Appendix L NOISE IMPACT ASSESSMENT

KENT HILLS 3: KENT HILLS WIND FARM EXPANSION PHASE 3

Appendix L Noise Impact Assessment

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Noise Impact Assessment of Kent Hills 3: Kent Hills Wind Farm Expansion Phase 3

Final Report

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NOISE IMPACT ASSESSMENT OF KENT HILLS 3: KENT HILLS WIND FARM EXPANSION PHASE 3

September 21, 2017

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1.0 INTRODUCTION

Stantec Consulting Ltd. (Stantec) was retained by TransAlta Corporation (TransAlta) to complete a Noise Impact Assessment (NIA) for the Kent Hills 3 Project, an expansion of the Kent Hills Wind Turbine Farm located in Albert County, New Brunswick (NB).

The purpose of the NIA is to determine if the cumulative operation of the existing Kent Hills Wind Turbine Farm and the proposed expansion will be compliant with the New Brunswick Department of Environment and Local Government's (NBDELG) Environmental Impact Assessment (EIA) Sector Guidelines for Wind Turbines (refer to Section 4).

This report is presented in seven sections. An introduction overview of the Project is provided in Sections 1 and 2. Section 3 characterizes the existing acoustic environment in the Project area and Section 4 outlines the criteria that will be used to assess whether the Project is in compliance with environmental regulatory requirements. The methodology used to conduct the NIA and the results obtained are presented in Section 5 and a discussion of the results is provided in Section 6. Closure and references cited sections are provided in Section 7 and 8, respectively.

2.0 PROJECT OVERVIEW

2.1 BACKGROUND

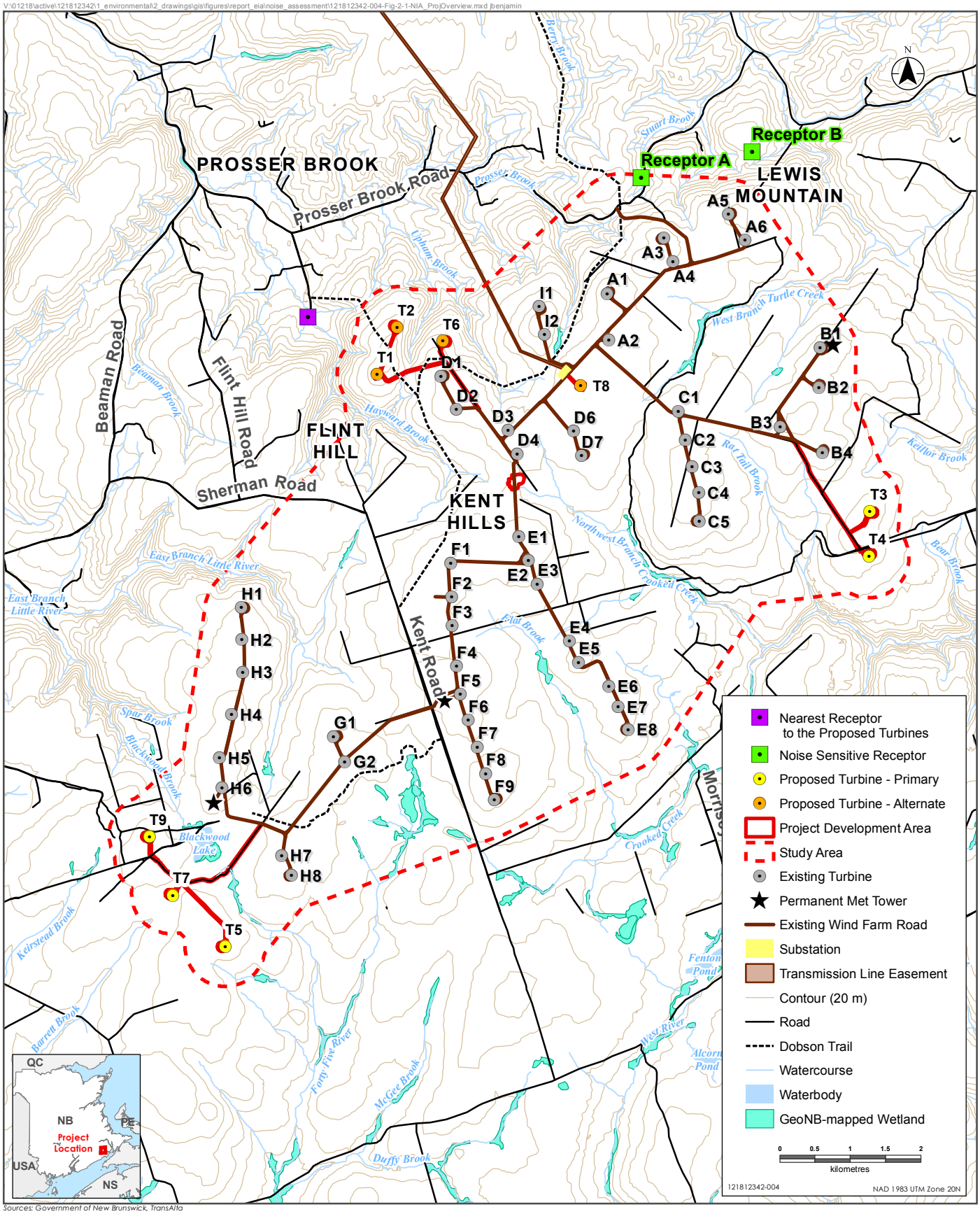
TransAlta operates a 50 turbine, 150 MW, wind farm facility at Kent Hills in the southeastern section of Elgin Parish in Albert County, NB, which was constructed from 2007 to 2010, and commissioned on December 31, 2008 (first phase) and December 31, 2010 (the first expansion). The Kent Hills Wind Farm was approved under the New Brunswick Environmental Impact Assessment (EIA) Regulation - Clean Environment Act (EIA file number 4561-3-1128), and the first expansion was later approved under the EIA file number 4561-3-1238.

TransAlta wishes to further expand the facility by five (5) turbines for an additional 17.25 MW of capacity. This expansion is referred to as Kent Hills 3, the "Project".

2.2 PROJECT DETAILS

The Project - Kent Hills 3 - includes the installation and operation of five turbines (Vestas V126 turbines, 3.45 MW). Nine locations for these turbines are under consideration, including four spares to be used in the situation where site-specific geotechnical conditions are considered unacceptable from an engineering perspective. The nine new turbine locations are located in three clusters plus one location across from the existing substation. Additional infrastructure required for the new turbine locations includes additional access roads and collection system, which includes the upgrade of existing forestry roads where possible. Upgrade of the 138 kV transmission line (constructed and operated by NB Power Transmission Corporation) and the

substations is not needed as they have sufficient capacity to handle a 167 MW load. The turbine locations in the three clusters are all located within 1 km of the original EIA Study Area, to the north, southwest, and east (Figure 2.1).



Project Overview

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121812342 KENT HILLS - PHASE 3 - TRANSALTA CORPORATION

Figure 2.1

3.0 EXISTING ACOUSTIC ENVIRONMENT

The existing acoustic environment at and surrounding the Project site is characterized as relatively quiet, with sounds of nature (such as wind, birds) dominating, with occasional influence from the operation of the existing Kent Hills Wind Farm, and some influence from forestry, agricultural and mineral aggregate operations.

Results from the previous noise impact assessments completed for the Kent Hills Wind Farm and initial expansion suggest that sound levels adjacent to all known receptors (households) within 1 km of the nearest wind turbine were predicted to be below 40 dB_A over a ten minute period, even when assuming that wind is coming from all directions at once and all receptors are downwind which would be a conservatively high noise assumption (TransAlta Wind 2007 & 2009). To date no noise complaints have been received by TransAlta in relation to the Kent Hills Wind Farm (C. Macy, pers. comm.)

4.0 SOUND LEVEL CRITERIA

New Brunswick has recommended sound criteria for wind turbines in the EIA Sector Guidelines for Wind Turbines, "Additional Information Requirements for Wind Turbines" document (Government of New Brunswick ND). This guidance suggests that a noise impact assessment, to show compliance with the criteria as per Table 4.1, is required for all noise sensitive locations (including recreational, residential, and institutional uses) within 1 km of the nearest turbine.

Table 4.1 Recommended Sound Criteria for Wind Turbines[1]

Wind Speed (m/s)	4	5	6	7	8	9	10	11
Sound Criteria (dBA)	40	40	40	43	45	49	51	53

[1] Values obtained from the "Additional Information Requirements for Wind Turbines" document provided by the Government of New Brunswick, no date.

5.0 NOISE IMPACT ASSESSMENT

5.1 METHODOLOGY

The dispersion and attenuation of sound in the atmosphere is modelled using algorithms based on the conservation of energy and the absorption of the expanding sound waves by the atmosphere and barriers in the path. There are numerous software packages available for modelling sound transmission in the atmosphere. Some use proprietary algorithms, and some are based on published methods that have international recognition. Cadna (Computer Aided Noise Abatement, version 4.5), produced by Datakustik in Germany, and recognized by environmental agencies in many countries, is a software program that is based on the propagation models in ISO 9613. This ISO standard is in two parts. ISO 9613-1 is concerned with the attenuation of sound by the constituents of air. ISO 9613-2 incorporates the atmospheric absorption component into a framework that models the attenuation of sound by the geometric spreading of sound in the free atmosphere. Cadna is capable of predicting sound levels at specified receiver locations originating from a variety of sources and can also account for such factors as:

- distance attenuation (*i.e.*, geometrical dispersion of sound with distance)
- geometrical characteristics of the source and receivers
- atmospheric attenuation (*i.e.*, the rate of sound absorption by atmospheric gases in the air between sound sources and receptors)
- ground attenuation (*i.e.*, effect of sound absorption by the ground as sound passes over various terrain and vegetation types between source and receptor)
- screening effects of surrounding terrain or vegetation
- meteorological conditions and effects

The application of the sound model requires several input variables which are further discussed in the following subsections.

5.1.1 Meteorological Factors

Meteorological factors, such as temperature, humidity, wind speed and direction, influence sound propagation. The effects of wind on outdoor sound propagation during different weather conditions could cause variations in Project-related sound levels measured at a receptor. If the receptor is upwind of the facility, the wind could cause greater sound attenuation, and lower sound levels at the residence. However, if the residence is downwind of the facility, the opposite effect could occur, resulting in higher sound levels at the residence. Crosswinds have less effect on outdoor sound propagation.

The ISO algorithms in Cadna were designed to reflect a situation where there is a modest wind directed from the source to the receiver; that is, the receiver is modeled as if always downwind of all sources, a conservative, worst-case assumption.

The following meteorological elements were assumed for the NIA:

- temperature = 10°C (50°F);
- relative humidity = 70 percent.

These are the standard values recommended as per ISO 9613 as they maximize sound transmission.

5.1.2 Terrain and Vegetation

Factors such as terrain conditions, types of vegetation and ground cover can all affect the absorption that takes place when sound waves travel over land. For example, if the ground is moist or covered in fresh snow or vegetation, it will be absorptive and aid in sound attenuation, with a ground absorption coefficient close to 1. In contrast, if the ground is hard-packed or frozen, it will be reflective and will not aid in sound attenuation, with a ground absorption coefficient closer to zero.

There are no water bodies of significant size between the sources and potentially affected receptors in this Project. Psychologically, trees and thick brush are beneficial in visually isolating the sound source and receiver; however, the actual degree of sound attenuation is limited. A thick growth of trees and brush about 30 m (100 ft) deep will achieve a noise reduction of 3 to 4 dB. If the vegetation is deciduous, the loss of the leaves means a loss in the attenuation properties in fall, winter and spring, and the vegetation must be in the line of sight to achieve a reduction. Note also that some part of the sound energy will refract over the bush, just as it can refract over hills, and so doubling the depth of the forest will not necessarily double the reduction in sound transmission.

The ground in the Project area between the turbines and receptors is generally vegetated, and therefore a ground absorption coefficient of 0.70 was used.

The local topography was also incorporated into the CadnaA model.

5.1.3 Wind Turbine Sound Levels

The existing Kent Hills Wind Farm consists of 50 Vestas V90 3 MW wind turbines with a hub height of 80 m. The Project includes the addition of five V126 3.45 MW wind turbines (blades with serrated trailing edge) with a hub height of 117 m. The locations of the existing and proposed turbines are presented in Figure 2.1 and listed in Appendix A. Both the existing and proposed wind turbines were included in the modelling done for this NIA.

Octave data for both the existing and planned wind turbines, by wind speed, are presented in Tables 5.1 and 5.2. These data were obtained from the previous Noise Impact Assessment (TransAlta Wind 2009) conducted for the Kent Hills Wind Farm and manufacturer specifications (see Appendix B) for the new turbines (Vestas Wind Systems A/s 2017).

An octave is the interval between two frequencies having a ratio of two to one. For acoustic measurements, the octaves start a 1,000 Hz centre frequency and go up or down from that point, at the 2:1 ratio. From 1,000 Hz, the next filter's centre frequency is 2,000 Hz, the next is 4,000 Hz, or 500 Hz, 250 Hz, etc. Octave filtering is usually referred to as the class of octave filters typically 1, 3 or 12, thus creating full octaves, one-third octaves, or one-twelfth octaves. The division of sound into frequency bands is done in analysis because the different frequencies behave differently in the atmosphere, higher frequency sound being absorbed more readily than low frequency sound.

Table 5.1 Octave Band Analysis Data for the Vestas V90 Wind Turbines

Wind Speed (m/s)	Overall SPL (dBA)	Octave Band							
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
4	97.0	77.6	83.5	88.3	92.0	92.4	87.4	81.8	71.1
5	102.0	82.6	88.5	93.3	97.0	97.4	92.4	86.8	76.1
6	105.8	88.2	93.4	99.1	100.8	100.4	95.3	87.9	77.3
7	108.2	94.5	95.6	100.2	102.3	103.4	99.1	93.8	83.9
8	109.3	96.4	98.7	102.1	102.1	104.1	100.3	95.9	88.1
9	109.4	92.6	98.4	101.8	102.8	104.1	100.3	97.6	93.0
10	106.7	93.9	95.3	98.4	99.7	101.5	97.8	95.0	91.8
11	105.9	91.0	92.8	97.7	101.0	101.1	95.3	88.0	76.9

TransAlta Wind 2009

Table 5.2 Octave Band Analysis Data for the Vestas V126 Wind Turbines

Wind Speed (m/s)	Overall SPL (dBA)	Octave Band							
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
4	91.5	76.9	83.3	86.9	82.9	81.7	83.4	80.2	67.9
5	93.1	77.3	83.9	88.0	85.4	84.5	85.1	81.3	67.6
6	96.0	78.8	85.6	90.3	89.3	88.8	88.0	83.1	67.8
7	99.2	80.7	87.5	92.8	93.2	93.0	90.9	85.3	68.5
8	102.3	82.5	89.4	95.5	96.7	96.7	93.6	87.2	69.2
9	104.2	83.6	90.6	96.8	98.9	99.1	95.4	88.7	70.0
10	104.4	83.8	90.9	97.0	99.2	99.4	95.6	88.8	70.1
11	104.4	84.1	90.8	96.8	99.2	99.4	95.5	88.5	69.4

Vestas Wind Systems A/S 2017

As shown in the tables, the data on the overall sound power levels (SPL) for the new turbines range from 2 to 10 dBA lower than that of the existing turbines.

5.1.4 Receptors

The noise sensitive receptors include those locations (including recreational, residential, and institutional) that are located within 1 km of the nearest turbine. There are two noise sensitive receptors located within 1 km of the existing Kent Hills Wind Turbine Farm and the Project. These locations are listed in Table 5.3, along with distances to the nearest turbine, and presented on Figure 2.1. Receptors located beyond 1 km of the nearest turbine were not included as a discrete receptor in the model, as the predicted sound levels at these locations would be lower than those locations located closer to the turbines.

Table 5.3 Noise Sensitive Receptors

Receptor ID	UTM Coordinates, Zone 20		Distance to Nearest Turbine (m)	Nearest Turbine ID	Distance to New Turbine (m)	New Turbine ID
	Easting (m)	Northing (m)				
A	354,288	5,078,431	911	A3	3,070	T8
B	355,861	5,078,798	946	A5	4,100	T8

As shown geographically, the new turbines are much further away (3-4 km versus 1 km) from the noise sensitive areas than existing turbines. In addition to the discrete noise sensitive receptors identified above, the NIA includes a grid of receptors overlaid on the Project area. The grid allows for the spatial distribution of sound levels to be assessed. The receptor grid array consisted of a 15 km by 15 km (10 m) spacing.

The receptor height for both the discrete and gridded receptors was 1.5 m above the ground.

5.1.5 Modelling Scenarios

For this noise impact assessment, two scenario's were selected for modeling:

- the Project; and
- the existing Kent Hills Wind Turbine Farm plus the Project (cumulative).

As a conservative approach, all the proposed new V126 turbine locations were included in each model. This is conservative as only five new turbines will ultimately be installed. If there are no exceedances in this scenario, no further refinement of the models is needed and any of the nine locations (or all of them) could be used without exceeding the noise criteria.

5.2 RESULTS

The predicted sound pressure levels by wind speed at each noise sensitive receptor, for the Project only and for the cumulative operation of the existing Kent Hills Wind Turbine Farm and the Project, are presented in Tables 5.4 and 5.5. As stated above, these predictions assume that

there is a V126 turbine at each of the proposed nine sites, when in fact only 5 turbines will be installed. The modelled results do not include background noise contribution.

Table 5.4 Predicted Sound Pressure Levels (dBA) at the Regulated Wind Speeds for the Project Only

Noise Sensitive Receptor	Hub Height Wind Speed (m/s)[1]							
	4	5	6	7	8	9	10	11
	Maximum Predicted Sound Pressure Level (dBA)							
A	5.7	6.8	9.1	11.8	14.4	16.0	16.2	16.2
B	3.0	4.1	6.2	8.8	11.3	12.8	13.0	13.0
Recommended Limit (dBA)	40	40	40	43	45	49	51	53

[1] Wind speed refers to a reference height of 10 metres.

Table 5.5 Predicted Sound Pressure Levels (dBA) at the Regulated Wind Speeds for the Cumulative Operation of the Existing Kent Hills Wind Turbine Farm and the Project

Noise Sensitive Receptor	Hub Height Wind Speed (m/s)[1]							
	4	5	6	7	8	9	10	11
	Maximum Predicted Sound Pressure Level (dBA)							
A	25.7	30.7	34.9	37.7	39.1	38.3	36.3	35.4
B	24.3	29.3	33.4	36.2	37.6	36.8	34.8	33.9
Recommended Limit (dBA)	40	40	40	43	45	49	51	53

[1] Wind speed refers to a reference height of 10 metres.

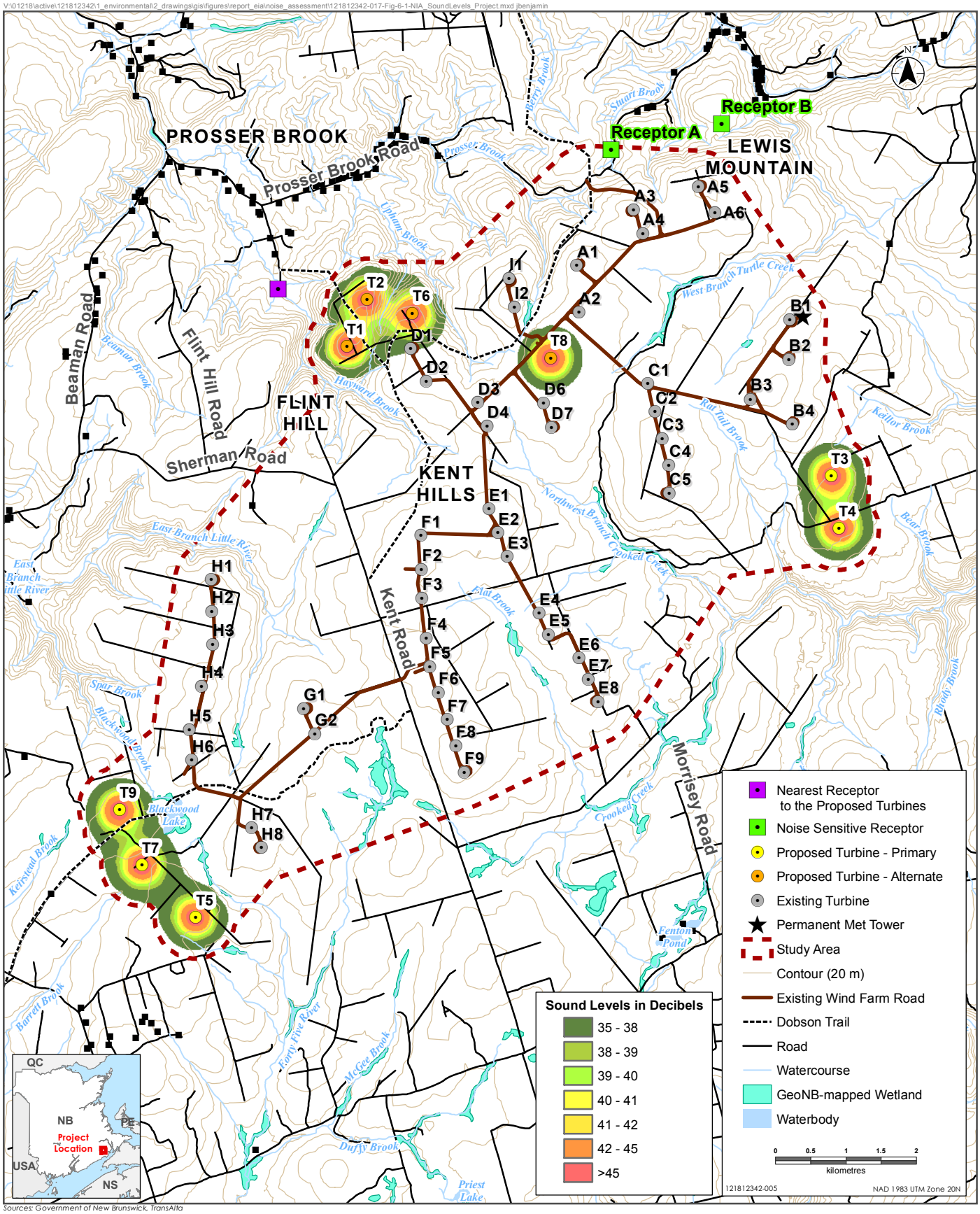
6.0 DISCUSSION

In each modelling scenario, all receptors are expected to receive sound exposures from either the proposed turbines only, or the combined effects of the proposed and existing Kent Hills project wind turbines that are in compliance with the recommended criteria from the Government of New Brunswick.

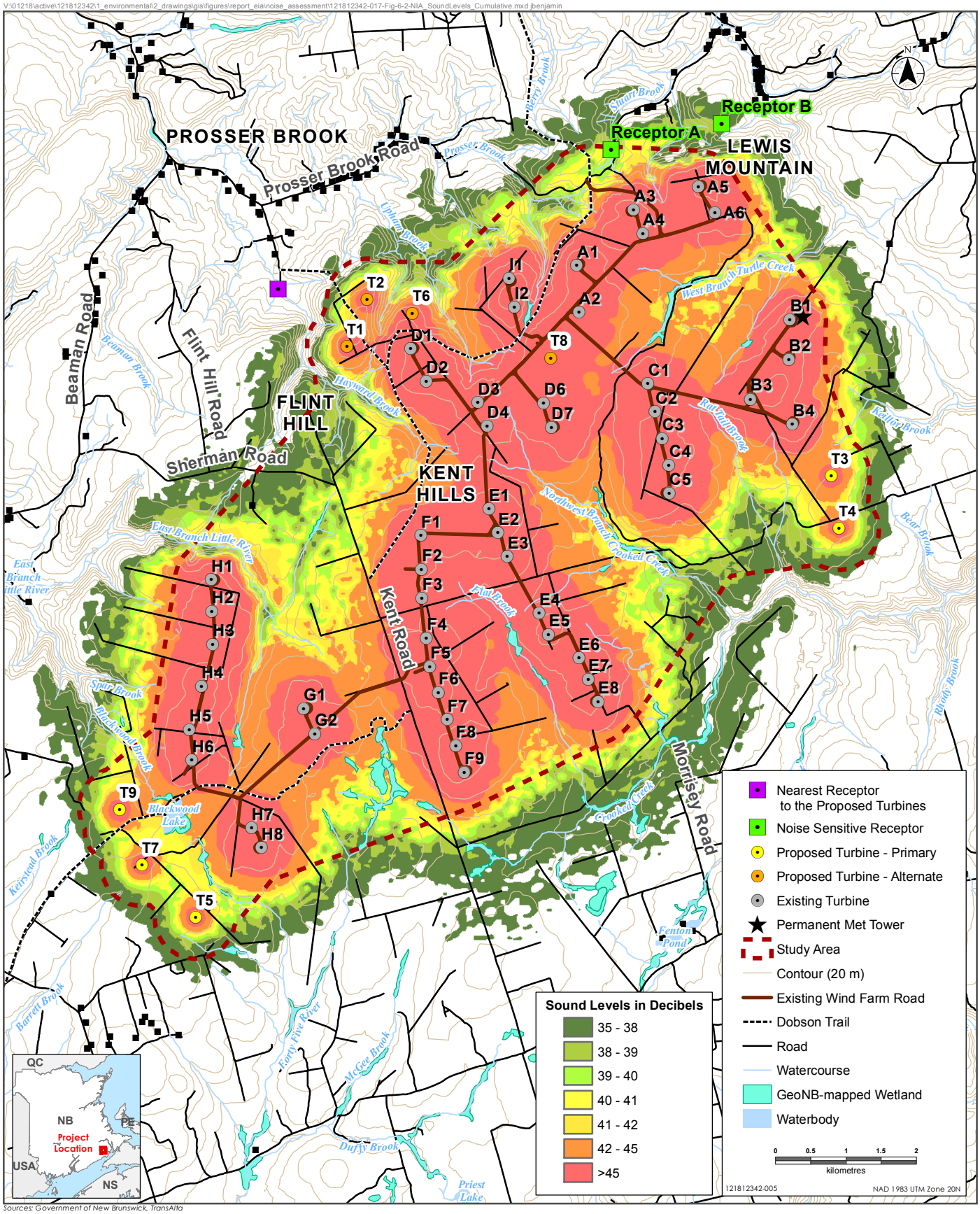
The analysis is considered to be conservative as V126 turbines are modelled at all nine potential locations in each modelling scenario, even though only five will actually be constructed, and because all receptors are assumed to be downwind from all sources at the same time.

Since the modelling was completed, the location of T3 changed slightly. As the change is only 160 m) and T3 is not located near any receptors (i.e. nearest receptor is located > 4 km way), we do not anticipate a change in the predicted noise levels at receptors A and B.

Figure 6.1 represents the noise contours for the Project only with windspeeds of 8 m/s. Figure 6.2 represents the noise contours for the cumulative operation of the Project and the existing Kent Hills Wind Turbine Farm with windspeeds of 8 m/s. The figures show that noise levels will be below the criteria (45 dBA) beyond approximately 200 meters of the new turbines, and within 500-600 meters from the existing turbines.



Kent Hills Wind Farm Expansion Sound Levels (Project Only) – Maximum Facility Sound Levels – 8 m/s Wind Speed



Kent Hills Wind Farm Expansion Sound Levels (Cumulative) – Maximum Facility Sound Levels – 8 m/s Wind Speed

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Figure 6.2

7.0 CLOSURE

This report has been prepared on behalf of TransAlta. The acoustic analysis highlighted in this report is based on information obtained from TransAlta. The assessment represents the conditions at the subject facility at the time of the assessment, and the conclusions are the best judgment of the assessor based on current environmental standards. Stantec Consulting Ltd. attests that to the best of our knowledge, the information presented in this report is accurate.

8.0 REFERENCES

8.1 LITERATURE CITED

Government of New Brunswick. No date. Additional Information Requirements for Wind Turbines, as accessed from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/SectorGuidelines/WindTurbines.pdf accessed on July 10, 2017

TransAlta Wind. 2007. Sound Impact Analysis for the Kent Hills Wind Farm Albert County, NB.

TransAlta Wind. 2009. Environmental Noise Impact Assessment, Kent Hills Wind Farm Expansion.

Vestas Wind Systems A/S. 2017. V126-3.45 MW High Torque (HTq) Third Octave Noise Emission.

8.2 PERSONAL COMMUNICATIONS

Macy, Chad. Project Environmental Lead, TransAlta Corporation. Calgary AB. June 20, 2017.

NOISE IMPACT ASSESSMENT OF KENT HILLS 3: KENT HILLS WIND FARM EXPANSION PHASE 3

September 21, 2017

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APPENDIX A
TURBINE LOCATIONS

NOISE IMPACT ASSESSMENT OF KENT HILLS 3: KENT HILLS WIND FARM EXPANSION PHASE 3

September 21, 2017

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Turbine ID	Turbine Type	UTM Coordinates	
		Easting (m)	Northing (m)
T1	Vestas126	350,539	5,075,645
T2	Vestas126	350,826	5,076,312
T6	Vestas126	351,471	5,076,116
T8	Vestas126	353,428	5,075,481
T3	Vestas126	357,414	5,073,807
T4	Vestas126	357,522	5,073,063
T9	Vestas126	347,312	5,069,069
T7	Vestas126	347,631	5,068,288
T5	Vestas126	348,394	5,067,542
H1	Vestas90	348,613	5,072,334
H2	Vestas90	348,621	5,071,883
H3	Vestas90	348,632	5,071,416
H4	Vestas90	348,476	5,070,820
H5	Vestas90	348,302	5,070,207
H6	Vestas90	348,338	5,069,775
H7	Vestas90	349,186	5,068,817
H8	Vestas90	349,327	5,068,535
G1	Vestas90	349,924	5,070,504
G2	Vestas90	350,082	5,070,148
F1	Vestas90	351,587	5,072,964
F2	Vestas90	351,597	5,072,481
F3	Vestas90	351,604	5,072,075
F4	Vestas90	351,667	5,071,505
F5	Vestas90	351,718	5,071,104
F6	Vestas90	351,835	5,070,736
F7	Vestas90	351,963	5,070,352
F8	Vestas90	352,082	5,069,980
F9	Vestas90	352,203	5,069,605
D1	Vestas90	351,445	5,075,614
D2	Vestas90	351,665	5,075,146
D3	Vestas90	352,399	5,074,852
D4	Vestas90	352,529	5,074,516
E1	Vestas90	352,553	5,073,338
E2	Vestas90	352,684	5,073,003
E3	Vestas90	352,815	5,072,666
E4	Vestas90	353,268	5,071,858
E5	Vestas90	353,401	5,071,556
E6	Vestas90	353,829	5,071,221
E7	Vestas90	353,965	5,070,926
E8	Vestas90	354,104	5,070,602
D6	Vestas90	353,331	5,074,840
D7	Vestas90	353,442	5,074,492
I1	Vestas90	352,841	5,076,608
I2	Vestas90	352,914	5,076,204
A2	Vestas90	353,831	5,076,128

Turbine ID	Turbine Type	UTM Coordinates	
		Easting (m)	Northing (m)
A1	Vestas90	353,803	5,076,793
A3	Vestas90	354,609	5,077,579
A4	Vestas90	354,739	5,077,243
A5	Vestas90	355,527	5,077,913
A6	Vestas90	355,761	5,077,546
B1	Vestas90	356,826	5,076,024
B2	Vestas90	356,808	5,075,459
B3	Vestas90	356,262	5,074,897
B4	Vestas90	356,862	5,074,536
C1	Vestas90	354,812	5,075,116
C2	Vestas90	354,913	5,074,715
C3	Vestas90	355,011	5,074,337
C4	Vestas90	355,109	5,073,960
C5	Vestas90	355,112	5,073,561

APPENDIX B
TURBINE SPECIFICATIONS

NOISE IMPACT ASSESSMENT OF KENT HILLS 3: KENT HILLS WIND FARM EXPANSION PHASE 3

September 21, 2017

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DMS 0055-1399_V01

V126-3.45 MW High Torque (HTq)
Third octave
noise emission

Original Instruction: T05 0055-1399 VER 01

T05 0055-1399 Ver 01 - Approved - Exported from DMS: 2017-06-14 by KETAG

Abstract

This document serves as a paper behind the General Specification.

The document describes the measured/estimated third octave spectra for noise levels according to the General Specification.

The document is a living document and will be updated regularly.

When new measurements exist the document might be updated.

Contents

1. Introduction

The purpose of this document is to present the expected third octave noise spectra for the V126-3.45 MW high torque (HTq) turbine.

All presented octave values are based on internal measurement results obtained on a V126-3.3 MW turbine located at the Østerild test centre in Denmark.

2. Method

2.1 Procedure

During measurements, a very large number of correlated values for noise emission spectra and turbine operating parameters are identified.

From these a relation between noise emission within each 1/3 octave band, wind speed and operational conditions are extracted. By combination of these extracted values and the actual turbine operation and rotor size, an estimate of the actual 1/3 octave performance is obtained.

In order to secure that measurement system limitations are not influencing the findings, the frequency content are limited to the frequency range 6.3 Hz to 10 kHz. The stated spectral values are thus representative for the expected noise emission from the turbine at each wind speed.

The method is verified as giving results corresponding to direct measured values.

The reported wind speed range cover hub height wind speeds from 3 to 20 m/s. Extrapolations outside this wind speed range is not possible due to limitations in the measured input data.

The stated values are expected to be representing an upper 95% confidence limit for the turbine performance, but do not in any way enable issuing guarantees on the values.

2.2 Physical environment

The results are valid for the downwind reference position as defined according to IEC 61400-11 Ed.3.

Applicable environmental conditions are thus corresponding to the standardized requirements as described directly and indirectly in IEC 61400-11.

These can be interpreted as air density 1.225 kg/m^3, yaw errors below +/- 15 deg. and vertical inflow angles below +/- 10 deg. Blade condition is clean and undamaged.

3. Results

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	13.3	11.7	12.7	16.3	19.8	23.3	25.0	25.5	26.6	27.9	28.8	29.5	30.0	30.5	30.9	31.2	31.6	31.8
8 Hz	20.2	18.7	19.7	23.3	26.8	30.3	31.9	32.4	33.5	34.7	35.6	36.3	36.7	37.2	37.6	37.9	38.3	38.5
10 Hz	26.3	25.0	26.2	29.7	33.3	36.7	38.4	38.9	39.8	40.9	41.6	42.1	42.5	42.9	43.2	43.5	43.8	44.0
12.5 Hz	34.1	32.9	34.0	37.6	41.1	44.6	46.3	46.7	47.7	48.7	49.5	50.0	50.4	50.8	51.2	51.4	51.7	51.9
16 Hz	41.6	40.0	41.0	44.6	48.2	51.7	53.3	53.8	55.0	56.3	57.3	58.0	58.5	58.9	59.4	59.7	60.1	60.3
20 Hz	47.3	46.9	48.5	52.1	55.6	59.0	61.0	61.3	61.7	62.2	62.5	62.7	62.9	63.0	63.1	63.2	63.3	63.3
25 Hz	51.8	51.5	53.4	57.0	60.6	64.1	66.1	66.4	66.7	67.1	67.3	67.5	67.6	67.6	67.8	67.8	67.9	67.9
31.5 Hz	54.2	53.0	54.2	57.8	61.4	64.8	66.6	67.0	68.0	69.0	69.8	70.3	70.7	71.1	71.4	71.6	71.9	72.1
40 Hz	56.9	55.9	57.4	61.0	64.6	68.1	69.9	70.4	71.1	71.9	72.5	72.9	73.2	73.5	73.8	73.9	74.2	74.3
50 Hz	61.4	60.6	62.1	65.7	69.3	72.8	74.6	75.0	75.7	76.5	77.0	77.4	77.7	77.9	78.2	78.3	78.5	78.7
63 Hz	64.9	64.6	66.4	70.0	73.6	77.0	78.9	79.3	79.6	80.0	80.3	80.4	80.6	80.7	80.8	80.8	80.9	80.9
80 Hz	68.5	67.7	69.1	72.7	76.3	79.7	81.5	81.9	82.6	83.4	83.9	84.3	84.5	84.8	85.0	85.1	85.4	85.5
100 Hz	71.1	70.1	71.4	75.1	78.7	82.2	84.0	84.4	85.2	86.2	86.8	87.3	87.7	88.0	88.3	88.5	88.7	88.9
125 Hz	73.3	73.6	75.9	79.5	83.2	86.7	88.9	89.2	89.1	89.0	88.9	88.9	88.8	88.7	88.7	88.5	88.5	88.4
160 Hz	74.4	74.3	76.3	79.9	83.5	86.9	88.9	89.3	89.4	89.6	89.7	89.8	89.8	89.8	89.8	89.8	89.8	89.8
200 Hz	75.9	76.2	78.3	81.8	85.4	88.8	90.9	91.2	91.2	91.2	91.2	91.1	91.0	91.0	91.0	90.9	90.9	90.8
250 Hz	78.5	79.0	81.3	84.8	88.4	91.8	93.9	94.2	94.0	93.8	93.6	93.5	93.3	93.1	93.1	92.9	92.8	92.7
315 Hz	79.5	79.9	82.1	85.6	89.3	92.6	94.7	95.0	94.9	94.7	94.6	94.5	94.3	94.2	94.2	94.0	94.0	93.9
400 Hz	79.4	79.9	82.2	85.7	89.4	92.7	94.9	95.1	94.9	94.7	94.6	94.4	94.3	94.1	94.1	93.9	93.8	93.7
500 Hz	81.4	82.4	84.9	88.5	92.1	95.5	97.8	98.0	97.5	96.9	96.5	96.2	95.9	95.6	95.4	95.1	95.0	94.8
630 Hz	82.3	83.3	85.9	89.4	93.1	96.4	98.7	98.9	98.4	97.8	97.4	97.0	96.7	96.4	96.2	95.9	95.8	95.6
800 Hz	82.5	83.1	85.5	89.0	92.7	96.1	98.3	98.6	98.3	98.0	97.8	97.6	97.4	97.3	97.2	97.0	96.9	96.8
1 kHz	83.0	82.9	84.8	88.4	92.0	95.5	97.5	97.8	98.0	98.3	98.4	98.5	98.6	98.6	98.7	98.6	98.7	98.7
1.25 kHz	82.2	82.0	83.9	87.5	91.1	94.6	96.6	96.9	97.2	97.5	97.7	97.8	97.9	97.9	98.0	98.0	98.1	98.1
1.6 kHz	80.9	80.0	81.5	85.2	88.8	92.3	94.1	94.5	95.2	96.0	96.5	96.9	97.1	97.4	97.6	97.8	98.0	98.1
2 kHz	79.5	78.6	80.1	83.8	87.4	90.9	92.8	93.2	93.9	94.7	95.2	95.6	95.9	96.1	96.4	96.5	96.7	96.9
2.5 kHz	78.2	77.4	78.9	82.5	86.2	89.7	91.5	92.0	92.6	93.4	94.0	94.3	94.6	94.9	95.1	95.3	95.5	95.6
3.15 kHz	76.8	76.6	78.5	82.1	85.7	89.1	91.1	91.5	91.7	91.9	92.1	92.2	92.3	92.3	92.4	92.3	92.4	92.4
4 kHz	77.1	77.4	79.5	83.0	86.6	89.9	92.0	92.3	92.2	92.2	92.1	92.1	92.0	91.9	91.8	91.7	91.7	91.6
5 kHz	72.6	73.1	75.3	78.8	82.4	85.7	87.9	88.1	88.0	87.8	87.7	87.6	87.4	87.3	87.2	87.1	87.1	86.9
6.3 kHz	64.9	64.9	67.0	70.7	74.4	77.9	80.0	80.3	80.4	80.5	80.6	80.6	80.6	80.6	80.7	80.6	80.6	80.6
8 kHz	56.7	55.9	57.5	61.2	64.9	68.4	70.3	70.7	71.4	72.1	72.6	73.0	73.3	73.5	73.7	73.9	74.1	74.2
10 kHz	51.8	50.1	51.1	54.8	58.4	62.0	63.6	64.1	65.4	66.8	67.8	68.5	69.1	69.6	70.1	70.4	70.8	71.1
A-wgt	92.1	92.3	94.4	98.0	101.6	105.0	107.1	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4	107.4

Table 1: V126-3.45 MW, expected 1/3 octave band performance, Mode 0-0S & Mode 0-0S (HWO) (Blades without serrated trailing edge)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	19.5	17.6	17.2	19.2	21.2	23.3	24.0	24.4	25.8	27.3	28.4	29.2	29.8	30.5	31.0	31.5	31.9	32.3
8 Hz	25.3	23.6	23.6	25.7	27.9	30.1	31.0	31.4	32.6	33.9	34.9	35.7	36.2	36.7	37.2	37.6	38.0	38.4
10 Hz	30.0	28.9	29.4	31.7	34.1	36.5	37.6	38.0	38.7	39.7	40.3	40.9	41.2	41.6	42.0	42.3	42.5	42.7
12.5 Hz	38.0	36.8	37.2	39.4	41.7	43.9	45.0	45.3	46.1	47.1	47.7	48.3	48.6	49.0	49.4	49.7	49.9	50.1
16 Hz	49.5	48.2	47.4	48.5	49.8	51.2	51.7	52.0	52.9	54.0	54.8	55.5	55.9	56.4	56.8	57.1	57.4	57.7
20 Hz	47.3	46.9	48.8	52.3	55.8	58.9	60.8	61.1	61.4	61.8	62.1	62.3	62.4	62.6	62.8	62.9	63.0	63.1
25 Hz	47.0	46.1	48.6	53.3	57.8	61.9	64.2	64.6	65.3	66.0	66.6	67.1	67.3	67.7	68.0	68.2	68.4	68.6
31.5 Hz	59.6	58.6	58.9	60.8	62.9	64.9	65.9	66.2	66.9	67.8	68.3	68.9	69.1	69.5	69.8	70.1	70.3	70.5
40 Hz	61.9	61.1	61.9	64.3	66.8	69.2	70.5	70.8	71.3	72.0	72.5	72.9	73.1	73.4	73.7	73.9	74.1	74.2
50 Hz	66.1	65.4	66.2	68.6	71.1	73.4	74.7	75.0	75.5	76.1	76.5	76.9	77.1	77.3	77.6	77.7	77.9	78.0
63 Hz	68.9	68.6	69.7	72.1	74.6	77.0	78.4	78.6	78.9	79.1	79.4	79.6	79.6	79.8	80.0	80.0	80.1	80.2
80 Hz	76.1	75.8	76.0	77.2	78.8	80.3	81.2	81.4	81.6	81.9	82.1	82.3	82.4	82.6	82.7	82.8	82.9	82.9
100 Hz	76.7	76.6	77.1	78.8	80.7	82.4	83.6	83.8	83.9	84.0	84.2	84.4	84.4	84.5	84.6	84.6	84.7	84.7
125 Hz	74.6	74.6	76.2	78.9	81.7	84.3	85.9	86.2	86.2	86.2	86.3	86.3	86.3	86.3	86.4	86.4	86.4	86.4
160 Hz	81.3	81.5	81.9	83.2	84.8	86.3	87.3	87.5	87.4	87.4	87.4	87.5	87.4	87.5	87.5	87.5	87.5	87.5
200 Hz	83.5	83.7	84.3	85.6	87.3	88.8	89.9	90.1	89.9	89.8	89.8	89.8	89.7	89.7	89.7	89.7	89.6	89.6
250 Hz	81.0	81.5	82.9	85.3	87.8	90.1	91.7	91.8	91.6	91.4	91.2	91.2	91.0	90.9	90.9	90.8	90.7	90.7
315 Hz	80.1	80.4	82.4	85.6	88.9	91.8	93.7	93.9	93.8	93.7	93.7	93.7	93.6	93.6	93.6	93.6	93.6	93.5
400 Hz	78.8	78.9	81.1	84.7	88.2	91.4	93.5	93.7	93.7	93.8	93.8	93.9	93.8	93.9	94.0	94.0	94.0	94.0
500 Hz	78.0	78.2	80.7	84.6	88.5	91.9	94.1	94.4	94.4	94.4	94.4	94.5	94.4	94.4	94.5	94.5	94.5	94.5
630 Hz	76.8	77.0	79.9	84.3	88.5	92.3	94.7	95.0	95.0	95.0	95.0	95.1	95.0	95.0	95.1	95.1	95.1	95.1
800 Hz	76.2	76.4	79.3	83.7	88.0	91.8	94.2	94.5	94.4	94.5	94.5	94.5	94.5	94.5	94.6	94.6	94.6	94.6
1 kHz	76.8	76.9	79.8	84.2	88.5	92.3	94.7	95.0	95.0	95.0	95.1	95.1	95.1	95.1	95.2	95.2	95.2	95.2
1.25 kHz	77.3	77.3	80.0	84.1	88.2	91.8	94.1	94.4	94.4	94.4	94.5	94.6	94.5	94.6	94.6	94.6	94.6	94.7
1.6 kHz	79.6	79.6	81.2	84.1	87.1	89.8	91.5	91.7	91.8	91.9	92.0	92.1	92.1	92.2	92.3	92.3	92.3	92.3
2 kHz	77.2	77.6	79.7	82.8	86.0	88.9	90.8	91.0	90.8	90.6	90.5	90.5	90.3	90.3	90.3	90.2	90.2	90.1
2.5 kHz	77.8	78.3	80.0	82.5	85.2	87.6	89.3	89.4	89.1	88.8	88.5	88.4	88.2	88.1	88.1	88.0	87.9	87.8
3.15 kHz	76.2	77.0	78.4	80.4	82.7	84.7	86.3	86.4	86.0	85.6	85.3	85.1	84.9	84.7	84.7	84.5	84.4	84.3
4 kHz	76.0	76.1	77.0	78.8	80.9	82.9	84.1	84.3	84.3	84.4	84.4	84.5	84.5	84.5	84.6	84.6	84.6	84.6
5 kHz	69.9	71.1	72.1	73.2	74.7	76.0	77.2	77.3	76.5	75.7	75.1	74.8	74.3	74.0	73.9	73.6	73.3	73.1
6.3 kHz	64.0	65.5	66.1	66.6	67.6	68.4	69.4	69.4	68.5	67.5	66.8	66.4	65.9	65.5	65.3	64.9	64.6	64.4
8 kHz	61.9	61.7	60.4	59.9	59.9	60.0	60.1	60.3	60.5	60.7	60.9	61.2	61.2	61.3	61.5	61.6	61.6	61.7
10 kHz	61.4	60.1	57.7	56.5	56.0	55.8	55.4	55.6	56.5	57.5	58.3	58.9	59.3	59.8	60.2	60.5	60.8	61.0
A-wgt	91.3	91.5	93.1	96.0	99.2	102.2	104.2	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4	104.4

Table 2: V126-3.45 MW, expected 1/3 octave band performance, Mode 0 & Mode 0 (HWO) (Blades with serrated trailing edge)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	19.7	17.7	17.5	19.5	21.9	23.5	24.1	24.1	25.2	26.5	27.5	28.2	28.9	29.4	29.9	30.3	30.7	31.1
8 Hz	25.5	23.7	23.8	26.0	28.5	30.3	30.9	30.9	31.9	33.1	33.9	34.6	35.2	35.6	36.1	36.4	36.8	37.1
10 Hz	30.2	29.0	29.6	32.1	34.7	36.6	37.2	37.2	38.0	38.7	39.3	39.8	40.2	40.5	40.8	41.0	41.3	41.5
12.5 Hz	38.2	36.9	37.4	39.7	42.3	44.1	44.7	44.7	45.4	46.2	46.7	47.2	47.6	47.9	48.2	48.4	48.7	48.9
16 Hz	49.7	48.3	47.7	48.8	50.4	51.4	51.9	51.9	52.6	53.5	54.1	54.7	55.2	55.4	55.7	56.0	56.3	56.6
20 Hz	47.5	47.0	49.0	52.6	56.3	58.9	59.7	59.7	60.1	60.4	60.7	60.9	61.1	61.2	61.4	61.5	61.6	61.7
25 Hz	47.2	46.2	48.8	53.7	58.4	61.8	62.8	62.9	63.6	64.3	64.9	65.4	65.8	66.1	66.4	66.6	66.9	67.1
31.5 Hz	59.8	58.7	59.1	61.1	63.5	65.1	65.7	65.7	66.3	66.9	67.4	67.8	68.2	68.4	68.7	68.8	69.1	69.3
40 Hz	62.1	61.2	62.1	64.6	67.3	69.3	69.9	69.9	70.5	71.0	71.4	71.8	72.1	72.2	72.5	72.6	72.8	73.0
50 Hz	66.3	65.5	66.4	68.9	71.6	73.6	74.1	74.1	74.6	75.1	75.5	75.7	76.0	76.1	76.3	76.4	76.6	76.8
63 Hz	69.1	68.7	69.9	72.4	75.1	77.1	77.7	77.6	78.0	78.2	78.3	78.4	78.6	78.6	78.7	78.7	78.8	78.9
80 Hz	76.3	75.9	76.2	77.5	79.3	80.5	80.9	80.8	81.1	81.3	81.3	81.5	81.6	81.5	81.6	81.6	81.7	81.7
100 Hz	76.9	76.7	77.4	79.1	81.2	82.6	83.1	83.0	83.2	83.3	83.3	83.4	83.4	83.4	83.4	83.4	83.4	83.5
125 Hz	74.8	74.7	76.4	79.2	82.2	84.4	85.0	84.9	85.1	85.1	85.1	85.1	85.1	85.1	85.1	85.1	85.1	85.1
160 Hz	81.5	81.6	82.1	83.5	85.3	86.5	86.9	86.8	86.9	86.8	86.7	86.6	86.6	86.4	86.4	86.3	86.3	86.3
200 Hz	83.7	83.8	84.5	85.9	87.8	89.0	89.4	89.3	89.4	89.2	89.0	88.9	88.8	88.6	88.6	88.4	88.4	88.4
250 Hz	81.2	81.6	83.1	85.6	88.3	90.2	90.8	90.7	90.6	90.4	90.1	90.0	89.9	89.7	89.7	89.5	89.4	89.4
315 Hz	80.3	80.5	82.6	85.9	89.3	91.8	92.5	92.5	92.6	92.5	92.4	92.4	92.3	92.2	92.3	92.2	92.2	92.2
400 Hz	79.0	79.0	81.3	85.0	88.7	91.4	92.2	92.1	92.3	92.4	92.4	92.5	92.5	92.5	92.6	92.5	92.5	92.6
500 Hz	78.2	78.3	80.9	84.9	88.9	91.9	92.7	92.7	92.9	92.9	92.9	93.0	93.0	92.9	93.0	93.0	93.0	93.1
630 Hz	77.0	77.1	80.1	84.6	89.0	92.2	93.1	93.1	93.3	93.4	93.4	93.5	93.5	93.5	93.6	93.5	93.5	93.6
800 Hz	76.4	76.5	79.5	84.0	88.4	91.7	92.6	92.5	92.8	92.8	92.9	92.9	93.0	93.0	93.1	93.0	93.0	93.1
1 kHz	77.0	77.0	80.0	84.5	88.9	92.2	93.1	93.1	93.3	93.4	93.5	93.5	93.6	93.6	93.7	93.6	93.7	93.8
1.25 kHz	77.5	77.4	80.2	84.4	88.6	91.7	92.6	92.5	92.8	92.9	92.9	93.0	93.0	93.0	93.2	93.1	93.2	93.2
1.6 kHz	79.8	79.7	81.4	84.4	87.6	89.8	90.5	90.4	90.7	90.7	90.8	90.8	90.9	90.9	90.9	90.9	90.9	91.0
2 kHz	77.4	77.7	79.9	83.1	86.5	88.9	89.6	89.5	89.6	89.4	89.2	89.2	89.1	88.9	88.9	88.8	88.8	88.8
2.5 kHz	78.0	78.4	80.2	82.8	85.6	87.7	88.2	88.1	88.1	87.7	87.4	87.3	87.1	86.9	86.8	86.6	86.5	86.5
3.15 kHz	76.4	77.1	78.5	80.7	83.1	84.9	85.4	85.2	85.1	84.6	84.3	84.0	83.8	83.5	83.4	83.2	83.1	83.0
4 kHz	76.2	76.2	77.2	79.1	81.4	83.0	83.5	83.4	83.6	83.5	83.5	83.5	83.5	83.4	83.4	83.3	83.4	83.4
5 kHz	70.1	71.2	72.2	73.4	75.1	76.2	76.5	76.3	75.9	75.0	74.3	73.9	73.4	73.0	72.7	72.3	72.1	71.9
6.3 kHz	64.2	65.6	66.3	66.8	67.9	68.7	68.9	68.7	68.1	67.1	66.2	65.6	65.1	64.5	64.2	63.8	63.5	63.2
8 kHz	62.1	61.8	60.7	60.2	60.4	60.5	60.6	60.5	60.6	60.7	60.6	60.7	60.7	60.6	60.6	60.6	60.6	60.6
10 kHz	61.6	60.2	57.9	56.9	56.6	56.3	56.4	56.3	57.0	57.7	58.1	58.6	59.0	59.2	59.4	59.6	59.9	60.0
A-wgt	91.5	91.6	93.3	96.3	99.6	102.2	102.9	102.9	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0

Table 3: V126-3.45 MW, expected 1/3 octave band performance, Sound Optimized Mode SO1 & Mode SO1 (HWO) (Blades with serrated trailing edge)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	19.7	17.7	17.5	19.6	21.4	21.9	22.3	23.0	24.1	25.4	26.4	27.2	27.9	28.5	29.1	29.6	30.1	30.5
8 Hz	25.5	23.7	23.8	26.1	28.1	28.6	29.0	29.6	30.6	31.8	32.7	33.4	34.0	34.6	35.1	35.5	36.0	36.4
10 Hz	30.2	29.0	29.6	32.1	34.3	34.9	35.3	35.7	36.3	37.1	37.8	38.3	38.7	39.1	39.5	39.8	40.1	40.3
12.5 Hz	38.2	36.9	37.4	39.8	41.8	42.4	42.8	43.2	43.9	44.7	45.3	45.8	46.3	46.6	47.0	47.3	47.6	47.9
16 Hz	49.7	48.3	47.7	48.9	50.1	50.4	50.7	51.1	51.9	52.8	53.6	54.2	54.7	55.2	55.6	56.0	56.3	56.6
20 Hz	47.5	47.0	49.0	52.7	55.8	56.7	57.1	57.3	57.6	57.9	58.2	58.4	58.6	58.7	58.9	59.0	59.2	59.3
25 Hz	47.2	46.2	48.8	53.7	57.8	58.9	59.4	59.9	60.5	61.1	61.7	62.1	62.4	62.7	63.1	63.3	63.5	63.7
31.5 Hz	59.8	58.7	59.1	61.2	63.1	63.6	63.9	64.3	64.9	65.6	66.1	66.6	67.0	67.3	67.6	67.9	68.2	68.4
40 Hz	62.1	61.2	62.1	64.7	66.9	67.6	67.9	68.2	68.7	69.3	69.8	70.1	70.5	70.7	71.0	71.2	71.4	71.6
50 Hz	66.3	65.5	66.4	69.0	71.2	71.9	72.2	72.5	72.8	73.4	73.8	74.1	74.4	74.6	74.9	75.0	75.2	75.4
63 Hz	69.1	68.7	69.9	72.5	74.7	75.5	75.7	75.9	76.0	76.3	76.5	76.7	76.8	76.9	77.1	77.2	77.3	77.3
80 Hz	76.3	75.9	76.2	77.6	79.0	79.5	79.6	79.7	79.9	80.1	80.4	80.6	80.7	80.8	81.0	81.1	81.2	81.2
100 Hz	76.9	76.7	77.4	79.2	80.8	81.4	81.6	81.7	81.7	81.9	82.1	82.2	82.3	82.3	82.4	82.5	82.5	82.6
125 Hz	74.8	74.7	76.4	79.3	81.8	82.6	82.8	82.9	82.9	82.9	83.0	83.1	83.1	83.1	83.2	83.2	83.2	83.2
160 Hz	81.5	81.6	82.1	83.6	85.0	85.5	85.6	85.6	85.5	85.5	85.6	85.6	85.6	85.6	85.6	85.6	85.6	85.6
200 Hz	83.7	83.8	84.5	86.0	87.5	88.0	88.1	88.1	87.9	87.8	87.8	87.8	87.8	87.7	87.7	87.7	87.6	87.6
250 Hz	81.2	81.6	83.1	85.7	87.9	88.7	88.8	88.8	88.5	88.4	88.2	88.1	88.1	87.9	87.9	87.8	87.7	87.6
315 Hz	80.3	80.5	82.6	86.0	88.9	89.8	90.1	90.1	90.0	90.0	89.9	89.9	89.9	89.8	89.8	89.8	89.8	89.7
400 Hz	79.0	79.0	81.3	85.0	88.2	89.2	89.5	89.6	89.6	89.7	89.8	89.8	89.8	89.8	89.9	89.9	89.9	89.9
500 Hz	78.2	78.3	80.9	85.0	88.4	89.5	89.8	89.9	89.9	89.9	90.0	90.0	90.0	90.0	90.0	90.0	90.0	90.0
630 Hz	77.0	77.1	80.1	84.6	88.4	89.6	90.0	90.1	90.1	90.1	90.2	90.2	90.2	90.1	90.2	90.2	90.2	90.2
800 Hz	76.4	76.5	79.5	84.0	87.9	89.0	89.4	89.5	89.6	89.6	89.6	89.6	89.6	89.6	89.7	89.7	89.7	89.6
1 kHz	77.0	77.0	80.0	84.5	88.4	89.5	89.9	90.0	90.1	90.1	90.2	90.2	90.3	90.2	90.3	90.3	90.3	90.3
1.25 kHz	77.5	77.4	80.2	84.5	88.1	89.2	89.5	89.7	89.7	89.8	89.9	89.9	89.9	89.9	90.0	90.0	90.0	90.0
1.6 kHz	79.8	79.7	81.4	84.5	87.1	88.0	88.2	88.3	88.4	88.5	88.6	88.7	88.8	88.7	88.9	88.9	88.9	88.9
2 kHz	77.4	77.7	79.9	83.2	86.0	87.0	87.2	87.2	87.0	86.9	86.8	86.7	86.7	86.5	86.5	86.5	86.4	86.4
2.5 kHz	78.0	78.4	80.2	82.9	85.2	86.1	86.2	86.1	85.8	85.6	85.4	85.2	85.1	84.9	84.9	84.8	84.7	84.5
3.15 kHz	76.4	77.1	78.5	80.8	82.8	83.5	83.7	83.5	83.1	82.7	82.5	82.3	82.2	81.9	81.8	81.7	81.6	81.4
4 kHz	76.2	76.2	77.2	79.2	81.1	81.7	81.9	81.9	81.9	81.9	82.0	82.1	82.1	82.1	82.2	82.2	82.2	82.2
5 kHz	70.1	71.2	72.2	73.5	74.8	75.4	75.4	75.0	74.3	73.6	73.2	72.8	72.4	72.0	71.8	71.5	71.2	71.0
6.3 kHz	64.2	65.6	66.3	66.9	67.8	68.3	68.2	67.6	66.8	66.0	65.4	64.9	64.5	64.0	63.7	63.4	63.1	62.8
8 kHz	62.1	61.8	60.7	60.3	60.3	60.4	60.4	60.4	60.5	60.7	60.9	61.1	61.3	61.3	61.5	61.6	61.6	61.7
10 kHz	61.6	60.2	57.9	57.0	56.5	56.4	56.5	56.8	57.4	58.3	59.1	59.7	60.2	60.6	61.0	61.4	61.7	62.0
A-wgt	91.5	91.6	93.3	96.3	99.2	100.1	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4	100.4

Table 4: V126-3.45 MW, expected 1/3 octave band performance, Sound Optimized Mode SO2 & Mode 2 (HWO) (Blades with serrated trailing edge)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	19.5	17.6	16.6	16.7	17.4	18.7	19.9	20.7	21.8	23.0	24.1	25.1	25.9	26.8	27.4	28.1	28.7	29.1
8 Hz	25.4	23.7	23.0	23.3	24.1	25.4	26.5	27.3	28.3	29.4	30.3	31.2	32.0	32.8	33.3	33.9	34.4	34.8
10 Hz	30.1	29.0	28.9	29.6	30.4	31.6	32.7	33.3	33.9	34.7	35.3	36.0	36.5	37.1	37.4	37.8	38.1	38.4
12.5 Hz	37.9	36.8	36.7	37.3	38.0	39.2	40.2	40.8	41.4	42.2	42.8	43.5	44.0	44.6	44.9	45.4	45.7	46.0
16 Hz	48.8	47.5	46.3	46.2	46.5	47.4	48.2	48.7	49.5	50.4	51.1	51.9	52.5	53.2	53.6	54.1	54.5	54.8
20 Hz	48.0	47.6	49.0	50.7	51.7	53.2	54.3	54.8	55.1	55.4	55.7	55.9	56.2	56.4	56.5	56.8	56.9	57.0
25 Hz	48.5	47.6	49.4	51.5	53.1	55.1	56.7	57.5	58.1	58.8	59.3	59.8	60.2	60.7	61.0	61.4	61.6	61.8
31.5 Hz	59.4	58.4	58.2	58.7	59.4	60.4	61.3	61.9	62.4	63.1	63.6	64.2	64.7	65.2	65.5	65.9	66.1	66.4
40 Hz	61.9	61.2	61.5	62.4	63.1	64.3	65.3	65.8	66.2	66.8	67.2	67.7	68.1	68.5	68.8	69.1	69.3	69.5
50 Hz	66.1	65.4	65.8	66.7	67.5	68.6	69.5	70.0	70.3	70.9	71.2	71.7	72.0	72.4	72.6	72.9	73.1	73.2
63 Hz	68.8	68.6	69.3	70.4	71.1	72.2	73.0	73.3	73.5	73.7	73.9	74.1	74.3	74.5	74.6	74.8	74.9	74.9
80 Hz	75.3	75.1	74.9	75.4	75.8	76.4	77.0	77.1	77.3	77.5	77.7	77.9	78.1	78.4	78.4	78.6	78.7	78.8
100 Hz	76.1	76.0	76.3	77.1	77.6	78.3	78.9	79.0	79.1	79.3	79.3	79.5	79.6	79.8	79.8	80.0	80.0	80.0
125 Hz	74.6	74.7	75.9	77.4	78.2	79.2	80.0	80.3	80.3	80.3	80.3	80.4	80.5	80.6	80.5	80.6	80.6	80.6
160 Hz	80.5	80.6	80.9	81.6	81.9	82.5	82.9	82.9	82.8	82.9	82.8	82.9	82.9	83.0	82.9	82.9	82.9	82.9
200 Hz	82.7	82.9	83.3	84.1	84.4	85.0	85.4	85.4	85.2	85.2	85.0	85.0	85.0	85.0	84.9	85.0	84.9	84.8
250 Hz	80.8	81.2	82.5	83.9	84.6	85.4	86.0	86.1	85.8	85.7	85.5	85.4	85.2	85.2	85.0	85.0	84.9	84.8
315 Hz	80.5	80.7	82.4	84.3	85.2	86.3	87.2	87.5	87.4	87.4	87.3	87.2	87.2	87.2	87.1	87.2	87.1	87.0
400 Hz	79.4	79.5	81.3	83.2	84.3	85.6	86.7	87.0	87.0	87.1	87.1	87.2	87.2	87.3	87.3	87.4	87.3	87.3
500 Hz	78.9	79.0	81.1	83.2	84.4	85.9	87.0	87.4	87.3	87.4	87.4	87.4	87.4	87.5	87.4	87.5	87.5	87.4
630 Hz	77.9	78.1	80.5	82.9	84.3	85.8	87.1	87.5	87.5	87.6	87.5	87.6	87.6	87.7	87.6	87.7	87.6	87.6
800 Hz	77.4	77.5	79.9	82.4	83.7	85.3	86.5	87.0	87.0	87.0	87.0	87.1	87.1	87.1	87.1	87.1	87.1	87.1
1 kHz	77.9	78.0	80.4	82.8	84.2	85.8	87.0	87.5	87.5	87.6	87.6	87.7	87.7	87.8	87.7	87.8	87.8	87.8
1.25 kHz	78.2	78.3	80.5	82.7	84.0	85.5	86.7	87.1	87.2	87.3	87.3	87.3	87.4	87.5	87.4	87.5	87.5	87.5
1.6 kHz	79.8	79.8	81.0	82.6	83.4	84.6	85.4	85.7	85.8	85.9	86.0	86.1	86.1	86.3	86.3	86.4	86.4	86.4
2 kHz	77.5	77.9	79.6	81.5	82.4	83.5	84.3	84.5	84.3	84.2	84.1	84.0	83.9	83.9	83.8	83.8	83.7	83.6
2.5 kHz	77.6	78.1	79.6	81.2	81.9	82.7	83.4	83.4	83.1	82.9	82.6	82.5	82.3	82.2	82.0	81.9	81.8	81.6
3.15 kHz	75.8	76.4	77.7	79.1	79.7	80.3	80.8	80.7	80.3	80.0	79.7	79.5	79.2	79.1	78.9	78.8	78.6	78.4
4 kHz	75.6	75.6	76.3	77.3	77.8	78.5	79.1	79.3	79.2	79.3	79.3	79.4	79.4	79.5	79.5	79.6	79.6	79.6
5 kHz	68.7	69.9	70.9	72.1	72.2	72.4	72.5	72.1	71.4	70.8	70.2	69.7	69.3	68.9	68.5	68.2	67.9	67.6
6.3 kHz	62.4	63.8	64.6	65.5	65.5	65.4	65.2	64.7	63.8	63.1	62.3	61.8	61.2	60.8	60.3	59.9	59.5	59.2
8 kHz	60.0	59.8	58.4	58.0	57.7	57.8	57.8	57.7	57.8	58.0	58.1	58.4	58.5	58.8	58.9	59.0	59.1	59.2
10 kHz	59.3	58.1	55.4	54.1	53.8	53.9	54.1	54.3	54.9	55.8	56.5	57.2	57.8	58.5	58.9	59.4	59.8	60.1
A-wgt	91.3	91.5	92.9	94.5	95.5	96.6	97.5	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8	97.8

Table 5: V126-3.45 MW, expected 1/3 octave band performance, Sound Optimized Mode SO11 & Mode SO11 (HWO) (Blades with serrated trailing edge)

Frequency	Hub height wind speeds [m/s]																	
	3 m/s	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s	13 m/s	14 m/s	15 m/s	16 m/s	17 m/s	18 m/s	19 m/s	20 m/s
6.3 Hz	19.5	17.6	17.3	17.5	18.6	19.3	20.4	21.7	24.3	25.9	27.1	27.9	28.6	29.3	29.9	30.4	30.8	31.3
8 Hz	25.4	23.7	23.7	24.1	25.4	26.2	27.2	28.5	31.1	32.5	33.6	34.3	34.9	35.5	36.1	36.5	36.9	37.4
10 Hz	30.1	29.0	29.5	30.4	31.9	32.8	33.7	34.8	37.1	38.1	38.9	39.4	39.8	40.2	40.6	40.9	41.1	41.5
12.5 Hz	37.9	36.8	37.2	38.0	39.4	40.3	41.2	42.2	44.4	45.5	46.2	46.7	47.2	47.6	48.0	48.2	48.5	48.9
16 Hz	48.8	47.5	46.8	46.6	47.3	47.7	48.4	49.3	51.0	52.1	52.9	53.5	54.1	54.6	55.0	55.4	55.7	56.1
20 Hz	48.0	47.6	49.4	51.5	53.8	55.2	56.3	57.4	59.8	60.5	60.8	61.0	61.2	61.4	61.5	61.6	61.7	61.9
25 Hz	48.5	47.6	50.1	52.8	55.8	57.6	59.1	60.7	64.2	65.4	66.0	66.4	66.8	67.1	67.5	67.7	67.9	68.2
31.5 Hz	59.4	58.4	58.7	59.3	60.6	61.4	62.2	63.2	65.1	66.0	66.7	67.1	67.5	67.9	68.2	68.5	68.7	69.0
40 Hz	61.9	61.2	61.9	63.0	64.6	65.6	66.5	67.5	69.6	70.4	70.9	71.3	71.6	71.9	72.2	72.4	72.6	72.8
50 Hz	66.1	65.4	66.2	67.3	69.0	69.9	70.8	71.7	73.7	74.4	74.9	75.2	75.5	75.7	76.0	76.2	76.3	76.6
63 Hz	68.8	68.6	69.6	70.9	72.7	73.6	74.4	75.2	76.9	77.3	77.6	77.7	77.9	78.0	78.2	78.2	78.3	78.5
80 Hz	75.3	75.1	75.2	75.7	76.7	77.3	77.8	78.3	79.3	79.6	79.9	80.0	80.2	80.3	80.5	80.5	80.6	80.8
100 Hz	76.1	76.0	76.5	77.4	78.7	79.4	80.0	80.5	81.7	81.9	82.1	82.1	82.2	82.3	82.4	82.4	82.5	82.6
125 Hz	74.6	74.7	76.2	77.9	79.9	81.0	81.8	82.5	84.2	84.4	84.5	84.5	84.5	84.6	84.6	84.6	84.6	84.7
160 Hz	80.5	80.6	81.0	81.7	82.9	83.5	83.9	84.2	85.0	85.0	85.1	85.1	85.0	85.1	85.1	85.1	85.0	85.1
200 Hz	82.7	82.9	83.4	84.2	85.4	86.0	86.4	86.7	87.5	87.4	87.4	87.3	87.3	87.2	87.3	87.2	87.1	87.2
250 Hz	80.8	81.2	82.6	84.3	86.1	87.1	87.7	88.2	89.4	89.3	89.2	89.0	88.9	88.8	88.8	88.6	88.5	88.5
315 Hz	80.5	80.7	82.7	84.9	87.2	88.5	89.3	90.1	91.9	92.1	92.1	92.0	91.9	91.9	91.9	91.9	91.8	91.8
400 Hz	79.4	79.5	81.6	84.0	86.5	87.9	88.9	89.8	91.9	92.3	92.4	92.4	92.4	92.5	92.5	92.5	92.5	92.5
500 Hz	78.9	79.0	81.5	84.1	86.8	88.3	89.4	90.4	92.7	93.0	93.1	93.1	93.1	93.1	93.1	93.1	93.1	93.1
630 Hz	77.9	78.1	80.9	83.9	86.9	88.6	89.8	90.9	93.4	93.8	93.9	93.9	93.9	93.9	93.9	93.9	93.9	93.9
800 Hz	77.4	77.5	80.3	83.3	86.3	88.0	89.2	90.3	92.9	93.3	93.4	93.4	93.4	93.4	93.4	93.4	93.4	93.4
1 kHz	77.9	78.0	80.8	83.8	86.8	88.5	89.7	90.8	93.4	93.9	94.0	94.0	94.0	94.0	94.1	94.1	94.0	94.1
1.25 kHz	78.2	78.3	80.9	83.6	86.5	88.1	89.2	90.3	92.7	93.2	93.3	93.3	93.3	93.4	93.4	93.4	93.4	93.5
1.6 kHz	79.8	79.8	81.4	83.2	85.2	86.4	87.3	88.0	89.9	90.2	90.3	90.4	90.4	90.5	90.6	90.6	90.6	90.7
2 kHz	77.5	77.9	79.9	82.0	84.3	85.6	86.4	87.1	88.8	88.9	88.8	88.7	88.6	88.5	88.5	88.4	88.3	88.3
2.5 kHz	77.6	78.1	79.8	81.6	83.5	84.6	85.2	85.7	86.8	86.7	86.5	86.3	86.1	86.0	85.9	85.8	85.7	85.6
3.15 kHz	75.8	76.4	77.8	79.3	81.1	81.9	82.4	82.7	83.6	83.2	83.0	82.7	82.5	82.4	82.3	82.1	81.9	81.9
4 kHz	75.6	75.6	76.5	77.6	79.1	79.8	80.4	80.9	82.1	82.2	82.3	82.3	82.4	82.4	82.5	82.4	82.4	82.5
5 kHz	68.7	69.9	70.8	71.9	73.2	73.7	73.8	73.7	73.6	72.8	72.3	71.8	71.4	71.1	70.8	70.5	70.2	70.0
6.3 kHz	62.4	63.8	64.4	65.1	66.1	66.4	66.4	66.0	65.4	64.3	63.6	63.0	62.6	62.2	61.8	61.5	61.1	60.9
8 kHz	60.0	59.8	58.5	57.7	57.7	57.6	57.6	57.7	57.7	57.7	58.0	58.1	58.2	58.4	58.5	58.5	58.6	58.8
10 kHz	59.3	58.1	55.7	53.9	53.4	53.0	53.2	53.5	54.0	54.6	55.5	56.1	56.6	57.0	57.5	57.8	58.1	58.5
A-wgt	91.3	91.5	93.1	95.2	97.4	98.8	99.7	100.5	102.6	102.9	102.9	102.9	102.9	102.9	102.9	102.9	102.9	102.9

Table 6: V126-3.45 MW, expected 1/3 octave band performance, Sound Optimized Mode SO12 & Mode SO12 (HWO) (Blades with serrated trailing edge)

4. Limitations

The values as stated in the present document are to be regarded as “best estimates” for the octave band performance for the turbine. The values are to be regarded as informative and cannot in any way be used as guaranteed for any projects.

The complete document can be handed out as pdf and must always be referred to using the complete document DMS number.

5. Recalculation to 10 m wind speeds

In case 10 m height wind speed references are required, recalculation of the stated values can be made using the following procedure:

1. The stated hub height wind speeds are recalculated to 10 m reference height.
2. Integer 10 m height wind speed related sound power levels are calculated using linear interpolation between the nearest non integer values.

Recalculation is made using procedures as defined in IEC 61400-11 ed.3. Appendix D.