STATE OF VERMONT
PUBLIC SERVICE BOARD

Petition of Georgia Mountain Community Wind, LLC
for a Certificate of Public Good, pursuant to
30 V.S.A. § 248, authorizing the construction and
operation of a three to five turbine wind electric
generation facility, in Georgia and Milton, Vermont

I. Introduction

Georgia Mountain Community Wind, LLC petitioned the Public Service Board for a Certificate of Public Good for the construction and operation of the Georgia Mountain Community Wind Project, a 3-5 wind turbine electric energy facility on approximately 45 acres of property on Georgia Mountain in the Towns of Milton and Georgia. This Proposal for Findings of Fact, Conclusions of Law and Order sets forth the findings and recommendations of the Vermont Agency of Natural Resources (Agency or ANR) with respect to criteria relating to natural resources in accordance with 30 V.S.A.§ 248(b)(5).

II. Findings

1. The total project area of impact is approximately 45 acres, along the ridgeline of Georgia Mountain, a rare and irreplaceable natural area, in the towns of Milton and Georgia.

A. 30 V.S.A.§ 248(b)(5) – Aesthetics, Historic Sites, Air and Water Purity, the Natural environment, and the Public Health and Safety

2. Absent the proposed mitigation described below, the Project will have an undue adverse impact on the natural environment, with due consideration having been given to the criteria specified in10 V.S.A. §§ 1424a(d) and 6086(a) (1) through (8) and (9)(K).

Water and Air Pollution

[10 V.S.A. § 6086(a)(1)]

Outstanding Resource Waters

[10 V.S.A. § 1424(a)(d), 30 V.S.A. § 248(b)(8)]

3. There are no Outstanding Resource Waters in the Project area. AE-2 at 30.

Water and Air Pollution

[10 V.S.A. § 6086(a)(1)]

4. The Project will not "result in undue air pollution." The wind turbines will not generate any air pollutants. Accordingly, operation of the Project will not require an air pollution control permit from ANR.

Wetlands

[10 V.S.A. § 6086(a)(1)(G)]

5. The Vermont Significant Wetland Inventory maps do not identify any Class I wetlands within the Project area. AE2 at 24.

6. The Project as currently proposed will not require a conditional use determination (CUD) Quackenbush, Direct pf at page 3, lines 12-13.

7. The Project as proposed will not directly impact any Class I or Class II wetland resources. AE-2 at 25.

8. There are two Class III wetlands within the vicinity of the Project area which have significant functions, Wetland # 31, and # 8. AE-2 at 25.

9. There are three Class III wetlands that will be directly impacted by the proposed Project, Wetland #22, Wetland #15, and Wetland # 34. AE-2 at 25.

Soil Erosion

[10 V.S.A. § 6086(a)(4)]

10. The project has obtained an operational stormwater permit and a NPDES construction permit from ANR. Cross I Tr. 91-92

11. The stormwater features will remain throughout the life of the project. Cross Tr. at 93 lines 20-23.

12. Along the roadway, stormwater collection channels or ditches will be constructed to detain and redirect water. The ditches will be lined with stone riprap. The ditches are approximately 70 feet wide from top of slope to the opposite back of slope. Cross Tr. at 96 lines 1-16.

13. The stone lined channels are a permanent stormwater feature that will remain in place during the life of the project. Cross Tr. p. 96 at lines 17-20.

14. The project will include four detention ponds and one sediment trap. Cross I. Tr. at 98 lines 20-25.

Rare and Irreplaceable Natural Areas (RINA)
10 V.S.A. § 6086(a)(8)

15. Absent the mitigation proposed by ANR the project will result in an undue adverse impact to the rare and irreplaceable association of natural communities on Georgia Mountain.

I. Project site

16. The Project area occurs within the Champlain Valley biophysical region of the state. AE-2 at 2, Sorenson pf direct at 8. Lew-Smith Tr. at 95.

17. The Georgia Mountain Community Wind project site is forested. Lew-Smith, Tr. page 98, lines 14-18.

18. The site consists of a forest canopy. Lew-Smith Tr. at page 98.

19. The Champlain Valley is the most densely developed biophysical region in Vermont. Sorenson Direct pf. at 9.

20. The forest landscape is diminishing in the Champlain Valley biophysical region as a result of development pressure. Lew-Smith Tr. at p. 97, lines 20-25.

21. Most of the development in the Champlain Valley Biophysical region is taking place in the forests. Lew-Smith Tr. page 97, lines 22-25.

22. Invasive non-native species are not currently present in the project area. Sorenson Tr. at 183, lines 12-15. See generally Exhibit AE-2.

II. Methodology for Assessing Rare and Irreplaceable Natural Areas

23. The review of natural resource issues requires the evaluation of impacts at three scales: species scale, natural community scale, and landscape scale. Sorenson Direct pf. at 3.

24. The primary concern at the species scale of review for projects like GMCW, are rare plant and animal species, birds, bats, bear, and deer. Sorenson Direct pf. at 3.

25. The primary concerns at the natural community scale are rare, uncommon, and state-significant natural communities, as well as wetlands in general. Sorenson Direct pf. at 3.

26. The third and largest scale is the landscape scale. The primary concerns at this broad scale are the associations of state-significant natural communities (state-significant site), ecological processes that influence these natural communities, and interior forest wildlife habitat. Sorenson Direct pf. at 3.

27. Natural communities are interacting assemblages of plants and animals, their physical environment, and the natural processes that affect the organisms and the environment. Sorenson Direct pf at 4.

28. These assemblages of plants, animals, and other organisms found in natural communities repeat wherever certain environmental conditions (such as soil, hydrology, and climate) are found. Sorenson Direct pf at 4.

29. Whereas a natural community refers to an actual occurrence on the ground, a natural community type is a composite description summarizing the characteristics of all known examples of that type. Sorenson Direct pf. at 4.

30. The Agency of Natural Resources, Non-game natural heritage program (NNHP) 1 has developed a classification of more than 80 natural community types2.

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1 While this matter has been pending, the name of the Nongame Heritage Program (NNHP) has changed to the Natural Heritage Information Center Project. Sorenson Tr. at 150. To avoid confusion, the program will be referred to here as the Nongame Heritage Program (NNHP)

Each natural community type is ranked according to its relative rarity in Vermont. Sorenson Direct pf. at 4.

31. The following State Rarity Rank system is used by the VFWD, and is based on the known number of occurrences of a natural community type, the total area occupied by the type, and the quality or condition of most occurrences:

> **S1**: very rare in the state, generally with fewer than five high quality occurrences;
> **S2**: rare in the state, occurring at a small number of sites or occupying a small total area in the state;
> **S3**: high quality examples are uncommon in the state, but not rare; the community is restricted in distribution for reasons of climate, geology, soils, or other physical factors, or many examples have been severely altered;
> **S4**: widespread in the state, but the number of high quality examples is low or the total acreage occupied by the community type is relatively small;
> **S5**: common and widespread in the state, with high quality examples more common.

32. The Agency considers S1 and S2 natural community types to be rare in Vermont. Sorenson Direct pf. at 5.

33. The Agency considers those natural community occurrences that meet a combination of Rarity Rank (for the type) and quality (Element Occurrence Rank) to be state-significant natural communities. Sorenson Direct pf. at 5.

34. Almost all examples of rare natural community types are considered state-significant, whereas only the very best examples of common (S5) community types are considered state-significant. For uncommon (S3) and widespread (S4) types, those examples that are excellent to good are considered state-significant. Sorenson Direct pf. at 5.

35. The Agency considers state significant examples of more common community types that have exceptional characteristics, such as the presence of old growth forest patches or very large and unfragmented size, to warrant conservation of the community as a rare and irreplaceable natural area. ANR exhibit 10 at 4, and pages 2-3. AE-2 at 4-5.

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2 Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont. E.H. Thompson and E.R. Sorenson. 2000 and 2005. Published by The Nature Conservancy and Vermont Department of Fish and Wildlife, distributed by University Press of New England.

36. Examples of state-significant natural communities are tracked by the VFWD in the database maintained by the Nongame and Natural Heritage Program. This database currently includes information on approximately 1,500 state-significant natural communities in Vermont.

37. The final ranking of a natural community occurrence is based on a decision by ANR NNHP personnel. AE-2, at 5,

38. It is appropriate to conduct a landscape analysis of the Georgia Mountain site. Lew-Smith Tr. at 96.

39. The landscape context of a natural community describes the physical structure, the extent, and the condition of the surrounding landscape. ANR Cross Exhibit 10

40. A landscape context that is highly connected by intact natural communities, with little or no fragmentation by roads or other barriers, and with species interactions and natural processes occurring across the landscape is highly rated. ANR- Cross 10

41. The NNHP also evaluates associations of natural communities. A site may be considered State Significant if it contains an association of natural communities that characterizes a particular part of the landscape and for which ecologically intact examples are rare or declining in the state. ANR Cross Exhibit 10 at 3.

42. An association of natural communities is a state-significant site where it includes two or more natural communities that are at or near state-significant level, that have a strong ecological connection with each other, and that are a good representation of a declining or rare landscape feature in the biophysical region. ANR Cross Exhibit 10 at 3; Sorenson Direct pf. at 5-6.

43. A state-significant site may be a small-scale feature such as a mosaic of marsh types within a wetland complex or it may be a landscape scale feature such as an association of oak-pine forest types on warm, dry mountain slopes and summit. Sorenson Direct pf. pages 5-6. See also ANR Cross Exhibit 10.

44. The natural communities in these associations are typically closely linked by ecological characteristics of the site, such as topography, soils, hydrology, or natural disturbance. ANR Cross Exhibit 10 Check

45. The association of natural communities is the State-Significant feature, not necessarily all of the individual natural communities that are components of the

association, although at least one component natural community should be State-Significant. Eric Sorenson Direct pf at

46. Natural communities that have managed to remain unimpacted have an even greater role with respect to their significance in the natural environment. Lew-Smith Tr. page 122 lines 23- page 123, lines 2.

47. When evaluating and ranking natural community types, one should take into consideration the area that is to be impacted including the surrounding natural communities in the vicinity of the proposed clearing. Michael Lew Smith question 9 at 4.

48. In assessing natural communities, the agency reviews the full ecological extent of the community and does not limit its review or base its review on private property boundaries. It reviews the full ecological extent of the community. Sorenson Tr. at page 153, lines 8-19.

III. Natural Communities in the Project Area

49. Georgia Community Site contains seven state significant natural communities. The following five significant natural communities were mapped in the project area by the Petitioner's ecologist.
    i. Dry Oak-Hickory-Hophornbeam Forest (S3)
    ii. White Pine-Red Oak-Black Oak-Forest (S3)
    iii. Mesic Red Oak-Northern Hardwood Forest (S4)
    iv. Northern Hardwood Forest (S5)
    v. Hemlock Forest (S4) Sorenson Direct pf at 6-7; Exhibit AE-2 at 8.

50. In addition, previous inventory work on Georgia Mountain documented two other significant communities on Georgia Mountain: Dry Oak Forest (S3) and Rich Northern Hardwood Forest (S4) Sorenson Direct pf at 6.

51. The uncommon (S3) Dry Oak-Hickory-Hophornbeam Forest and White Pine-Red Oak-Black Oak Forest occur as relatively small forest patches (10 to 40 acres) on the GMCW project area and dry, rocky land farther to the north and northwest on Georgia Mountain. Sorenson Direct pf. at 7

52. The widespread (S4) Mesic Red Oak-Northern Hardwood Forest and common (S5) Northern Hardwood Forest occur as the dominant forest types on Georgia Mountain, occupying at least 500 and 1,500 acres, respectively. It is the large size and relatively unfragmented condition of these natural communities that make them state-significant examples. Sorenson Direct pf. at 7-8

53. The project site includes 519 acres of Mesic Red Oak-Northern hardwood forest. The forest extends beyond the study area to include an additional forest of approximately 170 acres in size. AE-2 at 8.

54. The Mesic Red Oak-Northern hardwood forest on the Georgia Community Wind site is intact and contiguous. Lew- Smith Tr. at 100, lines 10-13.

55. The Mesic Red Oak Northern hardwood forest is a relatively large forest in the Champlain Valley biophysical region. Lew- Smith Tr. at 100, lines 6-9.

56. The Mesic red oak-northern hardwood forest is a state significant site. Exhibit AE-11.

57. The variations in soil depth of the Mesic red- oak northern hardwood forest create the variations in the vegetation of the forest. Exhibit AE-2 at 11.

58. There are approximately 38.5 acres of dry oak-hickory-hophornbeam forest in the Georgia Mountain study area. Exhibit AE-2 at 8.

59. The dry oak hickory hophornbeam forest community type occurs primarily on the summit and southern slopes of Georgia Mountain. Exhibit AE-2 at 13.

60. The soils are shallow and well to rapidly drained, bedrock outcrops are common throughout these forests. These factors combined with their southern slopes yields a community that has affinities with more southern forests. Exhibit AE-2 at 13.

61. The Georgia Mountain site contains approximately 143 acres of Northern Hardwood Forest. The Forest extends beyond the study area and includes 1500 acres of forest. Exhibit AE-2 at 8.

62. The Georgia Mountain site includes 8.6 acres of white pine-red oak-black oak forest. This forest occupies drier areas with shallower soils and frequent bedrock outcropping. Exhibit AE-2 at 15-16.

63. The Georgia Mountain site includes approximately 37.5 acres of hemlock forest. Exhibit AE-2 at 8.

<u>IV. The Association of natural communities on Georgia Mountain is a state significant site</u>

64. The association of state-significant natural communities on Georgia Mountain is a state significant site. Sorenson Direct pf. at 8.

65. A state-significant site is one that includes two or more natural communities that are at or near state-significant level, that have a strong ecological connection with each other and that are a good representation of a declining or rare landscape feature in the biophysical region. Sorenson Direct pf. at 8.

66. Georgia Mountain includes state-significant examples of Dry Oak Forest, White Pine-Red Oak-Black Oak Forest, Dry Oak-Hickory-Hophornbeam Forest, Red Oak-Northern Hardwood Forest, Northern Hardwood Forest, Rich Northern Hardwood Forest, and Hemlock Forest. Sorenson Direct pf. at 8.

67. These natural community types, especially the variety of oak-pine forest types, are characteristic of the warm, acidic, Cheshire Quartzite hills on the eastern side of the Champlain Valley biophysical region. Sorenson Direct pf. at 8.

68. This range of Mesic northern hardwood forest types to dry oak-pine forest types is an excellent representation of the diversity of natural community types that can occur in the acidic, low hills of this region. This diversity of types and especially the presence of oak-pine forest types that disappear to the north and east as the hills get higher and cooler make Georgia Mountain an especially important example. Sorenson Direct pf. at 8-9

69. Current development pressure and past clearing for agriculture has reduced the extent of natural sites like Georgia Mountain dramatically within this biophysical region. Sorenson Direct pf. at 9; Lew-Smith Tr. page 105, lines 16-21

70. It is the presence of this association of natural communities and their size that makes Georgia Mountain a state-significant site. There are approximately 4,700 acres of contiguous habitat at Georgia Mountain, extending north to the Lamoille River and east to Prospect Hill. Sorenson Direct pf. at 9.

71. Existing and permanent habitat fragmentation within these 4,700 acres is mostly limited to Class 4 roads, the cellular phone tower, and its access road. Sorenson Direct pf at 9.

72. Within this relatively unfragmented habitat all the components of healthy, functioning, and adapting natural communities are expected to occur: native plants characteristic of each natural community type; ecological processes that influence plant distribution, soil development, and hydrology; and wildlife species that rely on interior forest conditions and/or use the mast fruit produced by the oak and beech of these natural community types. Sorenson Direct pf. at 9.

V. The association of state significant natural communities on Georgia Mountain is rare and irreplaceable

73. Only the Agency, the Public Service Board, or the District Commission can make a determination that a state significant site is a RINA. Sorenson Tr. at page 168 lines 12-17.

74. More common natural communities can be considered rare and irreplaceable. Lew- Smith Tr. p. 121 lines 25- page 122 lines 2

75. The excellent representation of state-significant oak-pine forest natural community types characteristic of the warmer, acidic low hills of the Champlain Valley biophysical region make this a rare natural area within the region. Sorenson Direct pf. at 10.

76. This association of natural communities is large and relatively unfragmented. The presence of this large and unfragmented association of natural communities within the highly developed Champlain Valley contributes to Georgia Mountain's significance as a rare natural area within the region. Sorenson Direct pf. at 10-11.

77. A natural area, rare at the scale of the unfragmented habitat present at Georgia Mountain, is irreplaceable once the habitat is permanently fragmented or lost to development. Sorenson Direct pf. at 11.

78. Size is an exceptional characteristic or feature of a significant natural community or association of state significant natural communities that can qualify the community or association of communities as a rare or irreplaceable natural area. ANR Cross Exhibit 11

79. What makes this association rare is the size. The Georgia Mountain site is a very large example of the association of natural communities in the Champlain Valley. Sorenson Tr. 191 lines 1-10.

80. It is one of the two largest examples known in the Champlain Valley Biophysical region. It is the combination of the uncommonness of the association and the rare feature of its large size or scale of this site that makes it so exceptional. Sorenson Tr. page 191, lines 22 – page 192 line 1-10.

81. Natural processes predominate in the large and contiguous area of habitat over human influences. Sorenson Direct pf. at 10.

82. An additional factor contributing to Georgia Mountain’s importance as a RINA is the presence of three endangered, threatened, and rare plant species on the mountain. The three species are bronze sedge (Carex foenea, state

endangered, very rare) autumn coralroot (Corallorhiza Odontorhiza, state threatened, rare to uncommon). Bronze sedge is closely associated with dry oak forests and ledges and occurs only at four sites in Vermont.

83. The Georgia Mountain natural area is irreplaceable once the habitat and natural communities are permanently fragmented or lost to development. Sorenson Rebuttal, pf at 6 lines 3-7.

84. The conditions that created the association of state significant natural communities on Georgia Mountain were mountain building and erosion over millennia, several different glaciations. The conditions that exist on the site are not just the result of a recent glaciation. They are the result of hundreds of thousands of years, millions of years. Sorenson Tr. at p. 210 lines 16-23.

85. ANR's recommendation that the association of natural communities in and around Georgia Mountain be considered a RINA is consistent with Agency practice. Sorenson Rebuttal pf. at 2 line 20 – page 3 line 2.

86. The association of natural communities found on the site is found more often in the southwestern part of Vermont. Lew-Smith Tr. page 134 lines 1-7; Sorenson Tr. at 208.

87. There is more potential for development in the Champlain Valley biophysical region than in southern Vermont. Lew-Smith page 134 lines 8-18

88. Development and development pressure has reduced the extent of natural community types like those found on Georgia Mountain. Lew-Smith Tr. page 105 lines 16-21

89. Mr. Lew Smith has not conducted any inventories to determine whether the association of natural communities found on Georgia Mountain can be found in other locations of the Champlain Valley biophysical region. Lew-Smith Tr. page 141lines 6-25.

90. The association of natural communities found on Georgia Mountain would not be located in the Green Mountains or in the Northeast Kingdom. Sorenson Tr. at 202.

VI. Habitat fragmentation is an impact of the Proposed project

91. ANR is concerned about the GMCW project's fragmentation of the state-significant site – the association of state-significant natural communities on

Georgia Mountain – and the effect of this fragmentation on natural communities, ecological processes, and interior forest habitat. Sorenson Direct pf. at 3.

92. When referring to natural communities, wildlife habitat, and landscapes, fragmentation means dividing land with naturally occurring vegetation and ecological processes into smaller and smaller areas as a result of roads, land clearing, development, or other land uses that remove vegetation and create physical barriers between previously connected natural vegetation. GMCW Exhibit-Cross-Sorenson-5.

93. Fragmentation alters interior forest wildlife habitat, impairs movement of some wildlife species, changes natural ecological processes such as surface water drainage and susceptibility of trees to blowdown by high wind events, and increases the likelihood of introduction of non-native, invasive plant species. GMCW Exhibit-Cross-Sorenson-5.

94. The risk of invasive species is greater in the Champlain Valley biophysical region. Page 113 lines 18- page 114 line 2.

95. The reduction in size of forest patches by roads and development can render the forest unsuitable for certain species of native plants and animals. ANR-Cross Exhibit 11 page 20. check

96. Fragmentation of a forested area affects species composition. Tolerant species often include invasive exotic plants and animals that out-compete native species or otherwise lead to decreased productivity of native species. ANR Cross Exhibit 11 at page 20.

97. Fragmentation can lead to reduced populations of plants and animals as a result of predation pressure along forest edges. ANR Cross Exhibit 11 at page 20.

98. In forested natural communities, fragmentation can lead to reduced populations of plants and animals as a result of predation pressure along forest edges. ANR Cross Exhibit 11 page 20.

99. In forested natural communities, fragmentation can lead to increased species vulnerability to natural disturbances. ANR Cross Exhibit 11 page 20.

100. Ecologists do not like to see forest blocks fragmented. Lew-Smith Tr. page 136 lines 24- Page 137 line 5.

VII. The Project will result in the following impacts to the association state significant natural communities on Georgia Mountain

101. Construction of the project will result in the clearing of approximately 45.69 acres. Cross II, Feb. 10 Tr. at page 53.

102. The clearing required for the project will impact 32.3 acres of the Mesic Red Oak Northern Hardwood Forest. AE-2 at 8, revised by Correspondence from Michael Lew Smith March 1, 2010.

103. The clearing limits in some locations will be more than 150 feet. Cross I. Tr. at page 95.

104. The clearing required for the project will remove approximately .45 acres of Dry Oak-Hickory-Hophornbeam Forest. AE-2 at 8.

105. The clearing required for the project will require removal of approximately 7.6 acres of Northern Hardwood forest. AE-2 at 8

106. The project will create holes or canopy gaps in the Georgia Mountain forest. Lew-Smith Tr. Page 110, lines 11-22.

107. The project will result in an adverse impact to the dry oak-hickory-hophornbeam forest. Lew-Smith Tr. page 103- lines 23- page 104, line 4.

108. The biggest undue adverse effect on the rare and irreplaceable natural area resulting from the project is the road and all the associated clearing and infrastructure associated with it. Sorenson Feb. 10, Tr. at 182 lines 16-21.

109. It is the location and juxtaposition of the impact in relation to the association of natural communities that makes the impact so significant. The creation of 2.5 miles of road and clearing associated with the road at a width of 80 to more than 150 feet through a largely unfragmented area results in a significant impact. Sorenson Tr. page 164 lines 8- 12

110. The construction of the project and infrastructure and associated clearing and grading and forest clearing will result in fragmentation of the natural communities that are on and near the summit of Georgia Mountain, which contains the most important and sensitive communities of the Georgia Mountain state significant site. GMCW Exhibit-Cross-Sorenson-5.

111. There has not been another wind energy project in the Champlain Valley that penetrates as deeply into a large unfragmented area of this association of natural communities as found on Georgia Mountain. Sorenson Tr. at 169 lines 24-170 line 5.

112. The construction of approximately 2.5 miles of road approximately 80 to 150 feet wide or wider on the side slopes and ridgelines of the Georgia Mountain results will have fragmenting effects. Lew-Smith Tr. at Page 113, lines 1-9

113. Most natural communities cannot be replaced as they are the result of millennia of natural succession under specific site conditions. GMCW Exhibit Cross Sorenson-7. Once removed we will not be able to restore Mesic Red Oak-Northern Hardwood Forest. Eric Sorenson page 187, lines 17-24

114. Mr. Lew Smith would recommend the monitoring for invasive species and the prevention of invasive species. Lew-Smith Tr. at 114 lines 13-17.

115. It is important to monitor and control for invasive species. Lew-Smith Tr. Page 114, lines 18-20

116. The introduction of invasive species can result in an adverse effect to the forest habitat. Lew Smith Tr. page 113, lines 3-6

117. The risk of invasive species is greater in the Champlain Valley biophysical region than in other parts of the state. Lew -Smith page 113, lines 24- page 114 line 2.

118. The blasting, clearing and earth disturbance necessary to construct the 2.5 mile road and associated grading to support the road and infrastructure would change the water movement over the surface on the mountain, and would change the soil type and condition of the surface one the mountain. Eric Sorenson page 187

119. Areas that attract invasives are large clearings with large disturbances. Sorenson Tr. Page 200 lines 1-9

VIII. Existing conditions and activities have not had the same permanent fragmenting effect as will result from this project

120. The permanent impacts of the proposed project are more severe than the temporary effects of logging activity and ATV trails. Sorenson Tr. Feb. 10, at 183, lines 4-4-21.

121. Timber harvest activities are not fragmenting features like the permanent impacts from a wind project. Austin Tr. Feb. 8, page 178, lines 17-page 179 line 1.

122. With logging activities forests regenerate over time. After the logging is completed, the area is allowed to grow back to a forest as good as the one before. Austin Tr. Feb 8, page 178 lines 20 page 179 line 1; Sorenson Feb 10 Tr. page 183 lines 12-16.

123. Logging of many forest communities can result in relatively minor alterations of natural process and there is a high potential for recovery. ANR Cross Exhibit 10 at 6.

124. Alterations that affect key natural processes and are likely to be permanent are clearly the most damaging to the ecological integrity of the natural community. ANR Cross Exhibit 10 at 6

125. The impacts of a cell tower project are less than the anticipated impacts from the wind energy project. One reason for this distinction is that the number of acres cleared for the road and wind turbines. Austin cross examination Feb 8, Tr. at page 184 line 21- page 185 line 8.

IX. The proposed project will result in an undue adverse effect to the association of state significant natural communities on Georgia Mountain

126. The GMCW project will result in degradation of the association of state-significant natural communities (state-significant site) on Georgia Mountain. Sorenson Direct pf. at 11-12

127. The adverse effects on the association of state-significant natural communities will be the result of substantial and permanent habitat fragmentation associated with construction of access roads, wind turbines, powerline, and the associated forest clearing. Sorenson Direct pf at 11-12

128. The construction and clearing will result in the direct loss of state-significant natural communities where this construction occurs. Sorenson Direct pf. at 12

129. The clearing will result in alterations in the ecological processes that influence the formation and maintenance of the association of natural communities, including natural disturbance by wind, colluvial action on mountain slopes, and wildlife species composition. Sorenson Direct pf. at 12

130. This fragmentation will be caused by construction of about 2.5 miles of ridgeline and mountain-slope roads (and associated drainage structures) and by creation of permanent clearings of approximately 44 acres associated with the maintained roads, wind turbine towers, and transmission lines. Sorenson Direct pf. at 12

131. The significance of the fragmenting impact from the roadway is the width of the disturbance, the width of the clearing for road surface, riprap channels and associated clearing, staging areas, detention ponds all that contribute to the fragmentation here. Sorenson Feb 10 Tr. at 174

132. In addition, the ecological integrity of the association of natural communities is threatened by the introduction of non-native, invasive species in association with the construction and clearing activity. Sorenson Direct pf. at 12

133. Wind developments have the potential to penetrate more deeply into large areas of unfragmented habitat and natural communities than other forms of development. Even ski area developments tend to be more concentrated in their footprint. Sorenson Rebuttal pf. at page 2 lines 11-15.

134. The impacts of the project are permanent. Even with restoration at the end of the project it is very difficult to restore natural communities to their pre-disturbance condition. Grades can return to their preconstruction levels, trees can grow, but the ecological systems cannot return without thousands of years which is the scale on which these systems had developed. Sorenson Feb 10 Tr. at 183 lines 14-21.

135. Construction of the project requires the blasting down into the bedrock which changes the hydrology on the mountain. Filling the area to replace grades after the project is decommissioned creates very porous soil conditions which are very different than the preconstruction conditions. Although there may be some restoration it will be difficult to restore to the site to its preconstruction conditions. Sorenson Tr. page 186- lines 1-page 187 line 16.

136. Any restoration effort after decommissioning will be unable to restore the Mesic red oak northern hardwood forest. Sorenson Tr. at page 187 lines 12-16.

137. Although the approximate 40+ acres of clearing and development is a relatively small percentage of the total area of habitat on Georgia Mountain, the linear orientation of the impacts and their location along the Georgia Mountain ridgeline will maximize their fragmenting effects on the association of state-significant natural communities, and especially the more sensitive dry oak natural communities occurring along the ridgeline. Sorenson Direct pf at 12.

138. The proposed project will more than double the length of existing Class 4 roads within the approximately 4,700 acres of relatively unfragmented habitat on Georgia Mountain. There are currently 1.7 miles of Class 4 roads and driveways within this area (Georgia Mountain Road is the longest). Sorenson Direct pf at 13,

139. The project proposal is to construct an additional 2.5 miles of side-slope and ridge-top crane roads and access roads on Georgia Mountain. Unlike the existing Class 4 roads on the northern side of Georgia Mountain that are generally located in valley bottoms, the proposed new 2.5 miles of roads will be on more sensitive slopes and along ridgelines, where cut and fill slopes will require that the road footprint is wide. Sorenson Direct pf. at 13 lines 1-11,

140. The initial travelled surface of the proposed access road will be 35 feet, but the total width of clearing and rip-rap channels ranges from 60 feet to 150 feet (see Exhibit Petitioner PC-7). Sorenson Direct pf. at 13.

141. These roads will result in permanent forest canopy gaps along their entire lengths, unlike the Class 4 roads and cell tower access road that are narrower and mostly maintain forest canopy closure. Sorenson Direct pf. at 13

142. The proposed GMCW project infrastructure and clearing is expected to decrease the capacity of the habitat to support area-sensitive wildlife species and especially nesting of forest-interior bird species. Sorenson Direct pf. at 13

143. The permanent clearings associated with the roads, turbines, and transmission lines will create forest edge and are expected to alter wildlife use of the area, with a trend toward more bird species associated with habitat edge and a decline in forest interior species. Sorenson Direct pf at 13-14.

144. Although natural communities are commonly identified and classified primarily based on their characteristic plant species, the animal component is equally important to healthy, viable natural communities and their resiliency and ability to adapt to changing environmental conditions, such as climate change. Sorenson Direct pf at 14

145. Whereas forest management and ATV use on Georgia Mountain may result in temporary changes in wildlife use of the association of natural communities, the GMCW project infrastructure will result in permanent changes in wildlife use. Sorenson Direct pf at 14

146. The construction of this infrastructure will significantly decrease the role that natural processes play in shaping the natural communities and habitat on Georgia Mountain. An expected change is the increased susceptibility of ridgeline and upper mountain slope forests to blowdown from wind because of permanent canopy gaps created by project clearing. Surface water runoff characteristics are also expected to change as a result of the road and associated rip-rap channels and detention basins along the slopes and ridgeline. Sorenson Direct pf. at 14.

147. Road construction along mountain slopes is also expected to alter colluvial action – the natural downslope movement and accumulation of rich topsoil and nutrients that is primarily responsible for creating enriched forests on lower mountain slopes. Sorenson Direct pf. at 14.

148. The scale of proposed road construction and clearing will also increase the risk for introducing non-native, invasive species into the natural communities on Georgia Mountain. Sorenson Direct pf. at 14-15

149. Non-native, invasive species are aggressive colonizers of bare soils that have been exposed by construction or erosion, especially if there is also abundant sunlight from canopy removal. In Vermont, the warmer Champlain Valley and Connecticut River valley are especially susceptible to invasive plant species. These species, including honeysuckles (*Lonicera* spp.), buckthorns (*Rhamnus* spp.), and barberries (*Berberis* spp.), once established on forest edges can quickly spread into the interior of forests (especially those that are heavily managed or that have exposed soils associated with erosion or recreation trails) and reduce the quality of wildlife habitat, interfere with natural forest regeneration, and reduce the ecological integrity of the natural communities. Some invasive plant species, such as those mentioned above, are spread by birds, especially bird species associated with forest edge habitat. Other species, such as Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*), are commonly spread to new sites in contaminated fill material trucked in for road construction. Sorenson Direct pf. at 14-15

150. The proposed project as currently designed, and without further mitigation, will have an undue adverse effect on the Georgia Mountain Rare and Irreplaceable Natural Area. Sorenson Direct pf. at 15 lines 12-13; Sorenson Rebuttal pf. at 6 lines 7-9

X. The following mitigation is necessary to offset the undue adverse effect of the project.

151. The following mitigation is necessary to offset the undue adverse effect of the project.
   A. Establish a permanent conservation easement on the property controlled by the Petitioner and on which the GMCW project is located to preclude future development of the most important interior habitat and natural communities on and around the summit of Georgia Mountain.
   B. Develop a 10 year non-native, invasive plant monitoring and management plan for the project in order to control the establishment of these species in areas cleared for roads, utility lines, and turbines and to prevent their spread into surrounding forest. This will need to be a long term plan with termination based on success of the operation as established through on-site monitoring and invasive species control.

   C. Carefully review the access road design to minimize its final cleared width and to minimize the adverse effects of the rip-rap channels and the road on surface water runoff and colluvial action.

   D. Restricting ATV access to one or two corridors along the edges of the mountain. ATV trails in the most sensitive oak-pine natural communities around the Georgia Mountain summit should be discontinued, allowed to revegetate, and monitored for invasive species. Sorenson Direct pf. at 16-18

XI. The Proposed easement does not mitigate for the impact of the proposed project.

152. The proposed easement does not adequately mitigate for the impact of the proposed project. John Austin rebuttal pf. at 4.

153. The proposed easement does not include a non-native invasive plant species monitoring and elimination plan. Exhibit REB-JH-7

154. The proposed easement is temporary and is limited to the period of the Certificate of Public Good. Exhibit REB-JH-7

155. The proposed easement allows Petitioner to charge a fee for access to or use of the Georgia Mountain site. Exhibit REB-JH-7 at 2, 4

156. The proposed easement allows Petitioner to create new ATV trails within the easement area. Exhibit REB-JH-7 at 3.

157. The proposed easement allows Petitioner to clear trees, brush, and other vegetation, and to keep such vegetation cleared to a width of ten feet on new and existing ATV trails. Exhibit REB-JH-7 at 3-4

158. The proposed easement allows Petitioner to install erosion controls on the new and existing ATV trails. Exhibit REB-JH-7 at 4

159. The proposed easement allows Petitioner to construct, install, maintain, repair, replace, realign, relocate, upgrade trails on the "protected property" for hiking, running, horseback riding, bicycling, cross-country skiing, snowshoeing, hunting, trapping, bird-watching, and any other recreational activity. Exhibit REB-JH-7 at 2

Discussion

Based on the testimony and evidence presented in this matter and the findings above, the project will result in an undue adverse impact to the rare and irreplaceable association of state significant natural communities on Georgia Mountain unless a permanent easement preserving the Georgia Mountain site within the control of Petitioner is established which includes the elements of the non-native invasive species plan, and ATV limitations recommended by ANR. See 30 V.S.A. § 248(b) (5).

Under Section 248(b)(5), the Public Service Board cannot issue a Certificate of Public Good unless it finds that the project will not result in an undue adverse effect on aesthetics, historic sites, air and water purity, the natural environment and public health and safety. The statute incorporates many of the Act 250 criteria by reference, including necessary wildlife habitat and endangered species under 10 V.S.A. § 6086(a) (8) (A). As the Board announced in *East Haven*, the Board's inquiry, however, is not constrained by the Act 250 criteria.

> Although in Section 248(b) (5) the General Assembly has provided the Board with guidance as to what specific environmental impacts to examine in reviewing

> a proposed project, it did not limit the scope of the Board's review to only the incorporated Act 250 criteria.[1] The statute specifically provides that the Board must find that a proposed project will not have an "undue adverse effect on . . . the natural environment." A project such as this has the potential of multiple and substantial impacts on wildlife. To consider fully whether those impacts constitute an "undue adverse effect on . . . the natural environment," this review should not be constrained to only the effects on "endangered species" and "necessary wildlife habitat" as those are considered under Act 250.4

The evidence demonstrates that the project will result in an undue adverse effect to the natural environment. Application of the Act 250 Criterion 8 factors to the Georgia site demonstrates that the association of state significant natural communities on Georgia Mountain is rare and irreplaceable, that the project will result in an undue adverse impact to this RINA, and that the proposed temporary easement will not mitigate for the undue adverse impacts resulting from clearing 45 acres of forested habitat on Georgia Mountain.

1. The association of state significant natural areas on Georgia Mountain is rare and irreplaceable.

In evaluating whether the association of state significant natural communities on Georgia Mountain is a RINA, the Board is guided by Act 250 precedent. An evolving standard for determining whether an area is a rare and irreplaceable natural area has been developed by the District Commissions and Environmental appellate tribunals. Criterion 8 requires the District Commission to find that the project will not have an undue adverse effect on rare and irreplaceable natural areas. 10 V.S.A. 6086 (a) (8). In determining whether a project has an undue adverse impact on a rare and irreplaceable natural area, the Commission considers: (a) whether the project site is located in a natural area or contains a

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3. See Docket 6860, Order of 1/28/04 (reviewing the potential health impact of electro-magnetic fields emanating from a proposed transmission line).

4. Docket 6911, Order of 7/17/06 at 66.

natural area; (b) whether the natural area is "rare and irreplaceable"; (c) whether the project would have an "adverse effect" on the rare and irreplaceable natural area; and (d) whether any adverse effect would be "undue." *In re McCullough Crushing, Inc.*, Application #5W0842-3, Findings of Fact and Conclusions of Law and Order, at 16 (Dec. 8, 2009) citing *Re: Leo and Theresa Gauthier*, #4C0842-EB, Findings of Fact, Conclusions of Law, and Order at 11-13 (June 26, 1991); *Re: Barre Granite Quarries, LLC and William and Margaret Dyott*, Findings of Fact, Conclusions of Law, and Order at 83-85 (December 8, 2000); *Re Josiah E. Lupton, Quiet River Campground*, Land Use Permit #3W0819 (Revised)-EB, Findings of Fact, Conclusions of Law, and Order at 28 -29 (May 18, 2001). *See also Re John Larkin*, 4C0626-6C, Findings of Fact, Conclusions of law and Order (Jan. 11, 2001).

The first prong of the RINA inquiry examines whether the area is a natural area. The Environmental Board has considered "an area which contains an identifiable type of ecologic community, with heavy plant growth and where natural conditions predominate over human influences" to be a natural area. *See re: Leo and Theresa Gauthier*, 4C0842-EB, Findings of Fact Conclusions of law and Order at 9 (June 26, 1991).

Application of this standard to Georgia Mountain demonstrates that the association of natural communities on Georgia Mountain is a natural area. Georgia Mountain is part of approximately 4,700 acres of contiguous, relatively unfragmented habitat and is one of the largest such habitat blocks in the Champlain Valley biophysical region. Petitioner's own experts acknowledge that the Georgia Mountain habitat consists of largely contiguous forest. Petitioner's bird expert opined that avian species diversity and density parallels that of other forested regions in the state. The broader forest habitat

within which Georgia Mountain is located is a large, relatively unfragmented area that is important for wildlife.

There are seven state-significant natural communities documented from this large Georgia Mountain site. The three types of dry oak and pine natural communities on and around the summit of Georgia Mountain are the most significant and sensitive types. Natural ecological processes predominate over human influence in all of these state-significant natural communities, making this a large natural area.

The location of the cell tower and ATV trails on the mountain does not diminish the site as a natural area. Within this relatively large and contiguous area of habitat natural processes (succession, hydrology, animal movement, and natural disturbance) still prevail over human influences. It is within large areas of unfragmented habitat such as this that we can expect to maintain these natural processes into the future, along with interior forest habitat for area-sensitive wildlife species and ecological resiliency in the face of climate changes. All these factors contribute to Georgia Mountain clearly being a natural area.

The RINA under review in the present action is the association of state significant natural communities. Contrary to Petitioner's claim, the Agency of Natural Resources and the District Commission have determined that an association of natural communities constitutes a RINA worthy of protection under Act 250 Criterion 8. *See Re John Larkin*, 4C0626-6C, Findings of Fact, Conclusions of law and Order (Jan. 11, 2001).

In *Larkin*, the District Commission evaluated the natural areas in and around the project site and evaluated whether the association of natural communities should be

considered a RINA and whether the proposed project would have an adverse impact and whether any adverse impact would be undue. *Larkin* page 13. The testimony and evidence presented regarding the natural areas was not limited to those natural communities found on the site. ANR, through Eric Sorenson, identified five natural communities on or directly adjacent to the project site. *Larkin* at 6. ANR opined that "the combination and association of these five natural communities at the project site that make it a rare and irreplaceable natural area." *Id*. at 13. Mr. Sorenson opined that the association of these community types is rare and cannot be replaced once lost. *Larkin* at 13.

Similar to Petitioner's claim here, the applicant in Larkin argued that the association could not be considered a RINA because the project itself would not be impacting or altering four of the five communities, and that the fifth was already altered by human disturbance. *Larkin* at 14. Rather than yield to this objection, the Commission was instead persuaded by ANR's "presentation of evidence regarding the rare and irreplaceable nature of the association of the five natural areas at the project site." *Larkin* at 14. The Commission found that it was the combination of these natural areas in this location that makes it a rare and irreplaceable natural area. The commission found that the "development at the site will constitute an undue adverse impact on this rare and irreplaceable natural area because of construction and human disturbance such that the natural conditions no longer predominate over human activities." *Larkin* at 14

In addition to the *Larkin* decision, the ANR Guidelines for the Conservation and Protection of State-Significant Natural Communities (ANR Cross Exhibit 10) also demonstrates that an association of state significant sites can constitute a RINA worthy of

protection. "[A]n association of natural communities that characterizes a particular part of the landscape and for which ecologically intact examples are rare or declining in the state may be considered state significant." ANR Cross Exhibit 10 at 3. Both Eric Sorenson and Petitioner's expert testified that the association is uncommon in the Champlain Valley biophysical region. An uncommon state significant site can be considered rare and irreplaceable where it has exceptional characteristics such as the presence of old growth forest patches or very large and unfragmented size. Id. at 4.

Eric Sorenson, the co-author of the book to which Mr. Lew-Smith and other ecologists refer in conducting natural area evaluations, *Wetland Woodland Wildland Guide to Natural Communities in Vermont,* testified that the exceptional feature of the association of state significant natural communities on Georgia Mountain is its size. Size is an exceptional characteristic to which ANR relies when determining whether state significant examples of more common natural community types (S3, S4, S5) should deserve protection as a rare and irreplaceable natural area.

Application of *Larkin* and the Vermont guidelines compels a finding that the association of natural communities on Georgia Mountain is a rare and irreplaceable natural area and that the project absent the permanent mitigation proposed by ANR will result in an undue adverse impact to this natural area. The site consists of seven state significant natural communities. Based on the high quality of the natural communities in this association, the size of the natural communities (especially the very large Mesic Red Oak-Northern Hardwood Forest), and the very large area of unfragmented habitat that includes this association, the association of natural communities is a rare natural area in

the otherwise highly developed landscape of the Champlain Valley. A natural area, rare at the scale of the unfragmented habitat present at Georgia Mountain, is irreplaceable once the habitat is permanently fragmented or lost to development. The continued loss and fragmentation of large blocks of contiguous habitat, especially examples like Georgia Mountain that are rare landscape features, is one of the greatest threats to wildlife, ecological processes, and the natural environment of Vermont.

This association of state-significant natural communities on Georgia Mountain is an excellent example of the dry oak and pine forest types that occur on low, warm, acidic hills of the Champlain Valley. The excellent representation of state-significant oak-pine forest natural community types characteristic of the warmer, acidic low hills of the Champlain Valley biophysical region make this a rare natural area within the region. This association of natural communities is large and relatively unfragmented. The presence of this large and unfragmented association of natural communities within the highly developed Champlain Valley contributes to Georgia Mountain's significance as a rare natural area within the region. A natural area, rare at the scale of the unfragmented habitat present at Georgia Mountain, is irreplaceable once the habitat is permanently fragmented or lost to development.

The presence of development pressures and development further supports not detracts the significance or rarity of this site. As in the case of the *Larkin* project site, where houses and bike paths were located in proximity to the proposed development, that there may be quarries or other activities and residential pressures in the area elevates the rarity of this site. That it has remained relatively undeveloped and presents an

ecologically integrated and large area of intact forest in the Champlain Valley Biophysical region compels a finding that it is rare.

Although conceding that the Agency does consider the association of natural communities as state significant, Petitioner's consultant, Mr. Lew-Smith did not determine or evaluate whether there exists an association of state significant natural communities on Georgia Mountain or whether the association is state significant and rare. Mr. Lew Smith admits that he has not conducted an analysis to determine whether the association of natural communities on the site is a rare and irreplaceable natural area. His focus was on the individual communities only. Mr. Lew-Smith did not inventory other areas in the Champlain Valley biophysical region to determine the existence or size of such a similar association elsewhere.

There is more support for protection of the natural association of natural communities at the Georgia Mountain site because the Board's role in protection of the natural environment is not constrained by the Act 250 criteria. Indeed, the Board has determined that it need not classify a wildlife habitat as necessary in order to rule that the project would result in an undue adverse impact to that habitat.

2. The proposed project will result in an undue adverse impact absent a permanent easement to protect the remaining features of the association of state significant natural communities on the site

The proposed Georgia Mountain Community Wind project will result in approximately 45 acres of direct impact to the state significant natural communities of this rare and irreplaceable natural area. These impacts result from construction of ridgeline and sideslope roads, drainage structures, staging areas, and turbine support

structures, as well as associated clearing for roads, turbines, and powerlines. These impacts are not concentrated in one location on the edge of the rare and irreplaceable natural area, but are instead linear in orientation, resulting in a high degree of fragmentation in the most significant and sensitive location on the summit of Georgia Mountain. The proposed road and associated clearing and grading vary in width from 80 to more than 150 feet, with some areas that include stormwater ponds and staging areas being much wider. The large canopy gaps and disturbed soils provide ideal conditions for the spread of non-native invasive species.

All of these impacts represent an undue adverse effect on the rare and irreplaceable natural area, as well as the natural environment in general. However, with appropriate mitigation, these impacts could be reduced so they are adverse, but not undue.

3. The proposed Easement is inadequate to mitigate for the undue effects of the project

Any mitigation should include a permanent conservation easement to protect the remaining association of natural communities on the Georgia Mountain summit and sideslopes, monitor and control invasive species during and after construction, and limit the extent of ATV trails on the more sensitive areas of the site.

There is great concern and uncertainty regarding the feasibility and success of restoration of this natural area in the decommissioning phase. Given this uncertainty, the conservation easement should be in effect in perpetuity or until such time as there is documented success in restoring a stable forest community dominated by native species and without invasive species in the project area.

The proposed easement does not permanently conserve the remaining association of state significant natural communities on Georgia Mountain. To mitigate for the permanent impacts of the project, the easement designed to mitigate for these impacts must be permanent. As Eric Sorenson opined although regrowth may occur on the project site, revegetation can never restore the existing association of natural communities on the project site. Accordingly, the remaining state significant communities that comprise the association must be preserved. The easement must extend to the west of the access road.

The easement must also limit, not expand, the ATV use on the mountain. Mr. Harrison has indicated that he is willing to limit ATV use along the ridgeline of the project. The Board should adopt this limitation in its CPG. Any easement designed to conserve the existing natural communities should not allow the expansion of trails for ATV or other recreational vehicles or uses.

Petitioner's ecologist Mr. Lew-Smith agrees with ANR that a non-native invasive species monitoring plan should be included to control for the introduction of invasive species to the project site.

Necessary Wildlife Habitat and Endangered Species

[10 V.S.A. § 6086(a)(8)(A)]

Section 248(b)(5) provides that the Board must find that a proposed project "will not have an undue adverse effect on aesthetics, historic sites, air and water purity, the natural environment and the public health and safety ."[5] The statute incorporates many of the Act 250 criteria by reference, including necessary wildlife habitat and endangered species under 10 V.S.A. § 6086(a)(8)(A). The Board's inquiry, however, is broad in scope. The Board has held:

> Although in Section 248(b)(5) the General Assembly has provided the Board with guidance as to what specific environmental impacts to examine in reviewing a proposed project, it did not limit the scope of the Board's review to only the incorporated Act 250 criteria.[2] The statute specifically provides that the Board must find that a proposed project will not have an "undue adverse effect on . . . the natural environment." A project such as this has the potential of multiple and substantial impacts on wildlife. To consider fully whether those impacts constitute an "undue adverse effect on . . . the natural environment," this review should not be constrained to only the effects on "endangered species" and "necessary wildlife habitat" as those are considered under Act 250.[7]

Migratory Birds

Findings

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5 30 V.S.A. 248(b)(5)

6. See, for example, Docket 6860, Order of 1/28/04 (reviewing the potential health impact of electro-magnetic fields emanating from a proposed transmission line).

7. Docket 6911, Order of 7/17/06 at 66. See also, Docket 7250, Order of 7/17/09 at 3-4 (stating that while the Board must give due consideration to the Act 250 criteria, including the necessary wildlife habitat criterion… evaluation under Act 250 is not dispositive, as we must, in the end, apply section 248(b)(5) and determine whether the project will have an undue adverse effect on the natural environment.)

160. There is a lack of information to determine whether the proposed project would have an undue adverse impact on birds

I. Background

161. The Georgia Mountain Wind Project study area consists of largely contiguous forest. RBR-2 at 3. Ms. Renfrew Tr. at 73.

162. The broader forest habitat within which Georgia Mountain is located is a large, relatively unfragmented area that is important for wildlife. John Austin pf Direct at 17.

163. At the proposed site, avian species diversity and density parallels that of other forested regions in the state. RBR-2 at 1.

II. Breeding Bird Species Observed

164. Thirty-six species of breeding birds were observed at the project site. Six species common to Northern Hardwood forest comprised 52% of the birds observed. Most of the species observed nest in mature forest habitat and, 15% of the birds observed were considered edge species. Renfrew pf Direct at 3.

165. Ten species (28%) are listed as species of greatest conservation concern in Vermont and/or within BCR 13 (Tables 1 and 2). John Austin pf Direct at 17.

166. A Cerulean Warbler, a species of high conservation concern in the Eastern United States and a Species of Special Concern in Vermont, was found at the project site. Renfrew pf direct at 3 ln 20. Ms. Renfrew Tr. at 85.

167. A pair of Red-shouldered hawks which are considered a species of greatest conservation need in Vermont were also found. Renfrew pf Direct at 4 ln1. Ms. Renfrew Tr. at 85.

168. The breeding bird Atlas shows fewer numbers of the red-shouldered hawk detected today than previous surveys conducted in the 1970's. Ms. Renfrew Tr. at 86-87.

III. Fatality Risk from Collisions with Wind Turbines

169. Bird fatalities have been documented for many years at wind facilities throughout the country as well as in other countries. John Austin pf Direct at 12.

170. Many species of passerine birds (songbirds) migrate at night during the spring and fall periods. There are variations in their flight height in relation to weather, cloud cover, precipitation, and to some extent, landscape features such as topography and ridgelines. John Austin pf Direct at 12.

171. Some birds that migrate at night fly lower than others and their migration can be influenced by encounters with steep, high topography which are found in parts of Vermont. John Austin pf Direct at 12.

172. Birds migrating at night that encounter low could cover, fog, or precipitation, as is often the case in Vermont during the fall, will fly at lower altitudes. John Austin pf Direct at 12.

173. Two species that routinely fly above the treeline during the breeding season, Common Raven and Red-shouldered Hawk, were detected in the breeding bird inventory. RBR-2 at 8.

174. The variation in flight height creates an added risk of collision with tall structures such as wind turbines. John Austin pf Direct at 12.

IV. Habitat Fragmentation

175. Habitat fragmentation is the risk factor of greatest concern to breeding birds with respect to wind energy projects. Ms. Renfrew Tr. at 70. RBR-2 at 6.

176. Habitat fragmentation is the process of creating smaller and smaller patches of habitat as a result of man-made influences. John Austin pf Direct at 18. Ms. Renfrew Tr.at 70.

177. Habitat fragmentation directly affects our resident and migratory songbirds. ANR Cross Exhibit 11 at 20.

178. Species such as forest interior songbirds require large areas of remote, contiguous habitat to meet their life requisites. John Austin pf Direct at 18.

179. It is important to know the clearing limits when assessing the potential effect of fragmentation because it defines the area that will be disturbed. Ms. Renfrew Tr. at 75.

180. The clearing for the Georgia Mountain Community Wind Project will result in some breeding bird habitat loss. Ms. Renfrew Tr. at 92.

181. Roads, turbines, and other infrastructure will cause a direct loss of habitat, create edge habitat and reduce the size of contiguous forest patches. RBR-2 at 6

182. New roads and openings can provide travel lanes for predators, brood parasites and invasive species which can result in an increase in nest predation rates and lower productivity. John Austin pf Direct at 19. Ms. Renfrew Tr.at 70 and 93.

183. Fragmentation results in negative impacts to some species of breeding birds. Ms. Renfrew Tr.at 70.

184. Habitat fragmentation can result in the increase of edge bird avian species. John Austin surrebuttal at 4. Renfrew Rebuttal, page 2, lines 3-5. Ms. Renfrew Tr. at 71.

185. Fragmentation can also lead to a decrease in interior forest birds. Ms. Renfrew Tr.at 71.

186. The Searsburg energy facility studies illustrate changes in composition of the bird community in the area of the wind project with a trend toward more bird species that associate with edge habitat and a decline in species associated with interior forest. John Austin pf Direct at 19. Ms. Renfrew Tr. at 71.

187. Fragmentation can also result in the introduction of invasive plant species. Ms. Renfrew Tr. at 72.

188. Preventing the invasion of invasive plant species is beneficial to some bird species including breeding bird species. Ms. Renfrew Tr. at 90.

189. Fragmentation and the increase in invasive plant species can result in decreased productivity for some breeding birds. RBR-2 at 6

V. Uncertainty in Impacts of Wind Projects on Bird Species

190. Clearing limits needed to construct the stormwater management system for the project which include three sediment ponds and one sediment trap, were not considered in the breeding bird report. Ms. Renfrew Tr. at 76-77.

191. The width of the transmission line and its clearing limits are now 50 feet and the breeding bird report only accounted for a 25 foot clearing limit for that transmission line. Ms. Renfrew Tr. at 80.

192. The unique geography, climate conditions, prior land use, landscape matrix, and natural community composition of each proposed wind site location makes it challenging to extrapolate impact assessment results from one project site to another. RBR-2 at 2

193. A separate assessment for each project site is necessary. RBR-2 at 2

194. The scientific community is still on a steep learning curve regarding the potential impact of wind power, documenting the actual impacts is still in its infancy in the northeastern U.S. where most large scale wind projects are relatively new. RBR-2 1t 2.

195. Few assessments and even fewer controlled studies have examined the impacts of wind turbines on breeding birds and the results have been equivocal. RBR-2 at 2

196. The scientific community has not conducted many rigorous controlled studies pre and post construction for wind turbine projects. Ms. Renfrew Tr. at 82.

VI. Post Construction Surveys and Avian Fatality Mitigation

Radar Evaluations and Mortality Surveys

197. Radar evaluations of nocturnal bird migration are essential for understanding the potential effects of wind energy development on migrating birds in Vermont. John Austin pf Direct at 12.

198. Post-construction bird mortality surveys are needed to predict where wind energy may present risks to bird populations. John Austin pf Direct at 10-11.

199. Post-construction mortality survey data is essential for understanding the full scope of impacts associated with the project and for identifying opportunities to mitigate those effects through on-going monitoring, habitat management and enhancement, improved siting of wind energy facilities and possible operational adjustments. John Austin pf Direct at 11.

200. The results of the radar evaluations and post-construction monitoring are helpful in understanding the level of risk presented by the proposed project to nocturnal migrating birds. In addition, the results will be an essential part of assessing the significance of any bird mortality that may result. John Austin pf Direct at 11.

201. Details regarding the number of search days per week, number of turbines searched per day should be addressed in the detailed post-construction monitoring plan. John Austin pf Direct at 14.

202. In order to capture data that will characterize the full scope of bird mortality, sampling should occur during both spring and fall migration periods which will include mid-April through mid-June and late August through early November. All of these details for a post-construction bird mortality survey should be incorporated into a comprehensive bird mortality monitoring and evaluation plan. John Austin pf Direct at 15.

Thresholds

203. The impact of utility scale wind projects on migrating birds could be considered insignificant if bird collision mortality at project sites in Vermont was similar to the national average (2.3 birds/turbine/year) and none of the species affected by this source of mortality were considered threatened or endangered by the state or federal government, or species of greatest conservation concern (i.e., rare, listed as species of conservation concern by the Department or the U.S. Fish and Wildlife Service). John Austin pf Direct at 16.

204. The above figures should serve as a threshold for determining whether additional mortality surveys are needed or whether operational adjustments should be considered. John Austin pf Direct at 16.

205. It has not been demonstrated that there will be no impact from the project or that this project will not reach the unacceptable threshold for fragmentation. Because of this uncertainty, it is important to look for all reasonable and

practical opportunities to avoid or mitigate the effects of fragmentation. Austin Surrebuttal at 4. John Austin pf Direct at 19.

206. Collisions involving any state or federally listed threatened or endangered birds will serve as a trigger to consider additional surveys or other mitigation measures. John Austin pf Direct at 16.

Recommended Conditions

207. The following conditions of the CPG are essential for a suitable post-construction bird mortality monitoring protocol in order to assure that there will be no undue adverse impact to bird populations:

a)post-construction bird mortality surveys should be conducted in accordance with a detailed mortality survey protocol that has been developed in coordination with the Department and that has been reviewed and approved by the Department of Fish and Wildlife;

b)the surveys should be conducted for no less than 2 years in order to capture the potential variability in abundance of migrants, weather, and environmental conditions;

c)all post-construction mortality surveys should be conducted in a fashion that provides statistically reliable samples and associated estimates of bird and bat mortality; and they must include searcher efficiency tests and scavenger rate tests on a regular basis as described in the Agency of Natural Resources' draft Guidelines for the Review and Assessment of Impacts Associated with Wind Energy Development in Vermont. John Austin pf Direct at 14.

208. Temporarily disturbed areas should be reclaimed where possible and infrastructure should be sited on areas already disturbed or developed whenever possible. GMCW Renfrew exhibit 2 at 9. Ms. Renfrew Tr. at 98.

Discussion

In order to issue a certificate of public good, the board must find that the project will not have an undue adverse impact on the natural environment which includes

assessment of the threats to wildlife habitat and rare and endangered species.[8] There is insufficient information to determine whether the proposed project would have an undue adverse impact on birds.

It remains uncertain whether the project will have an adverse affect on bird populations present or migrating through Georgia Mountain because the studies completed for this project were insufficient to reach such a conclusion. Few pre-construction and post-construction studies have been completed to thoroughly assess wind energy facilities' effects on present bird populations. Petitioner's own bird expert concedes that there is a dearth of information on the impact of wind projects on birds.

The study of the Georgia Mountain project site did not include the actual clearing limits for the project. Defining the clearing limits to encompass all new road widths and transmission line widths as well as stormwater management systems, is needed to provide a more accurate evaluation of the projects potential impact on bird populations.

Although uncertainties exist, Petitioner's own expert admits there are numerous risks to bird populations from wind energy facilities. These acknowledged risks include increased risk of collision due to variable weather conditions and flight height variation. Of these risks, Petitioner's expert concedes that habitat fragmentation poses the greatest threat to bird populations with respect to the Georgia Mountain Community Wind Project. Presently, Georgia Mountain is a largely forested area with predominant areas of closed canopy. Fragmentation of this forested area and ridgeline could lead to adverse effects on bird populations on and surrounding the project site.

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8 See Docket No. 6911 at 59-60

The Searsburg energy facility studies illustrate changes in composition of the bird community in the area of the wind project with a trend toward more bird species that associate with edge habitat and a decline in species associated with interior forest. Both Mr. Austin and Dr. Renfrew agree that fragmentation can lead to increased invasive plant species, decrease in interior forest bird populations and increase in nest predation and parasitism. Because of these possible detrimental effects, measures must be taken to reduce the effects of fragmentation at this site consistent with the recommendations of ecologists involved with the assessment of this project.

Thirty-six species of breeding birds including ten species of greatest conservation concern and one state listed threatened species were observed on the Georgia Mountain Community Wind Project site. Rare species including the Cerulean Warbler and the red-shouldered hawk, which were present at the site, should be considered in the construction, monitoring, operational adjustments and reclamation associated with the project site. Because of the possible impacts to these species and the uncertainty surrounding wind facility studies and their bird population impacts, conditions must be imposed to protect these populations to assure that there is no undue adverse impact to the avian community.

Due to the uncertainty of bird fatality estimates and impact to populations with respect to this and other wind facilities, post-construction monitoring surveys must be conducted in order to accurately determine the existence and extent of the detrimental effect on bird populations. The Board has previously ordered post-construction radar and

mortality studies in the East Haven case. [9] The data from such post-construction studies can then be used to inform decisions to implement operational adjustments that will minimize the negative impact from the Georgia Mountain utility-scale wind project.[10]

Because GMCW cannot demonstrate that there will be no undue adverse impacts to avian populations, the Board must implement all reasonable and practical conditions to avoid or mitigate the effects of potential impacts. After the project construction, the areas should be reclaimed and disturbed areas should be restored, as closely as possible, to pre-construction conditions in order to aid bird communities in reestablishing themselves in these affected areas.

In light of the uncertainty associated with this wind facility's affect on surrounding bird communities, in order to assure that there will be no undue adverse impact to bird populations the board must impose the following conditions for a suitable post-construction bird mortality monitoring protocol: (1) post-construction bird mortality surveys should be conducted in accordance with a detailed mortality survey protocol that has been developed in coordination with the Department of Fish and Wildlife and that has been reviewed and approved by the Department; (2) the surveys should be conducted for no less than two years in order to capture the potential variability in abundance of migrants, weather, and environmental conditions; (3) all post-construction mortality surveys should be conducted in a fashion that provides statistically reliable samples and associated estimates of bird and bat mortality; and they must include searcher efficiency

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9 See Docket 6911 at 74 (where the Board recommends the condition that post construction surveys be completed to determine avian mortality rates). See also Docket 7156 at 94.

10 See Docket 6911 at 74 (where board recommends that parties may petition for operational adjustments if study results show that they may be necessary).

tests and scavenger rate tests on a regular basis as described in the Agency of Natural Resources' draft Guidelines for the Review and Assessment of Impacts Associated with Wind Energy Development in Vermont.

Findings

Bats

I. Vermont's Bats

209. There are nine species of bats found in Vermont. In general, six of the species hibernate in caves or mines during the winter and emerge in the spring to migrate to their summer range. Darling pf Direct at 7.

210. The migrations of these species vary from a mile or more to a few hundred miles. Darling pf Direct at 7.

211. Vermont's cave dwelling bat species include the little brown bat, big brown bat, Indiana bat, small-footed bat, tri-colored bat and the northern long-eared bat. Darling pf Direct at 7.

212. The remaining three bat species, the hoary bat, red bat, and the silver-haired bat, are considered long distance migrants that solitary roost in trees and migrate out of the Northwest in late summer and early fall and spend the winter months in the southeastern United States or further south. Darling pf Direct at 7.

213. They return to Vermont and the Northeast in late spring. Darling pf Direct at 7.

214. Vermont's bat populations are forced to survive at the more northern latitudes of their range in North America. Darling pf Direct at 8.

215. Vermont bats endure with shorter summers, longer hibernation periods, and cooler, more volatile temperatures. These factors all result in lower bat populations relative to the lower latitudes of North America. Darling pf Direct at 8

216. Because bat numbers are fewer at Vermont's latitude, their populations are more vulnerable to added mortality factors. Darling pf Direct at 8.

217. Vermont bat species are long-lived (i.e. 20 years or more) and all have very low reproductive potential that makes them particularly vulnerable to additional mortality factors. Darling pf Direct at 8.

Threatened Species

218. The state threatened small-footed bat (Myotis leibii) may also be impacted by collisions with turbines at this site. Darling pf Direct at 13.

219. Field evaluations confirmed that there are suitable roosting habitat sites for the small footed bat within the foraging distance (3 miles) of the projected areas. ANR Scott Darling Exhibit 2 at 4.

220. The Small-footed Bat Habitat Site Review showed areas of suitable small-footed habitat and excellent roosting habitat. Site 2, clearly visible from Manley Road, is a high rank site because it is extremely large in size, receives extensive solar radiation, and upon inspection with binoculars, includes fractures that may serve as roosting sites. ANR Scott Darling Exhibit 2 at 3.

221. The taking of one small-footed bat constitutes a violation of the state's endangered species law. A state Threatened and Endangered Species permit is required when such takings are likely to occur. Darling pf Direct at 18.

White Nose Syndrome

222. White Nosed Syndrome may kill as much as 95% of the six species of cave-dwelling populations in just a few years time. Darling pf Direct at 24.

223. Within the past two years there had been an estimated loss of as many 400,000 bats in Vermont due to White Nose Syndrome. Darling pf Direct at 24.

224. Because White Nose Syndrome negatively affects bat numbers, populations of cave-dwelling species are more vulnerable than previously thought from impacts of utility scale wind facilities. Darling pf Direct at 24.

II. Threats to Vermont Bat Populations From Wind Energy Facilities

Bat Fatality from Wind Turbines

225. Utility scale wind facilities have shown high fatality bat rates. Darling pf Direct at 11.

226. Data reflecting high fatality rates include rates in Alberta (22 bats/ turbine) (Baerwald, pers. Com..), New York (25 bats/ turbine- daily searches) (Jain et al. 2007), Tennessee (64 bats/ turbine) (Fiedler et al. 2007) and Germany (12-21 bats/ turbine) (Brinkman et al. 2006). Darling pf Direct at 11.

227. There are several hypotheses that may account for bat fatalities including: roost attraction, landscape attraction, heat attraction and acoustic attraction. (Kunz at al. 2007). Mr. Gruver Tr. at 83.

228. These attractive properties that may account for bat fatalities are present at the Georgia Mountain site. Mr. Gruver Tr. at 84.

229. Bats are being killed by wind turbines by collision with turbine rotors and by significant pulmonary trauma that may be a result of drastic changes in barometric pressure resulting from quickly being swept up though the rotors and down the leeward side. Darling pf Direct at 12.

230. Most bat fatalities at wind turbines in North America have been reported in late summer and early autumn. (Johnson 2005; Arnett et al. in press; RMR Barclay and E. Baerwald pers comm.; Kunz et al. 2007). Darling pf Direct at 26.

231. Species potentially affected by this project as a result of collisions with turbines and rotating blades are: the silver-haired bat (Lasionycteris noctivagans), the hoary bat (Lasiurus cinereus) and the red bat(Lasiurus borealis) from the migratory bat species. Darling pf at 13.

232. These three species generally comprise three-quarters of the total bat fatalities at eastern wind energy facilities. Darling pf Direct at 23

233. These three species comprised 73.4% of the total bat fatalities at the Maple Ridge wind energy facility in New York. Darling pf Direct at 23.

234. The cave dwelling species most likely to be affected are: the little brown bat (Myotis lucifugus), the big brown bat (Eptesicus fuscus) and the tri-colored bat (Perimyotis subflavus). Each has been represented in fatality studies throughout the East. Darling pf Direct at 23

Tower Height

235. Bat fatalities increase exponentially as turbine heights increase with turbine towers 65 meters or taller having the highest fatality rates. (Barclay 2007) Mr. Gruver Tr. at 88.

236. As turbine and rotor heights have increased to over 400 feet in recent years, there is evidence that the taller turbines may actually be killing a greater number of bats. (Barclay et al. 2007). Darling pf Direct at 11.

237. The Buffalo Mountain wind energy facility in Tennessee has tall towers (65 m) and showed high bat fatality rates. Mr. Gruver Tr. at 90.

238. Tower height for Georgia Mountain is proposed to be 85 meters in height. Mr. Gruver Tr. at 93 ln. 6-11.

Uncertainty of Bat Data and Fatality Studies

Uncertainty of Bat Population Data

239. It is difficult to determine what levels of bat mortality from wind turbines may affect the viability of Vermont's bat populations. Darling pf at 25

240. There are two critical components for addressing this issue: estimate of current bat populations and total annual bat fatalities. Darling pf at 25.

241. There remains significant data gaps regarding distribution, abundance and stability of the migratory bat species' populations in the state. Darling pf Direct at 8

242. Migratory tree bat species have been found to be most vulnerable to collisions with utility scale wind projects but most of the information about Vermont bat species center around cave-dwelling species. Darling pf Direct at 8.

243. Scientists have avoided making projections of cumulative fatalities for the period from 2006-2020 because of uncertainty with respect to population sizes

and the demographics of bat species being killed in the Mid-Atlantic Highland region. (Kunz et al. 2007).

244. Total annual bat fatalities in the Mid-Atlantic Highlands region could range from 33, 000- 62, 000 bats or 59, 000-111, 000 bats using different scientific models. This range in bat mortality data demonstrates the inability of scientists to make accurate predictions of bat mortality. (Kunz et al. 2007) Darling pf Direct at 26.

245. Such variable estimates of bat fatality data, makes it difficult to determine what levels of bat mortality from a specific wind site may have an undue adverse affect on Vermont's bat population. Scott darling pf Direct at 25-26.

Bat Fatality and Forested Ridgelines

246. Bat fatalities at wind energy facilities appear to be highest along forested ridgetops in the eastern US and lowest in relatively open landscapes in the mid-western and western states. (Johnson 2005; Arnett et al. in press; Kunz et al 2007). Mr. Gruver Tr. at 86-87.

247. Sites that were flat and non-forested or agricultural, reported low bat mortality. Mr. Gruver Tr. at 86

248. Information from sites such as Buffalo Mountain and Maple Ridge should be considered in the evaluation of the Georgia Mountain project as both have similar project sites including forested ridgelines. Darling Rebuttal Testimony at 2.

249. Wisconsin's Blue Sky Green Field, a forested ridge top site, showed higher bat fatality rates than expected including higher big brown bat mortality. Mr. Gruver Tr. at 81.

250. Large numbers of bat fatalities have been observed at utility-scale wind-energy facilities, especially along forested ridgetops in the Eastern US (Kerns and Kerlinger 2004, Arnett 2005; GOA 2005; Johnson 2005; Fiedler et al. 2007; Kunz et al 2007). Mr. Gruver Tr. at 82-83 and 85. Darling pf Direct at 10-11.

251. Buffalo Mountain, Mount Storm and Mountaineer which have shown high fatality rates in bats also include forested ridgetops similar to the Georgia Mountain site. Mr. Gruver Tr. at 79 and 85-86.

252. At the Mountaineer Wind Project in West Virginia, a site constructed on a forested ridgetop, 475 dead bats from 44 turbines were observed resulting in a total facility estimate of 2042 dead bats or 47.5 dead bats/turbine. (Kerns and Kerlinger 2004). Darling pf Direct at 10.

253. Research conducted in 2004 at the Meyersdale Windfarm site, another forested ridgetop, demonstrated a mortality rate of 25 bats/turbine for the six week study period. (Arnett 2005). Darling pf Direct at 11.

Uncertainty of GMCW Project Data

254. Limitations in the study completed for this project as well as other studies completed at other wind facilities complicate the ability to interpret results relative to risk for bat fatalities due to collision. Darling pf at 17.

255. Pre-construction studies are necessary to evaluate pre-construction bat activity levels and post-construction fatality rates in order to evaluate risk before a project is built and operating. Darling Rebuttal Testimony at 2.

256. Five detectors were used over a three month period from July1, 2008-October 31, 2008 to record numbers of bat flight passes per night. GMCW JG Exhibit 2 at i.

257. Of the total number of 615 possible detector-nights only data from 451 detector nights was collected due to equipment malfunctions. One of the detectors (GM1 Low) was actually collecting data as little as 23% of the time. Darling pf Direct at 17.

258. A detector-night is the number of detectors used per night – i.e. 451 detectors for one night would yield 451 "detector nights." Gruver Cross Examination at 77.

259. The radar study conducted by Mr. Gravel can not accurately give an accurate bat fatality estimate because there is no pool of data suggesting a predictive relationship between pre-construction radar targets and post-construction bat fatality rates. Darling pf Direct at 16.

260. Mr. Gravel uses one comparison site in his model located in the state of Maine, a state with a very different and substantially lower residential bat population that the state of Vermont. Darling pf Direct at 16.

261. The fall season report for the Georgia Mountain project provides no estimate of fatality rates for the project. Darling pf Direct at 16.

262. The first season of fatality monitoring for the Georgia Mountain project was completed in October 2008. The entire fatality monitoring study for this project was completed in May 2009. The project's scavenger and searcher efficiency rate were well known by that date. Darling Rebuttal Testimony at 3.

263. Mr. Gruver's consulting firm had not calculated an estimate of bat fatality in order to apply it to their analysis. Mr. Gruver provides a figure of 8 bats per turbine based on the raw numbers (i.e. those actually observed during the surveys) of dead bats and does not take into account scavenger and searcher efficiency rates. Darling Rebuttal Testimony at 3.

264. Once scavenging and searcher efficiency estimates are incorporated into the formula to estimate total bat fatality rates, the estimates are several times the number of observed fatalities. Darling Rebuttal Testimony at 4.

Operational Adjustments and Post Construction Monitoring

Mortality Thresholds

265. Because of the uncertainty of bat population studies and uncertainty in bat fatality estimates, undue adverse impacts to bat populations may occur after project construction. Darling pf Direct at 37.

266. Adverse impacts of the project should be addressed when estimated bat fatalities for the period July 1 through September 30 at the Georgia Mountain site exceed:

-0.0 threatened and endangered bat species/ turbine (Indiana or small footed bat) or

-3.0 migratory bats/ turbine (combinations of red bat, hoary bat and silver- haired bat) or

-5.0 bats/turbine of other species (combinations of little brown bat, big brown bat, northern long-eared bat, and tri-colored bat). Darling pf Direct at 28.

267. If average bat fatality estimates for the three post- construction fatality surveys exceed the thresholds, then appropriate mitigation measures should be required to attempt to reduce bat facilities below such thresholds. Darling pf Direct at 31.

Post Construction Monitoring

268. It is reasonable to require post construction protocols be developed and approved by the agency as standard procedure. Mr. Gruver Tr. at 99.

269. Post construction monitoring as recommended by ANR is commonly completed at other wind power facilities. Mr. Gruver Tr. at 97 ln 19-20.

270. Post construction bat fatality monitoring is done at almost every facility. Mr. Gruver Tr. at 97 ln 23-24.

271. It is reasonable to impose three years of post-construction bat monitoring for the small-footed bat for that specific period, to determine the small-footed bat kill because there is potential roosting habitat within three miles of the project. Mr. Gruver Tr. at 98.

272. Additional evaluation (site reviews and/or acoustic monitoring) of suitable small-footed bat roosting habitat sites should be conducted or the project should commit to expanding the post-construction monitoring period to include the month of June. ANR Scott Darling Exhibit 2 at 4.

273. The requirement to conduct studies earlier in the season for general bat fatality is reasonable. Mr. Gruver Tr. at 98.

Operational Controls and Adjustments

274. Types of operational adjustments may include date specific shut-down periods or limitations on operation during specific wind and temperature regimes that pose greatest threat of bat fatality events. Darling pf Direct at 31.

275. Operational controls such as shut-down periods, would reduce bat fatalities. Mr. Gruver Tr. at 96.

276. Research on operational adjustments has been conducted at three sties to date- Germany, Alberta, Canada and Pennsylvania. While Germany's results have not been published, they did find an approximately 50% reduction in bat

fatalities when the turbine cut-in wind speed was changed to 5.5 meters/second. Darling pf Direct 35

277. In Alberta, Canada, an experimental operational adjustment treatment was conducted during the month of August 2008. At this site, 10 turbines were operated normally with cut-in wind speeds of 4.0 meters/second. A set of 19 experimental turbines raised their cut-in speed to 5.5 meters/second. Bat fatalities were reduced by approximately 52% from the same time frame the previous year (Barclay 2008). Darling pf Direct at 34.

278. In the first year of the Casselman Wind Project in Pennsylvania study, researchers ran an operational adjustment experiment from July 26 to October 10, 20008 on 23 turbines. They found that the fully operational turbines killed 5.4 times as many bats as the two experimental groups indicating a 73% mean reduction in bat fatalities as a result of the operational adjustments (Arnett et al. 2009). Darling pf Direct at 35

279. Operational adjustments can be implemented with little impact on energy production. Darling pf Direct at 35.

280. From the 2008 trials in Pennsylvania, the operational adjustments, when applied to all 23 turbines sacrificed energy productions as follows: At 5.0 meters/second: Loss of 3% of energy production during 76- day treatment period, 0.3% of energy production for the year. At 6.5 meters/second: Loss of 11% of energy production during 76-day treatment period. 1% of energy production for the year. Darling pf Direct at 35.

281. These results support the fact that wind projects using operational adjustments can effectively reduce bat fatalities without significantly impacting revenues. Darling pf Direct at 35.

<u>Recommended Conditions</u>

282. In order to assure that the Project will not have an undue adverse effect, the following conditions must be incorporated into a Certificate of Public Good:

- Require the petitioner to either 1) conduct three years of post- construction bat fatality monitoring during the period July 1 through September 30 that includes daily search intervals to determine bat fatality levels or 2) initiate the first state

of operational adjustments as agreed by ANR and conduct one year of post-construction monitoring during the period July 1 through September 30 that includes daily search intervals to determine bat fatality levels.[11]

- Require the petitioner to conduct three years of post construction bat fatality monitoring for the state threatened small-footed bat for the period June 1 through July 31 to determine if small-footed bats are killed by the project.
- Require that post-construction monitoring protocols be developed with and approved by ANR, unless the Petitioner prefers to come before the Public service Board.
- Require post-construction monitoring studies be conducted by a third party having the necessary experience as approved by ANR.

- Require permission be granted to ANR to access the project area during the post-construction monitoring.

- Require the petitioner to hand over all bat carcasses to ANR for species verification and research[12]

- Require that the results of post-construction monitoring studies be prepared and made available to ANR within 90 days of the end of data collection.

- Require that bat fatality thresholds as described in Scott Darling's testimony be applied to the project as the trigger for initiating or expanding operational adjustments

- Limit the extent of operational adjustments for-non-listed bat species to the 6 meters/second wind speed for the period July 1 through September 30. Direct Testimony of Scott Darling13 p. 38-39.

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11 . Most bat fatalities in North America have been reported in late summer and early autumn (Johnson 2005; Arnett et al. in press; RMR Barclay and E Baerwald pers comm.; Kunz et al. 2007)

12. ANR is willing to adjust this to incorporate scavenger efficiency studies raised as an issue by petitioner.

13. Data already exists from the Georgia Mountain project that demonstrates how effective operation adjustment can be at this site. First the acoustic bat survey data shows an inverse relationship between bat activity and wind speed. When wind speed is organized into 3 meters/ second blocks, approximately 69% of all bat activity occurred at or below 6 meters/ second win speed, and approximately 44 % of all bat activity occurred at or below four meters/second wind speed. Consequently, nearly one- half to over two-thirds of bat fatalities are likely to be avoided by implementing operational adjustments for a given time period. Darling pf Direct at 34.

Discussion

In order to issue a certificate of public good, the board must find that the project will not have an undue adverse impact on the natural environment which includes assessment of the threats to wildlife habitat and rare and endangered species.[14] In this case, due to the uncertainty from site-specific project studies as well as uncertainty in bat population and estimated bat fatality studies, there is insufficient information for the Board to make the finding that there will not be an undue adverse impact to bat populations resulting from the Georgia Mountain Community Wind Project. In order to make that finding the Board must impose conditions of post-construction monitoring and operational adjustments.

The fatality risk to bats from wind generation facilities is well documented. High levels of bat mortality have been documented at utility scale wind generation facilities similar to the Georgia Mountain Community Wind Project site. Sites that have forested ridgelines consistent with the attributes of this project area show significantly higher mortality rates than sites constructed on flat or agricultural lands. Sites with large turbine heights similar to those proposed at this site also show higher bat fatality rates.

Threats to the health of Vermont's bat populations and other challenges that Vermont bats face make bats particularly vulnerable to fatality risks from wind facilities. Vermont bats are more susceptible to risk because of a low reproductive rate and having to cope with shorter summers and variable weather conditions at Vermont's higher latitude. Also, the more recent threat of White Nose Syndrome on the state's cave

14 See Docket 6911 and Docket 7250.

dwelling bats have placed these species in a position of unprecedented vulnerability. Because bat populations face these threats, they are more susceptible to detrimental impacts from wind facilities.

Vermont bat's higher risk factors coupled with the uncertainty of GMCW's ability to accurately predict bat fatalities makes it difficult to accurately predict the detrimental impact from the Georgia Mountain wind facility. GMCW was unable to provide bat estimates that factored in scavenger and searcher efficiency rates and conducted a study which involved only 451 detector nights over a three month period. This study falls significantly short of previous studies performed for similar wind projects.[15] Further, the radar study completed by GMCW can not give an accurate estimate of potential bat fatality rates because there is no pool of data suggesting a predictive relationship between pre-construction radar targets and post-construction bat fatality rates. Also, Mr. Gruver used only one comparison site in his model which was located in the state of Maine, a state with a very different and substantially lower residential bat population than the state of Vermont. The shortcomings of these site specific studies limit GMCW's conclusions regarding estimated bat fatalities.

Due to the uncertainty in predicting the project's bat fatality rate, vulnerability of Vermont bat populations and the potential for harm, post construction monitoring is necessary and thresholds must be imposed when assessing the project's impacts on bat

15 Docket No. 7156 (where UPC collected data from over 1000 detector nights over a three year period.

fatalities.[16] The Board has previously enforced such post-construction monitoring conditions in the UPC case to study wind facility affects on bat fatalities.[17]

Adverse impacts to bat populations may occur as a result of the new wind facility and should be addressed when estimated bat fatalities for the period July 1 through September 30 at the Green Mountain site exceed 0.0 threatened and endangered bat species/ turbine (Indiana or small footed bat), 3.0 migratory bats/ turbine (combinations of red bat, hoary bat and silver- haired bat) or 5.0 bats/turbine of other species (combinations of little brown bat, big brown bat, northern long-eared bat, and tri-colored bat).

Uncertainty in predicting bat fatality levels at this or any other utility scale wind energy project, requires that adequate measures be taken to either reduce bat fatalities from the start in an effort to avoid undue adverse effects, or to adequately monitor post-construction bat fatalities and, if necessary, initiate operational adjustments to reduce bat fatalities to acceptable levels. If average bat fatality estimates for the post- construction fatality surveys exceed the thresholds, then appropriate mitigation measures should be required to attempt to reduce bat facilities below such thresholds. Adaptive management should be used by the Petitioner to address bat fatality issues.

The petitioner and our experts agree that operational adjustments have proved successful at other sites. Scott Darling has sited several studies that have shown positive

16 The small-footed bat, a state listed endangered species, has possible roosting sites in the area and it is reasonable to carry out a post construction study for up to three years to monitor threats to that and other bat populations.

17 Docket 6911 at 74

results of operational adjustments on reducing bat fatalities at other wind facilities.[18] Petitioner's expert, Mr. Gruver, also concedes that operational adjustments are reasonable and would lead to a reduction in bat fatalities. Given this support, operational adjustments should be a necessary condition of the CPG in order to minimize the overall negative impact on bat populations if significant levels of bat mortality are found. [19] Types of operational adjustments may include date specific shut-down periods, adjustments of cut-in wind speed, or limitations on operation during specific wind and temperature regimes that pose greatest threat of bat fatality events. [20] [21]

Due to the tenuous nature of bat populations in Vermont and the uncertainty of bat fatality studies completed for the Georgia Mountain facility, in order to assure there is no undue adverse impact to bat populations, it is necessary to condition post-construction studies to assess negative impacts of this project on the bat populations and to condition operational adjustments. Post-construction studies will help assure that critical bat fatality thresholds will not be exceeded. If thresholds are exceeded, proper operational adjustments can then be made to lessen the impact on bat fatality rates at the Georgia Mountain Community Wind facility.

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18 See Darling pf Direct at 34-35.

19 See Md Public Service Commission Order No 8938 at 74 (where Commission implemented a condition which included the possibility for operational adjustments should significant mortality rates be found)

20. The certificate of public good for Docket 7156 included a joint stipulation between ANR and the petitioner that initiated the outer boundaries of an operation adjustment protocol under which bat fatalities would be reduced. Darling pf Direct at 33.

21. The use of operational adjustments have also been included in proposed and final permits from other states such as the Public Service Commission of Maryland (Case No. 9008 and 8938) as well as the Virginia State Corporation Commission (Case No. PUE-2005-00101). In all three cases, specific bat fatality thresholds are provided, above which additional operational adjustments must be initiated. Darling pf Direct at 33

Conclusion

In order to assure that the Project will not have an undue adverse effect, the following conditions must be incorporated into a Certificate of Public Good:

- Require the petitioner to either 1. conduct three years of post- construction bat fatality monitoring during the period July 1 through September 30 that includes daily search intervals to determine bat fatality levels or 2) initiate the first state of operational adjustments as agreed by ANR and conduct one year of post-construction monitoring during the period July 1 through September 30 that includes daily search intervals to determine bat fatality levels.
- Require the petitioner to conduct three years of post construction bat fatality monitoring for the state threatened small-footed bat for the period June 1 through July 31 to determine if small-footed bats are killed by the project.
- Require that post-construction monitoring protocols be developed with and approved by ANR, unless the Petitioner prefers to come before the Public service Board.
- Require post-construction monitoring studies be conducted by a third party having the necessary experience as approved by ANR.

- Require permission be granted to ANR to access the project area during the post-construction monitoring.

- Require the petitioner to hand over all bat carcasses to ANR for species verification and research.

- Require that the results of post-construction monitoring studies be prepared and made available to ANR within 90 days of the end of data collection.

- Require that bat fatality thresholds as described in Scott Darling's testimony be applied to the project as the trigger for initiating or expanding operational adjustments

- Limit the extent of operational adjustments for-non-listed bat species to the 6 meters/second wind speed for the period July 1 through September 30.

Deer

Two areas of deer winter habitat have been identified in the vicinity of the proposed project. Austin, Direct pf. at 6.

One area is 400 feet from the project footprint and the second is 1000 feet away. The Department does not believe the project, as currently designed, will impact deer wintering habitat Austin Direct pf at 6.

The Department does, however, note that per the Petitioners consultant, "the forest in this area [WL2] is currently being actively managed and areas of cover are being removed." "Natural Resource Impact Assessment Under 30 V.S.A. 248(B) (5) Georgia Mountain Community Wind Project, p. 19" The referenced areas of cover are softwood trees that are a critical component of the hemlock forest identified as Wildlife Area 2 (WL2) and which serve as deer wintering habitat in this area. Austin Direct pf at 6

The Department is interested in the future management of this habitat area in the context of any agreement that may be reached with the Petitioner related to stewardship of the land in the future. Austin Direct pf at 6-7

Black bear

Black bears require large areas of remote contiguous habitat to meet their life needs. Parsons Tr. 46 lines 18-20.

The project site does not contain necessary wildlife habitat on or around the project site. Austin Direct pf at 7.

The project area contains land that is relatively remote (particularly for the region as a whole), forested, has wetlands and mast bearing species, and is likely utilized by black bear, at least seasonally, in the region. AE-2 at 20; Austin Direct pf. at 7.

No signs of bear use of the wetlands in the project area and no known suspected or black bear travel corridors were found on the project site. AE- 2_; Austin Direct pf. at 7.

The site lacks the high quality black bear habitat features that support local bear populations and rise to the level of "necessary black bear habitat." Austin Tr. at p 12-121

The project, as currently designed, will not impact significant black bear habitat. Austin, AE-2.

The project will result in additional fragmentation and loss of interior forest habitat that is important for the health and welfare of the bear population as well as other species of wildlife. Austin Direct pf. at 7.

The effects of fragmentation associated with the proposed project could be mitigated through the long-term conservation and stewardship of Petitioner's larger property. Austin Direct pf. at 7-8.

Moose

The project site is not located within an area where moose would tend to spend the winter months. Moose winter habitat was not identified by Petitioner at the project site. Austin Direct pf. at 9.

The project will not impact moose winter habitat. Austin Direct pf. at 9.

III. Conclusion

Absent the mitigation measures and conditions recommended by the Agency of Natural Resources, the project will have an undue adverse impacts to the natural environment. Accordingly, ANR respectfully recommends that the Board impose as conditions of the certificate of public good the ANR recommendations contained in the findings and conclusions above.

Respectfully submitted this 15th day of March, 2010 at Waterbury, Vermont.

State of Vermont
Agency of Natural Resources

BY: _____

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