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IMMISSION AUDIT REPORT – **Project: 13228.07**

South Kent Wind Project
R2794 – Turbine P060
Chatham-Kent, Ontario

Prepared for:

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April 26, 2022

Revision History

Version	Description	Author	Reviewed	Date
1	Initial Report	AM, AS	PA	February 11, 2022
2	Updates and corrections to: Throughout Report - Turbine ID P060 Section 3 Monitor Location Section 3.1.1 Historical Wind Rose Table 3 Relevant Tones Section 4.3 Power threshold Table 9 Table 13 Tonal Assessment Table 13 footnote Appendix G - Wind Screen IL Appendix G Power threshold	AM, AS	PA	March 17, 2022
3	Updates to: Section 4.3 Filtering Section 5.4.1 Tonality Assessment	AM, AS	PA	April 26, 2022

Important Notice and Disclaimer

Executive Summary

Aercoustics Engineering Limited ("Aercoustics") was retained by South Kent Wind LP to complete the acoustic audit requirements outlined in the Renewable Energy Approval ("REA") for South Kent Wind Project ("SKWP"). SKWP operates under REA #2871-8UKGPC, issued on June 15, 2012 [1].

A Noise Abatement Action Plan (NAAP) was implemented at SKWPP to address the non-compliant cumulative sound impact calculated at receptor R2794 during the prior I-audit campaign [2]. In order to verify that the NAAP is effective, E-audit testing was completed at Turbine P060 and demonstrated compliance in the E-audit report issued by Aercousitcs [3].Following concerns from the MECP regarding daytime compliance at this receptor, SKWPP proposed an additional I-audit testing campaign in order to assess daytime turbine sound impact detailed in the Daytime Immission Audit Measurement Plan [4].

This report summarises the results of daytime I-audit testing conducted at receptor R2794.

The monitoring near receptor R2794 was conducted over the following period:

Audit Receptor	Audit Start Date	Audit End Date	Monitoring Duration (weeks)
R2794	November 04, 2021	January 16, 2022	10

The audit has been completed as per the methodology outlined in Parts D and E5.5 RAM-I (Revised Assessment Methodology) of the "*MECP Compliance Protocol for Wind Turbine Noise*" (updated April 21, 2017) with the exception of the deviation from Section D5.2 of the Protocol to collect and analyze measurement data during daytime hours, between 07:00 and 19:00 (i.e., daytime only). The assessment requirements outlined in the Protocol have been met with sufficient data for assessment.

Based on the results presented in this report, the cumulative sound impact calculated at R2794 complies with the MECP sound level limits in all wind bins having sufficient data for assessment.

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1 Introduction

Aercoustics Engineering Limited (“Aercoustics”) was retained by South Kent Wind LP to complete daytime acoustic immissiion audit (I-audit) measurements for South Kent Wind Project (“SKWP”). SKWP operates under REA #2871-8UKGPC, issued on June 15, 2012 [1].

A Noise Abatement Action Plan (NAAP) was implemented at SKWPP to address the non-compliant cumulative sound impact calculated at receptor R2794 during the prior I-audit campaign [2]. Although complaince was demonstrated during nighttime hours through an E-audit at Turbine P060 [3], the MECP indicated concerns that the daytime sound impact at receptor R2794 may not be compliant.

To evaluate whether the turbine sound impact is compliant during daytime hours, Aercoustics has conducted an additional I-audit campaign at R2794 to assess the daytime turbine sound impact, as proposed by SKWPP in the Daytime Immission Audit Measuremtent Plan [4].

The daytime audit was completed per the methodology outlined in Part D and Part E of the Compliance Protocol for Wind Turbine Noise (“Complaince Protocol” or “Protocol”), April 2017 revision [5]. The Compliance Protocol is an Ontario MECP document used to evaluate noise from a wind turbine at nearby receptors.

A deviation from Section D5.2 of the Protocol was necessary to collect and analyze measurement data during daytime hours, between 07:00 and 19:00 (i.e daytime only).

This report presents the results of the daytime I-Audit assessment for receptor R2794 near turbine P060.

2 Facility Description

South Kent Wind Project is a wind facility comprising 124 Siemens SWT-101 wind turbines with name plate capacities of 2.221 MW, 2.126 MW, 1.903 MW, and 1.824 MW. The total name plate capacity of the facility is 270 megawatts. Each turbine has a hub height of 99.5 metres. The facility is located in the Chatham-Kent Municipality.

The facility has two large substation transformers rated at 148 and 129 MVA. The facility is designed to operate 24 hours per day, 7 days per week.

As per the NAAP, turbine T60 operates in a reduced noise mode with a capacity of 1.745MW during night-time hours (19:00 to 07:00). During all other hours, T60 operates in the 2.126MW operating mode.

3 Audit Location

The receptor selection process, measurement equipment, and details regarding the monitoring locations are provided in this section.

3.1 Receptor Selection

Measurement equipment was erected at receptor R2794 near the test turbine P060. The measurement location was selected as per Section E3.1.2 of the Compliance Protocol, wherein measurements are to be conducted at the point of reception with the greatest predicted noise impact from the specified test turbine ("worst-case receptor"). The frequent downwind conditions were also considered for receptors with similar predicted partial sound levels from the test turbine. The prevailing wind direction for the site is discussed in the following section.

The worst-case receptors for P060 are R5208 and R2742, which are located on a small lot surrounded by a line of trees. Due to the trees and the buildings on the lot, monitoring would not have been feasible at these locations. In addition, land access for the neighbouring property, R2736, was denied. Supporting documentation is provided in Appendix G. As a result, measurement locations at an equivalent distance of 554 m from R5208 to P060 were considered. A location near R2794 was selected such that the monitor could be placed approximately 554 metres from P060 in the predominant downwind direction. This receptor location was selected in consultation with the MECP and confirmed in an email from the MECP dated July 19, 2019.

The receptor selection table for P060 is shown in Table 1 below. Predicted sound impacts at the receptor were obtained from the Noise Assessment Report for SKWP prepared by Hatch and dated May 7, 2013. A sound model using the original assessment report parameters was created by Aercoustics to calculate predicted sound levels at monitor locations.

Table 1: Receptor Selection Table

SPL Rank	Point of Reception ID	Nearest Turbine	Distance to Test Turbine (m)	Predicted Overall Sound Level (dBA)	Predicted Partial Sound Level from **test turbine** only* (dBA)	Wind Direction from Test Turbine	Notes
1	R5208	P060	554	39.0	36.6	Crosswind	Location not suitable for monitor setup
2	R2742	P060	570	38.9	36.3	Crosswind	Location not suitable for monitor setup
3	R2736	P060	572	38.8	36.3	Crosswind	Land access denied
4	R2794	P060	604	39.1	35.7	Downwind	-

SPL Rank	Point of Reception ID	Nearest Turbine	Distance to Test Turbine (m)	Predicted Overall Sound Level (dBA)	Predicted Partial Sound Level from **test turbine** only* (dBA)	Wind Direction from Test Turbine	Notes
-	**Location near R2794****	**P060**	**543**	**39.5**	**36.8**	**Downwind**	**Measured location**

* These values are predicted based on the manufacturer specified sound power level for each turbine, not the measured sound power levels. They are included to be indicative of the relative contribution of the turbine of interest at each location.

** Proxy location selected in consultation with the MECP.

3.1.1 Historical Wind Direction

Historical wind direction information was provided by SKWP and used to support selection of suitable audit receptors. This wind direction information is provided in Figure 1 and includes the SKW average wind rose, and a wind rose filtered for hub height wind speeds of 10-50 m/s. The prevailing downwind direction for the facility was determined to be 210°.

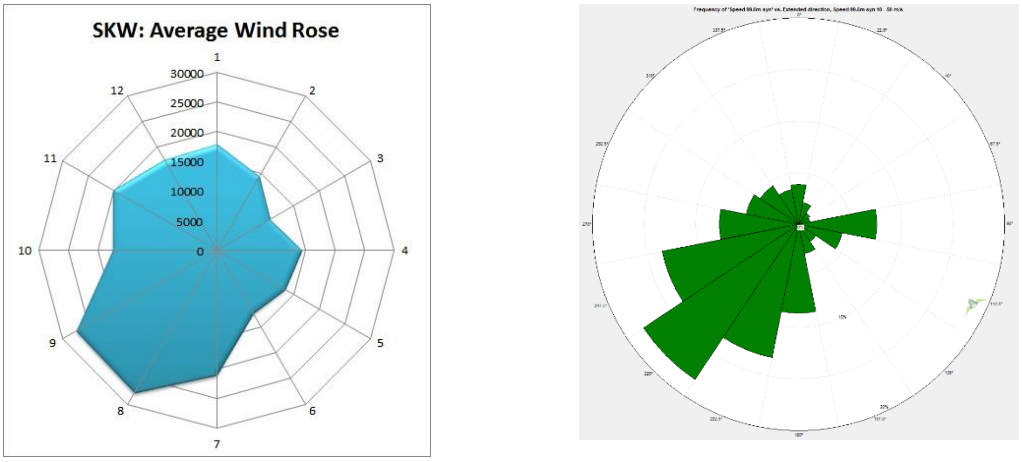

Figure 1: Historical Wind Rose used for Receptor Selection and Wind Rose filtered for hub height wind speed above 10 m/s

3.2 Monitoring Location

The monitor was erected approximately 64 metres from the coordinates of R2794, 61 metres closer to the test turbine (turbine P060). The distance between the monitor location and the test turbine was approximately 11 metres shorter than the distance between the worst-case receptor (R5208) and the test turbine. The monitor was erected at the receptor height of 4.5 metres. The ground cover between the measurement location and the nearest turbines was open field, predominantly covered with cleared farmland.

Table 2 provides a summary of the receptor and monitor locations. Site photographs and plans are provided in Appendix A.

Table 2: Coordinates and Turbines to Receptor and Measurement Locations

Audit Receptor	Measurement Duration	Location	Coordinates (UTM x,y, Zone 17T)	Distance to Test Turbine (m)	Predicted Overall Sound Level (dBA)
R2794	Nov 4, 2021 – Jan 16, 2022	Receptor	406980 mE / 4688130 mN	604	39.1
		Monitor	406931 mE / 4688089 mN	543	39.5

3.3 Existing Ambient Environment

The ambient acoustic environment for the SKWP site is comprised of a mixture of many different ambient sources. The contribution of noise from flora, fauna, traffic, and industry near the monitor location were considered throughout the measurement campaign.

Existing ambient noise sources were categorized as either extraneous – such as short-term events, or frequency-specific noise – or constant noise sources as part of the existing ambient sound environment. In the case of extraneous noise sources, filtering was employed to reduce or remove it, as further discussed in Section 4.3.2. For constant noise sources identified as being a part of the existing ambient sound environment, efforts were made to ensure that the noise was equally present in both *Total Noise* and *Background* periods, as further discussed in Section 4.3.3.

3.3.1 Flora Noise

Ambient noise from flora refers to the noise generated by wind blowing over vegetation and foliage and is typically proportional to wind speed, with higher wind speeds generating increased amounts of noise. Due to its ever-present and broadband nature, noise from flora is considered a constant noise source as part of the existing ambient environment.

The monitor was located in a field with cleared farmland which had a negligible noise impact on the measurements. The monitor was also located approximately 25 metres from a tree line to the north-east.

3.3.2 Fauna Noise

Noise from fauna refers to noise typically arising from the activity of insects, birds, livestock, or dogs. Noise of this nature may be concentrated at high frequencies (such as crickets chirping) or limited to short-term events (such as dogs barking). Noise from fauna is considered extraneous noise.

There were several dogs on the property. There were no other significant sources of fauna noise identified at the monitor location.

3.3.3 Traffic Noise

Traffic noise may include short-term events such as individual car passbys (considered extraneous noise) or constant noise (i.e. “traffic hum”) from high-volume or frequently travelled roads and highways.

The monitor was located over 350 metres from 10 Line to the north-west. Due to the distance from the nearest road, individual car passbys were not a significant source of noise throughout the measurement campaign, however distant traffic was at times audible.

The monitor was not located near any major highways and therefore constant traffic noise was not a concern during the measurements.

3.3.4 Industry Noise

Noise generated by farming equipment was at times present during the daytime audit campaign. The intervals including farming activities were filtered out either manually by listening analysis or automatically by the transient (L_{Aeq} – L_{90} filter).

3.3.5 Self-Generated Noise

Self-generated noise is noise which results from wind blowing over the monitoring equipment and is a factor at high wind speeds at the measurement position. This noise was minimized by a secondary wind screen installed around the microphone in accordance with Section D2.1.4 of the Protocol. The insertion loss of the wind screen has been tested and was accounted for in the analysis and is provided in Appendix G.

3.3.6 Other Sources

No other notable ambient noise sources were identified in the vicinity of the monitor.

4 Audit Methodology

For the duration of the measurement campaign, acoustic and weather data were logged simultaneously in one-minute intervals at the measurement location. Analysis and filtering were conducted in accordance with Sections D5.2 and E5.5 of the Protocol, with additional filters applied as needed—following the guidance in the Protocol—to remove or reduce extraneous ambient noise (see Section 4.3.2 below) and ensure representative ambient conditions (see Section 4.3.3 below).

Intervals that passed the filtering criteria were sorted into integer wind bins[1] depending on the measured wind speed at 10 metres above ground level (“10m-AGL”) and classified as either *Total Noise* or *Background* depending on the operation of the nearby SKWP turbines. The *Turbine-Only* sound level for each wind bin was determined by

[1] An integer wind bin spans 1 m/s, centred on each integer wind speed, open at the low end and closed at the high end.

logarithmically subtracting the average *Background* levels from the *Total Noise* level in wind bins with sufficient data for assessment.

The calculation of the average measured tonal audibility was determined in accordance with IEC 61400-11 Edition 3.0, as per Section D3.8.3 of the Protocol, with modifications to adapt the method to immission measurements. Calculations were conducted based on the narrowband spectra of the intervals within the tonality assessment dataset from 20 Hz to 3000 Hz with a frequency resolution of 2 Hz. As per IEC 61400-11, a tone would have to be present in at least 20% of the samples in order to be deemed relevant and evaluated under the penalty scheme (discussed in Section 4.4.3). This reduces the possibility of intermittent tones related to either the unsteady operation of the turbines, or from other contaminating sources, being attributed to the steady state operation of the turbines.

The assessment dataset was determined based on the minimum power output of the test turbine corresponding to a tonal audibility greater than 0 dB in the P060 E-Audit test results. Table 3 presents a summary of the relevant tones for this assessment as determined from the E-Audit, and includes the frequency range, tonal audibility range, and corresponding turbine operational parameters during which elevated tonal audibility levels were observed. A centre frequency of 120 Hz and 460 Hz were selected for the tonality assessment.

Table 3: Summary of Relevant Tones from P060 E-Audit

Turbine ID	Frequency Range (Hz)	Tonal Audibility (dB)	Hub Height Wind Speed Range (m/s)	Electrical Power Output Range (kW)
P060	426 – 494	0.1 – 5.8	8 – 12.5	1095 – 2126
	120	1.6 - 2.6	10.5 – 12.5	2008 - 2126

4.1 Measurement Equipment

The following acoustic and non-acoustic measurement equipment was installed at the monitor location:

- One (1) Type 1 sound level meter with microphone and pre-amplifier, installed at receptor height;
- One (1) primary and one (1) secondary[2] windscreen for the microphone; and
- One (1) anemometer, installed at 10m-AGL

The measurement equipment was configured to log one-minute equivalent sound levels (L_{eq}) in A-weighted broadband and 1/3rd octave band frequencies. The microphone was installed at least 5 metres away from any large reflecting surfaces, as far away as

[2] The 1/3 octave band insertion loss of the secondary windscreen has been tested and has been accounted for in the data analysis.

practically possible from trees and other foliage, and in direct line of sight to the nearest SKWP turbines.

Table 4 lists the specific make, model, and serial numbers for the measurement equipment.

Table 4: Equipment Details

Audit Receptor	Equipment	Make/Model	Serial Number	Date of Last Calibration
R2794	Sound Level Meter	2250	3004431	Feb 17, 2021
	Microphone	4189	2888684	Feb 17, 2021
	Pre-Amplifier	ZC 0032	20151	Feb 17, 2021
	Weather Anemometer	Vaisala WXT520	K0630016	June 29, 2021

The measurement chain was calibrated before, during, and after the measurement campaign using a type 4231 Brüel & Kjær acoustic calibrator. The measurement equipment was also verified by laboratory calibration per the requirements in Section D2.3 of the Protocol; calibration certificates are provided in Appendix D.

4.2 Measurement Parameters

Measurement equipment was configured to run from approximately 6:50am to 8pm, local time. The measurement parameters acquired and used in the audit are listed in Table 5.

Table 5: Measurement Parameters Used in the Study

Parameter Group	Measurement Parameters	Notes
Acoustic (microphone height)	L_{Aeq}	dBA
	L_{90}	dBA
	1/3rd Octave Band	dBA (20 Hz – 20 kHz)
	Signal Recording	Uncompressed raw files
Weather (10-m height)	Wind Speed	m/s
	Wind Direction	0-360˚
	Temperature	˚C
	Humidity	0-100%
	Precipitation	mm
Turbine (hub height)	Wind Speed	Provided by operator
	Yaw Angle	Provided by operator
	Power Output	Provided by operator
	Rotational Speed	Provided by operator

SKWP wind turbine operational information was collected during the measurement campaign using the facility SCADA system and provided to Aercoustics by South Kent Wind LP.

4.3 Filtering Criteria

Intervals were included or excluded from analysis depending on several filtering criteria. Some of these criteria apply to all intervals and some apply only for *Total Noise* or *Background* intervals. Measurement intervals were first passed through the *All Intervals* filters, after which they were sorted into either *Total Noise* or *Background* categories based on the operation of the nearby turbines. Intervals were included in the assessment dataset if they met all the following criteria:

All Intervals

- Occurred between 7am – 7pm
- Had no precipitation within one hour before or after
- Had an ambient temperature above -10˚C
- Had minimal influence from extraneous ambient noise sources

Total Noise Intervals

- All nearby turbines were operating
- Test turbine was generating sufficient power:
    - *For sound pressure level analysis:* Test turbine was generating at least 85% of the maximum rated power output and 90% or more of its maximum sound power level (see Appendix G for more details)
    - *For tonality analysis:* (1) Test turbine was generating at least 85% of maximum rated power output and 90% or more of its maximum sound power and (2) Test turbine was generating at least the minimum power output corresponding to the conditions where the measured tonal audibility was greater than 0 dB during the E-Audit Test.
- Monitor was located downwind of the test turbine

Background Intervals

- All nearby turbines were parked (i.e. not rotating)

4.3.1 Turbines in Study Area

As noted above, several filtering criteria were applied based on the operation of the nearest turbine and the turbines in the surrounding area. To verify the operation of these turbines, information from the facility SCADA was processed along with the acoustic and weather data.

The minimum number of turbines included in the study area for the receptor and verified for *Total Noise* measurements was selected based on the guidance of Section D3.8.1 of the Protocol:

> ***D3.8.1 Overall equivalent sound level – wind turbines operational***
>
> *"[…] At a minimum, all relevant turbines of the subject and adjacent wind facilities, typically within 3 km of the measurement location should be operational. In the event that an adjacent wind facility dominates the background sound levels, subsequent to approval by the Ministry, an alternative measurement location may be selected."*

The minimum number of turbines included in the study area of the receptor and verified for *Background* measurements was selected based on the guidance of Section D3.5.2 of the Protocol:

> ***D3.5.2 Acoustic measurements with wind turbines parked***
>
> *"Ambient noise measurements shall be carried out at a point of reception with all turbines in the vicinity of the point of reception parked. The prediction model will be used to determine the number of turbines that require parking in order for the predicted noise contribution of the wind facility to fall to 30 dBA or 10 dB less than the applicable criterion."*

The turbines in the study area of the receptor are listed in Table 6 below.

Table 6: Turbines Included in the Study Area

Audit Receptor	Turbines verified for *Total Noise* Measurements	Turbines verified for *Background* Measurements
R2794	P054, P055, P056, P057, P058, P060, P097, P100, P111, P163, P164	P055, P056, P057, P060, P100, P111, P164

Parked turbines do not rotate or generate power. There is some idling of the blades (~3 RPM or less), but the acoustic impact of the turbines in this condition is negligible at the receptor. The turbines were confirmed to be running in their normal operating mode for the duration of the monitoring campaign. See Appendix B for a statement from the operator.

4.3.2 Removal of Extraneous Noise

'Extraneous noise' is defined as ambient sound sources unrelated to the operation of the wind facility. The removal or reduction of extraneous noise sources in the measurement data is important to ensure the assessment of turbine-only sound levels is as accurate and free of contamination as possible. The Protocol provides the following guidance regarding extraneous noise:

> ***C2.4.7 Extraneous noise sources[3]***
>
> *"Measurements are to be inhibited when the sound level is affected by noise from extraneous sources such as vehicle noise, dogs barking and wind gusts (i.e. other than wind turbine sound).*
>
> *"The same result can also be achieved by digitally recording the sound level time history and later editing out the extraneous events and recalculating the descriptors such as Leq. This should address measurement situations where extraneous sounds were not inhibited."*
>
> ***D3.5 Acoustic measurements***
>
> *"[…] In addition, if the background sound levels are greater than the applicable exclusion limits then the applicable limits are the background sound levels without extraneous noise sources."*
>
> ***D5.3 Effects of insects and fauna***
>
> *"The analysis shall identify the influence of any insects, fauna, or other extraneous but constant sources of noise and verify them through sound recordings. Noise from insects can be removed from the 1/3rd octave spectra of each measurement. It has to be shown, however, that the contribution of the wind turbine noise in those frequencies is minimal."*
>
> ***D6 Assessment of compliance***
>
> *"[…] However, if the background sound levels are greater than the applicable exclusion limits then the applicable limits are now the background sound levels without extraneous noise sources."*

Extraneous noise can be steady or transient. Steady noise can be removed via filtering or removal of specific 1/3rd octave bands affected by the contamination (as per Protocol section D5.3). Transient noise can be removed or reduced from the dataset by automatic and manual filtering techniques.

Extraneous noise from car passbys and other short-term events was removed by manually removing intervals that had been verified through listening tests to have audible contamination.

4.3.3 Representative Ambient Conditions

The conditions present during the *Total Noise* and *Background* periods must be from similar weather and wind shear conditions, per Protocol section D3.8.2:

[3] It is acknowledged that the measurements in this report follow Part D and Part E of the Protocol and this guidance is from Part C. Nevertheless, the guidance regarding the removal of extraneous noise in Part C is applicable here as the requirement to remove contamination from the measurement dataset follows good engineering principles for noise measurements.

> ***D3.8.2 Overall equivalent sound level – wind turbines parked***
>
> *"Ambient noise measurements should be performed with the turbines parked and conducted within the same general measurement period and with the same weather and wind shear conditions. Measurements of ambient noise obtained during other periods are not recommended and should only be used with great caution to ensure that they represent the "current" ambient noise."*

Background measurements were collected periodically throughout the measurement campaign to ensure the *Background* and *Total Noise* measurements were collected during similar conditions in the same seasons.

4.3.4 Adjacent Wind Facilities

Adjacent wind facilities were present in the area adjacent the receptor location but are expected to have a negligible impact at the audit measurement location.

4.4 Compliance Criteria

The minimum criteria required for an assessment of compliance per the Compliance Protocol are detailed in this section.

4.4.1 Sample Size Requirements

Requirements per the RAM-I methodology of the Compliance Protocol (Section E5.5) are used for this audit. Per Section E5.5 of the Protocol, an assessment dataset is considered complete if at least three wind bins from 1 – 7 m/s (inclusive) or two wind bins from 1 – 4 m/s (inclusive) are complete. A wind bin is considered complete if there are at least 60 valid *Total Noise* and 30 valid *Background* intervals.

For the purposes of the tonal audibility analysis of these far field measurements, per Section D3.8.3 of the protocol, a wind bin is considered complete if there are at least five (5) one-minute intervals for *Total Noise* and *Background.*

4.4.2 Sound Level Limits

Sound level limits vary with 10m-AGL wind speed and by class designation. The area surrounding the South Kent Wind Project site has previously been designated as Class 3. Exclusion limits for a Class 3 area are summarized in Table 7 below.

Table 7: MECP Exclusion Limits (Class 3)

Wind speed at 10 m height, 10m-AGL (m/s)	Sound Level Exclusion Limit (dBA)
≤ 6	40
7	43

These sound level limits apply to points of reception. Given that the predicted impact at the monitoring location is greater than the predicted impact at the receptor (see Table 2,

Section 3.2), results at the monitor are conservative and can be used to show compliance at the receptor.

4.4.3 Tonal Penalty

Any applicable tonal penalties are based on the mean tonal audibility for each wind bin and are calculated according to Annex C of ISO 1996-2-2007, per Section E5.5.2 of the Protocol. The penalty scheme is summarized in Table 8 below.

Table 8: Calculation of Applicable Tonal Penalty

Mean Audibility, ΔL	Tonal Adjustment, K_T
ΔL ≤ 4 dB	0 dB
4 dB < ΔL ≤ 10 dB	ΔL-4 dB
10 dB < ΔL	6 dB

4.5 Deviations

Any deviations from the methods prescribed in the Protocol are discussed in this section.

4.5.1 Hourly Time Filter

As per section D5.2 of the Protocol, intervals are to be measured between 22:00 and 05:00 (i.e. nighttime only). As noted in section 4.3, the hourly time filter deviated from the Protocol requirements and intervals were measured during the hours of 07:00 – 19:00 as per the Immission Audit Measurement Plan [4].

5 Audit Results

Sound levels and weather conditions measured throughout the course of the I-Audit campaign are summarized in the following sections.

5.1 Audit Duration

The length of the monitoring campaign is summarized in Table 9 below.

Table 9: Length of Monitoring Campaign

Audit Receptor	Audit Start Date	Audit End Date	Monitoring Duration (weeks)
R2794	November 04, 2021	January 16, 2022	10

5.2 Weather Conditions

Throughout the measurement campaign, a variety of weather conditions were encountered. The range of weather conditions measured in the assessment dataset are summarized in Table 10. Note that the assessment dataset includes the *Total Noise* and *Background* data that remains after filtering.

Table 10: Range of Weather Conditions in Assessment Dataset

Audit Receptor	Atmospheric Pressure (kPa)	10m-AGL Wind Speed (m/s)	Relative Humidity (%)	Temperature (°C)	Hub-Height Wind Speed (m/s)
R2794	96 – 101	0.1 – 21.8	33 – 88	-15 – 18	0 – 30

During the audit period, the predominant wind direction was measured to be from the south-west. A wind rose detailing the measured wind directions observed during the entire measurement campaign is provided in Figure 2. Note that wind directions shown on the wind rose indicate the direction the wind is coming from. The purple shaded region represents the downwind condition from the test turbine at the monitor location.

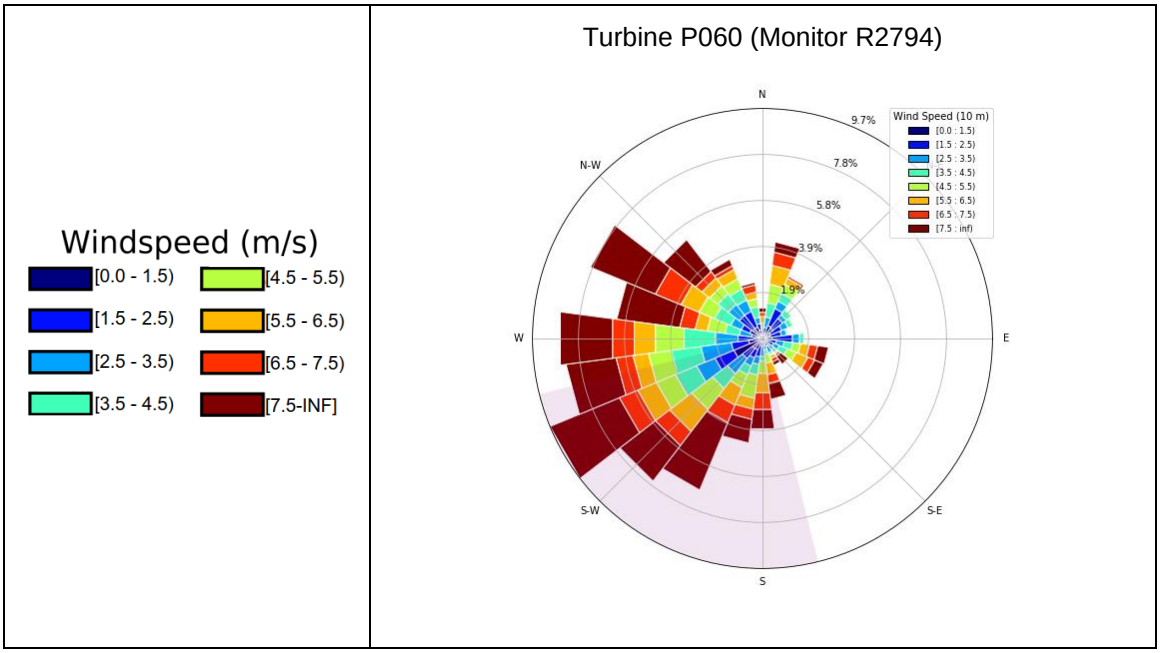

Figure 2: Wind Rose (All Measured Data)

From Figure 2, the distribution of wind directions observed during the measurement campaign is similar to those expected based on the historical wind rose provided in Section 3.1.1. Wind roses for the assessment dataset are included in Appendix C.

5.3 Data Excluded due to Filtering Criteria

A range of power output and wind conditions were measured over the course of the audit campaign. Table 11 provides the amount of time during the measurements (between 7am and 7pm) where the two main filtering conditions (high turbine power and downwind conditions) were met, i.e. the percentage of time during the measurement campaign that a receptor experienced the maximum noise impact from the South Kent Wind Project facility.

Table 11: Prevalence of Suitable Turbine Conditions During Measurements

Audit Receptor	Test Turbine	Prevalence of Downwind	Prevalence of High Output (>85% power)	Prevalence of Downwind and High Output
R2794	P060	39%	26%	13%

These conditions represent the minimum requirements for valid *Total Noise* intervals. The additional filters discussed in Section 4.3 further reduced the assessment dataset.

5.4 Measured Sound Levels

Average measured sound levels by wind bin for *Total Noise* and *Background* periods are presented in Table 12 below. As noted in Section 4.3, the sound pressure level assessment dataset was filtered based on a minimum power threshold of 85% of the maximum turbine power output.

Table 12: Average Measured Sound Levels, RAM-I Analysis

Audit Receptor	Period	Measurement Parameter	Wind Bin (m/s)						
			1	2	3	4	5	6	7
R2794	Total Noise	Number of Samples	0	0	1	12	253	643	966
		Average L_{Aeq} (dBA)	-	-	-	-	43	44	47
		Standard Deviation (dB)	-	-	-	-	1.3	1.3	1.4
	Background	Number of Samples	532	185	9	19	33	58	50
		Average L_{Aeq} (dBA)	41	40	-	-	39	41	45
		Standard Deviation (dB)	5.7	4.6	-	-	1.4	1.7	1.6

- Sound level not reported in wind bin if minimum sample size not met for *Total Noise* (60) or *Background* (30).

It should be noted that the sound levels presented here are rounded to the nearest integer; all calculations and analysis are conducted using the un-rounded sound levels.

Measurement data points from Table 12 are also plotted in Figure 3 below.

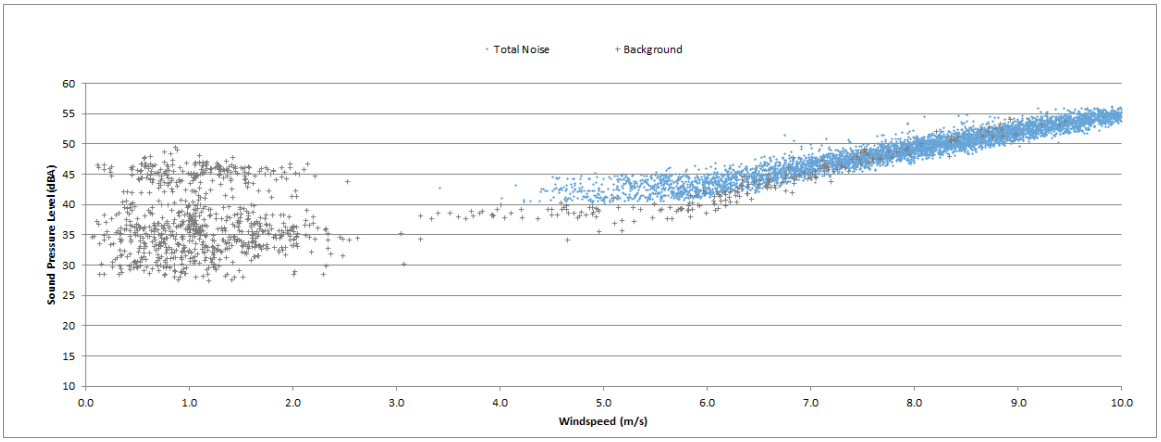

Figure 3: Average Measured Total Noise and Background Sound Levels
Monitor Near R2794

5.4.1 Tonal Adjustment

Tonal audibility results for R2794 in the far field of P060 are presented in Table 13 and Table 14 below. As noted in Section 4.3, the tonal assessment dataset was filtered based on a minimum 85% power threshold and a minimum power threshold of 1095 kW.

Table 13 Tonality Assessment Table - 85% Power Threshold

Centre Frequency	Tonality Parameter	Wind Bin (m/s)						
		1	2	3	4	5	6	7
460 Hz	Data Points in Wind Bin	0	0	1	12	253	643	966
	Data Points with Detected Tone	0	0	1	10	117	211	133
	Tonal Presence	-	-	100%	83%	46%	33%	14%
	Mean Tonal Audibility, ΔL (dB)	-	-	-	-2.0	-1.3	-1.3	-4.2
	Tonal Adjustment, K_T (dB)	0	0	0	0	0	0	0
120 Hz	Data Points in Wind Bin	0	0	1	12	253	643	966
	Data Points with Detected Tone	0	0	1	11	147	414	494
	Tonal Presence	-	-	100%	92%	58%	64%	51%
	Mean Tonal Audibility, ΔL (dB)	-	-	-	-3.1	-1.1	-0.9	-1.9
	Tonal Adjustment, K_T (dB)	0	0	0	0	0	0	0

- Mean Tonal Audibility not reported in wind bin if minimum sample size (5) not met.

Table 14: Tonality Assessment Table – 1095 kW Power Threshold

Centre Frequency	Tonality Parameter	Wind Bin (m/s)						
		1	2	3	4	5	6	7
460 Hz	Data Points in Wind Bin	0	1	75	207	933	1333	1487
	Data Points with Detected Tone	-	0	25	91	462	494	253
	Tonal Presence	-	0%	33%	44%	50%	37%	17%
	Mean Tonal Audibility, ΔL (dB)	-	-	-5.1	-3.4	-2.5	-2.0	-4.0
	Tonal Adjustment, K_T (dB)	0	0	0	0	0	0	0
120 Hz	Data Points in Wind Bin	0	1	75	207	933	1333	1487
	Data Points with Detected Tone	0	0	20	73	381	645	672
	Tonal Presence	-	0%	27%	35%	41%	48%	45%
	Mean Tonal Audibility, ΔL (dB)	-	-	0.0	-2.2	-2.1	-1.8	-1.8
	Tonal Adjustment, K_T (dB)	0	0	0	0	0	0	0

- Mean Tonal Audibility not reported in wind bin if minimum sample size (5) not met.

From the results in Table 14 and Table 14, no tones were detected that exceeded the 4 dB threshold for tonal penalties. As a result, no tonal penalty is applicable.

5.4.2 Other Adjustments

No other adjustments.

5.5 Turbine-Only Sound Levels

The average measured sound levels by wind bin for *Total Noise* and *Background* periods are presented in Table 15.

Table 15: Calculated Turbine-Only Sound Levels, RAM-I Analysis

Audit Receptor	Measurement Period	Wind Bin (m/s) 1	2	3	4	5	6	7
R2794	Total Noise (dBA)	-	-	-	-	43	44	47
	Background (dBA)	41	40	-	-	39	41	45
	Signal to Noise (dBA)	-	-	-	-	3.9	2.5	1.3
	Turbine-Only (dBA) [monitor location]	-	-	-	-	40	40*	41*
	Tonal Adjustment	0	0	0	0	0	0	0

- Sound level not reported in wind bin if minimum sample size not met for *Total Noise* (60) or *Background* (30).

* Signal-to-noise level less than 3 dB. Increased uncertainty in determination of Turbine-Only Sound Impact.

6 Assessment of Compliance

This section provides the results of the measurements and calculations as they pertain to the determination of compliance of the facility in accordance with the criteria listed in Section 4.4 of this report.

6.1 Assessment Table

Table 16 compares the final Turbine-Only sound levels for each wind bin at the Receptor location to the applicable exclusion limits and background sound levels. Final Turbine-Only sound levels at the Point of Reception are calculated by taking the Turbine-Only sound level at the measurement location and applying any applicable adjustments as indicated in Table 15.

Table 16: Assessment Table

Audit Receptor	Wind speed at 10m-AGL (m/s)	1	2	3	4	5	6	7
R2794	Turbine-Only Sound Level (dBA)	-	-	-	-	40	40*	41*
	Background Sound Level (dBA)	*41*	*40*	-	-	*39*	*41*	*45*
MECP Exclusion Limit (dBA)		40	40	40	40	40	40	43
Compliance? (Y/N)		-	-	-	-	Yes	Yes	Yes

- Sound level not reported in wind bin if minimum sample size not met for *Total Noise* (60) or *Background* (30).

* Signal-to-noise level less than 3 dB. Increased uncertainty in determination of Turbine-Only Sound Impact.

6.2 Statement of Compliance

Based on the Receptor Turbine-Only sound levels presented in Table 16, sound immission levels at the audited receptor is in compliance with the applicable sound level limit at all wind speeds with sufficient data for assessment.

7 Conclusion

Aercoustics Engineering Limited has completed daytime acoustic immission audit measurements at the South Kent Wind Power Project, as requested by the Ministry of Environment, Conservation and Parks. SKWP operates under REA #2871-8UKGPC, issued on June 15, 2012. Testing was conducted in accordance with the methodology outlined in Part D and Part E of the MECP Compliance Protocol for Wind Turbine Noise, with the exception of the measurements conducted during daytime (07:00 – 19:00) hours. Based on the results presented in this report, the cumulative daytime-only sound impact calculated at R2794 complies with the MECP sound level limits.

8 References

[1] V. Schroter, “Renewable Energy Approval #2871-8UKGPC,” Ontario Ministry of the Environment, Toronto, ON, June 15, 2012.

[2] A. Davidson, A. Denison and P. Ashtiani, “South Kent Wind Project Immission Audit Report – R2794 – Turbine P060,” Aercoustics Engineering Ltd., Mississauga, ON, February 28, 2020.

[3] S. Sanchez, A. Munro and P. Ashtiani, “South Kent Wind / Turbine P060 IEC 61400-11 Edition 3.0 Measurement Report”, Aercoustics Engineering Ltd., Mississauga, ON, March 29, 2021.

[4] A. Munro, P. Ashtiani, “South Kent Wind Power Project Daytime Immission Audit Measurement Plan”, Aercoustics, Mississauga, ON, July 14, 2021.

[5] Ministry of the Environment and Climate Change, “Compliance Protocol for Wind Turbine Noise,” Government of Ontario, Toronto, 2017.

Appendix A
Site Details

Legend

- Ontario HWY 401
- Campaign Monitor
- Receptor Locations
- South Kent Turbines

Third Party Turbines

- Raleigh

N

Project ID:	13228.07
Drawn by:	AM
Reveiwed by:	PA
Date:	February, 2022
Revision:	1
Scale:	As Indicated

South Kent Wind Project
Daytime Immission Audit Report

Appendix A.1

Site Plan Overview

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Legend

Campaign Receptor

- **Campaign Monitor**
- **Campaign Receptor**
- **South Kent Turbines**

N

Project ID:	13228.07
Drawn by:	AM
Reveiwed by:	PA
Date:	February, 2022
Revision:	1
Scale:	As Indicated

South Kent Wind Farm
Daytime Immission Audit Report
R794 - T060

Appendix A.2

Monitor and Receptor Location

aercoustics

Project ID:	13228.07
Drawn by:	AM
Reveiwed by:	PA
Date:	February, 2022
Revision:	1
Scale:	As Indicated

South Kent Wind Farm
Daytime Immission Audit Report
R2794 - T060

Appendix A.3

Monitor to T060

aercoustics

Project ID:	13228.07
Drawn by:	AM
Reveiwed by:	PA
Date:	February, 2022
Revision:	1
Scale:	As Indicated

South Kent Wind Farm
Daytime Immission Audit Report
R2794 - T060

Appendix A.4

Monitor to Receptor

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Appendix B
Statement from the Operator

SP South Kent Wind LP
2050 Derry Road West
2nd Floor
Mississauga, ON L5N 0B9
www.southkentwind.com

February 8, 2022

Director, Environmental Approvals Access and Service
Integration Branch Ministry of Environment
2 St. St Clair Avenue West, Floor 12A
Toronto ON M4V 1L5

Subject: South Kent Wind Project (REA #2871-8UKGPC) Receptor Emission Audit 2021-2022

Dear Director

Please accept this letter as confirmation that all turbines tested during the acoustics measurement campaign conducted by Aercoustics Engineering Limited from November 4, 2021 to January 16, 2022 were operating normally for the duration of the campaign, with the exception of specific time periods during which the turbines were placed in remote owner stop to facilitate ambient noise measurements.

The turbines placed in remote owner stop for ambient measurements were different depending on the receptor targeted, and were as follows:

- R2794: T055, T056, T057, T060, T100, T111, T164

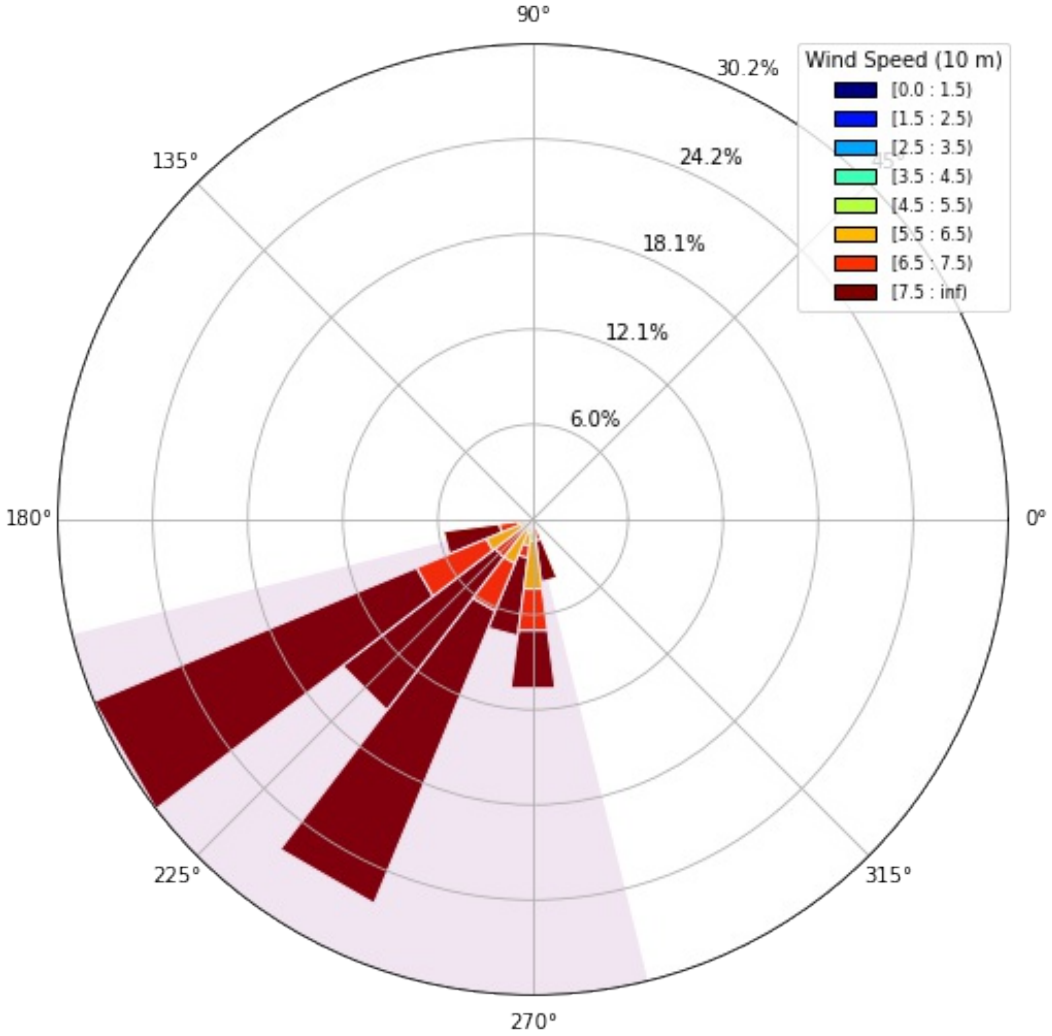
The turbines verified for operational measurements were different depending on the receptor targeted, and were as follows:

- R2794: T054, T055, T056, T057, T058, T060, T097, T100, T111, T163, T164

Sincerely,

Kevin Aikenhead
Facility Manager
South Kent Wind
C: 519-350-9373

Appendix C
Wind Roses



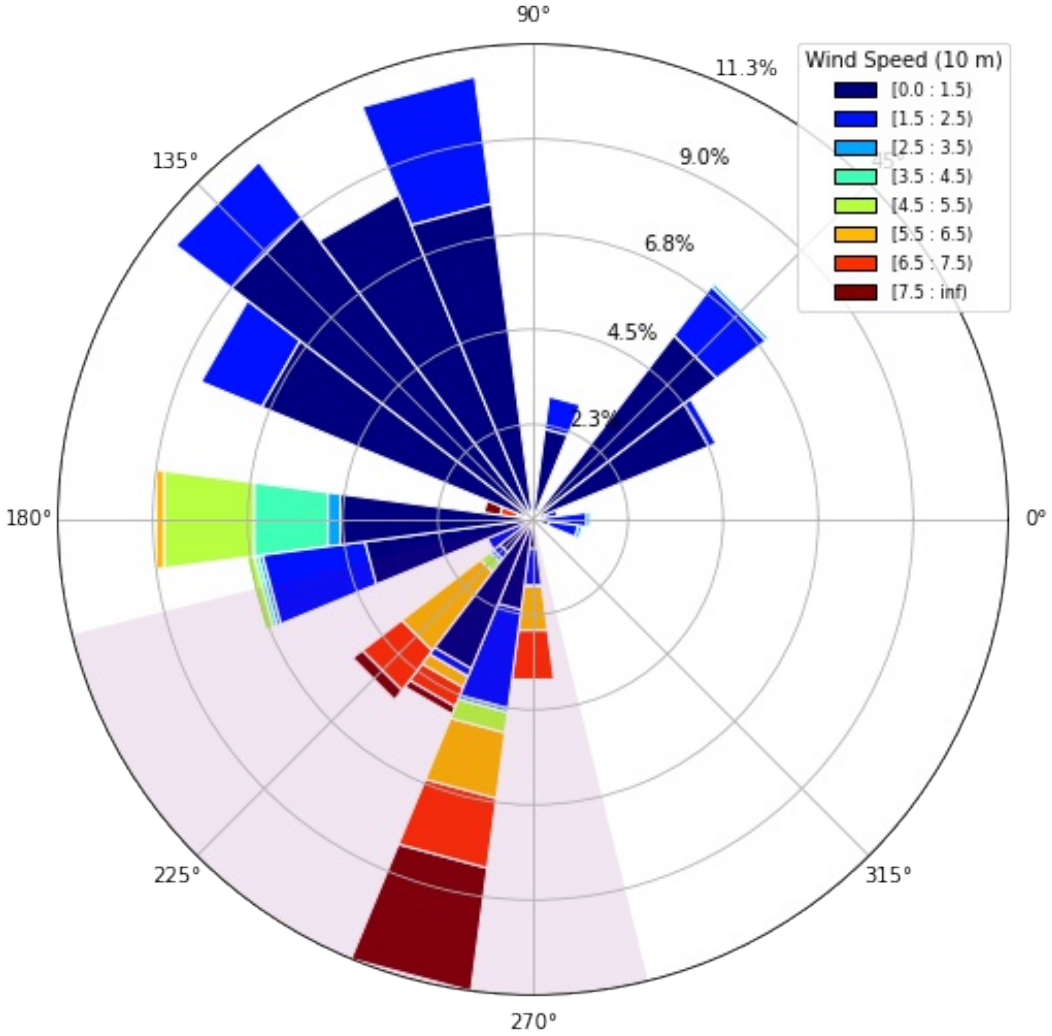
Project ID:	13228.07
Drawn by:	AM
Reveiwed by:	PA
Date:	February, 2022
Revision:	1
Scale:	As Indicated

South Kent Wind Farm
Daytime Immission Audit Report
R2794 - T060

Appendix C.1

Supplementary Wind Rose based on Assessment Data Total Noise

aercoustics



Project ID: 13228.07
Drawn by: AM
Reveiwed by: PA
Date: February, 2022
Revision: 1
Scale: As Indicated

South Kent Wind Farm
Daytime Immission Audit Report
R2794 - T060

Appendix C.2

Supplementary Wind Rose based on Assessment Data Background Noise

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Appendix D
Calibration Certificates

CALIBRATION CERTIFICATES

Details are disclosed in the table below regarding the calibration of the equipment used for the Immission Audit at monitor location R4368. The associated calibration certificates are provided in this appendix.

Audit Receptor	Equipment	Make/Model	Serial Number	Date of Last Calibration
R2794	Sound Level Meter	2250	3004431	Feb 17, 2021
	Microphone	4189	2888684	Feb 17, 2021
	Pre-Amplifier	ZC 0032	20151	Feb 17, 2021
	Weather Anemometer	Vaisala WXT520	K0630016	June 29, 2021

CERTIFICATE of CALIBRATION

Make :	Bruel & Kjaer	Reference # :	163807
Model :	2250	Customer :	Aercoustics Engineering Ltd Mississauga, ON
Descr. :	Sound Level Meter Type 1		
Serial # :	3004431	P. Order :	2020.11.11
Asset # :	00039		

Cal. status : Received in spec's, no adj. made, minor repair.
Unit repaired by Durham Instruments

Navair Technologies certifies that the above listed instrument was calibrated on date noted and was released from this laboratory performing in accordance with the specifications set forth by the manufacturer.

Unless otherwise noted in the calibration report a 4:1 accuracy ratio was maintained for this calibration.

Our calibration system complies with the requirements of ISO-9001-2015 and is registered under certificate CA96/269, working standards used for calibration are certified by or traceable to the National Research Council of Canada or the National Institute of Standards and Technology.

Calibrated : Feb 17, 2021 By : Petro Onasko

Cal. Due : Feb 17, 2023

Temperature : 23 °C ± 2 °C Relative Humidity : 30% to 70%

Standards used : J-216 J-303 J-512

Navair Technologies

REPAIR AND CALIBRATION TRACEABLE TO NRC AND NIST
6375 Dixie Rd. Mississauga, ON, L5T 2E7 http: // www.navair.com
Phone : 800-668-7440 Fax: 905 565 8325 e-Mail: service @ navair.com

NT NAVAIR TECHNOLOGIES

6375 Dixie Rd Unit # 7
Mississauga ON L5T 2E7
Tel: (905) 565-1583
Fax: (905) 565-8325

Form: BK2250	Approved by: J.R.	May-09	Ver 1.0

Calibration Report part of Certificate: **163807**

Make	Model	Serial	Asset	Cal by
Brüel & Kjær	2250	*3004431*	*00039*	*P.O.*

TYPE 1 Specs

With mike 4189 № 2888684 & preamp ZC 0032 No 20151

Test	Input	Min	Reading	Max	In/Out

Frequency Response

Tested with Dummy Microphone — IEC61672-1 limits
WTG Curve Check

31.5 Hz	72.6	*74.5 dB A*	76.6	*In*
63 Hz	86.3	*87.8 dB A*	89.3	*In*
125 Hz	96.4	*97.8 dB A*	99.4	*In*
250 Hz	103.9	*105.3 dB A*	106.8	*In*
500 Hz	109.4	*110.8 dB A*	112.2	*In*
1 kHz	112.9	*114.0 dB A*	115.1	*In*
2 kHz	113.6	*115.2 dB A*	116.8	*In*
4 kHz	113.4	*115.0 dB A*	116.6	*In*
8 kHz	109.8	*112.9 dB A*	115.0	*In*
12.5 kHz	103.7	*109.3 dB A*	112.7	*In*
31.5 Hz	109.0	*111.0 dB C*	113.0	*In*
63 Hz	111.7	*113.2 dB C*	114.7	*In*
125 Hz	112.3	*113.8 dB C*	115.3	*In*
250 Hz	112.5	*114.0 dB C*	115.4	*In*
500 Hz	112.6	*114.0 dB C*	115.4	*In*
1 kHz	112.9	*114.0 dB C*	115.1	*In*
2 kHz	112.2	*113.8 dB C*	115.4	*In*
4 kHz	111.6	*113.2 dB C*	114.8	*In*
8 kHz	107.9	*111.0 dB C*	113.1	*In*
12.5 kHz	101.8	*107.4 dB C*	110.8	*In*
31.5 Hz	112.0	*114.1 dB Z*	116.0	*In*
63 Hz	112.5	*114.0 dB Z*	115.5	*In*
125 Hz	112.5	*114.0 dB Z*	115.5	*In*
250 Hz	112.5	*114.0 dB Z*	115.4	*In*
500 Hz	112.6	*114.0 dB Z*	115.4	*In*
1 kHz	112.9	*114.0 dB Z*	115.1	*In*
2 kHz	112.4	*114.0 dB Z*	115.6	*In*
4 kHz	112.4	*114.0 dB Z*	115.6	*In*
8 kHz	110.9	*114.0 dB Z*	116.1	*In*
12.5 kHz	108.0	*113.6 dB Z*	117.0	*In*

NT NAVAIR TECHNOLOGIES

6375 Dixie Rd Unit # 7
Mississauga ON L5T 2E7
Tel: (905) 565-1583
Fax: (905) 565-8325

Test	Input	Min	Reading	Max	In/Out
Scale Test with microphone					
	Scale dBc @1 kHz				
	20 - 140 dB Range				
	114 dB	113.5	*114.0 dB*	114.5	*In*
	104 dB	103.5	*104.0 dB*	104.5	*In*
	94 dB	93.5	*94.0 dB*	94.5	*In*
Impulse Test					*Pass*
Fast/Slow					*Pass*
AC O/P					*Pass*
Source operation					*Pass*

SOH Wind Engineering LLC
141 Leroy Road · Williston, VT 05495 · USA
Tel 802.316.4368 · Fax 802.735.9106 · www.sohwind.com

CERTIFICATE FOR CALIBRATION OF SONIC ANEMOMETER

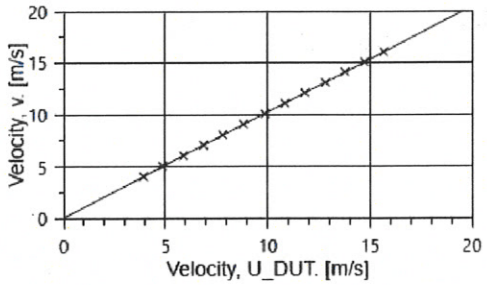
Certificate number: 21.US2.04683 **Date of issue:** June 29, 2021
Type: Vaisala Weather Transmitter, WXT520 **Serial number:** K0630016
Manufacturer: Vaisala, Oyj, Pl 26, FIN-00421 Helsinki, Finland
Client: Aercoustics Engineering Ltd., 1004 Middlegate RD, Suite 1100, S.Tower, Mississauga, ON L4Y 1M4, Canada

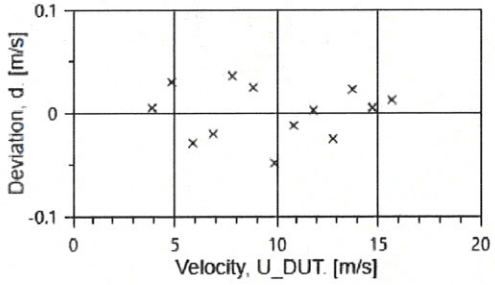
Anemometer received: June 24, 2021 **Anemometer calibrated:** June 29, 2021
Calibrated by: MEJ **Procedure:** MEASNET, IEC 61400-12-1:2017 Annex F
Certificate prepared by: EJF **Approved by:** Calibration engineer, EJF

Calibration equation obtained: v [m/s] = 1.01964 · U [m/s] + 0.02945

Standard uncertainty, slope: 0.00198 **Standard uncertainty, offset:** 0.71773
Covariance: -0.0000399 (m/s)²/m/s **Coefficient of correlation:** ρ = 0.999979
Absolute maximum deviation: -0.049 m/s at 10.055 m/s
Barometric pressure: 1007.5 hPa **Relative humidity:** 51.3%

Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	d.p. box [°C]	Wind velocity, v. [m/s]	Anemometer Output, U. [m/s]	Deviation, d. [m/s]	Uncertainty u_c (k=2) [m/s]
1-first	9.33	28.4	27.0	4.017	3.9067	0.005	0.023
13-last	14.51	28.5	27.0	5.011	4.8567	0.030	0.026
2	20.92	28.3	27.0	6.016	5.9000	-0.029	0.030
12	28.46	28.5	27.0	7.021	6.8767	-0.020	0.034
3	37.31	28.3	27.0	8.035	7.8167	0.036	0.039
11	47.29	28.6	27.0	9.050	8.8233	0.024	0.043
4	58.42	28.3	27.0	10.055	9.8800	-0.049	0.047
10	70.60	28.6	27.0	11.059	10.8293	-0.012	0.051
5	84.12	28.4	27.0	12.067	11.8033	0.002	0.056
9	98.48	28.6	27.0	13.063	12.8067	-0.025	0.060
6	114.40	28.4	27.0	14.075	13.7533	0.022	0.064
8	130.78	28.6	27.0	15.054	14.7300	0.005	0.069
7	148.32	28.5	27.0	16.030	15.6800	0.012	0.073





EQUIPMENT USED

Serial Number	Description
Njord2	Wind tunnel, blockage factor = 1.0035
13924	Control cup anemometer
-	Mounting tube, D = 19 mm
TT005	PR Electronics, PT100, 0-10V Output, wind tunnel temp.
TT003	Summit Electronics, 1XPT100, 0-10V Output, differential pressure box temp.
DP008	Setra Model 239, 0-1inWC, differential pressure transducer
HY004	Dwyer RHP-2D20, 0-10V Output, humidity transmitter
BP001	Setra Model 278, barometer
PL3	Pitot tube
XB001	Computer Board. 16 bit A/D data acquisition board
Njord2-PC	PC dedicated to data acquisition

The accuracies of all measurements were traceable to the SI through NIST or CIPM recognized NMI's.

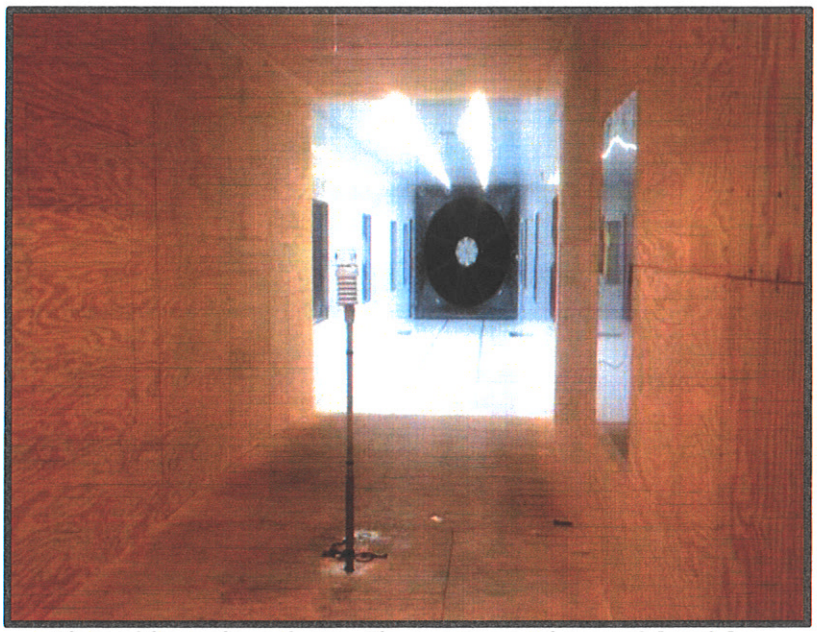


Photo of the wind tunnel setup. The cross-sectional area is 2.5m x 2.5m.

UNCERTAINTIES

The documented uncertainty is the total combined uncertainty at 95% confidence level (k=2) in accordance with EA-4/02. The uncertainty at 10 m/s comply with the requirements in the IEC 61400-12-1:2005 procedure. See Document US.12.01.004 for further details.

COMMENTS

This sensor was oriented in the 90° position during calibration.

Certificate number: 21.US2.04683

SOH Wind Engineering LLC
141 Leroy Road · Williston, VT 05495 · USA
Tel 802.316.4368 · Fax 802.735.9106 · www.sohwind.com

CERTIFICATE FOR CALIBRATION OF SONIC ANEMOMETER

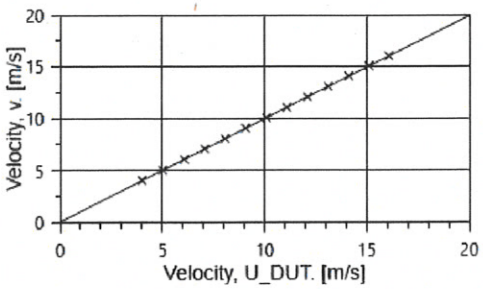
Certificate number: 21.US2.04684 **Date of issue:** June 29, 2021
Type: Vaisala Weather Transmitter, WXT520 **Serial number:** K0630016
Manufacturer: Vaisala, Oyj, Pl 26, FIN-00421 Helsinki, Finland
Client: Aercoustics Engineering Ltd., 1004 Middlegate RD, Suite 1100, S.Tower, Mississauga, ON L4Y 1M4, Canada

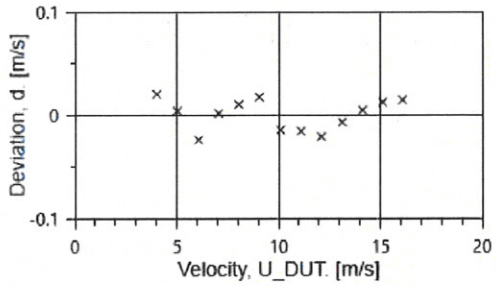
Anemometer received: June 24, 2021 **Anemometer calibrated:** June 29, 2021
Calibrated by: MEJ **Procedure:** MEASNET, IEC 61400-12-1:2017 Annex F
Certificate prepared by: EJF **Approved by:** Calibration engineer, EJF

Calibration equation obtained: v [m/s] = 0.99391 · U [m/s] + 0.01735

Standard uncertainty, slope: 0.00117 **Standard uncertainty, offset:** 0.72021
Covariance: -0.0000136 (m/s)²/m/s **Coefficient of correlation:** $\rho = 0.999992$
Absolute maximum deviation: -0.024 m/s at 6.028 m/s
Barometric pressure: 1007.5 hPa **Relative humidity:** 51.3%

Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	Temperature in d.p. box [°C]	Wind velocity, v. [m/s]	Anemometer Output, U. [m/s]	Deviation, d. [m/s]	Uncertainty u_c (k=2) [m/s]
1-first	9.35	28.4	27.1	4.023	4.0100	0.020	0.023
13-last	14.50	28.6	27.1	5.012	5.0214	0.004	0.026
2	20.99	28.4	27.1	6.028	6.0714	-0.024	0.030
12	28.65	28.6	27.1	7.045	7.0690	0.001	0.034
3	37.30	28.4	27.1	8.035	8.0571	0.010	0.039
11	47.18	28.7	27.1	9.041	9.0619	0.017	0.043
4	58.30	28.4	27.1	10.046	10.1048	-0.015	0.047
10	70.31	28.7	27.1	11.039	11.1048	-0.016	0.051
5	83.67	28.4	27.1	12.037	12.1143	-0.021	0.056
9	98.34	28.7	27.1	13.056	13.1262	-0.007	0.060
6	114.08	28.5	27.1	14.057	14.1214	0.005	0.064
8	130.65	28.7	27.1	15.049	15.1119	0.012	0.069
7	147.90	28.6	27.1	16.010	16.0762	0.014	0.073





EQUIPMENT USED

Serial Number	Description
Njord2	Wind tunnel, blockage factor = 1.0035
13924	Control cup anemometer
-	Mounting tube, D = 19 mm
TT005	PR Electronics, PT100, 0-10V Output, wind tunnel temp.
TT003	Summit Electronics, 1XPT100, 0-10V Output, differential pressure box temp.
DP008	Setra Model 239, 0-1inWC, differential pressure transducer
HY004	Dwyer RHP-2D20, 0-10V Output, humidity transmitter
BP001	Setra Model 278, barometer
PL3	Pitot tube
XB001	Computer Board. 16 bit A/D data acquisition board
Njord2-PC	PC dedicated to data acquisition

The accuracies of all measurements were traceable to the SI through NIST or CIPM recognized NMI's.

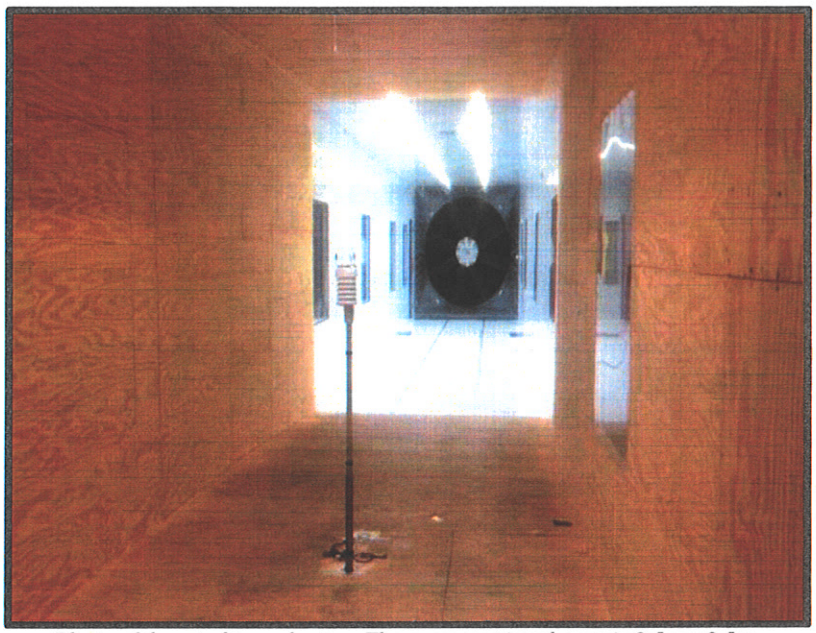


Photo of the wind tunnel setup. The cross-sectional area is 2.5m x 2.5m.

UNCERTAINTIES

The documented uncertainty is the total combined uncertainty at 95% confidence level (k=2) in accordance with EA-4/02. The uncertainty at 10 m/s comply with the requirements in the IEC 61400-12-1:2005 procedure. See Document US.12.01.004 for further details.

COMMENTS

This sensor was oriented in the 0° position during calibration.

Certificate number: 21.US2.04684

Appendix E
MECP I-Audit Checklist

MECP I-Audit Checklist

Wind Energy Project – Screening Document – Acoustic Audit Report – Immission

Information Required in the Acoustic Audit Report – Immission

Item #	Description	Complete?	Comment
1	Did the Sound level Meter meet the Type 1 Sound level meter requirements according to the IEC standard 61672-1 Sound level Meters, Part 1: Specifications? Section D2.1.1	✓	
2	Was the complete sound measurement system, including any recording, data logging or computing systems calibrated immediately before and after the measurement session at one or more frequencies using an acoustic calibrator on the microphone (must not exceed ±0.5dB)? Section D2.1.3	✓	
3	Are valid calibration certificate(s) of the noise monitoring equipment and calibration traceable to a qualified laboratory? Is the validity duration of the calibration stated for each item of equipment? Section D2.3	✓	
4	Was the predictable worst case parameters such as high wind shear and wind direction toward the Receptor considered? Section D3.2	✓	
5	Is there a Wind Rose showing the wind directions at the site? Section D7 (1e)	✓	
6	Did the results cover a wind speed range of at least 4-7 m/s as outlined in section D 3.8.?	✓	
7	Was the weather report during the measurement campaign included in the report? Section D7 (1c)	✓	
8	Did the audit state there was compliance with the limits at each wind speed category? Section D6	✓	
9	Are pictures of the noise measurement setup near Point of reception provided? Section D3.3.2 & D3.4	✓	
10	Was there justification of the Receptor location choice(s) prior to commencement of the I-Audit? Section D4.1	✓	
11	Was there sufficient valid data for different wind speeds? Section D5.2 # 3	✓	
12	Was the turbine (operational) specific information during the measurement campaign in tabular form (i.e. wind speed at hub height, anemometer wind speed at 10 m height, air temperature and pressure and relative humidity) Section D3.7	✓	
13	Were all the calculated standard deviations at all relevant integer wind speeds provided? Section D7 (2d)	✓	
14	Compliance statement	✓	
15	All data included in an Excel spreadsheet	✓	
16	If deviations from standard; was justification of the deviations provided	✓	

Appendix F
E-Audit Report Summary

E-AUDIT REPORT SUMMARY

This section provides a summary of the results from the following E-Audit report:

> REPORT ID: 13228.00.T060.RP5, South Kent Wind Farm – Turbine T060, IEC 61400-11 Edition 3.0 Measurement Report dated 21 December 2018 – Revision 5.

Sound Power Level of Turbine

The calculated apparent sound power level at hub height is summarized in Table 1. Corresponding sound power levels for 10 m height wind speeds are provided in Table 2.

Table 1 – $L_{WA,\,K}$ at each integer wind speed

Wind Speed (m/s)	Apparent L_{WA}, (dBA)	Uncertainty (dB)
7.5	102.5*	1.0
8	103.3	0.9
8.5	104.0	0.8
9	104.1	0.8
9.5	104.2	0.8
10	104.4	0.7
10.5	104.8	0.8
11	104.9	0.8
11.5	104.8	0.8
12	104.7	0.8
12.5	104.7	0.9

Values marked with an asterisk * denote 3 to 6 dB difference between Turbine ON and Background

Table 2 – $L_{WA\ 10m,\,K}$ at each integer wind speed

Wind Speed (m/s)	Apparent L_{WA}, (dBA)	Uncertainty (dB)
5	101.8*	1.0
6	103.9	0.8
7	104.4	0.8
8	104.8	0.8
9	104.7*	1.4

Values marked with an asterisk * denote 3 to 6 dB difference between Turbine ON and Background

Tonality Analysis

The tonality analysis for the turbine is summarized in Table 3. All ΔL_{tn} and ΔL_a values reported represent the energy average of all data points with an identified tone that fall within the same frequency of origin.

Table 3 – Tonality Assessment Summary

Wind Speed (m/s)	Frequency (Hz)	Tonality, ΔL_{tn} (dB)	Tonal audibility, ΔL_a (dB)	FFT's with tones	Total # of FFT's	Presence (%)
7.5	416	-5.0	-2.7	74	119	62%
8	426	-0.2	2.0	61	177	34%
8.5	475	-4.7	-2.4	187	189	99%
9	111	-4.5	-2.5	55	55	100%
9	476	-2.2	0.1	55	55	100%
9.5	111	-3.9	-1.9	25	25	100%
9.5	476	0.6	2.9	25	25	100%
10	112	-3.1	-1.0	14	14	100%
10	478	3.6	5.8	14	14	100%
10.5	119	-0.4	1.6	18	18	100%
10.5	489	1.6	3.9	17	18	94%
11	119	0.6	2.6	29	29	100%
11	491	1.4	3.7	27	29	93%
11.5	119	0.5	2.5	43	43	100%
11.5	492	1.0	3.3	43	43	100%
12	119	0.5	2.5	36	36	100%
12	492	1.2	3.4	35	36	97%
12.5	119	-0.1	1.9	8	8	100%
12.5	494	1.2	3.5	8	8	100%

Closure

Measurements and analyses per IEC 61400-11:2012 (Edition 3.0) were performed on turbine T060 of the South Kent Wind Farm, located in the municipality of Chatham-Kent. The test turbine was found to have a maximum apparent sound power level of 104.9 dBA and a maximum tonal audibility of 5.8 dB.

Appendix G
Additional Justification/ Supplementary Information for the Regulator

SP South Kent Wind LP
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February 12, 2020

Director, Environmental Approvals Access and Service
Integration Branch Ministry of Environment
2 St. St Clair Avenue West, Floor 12A
Toronto ON M4V 1L5

Subject: South Kent Wind Project (REA #2871-8UKGPC) Receptor Imission Audit 2019-2020 Land Access

Dear Director

Please accept this letter acknowledging on August 2, 2019 South Kent did attempt to get access granted to lands for receptor R2736, but the land owner declined to participate in the Audit.

Also, South Kent could not use receptor R3282 due to the fact that the potential monitor location was inside of a horse pen. For the safety of the animals it was decided to use another location on the same lands.

Sincerely,

Kevin Aikenhead
Facility Manager
South Kent Wind
C: 519-350-9373

aercoustics

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Secondary Windscreen

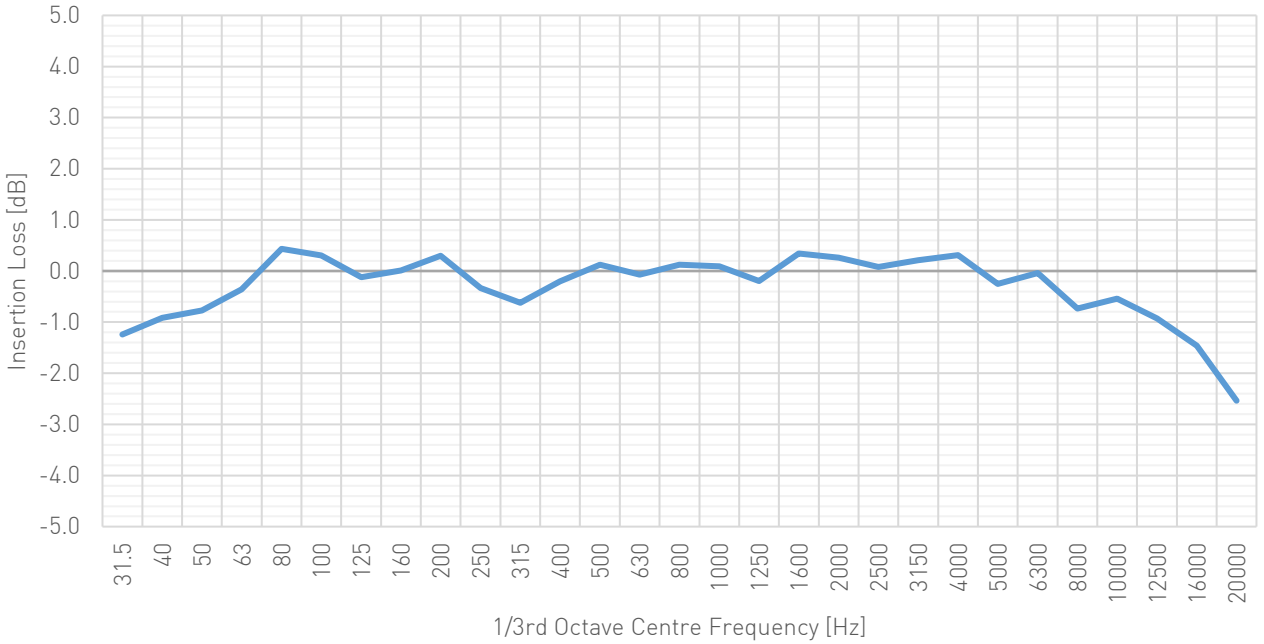
Certificate of Conformance

Model description: 24 inch wide, spherical secondary wind screen with aluminium frame, and approx. 1 inch thick foam with porosity in conformance with IEC 61400-11

Insertion Loss specification in accordance with ANSI S1.17 Part 1 (2004)

Frequency [Hz]	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630
IL [dB]	-1.2	-0.9	-0.8	-0.4	0.4	0.3	-0.1	0.0	0.3	-0.3	-0.6	-0.2	0.1	-0.1

[Hz]	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	12500	16000	20000
[dB]	0.1	0.1	-0.2	0.3	0.3	0.1	0.2	0.3	-0.3	0.0	-0.7	-0.5	-0.9	-1.5	-2.5



Appendix G - Power Thresholds for 90% Sound Power

*Wind bins for interpolation are highlighted in light blue

Table G.1: SKWP P060 Turbine - Measured Power and Sound Power

P060 (2.126 MW) E-Audit Test Results Summary												
IEC 61400-11 Test	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13
Power (kW)	994	1196	1425	1654	1817	1979	2038	2096	2109	2121	2123	2125
SPL (dBA)	102.7	104.1	104.6	104.5	104.5	104.4	104.7	104.9	104.6	104.5	104.5	104.3

Table G.2: Power Thresholds for 90% Sound Power

	maximum sound	90% sound power	electrical power at	percentage of rated
P060	104.9	104.4	1283	60%

End of Report