STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

Petition of BNE Energy Inc. for a Declaratory Ruling for the Location, Construction and Operation of a 4.8 MW Wind Renewable Generating Project on Winsted-Norfolk Road in Colebrook, Connecticut ("Wind Colebrook North")

Petition No. 984

November 29, 2011

REPORT OF MICHAEL S. KLEIN REGARDING BNE'S D&M PLAN

I. Background and Summary

1. My name is Michael Klein. I am the principal of Environmental Planning Services (EPS). I was retained by Reid and Riege, PC on behalf of FairwindCT, Inc., Susan Wagner and Michael and Stella Somers to review the potential impacts of the proposed BNE Wind Colebrook North turbine project on wetlands and watercourses, water quality, and bio-diversity. I am a biologist and soil scientist with 34 years of experience in biological and wetland surveys, erosion and sediment control, impact assessment and mitigation design. My qualifications and experience are outlined in more detail in my pre-filed testimony contained in the record of this docket.

2. During the hearings held in this matter, I submitted pre-filed testimony about BNE's failure to provide adequate data that would permit an accurate site assessment and impact analysis. I testified that the wetland and biological surveys submitted were inadequate to allow the Siting Council to make a reasoned judgment because the timing and duration of many of the surveys was not sufficient to even identify the resources present, let alone describe and evaluate potential impacts of the project. I also testified that the site development plans presented by BNE

during the hearing would result in substantial indirect adverse impacts from erosion, sedimentation, and degradation of water quality. I also testified regarding the significance of BNE's failure to conduct any on-site investigations of birds, bats and other wildlife before filing its petition.

3. I have now reviewed the plans and reports submitted by BNE during the "D&M" phase. Numerous deficiencies remain in the plans, including systemic deficiencies that affect the entire project. This report discusses my conclusions with regard to both those systemic deficiencies and some specific comments on technical details of the plans. I also discuss the continued deficiencies of BNE's submissions regarding wildlife – namely, that to this date, BNE has still not provided the Council with any site-specific surveys of bats, birds or other wildlife. No construction should be approved in the absence of adequate baseline data about the wildlife that use the project site. Any impact assessment developed in the absence of site-specific data is purely speculative.

4. In sum, the new plans and reports submitted by BNE do not demonstrate that this project is ready for construction. Instead, the D&M Plan submissions show that BNE has not remedied many of the defects that were present during the earlier proceeding in this matter. The new plans and reports also lack the geotechnical data and analysis that BNE repeatedly promised would be provided to support its site plans during the D&M phase, and lack site-specific data regarding birds, bats and other wildlife.

II. BNE's D&M Plan Contains Systemic Deficiencies that Impact the Entire Project

5. The proposed reconstruction of Rock Hall Road will require work within and immediately adjacent to wetlands and watercourses for approximately 250 linear feet, including

work at a culvert that passes a perennial stream with a watershed of approximately 1 square mile according to U.S. Geological Survey Streamstats program. (See Exhibit A (map and statistics).) No detailed plans, construction sequence, or erosion control plans have been submitted for this element of the project. This work will have direct and indirect impacts on wetlands and watercourses and requires a permit from the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act, which in turn triggers the requirement for a Water Quality Certificate from CT DEEP under Section 401 of the Clean Water Act. To the best of my knowledge, BNE has not submitted an application for either approval. BNE may also require a permit from the local inland-wetland agency and/or a Diversion Permit from the CT DEEP for this work.

6. As with the Wind Colebrook South (Petition 983), the new site plans included in this D&M plan do not reference a source for the topographic data. These plans are presented as construction documents, but there is no indication about whether field topography was used. Prior plans were based on CT DEEP GIS LIDAR (remote sensing) data, which are of unknown accuracy and cannot be used for construction drawings. Use of anything other than field topography is especially problematic on this site with this proposal because the site is moderately to steeply sloping, the grading is at or above the limits of acceptability in some areas, and the grading extends to within a few feet of the site boundary north of proposed Turbine 3. Without a plan based on field data, there is no way for the petitioner to insure that the project can be constructed as designed and remain entirely on property under its ownership or control.

7. The access road drains to Rock Hall Road, which has no formal drainage system. The stormwater from the site will flow southerly along the east side of Rock Hall Road and discharge to a wetland and watercourse approximately 300 to 400 feet to the east. BNE has not

made any provisions to accommodate this flow in a formal drainage system or to remove contaminants to protect the wetland and downstream water quality.

8. The proposed long-term monitoring plans for stream bank restoration, wetland mitigation areas and site restoration do not meet industry or regulatory agency minimum standards for length of monitoring, success criteria, or remedial actions. For example, there is no proposal to achieve no net loss of either wetland acreage or function. In addition, the plan proposes only a 3-year monitoring plan for the streambank restoration, while the standard for monitoring of mitigation sites is 5 years.

9. Neither the original petition, the D&M plans nor the supplemental data filed by BNE in response to interrogatories include the results of any on-site surveys for breeding birds, bats, or other mammals. This information is critical because the US Fish and Wildlife Service has determined that noise levels within 1 mile of a 1.5 MW, 263-foot hub height turbine are likely to be above the levels which will have negative effects on sensitive woodland and grassland birds. (See Exhibit B (paper titled "The Effects of Noise on Wildlife," available at http://www.fws.gov/windenergy/docs/Noise.pdf).) Recent research cited in that summary document identifies impacts to birds, bats, and wildlife at noise levels and frequencies reasonably likely to be experienced at wind energy sites to include:

a. Declines in density;

b. Negative impacts on behavior, communication, health and survival;

c. Damage to hearing from acoustic overexposure;

d. Masking of communication signals;

e. Reductions in alerting distances, impairing survival;

f. Reduced fitness; and

g. Decreased foraging and mating success.

Without any baseline data, there is no way for the Council to determine the scope of the potential adverse effects that these turbines will have on local wildlife. This project should not be approved for construction until BNE has provided on-site surveys for bats and birds that provide adequate baseline data. This is especially troubling because BNE has not completed and does not plan to conduct any on-site surveys of breeding, foraging or migratory use of the site by raptors, one of the two groups of wildlife most likely to experience significant increases in mortality during operation of the turbines. Furthermore, BNE has not provided the results of any on-site surveys for bats, the other group which is likely to experience significantly increased mortality during operation of the turbines.

10. No geo-technical work has been performed, as repeatedly promised during the hearing, to support detailed design of cut and fill slopes and stormwater basins. Data required by the CT DEP Stormwater Manual ("2004 Stormwater Manual") but not presented include basin sizing/pollutant attenuation calculations and slope stability analysis.

11. No soil testing or design data has been presented for the off-site septic system proposed to support this facility.

12. No drainage area maps have been presented to support the sizing and location of the erosion control or stormwater management facilities. Unless they are properly sized, they will not function as required and will likely result in pollution and degradation of downstream wetlands and watercourses.

13. The Stormwater Pollution Prevention Plan utilizes measures that do not conform to the requirements of the 2004 Stormwater Manual and/or the 2002 Guidelines. The CT Stormwater General Permit for Construction and Dewatering Wastewaters ("General Permit") requires a project either comply with the 2004 Stormwater Manual and the 2002 Guidelines or that the project is supported by a detailed engineering analysis that demonstrates that the project meets the goals of the General Permit. Because BNE does not comply with the 2004 Stormwater Manual and the 2002 Guidelines, and has not provided a detailed engineering analysis documenting the effectiveness of the proposed measures, the plans cannot be said to conform to the requirements of the General Permit.

14. The Construction Sequence and Wood Turtle Protection Program both appear to require installation of geotextile silt fence across the watercourses that cross the access road. This product is only suitable for drainage areas of up to about 2 acres; the drainage area upstream of the proposed crossings is approximately 100 acres.

15. The overall construction sequence (180 days, starting time unknown) has not been properly coordinated with the construction sequence for the three-sided box culvert installation (bridge and footings to be installed between July 1 and September 30).

16. No erosion controls are shown for the post-construction grading, which will require disturbance of approximately 15 acres.

III. BNE's D&M Plan Reflects Continued Errors, Inconsistencies and Omissions

17. On Sheet C-003, labeled "Clearing Limit," BNE delineates a "Proposed Open Space Conservation Property." It is not denoted as an easement, nor is there any definition of the restrictions on that portion of the site or how those restrictions will be enforced. There is also no

indication in BNE's D&M plan that the various environmental consultants took the proposed use and restriction into consideration in their assessments, or what assumptions the consultants may have used in their assessments.

18. On Sheets C-101 through C-104, labeled "Site Plans," numerous deep test pit and percolation test locations are shown but the data are not provided on the plans. These data are required to support stormwater quality and erosion control elements.

19. On Sheet C-201, labeled "Erosion Control Plan," Temporary Sediment Trap 4 does not conform to the requirements of the 2002 Guidelines with respect to berm height.

20. On Sheet C-202, labeled "Erosion Control Plan," Temporary Sediment Trap 3 does not conform to the requirements of the 2002 Guidelines with respect to berm height. In addition, geotextile silt fence is not used properly along the access road.

21. On Sheet C-203, labeled "Erosion Control Plan," geotextile silt fence is not used properly along the access road.

22. On Sheet C-204, labeled "Erosion Control Plan," geotextile silt fence is not used properly along the south, east and northeast portions of the Turbine 2 area.

23. On Sheet C-301, labeled "Grading Plan," the plans do not include provisions for handling run-on or groundwater in the crane assembly area.

24. Sheets C-301 and C-302, labeled "Grading Plan," do not reflect the changes that were recommended by BNE's ecological consultant, Michael Klemens, during the hearing and were required to be implemented by the Siting Council's decision. Specifically:

a. Sheet C-301 shows the western culvert was shifted northerly by approximately 25 feet, rather than the 40 feet recommended in Dr. Klemens' May 1, 2011 Herpetological Assessment.

b. Sheet C-301 shows that Temporary Sediment Trap 4 (TST4) has been shifted closer to the wetland and affects a substantially greater length of wetland edge, rather than being moved further away or eliminated, as recommended in the Herpetological Assessment.

c. Sheet C-302 shows the eastern culvert was not relocated as recommended in the Herpetological Assessment.

d. None of the property has been placed in a conservation easement, as recommended in the Herpetological Assessment.

25. On Sheet C-303, labeled "Grading Plan," the plans do not include provisions for handling run-on or groundwater in the tower laydown or blade assembly area.

26. On Sheets C-401 and C-402, labeled "Access Drive Plan," the following errors are present:

a. The limit of wetland labeled appears to indicate a 125-foot long wetland crossing. The plan view shows the disturbed area to be 40 to 45 feet wide. That total wetland disturbance of 5000 to 5625 square feet does not conform to 4960 square feet noted on Sheet C-601 and also does not include areas of temporary wetland and stream crossings, watercourse diversions, dewatering sumps, corduroy bridges or footing excavations noted on Sheet C-601 and other places on the plans.

b. The total wetland disturbance cited also does not include the improvements to Rock Hall Road, which include reconstruction of approximately 250 feet of road through a wetland and replacement of a culvert that passes a perennial stream crossing with a watershed of approximately 1 square mile. (See Exhibit A.)

c. The construction sequence contemplates the need for diverting the watercourses at the site. This stream diversion requires a permit from CT DEEP and the U.S. Army Corps of Engineers, and should be coordinated with the overall construction plan so that the work occurs in the dry season, in order to prevent adverse impacts downstream.

27. On Sheets C-501 and C-502, labeled "Post Construction," Stormwater Pond 2 does not illustrate a micro-pool as labeled on the Grading Plan and no erosion controls are shown.

28. On Sheet C-503, labeled "Post Construction," no erosion controls are shown.

29. On Sheet C-504, labeled "Post Construction," no erosion controls are shown.

30. On Sheet C-600, labeled "E&S Narrative & Sequence," temporary sediment traps are not part of initial erosion and sediment control installation as required by 2002 Guidelines.

31. On Sheet C-602, labeled "Streambank Restoration," the following errors are present:

a. The sequence calls for a box culvert which conflicts with the plans and profiles as well as the overall E&S narrative, which calls for a three-sided culvert. A three-sided culvert requires substantial excavation in and adjacent to the streams and/or wetlands and requires significant dewatering.

b. The specification of only one woody plant species and use of only live stakes is not adequate to properly restore or stabilize the area.

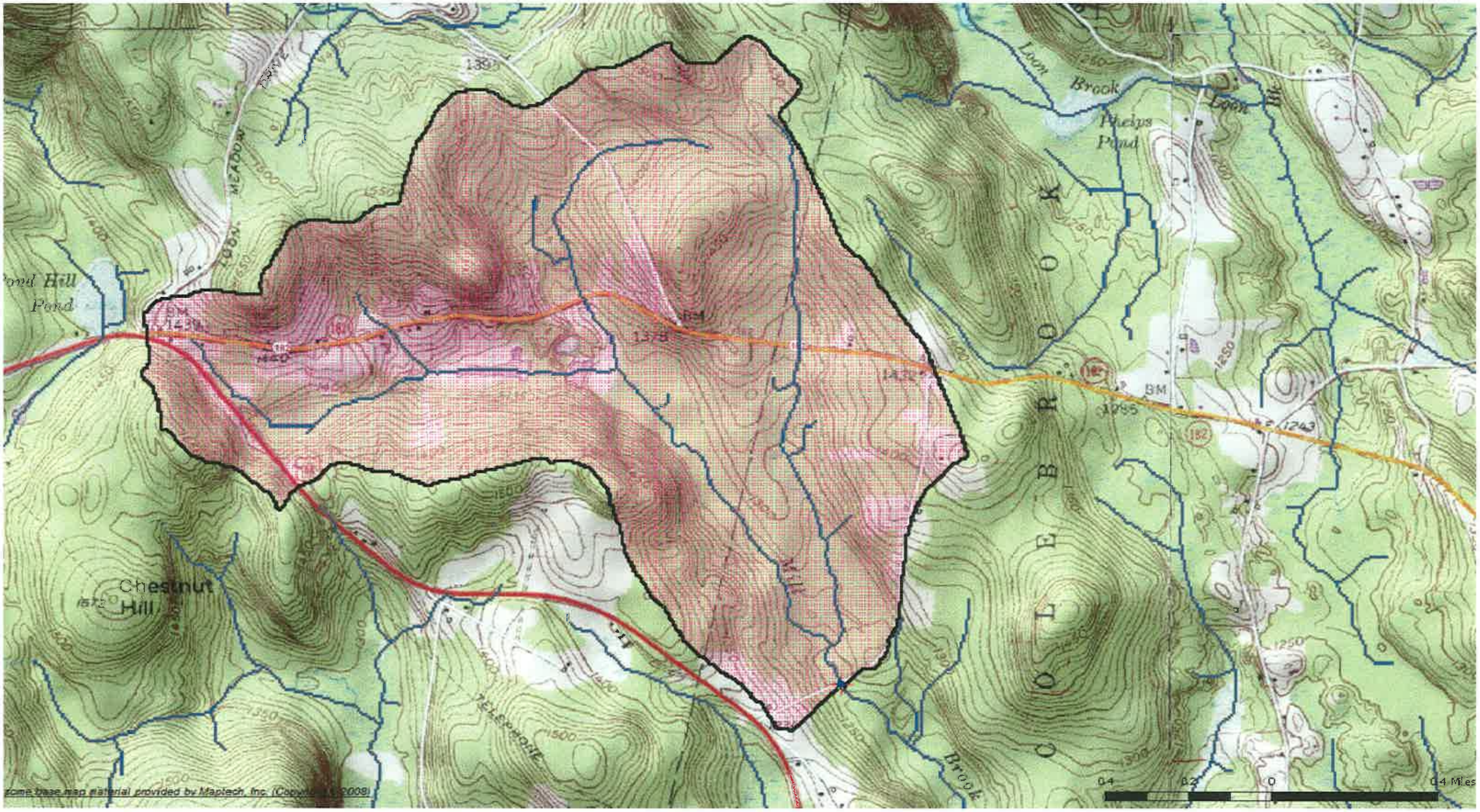
c. The proposed long-term monitoring plan does not meet industry standards or U.S. Army Corps of Engineers standards for length of monitoring, success criteria, or remedial actions.

The statements above are true and accurate to the best of my knowledge.

November 29, 2011
Date

/s/ Michael S. Klein
Michael S. Klein

EXHIBIT A



Chestnut Hill
Pond Hill Pond
Loon Meadow Drive
Loon Brook
Phelps Pond
Loon Bk
COLEBROOK
Brook
Telephone
BM
1378
1295
1243
0.4 0.2 0 0.4 Miles
Some base map material provided by Maptech, Inc. (Copyright 2008)

USGS
Connecticut StreamStats

Basin Characteristics Report

Date: Mon Nov 21 2011 15:35:54 Mountain Standard Time
NAD27 Latitude: 41.9761 (41 58 34)
NAD27 Longitude: -73.1404 (-73 08 26)
NAD83 Latitude: 41.9762 (41 58 34)
NAD83 Longitude: -73.1400 (-73 08 24)

Parameter	Value
24-hour, 2-year precip	3.4
24-hour, 25-year precip	6.5
X coordinate of the outlet in map coordinates	893955.0
24-hour, 10-year precip	5.1
24-hour, 50-year precip	7.7
24-hour, 100-year precip	9.2
Wetlands	1.4
Coarse-grained stratified drift - SYE	0.3
Area in square miles	1.8
Y coordinate of the outlet in map coordinates	916665.0
Percentage of area of coarse-grained stratified drift	0.0

EXHIBIT B

The Effects of Noise on Wildlife

Noise standards for wind turbines developed by countries such as Sweden and New Zealand and some specific site level standards implemented in the U.S. focus primarily on sleep disturbance and annoyance to humans. However noise standards do not generally exist for wildlife, except in a few instances where federally listed species may be impacted. Findings from recent research clearly indicate the need to better address noise-wildlife issues. As such, noise impacts to wildlife should clearly be included as a factor in wind turbine siting, construction and operation. Some of the key issues include 1) how wind facilities affect background noise levels; 2) how and what fragmentation, including acoustical fragmentation, occurs especially to species sensitive to habitat fragmentation; 3) comparison of turbine noise levels at lower valley sites – where it may be quieter – to turbines placed on ridge lines above rolling terrain where significant topographic sound shadowing can occur having the potential to significantly elevate sound levels above ambient conditions; and 4) correction and accounting of a 15 decibel (dB) underestimate from daytime wind turbine noise readings used to estimate nighttime turbine noise levels (e.g. van den Berg 2004, J. Barber Colorado State Univ. and National Park Service pers. comm., K. Fristrap National Park Service pers. comm.).

Turbine blades at normal operating speeds can generate significant levels of noise. Based on a propagation model of an industrial-scale 1.5 MW wind turbine at 263 ft hub height, positioned approximately 1,000 ft apart from neighboring turbines, the following decibel levels were determined for peak sound production. At a distance 300 ft from the blades, 45-50 dBA were detected; at 2,000 ft, 40 dBA; and at 1 mi, 30-35 dBA (Kaliski 2009). Declines in densities of woodland and grassland bird species have been shown to occur at noise thresholds between 45 and 48 dB, respectively; while the most sensitive woodland and grassland species showed declines between 35 and 43 dB, respectively. Songbirds specifically appear to be sensitive to very low sound levels equivalent to those in a library reading room (~30 dBA)[1] (Foreman and Alexander 1998). Given this knowledge, it is possible that effects to sensitive species may be occurring at ≥ 1 mile from the center of a wind facility at periods of peak sound production.

Noise does not have to be loud to have negative effects. Very low frequency sounds including infrasound are also being investigated for their possible effects on both humans and wildlife. Wind turbine noise results in a high infrasound component (Salt and Hullar 2010). Infrasound is inaudible to the human ear but this unheard sound can cause human annoyance, sensitivity, disturbance, and disorientation (Renewable Energy World 2010). For birds, bats, and other wildlife, the effects may be more profound. Noise from traffic, wind and operating turbine blades produce low frequency sounds (< 1-2 kHz; Dooling 2002, Lohr et al. 2003). Bird vocalizations are generally within the 2-5 kHz frequency range (Dooling and Popper 2007) and birds hear best between 1-5 kHz (Dooling 2002). Although traffic noise generally falls below the frequency of bird communication and hearing, several studies have documented that traffic noise can have significant negative impacts on bird behavior, communication, and ultimately on

[1] CA Department of Transportation 1998

avian health and survival (e.g., Lohr et al. 2003, Lengagne 2008, Barber et al. 2010). Whether these effects are attributable to infrasound effects or to a combination of other noise factors is not yet fully understood. However, given that wind-generated noise including blade turbine noise produces a fairly persistent, low frequency sound similar to that generated by traffic noise (Lohr et al. 2003: Dooling 2002), it is plausible that wildlife effects from these two sound sources could be similar.

A bird's inability to detect turbine noise at close range may also be problematic. For the average bird in a signal frequency of 1-4 kHz, noise must be 24-30 dB above the ambient noise level in order for a bird to detect it. As noted above, turbine blade and wind noise frequencies generally fall below the optimal hearing frequency of birds. Additionally, by the inverse square law the sound pressure level decreases by 6 dB with every doubling of distance. Therefore, although the sound level of the blade may be significantly above the ambient wind noise level and detectable by birds at the source, as the distance from the source increases and the blade noise level decreases toward the ambient wind noise level, a bird may lose its ability to detect the blade and risk colliding with the moving blade. A bird approaching a moving blade under high wind conditions may be unable to see the blade due to motion smear, and may not hear the blade until it is very close – if it is able to hear it at all (Dooling 2002). Another concern involves the effect of ambient noise on communication distance and an animal's ability to detect calls. For effects to birds, this can mean 1) behavioral and/or physiological effects, 2) damage to hearing from acoustic over-exposure, and 3) masking of communication signals and other biologically relevant sounds (Dooling and Popper 2007). Of the 49 bird species whose behavioral audibility curves and/or physiological recordings have been determined, Dooling and Popper (2007) developed a conceptual model for estimating the masking effects of noise on birds. Based on the distance between birds and the spectrum level, bird communication was predicted to be "at risk" (e.g., at ~ 755 ft distance where noise was 20 dB), "difficult" (.e.g., at ~755 ft where noise was 25 dB) and "impossible" (e.g., at ~755 ft where noise was 30 dB). While clearly there is variation between species and there is no single noise level where one-size-fits-all, this masking effect of turbine blades is of concern and should be considered as part of the cumulative impacts analysis of a wind facility on wildlife. It must be recognized that noise in the frequency region of avian vocalizations will be most effective in masking these vocalizations (Dooling 2007).

Barber et al. (2010) assessed the threats of chronic noise exposure, focusing on grouse communication calls, urban bird calls, and other songbird communications. They determined that while some birds were able to shift their vocalizations to reduce the masking effects of noise, when shifts did not occur or were insignificant, masking could prove detrimental to the health and survival of wildlife (Barber et al. 2010). Although much is still unknown in the real world about the masking effects of noise on wildlife, the results of a physical model analyzing the impacts of transportation noise on the listening area[2] of animals resulted in some significant findings. With a noise increase of just 3 dB – a noise level indentified as "just perceptible to humans" – this increase corresponded to a 50% loss of listening area for wildlife (Barber et al. 2010). Other data suggest noise increases of 3 dB to 10 dB correspond to 30% to

[2] The listening area is the active space of vocalization in which animals search for sounds (Barber et al. 2010).

90% reductions in alerting distances[3] for wildlife, respectively (Barber et al. 2010). Impacts of noise could thus be putting species at risk by impairing signaling and listening capabilities necessary for successful communication and survival.

Swaddle and Page (2007) tested the effects of environmental noise on pair preference selection of Zebra Finches. They noted a significant decrease in females' preference for their pair-bonded males under high environmental noise conditions. Bayne et al. (2008) found that areas near noiseless energy facilities had a total passerine density 1.5 times greater than areas near noise-producing energy facilities. Specifically, White-throated Sparrows, Yellow-rumped Warblers, and Red-eyed Vireos were less dense in noisy areas. Habib et al. (2007) found a significant reduction in Ovenbird pairing success at compressor sites (averaging 77% success) compared to noiseless well pads (92%). Quinn et al. (2006) found that noise increases perceived predation risk in Chaffinches, leading to increased vigilance and reduced food intake rates, a behavior which could over time result in reduced fitness. Francis et al. (2009) showed that noise alone reduced nesting species richness and led to a different composition of avian communities. While they found that noise disturbance ranged from positive to negative, responses were predominately negative.

Schaub et al. (2008) investigated the influence of background noise on the foraging efficiency and foraging success of the greater mouse-eared bat, a model selected because it represents an especially vulnerable group of gleaning bats that rely on their capability to listen for prey rustling sounds to locate food. Their study clearly found that traffic noise, and other sources of intense, broadband noise deterred bats from foraging in areas where these noise were present presumably because these sounds masked relevant sounds or echos the bats use to locate food.

Although there are few studies specifically focused on the noise effects of wind energy facilities on birds, bats and other wildlife, scientific evidence regarding the effects of other noise sources is widely documented. The results show, as documented in various examples above, that varying sources and levels noise can affect both the sending and receiving of important acoustic signaling and sounds. This also can cause behavioral modifications in certain species of birds and bats such as decreased foraging and mating success and overall avoidance of noisy areas. The inaudible frequencies of sound may also have negative impacts to wildlife. Given the mounting evidence regarding the negative impacts of noise – specifically low frequency levels of noise such as those created by wind turbines on birds, bats and other wildlife, it is important to take precautionary measures to ensure that noise impacts at wind facilities are thoroughly investigated prior to development. Noise impacts to wildlife must be considered during the landscape site evaluation and construction processes. As research specific to noise effects from wind turbines further evolves these findings should be utilized to develop technologies and measures to further minimize noise impacts to wildlife.

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[3] The alerting distance is the maximum distance at which a signal can be heard by an animal and is particularly important for detecting threats (Barber et al. 2010).

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CERTIFICATION

I hereby certify that a copy of the foregoing document was delivered by first-class mail and e-mail to the following service list on the 29th day of November, 2011:

Lee D. Hoffman
Paul Corey
Thomas D. McKeon
David M. Cusick
Richard T. Roznoy
David R. Lawrence and Jeannie Lemelin
Walter Zima and Brandy L. Grant
Eva Villanova

and sent via e-mail only to:

John R. Morissette
Christopher R. Bernard
Joaquina Borges King

Emily A. Gianquinto