BARON WINDS SOUND MONITORING AND COMPLIANCE PROTOCOL

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1.0 INTRODUCTION

This is a post-construction sound monitoring protocol for the Baron Winds project. It covers the methodology for a post-construction compliance test and complaint response.

2.0 FIRST-YEAR SOUND MONITORING PROTOCOL

The protocol is enumerated as follows:

Timing

1) Two sound monitoring tests will take place within the first 13 months of facility operation, with the first test to be completed within the first seven months of operation, to assess compliance with the permitted noise limits that are established in the Article 10 Certificate and Town wind laws.
2) Two monitoring periods will be performed, one with leaf-on conditions and the other with leaf-off conditions.

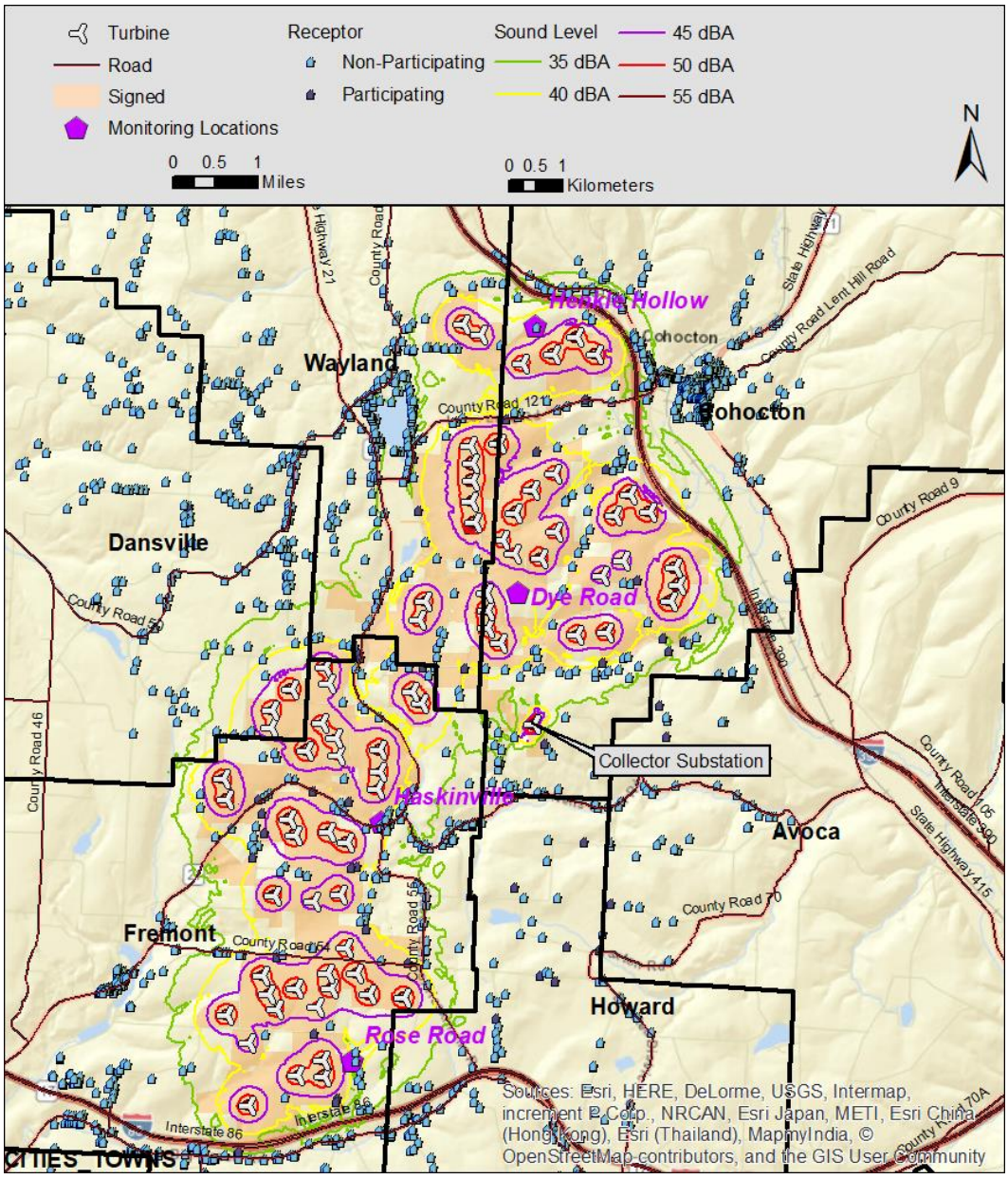
Locations

3) Monitoring stations will be set up at the following locations at which pre-construction sound level monitoring was conducted (see Table and Figure, below):

Location	Distance to closet wind turbine (ft)	Modeled Sound Level (dB)
Henkle Hollow	1,935	44
Dye Road	2,095	44
Haskinville	2,170	42
Rose Road	1,920	38

Henkle Hollow, Haskinville, and Rose Road are near homes. Henkle Hollow and Haskinville are near nonparticipating receptors, and Rose Road is near both participating and nonparticipating receptors.

4) Up to three additional sound monitoring locations will be identified for monitoring, representing areas where complaints were received during the first full year of operation. If more than three locations received complaints, then three will be selected based on the modeled sound levels of each location and how well a site can represent other complaint locations. Consideration of whether monitoring will be done at a location will also be based on
   a) The type of complaint,
   b) Whether the complaint was due to a continuing operational issue or a non-recurring event,
   c) Whether the modeled sound level is above 40 dBA (see Section 3.6, below), and
   d) Whether the landowner cooperates with the study.



MAP OF POST-CONSTRUCTION MONITORING LOCATIONS FOR BARON WINDS

Equipment Setup

5) Each monitoring station shall meet the following criteria:
   a) Sound level meters shall be certified to meet the Type 1 or Type 2 accuracy requirements as specified in ANSI S1.4-and IEC 61672-1.
   b) Sound level meter microphones shall be placed in accordance with the following criteria. If, at a given site, any of these criteria interfere with the others, they shall take precedence in the order listed:
      i) The microphone shall be fitted with a hydrophobic windscreen of diameter 7 inches.

ii) The microphone shall be placed outside, approximately 1.5 meters above the ground.
iii) The microphone shall not be placed such that any structure blocks the line of sight between the microphone and otherwise visible wind turbines.
iv) The microphone location at each site will be placed near the residence (if applicable), but no closer than 7 meters to the nearest reflective surface facing wind turbines, such as the wall of a building, to the extent practical.
v) The microphone shall be located in such a way that it is representative of the noise exposure at the monitoring location.

c) Each sound level meter shall be calibrated immediately before and after each monitoring period, and during any battery checks. Any calibration drift will be noted.
d) Each sound level meter will have been laboratory calibrated within the two years prior to the monitoring period and each calibrator will have been laboratory calibrated within the year prior to the monitoring period.
e) When an anemometer is included as part of a monitoring station, it will be placed at the same height as that of the microphone at that location.

Data Collection

6) Sound levels and spectra as one-second equivalent continuous sound levels will be logged over the entire monitoring period. These include
   i) A-weighted sound levels
   ii) 1/3-octave band sound level spectra from, at a minimum, 20 Hz to 10,000 Hz
7) The sound monitoring period will last at least two weeks or until at least 20 clean shutdowns have occurred, whichever is later. A clean shutdown is one where the maximum 10-minute hub height wind speed of the closest turbine exceeds 4 m/s and there is no rain for at least 50 percent of time between one hour before the shutdown and one hour after the shutdown.
8) Additional supporting data to be logged during the monitoring period shall include:
   a) Temperature and rainfall data during the monitoring period, either measured at the site (in 10-minute intervals), or from meteorological data reported from the Dansville Municipal Airport (station KDSV), substituted as a proxy.
   b) Wind speed and wind direction as measured at each turbine nacelle within 1.5 miles of each monitoring location, logged at 10-minute intervals.
   c) Power output at each turbine logged at 10-minute intervals.
9) Background sound levels shall be determined using turbine shutdown periods.
   a) All wind turbines within 1.5 miles of each monitoring station shall be shut down for 10 minutes.
   b) The shutdown periods shall occur between the hours of 11 pm and 7 am, at least twice per night if wind speeds at the closest turbine are greater than 4 m/s and there is no rain.
   c) We suggest that the shutdowns occur during the same times of night, such as midnight and 3 am, or whatever schedule may be appropriate for the operator.

d) During at least four shutdowns within the monitoring period, the maximum hub height wind speed of the closest turbine will exceed the wind speed that generates within 1 dB of the highest sound power. If these wind speeds do not occur during the first two weeks of monitoring, the monitoring period may be extended up to one week to capture this condition. Turbines shutdowns during this extended period need only take place during wind events appropriate to capture within 1 dB of the maximum sound power at the closest turbine. If the four wind events do not occur after the extended timeframe, the monitoring period can be ended.

e) The sound levels measured during the periods one hour prior to and one hour following each shutdown period shall be designated as "Turbine-plus-background" sound levels at each monitoring location.[1]

f) The sound levels measured during the shutdown period shall be designated as "Background."

g) If the average wind speed during the Background period is greater than 1 m/s different from the Turbine-plus-background period, then the results will either be excluded, or adjustments for background levels to account for changing wind speed may be used.

Data Analysis

10) The data resulting from the monitoring period shall be analyzed as follows:

a) For both Background and Turbine-plus-background monitoring periods, data shall be excluded from analysis if any of the following conditions occurs:

i) The presence of contaminating sound caused by human or other activity;

ii) Ground level wind gust speeds exceeding 5 m/s or creating notable contaminating noise;

iii) Ambient temperatures outside the specified limits of the monitoring equipment;

iv) Precipitation in the form of rain, sleet, or hail.

v) Humidity outside the monitoring equipment specifications.

b) Periods for which data must be excluded for a given station can be determined by one or more of the following methods:

i) Examining (listening to) the station's audio recordings;

ii) Analyzing the spectrograms of logged sound levels;

iii) Applying data from the meteorological instrumentation.

c) Data that are contaminated by high-frequency sound emitted by insects, birds, and amphibians, may be low-pass filtered using an "ANS" weighting.

d) For any one-hour period during which Turbine-plus-background sound levels exceed 45 dBA L_{eq}, Background will be subtracted to determine the sound level attributable to the Project (Turbine-only level).

[1] Studies have shown that sound levels can be elevated for a few minutes when wind turbines start up after a manual shutdown. Therefore, the Turbine-plus-background period after the turbine shutdown will start three to five minutes after all turbines have restarted to allow time to return to normal operation.

i) The Background level is the adjusted Background L_{eq} with a factor added for uncertainty according to ANSI S12.9 Part 3 Clause 7.3.
ii) The sound level attributed to turbine operations shall be determined by subtracting, on an energy basis, the Background from the Turbine-plus-background level, by 1/3 octave band.
iii) Background sound levels determined by subtraction for a given shutdown period shall be considered of sufficient accuracy only if the Turbine-plus-background sound level exceeds the Background sound level by at least 3 dB.

e) If, after subtraction, the sound level attributed to turbine operations (Turbine-only) exceeds 45 dBA outside, audio recordings of the sound and other data will be examined to determine whether the wind turbines contributed to the sound received at the station.
f) 1/3-octave band $L_{eq(10\ min)}$ will be evaluated to identify periods with steady pure tones using the criteria of ANSI S12.9 Part 4 Annex C.
   i) Tonal periods will be further screened to determine if the tonal sound is audible and if so, originated from the wind turbines.
   ii) Wind turbine tonal periods will be identified along with the tonal frequency.
g) The method anticipates two shutdowns per night resulting in four one-hour L_{eq} measurements per night. To determine compliance with the 8-hour L_{eq} standard, the equivalent continuous average of eight consecutive hourly L_{eq}s will be calculated, on a rolling hourly basis. The resulting $L_{(8h)}$ will be compared to the appropriate regulatory limits in the Certificate.

Reporting

11) Baron Winds shall submit a report within six weeks of the end of each sound monitoring period that includes the following information.[2]
   a) The locations of all sound monitors and the distance from each to the nearest turbine;
   b) A summary of all data collected, including sound levels, meteorological data at the monitoring stations, and turbine operating conditions;
   c) A list of periods with Turbine-only sound levels greater than the 45 dBA nighttime L_{eq} proposed regulatory limit, applicable town standard, or pure tone criteria, at monitoring stations representing non-participating receptors. Details of the analyses of each of those periods will be provided.
   d) An Appendix listing sound levels around each shutdown and the nacelle wind speed and power output for each turbine in 10-minute intervals around the turbine shutdowns during the monitoring period.
12) Compliance with the proposed regulatory limit will be assessed by the logarithmic average of the eight highest consecutive one-hour turbine-only equivalent average sound

[2] Some portions of the report may include information proprietary to the turbine operator, in which case distribution of that information would be limited per an appropriate protective agreement.

levels at a non-participating receptor. Compliance with the Town limits will be assessed by the highest measured 1-hour L_{10} sound level at a non-participating receptor.

13) The raw data collected at any monitoring station will be made available in electronic form upon request. However, audio recordings from those stations will not be made available if they contain recognizable human speech or other human activities for which there may be concerns over privacy.

3.0 COMPLAINT RESOLUTION

The following complaint resolution procedure assures that nearby residents' concerns regarding wind turbine noise are addressed in a timely manner while, at the same time, preventing abuse of the complaint process.

This complaint resolution process shall be in place for the life of the Project. This process can be amended at any time as mutually agreed to by the NYS DPS and Baron Winds.

The complaint resolution procedure shall be as follows:

Receiving a complaint

1) Baron Winds shall provide the name of the person who can be contacted in the case of a complaint, as well as the phone number by which that person can be reached, and post this with the Town Clerk of each town the project is located.
2) Baron Winds shall provide an acknowledgement to the complainant of a properly filed complaint within two business days.
3) Because of the complexity of wind turbine noise complaint resolution, the full cooperation of the complainant and adherence to this protocol are necessary to its success.
4) Complainants are requested to provide to Baron Winds the following information related to a potentially offending incident:
    a) Location at which the sound was observed;
    b) The date and time on which the sound was observed;
    c) Relevant weather conditions prevailing at the time the sound was observed. Such conditions would include, for example, presence of snow cover, cloudiness, any precipitation, and the approximate wind direction and speed.
    d) A description of the sound that was observed.
5) Baron Winds shall record the complainant's information, as well as the meteorological conditions, turbine operating status, and turbine power output that were logged during the period indicated in the complaint.

Complaint response

6) If (1) the complainant represents a permanent or seasonal residence within one mile of any turbine, and (2) based on monitoring and/or modeling, there appears to be a reasonable possibility that the sound level induced by the Project is greater than 40 dBA at the complainant's location, and (3) the sound is not related to Project maintenance or abnormal operational conditions, then Baron Winds will investigate the incident as follows:
    a) Determine whether the sound level at the complaint location is likely to be greater than 40 dBA by reviewing the pre-construction sound modeling.
    b) Baron Winds shall respond to the complainant in each case. However, Baron Winds is not required to conduct additional sound testing if:
        i) the modeled sound level is not greater than 40 dBA, or

ii) the complaint has occurred as a result of abnormal operation. In this case, Baron Winds shall make necessary repairs.

7) Baron Winds shall conduct sound monitoring if:
   a) The complaint location is further than 0.5 miles from any post-construction sound monitoring locations, or
   b) If there is a reasonable possibility that conditions have changed that affect wind turbine sound levels, or
   c) The last sound monitoring was conducted more than five years ago.
8) Baron Winds will not, as a result of additional complaints, repeat sound monitoring in a representative area during any five-year period following the first complaint response procedure for that area, unless changes in system operation or turbine maintenance can be reasonably assumed to have resulted in higher turbine sound levels. This clause shall not be construed as impeding a party from petitioning the NYS DPS for additional sound level monitoring, nor does it exclude the NYS DPS from requiring additional sound level monitoring during this period in order to address extenuating circumstances.
9) During the first year of operation, sound monitoring in response to complaints will be addressed as part of the first-year Sound Monitoring Protocol in Section 2.
10) Baron Winds may request that a Complainant maintain a written log of potentially offending sound events over some reasonable period of time, in order to assist in identifying influences that may affect the sound from the turbines. If the identified influences demonstrate that follow-up sound monitoring is warranted, Baron Winds shall make all reasonable efforts to conduct such monitoring under conditions similar to those existing at the time the complaint arose.
11) Baron Winds shall inform a resident when it intends to conduct any exterior sound monitoring and cooperate with the resident to determine an appropriate location for the monitoring equipment.

Reporting

12) Baron Winds shall submit a report with the official results of complaint-based monitoring to the complainant, to the NYS DPS and the Town Clerk of the complainant town within 45 days of completion of that monitoring. This report shall include the following information as collected during the entire complaint monitoring period:
   a) Wind speed and direction
   b) Operational status of the turbines
   c) Summary sound levels, and
   d) Sound level data as logged by the sound level meter throughout the monitoring period in graphical form.
13) If, as the result of a complaint resolution, it is determined that the sound level at any non-participating permanent residence, attributable to the Project, is above the 45 dBA $L_{(8h)}$ nighttime regulatory limit, Baron Winds shall take steps to identify the issue and evaluate practical measures to further minimize sound levels at the receptor. If complaint resolution monitoring determines the sound level at any non-participating

residence or seasonal home, attributable to the Project, is above the applicable town noise standard, Article 10 Certificate regulatory standard, or has audible pure tones, using the calculation procedures of Section 2, Baron Winds shall take remedial steps to identify and mitigate the issue.

Vibration Complaints

14) If the nature of the complaint is described by the complainant to be due to ground-borne or noise-induced interior vibration, a vibration test will be performed at the complainant's residence. This is intended to address the Project interior low-frequency noise-induced vibration design goal.
15) The vibration test will compare project-only vibration to perception criteria, as outlined in ANSI Standard S2.71.
16) Vibration measurement procedures will follow those outlined in ANSI S2.71.
17) Testing will comprise a measurement period of one hour, followed by measurement during the shutdown of all turbines within 1.5 miles of the residence for a period of 20 minutes, and measurement for the hour following the turbine restart.
18) Vibration measurement will only be performed if:
    a) The location is within one mile of the closest Facility wind turbine,
    b) Vibration measurements have not been performed at that particular location within the last five years, and
    c) The location is at least 0.5 miles from the nearest location where vibration has been measured in the last five years.
19) Measurement results will be summarized in a memo that will be submitted to the complainant, NYS DPS, and the Town Clerk, within 45 days of the monitoring.
20) If turbine-only vibration exceeds ANSI S2.71 criteria, Baron Winds shall take remedial steps to identify and mitigate the issue.