

STATE OF VERMONT
PUBLIC SERVICE BOARD

PSB Docket No. 7628

Joint Petition of Green Mountain Power Corporation,
Vermont Electric Cooperative, Inc., and Vermont
Electric Power Company, Inc. for a Certificate of
Public Good pursuant to 30 V.S.A. Section 248 to
Construct up to a 63 MW Wind Electric Generation
Facility and associated Facilities on Lowell Mountain
In Lowell, Vermont and the Installation of approximately
16.9 miles of Transmission Line and associated
Substations in Lowell, Westfield, and Jay, Vermont.

TESTIMONY OF ERIC SORENSON

**ON BEHALF OF THE
VERMONT AGENCY OF NATURAL RESOURCES**

Summary of Testimony

Mr. Sorenson is the Community Ecologist with the Vermont Fish and Wildlife Department (VFWD) of the Vermont Agency of Natural Resources (VANR). The purpose of his testimony is to provide the Department's review of the potential effects of the Kingdom Community Wind (KCW) project on significant natural communities and the large, relatively unfragmented habitat on Lowell Mountain.

1 **Q1. Please state your name, place of employment, your current position, and any other**
2 **position you have held with the Department.**

3

4 A1. My name is Eric Sorenson. I am the Community Ecologist with the Vermont Fish and
5 Wildlife Department (VFWD) of the Vermont Agency of Natural Resources (VANR). I
6 have been in this position since 1996.

7

8 **Q2. Please describe your educational background and any relevant experience.**

9

10 A2. I have a B.S. degree from the University of Michigan in Natural Resources and Wildlife
11 Ecology. I have an M.S. degree from the University of Maine in Botany and Plant
12 Ecology. Prior to my current position I worked from 1989 until 1996 as a wetland
13 ecologist with Vermont Department of Environmental Conservation implementing the
14 Vermont Wetland Rules. I also worked as a wetland consultant in Massachusetts for two
15 years and as an ecologist in Maine for one year. I have included a copy of my resume
16 with my testimony (Exhibit ANR-ES-1).

17

18 **Q3. Have you previously provided testimony to the Public Service Board?**

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20 A3. Yes. I provided written testimony on behalf of VFWD regarding Docket 7373, the
21 VELCO Southern Loop project. I also provided written and oral testimony regarding
22 Docket 7508, Georgia Mountain Community Wind, LLC.

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Q4. Please describe a few examples of the types of issues related to evaluating impacts to significant natural communities that you have participated in during your time with the Department.

A4. In my position as ecologist with the Department, I am responsible for the identification and classification of Vermont’s upland and wetland natural communities. I am the co-author of a book on Vermont’s natural communities. The majority of my work is to inventory, map, and evaluate significant natural communities across Vermont and to work with landowners on appropriate management and conservation. Both working with the Fish and Wildlife Department and in my previous position with the Department of Environmental Conservation, I have been responsible for evaluating the significance of wetland and upland natural communities associated with the regulatory process, including the Vermont Wetland Rules CUD, wetland reclassification, Act 250, Section 248, and 401 Water Quality Certification. I have developed the Agency of Natural Resources position and testified before District Environmental Commissions, the Environmental Board, the Natural Resources Board (former Water Resources Board), in civil court settings, and have provided testimony to the Public Service Board. Typically, the goal of my work in the regulatory arena is to identify significant natural communities and to work with applicants to avoid and/or minimize adverse effects on these natural areas.

1 **Q5. What is the purpose of your testimony in this proceeding?**

2

3 A5. The purpose of my testimony is to provide the Department’s review of the potential
4 effects of the Kingdom Community Wind (KCW) project on significant natural
5 communities and the large, relatively unfragmented habitat on Lowell Mountain. In
6 addition, my testimony pertains to significant natural communities and rare species along
7 the proposed transmission corridor alignment.

8

9 The review of natural resource issues requires that we evaluate impacts at three scales:
10 species scale, natural community scale, and landscape scale. For projects such as KCW,
11 our primary concerns at the species scale of review are rare plant and animal species,
12 birds, bats, bear, and deer. Our primary concerns at the natural community scale are rare,
13 uncommon, and state-significant natural communities, as well as wetlands in general.
14 The third and largest scale is the landscape scale. Our primary concerns at this broad
15 scale is the integrity of large, relatively unfragmented blocks of forest and habitat, the
16 ecological processes that influence the natural communities within these large forest
17 blocks, and interior forest wildlife habitat. There are clear relationships between the
18 elements of these three scales of natural resource review and they should not be viewed
19 in isolation from each other. Our primary concern is the KCW project's fragmentation of
20 the state-significant natural communities and the large, contiguous habitat block
21 associated with Lowell Mountain, and the effect of this fragmentation on natural
22 communities, ecological processes, and interior forest habitat.

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Q6. Describe the concept of natural communities and how they are ranked by VFWD.

A6. Natural communities are interacting assemblages of plants and animals, their physical environment, and the natural processes that affect the organisms and the environment. 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. 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. The concept of a natural community type is very useful in classifying the complex patterns in the landscape. In Vermont we have developed a classification of more than 80 natural community types¹. Each natural community type is ranked according to its relative rarity in Vermont. 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;

¹ 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.

1 **S3:** high quality examples are uncommon in the state, but not rare; the community
2 is restricted in distribution for reasons of climate, geology, soils, or other physical
3 factors, or many examples have been severely altered;

4 **S4:** widespread in the state, but the number of high quality examples is low or the
5 total acreage occupied by the community type is relatively small;

6 **S5:** common and widespread in the state, with high quality examples more
7 common.

8 The Agency considers S1 and S2 natural community types to be rare in Vermont. The
9 Agency considers those natural community occurrences that meet a combination of
10 Rarity Rank (for the type) and quality (Element Occurrence Rank) to be state-significant
11 natural communities. Almost all examples of rare natural community types are
12 considered state-significant, whereas only the very best examples of common (S5)
13 community types are considered state-significant. For uncommon (S3) and widespread
14 (S4) types, those examples that are excellent to good are considered state-significant.
15 Examples of state-significant natural communities are tracked by the VFWD in the
16 database maintained by the Natural Heritage Information Project. This database currently
17 includes information on approximately 1,600 state-significant natural communities in
18 Vermont.

19
20 **Q7. Have you reviewed the Petitioner’s prefiled testimony and exhibits?**

21

1 A7. Yes, I have. In particular I have reviewed: “Section 248 Natural Resources
2 Assessment Report, Green Mountain Power, Kingdom Community Wind Project,
3 Lowell, Westfield, and Jay, Vermont” by VHB Pioneer and dated February 26, 2010
4 (Exh. PET-JAN-2); "TE Plant and Natural Community Survey, Kingdom Community
5 Wind, Transmission Component – Lowell, Westfield, and Jay, Vermont" by VHB and
6 dated September 17, 2010 (Exh. PET-JAN-8); Kingdom Community Wind, project site
7 plans, prepared by Krebs & Lansing Consulting Engineers, Inc., dated 2/25/2010 with
8 latest revision 9/14/2010; "Joint petition of Green Mountain Power Corporation, Vermont
9 Electric Cooperative, Vermont Electric Power Co., Inc. and Vermont Transco LLC for a
10 Certificate of Public Good pursuant to 30 V.S.A §248; Prefiled testimony of Adam
11 Gravel, dated May 21, 2010; Bird and Pre-Construction Surveys (Exh. PET-AG-1, dated
12 January 2010) and Bird and Bat Risk Assessment (Exh. PET-AG-2,dated February 26,
13 2010), both by Stantec Consulting; and Response of Petitioners to second set of
14 discovery requests of Agency of Natural Resources, October 5, 2010.

15
16 **Q8. Please discuss what is known about state-significant natural communities in the**
17 **KCW project area and the Lowell Mountains.**

18
19 A8. Montane Spruce-Fir Forest is an uncommon (S3) natural community type in Vermont. It
20 occurs on mountain summits and ridgelines, typically at elevation over 2,500 feet in the
21 northern portion of Vermont. The community type is dominated by red spruce (*Picea*
22 *rubens*) and balsam fir (*Abies balsamea*), and has varying amounts of hear-leaved paper

1 birch (*Betula papyrifera* var. *cordifolia*). Cold conditions, abundant moisture from snow,
2 rain, and fog, and shallow acidic soils are the environmental conditions that create this
3 northern community type.

4
5 Previous to the KCW project, preliminary inventory work by VFWD had identified 96
6 acres of Montane Spruce-Fir Forest on the ridgeline of the Lowell Mountains as part of a
7 statewide inventory and mapping of this natural community type. The example of
8 Montane Spruce-Fir Forest on Lowell Mountain had not been visited by VFWD staff
9 prior to the review of the KCW project. The preliminary mapping of Montane Spruce-Fir
10 Forest was presented to staff at VHP Pioneer, consultants for Green Mountain Power
11 (GMP), in 2009.

12
13 As part of KCW project assessment of environmental features, VHB Pioneer conducted
14 field work to map the extent of Montane Spruce-Fir Forest on the KCW controlled
15 property on the Lowell Mountains. The results of this mapping were presented to VFWD
16 in letters from VHB Pioneer in letters dated December 22, 2009 and January 20, 2010.
17 Based on this site work by VHB Pioneer, only 2.9 acres of Montane Spruce-Fir Forest
18 was delineated on the KCW property.

19
20 On May 26, 2010, I visited the KCW project with representatives from GMP, Vermont
21 Agency of Natural Resources, U.S. Environmental Protection Agency, U.S. Army Corps
22 of Engineers, and U.S. Fish and Wildlife Service. During this site visit I observed that

1 there was much more Montane Spruce-Fir Forest on the Lowell Mountain ridgeline than
2 had been mapped by VHB Pioneer. In discussions with Adam Crary of VHB Pioneer
3 during the site visit and subsequently, we agreed that there had been a misunderstanding
4 by the original staff of VHB Pioneer on what vegetative composition and structure
5 defines a Montane Spruce-Fir Forest. Based on these discussions, Adam Crary remapped
6 the Montane Spruce-Fir Forest using primarily remote sensing information (aerial
7 photographs). The resulting delineation of Montane Spruce-Fir Forest is shown on the
8 project site plans and I agree with its accuracy. This second delineation identifies
9 approximately 81 acres of Montane Spruce-Fir Forest on the KCW property. There is a
10 small amount of Montane Spruce-Fir Forest to the south of the KCW property that I have
11 delineated using similar methods. Therefore, the total amount of Montane Spruce-Fir
12 Forest on the Lowell Mountain ridgeline is approximately 94 acres.

13
14 Montane Yellow Birch-Red Spruce Forest is also an uncommon (S3) natural community
15 in Vermont. It typically occurs on mountain slopes at elevations (2,000 feet to 2,500
16 feet) below Montane Spruce-Fir Forest. Dominant trees are red spruce and yellow birch
17 (*Betula alleghaniensis*). The slightly warmer site conditions and deeper soils in this
18 natural community type mean that there is usually a higher diversity of herbaceous
19 species than is found in Montane Spruce-Fir Forest.

20
21 The extent of Montane Yellow Birch-Red Spruce Forest was not identified on the KCW
22 project site by project consultants, despite several meetings in which the importance of

1 this natural community was discussed with the petitioner. As a result, I delineated the
2 approximate boundary of the Montane Yellow Birch-Red Spruce Forest on Lowell
3 Mountain based on remote sensing methods and provided this information to the
4 petitioner. This boundary is now shown accurately on the project site plans. The total
5 area of Montane Yellow Birch-Red Spruce Forest mapped on the slopes of Lowell
6 Mountain is 977 acres.

7
8 Based on the sizes of the natural communities, the current condition of the natural
9 communities, the large, relatively unfragmented landscape in which they occur, both the
10 Montane Spruce-Fir Forest and Montane Yellow Birch-Red Spruce Forest are considered
11 state-significant natural communities by VFWD using the Department's standard natural
12 community ranking procedures. The Montane Spruce-Fir Forest is a relatively small
13 example of this natural community type, but it is in very good condition currently and is
14 located in a large, relatively unfragmented block of forest and habitat. The Montane
15 Yellow Birch-Red Spruce Forest is a moderate sized example of this type, is in good to
16 moderate condition as a result of logging activity, and is located in the same large,
17 relatively unfragmented habitat block.

18
19 An example of the very rare (S1) Serpentine Outcrop occurs just east of Route 100 in
20 Lowell. This site, known as West Farman Hill, was first described and documented by
21 VFWD in 1984. Serpentine Outcrops are areas of exposed serpentine bedrock. This
22 bedrock originated deep in the earth's mantle and is unlike most other rocks found in the

1 earth's crust. Iron, magnesium, nickel, and chromium are all abundant in this rock type,
2 and these are minerals that are toxic to plants in high concentrations. Typical plant
3 nutrients such as calcium and phosphorus are very low in abundance on soils derived
4 from serpentine bedrock. The resulting natural community has a distinct set of plant
5 species, including red spruce, harebell (*Campanula rotundifolia*), and several rare
6 species. One of these species that occurs at the West Farman Hill site is Green Mountain
7 maidenhair-fern (*Adiantum viridimontanum*) – this species is rare (S2) and state-
8 threatened in Vermont and is considered globally uncommon. Another rare species at
9 this site is large leaf sandwort (*Moehringia macrophylla*). There are only eight known
10 examples of Serpentine Outcrop in Vermont and they are all in the Lowell area where
11 there are the largest exposures of serpentine bedrock.

12
13 VHB has accurately delineated the extent of Serpentine Outcrop and shown this natural
14 community on maps in their September 17, 2010 letter and report. The locations of
15 Green Mountain maidenhair fern have also been accurately mapped at this site by VHB.
16 The locations of the rare large leaf sandwort have not been mapped and needs to be in
17 order to avoid impacts to this species.

18
19 VFWD considers the Serpentine Outcrop at the West Farman Hill site to be a state-
20 significant natural community. This is due to the very rare nature of this community
21 type, its average size for the type, and the good to moderate condition of this site (the
22 existing transmission line crosses the Serpentine Outcrop).

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Q9 Petitioner asserts that the only significant natural community on the site is the Serpentine Outcrop, do you disagree with this opinion?

A9 Yes. I disagree with the statement in the Joint Petition which states that there are no state-significant natural communities in the KCW project investigation area except the Serpentine Outcrop community along the transmission line (page 9, paragraph 41). The two Montane forest natural communities on Lowell Mountain are also state-significant. All of three of these natural communities have been ranked and determined to be state-significant examples using the standard VFWD approach.

Q10. Are there state-significant natural communities in the KCW project area that you believe should be considered a rare and irreplaceable natural area (RINA) under 10 V.S.A. § 6086(a)(8)?

A10. Yes, I believe the Serpentine Outcrop at West Farman Hill should be considered a RINA by the Public Service Board under 10 V.S.A. § 6086(a)(8). In making this recommendation to the Board, it is important to demonstrate first that the area is natural and next that the natural area is both rare and irreplaceable. Although the Serpentine Outcrop is adjacent to Route 100, has an existing transmission line suspended over it, and three utility poles installed within the community, the natural community is dominated by native species (including two rare species) and primarily under the influence of natural

1 processes (the chemical characteristics of the serpentine bedrock and drought associated
2 with exposed bedrock that limits plant development). There are only eight known
3 examples of Serpentine Outcrop known in Vermont, making this a very rare natural
4 community type. Another factor contributing to the rarity of this natural area is the
5 presence of two rare species, one state-threatened in Vermont. Serpentine bedrock is
6 exposed in very limited areas in Vermont, primarily Lowell and Belvidere. The
7 movement of serpentine bedrock to near the earth's surface is the result of mountain
8 building events millions of years ago and the exposure of these areas is the result of
9 glacial scouring and deposition resulting from the last glacial retreat, which began about
10 20,000 years ago. Because of this, the Serpentine Outcrop community is irreplaceable.

11
12 I disagree with the statement in the Joint Petition which states that there are no Rare and
13 Irreplaceable Natural Areas (RINA) in the KCW project investigation area (page 9,
14 paragraph 41), as the Serpentine Outcrop meets the three part standard of what should be
15 considered a RINA. I discuss later that I believe undue adverse effects to this Serpentine
16 Outcrop RINA can be avoided.

17
18 Although both the state-significant montane forest natural communities and the large
19 unfragmented habitat area at the Lowell Mountains are very important environmental
20 conditions at the KCW project site, I do not believe that they meet the standards of a
21 RINA.

22

1 **Q11. If these two montane natural communities are considered uncommon and do not**
2 **constitute a RINA, why will the degradation of these communities result in an**
3 **undue adverse impact to the natural environment?**

4
5 A11. The Montane Spruce-Fir Forest and Montane Yellow Birch-Red Spruce Forest are both
6 state-significant examples of these community types using standard VFWD ranking
7 methodology. The proposed construction and clearing for the KCW project will degrade
8 the Montane Spruce-Fir Forest to the degree that it will no longer be considered state-
9 significant, using the same VFWD ranking specifications. This is a clear and objective
10 method for assessing changes to natural communities. The presence of a state-significant
11 natural community is a strong indication of ecological integrity and the degradation of
12 that natural community indicates a significant adverse effect on the natural environment.
13 More detail on these undue adverse effects to the state-significant natural communities
14 and large, relatively unfragmented habitat block on Lowell Mountains is presented later
15 in my testimony.

16
17 **Q12. Do you have concerns regarding KCW project impacts on the Serpentine Outcrop**
18 **natural community and RINA?**

19
20 A12. Yes, although I believe that the project impacts to the Serpentine Outcrop can be
21 minimized so that there is not an undue adverse effect on this natural community or the
22 rare species present if there is careful installation of new power lines and poles and if

1 there is a well designed and implemented vegetation management plan. Specifics of this
2 installation process and management plan have been discussed with the Petitioner, but
3 have not been finalized.

4
5 **Q13. Discuss Project impacts to rare, threatened, and endangered plants. Do you believe**
6 **that all of the rare plant occurrences will be adequately protected both during and**
7 **after construction?**

8
9 A13. I believe that rare, threatened, and endangered plants are not fully addressed in the
10 applicant's reports and the draft MOU. As of the date of this testimony we are still
11 waiting for specific information on how the Petitioner plans to avoid impacts to the State
12 Threatened Green Mountain maidenhair fern that occurs in the Serpentine Outcrop along
13 and adjacent to the existing transmission line that would be upgraded. We need specific
14 information on locations of proposed new poles, and if these poles are to be placed within
15 the maidenhair fern population, how they are to be placed without impacting the ferns. If
16 there is an unavoidable impact to the fern, we need to know how this will be minimized
17 and how the impact will be mitigated.

18
19 **Q14. Does the VFWD have specific recommendations regarding procedures to avoid**
20 **impacts to state listed plant?**

21

1 A14. Yes, the VFWD requests that all of the threatened plants that were identified within the
2 area of impact should be located, flagged, and fenced prior to any construction related
3 activity, including tree clearing, in the vicinity. No felling of trees or running equipment
4 over the plants, even under frozen conditions or with mats, or any incidental taking is
5 permitted without issuance of a separate Endangered Species Permit. We have also
6 requested that a qualified botanist be on site at all times while work occurs here, and that
7 existing poles be cut off at ground level in these areas, if that is allowed by current utility
8 regulations or standards.

9
10 **Q15. Does the Department have recommendations regarding procedures to avoid impacts**
11 **to rare plants?**

12
13 **A15.** The Department recommends restricting herbicides within 50 meters of any rare plant or
14 significant natural community and mechanical clearing limited to the dormant season
15 unless there is a management plan in place.

16
17 The Department also requests that detrimental impacts be avoided to all of the rare (S1,
18 S2, and S2/S3) species identified along the corridor by locating, flagging, and fencing
19 them prior to any construction related activities to avoid or minimize any impacts.

20

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22

1 **Q16. Do areas with rare plants require any special management?**

2

3 A16. We also request that all threatened and rare species within the new ROW be monitored
4 yearly for impacts from the new construction and clearing for a period of five years. This
5 would include impacts from new or increasing infestations of invasive, exotic species as
6 listed on the Noxious Weed Quarantine or the Invasive Species Watch Lists for Vermont.
7 In addition, we are requesting the Petitioner to submit a vegetation management plan
8 specifically for the rare Serpentine Outcrop natural community because of its rarity in the
9 state and because it provides specialized habitat for both the Green Mountain maidenhair
10 fern and large-leaved sandwort, both of which are endemic to this community type. The
11 management plan would specifically address inventory and management to prevent the
12 spread of invasive species, as well as “weedy” natives that might spread into the
13 serpentine area following disturbance. It would also outline special efforts required of
14 the contractors in this area to avoid or minimize any impacts to the serpentine natural
15 community and to avoid introduction of non-indigenous species.

16

17 **Q17. Explain the importance of the large, relatively unfragmented block of forest and**
18 **habitat associated with the Lowell Mountains?**

19

20 A17. The Vermont Wildlife Action Plan (VFWD 2005,
21 http://www.vtfishandwildlife.com/SWG_home.cfm) was developed to plan for the
22 conservation of all of Vermont's wildlife species. This comprehensive Wildlife Action

1 Plan addresses conservation of individual wildlife species that have special conservation
2 needs (Species of Greatest Conservation Need). The plan also addresses conservation of
3 habitat types to protect these Species of Greatest Conservation Need and to ensure that
4 Vermont's more common species remain common. A primary habitat level concern in
5 the Wildlife Action Plan is habitat fragmentation. When referring to natural
6 communities, wildlife habitat, and landscapes, fragmentation means dividing land with
7 naturally occurring vegetation and ecological processes into smaller and smaller areas as
8 a result of roads, land clearing, development, or other land uses that remove vegetation
9 and create physical barriers between previously connected natural vegetation.
10 Fragmentation alters interior forest wildlife habitat, impairs movement of some wildlife
11 species, changes natural ecological processes such as surface water drainage and
12 susceptibility of trees to blowdown by high wind events, and increases the likelihood of
13 introduction of non-native, invasive plant species.

14
15 I have conducted an assessment of large, unfragmented habitat blocks in the Northern
16 Green Mountains in order to evaluate the significance of the large habitat block that
17 includes the Lowell Mountains (Lowell Mountain Block). The assessment is based on
18 available GIS data. Habitat blocks were defined as areas of contiguous natural habitat
19 (forest, wetland, cliff, ponds, and streams) that are bounded by fragmenting features. For
20 this analysis, fragmenting features were considered Class 1, 2, and 3 roads, houses and
21 other development, and agricultural land. Class 4 roads were not considered fragmenting
22 features as they are typically very narrow (most have continuous forest canopy cover)

1 and have low traffic volumes. Based on these criteria, habitat blocks can be identified
2 and evaluated for their relative size and other factors.

3
4 In the Northern Green Mountains, 337 habitat blocks were identified. Of these, the
5 Lowell Mountain Block is 29, 680 acres, making it the twelfth largest habitat block in the
6 biophysical region.

7
8 **Q18. Do you have concerns regarding KCW project impacts on the state-significant**
9 **natural communities and the large, relatively unfragmented block of habitat**
10 **including the Lowell Mountains?**

11
12 A18. Yes. As proposed and without adequate mitigation, I believe the KCW project will result
13 in an undue adverse effect on the natural environment because of substantial degradation
14 of the two state-significant natural communities and because of significant and permanent
15 fragmentation of the currently unfragmented habitat block associated with the Lowell
16 Mountains.

17
18 My primary concern is that the KCW project will result in degradation of the state-
19 significant Montane Spruce-Fir Forest and, to a lesser extent, the Montane Yellow Birch-
20 Red Spruce Forest on the Lowell Mountains. The adverse effects on the state-significant
21 natural communities will be the result of substantial and permanent habitat fragmentation
22 associated with construction of access roads, ridgeline crane roads, turbine pads,

1 construction staging areas, stormwater management structures, collector lines, and the
2 associated forest clearing. There will be direct loss of state-significant natural
3 communities where this construction occurs, resulting in loss of about 25 acres of
4 Montane Spruce-Fir Forest and 81 acres Montane Yellow Birch-Red Spruce Forest.
5 There will be alterations in the ecological processes that influence the formation and
6 maintenance of the portions of these two natural communities that are near the
7 construction areas, including natural disturbance by wind, colluvial action on the steep
8 mountain slopes, and wildlife species composition. In addition, the ecological integrity
9 of the natural communities is threatened by the introduction of non-native, invasive
10 species in association with the construction and clearing activity.

11
12 The fragmentation of the 29,680 acre habitat block that includes the Lowell Mountains
13 and the KCW project will be caused by construction of about 2.5 miles of access road
14 from Route 100 to the Lowell Mountain ridgeline and about 4.0 miles of ridgeline crane
15 roads. These roads, associated drainage structures, and the 21 turbine pads will result in
16 construction of infrastructure and site clearing on 165 acres². Although these 165 acres
17 of clearing and development is a relatively small percentage of the total area of habitat on
18 the Lowell Mountains, the linear orientation of the impacts and their location along the
19 Lowell Mountain ridgeline will maximize their fragmenting effects on the state-

² This figure of 165 acres is taken from a spreadsheet provided by the Petitioner to answer questions about clearing and disturbance areas posed by ANR (ANR-SM-2). There is still confusion about the extent of clearing, as the Petitioner has also indicated in other correspondence to ANR that there will be 124 acres of total disturbed area.

1 significant natural communities and on the this large currently unfragmented habitat
2 block.

3
4 There are currently two Class 4 roads that traverse the 29,680 acre Lowell Mountain
5 Block. To the north of the KCW project area, Town Highway 52 cuts across the Lowell
6 Mountains through a saddle in the ridgeline. This Class 4 road is very narrow and is
7 barely discernable on aerial photographs of the area. In most locations along this Class 4
8 road there is forest canopy closure. To the east of the KCW project area, Albany Road
9 runs along the base of the Lowell Mountains at an elevation of about 1,600 feet. This
10 Class Four road is wider, with road surface of about 15 feet and some canopy gaps up to
11 30 feet wide. Although both of these Class 4 roads do represent some habitat
12 fragmentation in the Lowell Mountain Block, this fragmentation is minor compared to
13 what will occur as a result of the KCW project.

14
15 The project proposal is to construct 2.5 miles of access road from Route 100 to the
16 ridgeline and 4.0 miles of crane road along the Lowell Mountain ridgeline. Unlike the
17 existing Class 4 roads on the Lowell Mountain Block that are located off the ridgeline,
18 the proposed new 4.0 miles of crane road will be directly along the ridgeline as this is
19 where the wind resource is located. Given the steep slopes, cut and fill slopes will
20 require that the road footprint is wide. The initial travelled surface of the proposed crane
21 road will be 35 feet, but the total width of the constructed road, including cut and fill
22 slope and drainage structures ranges from 65 feet to 203 feet (based on measurements

1 made on the project site plans). At the access road and crane road intersection, the road
2 and slope width is 300 feet. Examining clearing widths along the crane road where there
3 is an adjacent turbine pad, the total cleared area is over 400 feet at many turbine pads and
4 540 feet wide at the Turbine 4 pad. These roads and turbine pads will result in permanent
5 forest canopy gaps along their entire lengths, unlike the Class 4 roads on the Lowell
6 Mountain Block that have mostly closed forest canopies. For comparison, I measured the
7 width of the maintained clearing for Interstate 89 for a narrow section of the right-of-way
8 in Brookfield, Vermont where there is only a grass median. In this location, the
9 maintained width (including road surfaces, grass median, and grass sideslopes) of the
10 highway ranges from 180 feet to 205 feet.

11
12 The proposed KCW project infrastructure and clearing is expected to decrease the
13 capacity of the Lowell Mountain habitat block to support area-sensitive wildlife species
14 and especially nesting of forest-interior bird species. The permanent clearings associated
15 with the roads, turbine pads, and connector lines will create forest edge and are expected
16 to alter wildlife use of the area, with a trend toward more bird species associated with
17 habitat edge and a decline in forest interior species. Although natural communities are
18 commonly identified and classified primarily based on their characteristic plant species,
19 the animal component is equally important to healthy, viable natural communities and
20 their resiliency and ability to adapt to changing environmental conditions, such as climate
21 change. Whereas forest management that creates patch canopy openings in the Lowell
22 Mountain Block may result in temporary changes in wildlife use in these areas, the KCW

1 project infrastructure will result in permanent changes in wildlife use in the vicinity of the
2 project.

3
4 In the Bird and Bat Risk Assessment report prepared by Stantec (February 26, 2010),
5 PET-AG-2, it is stated that "[o]verall, the assemblage of breeding bird species within the
6 Project area is composed of primarily forest interior breeders, as well as some species
7 associated with forest edge and disturbed forest habitats." (page 42) In the same report,
8 there is a conclusion that, "literature review regarding the likelihood of indirect impacts
9 to breeding birds ... suggests that some indirect impacts will likely occur as the result of
10 the Project, but that the magnitude of these impacts will be minimal, as the Project will
11 result in a relatively small amount of clearing relative to the entire Project area. In
12 addition, this area has experienced frequent changes in habitat conditions due to timber
13 harvesting activities to which the breeding bird population has likely become accustomed
14 to (Table 4-6). These impacts are expected to consist primarily of shifts in distribution of
15 species within the Project area which could also occur as the result of other types of
16 impacts, such as timber harvesting." (page 48).

17
18 Although I agree that the project is likely to result in a shift in breeding bird species away
19 from those that are forest interior species and toward more forest edge species, I strongly
20 disagree with the conclusion that the project impacts to the breeding bird populations will
21 be minimal. Although the forest on the KCW project and others in the Lowell Mountain
22 Block have been harvested for timber repeatedly over the past two centuries, each

1 logging operation results in relatively temporary effects on forest conditions and forest
2 interior conditions are expected to return to all areas that are logged in this area. These
3 altered forest conditions associated with logging operations are completely different from
4 the 165 acres of permanent clearing and construction associated with the KCW project.
5 In addition, the linear nature of the proposed disturbance (4.0 miles of ridgeline crane
6 road) exacerbates the degree of habitat fragmentation. Finally, the fragmentation from
7 the project is primarily in the Montane Spruce-Fir Forest where Canada warbler found in
8 high frequency (Stantec, Bird and Bat Pre-Construction Survey, January 2010, PET-AG-
9 1, page 36). Canada warbler is the only high priority Species of Greatest Conservation
10 Need documented in the project area.

11
12 **Q19. Jeff Wallin in discovery responses asserts that the fragmenting effect of the project**
13 **is beneficial to wildlife, and actually can serve as mitigation for the project. Do you**
14 **agree with this opinion?**

15 A19. I strongly disagree that creation of edge in this forest interior is in any way mitigation for
16 impacts to certain wildlife including bear, as suggested by Mr. Wallin. Although the
17 creation of edge and early successional habitat is clearly an appropriate wildlife
18 management technique in appropriate locations, Mr. Wallin's argument that creating
19 about 165 acres of permanent openings and the associated edge adjacent to the KCW
20 project infrastructure in the center of an unfragmented forest block will significantly
21 decrease the role that natural processes play in shaping the natural communities and
22 habitat on the Lowell Mountains. An expected change is the increased susceptibility of

1 ridgeline and upper mountain slope forests to blowdown from wind because of permanent
2 canopy gaps created by project clearing. Road construction along mountain slopes is also
3 expected to alter colluvial action – the natural downslope movement and accumulation of
4 rich topsoil and nutrients that is primarily responsible for creating soil enrichment on
5 lower mountain slopes.

6
7 The scale of proposed road construction and clearing will also increase the risk for
8 introducing non-native, invasive species into the natural communities on the Lowell
9 Mountains. Non-native, invasive species are aggressive colonizers of bare soils that have
10 been exposed by construction or erosion, especially if there is also abundant sunlight
11 from canopy removal. These species, including honeysuckles (*Lonicera* spp.),
12 buckthorns (*Rhamnus* spp.), and barberries (*Berberis* spp.), once established on forest
13 edges can quickly spread into the interior of forests (especially those that are heavily
14 managed or that have exposed soils associated with erosion or recreation trails) and
15 reduce the quality of wildlife habitat, interfere with natural forest regeneration, and
16 reduce the ecological integrity of the natural communities. Some invasive plant species,
17 such as those mentioned above, are spread by birds, especially bird species associated
18 with forest edge habitat. Other species, such as common reed (*Phragmites australis*), are
19 commonly spread to new sites in contaminated fill material trucked in for road
20 construction or carried on construction machinery.

21

1 Use of fragmentation as mitigation for the fragmenting effects of a project completely
2 undermines the VFWD and Vermont Wildlife Action Plan goals of protecting
3 unfragmented habitat.

4
5 The proposed project as currently designed, and without further mitigation, will have an
6 undue adverse effect on the natural environment at the project site, both by degrading the
7 two state-significant natural communities and by fragmenting the Lowell Mountain
8 habitat block.

9
10 **Q20. Have you reviewed the Petitioner's decommissioning plan and do you have any**
11 **concerns or comments about the plan?**

12
13 A20. Yes, I have reviewed the decommissioning plan and I have significant concerns with this
14 plan. My primary concern is that although the Petitioner proposes to remove turbines,
15 buildings, foundations, and underground collection conduit to a depth of 24 inches, they
16 propose to leave all access roads, crane roads, and turbine pads in place. Furthermore,
17 they propose only minimal steps for site restoration and no plans for site monitoring after
18 decommissioning. Although restoration of Montane Spruce-Fir Forest after
19 decommissioning may be an unattainable goal, there should be a clear goal and a plan to
20 re-establish a forest of native trees, shrubs, and herbs and to monitor this restoration until
21 success in reaching the goal is achieved. This should include monitoring and control of
22 invasive plant species.

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Q21. Has the Petitioner taken any steps to avoid and minimize the impact of the project to these state-significant natural communities and large, relatively unfragmented habitat block?

A21. Yes. It is important to note that the Petitioner has taken steps to reduce the adverse effects of fragmentation by using existing logging roads and trails to some extent. They have also revised their original proposal to automatically clear a 150 foot wide strip of forest in preparation for access road and crane road construction. Their proposed variable road location (Variable Road Location Detail, Site plan C-129) is a significant improvement and will reduce the area of impact to state-significant natural communities and other natural features. The Petitioner has also proposed a temporary conservation easement for 400 acres near the beaver pond on the western side of the project and a permanent conservation easement for 180 acres downslope and to the west of the 400 acre area.

Although these steps are helpful, the KCW project will still result in undue adverse effects on the natural environment as a result of degradation of the state-significant natural communities and fragmentation of the Lowell Mountain habitat block.

Q22. Are there additional steps that can be taken by the Petitioner to mitigate these undue adverse on the natural environment?

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A22. Yes. Certain steps can be taken to help mitigate the undue adverse effects of the proposed project on the natural environment at Lowell Mountain. Given the large scale of this project, and the long timeframe over which it is likely to be in operation, there is much uncertainty as to what mitigation steps will actually reduce the adverse impacts from this project to the level that they are not undue. Given this uncertainty, the following mitigation steps are proposed as minimums. All of these issues have already been discussed with the Petitioner.

1. Develop a site specific vegetation management plan for the Serpentine Outcrop along the transmission line in Lowell that covers removal and installation of utility poles and proposed long term management of this rare natural community and associated state-threatened and rare plant species.

2. All proposed conservation easements designed to mitigate undue adverse effects from the KCW project should be permanent easements, as the project impacts will be permanent.

3. Establish permanent conservation easement or land acquisition to conserve the high elevation forests in the project area, guaranteeing that there will be no future development other than the current wind energy project along this sensitive ridgeline.

1 4. Investigate and establish conservation easements to secure the connectivity of
2 the large, relatively unfragmented Lowell Mountain Block with large habitat blocks to
3 the south. The most effective location for conserving this habitat connectivity may be
4 along Boomhour Branch in the vicinity of East Hill Road.

5
6 5. The Decommissioning Plan presented (Exh. Pet.-CP-6) calls for removal of turbines
7 and other above and below ground equipment and structures, but proposes to leave roads,
8 fill slopes, turbine pads, and stormwater structures in place. The location of the project
9 infrastructure should be included in the ridgeline conservation easement described above.
10 There should be a plan for ecological restoration of the site with a goal of establishing (or
11 setting the path for establishment) of a forest composed of native species. Although re-
12 establishment of Montane Spruce-Fir Forest is unlikely due to the level of site
13 disturbance, appropriate grading, establishment of organic material, and planting or
14 seeding of native vegetation is feasible. This restoration plan should be approved by the
15 Agency of Natural Resources.

16
17 6. Develop a 10 year non-native, invasive plant monitoring and control plan for the
18 project in order to control the establishment of these species in areas cleared for roads,
19 utility lines, and turbines and to prevent their spread into surrounding forest. This will
20 need to be a long term plan with termination based on success of the operation as
21 established through on-site monitoring and invasive species control. There should be

1 separate invasive species monitoring and control plans for post construction (operation of
2 the project) and for decommissioning (coordinated with the ecological restoration plan.)

3

4 **Q23. Does this conclude your testimony at this time?**

5

6 A23. Yes, it does.