

Stipulation 19-1001.19 Exhibit 19: Noise and Vibration

Exhibit 19 shall comply with the requirements of 16 NYCRR § 1001.19 by containing:

A study of the noise impacts of the construction and operation of the facility. The name and qualifications to perform such analyses of the preparer of the study shall be stated. If the results of the study are certified in any manner by a member of a relevant professional society, the details of such certification shall be stated. If any noise assessment methodology standards are applied in the preparation of the study, an identification and description of such standards shall be stated.

a) A map of the Study Area showing the location of sensitive sound receptors¹ in relation to the Facility. The map will be created using aerial imagery and field verification.

b) An evaluation of ambient pre-construction baseline noise conditions, including identification of A-weighted sound levels, prominent tones, if any, at representative of potentially impacted receptors, using actual measurement data recorded in winter and summer (i.e., leaf off and leaf on) during the day and at night as a function of time and frequency. Ambient sound levels will be measured utilizing suitable and suitably calibrated sound level meter(s) and fractional octave band analyzer(s). Brand and model number of the sound level meters and calibrators used will be specified; locations, dates, and times of testing, weather conditions² (wind speed, wind direction, temperature, relative humidity and precipitation), frequency range of measurement, meter settings and general methodology and procedures will be specified and described. Ambient measurements to cover the infrasound range (from 0.8 Hz to 20 kHz) will be included as a separate measurement using specialized equipment. Noise descriptors including Leq and L90 will be calculated and included as part of the tabular results provided in section f) below. Temporal accuracy (for the number of days tested) will be calculated and reported based on a 95% confidence interval following the procedures included in ANSI Standard S12.9-1992 (R2013)/Part 2. Weather information can be supplemented with data from the most representative and proximal weather station(s). The ambient pre-construction baseline sound level will be filtered to exclude seasonal and intermittent noise, periods of rain, thunderstorms and excessive wind and gusts as appropriate. The "Ai" frequency-weighting network will be used where appropriate (i.e. bird and insect sound is prominent), also called ANS-weighted sound levels in ANSI/ASA 53/SCI.100-2014 - 512.100-2014.

c) An evaluation of future noise levels during construction of the proposed Facility including predicted A-weighted sound levels at proximate potentially impacted and representative sensitive sound receptors using a Cadna/A propagation model or similar, predicted construction traffic levels, construction equipment and construction activities sound emissions, and by following the guidelines and recommendations of FHWA Highway Construction Noise Handbook FHWA-HEP-06-015 as applicable.

¹ Sensitive sound receptors will be defined as non-participating residences, hospitals, care centers, schools, libraries, places of worship, campsites, public parks and New York State lands.

² Weather conditions are used to evaluation validity of the ambient measurement. Relevant conditions include wind speed, temperature (check if within equipment tolerances) and precipitation (rainfall generally invalidated data).

Information will include noise contours at one representative turbine location including all construction related noise and at the proposed batch plant/laydown area.

d) An estimate of the noise level to be produced by operation of the proposed Facility using computer noise modeling under the ISO 9613-2 conditions relating to a moderate nighttime inversion or, equivalently, downwind propagation, and the least attenuation due to temperature and humidity. Noise contours for these conditions representing the maximum one-hour equivalent average (Leq 1-h) sound levels for the highest wind turbine sound power levels will be provided. Noise modeling and calculation of the CONCAWE meteorological adjustments will include 64 different meteorological conditions and one year of turbine sound levels at each receiver by the use of computer noise model with estimates of hourly turbine power and one year of met tower data. These will be used to provide worst case (L10) and typical (LSO) sound levels at all sensitive sound receptors, as required by Section (f) below. The model will also include relevant noise sources from substations. The Application will include a brief discussion about the accuracy of selected outdoor propagation models, methodologies, ground absorption values, assumptions and the correlation between measurements and predictions for documented cases as compared to other alternatives, if available.

e) An evaluation of:

- 1) future noise levels during operation of the proposed Facility including predicting A-weighted sound levels and un-weighted full octave band low frequency levels at all sensitive sound receptors;
- 2) a tonal evaluation based on the reported sound power of the wind turbines and substation transformers;
- 3) Noise modeling shall be performed for the turbine model with the highest sound power levels discussed in the Application and the final turbine model selected will not have sound power levels greater than those presented in the Application. There will be discussion on the Applicant's avoidance and minimization of sound impacts presented in the Application.
- 4) A discussion of the potential for low frequency and infrasound emissions using literature and manufacturer data, extrapolated as applicable and appropriate, and manufacturer low frequency and infrasound data if available.
- 5) The Application will state the basis for the sound power levels used.
- 6) Amplitude modulation generation estimates will reference the methods outlined in IEC 61400- 11 Annexes B and D as applicable and appropriate. The potential for excessive amplitude modulation will be evaluated by review of the wind shear and turbulence intensity at the Facility. Amplitude modulation will be addressed by determining whether the area has unusually high wind shear or turbulence that could contribute to the phenomenon. One year of meteorological data will be evaluated to determine the frequency of unusually high wind shear events.

f) A summary, in tabular and/or graphical³ format, of A-weighted sound levels indicated by measurements and computer noise modeling at the representative external property boundaries of the Facility, and at the representative nearest and average sensitive sound receptors, for the following scenarios:

- 1) Daytime ambient noise level – a single value of sound level equivalent to the level of sound exceeded for 90 percent of the time during the daytime hours (7 am -10 pm) of a year (L90).
- 2) Summer nighttime ambient noise level – a single value of sound level equivalent to the level of sound exceeded for 90 percent of the time during the nighttime hours (10 pm – 7 am) during the summer (L90).
- 3) Winter nighttime ambient noise level – a single value of sound level equivalent to the level of sound exceeded for 90 percent of the time during the nighttime hours (10 pm – 7 am) during the winter (L90).
- 4) Worst case future noise level during the daytime period – the daytime ambient noise level (L90) as indicated in (f)(1) above, plus the modeled upper tenth percentile sound level (LIO) of the Facility in a year. Long-term statistical sound level LIO will be determined for scenarios that both include and exclude low wind periods when turbines will not be in operation.
- 5) Worst case future noise level during the summer nighttime period - the summer nighttime ambient noise level (L90), as indicated in (f) (2) above, plus the modeled upper tenth percentile sound level (LIO) of the Facility in a year. Long-term statistical sound level LIO will be determined for scenarios that both include and exclude low wind periods when turbines will not be in operation.
- 6) Worst case future noise level during the winter nighttime period - the winter nighttime ambient noise level (L90), as indicated in (f) (3) above, plus the modeled upper tenth percentile sound level (LIO) of the Facility in a year. Long-term statistical sound level LIO will be determined for scenarios that both include and exclude low wind periods when turbines will not be in operation.
- 7) Daytime ambient average noise level – a single value of sound level equivalent to the energy- average ambient sound levels (Leq) during daytime hours (7 am -10 pm).
- 8) Nighttime ambient average noise level – a single value of sound level equivalent to the energy-average ambient sound levels (Leq) during nighttime hours (10 pm – 7 am).
- 9) Typical facility noise levels - the noise level from the proposed new sources modeled as a single value of sound level equivalent to the level of the sound exceeded 50 percent of the time by such sources under normal operating conditions by such sources in

³ Graphical format sound contours will be depicted for representative external property boundaries only in 1dBA increments in drawings of the Facility broken in quadrants with turbines and parcel lines depicted.

a year (LSO), and in combination with the energy-average ambient sound level during the daytime hours (Leq), as indicated above in (f) (7). Long-term statistical sound level LSO will be determined for scenarios that both include and exclude low wind periods when turbines will not be in operation.

g) A description of noise standards applicable to the Facility, including any local regulations, noise design goals at representative sensitive sound receptors, and at representative external property boundaries.

h) A table outlining noise standards applicable to the Facility, including any local regulations, and noise design goals at representative sensitive sound receptors and at representative external property boundaries, including the degree of compliance indicated by computer noise modeling.

i) A noise complaint resolution plan covering the construction period including noise abatement measures for Facility activities along with procedures for handling complaints.

j) An identification and evaluation of reasonable noise abatement measures for the final design and operation of the Facility including the use of alternative technologies, alternative designs, and alternative Facility arrangements.

k) A discussion of:

- 1) The potential for the Facility to result in hearing damage based on OSHA standards, the recommendations of the United States Environmental Protection Agency and the guidelines of the World Health Organization.
- 2) A discussion of the potential for indoor and outdoor speech interference based on guidelines from the United States Environmental Protection Agency and the World Health Organization, including discussion of sound spectra at the appropriate frequency bands.
- 3) A review of studies, peer reviewed, government, scientific and professional publications, specific to the relationship between wind turbine noise and annoyance/complaints will be included. Community complaint potential will be evaluated based upon identified factors, thresholds and guidelines and;
- 4) At a minimum, the potential for sound-induced vibration and annoyance at the low frequency bands of 16, 31.5 and 63 Hz will be assessed using outdoor criteria established in annex D of ANSI standard S12.9 -2005/Part 4. Applicable portions of ANSI 12.2 (2008) may be used for the evaluation of frequency bands where ANSI 12.2 (2008) may be a more restricting criteria or if it is expected ANSI S12.9-2005/Part 4- Annex D guidelines being met but still represent a potential for perceptible vibrations at indoor locations of sensitive sound receptors.
- 5) The potential for structural damage; and the potential for interference with technological, industrial or medical activities that are sensitive to vibration or infrasound.

l) A post-construction noise evaluation protocol and studies that will be performed to establish conformance with operational noise design goals.

m) An identification of practicable post-construction operational controls and other mitigation measures that will be available to address reasonable complaints, including a description of a complaint-handling procedure that shall be implemented during periods of operation.

n) The computer noise modeling values used for the major noise-producing components of the Facility shall fairly match the unique operational noise characteristics of the particular equipment models and configurations proposed for the Facility. The software input parameters, assumptions, and associated data used for the computer modeling will be provided as an appendix. GIS files that contain modeled topography, proposed turbine and substation noise source locations, sensitive sound receptors, and all representative external boundary lines, identified by Parcel ID number, will be provided to DPS-Staff in digital format. The Application will also include:

- 1) A comparison between future noise levels or change in noise levels at noise sensitive receptors against any identified noise levels or thresholds by using the noise descriptors and specific requirements of local town laws, DEC Noise Policy (DEP-00-1, Feb 2, 2001), WHO guidelines, 16 NYCRR § 1001.19 and any identified and applicable annoyance/complaint thresholds or guidelines.

2) Estimates of:

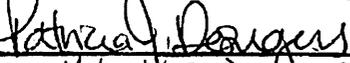
- i) the percentage of the population expected to be impacted by sound levels lower or higher than the threshold values or identified ranges, and
- ii) absolute values of the population expected to be impacted by sound levels lower or higher than the threshold values or identified ranges.

Cassadaga Wind LLC
As to Stipulation 19 identified above agree:

By: 
Name: Mike Sparschneider
Dated: 6/6/16

New York State Department of Environmental
Conservation

As to Stipulation 19 identified above agree:

By: 
Name: Patricia J. Desjardis
Dated: 7/13/16

New York State Department of Public Service
As to Stipulation 19 identified above agree:

By: 
Name: Andrea M. Corbin
Dated: 06/05/16

New York State Department of Agriculture
and Markets

As to Stipulation 19 identified above agree:

By: 
Name: Tara Wells
Dated: 7/11/16

Town of Charlotte
As to Stipulation 19 Identified above agree:

By: 
Name: Charles W. Malcomb/Special Counsel
Dated: 6/7/16

Town of Cherry Creek
As to Stipulation 19 Identified above agree:

By: 
Name: Charles W. Malcomb/Special Counsel
Dated: 6/7/16

Town of Arkwright
As to Stipulation 19 Identified above agree:

By: 
Name: Charles W. Malcomb/Special Counsel
Dated: 6/7/16