

May 16, 2017

By Hand Delivery and E-Mail

Ms. Judith Whitney, Clerk
Vermont Public Service Board
112 State Street, Drawer 20
Montpelier, VT 05620-2701

Re: Docket No. 7250 – Deerfield Wind Project

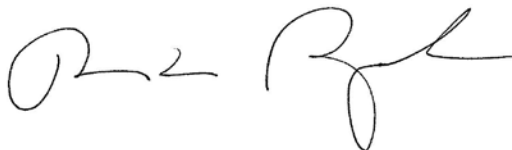
Dear Ms. Whitney,

Enclosed please find CPG Holder Deerfield Wind, LLC's ("Deerfield") *Proposed Sound Monitoring Plan*, filed in compliance with CPG Condition No. 30, which states as follows:

Deerfield shall submit to the Board for review and approval a noise monitoring plan to be implemented during the first full year of operation. The plan shall establish a monitoring program to confirm, under a variety of seasonal and climatic conditions, compliance with the maximum allowable sound levels described above. The plan shall also specify the protocols Deerfield will implement in the event complaints are received that the Project is exceeding the noise limit (including, if appropriate, monitoring at the affected locations). All monitoring results shall be promptly provided to the Board.

Thank you in advance for your consideration of the above, and please let me know if you have any questions.

Sincerely,



Andrew N. Raubvogel, Esq.

Encl.

cc: service list

**STATE OF VERMONT
PUBLIC SERVICE BOARD**

Docket No. 7250

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

CERTIFICATE OF SERVICE

I, Gillian Bergeron, certify that on May 16, 2017, I forwarded copies of Deerfield Wind, LLC's *Letter to the Public Service Board re Proposed Sound Monitoring Plan* to the following service list by the delivery method noted:

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Dated at Burlington, Vermont, this 16th day of May, 2017.

By:

A handwritten signature in black ink, appearing to read "Gillian Bergeron". The signature is stylized with a large, looped "G" and a long, sweeping horizontal stroke at the end.

Gillian Bergeron
Paralegal



the science of insight

PROPOSED

SOUND MONITORING PROTOCOL FOR DEERFIELD WIND

5.15.2017



PREPARED FOR:
DEERFIELD WIND, LLC

SUBMITTED BY:
RSG

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SOUND MONITORING PROTOCOL FOR DEERFIELD WIND

**PREPARED FOR:
DEERFIELD WIND, LLC**

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1.0 INTRODUCTION

The Vermont Public Service Board (Board) issued a revised Certificate of Public Good (CPG) for the Deerfield Wind Project (Docket #7250) (the “Project”) on July 17, 2009. As part of the CPG, post-construction sound monitoring is required to assure conformance with the Project’s CPG noise standards. The conditions of the CPG related to the monitoring condition are:

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

29. In the event noise from operation of the Project exceeds the maximum allowable levels, Deerfield shall take all remedial steps necessary to bring the sound levels produced by the turbine(s) into compliance with allowable levels, including modification or cessation of turbine(s) operation.

30. Deerfield shall submit to the Board for review and approval a noise monitoring plan to be implemented during the first full year of operation. The plan shall establish a monitoring program to confirm under a variety of seasonal and climactic conditions compliance with the maximum allowable sound levels described above.

This report describes a monitoring plan that meets the conditions of the CPG.

2.0 FIRST YEAR MONITORING PLAN

2.1 | MONITORING CONTRACTOR

Deerfield Wind will select a contractor to conduct the sound monitoring, subject to the Board's approval. The minimum qualifications shall be:

- Experience with long-term sound compliance monitoring at wind projects.
- Experience with cold-temperature sound monitoring.
- Experience with the methodologies outlined in this Protocol.
- Board Certification through the Institute of Noise Control Engineering.

2.2 | THIRD-PARTY REVIEW

A neutral, mutually-acceptable, third-party observer, to be selected and supervised by the Department of Public Service, shall be used during the first two-week monitoring period to assess compliance with the noise-monitoring requirements of the CPG and Order. The third party's role shall include implementation of the monitoring based upon the Board-approved protocols, as well as review of the data collected. The third party will file a report with the Board within 30 days of the completion of the first two-week monitoring period setting forth his/her opinion as to the sufficiency of the data collected, whether the turbine's sound levels were accurately captured at the monitoring locations, and, if any, recommendations for alternations to the plan to ensure that maximum Project sound levels are being captured by the monitoring. The third party may be asked by the Board to review additional monitoring periods. Costs associated with the third-party monitor shall be borne by Deerfield Wind.

2.3 | DURATION AND FREQUENCY

Each of the four quarterly monitoring periods shall be a continuous period at least two weeks in duration, and meant to capture a variety of meteorological and seasonal conditions.

In selecting the two weeks to conduct monitoring, the following shall be considered:

- Whether turbines will be out of service, the length of the outage, and whether the combination of the location of the turbines and length of outages would substantially affect the results of the sound monitoring.
- Whether forecasted heavy rains or storms comprise more than 50 percent of the two-week period.
- Whether normal operations are expected to be affected by safety concerns, grid reliability, or other issues.

This Protocol acknowledges that many of these factors cannot be forecast in advance with certainty, and therefore the presence of these conditions during monitoring periods may occur despite the best efforts of Deerfield Wind and the Consultant. Any departure from ideal monitoring conditions shall be noted in the report.

One period of monitoring will take place during each of winter, spring, summer, and fall, over the first year that the Project is commercially operating. The first year, for the purposes of this monitoring, shall be defined as the first year with four full seasons. For example, if construction concludes at the end of spring, the first year will start at the beginning of that summer through the end of spring the next year.

2.4 | MICROPHONE LOCATIONS

Sound monitoring is proposed for three locations, representing unique soundscapes around the Project. As shown on Figure 1 below, Site A is representative of the closest homes along VT 9, and Sites B and C are representative of the closest homes along VT 8.

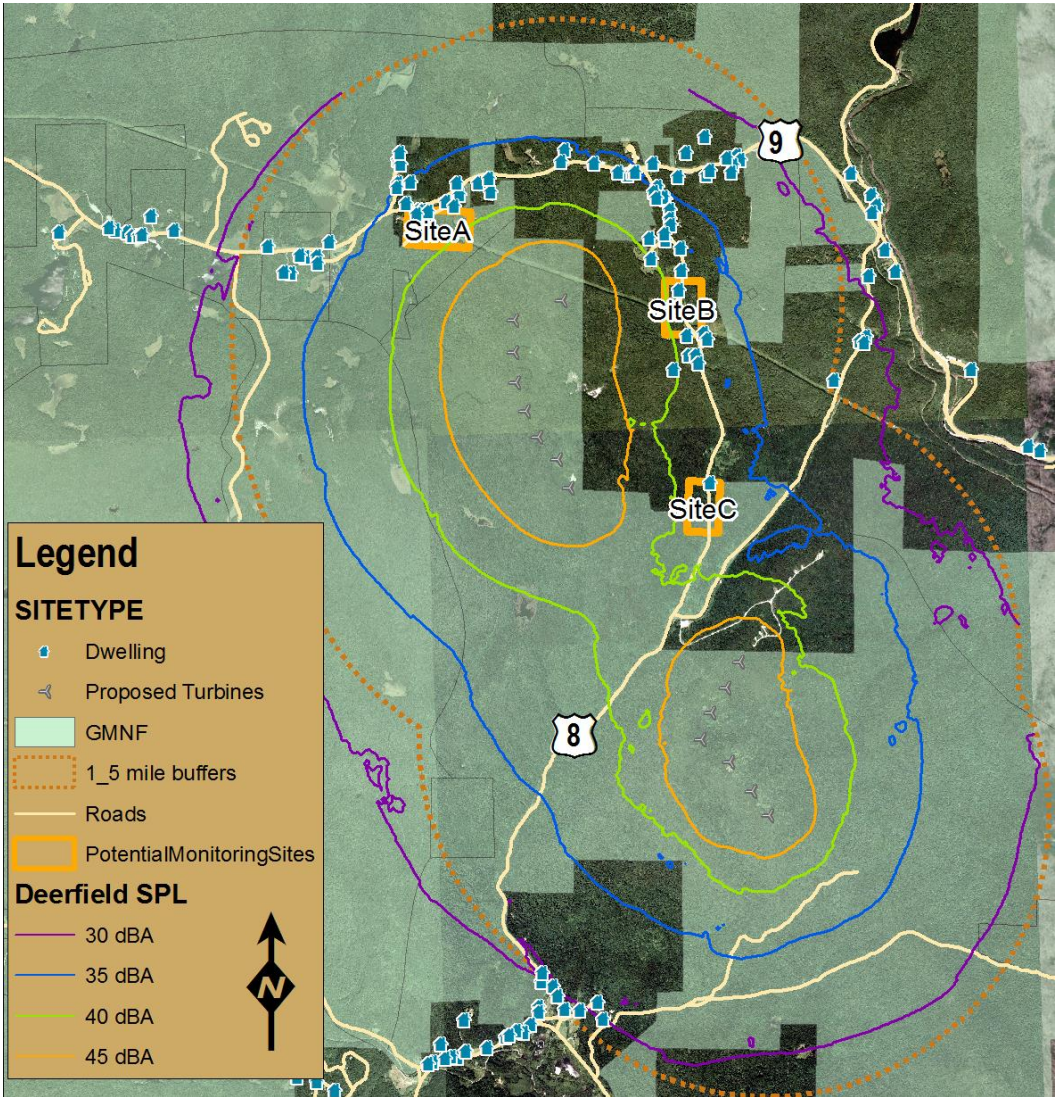


FIGURE 1: POTENTIAL POST-CONSTRUCTION SITES

- A) Site A is located south of Old Route 9, east of Bishop Hill Road, and south of VT Route 9 in Searsburg. This area is representative of sound impacts to the north of the Project, and would be as far off of VT 9 as practical. This is

similar in location to Site 2 from the pre-construction monitoring,¹ and is representative of the closest homes and highest sound impacts.

- B) Site B is located near the transmission line that crosses VT Route 8 approximately 1.3 km (0.8 miles) south of the VT 8/VT 9 intersection in Searsburg and west of VT Route 8, and extending north to 149 VT Route 8, just north of the transmission line. This is similar to Site 4 from the pre-construction monitoring, and is representative of the closest homes to the east of the project.
- C) Site C is located approximately 0.5 miles north of Sleepy Hollow Road on VT Route 8 in Searsburg, west of Route 8. This site is roughly equidistant between the Deerfield and Searsburg turbines. The Site includes the two closest homes to the north. This is similar to Site 5 from the pre-construction monitoring, and is representative of the highest combined noise impacts of Searsburg and Deerfield combined.

Monitoring sites are not proposed for the west or south, as there are no nearby homes in these directions, i.e., within a 1.5 mile radius. Beyond that distance, the modeled sound levels are generally less than 30 dBA, and thus do not present a reasonable likelihood of exceeding the CPG sound limit.

Where monitoring locations are near residential areas, to the extent permission is granted, monitors shall be set near individual homes closest to the Project at these locations. If permission is not granted, then alternative homes shall be contacted, or monitors will be placed in public rights-of-way that are representative of a home, at a similar or lesser distance from the Project.

Once the final monitoring site locations are selected by the Contractor, Deerfield Wind shall file a map with the PSB showing these monitoring, turbine, and met tower locations.

2.5 | LOGISTICS

The location of the microphones shall be chosen on site and based on the following list of site condition priorities:

- 1) Sound monitoring shall be conducted at least 25 feet away from any structure.
- 2) Microphones shall be placed in a location to avoid potential noise contamination from sources such as flowing water, wind chimes, air conditioners, noises from homes, etc.
- 3) Microphones shall be placed at a height approximately 4 to 5 feet above grade.
- 4) Microphones shall not be placed such that any structure blocks the line of sight between the microphone and wind turbines (if otherwise visible).

¹ RSG, "Revised Noise Impact Study for: Deerfield Wind Project, Searsburg/ Readsboro, VT," November 2007 (Exhibit DFLD-KK-4)

- 5) The Contractor will make every reasonable effort to site microphones in a manner that will maximize the probability of capturing the maximum noise levels at each monitoring location, taking into account all relevant factors such as minimizing line-of-sight obstructions between microphones and the Project, and maximizing the number of turbines in line-of-sight of the microphones at each monitoring location.

In some cases, these limitations may mean that the best monitoring location for a specific residence may be several hundred feet away from the primary residential structure. Every effort shall be made to ensure that locations selected are representative of the noise exposure at subject homes.

Sites will include meteorological instrumentation logging data in no more than 10 minute increments, which can include one or more of the following:

- Anemometer (all sites)
- Wind vane (one site)
- Temperature sensor (one site)
- Rain sensor (one site)

All sound level meters will meet IEC Type 1 or better specifications for accuracy, and will be calibrated before and after each measurement period. All monitors will collect 1/3 octave band data from 20 Hz to 10 kHz at one-second logging intervals and audio recordings where permission is granted by the property owner. To protect the privacy of neighbors, audio recordings shall be released to the PSB upon request and only under a confidentiality agreement or with permission of the homeowner.

2.6 | OUTSIDE TO INSIDE TEST

Sound tests of turbine operations will be limited to exterior measurements. This is because the 30 dB interior limit established by the PSB is sufficiently low that the sound test is easily contaminated by normal activities that occur indoors. In addition, frequent sound monitoring inside a bedroom is intrusive. To minimize the impact to residents, interior sound levels will be calculated based on a fixed 15 dBA reduction. However, in the event of a complaint at a residence, the homeowner will be given the option to allow for testing to be conducted to determine the actual outside to inside noise reduction (OINR) of the house, if that home meets the following criteria:

- 1) The preconstruction sound model shows Deerfield Project sound levels of 40.0 dBA or higher at that location; or
- 2) Sound monitoring (post-construction) shows Deerfield Project sound levels of 40.0 dBA(Leq)(1 hr) or higher at that location.

An OINR test is used to establish the noise reduction from the outside to the inside of a house. The test will be conducted in accordance with ASTM Standard E966-10, *Standard Guide for Field Measurement of Airborne Sound Insulation of Building Facades and Façade Elements*

(2010).² Any deviations from the standard necessitated by field conditions will be detailed in the report. The OINR test will be limited to a single fully-furnished occupied bedroom facing the Project at each home.

For any monitored home that does not grant permission, a 15 dB overall reduction shall be assumed.

Tests will be conducted if permission is granted by the homeowner, with windows closed, one quarter open, and fully open. If the complaint concerns sound levels in the months of May, June, July, August, and September, the windows-fully-open result will be applied. If the complaint concerns sound levels in the months of April or October, the windows-partially-open result will be applied. The remaining months will use the results of the windows-closed test.

2.7 | BACKGROUND SOUND MEASUREMENTS

To accurately measure the sound level of the wind turbines, background sound levels must be excluded. This will be accomplished by turning off wind turbines at regular intervals. Turning off wind turbines allows a direct comparison between periods with and without turbines operating.

During the measurement program, the turbines will be shut down for 20 minutes at a time no less than every eighth hour that the hub height wind speeds are at 6 m/s or above, in order to ensure that the turbines would be operating at or near their maximum sound output before and after each shutdown (assuming the wind conditions remain relatively constant over that period).

Individual contaminating events may be manually filtered or otherwise removed from the data set. These events include, but are not limited to traffic passbys, insects, property maintenance, gunshots, land clearing, voices, etc. This is described further in Section 3. Insects and birds may also be filtered by subtracting out sound at and above 1.6 kHz (a.k.a., “AI” weighting).

² The E966 standard is copyrighted. For those who wish to review the standard, but not purchase it, one can be made available for review at RSG offices.

3.0 DATA PROCESSING

Data during some periods will be removed from the results. These include periods when:

- Wind speeds (average or gusts) at a monitoring site are above 5 m/s – Winds above 5 m/s create a large amount of false noise generated from pressure fluctuations around the microphone.
- The temperature is below 14°F – The ANSI S1.4 standard, “Specification for Sound Level Meters,” does not require the provision of temperature corrections below -10°C (14°F) and above 50°C (122°F). As such most sound level meters are not calibrated outside this range. If sound level meters are certified for use below 14°F, this restriction will not apply.
- Rain is present – Rain dropping onto the microphone windscreen creates false noise.
- Spikes are present that are not consistent with wind turbine operation. Note that this screening may only be done for sound levels over 40.0 dBA, as manual filtering can be time-intensive.

Certain background sounds such as insects and birds can be filtered by employing a low pass filter without affecting the sound monitored from the wind turbines. If these types of sources are found, a low-pass filter may be used, consistent with that described in “Proposed ‘A_i’-weighting; A weighting to remove insect noise from A-weighted field measurements”, Paul D. Schomer, Ian M. Slauch, and George F. Hessler, InterNoise Proceedings, Volume 221, pp. 3991-4000 (2010).

Events over 40.0 dBA (i.e., 5 dBA lower than the CPG exterior noise limit) shall be investigated by listening to the audio tape or reviewing the spectrogram of the event and determining if the cause is wind turbine noise. If the exceedance is due to a background event, then it shall be eliminated.

Any substantial change in wind speed (or other background sound conditions) between the background and turbine-on monitoring periods shall be evaluated to assess its effect on the calculation of turbine-only sound level. Corrections may be applied as appropriate.

The background sound level for each period shall be logarithmically subtracted from the measured Turbine-On sound level.³ Where background sound levels are within 3 dB of the measured sound levels, the Turbine-only sound level will be indeterminate for that measurement period.

For the purposes of compliance with the 45 dBA exterior and 30 dBA interior standards, all results will be reported to the first decimal place.

Tonal sounds will be assessed using the criteria of ANSI S12.9 Part 4 Annex C using 1/3 octave band for each rolling measured Turbine-On $L_{eq}(1\text{-hour})$. Rolling periods will be incremented every 10 minutes. If tonal periods are found, then background sound levels can

³ This applies mainly to Methods 1 and 3, but background sounds, if determined, can also be subtracted in Method 2.

be removed or other methods employed to determine whether the tonality is due to the operation of the Project.

4.0 REPORTS

A report shall be prepared for each monitoring season. Each monitoring report shall include:

- A description of any changes in Project operation made since the last report, special operating conditions, or turbine maintenance issues found during the test procedure.
- A summary of all data collected, including sound levels, meteorological data at the monitoring stations, and turbine operating conditions.
- Times of potential exceedances of the outdoor, indoor, or tonal standard, and the results of investigations into those exceedances.
- Conclusions.
- An appendix containing 10-minute data for each turbine including wind speed, and electrical output.

If cold-weather-certified sound monitors are not used, then for the winter season, a report addendum will be prepared which includes sound levels during periods when the temperature is below 14°F. Deerfield Wind may include in its reports any information that it believes suggests that the sound level meters are not producing accurate data during times when the temperature falls below 14°F.

Reports shall be submitted within six weeks of the end of each monitoring period. Any confidential information (i.e., audio files near residences) will be provided only after executing an appropriate protective agreement. The public versions of the reports (i.e. without such confidential information) will also be provided to the Forest Service.

If it is found that the Project sound level at any permanent residence is above the allowable limit, Deerfield Wind shall take all remedial steps necessary to bring the sound levels produced by the turbine(s) into compliance with allowable levels, as required by the CPG. Such steps may include engineered solutions, operational changes or adjustments, or legal agreements, as applicable.

5.0 COMPLAINT RESOLUTION

The following complaint resolution procedure will assure that concerns by neighbors regarding wind turbine noise are addressed in a timely manner while, at the same time, preventing abuse of the complaint process. The complaint resolution procedure shall be as follows:

- 1) The complaint process shall be in place for the life of the Project.
- 2) A complaint phone number and contact person shall be provided to the Town Clerks and Selectboards of Searsburg and Deerfield.
- 3) Deerfield Wind will provide an initial acknowledgment to complaints within two business days.
- 4) Complainants will provide Deerfield Wind with the following information related to the complaint:
 - a. Location of the observed sound
 - b. Time(s) and date the sound occurred
 - c. Weather conditions (snow cover, cloud cover, wind direction and relative speed, etc.)
 - d. Description of the sound
- 5) Complainants may be asked to log sound events to help identify factors that affect the sound.
- 6) Deerfield Wind shall record the complainant information, and weather, turbine operating status, and power output during the time of the complaint. The Forest Service, Public Service Board, and Department of Public Service will be informed of complaints.
- 7) Deerfield Wind will investigate as described below if the complaint represents a permanent residence within 1.5 miles of the turbine string (see map on Figure 1).
- 8) Sound monitoring may be conducted in response to a complaint within the 1.5 mile area if the sound level is within 5 dB of the exterior sound limit, based on sound modeling.
- 9) Sound monitoring may also be conducted if first-year compliance monitoring during normal operating conditions (defined below) showed that a monitoring location within one mile of the complainant's home showed higher sound levels than what was modeled, to the extent that if this adjustment were applied to the complainant's home, the sound level would be within 5 dB of the exterior limit. For example, if first year sound monitoring at Location A showed that the maximum sound level is 39.0 dBA compared to modeling at that location of 38.0 dBA, then 1.0 dB would be added to the modeled sound levels of all other homes within a mile of Location A. If that adjustment raises the modeled sound level of a complainant's home over 40.0 dBA, then that complainant may be offered sound testing at the expense of Deerfield Wind.

Normal operating conditions would not include temporary maintenance issues, short term abnormal turbine operations, or other correctable or corrected conditions at the Project. If such abnormal conditions are the cause of the noise complaint, noise monitoring shall not be required. Deerfield Wind will make any necessary

corrections to the Project as soon as feasible and shall communicate the situation to the complainant, Forest Service, Public Service Board, and Department of Public Service.

- 10) If Deerfield Wind's sound consultant determines that follow-up sound monitoring is warranted under either section 8 or 9 above, the monitoring shall begin no later than six weeks thereafter. All reasonable efforts shall be made to conduct such monitoring under conditions similar to those existing at the time the complaint arose.
- 11) Deerfield Wind's sound consultant shall work with the complainant to determine an appropriate location for the monitoring equipment.
- 12) Sound monitoring will follow the applicable protocols from Sections 2.5, 2.7, 3.0, and 4.0, above. Note that the responding noise control engineer may revise aspects of this Protocol to address specific conditions and limitations. For example, if the complaint occurs to the north of the Project along VT 9, then the noise control engineer can limit the turbine shutdown to the western array as the eastern array would not materially affect the overall sound levels in that area. The basis for any deviations from this Protocol should be described and substantiated in the test report.
- 13) The primary method for determining the attenuation value of a complainant home shall be OINR testing. OINR testing will be offered to complainants at Deerfield Wind's expense if the conditions for sound monitoring in Item 9, above, are met. The monitored exterior sound level will be converted to an interior level based on the ASTM E966 test result at the home. If permission is not granted for outside-to-inside testing, the attenuation value will be 15 dBA.
- 14) Because of the complexity of complaint resolution, full cooperation of the complainant and the adherence to the above test procedures is necessary.
- 15) The results of the monitoring shall be contained in a report that is submitted to the complainant, the Department of Public Service, Forest Service, and the PSB. This report will contain specific information collected during the complaint monitoring, including wind speed and direction, operational status of the turbines, sound levels, and the raw sound level data collected by the noise control engineer conducting the tests. Allegedly confidential information will be treated the same as in Section 4 of this protocol.

If it is found that the Project sound level at the complainant residence is above the allowable limit, Deerfield Wind shall take all remedial steps necessary to bring the sound levels produced by the turbine(s) into compliance with allowable levels, as required by the CPG. Such steps may include engineered solutions, operational changes or adjustments, or legal agreements, as applicable.