Noise Impact Assessment

For the

West Bay Wind Project



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1.0 Introduction

The proposed West Bay Wind Project is located approximately 7 km northwest of Parrsboro and 2 km west of Lake Road Corner in Cumberland County, Nova Scotia. The proposed project will consist of 25 turbines with a proposed hub height of 125 m and a rotor diameter of 163 m.

The following report summarizes the results of sound modeling which will be incorporated into the Nova Scotia Environmental Assessment Registration document for the project.

2.0 Sound Analysis

2.1 Background

Nortek Resource Solutions Inc. has completed a noise impact assessment for the proposed West Bay Wind Project. The objective of the analysis was to assess the impact of the the wind turbine sound emissions on surrounding dwellings. Noise modeling is based on sound levels that are adjusted to take into account how humans perceive sound with a lower sensitivity to very low and very high frequencies. The A-weight decibel (dBA) provides a measure of the loudness of sound in human terms.

The Nova Scotia Department of Environment and Climate Change (NSECC) requires that predicted noise levels are not to exceed 40 dBA for permanent and seasonal residential receptors which include homes, camps, cottages, daycare facilities, hospitals and schools. The 40 dBA limit also includes a 35 dBA background noise consideration which is included in the modeling.

2.2 Methodology

The sound analysis was completed using WindPro 4.2.316 which provides a comprehensive suite of wind farm design and modeling software. The sound model is based on the *ISO 9613-2 – Attenuation of sound during propagation outdoors, Part 2*. This international standard provides a conservative estimate of sound propagation and subsequent environmental attenuation as a result of ground porosity, atmospheric attenuation and geometric spreading. A conservative modeling approach was utilized for this project by using the General Model with ground attenuation porosity set at 0.5 to represent a mix of well forested and cleared areas, where 0 is a hard surface (ie. concrete, asphalt, rock, water or ice) and 1 is a soft surface (ie. vegetation, trees or snow). The ISO 9613-2 standard assumes an ambient air temperature of 10° C and 70% relative humidity which are ideal for atmospheric sound transfer. A meteorological coefficient can be assigned to the model to simulate sound damping due to unique meteorological conditions and noise propagation in the upwind direction. To maintain a conservative approach, a meteorological coefficient was not applied for this analysis. Additionally, the modeling assumes that all receptors are downwind of each wind turbine, which

contributes to the conservative nature of the analysis.

2.2.1 Digital Elevation Model

A digital elevation model (DEM) that was derived from aerial Light Detection and Ranging (LiDAR) data was used to model the sound and attenuation in this analysis. The original DEM was resampled from 1 m to 4 m resolution to minimize the file size for the project and adjacent areas.

2.2.2 Modeled Turbines

The project will consist of 25 turbines which were included in the sound modeling and there are no existing turbines located within 3.0 km of the proposed wind project. Table 1 summarizes the proposed turbine positions and Table 2 summarizes the specific turbine specifications. The total sound power output at various wind speeds for each turbine model was supplied by the manufacturers and shown in Table 3.

Table 1: Proposed Turbine Locations

Id	Model	Easting (m)*	Northing (m)*
1	N163 5.X 5900	389,824	5,037,439
2	N163 5.X 5900	390,254	5,035,657
3	N163 5.X 5900	388,993	5,036,838
4	N163 5.X 5900	390,963	5,037,972
5	N163 5.X 5900	389,662	5,034,023
6	N163 5.X 5900	389,389	5,036,227
7	N163 5.X 5900	392,444	5,035,837
8	N163 5.X 5900	388,858	5,035,623
9	N163 5.X 5900	390,944	5,037,197
10	N163 5.X 5900	392,159	5,034,855
11	N163 5.X 5900	391,124	5,033,995
12	N163 5.X 5900	388,533	5,038,014
13	N163 5.X 5900	391,164	5,035,579
14	N163 5.X 5900	393,488	5,036,134
15	N163 5.X 5900	389,608	5,038,173
16	N163 5.X 5900	391,326	5,036,567
17	N163 5.X 5900	392,709	5,036,995
18	N163 5.X 5900	388,173	5,039,418
19	N163 5.X 5900	388,782	5,037,441
20	N163 5.X 5900	389,709	5,034,998
21	N163 5.X 5900	392,028	5,037,758
22	N163 5.X 5900	388,040	5,038,589
23	N163 5.X 5900	390,944	5,034,653
24	N163 5.X 5900	387,824	5,037,976
25	N163 5.X 5900	388,134	5,036,353

* UTM, NAD83(CSRS), Zone 20

Table 2: Proposed Turbine Specifications

Item	Specification
Manufacturer	Nordex
Model	N163/5.X
Hub Height	125 m
Rotor Diameter	163 m
Operation Mode	Level 0
Rated Power Output	5,900 kW

Table 3: Sound Power Levels for the Proposed and Existing Turbines (dBA).

Wind Farm	Model	Wind Speed (m/s @ 10 m)							
		6	7	8	9	10	11	12	Up to cut-out
West Bay Wind	N163 5.X 5900	108.9	109.2	109.2	109.2	109.2	109.2	109.2	109.2

*

All of the turbines were modeled with regular blades and operating at full power or Level 0 which means the turbines are generating power at full capacity and therefore also operating at their highest noise level.

2.2.3 Receptors

The spatial location of all the permanent and seasonal located within 2.0 km of the proposed turbines were extracted from the Nova Scotia Topographic database. Recent satellite imagery and Aerial LiDAR Point Cloud data were manually reviewed and additional potential receptors were identified and included in the analysis. There are a number of buildings located within the wind farm which are situated on properties where the landowners have entered into agreements with West Bay Wind Inc. for the development and operation of the wind project. These buildings are considered to be participating receptors and therefore have been excluded from this analysis. Accordingly, the assessment results presented below focus on non-participating receptors and their compliance with applicable noise criteria.

A total of 41 receptors were modeled using a ground attenuation of 0.5 (Figure 1). The individual coordinates, elevation and modeled A-weighted sound pressure levels for each receptor are shown in Table 4.

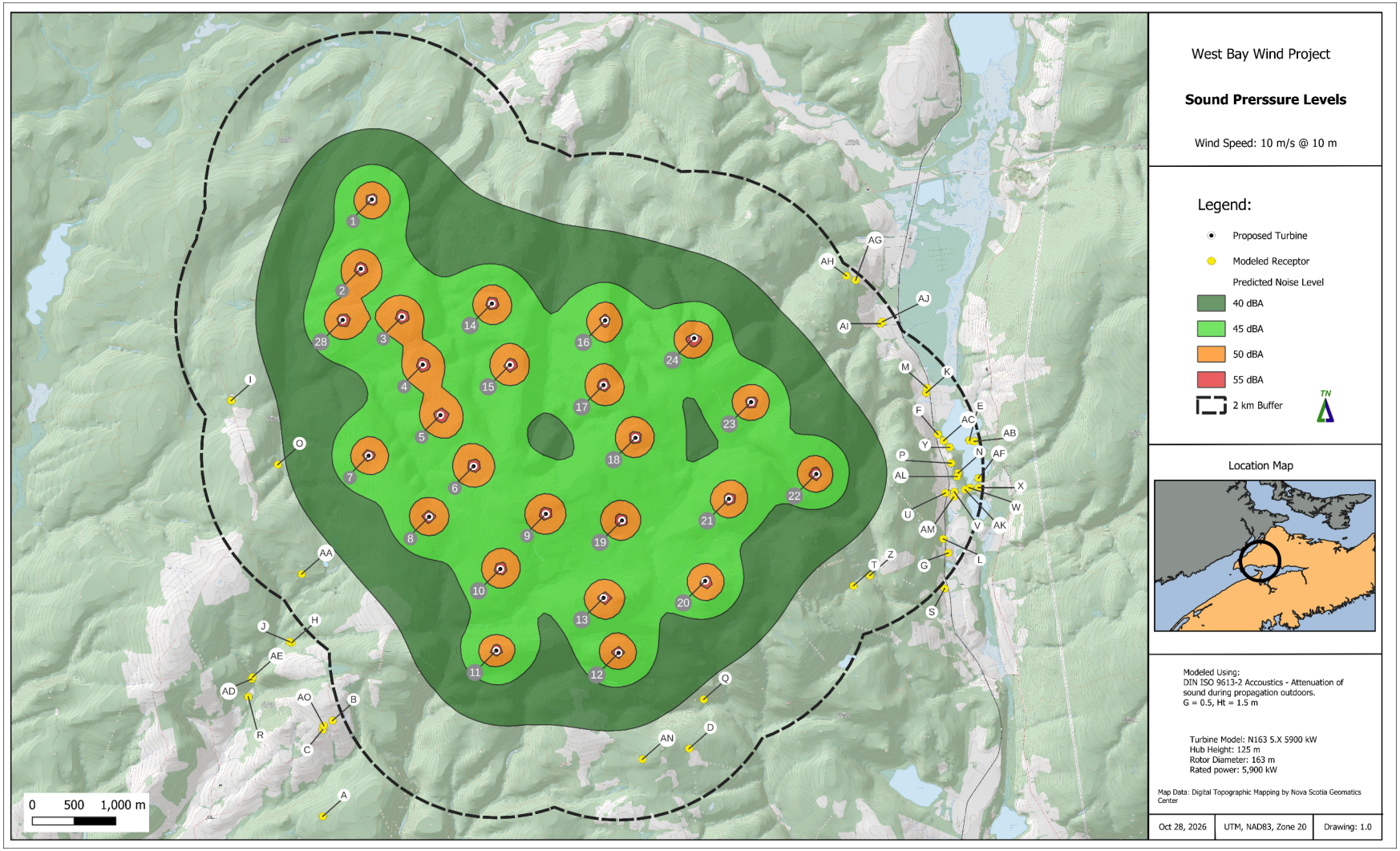


Figure 1: Modeled Sound Pressure Levels for the Proposed West Bay Wind Project.

2.3 Sound Modeling Results

The results of the analysis indicate that predicted sound pressure levels will not exceed 40 dBA for the modeled receptors based on the proposed turbine locations. Figure 1 and Table 4 show that all of the modeled receptors within 2.0 km of the proposed wind farm meet the 40 dBA threshold for sound power levels (including 35.0 dBA background noise). Therefore, no noise mitigation measures are required.

Table 4: Modeled Receptor Coordinates and Resulting Sound Levels.

Receptor ID	Easting* (m)	Northing * (m)	Immisison Height (m)	dBA
A	387,585	5,032,039	1.5	35.9
B	387,703	5,033,185	1.5	36.7
C	387,584	5,033,075	1.5	36.5
D	391,967	5,032,849	1.5	38.0
E	395,320	5,036,535	1.5	36.6
F	394,942	5,036,607	1.5	37.2
G	395,067	5,035,189	1.5	36.7
H	387,212	5,034,115	1.5	37.0
I	386,490	5,037,011	1.5	38.2
J	387,190	5,034,127	1.5	37.0
K	394,803	5,037,104	1.5	37.2
L	395,007	5,035,357	1.5	36.9
M	394,813	5,037,162	1.5	37.1
N	395,186	5,036,145	1.5	36.8
O	387,049	5,036,246	1.5	39.6
P	395,102	5,036,263	1.5	37.0
Q	392,142	5,033,438	1.5	39.3
R	386,694	5,033,469	1.5	36.2
S	395,023	5,034,764	1.5	36.5
T	393,932	5,034,796	1.5	38.3
U	395,033	5,035,906	1.5	37.1
V	395,141	5,035,920	1.5	36.9
W	395,319	5,035,969	1.5	36.6
X	395,427	5,035,970	1.5	36.5
Y	395,083	5,036,452	1.5	37.0
Z	394,129	5,034,920	1.5	38.1
AA	387,333	5,034,937	1.5	38.3
AB	395,377	5,036,523	1.5	36.5
AC	395,011	5,036,531	1.5	37.1
AD	386,735	5,033,681	1.5	36.3
AE	386,745	5,033,704	1.5	36.3
AF	395,428	5,036,084	1.5	36.5
AG	393,960	5,038,451	1.5	37.2
AH	393,849	5,038,503	1.5	37.3
AI	394,257	5,037,931	1.5	37.3
AJ	394,279	5,037,954	1.5	37.3
AK	395,269	5,035,947	1.5	36.7
AL	395,172	5,036,103	1.5	36.8
AM	395,132	5,035,860	1.5	36.9
AN	391,409	5,032,721	1.5	38.3
AO	387,598	5,033,125	1.5	36.6

* UTM, NAD83(CSRS), Zone 20

3.0 References

International Organization for Standardization (1996). ISO 9613-2: Acoustics –Attenuation of sound during propagation outdoors – Part 2: General method of calculation.

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