommends the establishment and funding of an escrow account to support post-construction monitoring studies. Darling surreb. at 3.

845. An escrow account is not necessary or appropriate in this situation. Iberdrola has a proven track record at its other projects of post-construction permit compliance and has demonstrated a significant commitment, as well as a managerial and financial capability, to conduct the surveys. A CPG condition that clearly establishes required post-construction practices serves the same purpose: a petitioner who fails to comply with study-related

requirements would be subject to the Board's authority to impose operational restrictions, monetary penalties, CPG suspension, and/or CPG revocation. These enforcement mechanisms adequately protect the public, and provide clear financial incentives for Deerfield Wind to fully comply with the CPG. Habig Panel reb. at 34; tr. 12/02/08 at 269-273 (Darling and Chairman Volz).

#### Adaptive Management

846. Mitigation measures, also referred to as "adaptive management", would be implemented should the results of post-construction mortality studies reveal that bird or bat fatalities are occurring at an unacceptable level. Adaptive management would consist of some form of operational adjustments in order to reduce fatalities. Proper adaptive management would also require some level of monitoring for documenting its efficacy. Darling pf. at 22.
847. ANR has recommended that the following bat mortality thresholds be established: 5 common bats per turbine/per year; 3 migratory bats per turbine/per year; 0 threatened/endangered bats per turbine/per year. Darling pf. at 19. If average bat fatality estimates for the three post-construction fatality surveys exceed these thresholds, then appropriate mitigation measures should be required to attempt to reduce bat fatalities below such thresholds. Darling pf. at 21.
848. ANR's proposed thresholds were based on an assumed wind energy build-out scenario in the eastern U.S. that is a much more aggressive than what is actually happening. Tr. 12/03/08 at 46-47 (Pelletier).
849. ANR's proposed mortality thresholds for common and migratory bats are likely to be exceeded at the Project, though this may not be indicative of population impacts. Tr. 12/03/08 at 22-23 (Pelletier).

850. Efforts should be made towards developing a legitimate threshold number of fatalities that triggers the need for mitigation measures. However, far too little is currently known about existing regional or local bat populations – common or rare – to associate a meaningful threshold number at this time. The use of a specific number now without input from ongoing and future post-construction monitoring efforts would be premature and not scientifically based. Pelletier reb. at 19.
851. Adaptive management controls can ultimately provide a responsible means of limiting risk. However, a great deal of valuable data and information is currently being generated with ongoing post-construction studies, many of which are helping to provide more narrow windows of potential vulnerability on a seasonal, nightly, and perhaps even hourly basis, and in accordance with specific weather conditions. All of this information can potentially combine to offer a viable means of protecting individual species and populations while minimizing unnecessary operational constraints. Pelletier reb. at 19.
852. There are currently measures in place for protecting listed threatened or endangered species through the incidental take permit process under the federal Endangered Species Act and Vermont's Chapter 123: Protection of Endangered Species Act. Pelletier reb. at 19.
853. Mortality figures at the Mars Hill wind project, a forested ridgeline site, have been very low based on two years of post-construction studies – less than one bat per turbine per year. The Mars Hill site may be the closest operating site to the Project; closer than the southeastern wind projects where there has been higher bat mortality. Tr. 12/03/08 at 50-51 (Pelletier).
854. Information from statewide acoustic surveys in Maryland and operating wind facilities in West Virginia and Pennsylvania suggest that bat activity levels and consequently fatality events decrease dramatically during periods of higher wind speeds and lower ambient temperature.

One model posits that curtailment of operations when wind speeds are at or below 4 m/sec reduces bat collisions by 80%. Darling pf. at 23-24.

#### Other Recommendations

855. To reduce impacts on migrating birds Deerfield Wind will use the lowest intensity red strobe-like lights possible (no steady burning/constant-on beacons) with the longest time-off cycle allowable to reduce the probability of attracting night migrating songbirds. Deerfield Wind will also extinguish all other forms of lighting at night at or adjacent to the project site to avoid attracting night migrants to the vicinity of the turbines. Kerlinger pf. at 14-15.

#### **Discussion on Birds and Bats -- 10 V.S.A § 6086(a)(8)(A)**

With respect to breeding and migrating birds (raptors and songbirds), Deerfield Wind has conducted several surveys over a number of years to characterize available habitat and migratory patterns and potential impacts. The Project site does not pose unique risk factors to bird species. There are no rare, threatened, or endangered species known to be in the area or that would be impacted. Breeding birds already exist within a varied environment of interior and edge habitat. Migratory birds are not found in large concentrations, are not being directed by the ridgeline, and largely fly above the turbine blades. These factors are generally similar to survey results found elsewhere in the northeast. In addition, bird mortality data from other wind projects is low, between one and seven birds per turbine per year, and orders of magnitude lower than fatalities associated with other human-induced activities such as vehicles, buildings, cats, pesticides, and communication towers. The risk to bird populations is thus low, and there is no evidence in the record to the contrary. Nonetheless, Deerfield Wind has agreed to work with ANR on developing a mortality study at this Project to confirm this conclusion, and to respond through adaptive management measures if mortality is higher than expected and poses a significant impact to bird populations.

With respect to bats, Deerfield Wind conducted multiple surveys over several years and collected a great deal of data regarding resident and migratory bats. The assessments show that there are no known rare, threatened, or endangered bat species within the project area. Bat mortality at wind projects in the central Appalachians has recently been identified as an issue of concern. Migrating bats appear to suffer the highest risk. The Project is located at the northern extent of the Appalachians, and very near the northern limit of the ranges of many of the bats found in the Northeast. In addition, the closest modern operating wind farm in New England – Mars Hill – has experienced very low bat mortality. Given these factors, Deerfield Wind's and ANR's bat experts agree that bat fatalities at the Project should be low, although uncertainty remains. Consequently, Deerfield Wind has agreed to work with ANR on developing a bat mortality study at this Project, and to respond through an adaptive management program if mortality is higher than expected and poses a significant impact to bat populations. Given the current research suggesting that the risk of bat fatalities is greatest under certain temperature and wind conditions during migration, it appears that operational curtailment may be a successful adaptive management measure.

With respect to ANR's request for a separate escrow account to be established for the post-construction mortality studies, there simply is no rationale or regulatory basis for the Board to impose such a requirement. As the Board itself observed during the hearings, it has ample enforcement authority should Deerfield Wind not comply with a CPG condition regarding the performance of such studies, including penalties, suspension, or revocation of the CPG. Tr. 12/02/08 at 269-273 (Darling and Chairman Volz). *See* 30 V.S.A. §§ 30, 247. The issue here is not whether Deerfield Wind will lack the financial resources to conduct such studies – project operations involve millions of dollars annually, and Deerfield Wind's witness testified that the company will simply include the study costs in the operational budget should the studies be required

under the CPG. It is also not a question of Deerfield Wind or its parent company dissolving or liquidating as a business, and thereby not being able to perform the studies. If that were to occur (an assumption not supported by any evidence), and the Project stopped operating (or was forced to do so by the Board), there would be no further need for bird and bat mortality studies and the issue would thus become moot.

In sum, the Findings above support a conclusion that the Project will not pose undue adverse impacts to birds and bats, provided that Deerfield Wind conducts the necessary post-construction mortality studies and implements adaptive management measures if they become necessary. Deerfield Wind proposes the following CPG condition:

Deerfield Wind shall submit a post-construction bird and bat mortality study to the Board for review and approval, and shall obtain such approval prior to commencing commercial operation of the Project. Prior to submission to the Board, Deerfield Wind shall first submit a draft of the plan to ANR for its review and concurrence. If after good faith discussions, Deerfield Wind is unable to obtain ANR's approval of the plan, it may submit the plan to the Board for resolution of any outstanding issues and final approval.

The bird and bat mortality study plan shall at a minimum include the following elements:

- The study will be conducted for up to three years, with a minimum of two years. The third year of study will only be required if the average avian and/or bat fatality estimates over the two-year period exceed the current established threshold ranges for mortality at wind projects located on northern forested ridges;
- The studies will be performed by a qualified third party consultant;
- The study periods will cover both spring and fall migration;
- Scavenging rates and searcher efficiency controls will be established for each period of study;
- Scientifically and statistically valid survey protocols will be employed based on the best available scientific information;
- Use of dogs on the project site will be limited to the extent absolutely necessary to design and test valid survey methods;

- The methodology will be designed to minimize impacts other natural resources within the project area including bear and moose habitat; and
- ANR will have the opportunity to review the study results at the end of each study year.

Deerfield Wind will engage with ANR in a cooperative, team-based process to review bird and bat mortality data.

If post-construction monitoring for the two year period demonstrates that the Project is having an undue adverse impact, i.e., avian or bat fatality estimates over the two-year period exceed the most current established threshold ranges for mortality at wind projects on northern forested ridges, Deerfield Wind shall submit an adaptive management plan to ANR and the Board within 6 months of completion of the second year of post-construction monitoring. The adaptive management plan will incorporate reasonable scientifically proven measures to reduce fatality rates of the affected bird or bat species, and include a final third year of monitoring to evaluate the efficacy of the adaptive management measures. Actual measures to be taken will depend on the type and severity of impacts, cost benefit considerations, likelihood of accomplishing the desired outcome, and practicality.

In the event that Deerfield Wind is unable to reach consensus with ANR during this review process, either entity may bring the matter to the Board for resolution. The Board shall retain final review and approval authority regarding the implementation of any adaptive management plan, and the need for a third year of mortality studies.

**M. Development Affecting Public Investments – 10 V.S.A § 6086(a)(9)(K)**

856. The Project will not unnecessarily or unreasonably endanger the public or quasi-public investment in public facilities, services, or lands, or materially jeopardize or interfere with the function, efficiency, or safety of, or the public's use or enjoyment of or access to public facilities, services, or lands. *See* Findings 857-862 below.
857. The Project area is located on private land and on portions of the Green Mountain National Forest, which is owned and controlled by the U.S. Forest Service. The U.S. Forest Service is currently reviewing a Special Use Permit application which seeks federal approval to construct the Project on portions of the National Forest. Zimmerman pf. at 22; DEIS at 3.

858. As discussed above, the Project will not have an undue adverse impact on wildlife habitat or other resources on public lands. *See* Findings 521-855 (Wildlife Habitat)
859. As discussed above under Traffic, the Project will not unreasonably impact any public roads, and Deerfield Wind will bear the cost of any necessary improvements. *See* Findings 304-323 (Traffic), *supra*.
860. The Project's transmission line is being designed in consultation with National Grid/VELCO to preserve the stability and reliability of their systems. Deerfield Wind will bear the costs of any necessary modifications. *See* Findings 169-182, *supra* (b(3)) and 885-894, *infra* (b(10)).
861. The Project will not have an undue adverse impact on aesthetics or historic sites on public lands or facilities that are within the viewshed of the Project, including but not limited to the Green Mountain National Forest, Molly Stark State Park, the Appalachian/Long Trail, Route 8, and Route 9. *See* Findings 352-494 and 495-520, *supra*.
862. The owner and operator of Molly Stark State Park, the Vermont Agency of Natural Resources, Department of Forests, Parks & Recreation, offered no testimony that the Project would unreasonably interfere with the public's use and enjoyment of this resource. *See* record, *generally*.

### **Discussion on Development Affecting Public Investments**

30 V.S.A. § 248(b)(5) requires that the Public Service Board give due consideration to criterion 9(K). 10 V.S.A. § 6086(a)(9)(K) specifically provides:

A permit will be granted for the development or subdivision of lands adjacent to governmental and public utility facilities, services and lands, including, but not limited to, highways, airports, waste disposal facilities, office and maintenance buildings, fire and police stations, universities, schools, hospitals, prisons, jails, electric generating and transmission facilities, oil and gas pipe lines, parks, hiking

trails and forest and game lands, when it is demonstrated that, in addition to all other applicable criteria, the development or subdivision will not unnecessarily or unreasonably endanger the public or quasi-public investment in the facility, service, or lands, or materially jeopardize or interfere with the function, efficiency, or safety of, the public's use or enjoyment of or access to the facility, service, or lands.

The Public Service Board has previously concluded that Criterion 9(K) applies to public investments on "lands physically adjacent to the proposed Project and to lands where the proposed Project has an adverse aesthetic impact." *Northwest Reliability Project*, Docket No. 6860, Order of 1/28/05 at 164; *Amended Petition of UPC Vermont Wind*, Docket No. 7156, Order of 8/8/07 at 103-105. In this case there are only a limited number of resources which could arguably meet this criteria.

First is the Green Mountain National Forest. The Project is located within the Green Mountain National Forest and is adjacent to portions of the Project, however, as described above under the environmental and aesthetic criteria, the Project's impacts will not rise to the level of endangering the public investment in this resource, nor will the Project materially jeopardize or interfere with the function, efficiency, safety, or use of the land.

Moreover, it would be inappropriate for the Public Service Board to prohibit the Project through application of this provision of state law. The U.S. Forest Service is responsible for the management of the Green Mountain National Forest and is conducting a separate permitting process to evaluate the both the Project's impacts on the GMNF and its consistency with the Forest Plan. As noted in Deerfield Wind's brief on preemption, given the extensive nature of the federal planning scheme here, it is not reasonable to conclude that Congress intended to provide states a veto power over activities on federal land if the state separately determines that the project may interfere with the public's use and enjoyment of such lands. That result would be inconsistent with the intent of the comprehensive federal land use planning scheme and would frustrate the Forest Service's congressional authority to determine the proper balance of the multiple uses on federal

land which "best meet the needs of the American people." Congress has fully occupied the field of land use planning on Federal land.

The Forest Service has already specifically concluded that the Project:

- is consistent with the laws, regulations, orders, and policies establishing or governing National Forest System (NFS) lands, with other applicable Federal laws, and with applicable State and local health and sanitation laws;
- is consistent or can be made consistent with standards and guidelines in the applicable forest land and resource management plan prepared under the NFMA and 36 CFR part 219;
- will not pose any serious or substantial risk to public health or safety; and
- will not unreasonably conflict or interfere with administrative uses by the Forest Service, other scheduled or authorized existing uses of the National Forest System, or use of adjacent to non-National Forest System lands;

The Board's ability to review criteria 9(K) issues as they relate to the GMNF is preempted.

Route 8 is also adjacent to portions of the facility, but there is no evidence that traffic from the project (or views of the Project) will endanger or materially jeopardize or interfere with the public's use of this resource.

Finally there will be limited views of the Project from other public resources including Molly Stark State Park, Route 9, and the Appalachian/Long Trail. To the extent that the Project will actually be visible from any of these resources, both aesthetic experts have concluded that the visual impact of the Project will not be unduly adverse and thus will not rise to a level that will materially interfere with the public's use or enjoyment of those public investments. Furthermore, Vermont Department of Forests, Parks and Recreation ("FPR") is the owner and manager of Molly Stark State Park and has not filed any testimony regarding adverse visual impacts to those state properties. FPR is a department of ANR, which not only is a party to this proceeding but is also affirmatively charged by statute to "provide evidence and recommendations concerning any findings to be made

under subdivision (b)(5) of [section 248] . . . .” The Department’s silence on this issue further supports what the record evidence indicates: that the Project satisfies the requirements of Criterion 9(K) with respect to this State Park.

#### **N. Public Health and Safety**

##### **Icing**

863. Through normal winter operation, wind turbines and other structures will accumulate ice. Ice falling from overhead structures or wind turbine rotor blades presents a potential hazard to persons in close proximity to the overhead structures. Zimmerman pf. at 55.
864. Site technicians for the Project will follow proper safety procedures, developed by the O&M services provider based on experience and any applicable federal or state safety codes when working in this environment. Working with the Forest Service, Deerfield Wind will develop plans to control public access to the turbines when dangerous icing conditions exist. Zimmerman pf. at 55; Zimmerman reb. at 6; DEIS at 346-347.
865. Icing can be detected when a turbine is generating less power than would be expected based on wind conditions. Tr. 12/12/08 at 201-202 (Goland).
866. Wind turbines will automatically go into standby mode when the generator speed falls below 850 RPM. Significant ice buildup will cause the generator speeds to fall; thus, when significant ice buildup has been detected on a turbine, that turbine will automatically go into standby mode and operational personnel will determine whether to implement “ice rules.” When ice rules are implemented a safety radius is to be established around the tower base. Service personnel will not be allowed within the safety radius and service vehicles will not be allowed to stop within the safety radius. Turbines can remotely be taken off-line from the Operations building as necessary. Ice rules will be rescinded when conditions improve and operation

personnel otherwise determine that site conditions warrant it. Tr. 12/12/08 at 201-202 (Goland); Zimmerman reb. at 6.

867. Iberdrola's operational experience at the Casselman wind facility has been that the majority of ice has dropped underneath the turbine. In some instances, ice has been thrown from turbine blades to distances of up to approximately 500 feet. No ice has been observed at greater distances. The turbines used at the Casselman facility consist of 77 meter rotor blades on 80 meter towers, similar to those proposed for the Deerfield Project. Tr. 12/12/08 at 199-205 (Goland).
868. Studies indicate that an appropriate (and conservative) safety distance, beyond which the probability of being injured by falling ice is very low, is approximated by one and one half times the sum of a turbine's hub-height plus its rotor diameter. Zimmerman pf. at 55; Zimmerman reb. at 6. For the Gamesa G87, this corresponds to a distance of  $1.5 \times (78.7\text{m} + 87\text{m}) = 248.6$  meters (820 feet). For the Gamesa G80, this corresponds to a distance of  $1.5 \times (78.7\text{m} + 80\text{m}) = 238.1$  meters (786 feet). There are no public areas or private residences within this radius of the turbines. Tr. 12/12/08 at 199-205 (Goland)..
869. In eleven years of operation, there have been no instances of injury as a result of icing conditions reported at the Searsburg facility. Zimmerman pf. at 55; Zimmerman reb. at 5.
870. In the winter of 1996-1997, a large piece of ice was observed at the base of a turbine at the Searsburg facility. The facility was not operating at that time as the turbines were awaiting commissioning. Ice built up on the top of the nacelle, slid off the nacelle's fiberglass surface when the temperature warmed, and landed at the base of the tower. When a turbine is operating, the heat generated inside the nacelle prevents such ice buildup. Since that time, the

plant has been in service over the winter months, and this phenomenon has not been experienced again. Zimmerman reb. at 5; tr. 12/11/08 at 84 (Zimmerman).

871. The roaring described by John Zimmerman in his e-mail from 2000, Exh. IWAG-7, due to rime ice buildup occurred at the turbine on Mt. Equinox, not at the Searsburg facility. Tr. 12/11/08 at 97 (Zimmerman).

872. The ice observed by Mr. Zimmerman at the Mt. Equinox and Searsburg sites (Exh. IWAG-7) was within 200 feet of the turbines. Mr. Zimmerman has never witnessed evidence of ice being thrown an eighth of a mile or a quarter of a mile at those sites, which he has visited approximately six times each. Tr. At 12/11/08 at 121-122 (Zimmerman).

873. There are no studies in the record that support the use of a one-quarter mile or one-half mile distance as an appropriate or necessary safety zone for ice throw; rather, at most it represents the maximum theoretical distance ice could be thrown under ideal conditions from turbines of a different height and size. The common development practice of avoiding erecting turbines within one half mile of residences is based on noise, not ice safety. Tr. 12/11/08 at 79-80 (Zimmerman); tr. 12/11/08 at 99 (Zimmerman).

#### Shadow Flicker

874. Deerfield Wind's consultants modeled the potential for shadow flicker that would be caused by Project turbines. The analysis shows that potential shadow flicker caused by the Project will not be a nuisance in the area. The conservative model output shows low occurrence of flicker throughout the surrounding areas, and the presence of dense mixed vegetation around

the Project site will reduce or eliminate the flicker in most areas. Exh. DFLD-JZ-18 at 3. *See also*, Exh. DFLD-JZ-31a-b.<sup>12</sup>

875. With existing vegetation considered, Deerfield Wind's modeling shows that there will be no shadow flicker at Thomas Shea's residence. Even when making the conservative assumption of no shielding from vegetation, the modeling showed only 1-10 hours of potential shadow flicker per year at Thomas Shea's residence. Zimmerman reb. at 4; Exh. DFLD-JZ-31a-b.

### **Discussion on Public Health and Safety**

The Project will not have an undue adverse effect on public health and safety.

First, ice that may form on the wind turbines will not pose undue risks to on-site workers or the general public. The risk of injury due to ice being shed or thrown from the turbines is extremely low. Experience at other wind projects – including Iberdrola's Casselman project, the Searsburg facility, and the Mt. Equinox facility – has shown that ice on turbines will primarily fall straight to the ground or within a relatively short distance. In addition, turbine icing can be detected and adequately managed. Significant icing will cause the turbines to automatically go into standby mode, after which "ice safety rules" will be put into effect to protect facility personnel. Deerfield Wind will also develop plans in coordination with the Forest Service to control public access to the turbines when potentially hazardous icing conditions exist, including the posting of warning signs and the use of gates on project access roads. No public roads, trails or other public areas, or private residences would be affected.

Second, the Project will cause little if any shadow flicker at surrounding residences, including at Thomas Shea's residence.

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<sup>12</sup> The shadow flicker maps in this exhibit supercede those found in JZ-18.

Finally, the Project will not generate noise levels in excess of any health-based standard. *See*, Findings 244-251, 444-494, *supra*.

**30 V.S.A. § 248(b)(6) – INTEGRATED RESOURCE PLANNING**

876. This criterion is not directly applicable to this Project. Deerfield Wind is not a regulated distribution utility and thus is not required to submit for Board approval a least cost integrated plan. However, inasmuch as integrated resource planning is relevant to any Board determination under section 248, Green Mountain Power (“GMP”), the Vermont utility that has executed a letter of intent regarding the purchase of power from this Project, seeks to develop a diverse supply portfolio that includes a mix of renewable and non-renewable energy. In fact, GMP’s 2007 IRP<sup>13</sup> identifies renewable generation (including wind) as a priority supply resource for the company. Smith pf. at 5. GMP’s 2003 IRP action plan specifically stated that the Company should “assess the merits of acquiring additional renewable resources, such as wind power.” *Id.* Over the long term, GMP aims to develop a portfolio comprised of 10-20 percent renewables. Tr. 12/9/08 at 118: 14-16 (Smith).

**Discussion on § 248(b)(6) – Integrated Resource Planning**

The Board has previously held that merchant plants are not required to prepare or submit Integrated Resource Plans, and that section 248(b)(6) therefore is not applicable to merchant plants. *See Petition of Entergy Nuclear Vermont Yankee, LLC*, Docket No. 6812, Order of 3/15/2004 at 103. The provision thus does not apply to this Project.

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<sup>13</sup> The GMP 2007 IRP was not yet approved at the time the Smith testimony was filed in this case.

**30 V.S.A. § 248(b)(7) – VERMONT ELECTRIC ENERGY PLAN**

877. The revised 15-turbine project complies with Vermont's Electric Energy Plan. This finding is supported by Findings 878-884, below.
878. Under 30 V.S.A § 202(f), the Department of Public Service (DPS) is responsible for making a determination of the Project's compliance with the Vermont Electric Energy Plan. Deerfield Wind submitted a request to the DPS for this determination. Zimmerman pf. at 64.
879. The DPS determined that the Project complies with the 2005 Vermont Electric Plan. Thomas/ Lamont pf. at 11; Lamont reb. at 4.
880. The revised 15-turbine project complies with the goals, recommendations and priorities established by the 2005 Vermont Electric Plan. The overarching goal of the Plan is "to meet Vermont's electric energy needs in a manner that is efficient, adequate, reliable, secure, sustainable, affordable, safe, and environmentally sound, while encouraging the State's economic vitality and maintaining consistency with other state policies." Plan at 1-4.<sup>14</sup> The Project is consistent with this broad goal. The Project will provide 30 MW of new renewable energy in an efficient, reliable, secure, sustainable, affordable, safe, and environmentally sound manner.
881. To achieve these goals, the Plan identifies several priorities for the State of Vermont, including resource diversification, lower cost electric service, and the promotion of clean and stable energy sources. Plan at 10-20. Increased wind power can play an important role in advancing each of these priorities.

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<sup>14</sup> The Board may take judicial notice of the 2005 Electric Plan, in accordance with 3 V.S.A. § 810(4).

882. Operation of the Project would result in greater diversification of Vermont's energy portfolio and would add another energy source that does not rely on inputs from outside the state. This increased diversification will, in turn, help buffer against increasing energy costs. The Plan acknowledges that, "[w]ind should be viewed as a component in a balanced portfolio of resources that can importantly act as a hedge against fluctuating fossil fuel prices." Plan at 5-6.
883. Wind similarly plays a critical role in "environmentally sound electric energy supply." The Plan emphasizes that, "[e]nhancement and conservation of our natural resources and mitigation of the impact of necessary energy production and use on air, water and land are basic governmental responsibilities. Planning for future electric energy needs must also address air and water quality objectives." Plan at 1-6. Wind is a clean source of energy, and no air pollution will be generated. Energy produced by the turbines will, in fact, decrease the overall emissions from fossil fuel plants, which would otherwise be needed to supply energy being produced by the wind farm. The Project will also not result in undue water pollution. *See Findings 252-303 above.*
884. The Project represents a commitment to the type of clean, reliable, affordable, and sustainable energy future envisioned in the Plan.

**30 V.S.A. § 248(b)(10) – TRANSMISSION FACILITIES**

885. The Project can be served economically by existing or planned transmission facilities without undue adverse effect on Vermont utilities or customers, as demonstrated by Findings 886-894 below.
886. Findings 169 to 182, *supra* (section 248(b)(3)) above are incorporated herein by reference.

887. Deerfield Wind will bear all the costs of the interconnection, with no impacts to Vermont utilities or ratepayers. Zimmerman pf. at 67.
888. The proposed point of interconnection for the Project is the National Grid/VELCO 69 kV line designated Y25N, which is the closest utility transmission line. Estey pf. at 3; Exhs. DFLD-DE-2 and -3.
889. National Grid has upgraded its portion of the Y25N line such that it is capable of handling a minimum of 65 MW. VELCO is in the process of making similar upgrades on the portion of the line that it owns. Estey pf. at 3.
890. The Project's substation will be located immediately adjacent to the existing National Grid 69 kV Y25N transmission line, in the northern part of the western project area. The Y25N line will be split and subsequently terminated within the new substation to create two transmission line segments where one previously existed – one from the new substation west to VELCO's Bennington substation, and the other segment east to National Grid's Searsburg Station. Estey pf. at 3; Exh. DFLD-JZ-30a; Exh. DFLD-JK-11 (sheet CS113).
891. The primary purpose of the substation is to provide a means of isolation between the wind generators and the transmission system and to provide for a change in voltage from the medium voltage collector system to the 69 kV transmission system. Estey pf. at 3.
892. While the Sleepy Hollow Substation is more central to the Project than the proposed substation location, National Grid concluded in the Feasibility Study that use of the Sleepy Hollow Substation as an interconnection point would require both expansion of that substation as well as the addition of a new substation (3 breaker ring bus) at the Sleepy Hollow tap point on the Y25N transmission line in order to provide adequate line protection and reliability. The requirement to construct essentially two new substations is more intrusive and

less cost effective than building a single new substation. The required new construction would mean doubling, if not tripling, the size of the existing Sleepy Hollow Substation and paying qualified electrical workers to work in an energized substation. Furthermore, the presence of a wetland restricts possible interconnection points. As a result, this is not a viable option. Estey pf. at 7; Estey suppl. pf. at 2-3; tr. 12/1/08 at 212-214 (Estey); tr. 12/2/08 at 32-33 (Habig).

893. The proposed substation is the most economical interconnection alternative, and will have no cost impact on Vermont utilities or their ratepayers. Estey pf. at 11; Estey suppl. pf. at 3.

894. The addition of the new substation will provide the utilities with better sectionalizing capabilities and offer improved reliability to the existing line by allowing either the westerly segment or the easterly segment to be interrupted as opposed to the entire line under its present configuration. Estey pf. at 11.

#### **Transmission Facilities Discussion – 30 V.S.A § 248(b)(10)**

The Project can be served economically by existing or planned transmission facilities without undue adverse effect on Vermont utilities or customers in compliance with section 248(b)(10).

Deerfield Wind will bear all the costs of the Project substation and its interconnection to the National Grid/VECLO 69 kV transmission line. Construction of the Project's substation in the northern part of the western project area is the most practical and efficient alternative. Expansion of the existing GMP Sleepy Hollow Substation and construction of a second substation for a three ring bus at the Sleepy Hollow tap, which would also be required, is not a viable option due to wetlands impacts, space constraints at the existing substation, and resulting higher costs.

#### **V. CONCLUSION**

Based on the above facts, the Board should find that the Deerfield Wind Project meets all of the section 248 criteria. The impacts of this Project have been exhaustively evaluated. There were

nine days of hearings and over forty witnesses provided testimony. The Board (and the parties) scrutinized the Project and its potential impacts in a detailed manner, and Deerfield Wind modified the Project twice to address concerns and further reduce impacts. While the Project will certainly have adverse impacts on some resources the extensive record in this case documents that the Project's benefits clearly outweigh those impacts. The Board should approve the Project.

Deerfield Wind will file a Proposed CPG incorporating Deerfield Wind's recommended CPG conditions following review of the other parties' filings in this case.

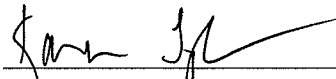
DATED at Burlington, Vermont this 22<sup>nd</sup> day of January, 2009.

**Deerfield Wind, LLC**

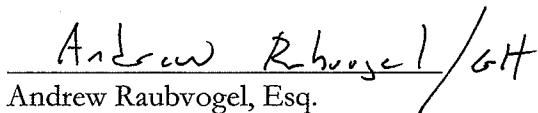
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**APPENDIX A**

**Deerfield Wind Project section 248 Proceeding -- Permissive Intervention (as of 12/21/07)**

Party	Date Granted	248 b(1) - Orderly Development	248(b)(2) - Need	248(b)(3) - Stability/Reliability	248 b(4) - Economic Benefits	Section 248(b)(5) and (b)(8)						248(b)(6) - Consistency with Least Cost Integrated Plan	248(b)(7) - Consistency with Depr. Electric Plan	248(b)(10) - Transmission Facilities
						ORW Waters	Aesthetics	Historic Sites	Environmental Criteria 1-7, 9k	Wildlife - Criteria 8(A)				
WRC <sup>2</sup>	11/6/07, 12/12/2007	X	X	X	X	X	X	X	X	X	X	X		
T. of Searsburg <sup>1</sup>	11/6/2007	X	X		X				1, 5					
T. of Readsboro <sup>1</sup>	11/6/2007	X	X		X				1, 5					
T. of Wilmington <sup>2</sup>	11/6/07, 12/12/2007	X	X		X				9c (forest)	X				
VNRC <sup>1</sup>	11/6/2007							X	X	X				
CLF <sup>1</sup>	11/6/2007	X	X		X			X					X	
VPIRG <sup>1</sup>	11/6/2007	X	X		X			X					X	
Fairwind VT <sup>1</sup>	11/6/2007	X	X		X			X	X	X				
GMP	11/6/2007	X	X	X	X			X	X	X	X	X	X	X
Save VT Ridgelines <sup>2</sup>	12/12/2007	X	X	X	X			X	X	X	X	X	X	X
Industrial Wind Action Group <sup>3</sup>	12/12/2007	X		X	X									X

<sup>1</sup> The detailed environmental criteria on which the Board permitted parties intervening on criteria (b)(5) and (b)(8) to intervene were often not specified in the order. Thus, this list is approximate based when possible on the language in the parties' own motions to intervene.

<sup>2</sup> Granted, with its interests limited as specified in SVR's Articles of Incorporation, which provide that the organization was established "to preserve the natural condition of Vermont's mountain landscape and to protect it from the negative impacts of wind-energy development, and to promote the orderly development of energy resources and responsible management of energy needs to minimize the adverse environmental and economic impact of energy use in Vermont."

<sup>3</sup> Granted, with its interests limited to those identified in IWAG's November 15, 2007 letter, which provides, in relevant part "the purpose of IWA is to raise awareness as to the

