Bodwell EnviroAcoustics LLC

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Maine DEP
106 Hogan Road, Suite 6
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February 25, 2016

Number Nine Wind Farm
Response to Peer Review Comments & Revised Sound Level Predictions

References:

1. Independent Peer Review of the Sound Assessment for the Number Nine Wind Project, Tech Environmental - October 7, 2015

2. Maine DEP NRPA/Site Location of Development Combined Application Section 5 Noise
   - Exhibit 5-A: Sound Level Assessment, Number Nine Wind Farm, LLC, Aroostook County, Bodwell EnviroAcoustics, LLC – April 2015
   - Exhibit 5-B: Sound Assessment – Generator Lead Lines: Audible Noise Sound Level, Number Nine Wind Farm, 345 kV Generator Lead Line, Commonwealth Associates, Inc. – March 30, 2015

Dear Ms. Damon:

This document provides a response to the findings and recommendations contained in the Independent Peer Review by Tech Environmental, acoustical consultant to the Maine DEP, as it relates to Section 5 (Noise) of the Maine DEP Site Location of Development Application for the Number Nine Wind Farm (NNWF). The following provides a summary of specific peer review comments concerning the sound assessments for the turbine area and the 345 kV Generator Lead Line. These comments and our response separately address 1) the Wind Turbine Layout and 2) the Generator Lead Line as the two primary areas of the Number Nine Wind Farm.

Wind Turbine Layout

Concerning the Sound Level Assessment for the turbine area, findings by Tech Environmental address the distance to the nearest dwelling and selection of sound test locations for operations sound testing to evaluate compliance with applicable Maine DEP sound level limits. Bodwell EnviroAcoustics (BEA) concurs with both review comments as well as the recommendation by Tech Environment to adjust one of the sound test locations. In addition, this response establishes an additional sound receptor point and provides some clarifications concerning sound test locations.

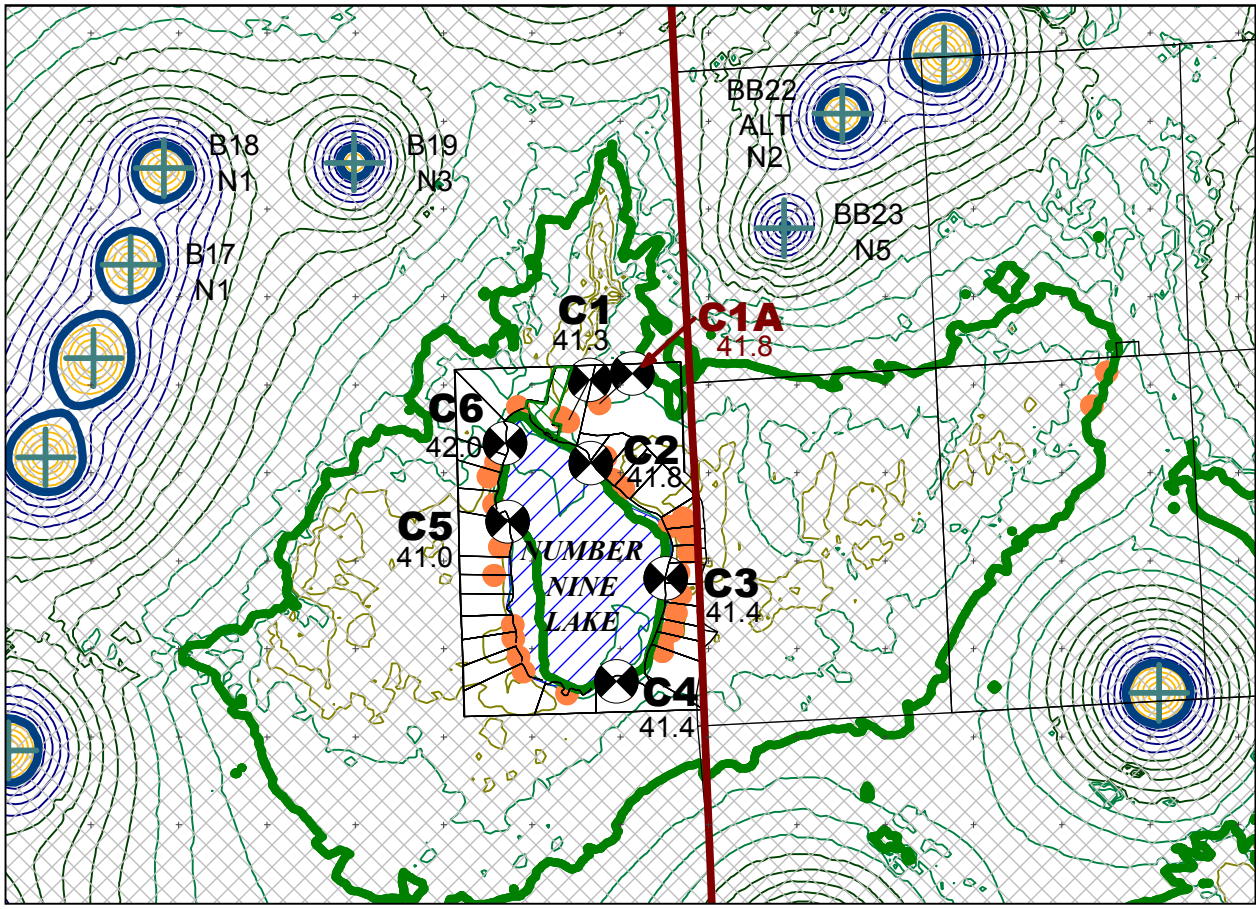
Distance to Nearest Dwelling - The distance from a proposed turbine site to the nearest dwelling was incorrectly stated as 2,260 feet and should have been shown as 2,890 feet. This corrected distance is based on the mapping and turbine layout as contained in the April 2015 Sound Level Assessment and does not affect the predicted sound levels at receptor points selected to evaluate compliance.

Sound Test Locations – Section 7.0 Sound Level Testing of the BEA Sound Level Assessment states that prior to operation of Number Nine Wind Farm, an operations sound testing plan will be prepared to identify sound test locations. BEA identified receptor points C1 and C6 for the sound test locations to represent receptor points where the predictive model shows that sound levels have the most potential to exceed the applicable sound limits. Tech Environmental recommended "that the second sound test location be receptor C3 across the lake from C6, and not C1, which is relatively close to C6."

In reviewing these comments in relation to the predictive sound model and test locations, BEA found that receptor point C1 should be moved east approximately 480 feet to represent the specific point within 500 feet of the dwelling on the nearby protected location with the highest potential to exceed the nighttime sound limit. The attached Figure 1 presents an excerpt from the predictive sound model that adds receptor point C1A on this protected location and where the predicted nighttime sound level is 41.8 dBA. The predicted nighttime sound level at this additional receptor point and all other receptor points as identified in the April 2015 Sound Level Assessment are within the 42 dBA nighttime limit. Therefore, this additional receptor point does not affect the report findings regarding compliance demonstration or the nighttime noise-reduced operating (NRO) plan.

Prior to commencing full operations, the sound test locations will be selected based on site conditions to represent those receptor points with the highest potential to exceed the nighttime sound limit. As shown by Figure 1, those would be receptor points C6 and C2, and the additional receptor C1A. When construction of the Project is substantially complete, a detailed site review will be conducted to select and document sound test locations, including sites for one or more 10-meter wind sensors, to represent these receptor points following criteria set forth by Section I(8) of Maine DEP Chapter 375.10. In many cases, proxy locations are selected from site reviews in order to select the best available test locations to represent the receptor points. The selected test locations will be documented as part of an Operations Sound Testing Plan and submitted to the Maine DEP for approval.

Figure 1. Excerpt from Sound Prediction Model with additional Receptor C1A



Generator Lead Line

Concerning the Audible Noise report for the Generator Lead Line by Commonwealth Associates, Inc. (CAI), findings by Tech Environmental address the applicable sound limits and application of tonal sound penalties under Maine DEP Chapter 375.10. In addition, comments by Tech Environmental request that additional mapping information be provided to confirm the proximity of the Gen Lead Line to nearby protected locations.

Specifically, the Peer Review at page 6 states "Generator Lead Lines are part of a grid-scale wind energy development, as defined in 35-A MRSA § 3451, and thus the Lead Lines are subject to the Chapter 375(10)(I) nighttime sound limit of 42 dBA at Protected Locations, with adjustment for Tonal Sounds in subsection I(3) of the Maine Noise Regulations."

Concerning Tonal Sounds, the Peer Review at page 6 states "Corona discharge under the worst case (wet conditions) can produce a tonal sound at 120 Hz, thus in the 125 Hz 1/3-octave band, that is 20 dB above the sound level in adjacent octave bands. Such a tone would qualify as Tonal Sound, as that term is defined in the Maine Noise Regulations. Thus, the 5-dBA penalty for Tonal Sound may apply to the Lead Lines."

Although its Applicability provision at Section 10(I)(1) extends Chapter 375(10)(I) to all components of a grid-scale wind energy development, Section 10(I) is, in nearly every other detail, strictly a wind turbine sound rule. There are numerous provisions of Section 10(I) that clearly indicate that it was intended to apply exclusively to wind turbines.[1,2]

Calculations presented in the March 2015 Audible Noise report by CAI indicated that the highest regulated sound output from the Gen Lead Line occurs while operating at full capacity during a wet

[1] NNWF as Applicant and its legal counsel join in affirmatively stating that sounds from the Bridal Path and Northern Generator Lead Lines are not subject to Section 10(I) of Chapter 375 of the Department's Rules. The original Petition for Rulemaking, the Basis Statement, the MDEP Staff Memoranda to the Board, and the overall language of Section 10(I) all clearly demonstrate that Section 10(I) is a Rule to address sounds from wind energy turbines. While this Response and the Revised Report from Commonwealth demonstrate compliance of the sounds from the Project's Generator Lead Lines with Section 10(I), including the Section 10(I) 42 dBA nighttime limit and a full 5 dBA tonal penalty, the Applicant does not waive its claim that Section 10(I) is not applicable to sounds from the Generator Lead Lines.

[2] Detailed examples of the nature and scope of Section 10(I) addressing only sounds from wind turbines include (1) the Section 10(I)(7) Submissions requirements (focusing on the "predictable worst case" impact on adjacent properties from the "maximum rated sound power output (IEC 61400-11) of the sound sources" (IEC 61400-11 addresses wind turbine sound) and modeling these sound sources as individual point sources at turbine hub height; Section 10(I)(8) sound measurement protocols (specifically in (e)(7), the Rule requires measurement of sound with "turbine hub-elevation wind speeds sufficient to generate the maximum continuous rated sound power from the nearest wind turbines to the measurement location"); and post-construction sound monitoring under 10(I) reflects sound levels from wind turbines.

conductor condition with a much lower sound level during fair weather when the conductors are dry. For Section 1 (Bridal Path) , the sound level predicted by CAI for the wet condition was 37.4 dBA at the edge of Gen Lead Line right-of-way. Adding a tonal sound penalty of 5 dBA would result in an adjusted sound level of 42.4 dBA, which would be 0.4 dBA above the 42 dBA nighttime limit for wind energy developments that applies within 500 feet of a dwelling on a protected location.

Applying this predicted sound level to the compliance criteria set forth in Section 10(I)(5) would require the Gen Lead Line to operate at full capacity under a wet conductor condition during a minimum of 12 ten-minute test periods during which site conditions meet the protocol requirements for wind turbine sound testing per Section 10(I)(8). The specified test conditions require measurement "during weather conditions when wind turbine sound is most clearly noticeable". These weather conditions are specified as turbine hub-elevation wind speeds sufficient to generate maximum continuous rated sound power, maximum surface winds less than 6 miles per hour, and the measurement location downwind of the nearest turbines. Section 10(I)(7) establishes that the "predictable worst case impact" of sound sources occurs during stable atmospheric conditions.

From experience sound testing grid-scale wind projects in Maine, it is unlikely that the Gen Lead Line would operate in a wet conductor condition for 12 ten-minute compliance measurement intervals meeting the required turbine test conditions per Section I(8). Moreover, even if 11 out of 12 compliance measurement intervals were also to occur with wet conductors, the average resulting sound level from the Gen Lead Line at the edge of ROW would be 36.3 dBA (37.4 dBA wet and 24.6 dBA fair weather). Assuming that sound levels emitted from the Gen Lead Line for all 12 measurement intervals were also found to produce a tonal sound at 125 Hz, the adjusted sound level with a 5 dBA tonal penalty would be 41.3 dBA and 0.7 dBA below the 42 dBA nighttime limit.

The Revised CAI Report

Nevertheless, Number Nine Wind Farm directed CAI to re-examine its predictive sound level calculations to determine specific modifications that would be required to demonstrate compliance with the 42 dBA nighttime limit under a wet conductor condition at full capacity including a 5 dBA penalty for tonal sounds. This led to design changes of several H-pole structures by SGC Engineering along Section 1 (Bridal Path) to ensure that the resulting sound level will be 37 dBA or less at the edge of the Gen Lead Line right-of-way (EROW) where an abutting or nearby property is a protected location with a dwelling located within 500 feet of the EROW. These modified segments of Section 1 are collectively referred to as the 1A Segments. As to Section 2 (Northern Section), Section 2a was extended approximately 1.3 miles to ensure that sound levels under a wet condition would be less than 37 dBA within 500 feet of a dwelling on all regulated protected locations. Section 2a is the portion of the Northern Gen Lead Line where a third 795 Drake conductor was added to reduce audible noise.

The CAI report attached as Attachment 1 has been revised to present the resulting sound levels calculated to represent the modified Gen Lead Line design. This report demonstrates that the worst-case wet conductor condition of both Sections 1 (Bridal Path) and Section 2 (Northern Section) of the Gen Lead Line will generate a sound level of 37.0 dBA or less within 500 feet of a dwelling on all regulated protected locations. Therefore, under the worst-case scenario of a wet conductor condition producing a tonal sound for a minimum of all 12 ten-minute test periods, audible noise from the Gen Lead Line will meet the 42 dBA nighttime limit within 500 feet of a dwelling on all regulated protected locations.

Guldberg pg. 6: "The question then arises whether there are any parcels containing a residential dwelling that have a property boundary coincident with the ROW and for which the dwelling is 500 feet or less from the ROW? A review of the Section 1 Lead Line maps reveals six possible residential parcels that meet these criteria. For the following parcels, which appear to be Protected Locations with a property line coincident with the Section 1 Lead Line ROW, the maximum sound level with a Tonal Sound penalty will be above the 42 dBA nighttime limit."

With the modified design for the 1A Segments of the Section 1 (Bridal Path) Gen Lead Line, the highest predicted sound level with a 5 dBA tonal penalty would be less than 42 dBA (see Attachment 1). In order to identify protected locations and possible sound test locations to demonstrate compliance, maps of land uses and protected locations have been prepared by SGC Engineering and NNWF based on aerial photogrammetry and field verification. For Section 1, these maps are provided as Exhibit 3 of the CAI Report and depict all of the protected locations abutting Section 1 of the Gen Lead Line with dwellings within 500 feet of the EROW, including the six possible residential parcels indentifed by Guldberg.

Guldberg pg. 7: "For Section 2a, the Commonwealth Report predicts a maximum sound level of 50.4 dBA at the ROW, which drops to 38.1 dBA at ROW+500 feet, and states (on page 3) Section 2b has no Protected Locations within 500 feet of the ROW. If a Tonal Sound penalty applies to Section 1a, then the maximum sound level is 43.1 dBA at ROW+500 feet and above the 42 dBA nighttime limit. From the maps provided for Lead Line Section 2a, I cannot see potential Protected Locations at and beyond 500 feet and thus I do not know if there are any Protected Locations along Section 1a with a maximum sound level (including a 5-dBA penalty) above 42 dBA."

BEA assumes that reference to the 50.4 dBA at the EROW and 38.1 dBA at EROW plus 500 feet is intended to refer to Section 2b of the Gen Lead Line. Additional land use mapping for all of Section 2 (Northern Section) has been prepared by SGC Engineering in order to identify where the worst-case wet condition sound level, with a 5 dBA tonal penalty, could potentially exceed 42 dBA within 500 feet of a dwelling on a regulated protected location. For Section 2b, this would require that a dwelling be located within 500 feet of any point where audible noise from the Gen Lead Line, with a 5 dBA tonal penalty, exceeds 42 dBA. Whereas the calculated audible noise level under a wet condition drops to 36.9 dBA at 580 feet from the Section 2b EROW, a dwelling would need to be located within 500 feet of the 580-foot lateral setback from the EROW, or a total of 1,080 feet from the EROW, in order to have any potential to exceed the 42 dBA limit. Maps for the entire Section 2 of the Gen Lead Line are presented in Exhibit 4 of the attached Revised CAI Report. These maps indicate there are no dwellings (or sleeping quarters) within 1,080 feet of Section 2b (as revised) of the Gen Lead Line. Therefore, sound levels from this and

all sections of the Gen Lead Line will be below the 42 dBA nighttime limit within 500 feet of a dwelling at any regulated protected location.

Please contact me if you have any questions or need additional information concerning the response to the Peer Review by Tech Environmental.

Respectfully,

R. Scott Bodwell, P.E.
Principal

Enclosures

ATTACHMENT 1

COMMONWEALTH ASSOCIATES, INC.
AUDIBLE NOISE SOUND LEVEL
NUMBER NINE WIND FARM
345 kV GENERATOR LEAD LINE

REVISED
February 19, 2016