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January 16, 2017

By Hand Delivery and E-Mail

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

Re: Docket No. 7250 – Deerfield Wind Project
Corrections to Final Sound Monitoring Protocol

Dear Ms. Whitney,

On behalf of Deerfield Wind, LLC ("Deerfield Wind"), I am writing to provide a corrected version of the Final Sound Monitoring Protocol ("SMP") it previously filed with the Public Utility Commission ("PUC") on December 20, 2017. Deerfield Wind has determined that the following corrections are required:

1. The PUC's December 14, 2017 order required the deletion of former Section 2.2 of the SMP (Third Party Review), which resulted in the renumbering of other paragraphs of Section 2. Deerfield has corrected cross-references to Section 2 that appear in Section 5 paragraph 13.

2. The December 14th order required that with respect to outside-to-inside testing ("OINR") under Section 2.5, OINR testing must be offered to homeowners under certain specified conditions, whether or not the homeowner has filed a complaint. Deerfield has corrected SMP section 2.5 accordingly.

A corrected version of the Final Sound Monitoring Protocol is provided with this letter, in both redline and clean versions.[1] Note that only the new changes are shown in redlining.

Please let me know if you have any questions or require further information.

Sincerely,

Andrew N. Raubvogel, Esq.
DUNKIEL SAUNDERS ELLIOTT RAUBVOGEL & HAND, PLLC

Encls.

cc: Service List

[1] At the request of Mr. Shea, Deerfield Wind also examined the "clean" and "redlined" versions of the SMP that it filed on December 20, 2017. Deerfield did not identify any inconsistencies between the redlined and clean versions.

STATE OF VERMONT
PUBLIC UTILITY COMMISSION

Amended Petition of Deerfield Wind, LLC for a certificate of public good authorizing it to construct and operate 15 turbine, 30 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 8 turbines along the ridgeline to the west of Route 8 in the northwesterly orientation (Western Project Area)	)	Docket No. 7250

CERTIFICATE OF SERVICE

I, Grace Grundhauser, certify that on January 16, 2018, I forwarded copies of Deerfield Wind, LLC's *Letter to the PUC re Corrected Sound Monitoring Protocol* with clean and redlined versions of the *Sound Monitoring Protocol* to the following service list by the delivery method noted:

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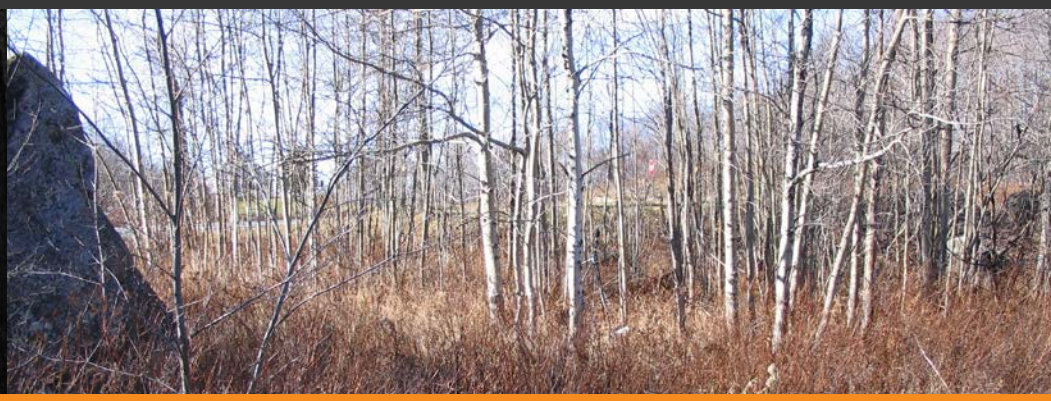
Dated at Burlington, Vermont, this 16th day of January, 2018.

By: 
Grace Grundhauser
Paralegal

FINAL SOUND MONITORING PROTOCOL FOR DEERFIELD WIND

RSG
the science of insight

Corrected 1.16.2018



PREPARED FOR:
DEERFIELD WIND, LLC

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White River Junction, VT 05001
802.295.4999
www.rsginc.com

SUBMITTED BY:
RSG

CONTENTS

List of Figures

1.0 INTRODUCTION

The Vermont Public Utility Commission ("PUC" or "Commission") (formerly the Public Service 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 [Commission] 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

A State of Vermont agency will select and supervise a contractor to conduct the sound monitoring, subject to the Commission's approval. The minimum qualifications shall be:

- Experience with short-term attended and 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.

Costs for the sound monitoring contractor shall be borne by Deerfield Wind LLC.

2.2 | DURATION AND FREQUENCY

Each of the two seasonal monitoring periods shall be a continuous period at least two weeks in duration, and meant to capture a variety of meteorological and seasonal conditions. Each monitoring period can be extended for up to 5 weeks in total if necessary to client sufficient valid data to determine Project-only sound levels.

In selecting the monitoring periods, 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 first 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 sound monitoring consultant. Any departure from ideal monitoring conditions shall be noted in the report.

One period of monitoring will take place during each of spring, 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 two full spring and fall seasons. For example, if construction concludes at the end of spring, the first year will start at the beginning of that fall through the end of spring the next year.

2.3 | 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.

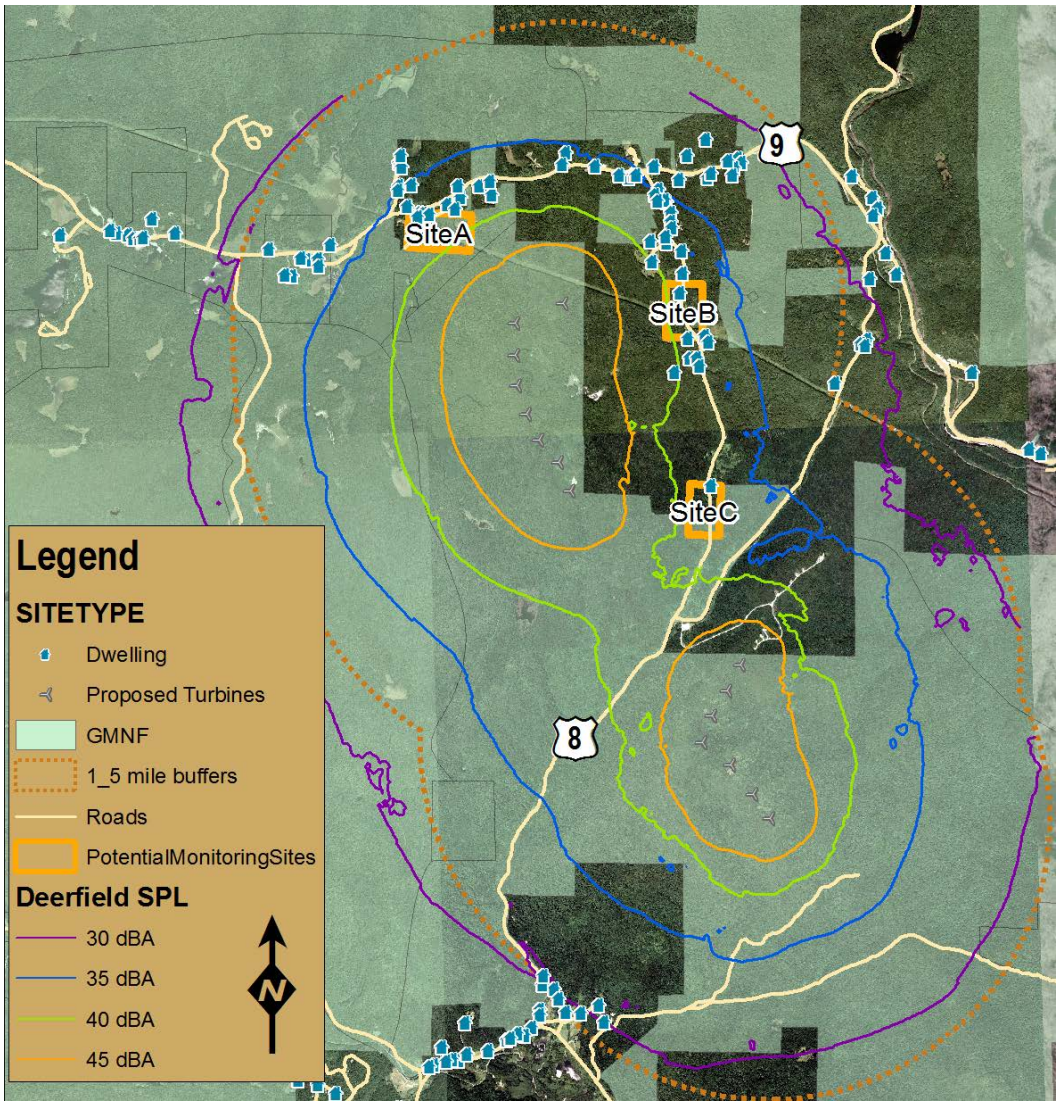


FIGURE 1: POTENTIAL POST-CONSTRUCTION SITES AND MODELED SOUND CONTOURS BASED ON AS-APPROVED FINAL DESIGN PLANS (SUBMITTED TO PUC ON 6/1/15)

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.

To the extent possible, the sound monitors should be located away from roads to avoid background sound contamination. However, the setback distance from roads should still be representative of the closest home or homes.

Up to three additional monitoring locations may be selected in response to noise complaints made prior to the beginning of the last monitoring period, provided any such addition location is materially different than the locations already being monitored, and that it is within the 30 dBA (exterior) contour.

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

Final monitoring locations will be selected by the sound monitoring consultant. When the sites have been selected and the consultant has conveyed them to Deerfield Wind, Deerfield Wind shall file a map with the Commission showing these monitoring, turbine, and met tower locations.

2.4 | LOGISTICS

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

1) Microphones shall be located at least 7.5 m from any surface where reflections may influence the measured sound pressure levels. 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.
2) Microphones shall be placed at a height approximately 4 to 5 feet above grade.
3) Microphones shall not be placed such that any structure blocks the line of sight between the microphone and wind turbines (if otherwise visible).
4) 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.
5) Appropriate wind screens should be used. For long-term monitoring in windy conditions, seven-inch hydrophobic wind screens or equivalent should be used.

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 PUC upon request and only under a confidentiality agreement or with permission of the homeowner. In all cases, the user of the audio may not disclose the content of private conversations that may have been inadvertently captured.

2.5 | 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 PUC 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, 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 dBA or higher at that location; or
2) Sound monitoring (post-construction) shows Deerfield Project sound levels of 40 dBA(Leq)(1 hr) or higher at that location.

Deerfield Wind shall offer OINR testing to homeowners who meet Criterion 1 at the outset of commercial operations, and to homeowners who meet Criterion 2 based upon the first year of post-construction monitoring.

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.

If a homeowner who meets one of these criteria initially declines OINR testing, an attenuation of 15 dBA will be assumed. However, if a homeowner who initially declined OINR testing subsequently files a complaint, that homeowner shall again be offered OINR testing at Deerfield's expense.

Tests will be conducted if permission is granted by the homeowner, with windows closed, one quarter open, and fully open. The sound monitoring consultant should ask the

[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.

complainant about their window opening patterns throughout the year, and should use the complainant's response as the basis for the window-position assumption.

2.6 | 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 once per night (10 pm to 7 am) where 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). It is understood that wind speeds may change considerably around the shutdown times and may not be consistently high among all turbines. A greater number of turbine shutdowns may occur, with turbine shutdowns to occur as needed in order to collect sufficient turbine-off data needed to accurately determine background sound levels.

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).

The sound engineer conducting the testing may modify the background sound methodology for good cause. If such modification is made, a description of the good cause and the modifications that were made shall be included in the sound monitoring report.

2.7 | ATTENDED MEASUREMENT

For one hour before or after at least one turbine shutdown event, attended monitoring will take place at each monitoring location. Attendants will make time-stamped notes as to what they hear and the relative loudness of those sounds, including but not limited to wind turbine sound, wind, anthropogenic, and biogenic sounds.

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 4 to 5 m/s – Winds above 5 m/s create a large amount of false noise generated from pressure fluctuations around the microphone. Data for wind speeds between 4 and 5 m/s (or below, as needed) should be carefully reviewed to identify any wind contamination that creates pseudo-noise or wind-induced noise that is sufficient to mask wind turbine sound prior to its inclusion in the filtered data set.
- 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 14ºF, this restriction will not apply.
- Rain is present – Rain, sleet, ice, or similar events that drop precipitation onto the microphone windscreen create false noise. Snow events will not be excluded because they do not create false noise.
- Spikes are present that are not consistent with wind turbine operation. Note that this screening is only required for sound levels over 40 dBA, as manual filtering can be time-intensive. Periods that were screened should be identified in the report.

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 'Ai'-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 dBA (i.e., 5 dBA lower than the CPG exterior noise limit) where the hub height wind speed is sufficient to generate within 1 dB of the maximum sound power (over a reasonable period of time and number of turbines), and the wind direction is not upwind of the nearest turbines 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. Events not meeting these criteria may still be investigated on a case by cases basis – for example, to compare modeled to monitored sound levels at a particular location.

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.

Where background sound levels are within 3 dB of the adjacent measured Turbine-on sound levels, the background and Turbine-on periods will be excluded from further processing

The Turbine-only sound level for the monitoring period will be determined by logarithmically subtracting the energy-averaged background sound level for all remaining measurement periods from the energy-averaged measured Turbine-On sound levels for all remaining measurement periods. This value will be used to compare to the appropriate CPG limits.

For the purposes of compliance with the 45 dBA exterior and 30 dBA interior standards, and other thresholds described in this protocol, all results will be rounded to the nearest whole integer.

At least two valid hours of Turbine-On data will be needed to determine compliance. Note that if five weeks of data monitoring are completed before two hours of valid data are collected, the monitoring period will be concluded, and the available valid periods will be used for compliance determination.

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

The sound monitoring report will include a description of each reason why data has been removed from monitoring results. The removed data will be retained by the sound monitoring consultant and provided to the Commission.

4.0 REPORTS

A report shall be prepared by the sound monitoring consultant 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.
- Layout of the project area, including topography, project boundary lines for the project and property lines delineating properties surrounding the project site.
- Locations of the sound measurement points with photographs and GPS coordinates of the microphones.
- Distance between any sound measurement point and the nearest wind turbine.
- 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. The sound monitoring consultant 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 to the PUC and the docket parties 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. If audio files are provided without a protective agreement, then private conversations will be redacted prior to release. 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 existing permanent structure for human habitation 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) Complaint phone numbers and contact persons for both Deerfield Wind and the Department of Public Service ("DPS") shall be provided to the Town Clerks and Selectboards of Searsburg and Readsboro, and neighbors within the 30 dBA contour line of Figure 1 existing at the time of the issuance of the CPG.

   Complaints may be made to Deerfield Wind by calling (866) 318-9858 or by sending a written complaint to the Deerfield Wind Project, 37 Putnam Road, Searsburg, VT 05363.

   Complaints may also be made to the DPS Consumer Affairs and Public Information Division ("CAPI") under its CPG Complaint Protocol by the following means:

   VT Department of Public Service, CAPI Division
   112 State Street
   Montpelier, VT 05620-2601

   E-mail: psd.consumer@vermont.gov
   Consumer Hotline: (800) 622-4496
   TTY: (800) 734-8390
   Fax: (802) 828-2342
   Web: http://publicservice.vermont.gov/cpg-complaint-protocol

3) Deerfield Wind will provide an initial acknowledgment to complaints within two business days of it being notified of the complaint.

4) Complainants who contact Deerfield Wind will be asked to provide 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) Deerfield Wind may ask complainants 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, PUC, and DPS will be informed of complaints along with these data.

7) If the complaint concerns an unidentified icing condition or mechanical problem, Deerfield will investigate as needed and take appropriate action if warranted. Once it is determined that either no aberrational condition exists or the condition is fixed, Deerfield will notify the complainant with a description of Deerfield's findings. Otherwise, no further complaint resolution steps need be taken. Deerfield will maintain files concerning such complaints and make these available to the PUC or DPS upon request.

8) Deerfield Wind will investigate as described below if the complaint represents permanent structure for human habitation existing at the time of the CPG issuance and within the 30 dBA contour shown on Figure 1.

9) Sound monitoring may be conducted in response to a complaint within the 30 dB contour if the sound level is within 5 dB of the exterior sound limit, based on sound modeling or upon order of the Commission in response to a complaint.

10) Sound monitoring may also be conducted if first-year or any subsequent Commission-ordered 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 (with contaminating events filtered out) 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 sound monitoring at Location A showed that the maximum sound level is 39 dBA compared to modeling at that location of 38 dBA, then 1 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 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, PUC, and DPS.

11) If Deerfield Wind's sound consultant determines that follow-up sound monitoring is warranted under either Section 8 or 9 above, Deerfield Wind will notify the DPS in writing. The State of Vermont shall contract for and supervise the sound monitoring consultant. The State's sound monitoring shall begin as soon as possible, but 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.

12) The sound monitoring consultant shall work with the complainant to determine an appropriate location for the monitoring equipment.

13) Sound monitoring will follow the applicable protocols from Sections 2.4, 2.6, 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 shall be described and substantiated in the test report.

14) 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.

15) Because of the complexity of complaint resolution, full cooperation of the complainant and the adherence to the above test procedures is necessary.

16) The results of the monitoring shall be contained in a report that is submitted to the complainant, Deerfield Wind, the Department of Public Service, Forest Service, and the PUC. 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.

17) If no exceedance is found at a location, including during the first-year monitoring, the location would be exempt from additional sound monitoring for five years.

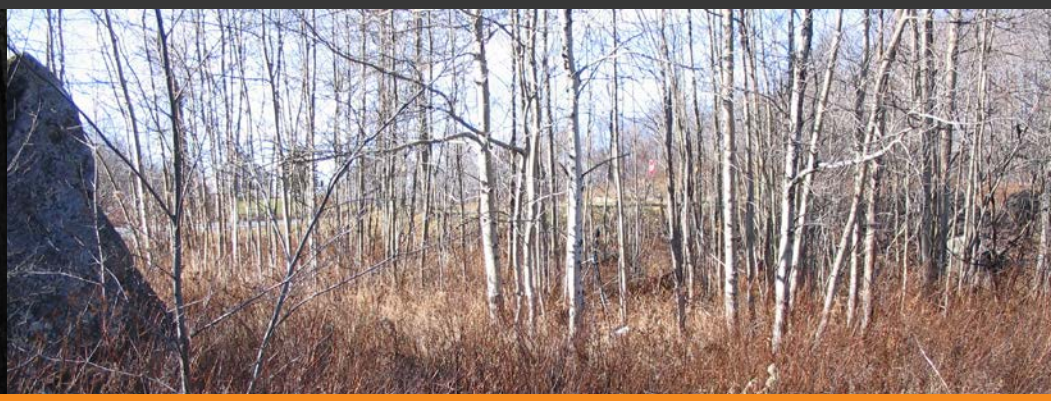
18) Nothing in this Protocol would prevent Deerfield Wind from appealing to the PUC from relief in the cases of alleged frivolous, harassing, or repeated unsubstantiated complaints.

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, but are not limited to, engineered solutions, operational changes or adjustments, including partial, temporary, or permanent shutdowns or noise-reduced operating modes, or legal agreements, as applicable.

Redlined Version

FINAL SOUND MONITORING PROTOCOL FOR DEERFIELD WIND

~~12.20.2017~~Corrected 1.~~X~~16.2018



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1.0 INTRODUCTION

The Vermont Public Utility Commission ("PUC" or "Commission") (formerly the Public Service 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 [Commission] 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

A State of Vermont agency will select and supervise a contractor to conduct the sound monitoring, subject to the Commission's approval. The minimum qualifications shall be:

- Experience with short-term attended and 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.

Costs for the sound monitoring contractor shall be borne by Deerfield Wind LLC.

2.2 | DURATION AND FREQUENCY

Each of the two seasonal monitoring periods shall be a continuous period at least two weeks in duration, and meant to capture a variety of meteorological and seasonal conditions. Each monitoring period can be extended for up to 5 weeks in total if necessary to client sufficient valid data to determine Project-only sound levels.

In selecting the monitoring periods, 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 first 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 sound monitoring consultant. Any departure from ideal monitoring conditions shall be noted in the report.

One period of monitoring will take place during each of spring, 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 two full spring and fall seasons. For example, if construction concludes at the end of spring, the first year will start at the beginning of that fall through the end of spring the next year.

2.3 | 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.

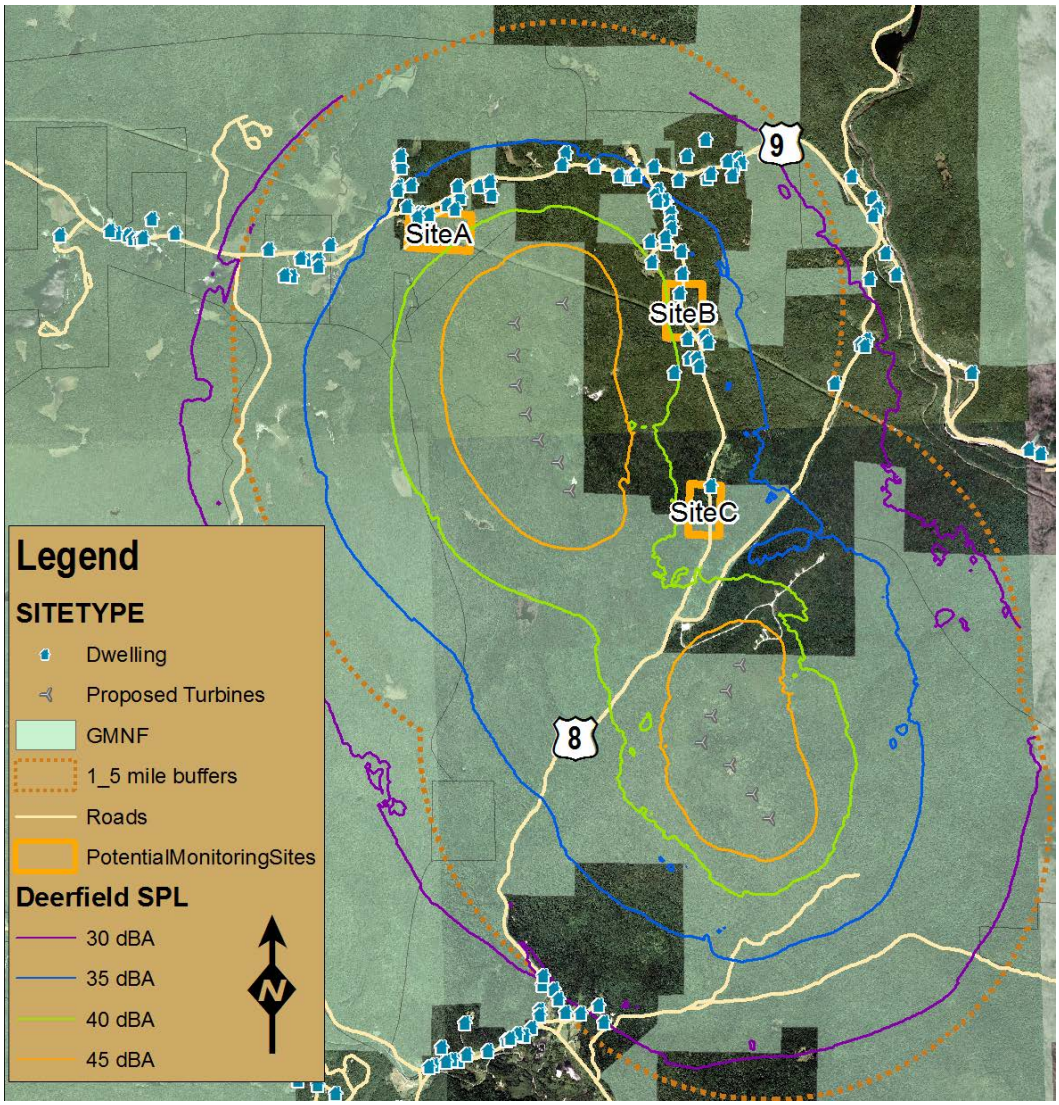

FIGURE 1: POTENTIAL POST-CONSTRUCTION SITES AND MODELED SOUND CONTOURS BASED ON AS-APPROVED FINAL DESIGN PLANS (SUBMITTED TO PUC ON 6/1/15)

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.

To the extent possible, the sound monitors should be located away from roads to avoid background sound contamination. However, the setback distance from roads should still be representative of the closest home or homes.

Up to three additional monitoring locations may be selected in response to noise complaints made prior to the beginning of the last monitoring period, provided any such addition location is materially different than the locations already being monitored, and that it is within the 30 dBA (exterior) contour.

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

Final monitoring locations will be selected by the sound monitoring consultant. When the sites have been selected and the consultant has conveyed them to Deerfield Wind, Deerfield Wind shall file a map with the Commission showing these monitoring, turbine, and met tower locations.

2.4 | LOGISTICS

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

1) Microphones shall be located at least 7.5 m from any surface where reflections may influence the measured sound pressure levels. 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.
2) Microphones shall be placed at a height approximately 4 to 5 feet above grade.
3) Microphones shall not be placed such that any structure blocks the line of sight between the microphone and wind turbines (if otherwise visible).
4) 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.
5) Appropriate wind screens should be used. For long-term monitoring in windy conditions, seven-inch hydrophobic wind screens or equivalent should be used.

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 PUC upon request and only under a confidentiality agreement or with permission of the homeowner. In all cases, the user of the audio may not disclose the content of private conversations that may have been inadvertently captured.

2.5 | 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 PUC 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 dBA or higher at that location; or
2) Sound monitoring (post-construction) shows Deerfield Project sound levels of 40 dBA(Leq)(1 hr) or higher at that location.

Deerfield Wind shall offer OINR testing to homeowners who meet Criterion 1 at the outset of commercial operations, and to homeowners who meet Criterion 2 based upon the first year of post-construction monitoring.

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.

If a homeowner who meets one of these criteria initially declines OINR testing, an attenuation of 15 dBA will be assumed. However, if a homeowner who initially declined OINR testing subsequently files a complaint, that homeowner shall again be offered OINR testing at Deerfield's expense.

[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.

Tests will be conducted if permission is granted by the homeowner, with windows closed, one quarter open, and fully open. The sound monitoring consultant should ask the complainant about their window opening patterns throughout the year, and should use the complainant's response as the basis for the window-position assumption.

2.6 | 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 once per night (10 pm to 7 am) where 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). It is understood that wind speeds may change considerably around the shutdown times and may not be consistently high among all turbines. A greater number of turbine shutdowns may occur, with turbine shutdowns to occur as needed in order to collect sufficient turbine-off data needed to accurately determine background sound levels.

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).

The sound engineer conducting the testing may modify the background sound methodology for good cause. If such modification is made, a description of the good cause and the modifications that were made shall be included in the sound monitoring report.

2.7 | ATTENDED MEASUREMENT

For one hour before or after at least one turbine shutdown event, attended monitoring will take place at each monitoring location. Attendants will make time-stamped notes as to what they hear and the relative loudness of those sounds, including but not limited to wind turbine sound, wind, anthropogenic, and biogenic sounds.

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 4 to 5 m/s – Winds above 5 m/s create a large amount of false noise generated from pressure fluctuations around the microphone. Data for wind speeds between 4 and 5 m/s (or below, as needed) should be carefully reviewed to identify any wind contamination that creates pseudo-noise or wind-induced noise that is sufficient to mask wind turbine sound prior to its inclusion in the filtered data set.
- 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 14ºF, this restriction will not apply.
- Rain is present – Rain, sleet, ice, or similar events that drop precipitation onto the microphone windscreen create false noise. Snow events will not be excluded because they do not create false noise.
- Spikes are present that are not consistent with wind turbine operation. Note that this screening is only required for sound levels over 40 dBA, as manual filtering can be time-intensive. Periods that were screened should be identified in the report.

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 'Ai'-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 dBA (i.e., 5 dBA lower than the CPG exterior noise limit) where the hub height wind speed is sufficient to generate within 1 dB of the maximum sound power (over a reasonable period of time and number of turbines), and the wind direction is not upwind of the nearest turbines 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. Events not meeting these criteria may still be investigated on a case by cases basis – for example, to compare modeled to monitored sound levels at a particular location.

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.

Where background sound levels are within 3 dB of the adjacent measured Turbine-on sound levels, the background and Turbine-on periods will be excluded from further processing

The Turbine-only sound level for the monitoring period will be determined by logarithmically subtracting the energy-averaged background sound level for all remaining measurement periods from the energy-averaged measured Turbine-On sound levels for all remaining measurement periods. This value will be used to compare to the appropriate CPG limits.

For the purposes of compliance with the 45 dBA exterior and 30 dBA interior standards, and other thresholds described in this protocol, all results will be rounded to the nearest whole integer.

At least two valid hours of Turbine-On data will be needed to determine compliance. Note that if five weeks of data monitoring are completed before two hours of valid data are collected, the monitoring period will be concluded, and the available valid periods will be used for compliance determination.

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

The sound monitoring report will include a description of each reason why data has been removed from monitoring results. The removed data will be retained by the sound monitoring consultant and provided to the Commission.

4.0 REPORTS

A report shall be prepared by the sound monitoring consultant 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.
- Layout of the project area, including topography, project boundary lines for the project and property lines delineating properties surrounding the project site.
- Locations of the sound measurement points with photographs and GPS coordinates of the microphones.
- Distance between any sound measurement point and the nearest wind turbine.
- 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. The sound monitoring consultant 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 to the PUC and the docket parties 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. If audio files are provided without a protective agreement, then private conversations will be redacted prior to release. 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 existing permanent structure for human habitation 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) Complaint phone numbers and contact persons for both Deerfield Wind and the Department of Public Service ("DPS") shall be provided to the Town Clerks and Selectboards of Searsburg and Readsboro, and neighbors within the 30 dBA contour line of Figure 1 existing at the time of the issuance of the CPG.

   Complaints may be made to Deerfield Wind by calling (866) 318-9858 or by sending a written complaint to the Deerfield Wind Project, 37 Putnam Road, Searsburg, VT 05363.

   Complaints may also be made to the DPS Consumer Affairs and Public Information Division ("CAPI") under its CPG Complaint Protocol by the following means:

   VT Department of Public Service, CAPI Division
   112 State Street
   Montpelier, VT 05620-2601

   E-mail: psd.consumer@vermont.gov
   Consumer Hotline: (800) 622-4496
   TTY: (800) 734-8390
   Fax: (802) 828-2342
   Web: http://publicservice.vermont.gov/cpg-complaint-protocol

3) Deerfield Wind will provide an initial acknowledgment to complaints within two business days of it being notified of the complaint.

4) Complainants who contact Deerfield Wind will be asked to provide 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) Deerfield Wind may ask complainants 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, PUC, and DPS will be informed of complaints along with these data.

7) If the complaint concerns an unidentified icing condition or mechanical problem, Deerfield will investigate as needed and take appropriate action if warranted. Once it is determined that either no aberrational condition exists or the condition is fixed, Deerfield will notify the complainant with a description of Deerfield's findings. Otherwise, no further complaint resolution steps need be taken. Deerfield will maintain files concerning such complaints and make these available to the PUC or DPS upon request.

8) Deerfield Wind will investigate as described below if the complaint represents permanent structure for human habitation existing at the time of the CPG issuance and within the 30 dBA contour shown on Figure 1.

9) Sound monitoring may be conducted in response to a complaint within the 30 dB contour if the sound level is within 5 dB of the exterior sound limit, based on sound modeling or upon order of the Commission in response to a complaint.

10) Sound monitoring may also be conducted if first-year or any subsequent Commission-ordered 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 (with contaminating events filtered out) 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 sound monitoring at Location A showed that the maximum sound level is 39 dBA compared to modeling at that location of 38 dBA, then 1 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 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, PUC, and DPS.

11) If Deerfield Wind's sound consultant determines that follow-up sound monitoring is warranted under either Section 8 or 9 above, Deerfield Wind will notify the DPS in writing. The State of Vermont shall contract for and supervise the sound monitoring consultant. The State's sound monitoring shall begin as soon as possible, but 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.

12) The sound monitoring consultant shall work with the complainant to determine an appropriate location for the monitoring equipment.

13) Sound monitoring will follow the applicable protocols from Sections 2.4~~5~~, 2.6~~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 shall be described and substantiated in the test report.

14) 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.

15) Because of the complexity of complaint resolution, full cooperation of the complainant and the adherence to the above test procedures is necessary.

16) The results of the monitoring shall be contained in a report that is submitted to the complainant, Deerfield Wind, the Department of Public Service, Forest Service, and the PUC. 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.

17) If no exceedance is found at a location, including during the first-year monitoring, the location would be exempt from additional sound monitoring for five years.

18) Nothing in this Protocol would prevent Deerfield Wind from appealing to the PUC from relief in the cases of alleged frivolous, harassing, or repeated unsubstantiated complaints.

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, but are not limited to, engineered solutions, operational changes or adjustments, including partial, temporary, or permanent shutdowns or noise-reduced operating modes, or legal agreements, as applicable.