aercoustics

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 1M4

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

REPORT ID**: 14284.00T60.RP5**

Grand Renewable Wind Farm – Turbine T60
IEC 61400-11 Edition 3.0 Measurement Report

Prepared for:

Grand Renewable Wind LP / Grand Renewable Wind GP Inc.
2050 Derry Road West, 2nd Floor
Mississauga, Ontario
L5N 0B9

Prepared by:

Kohl Clark, B. Eng.,

Payam Ashtiani, B.A.Sc., P.Eng.

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SCC Accredited CB-P/S
OCPS Accrédité CCN

Revision History

Revision Number	Description	Date
1	Issued Edition 2.1 draft test report	September 9, 2015
2	Issued final Edition 2.1 test report – updated power curve, minor edits	November 13, 2015
3	Issued final Edition 2.1 test report with minor corrections to report body	November 18, 2015
4	Minor updates to Table 2 (Edition 2.1)	February 04, 2016
5	Issued Edition 3.0 test report	March 02, 2018

This report in its entirety, including appendices contains 78 pages.

Statement of Qualifications and Limitations

This report was prepared by Aercoustics Engineering Limited in accordance with International Standard IEC 61400-11 (Edition 3.0, released 2012-11), "Wind turbine generator systems – Part 11: Acoustic noise measurement techniques". This report is specific only to the Wind Turbine identified in this report.

Aercoustics Engineering Limited shall not be responsible for any events or circumstances that may have occurred since the date on which the Wind Turbine was tested and/or this report was prepared, or for any inaccuracies contained in information that was provided to Aercoustics Engineering Limited. Further, Aercoustics Engineering Limited agrees that this report represents test data analysed as per the above described standard for the specific Wind Turbine described in this report, but Aercoustics Engineering Limited makes no other representations with respect to this report or any part thereof.

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This Statement of Qualifications and Limitations is attached to and forms part of this report.

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1 Introduction

Aercoustics Engineering Limited (Aercoustics) was retained by Grand Renewable Wind Farm ("GRWLP") to conduct an acoustic measurement of turbine T60 at the Grand Renewable Wind Farm. The purpose of the measurement was to provide verification of the maximum noise emission of the turbine. The measurement was carried out in accordance with International Standard IEC 61400-11 (Edition 3.0, released 2012-11), "Wind turbine generator systems – Part 11: Acoustic noise measurement techniques". This report is specific only to Turbine T60.

2 Wind Turbine Information

2.1 Wind turbine equipment specific information

Wind turbine specific equipment information for turbine T60 was provided by GRWLP and is summarized in Tables 1 – 5.

Table 1 - Wind Turbine Details

Wind Turbine Details	
Manufacturer	Siemens
Model Number	SWT2.3-101
Turbine ID	T60

Table 2 - Operating Details

Operating Details	
Vertical or Horizontal axis wind turbine	Horizontal
Upwind or downwind rotor	Upwind
Hub height	99.5 m
Horizontal distance from rotor centre to tower axis	3.5 m
Diameter of rotor	101 m
Tower type (lattice or tube)	Tubular
Passive stall, active stall, or pitch controlled turbine	Pitch controlled turbine
Constant or variable speed	Variable Speed
Power curve	See Figure B.01
Rotational speed at each integer standardised wind speed	See Figure B.02
Rated power output	2.221 MW
Control software version	14.04.30

Table 3 - Rotor Details

Rotor Details	
Rotor control devices	Pitch control
Presence of vortex generators, stall strips, serrated trailing edges	Vortex generators, Dino Tails, Winglet
Blade type	B49
Serial number	Blade A – 4902117901 Blade B – 4902114201 Blade C – 4902114001
Number of blades	3

Table 4 - Gearbox Details

Gearbox Details	
Manufacturer	Winergy
Model number	PEAB4456.8 cold climate 2.3MW
Serial number	4852343-0110-6

Table 5 - Generator Details

Generator Details	
Manufacturer	Loher
Model number	Generator Loher C3, SG V2
Serial number	6011712

2.2 Wind Turbine Location

Turbine T60 is located approximately 590m West of Port Maitland Road, and 1090m North of Kings Row in Haldimand County near the town of Dunnville. The specific UTM coordinates for T60 are 614974 mE, 4748176 mN, zone 17T.The area surrounding T60 is flat and consists primarily of farmland.

A general layout of the area in which the turbine is located is provided in the site plan (Figure A.01).

3 Measurement Details

3.1 Measurement Equipment

3.1.1 Acoustic Measurement Equipment

A summary of acoustic equipment utilized by Aercoustics for the measurement of turbine T60 is summarized in Table 6.

Table 6 - Acoustic Measurement Equipment

Equipment	Manufacturer Name & Model	Serial Number
Acoustic Data acquisition system	LMS SCADA Mobile	22143211
Microphone	B&K 4189	2369794
Pre-amplifier	B&K 2671	2625416
Acoustic calibrator	B&K 4231	3012380

Calibration of the measurement setup was carried out before and after Aercoustics set of measurements.

3.1.2 Meteorological Equipment

Wind speed for Turbine ON was derived from the power curve (as per procedures outlined in IEC 61400-11). Wind direction for turbine ON measurements was taken from the angular position of T60's nacelle yaw motor at a hub height of 99.5 meters. Data for background measurements was obtained from a 10m high anemometer, which was placed as per guidelines outlined in IEC-61400-11, Edition 2.1.

The meteorological equipment is summarized in Table 7

Table 7 – Meteorological Measurement Equipment

Equipment	Manufacturer Name & Model	Serial Number
Anemometer	VAISALA WXT520	K4250007
Serial to Analog Converter	NOKEVAL 7470	A165164

3.2 Measurement Setup

3.2.1 Microphone Placement

The measurement microphone was setup 154 m from the base of the turbine in 'Position 1', (i.e. downwind of the turbine, as per IEC 61400-11) at an elevation of 0m relative to the base of T60. The microphone was placed in the centre of a circular, acoustically reflective board.

During the measurement period only, data points for which the microphone was within 15 degrees of downwind from the turbine were used. The microphone position relative to downwind of the turbine was monitored via the yaw angle output provided from the turbine

system (discussed further in Section 3.5). During placement of the microphone the turbine was parked and the reference yaw angle for that measurement logged.

When measurements of T60 were taken, the surrounding land was planted with mature soy bean crop. The soy beans were removed in the immediate vicinity were removed; the effect from the remaining plants on the measurement was considered negligible. There were no nearby reflecting surfaces (houses, barns etc.); as such the influence from reflecting surfaces was considered to be negligible.

Photos of the measurement setup are provided in Figure A.02, Appendix A.

3.2.2 Double Windscreen Setup

A double windscreen setup was not utilized.

3.3 Measurement Schedule

Table 8 provides a summary of the test date and times. Data was logged in 10 second intervals for post-processing (as per the measurement standard).

Table 8 - Measurement Schedule Summary

Date	Test Type	Start Time	Finish time
August 13, 2015	Background	11:40 am	12:15 pm
	Turbine ON	12:24 pm	1:05 pm
	Background	1:34 pm	2:04 pm
	Turbine ON	2:32 pm	2:39 pm
	Turbine ON	2:39 pm	3:15pm
	Background	3:20 pm	3:51 pm
	Turbine ON	3:59 pm	4:32 pm
	Background	4:38 pm	5:31 pm

3.4 Meteorological Conditions

Detailed meteorological data relevant to the measurement is provided in Appendix E.

As previously mentioned, wind speed for Turbine ON was derived from T60's power curve (as per the standard), while wind direction was provided by the nacelle position of Turbine T60. Background data was obtained from an anemometer located 10m above ground level near T60.

Temperature and pressure readings during the measurement period were provided by the 10m anemometer, located near turbine T60 for the duration of Aercoustics measurements.

3.5 Turbine operational information

Output data from the turbine (Power, yaw, RPM, pitch angle, and nacelle wind speed) were obtained as analog output signals that were simultaneously acquired with the acoustic and anemometer measurement data using Aercoustics data acquisition system.

4 Measurement Results

4.1 Deviations from IEC-61400-11 Edition 3.0

Originally, the test contract required measurements in accordance to edition 2.1 of the standard (61400-11) which requires the anemometer to be placed upwind of the turbine. This test report is a reprocessing of the originally acquired data and as such during the test, the anemometer position was erected in an upwind (Ed 2.1), rather than crosswind (Ed 3.0) position relative to the test turbine.

The acoustic signal to noise ratio for the noise levels is >13.1 dB. This deviation is therefore considered to be negligible to the assessment of the maximum sound power of this turbine for this test. This method is in accordance with recommendations made by the convenor of IEC 61400-11 working group and detailed in Note N6.023.17 and provided in Appendix F.

4.2 Special Notes & Considerations

There were no other turbines in the immediate vicinity of T60.

4.3 Analysis Details

The following section outlines analysis of the measurement data acquired for T60. The data presented is exclusive of transient events such as vehicle traffic, wildlife, air traffic etc. The site has been assessed to have a roughness length of 0.05m, representative of farmland with some vegetation.

4.3.1 Double Windscreen Adjustment

As previously mentioned, no double wind screen was used, as such the measurement data did not require adjustment.

4.3.2 Wind Speed Correction

The wind speed for each measurement data point for Turbine ON was derived through the power curve (as per Section 8.2.1.1 of IEC-61400-11). For data points during Turbine ON that were outside the allowed range of the power curve, the wind speed was derived from the nacelle anemometer wind speed (as specified in Section 8.2.1.2 of IEC-61400-11).

Background wind speed was derived utilizing data acquired with the 10m anemometer and normalizing the wind speed (as per Section 8.2.2 of IEC-61400-11).

4.4 Type B uncertainties

Type B uncertainties were obtained through interpretation of information provided in Annex C of IEC-61400-11, and instrument uncertainties obtained from the calibration certificate. A summary of Type B uncertainties is provided in Table 9, while detailed information (including data in 1/3 octave) is provided in Appendix C.

Table 9 - Summary of Type B uncertainties

Component	Typical (dB)	Used (dB)
Calibration	0.2	0.2
Board	0.3	0.3
Distance & direction	0.1	0.1
Air absorption	0	0
Weather conditions	0.5	0.5
Wind speed measured	0.7	0.7
Wind speed derived	0.2	0.2
Wind speed from power curve	0.2	0.2

4.5 Sound Pressure Level Measurements

Sound pressure level measurements are summarized in Table 10. Detailed 1/3 Octave band spectrum data, respective uncertainties, and analysis plots are provided in Appendix C. A copy of the measurement data used for analysis is provided in Appendix E and includes meteorological and turbine operational data.

Table 10 - Summary of Sound Pressure Level Measurements

Wind Speed (m/s)	Turbine ON		Background		Turbine ON, Background adjusted L_{eq}, (dBA)
	L_{eq}, (dBA)	# of data pts	L_{eq}, (dBA)	# of data pts	
7.5	52.1	64	39.0	66	51.9
8	53.7	77	38.8	82	53.6
8.5	54.8	38	39.2	102	54.7
9	55.3	38	39.7	80	55.1
9.5	55.4	37	39.5	100	55.3
10	55.3	31	39.5	67	55.2
10.5	55.4	17	40.8	49	55.2
11	55.4	33	39.3	50	55.3
11.5	55.4	40	39.6	33	55.3
12	55.3	31	40.9	29	55.2
12.5	55.4	24	39.7	22	55.2

4.6 Sound Power Level of Turbine

The calculated sound power level of the turbine T60 (as per IEC 61400-11) is summarized in Table 11 (hub height) and Table 12 (10m height). Detailed 1/3 Octave band spectrum data and respective uncertainties are provided in Appendix C.

Table 11 - $L_{WA,K}$ at each integer wind speed

Wind Speed (m/s)	Apparent L_{WA}, (dBA)	Uncertainty (dB)
7.5	102.2	0.7
8	103.9	0.7
8.5	105.1	0.7
9	105.5	0.7
9.5	105.7	0.7
10	105.5	0.7
10.5	105.6	0.7
11	105.6	0.7
11.5	105.7	0.7
12	105.5	0.7
12.5	105.6	0.7

Table 12 - $L_{WA\ 10m,K}$ at each integer wind speed

Wind Speed (m/s)	Apparent L_{WA}, (dBA)	Uncertainty (dB)
5	101.6	0.7
6	104.9	0.7
7	105.6	0.7
8	105.6	0.7
9	105.5	0.7

4.7 Tonality Analysis

The tonality analysis for Turbine T60 is summarized in Table 13, while plots of narrow band spectra at each wind speed are provided in Appendix D. The ΔL_{tn} and ΔL_a values reported represent the energy average of all data points with an identified tone that falls within the same frequency origin (as specified in Section 9.5.8 in IEC-61400-11).

The narrow band spectra provided in the plots represents an energy average of all data points in the given wind speed bin for both Turbine ON and Background.

Table 13 - 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 (%)
8	475	-4.7	-2.4	24	77	31%
8.5	486	-3.7	-1.4	32	38	84%
9	488	-3.4	-1.1	31	38	82%
9.5	496	-2.8	-0.5	27	37	73%
10	498	-2.9	-0.6	23	31	74%
10.5	504	-2.1	0.2	16	17	94%
11	505	-2.6	-0.3	32	33	97%
11.5	514	-2.3	0.0	30	40	75%
12	516	-2.1	0.2	30	31	97%
12.5	521	-1.0	1.3	16	24	67%

5 Closure

Measurements and analysis were carried on Turbine T60 of the Grand Renewable Wind Farm, located in the Haldimand County as per International IEC 61400-11 (Edition 3.0, released 2012-11), "Wind turbine generator systems – Part 11: Acoustic noise measurement techniques".

Should you have any questions or comments please do not hesitate to contact the authors of this report.

6 References

1. International Standard IEC 61400-11 (Edition 3.0, released 2012-11), "Wind turbine generator systems – Part 11: Acoustic noise measurement techniques".

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix A
Site Details

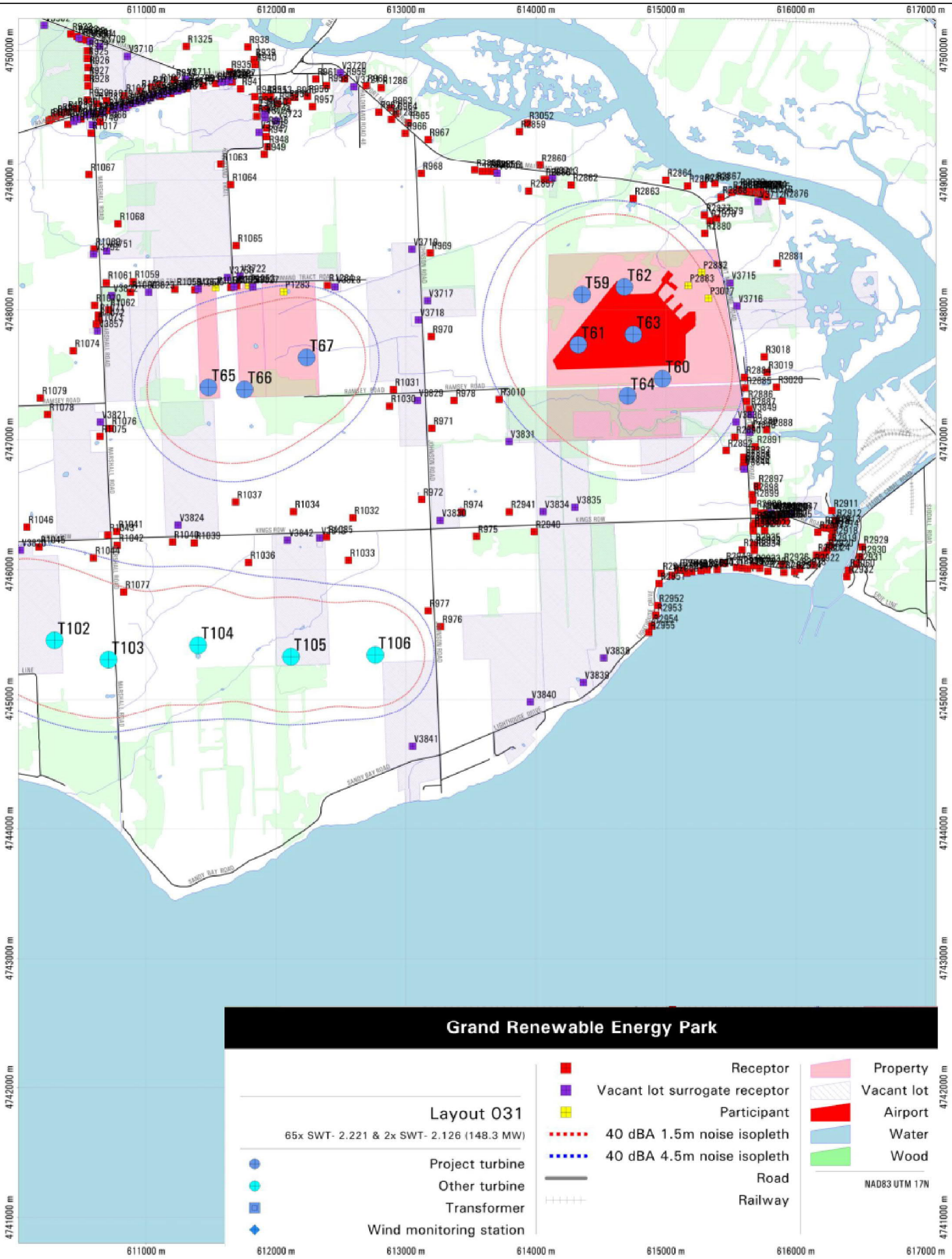

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Figure Title

Site Photos

Figure A.02

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix B
Turbine Information

Power Curve

Hub Wind Speed (m/s)	Electrical Power (kW)
0	0
1	0
2	0
3	27
4	116
5	264
6	485
7	792
8	1196
9	1666
10	2031
11	2180
12	2215
13	2220
14	2221
15	2221
16	2221
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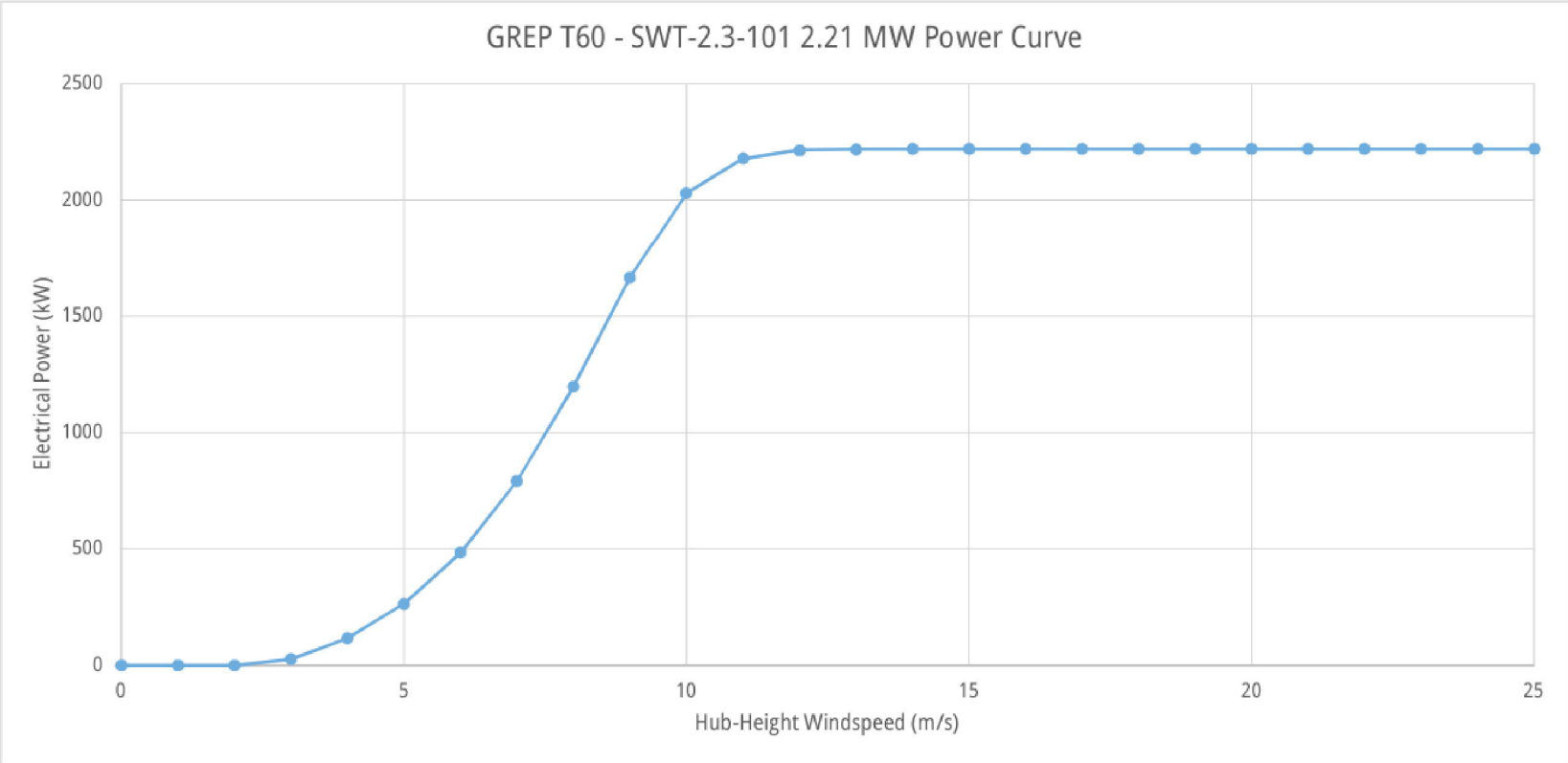
18	2221
19	2221
20	2221
21	2221
22	2221
23	2221
24	2221
25	2221



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Project Name

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Figure Title

Power Curve

Figure B.01

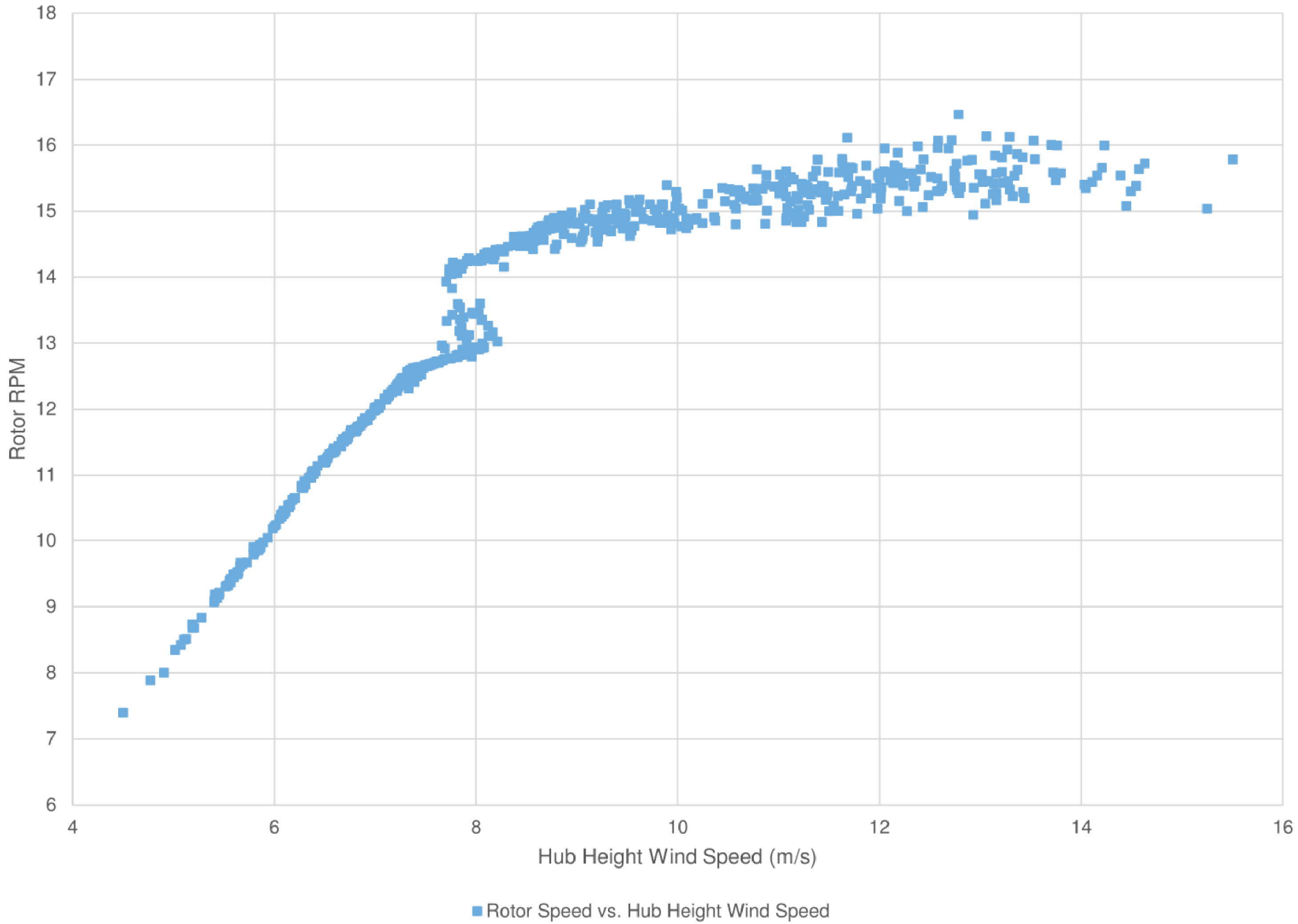

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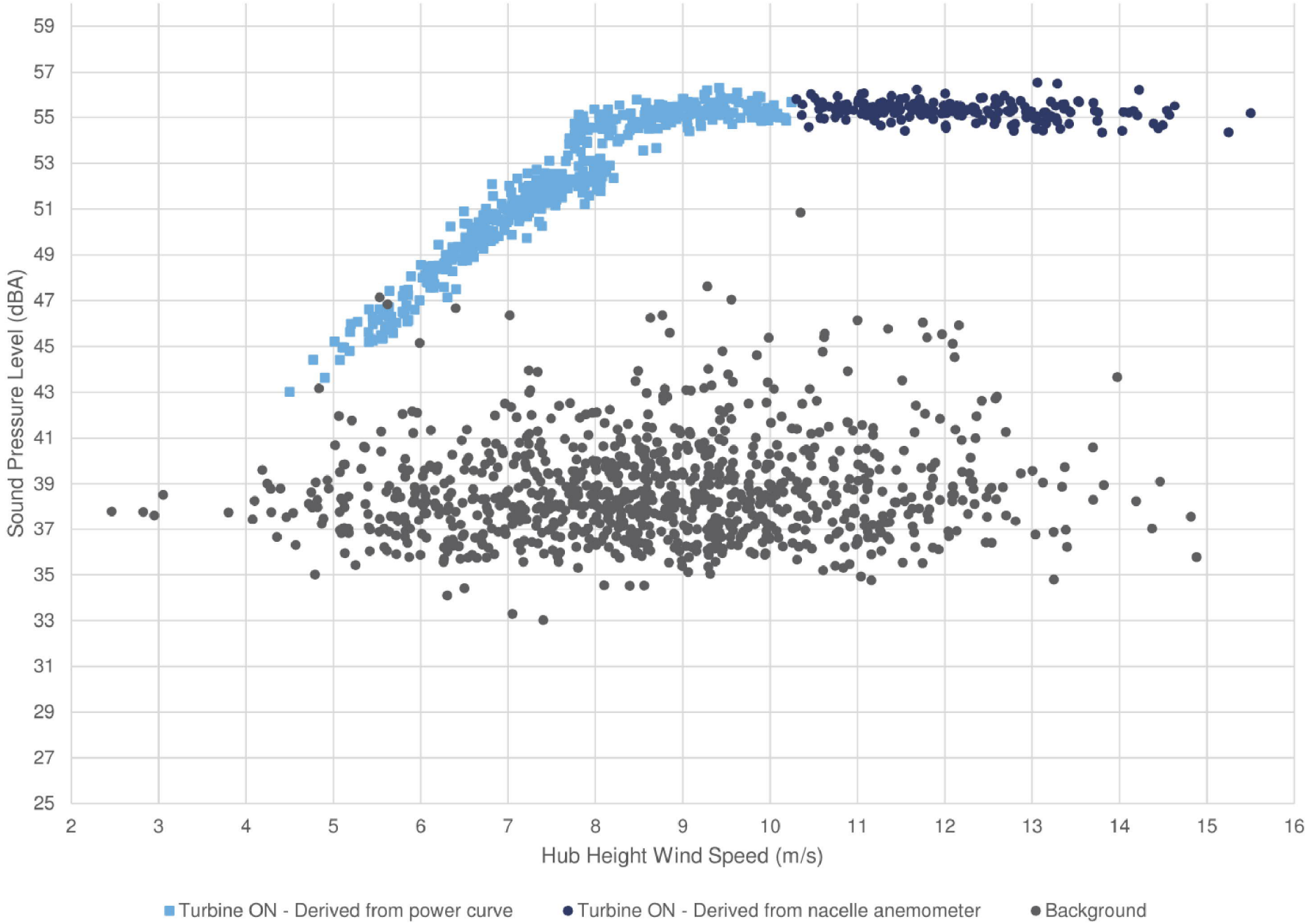
		Figure Title Rotor RPM vs. Wind Speed
		Figure B.02

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix C
Apparent Sound Power Level



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	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of overall measurement data pairs at Position 1 (Turbine ON & Background)	**Figure C.01**

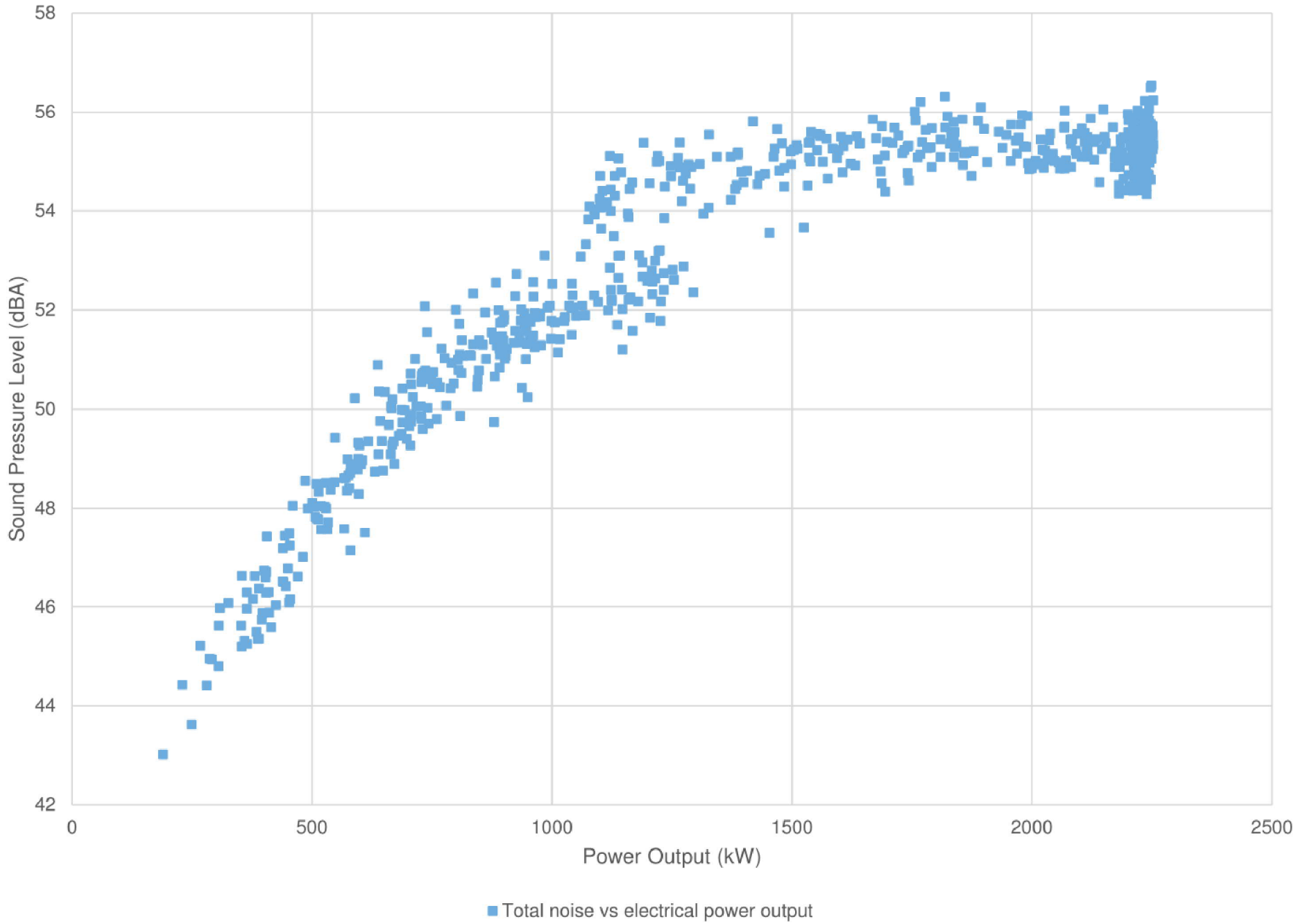

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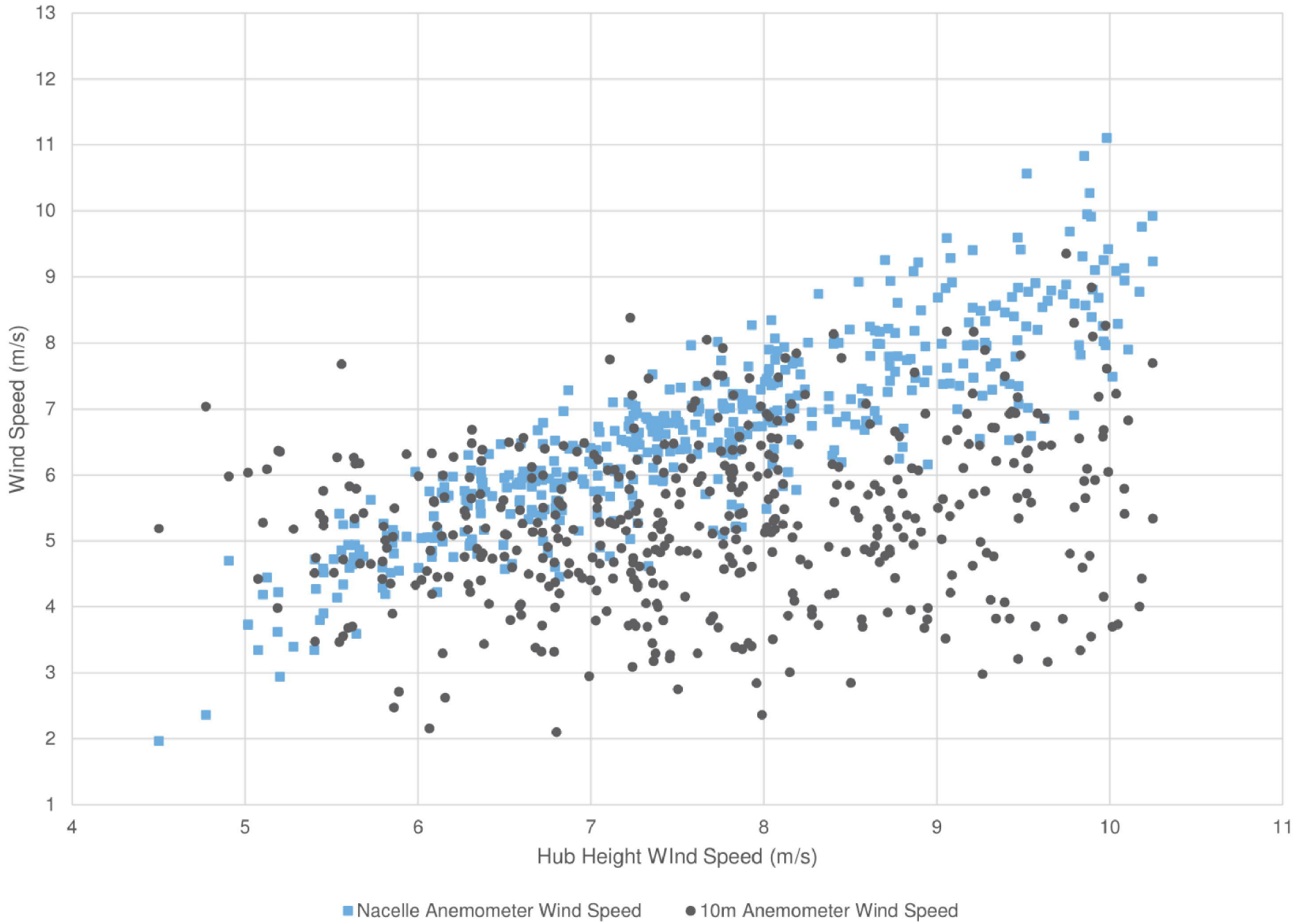
Figure C.02



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Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0

Figure Title

Plot of power curve relative to nacelle anemometer and 10m anemometer

Figure C.03

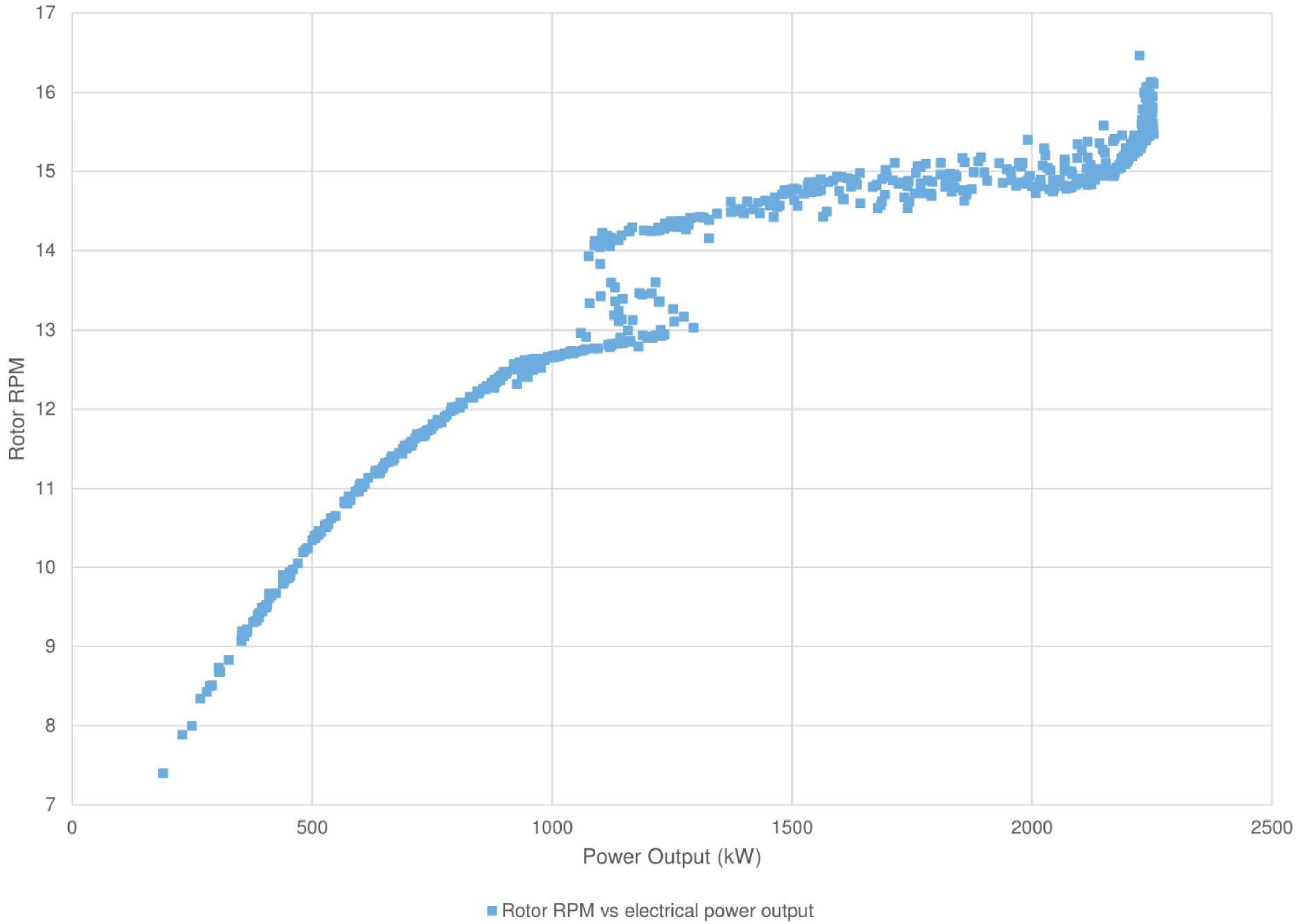

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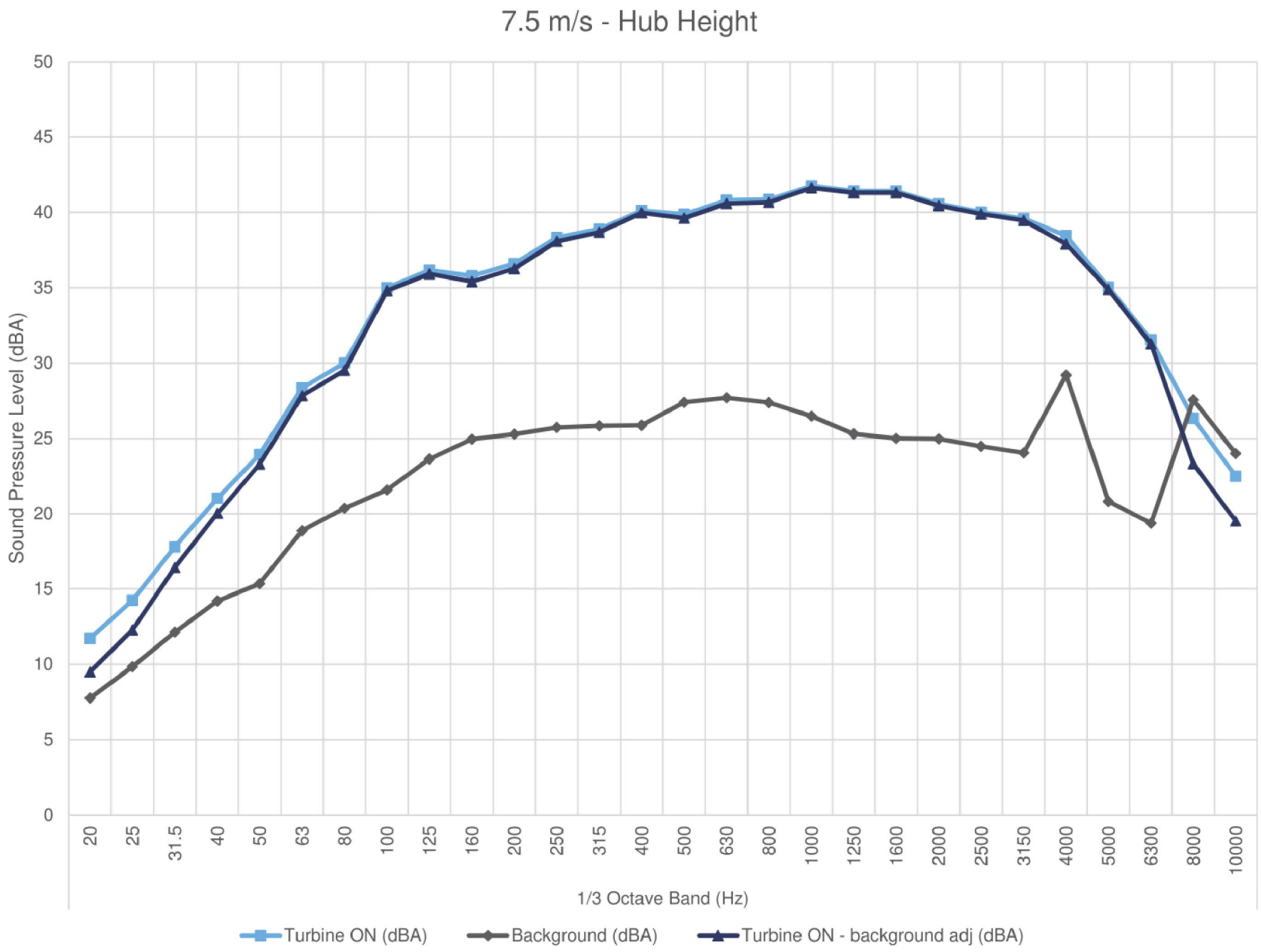
Figure C.04



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	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 7.5 m/s	**Figure C.05**

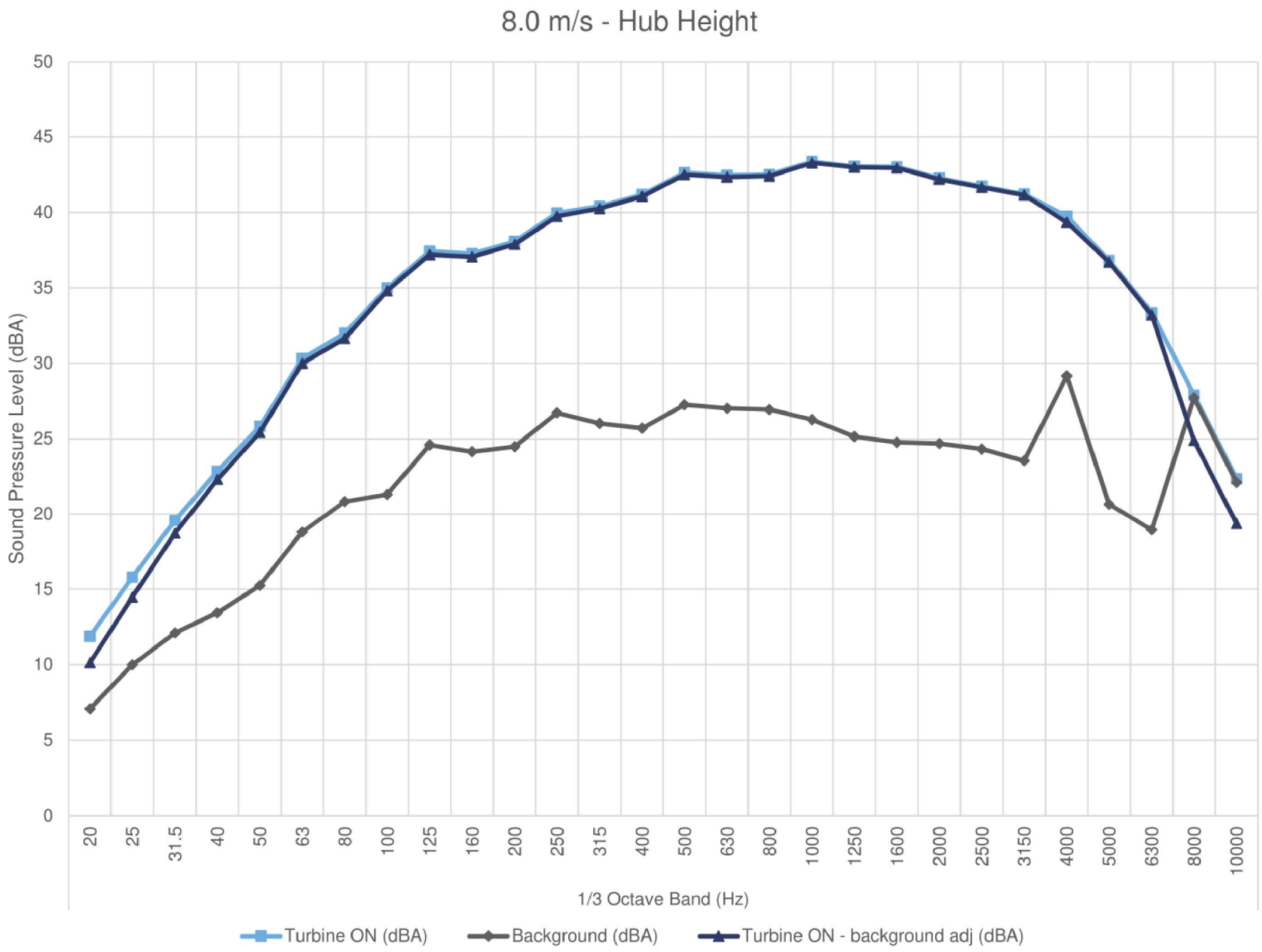

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		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 8 m/s	**Figure C.06**

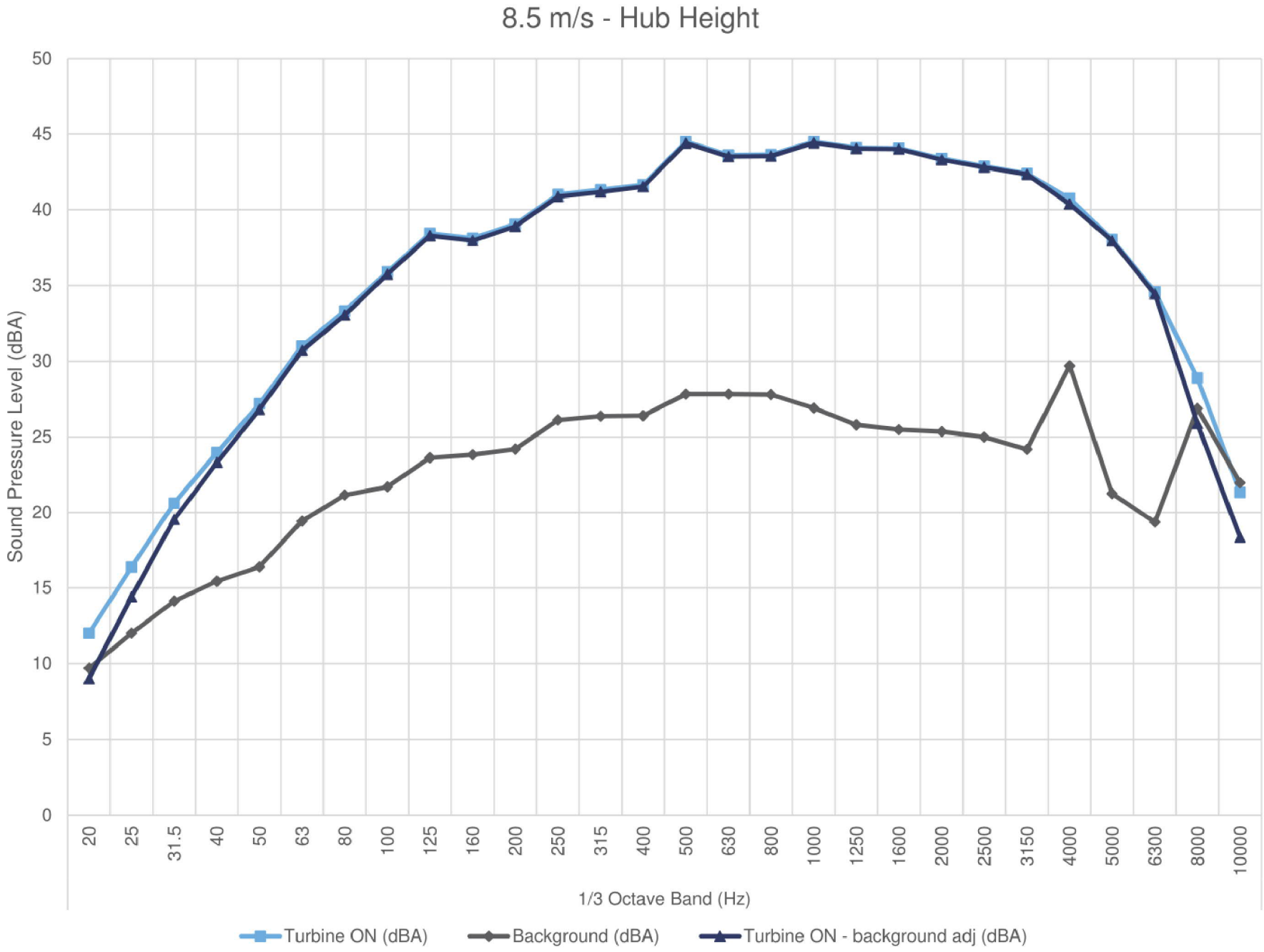

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		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 8.5 m/s	**Figure C.07**

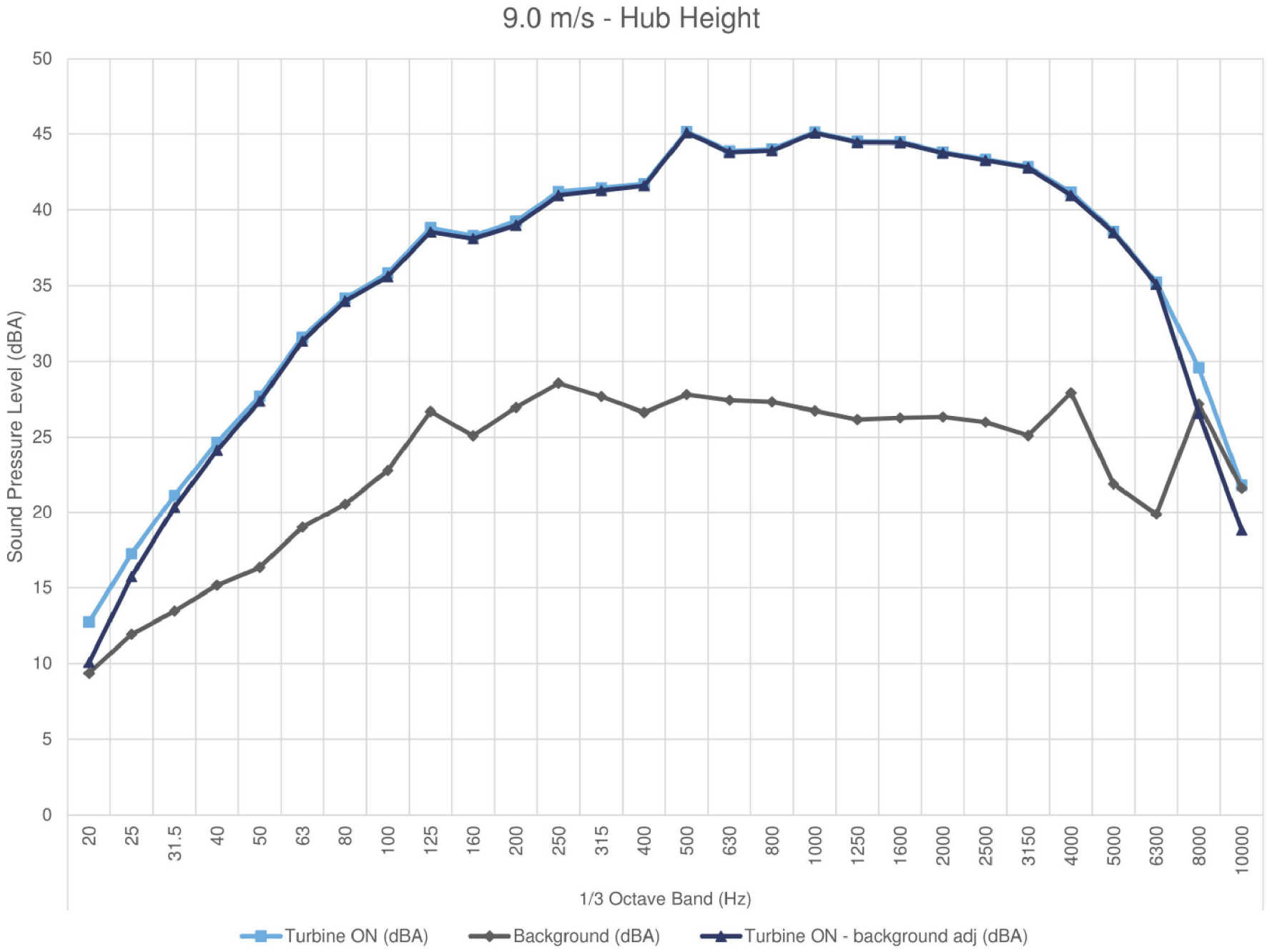

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		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 9 m/s	**Figure C.08**

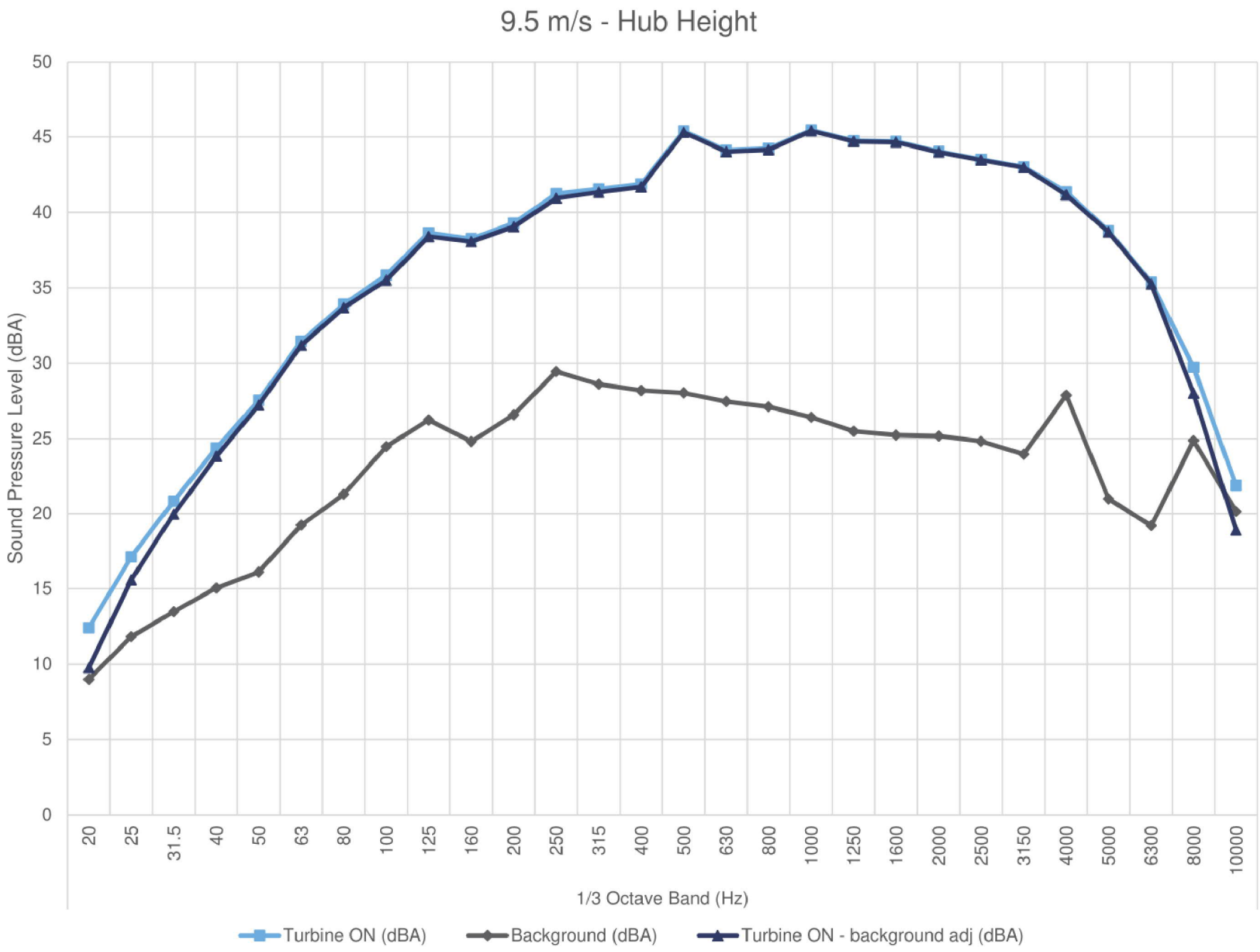

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		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 9 m/s	**Figure C.09**

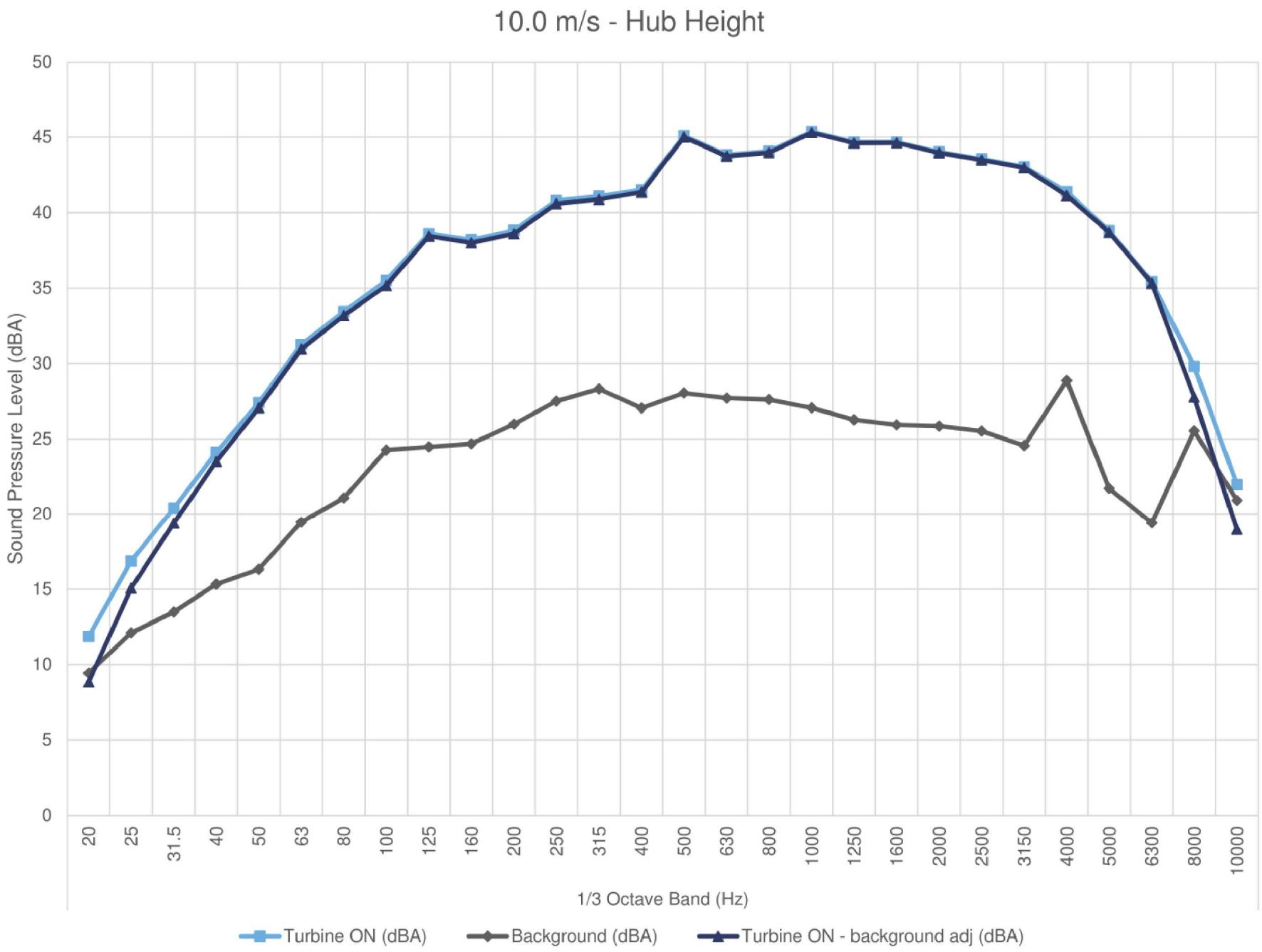

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		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 10 m/s	**Figure C.10**

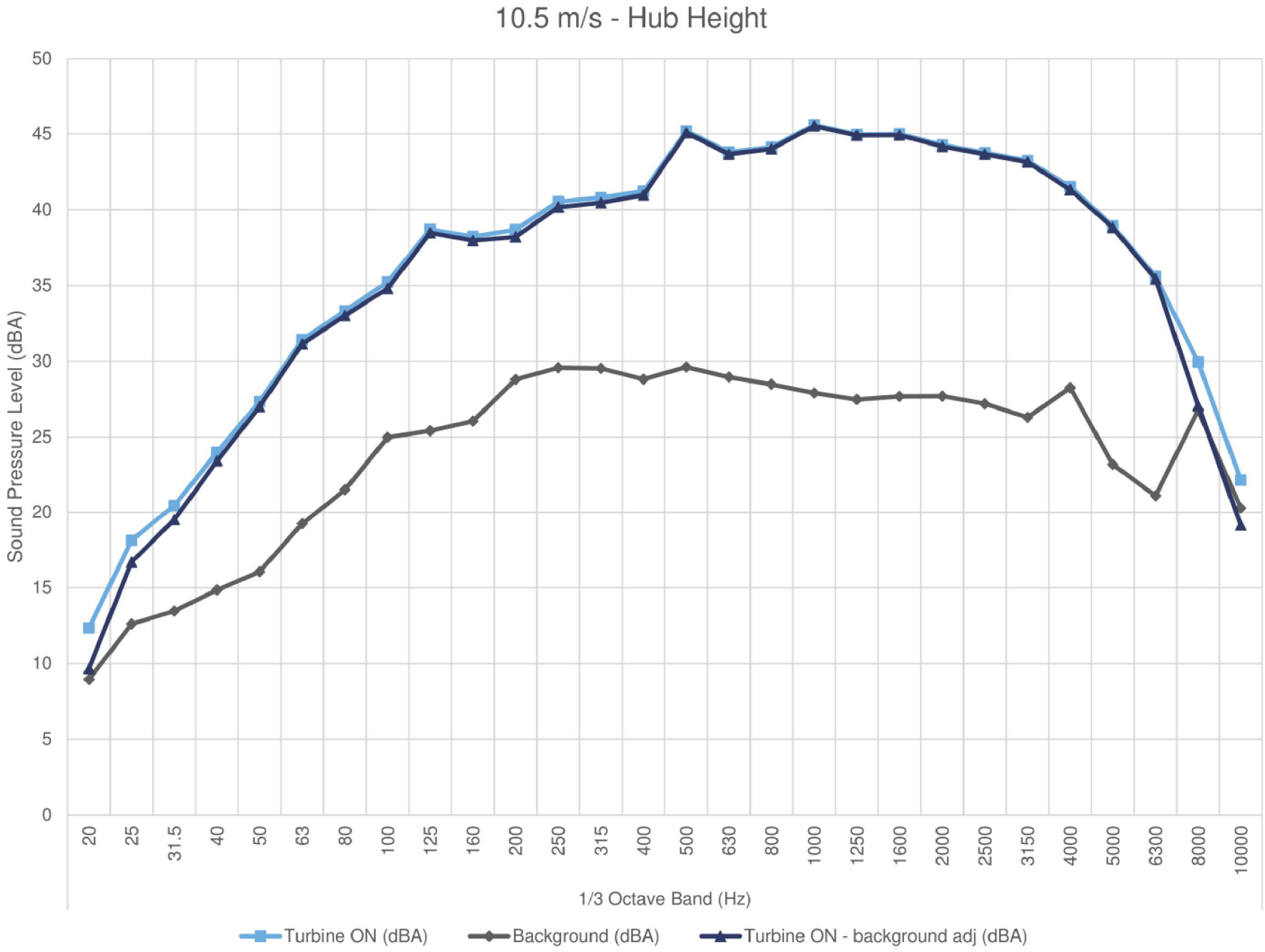

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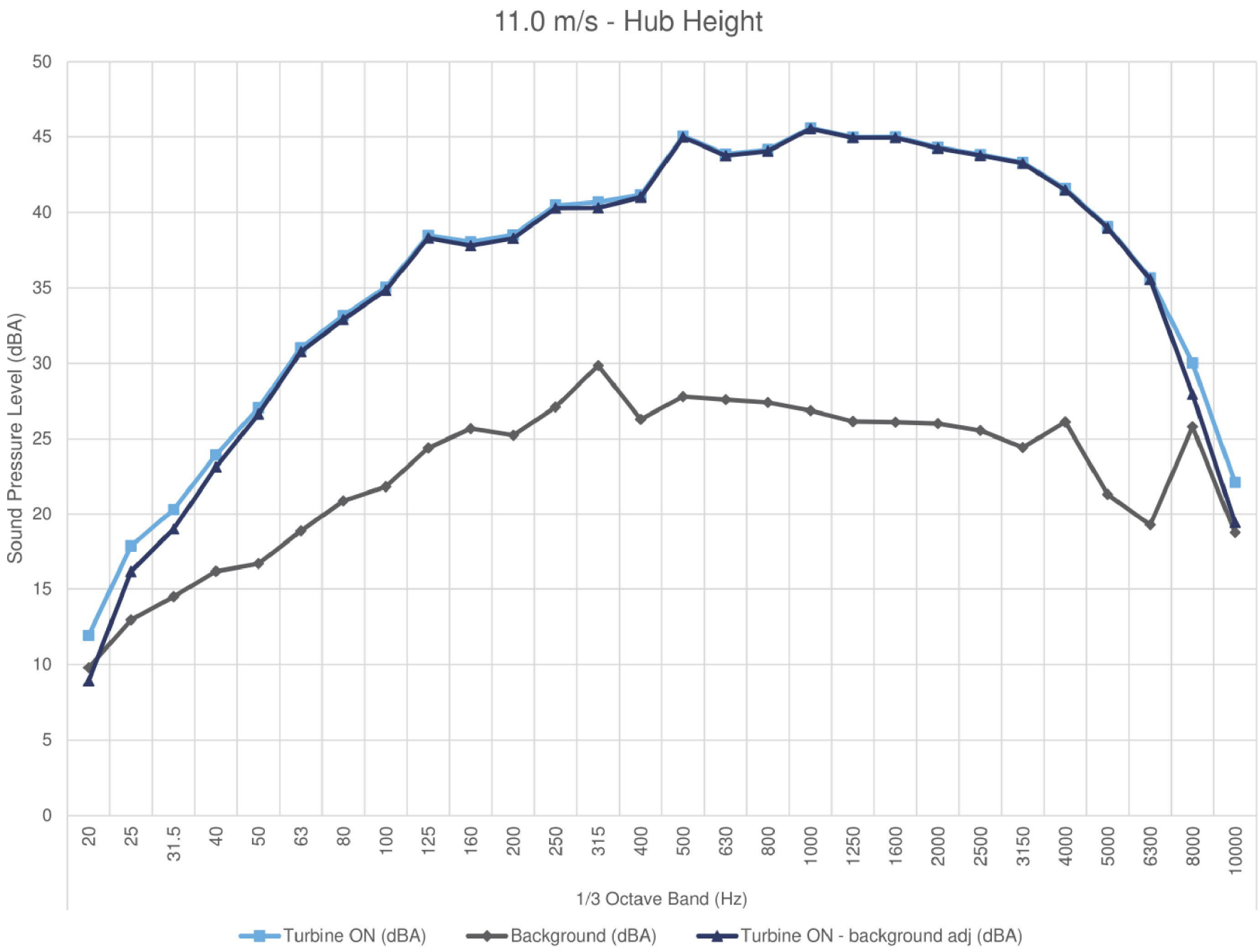
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 10.5 m/s	**Figure C.11**



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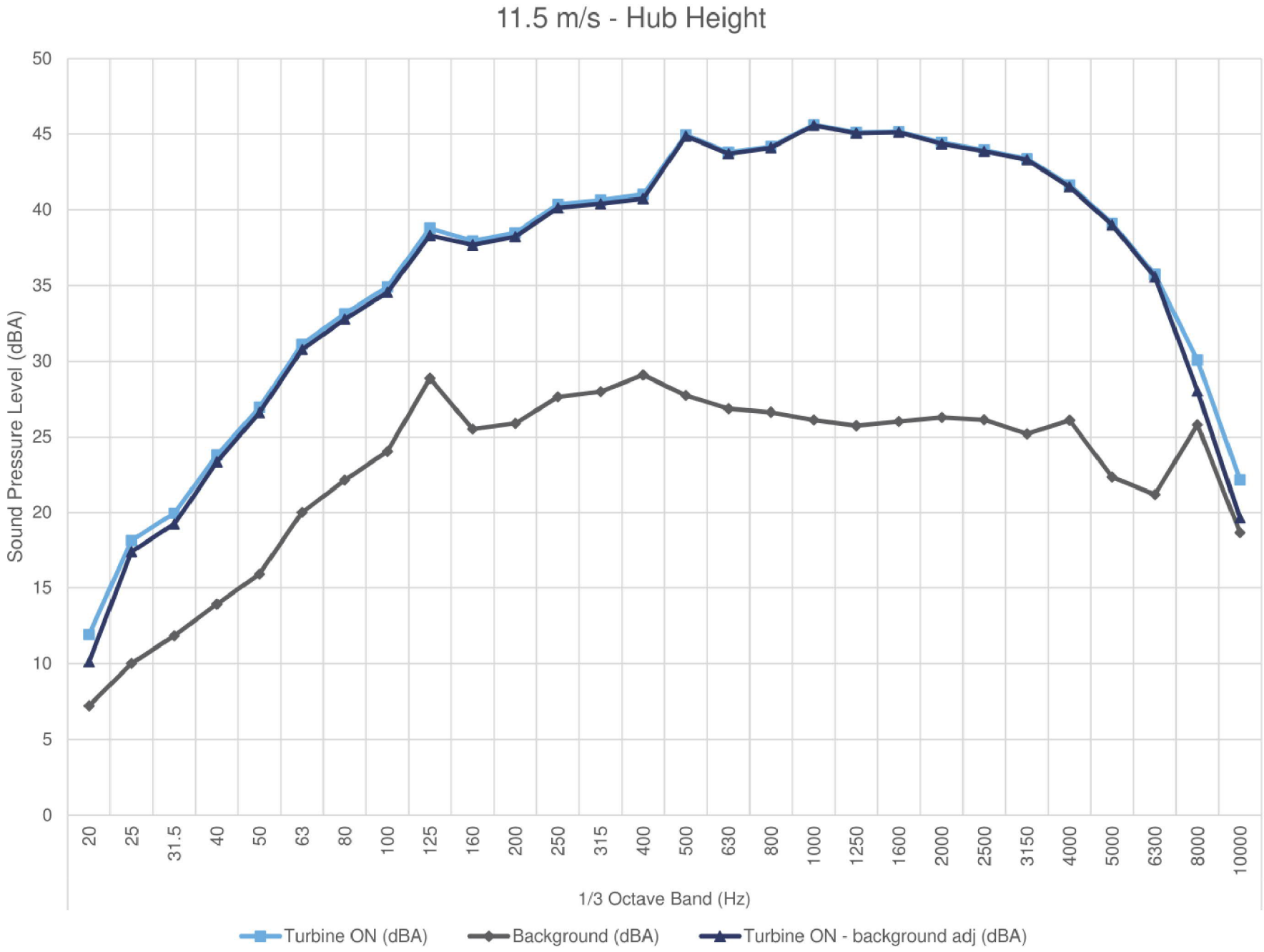
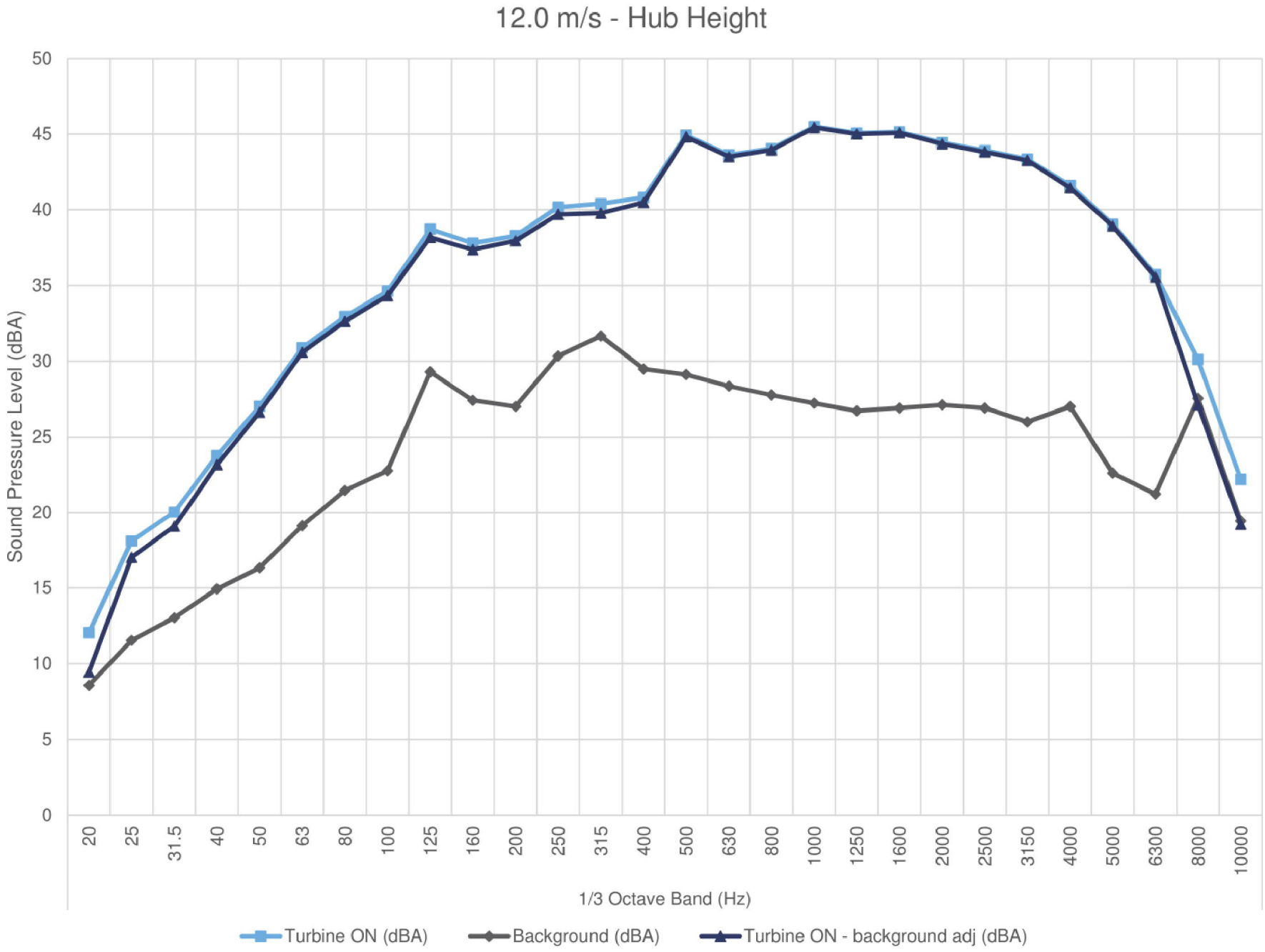
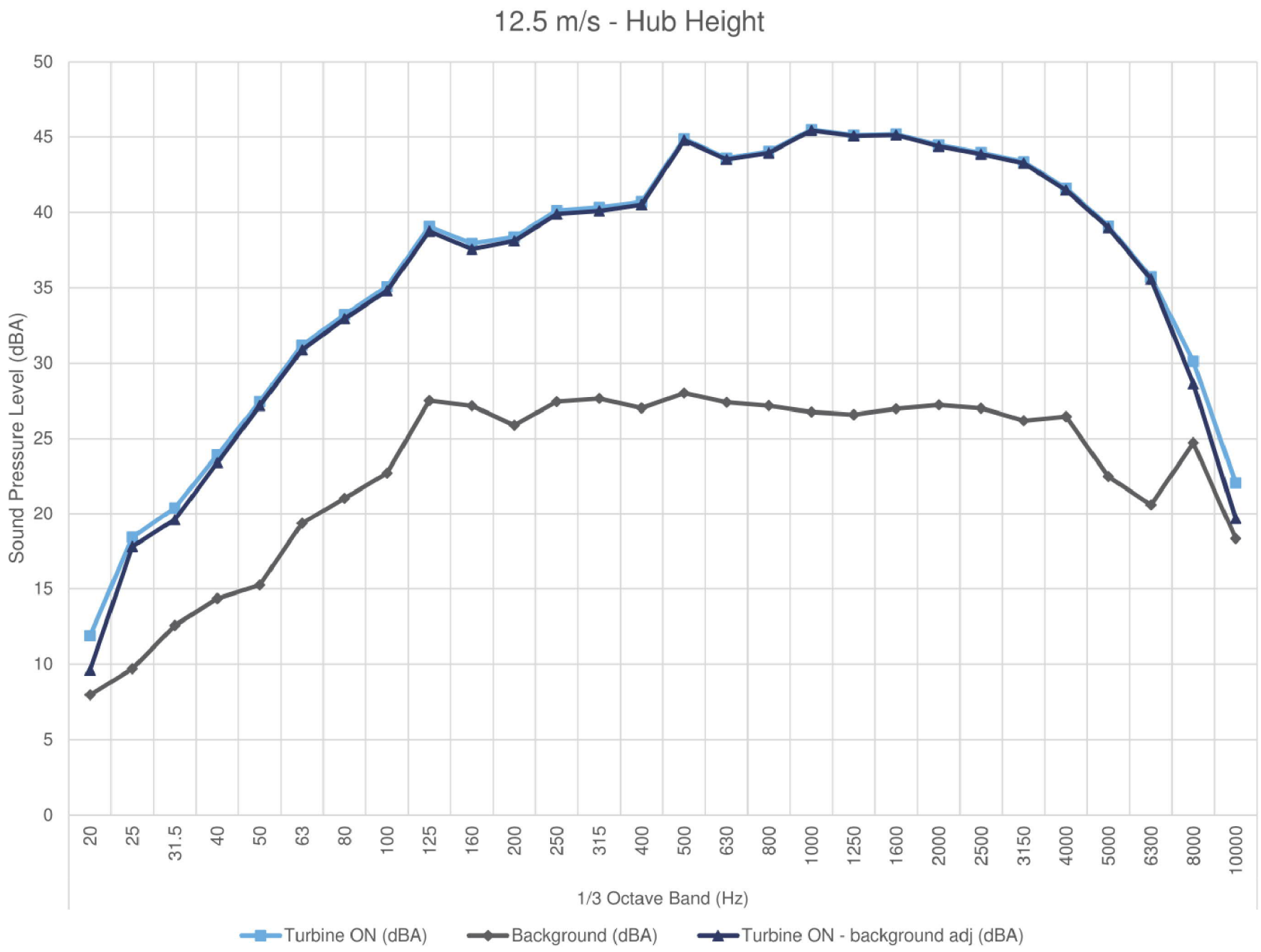
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 11 m/s	**Figure C.12**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 11.5 m/s	**Figure C.13**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 12 m/s	**Figure C.14**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of sound pressure spectrum in 1/3 Octave at 12.5 m/s	**Figure C.15**

Table C.01 Detailed apparent sound power level data at hub height

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

1/3 Octave values marked with brackets [ ] denote less than 3 dB difference between Turbine ON and Background

Overall levels marked with an asterisk * denote 3 to 6 dB difference between Turbine ON and Background, while Overall values with less than 3 dB difference between Turbine ON and Background are not reported

Wind Bin (m/s)	Parameter	1/3 Octave Band (Hz)																													Overall
		20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
7.5	Turbine ON (dBA)	11.7	14.2	17.8	21.0	24.0	28.4	30.0	35.0	36.2	35.8	36.6	38.3	38.9	40.1	39.9	40.8	40.9	41.7	41.4	41.4	40.6	40.0	39.6	38.5	35.1	31.6	26.3	22.5		52.1
	Background (dBA)	7.8	9.8	12.1	14.2	15.4	18.9	20.4	21.6	23.6	25.0	25.3	25.7	25.9	25.9	27.4	27.7	27.4	26.5	25.3	25.0	25.0	24.5	24.1	29.2	20.8	19.4	27.6	24.0		39.0
	Turbine ON - background adj (dBA)	9.5	12.3	16.4	20.0	23.3	27.9	29.5	34.8	35.9	35.4	36.3	38.1	38.7	40.0	39.6	40.6	40.7	41.6	41.3	41.3	40.4	39.9	39.5	37.9	34.9	31.3	[23.3]	[19.5]		51.9
	Signal to noise (dB)	4.0	4.4	5.7	6.9	8.6	9.5	9.6	13.4	12.5	10.8	11.3	12.6	13.0	14.2	12.5	13.1	13.5	15.2	16.1	16.4	15.6	15.5	15.5	9.3	14.2	12.2	-1.2	-1.5		13.1
	Uncertainty (dB)	1.9	1.7	1.2	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.8	0.8	1.9	3.2		0.7
	PWL (dBA)	59.8	62.6	66.8	70.4	73.7	78.2	79.9	85.2	86.3	85.8	86.6	88.4	89.0	90.3	90.0	90.9	91.0	92.0	91.7	91.7	90.8	90.2	89.8	88.3	85.2	81.6	[73.7]	[69.9]		102.2
8.0	Turbine ON (dBA)	11.9	15.8	19.6	22.8	25.8	30.3	32.0	35.0	37.4	37.3	38.1	40.0	40.4	41.2	42.6	42.5	42.5	43.4	43.1	43.0	42.3	41.7	41.2	39.7	36.8	33.4	27.9	22.4		53.7
	Background (dBA)	7.1	10.0	12.1	13.4	15.2	18.8	20.8	21.3	24.6	24.2	24.5	26.7	26.0	25.7	27.3	27.0	26.9	26.3	25.1	24.8	24.7	24.3	23.6	29.2	20.7	18.9	27.7	22.1		38.8
	Turbine ON - background adj (dBA)	10.1	14.5	18.7	22.3	25.4	30.0	31.7	34.8	37.2	37.1	37.9	39.7	40.2	41.1	42.5	42.3	42.4	43.3	43.0	42.9	42.2	41.7	41.1	39.3	36.7	33.2	[24.9]	[19.4]		53.6
	Signal to noise (dB)	4.8	5.8	7.5	9.4	10.6	11.5	11.2	13.7	12.8	13.1	13.6	13.2	14.4	15.5	15.4	15.5	15.6	17.1	17.9	18.2	17.6	17.4	17.7	10.6	16.2	14.4	0.2	0.3		14.9
	Uncertainty (dB)	1.6	1.5	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.9	3.2		0.7
	PWL (dBA)	60.5	64.8	69.1	72.7	75.8	80.4	82.0	85.2	87.6	87.4	88.2	90.1	90.6	91.4	92.9	92.7	92.8	93.6	93.3	93.3	92.6	92.0	91.5	89.7	87.1	83.6	[75.2]	[69.7]		103.9
8.5	Turbine ON (dBA)	12.0	16.4	20.6	24.0	27.2	31.0	33.3	35.9	38.4	38.1	39.0	41.0	41.3	41.6	44.5	43.6	43.6	44.5	44.1	44.1	43.4	42.9	42.4	40.7	38.0	34.6	28.9	21.4		54.8
	Background (dBA)	9.7	12.0	14.1	15.4	16.4	19.4	21.2	21.7	23.6	23.8	24.2	26.1	26.4	26.4	27.8	27.8	27.8	26.9	25.8	25.5	25.4	25.0	24.2	29.7	21.3	19.4	26.9	22.0		39.2
	Turbine ON - background adj (dBA)	[9]	14.4	19.5	23.3	26.8	30.7	33.0	35.7	38.3	38.0	38.9	40.9	41.2	41.5	44.4	43.5	43.5	44.4	44.0	44.0	43.3	42.8	42.3	40.4	37.9	34.4	[25.9]	[18.4]		54.7
	Signal to noise (dB)	2.3	4.4	6.5	8.5	10.8	11.6	12.1	14.2	14.8	14.3	14.9	14.9	14.9	15.2	16.6	15.8	15.8	17.6	18.3	18.6	18.0	17.9	18.2	11.0	16.8	15.2	2.0	-0.6		15.7
	Uncertainty (dB)	2.3	1.7	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.8	3.1		0.7
	PWL (dBA)	[59.4]	64.8	69.9	73.7	77.2	81.1	83.4	86.1	88.6	88.3	89.3	91.2	91.5	91.9	94.7	93.9	93.9	94.8	94.4	94.4	93.7	93.2	92.7	90.7	88.3	84.8	[76.3]	[68.7]		105.1
9.0	Turbine ON (dBA)	12.7	17.3	21.2	24.6	27.7	31.6	34.2	35.8	38.8	38.3	39.2	41.2	41.5	41.7	45.2	43.9	44.0	45.1	44.5	44.5	43.8	43.3	42.9	41.2	38.6	35.2	29.6	21.8		55.3
	Background (dBA)	9.4	11.9	13.5	15.2	16.3	19.0	20.6	22.8	26.7	25.1	27.0	28.6	27.7	26.6	27.8	27.4	27.3	26.7	26.2	26.3	26.3	26.0	25.1	27.9	21.9	19.9	27.2	21.6		39.7
	Turbine ON - background adj (dBA)	10.1	15.8	20.3	24.1	27.4	31.3	34.0	35.6	38.5	38.1	39.0	40.9	41.3	41.6	45.1	43.8	43.9	45.1	44.5	44.4	43.7	43.3	42.8	41.0	38.5	35.1	[26.6]	[18.8]		55.1
	Signal to noise (dB)	3.4	5.3	7.7	9.5	11.4	12.6	13.6	13.0	12.1	13.2	12.3	12.6	13.8	15.1	17.4	16.5	16.7	18.4	18.4	18.2	17.5	17.4	17.8	13.2	16.7	15.3	2.4	0.2		15.6
	Uncertainty (dB)	2.2	1.5	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.9	3.2		0.7
	PWL (dBA)	60.4	66.1	70.7	74.5	77.7	81.7	84.3	86.0	88.9	88.4	89.3	91.3	91.6	91.9	95.4	94.1	94.3	95.4	94.8	94.8	94.1	93.6	93.1	91.3	88.9	85.4	[76.9]	[69.2]		105.5
9.5	Turbine ON (dBA)	12.4	17.1	20.9	24.4	27.5	31.5	33.9	35.8	38.7	38.3	39.3	41.2	41.6	41.9	45.4	44.1	44.2	45.5	44.8	44.7	44.0	43.5	43.0	41.4	38.8	35.4	29.7	21.9		55.4
	Background (dBA)	9.0	11.8	13.5	15.1	16.1	19.2	21.3	24.5	26.2	24.8	26.6	29.4	28.6	28.2	28.0	27.5	27.1	26.4	25.5	25.2	25.2	24.8	24.0	27.9	21.0	19.2	24.9	20.1		39.5
	Turbine ON - background adj (dBA)	9.8	15.6	20.0	23.8	27.2	31.2	33.7	35.5	38.4	38.1	39.1	40.9	41.3	41.7	45.3	44.0	44.2	45.4	44.7	44.7	44.0	43.5	43.0	41.2	38.7	35.3	28.0	[18.9]		55.3
	Signal to noise (dB)	3.4	5.3	7.4	9.3	11.4	12.2	12.6	11.4	12.4	13.5	12.7	11.8	12.9	13.7	17.4	16.7	17.1	19.0	19.3	19.5	18.9	18.7	19.1	13.5	17.8	16.2	4.9	1.8		15.9
	Uncertainty (dB)	2.1	1.5	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	1.2	3.0		0.7
	PWL (dBA)	60.1	66.0	70.3	74.2	77.6	81.5	84.0	85.9	88.8	88.4	89.4	91.3	91.7	92.0	95.7	94.4	94.5	95.8	95.1	95.0	94.3	93.8	93.3	91.5	89.1	85.6	78.4	[69.3]		105.7
10.0	Turbine ON (dBA)	11.9	16.9	20.4	24.1	27.4	31.3	33.4	35.5	38.6	38.2	38.8	40.8	41.1	41.5	45.1	43.8	44.1	45.4	44.7	44.7	44.0	43.5	43.0	41.4	38.8	35.4	29.8	22.0		55.3
	Background (dBA)	9.4	12.1	13.5	15.3	16.3	19.5	21.1	24.3	24.5	24.7	26.0	27.5	28.3	27.0	28.0	27.7	27.6	27.1	26.3	25.9	25.9	25.5	24.6	28.9	21.7	19.4	25.5	20.9		39.5
	Turbine ON - background adj (dBA)	[8.9]	15.1	19.4	23.5	27.1	31.0	33.2	35.2	38.4	38.0	38.6	40.6	40.9	41.3	45.0	43.7	44.0	45.3	44.6	44.6	44.0	43.5	43.0	41.1	38.7	35.3	27.8	[19]		55.2
	Signal to noise (dB)	2.4	4.7	6.9	8.8	11.1	11.8	12.4	11.2	14.2	13.5	12.8	13.3	12.8	14.5	17.0	16.1	16.5	18.3	18.4	18.7	18.2	18.0	18.5	12.5	17.1	16.0	4.3	1.1		15.8
	Uncertainty (dB)	2.4	1.6	1.0	0.9	0.9	0.8	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.3	3.1		0.7
	PWL (dBA)	[59.2]	65.4	69.8	73.9	77.4	81.3	83.5	85.5	88.8	88.4	89.0	90.9	91.2	91.7	95.4	94.1	94.3	95.7	95.0	95.0	94.3	93.8	93.3	91.5	89.1	85.7	78.1	[69.3]		105.5
10.5	Turbine ON (dBA)	12.3	18.1	20.5	24.0	27.3	31.4	33.3	35.2	38.7	38.2	38.7	40.5	40.8	41.2	45.2	43.8	44.1	45.6	45.0	45.0	44.3	43.8	43.2	41.5	38.9	35.6	29.9	22.2		55.4
	Background (dBA)	9.0	12.6	13.5	14.9	16.1	19.2	21.5	25.0	25.4	26.0	28.8	29.6	29.5	28.8	29.6	29.0	28.5	27.9	27.5	27.7	27.7	27.2	26.3	28.3	23.2	21.1	26.8	20.3		40.8
	Turbine ON - background adj (dBA)	9.7	16.7	19.5	23.4	27.0	31.1	33.0	34.8	38.5	38.0	38.2	40.2	40.5	41.0	45.1	43.7	44.0	45.5	44.9	44.9	44.2	43.7	43.1	41.3	38.8	35.4	27.1	[19.2]		55.2
	Signal to noise (dB)	3.4	5.5	7.0	9.1	11.3	12.2	11.8	10.3	13.3	12.2	9.9	11.0	11.3	12.4	15.6	14.9	15.7	17.7	17.5	17.3	16.6	16.6	16.9	13.3	15.8	14.5	3.2	1.9		14.6
	Uncertainty (dB)	2.3	1.5	1.1	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.8	1.7	3.0		0.7
	PWL (dBA)	60.0	67.1	69.9	73.8	77.4	81.5	83.4	85.2	88.8	88.3	88.6	90.5	90.8	91.3	95.4	94.0	94.4	95.9	95.3	95.3	94.5	94.0	93.5	91.7	89.2	85.8	77.4	[69.5]		105.6
11.0	Turbine ON (dBA)	11.9	17.9	20.3	23.9	27.1	31.0	33.2	35.1	38.5	38.0	38.5	40.5	40.7	41.1	45.1	43.9	44.2	45.6	45.0	45.0	44.3	43.8	43.3	41.6	39.0	35.6	30.0	22.1		55.4
	Background (dBA)	9.8	13.0	14.5	16.2	16.7	18.9	20.9	21.8	24.4	25.7	25.2	27.1	29.9	26.3	27.8	27.6	27.4	26.9	26.1	26.1	26.0	25.5	24.4	26.1	21.3	19.3	25.8	18.7		39.3
	Turbine ON - background adj (dBA)	[8.9]	16.2	19.0	23.1	26.6	30.8	32.9	34.8	38.3	37.8	38.3	40.3	40.3	41.0	45.0	43.8	44.1	45.5	44.9	44.9	44.2	43.8	43.2	41.5	39.0	35.5	28.0	19.4		55.3
	Signal to noise (dB)	2.1	4.9	5.8	7.8	10.4	12.2	12.3	13.2	14.1	12.4	13.3	13.4	10.8	14.9	17.2	16.3	16.8	18.7	18.8	18.9	18.3	18.3	18.9	15.5	17.7	16.4	4.2	3.4		16.1
	Uncertainty (dB)	2.5	1.6	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.7	0.7	0.8	0.7	0.8	1.3	2.8		0.7
	PWL (dBA)	[59.3]	66.5	69.3	73.5	77.0	81.1	83.3	85.2	88.6	88.1	88.6	90.6	90.7	91.4	95.3	94.1	94.4	95.9	95.3	95.3	94.6	94.1	93.6	91.8	89.3	85.9	78.3	69.8		105.6

Table C.01 Detailed apparent sound power level data at hub height

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

1/3 Octave values marked with brackets [ ] denote less than 3 dB difference between Turbine ON and Background

Overall levels marked with an asterisk * denote 3 to 6 dB difference between Turbine ON and Background, while Overall values with less than 3 dB difference between Turbine ON and Background are not reported

Wind Bin (m/s)	Parameter	1/3 Octave Band (Hz)																													Overall
		20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
11.5	Turbine ON (dBA)	11.9	18.1	19.9	23.8	27.0	31.1	33.1	34.9	38.8	37.9	38.5	40.4	40.6	41.0	44.9	43.8	44.2	45.6	45.1	45.2	44.4	43.9	43.4	41.6	39.1	35.7	30.1	22.2		55.4
	Background (dBA)	7.2	10.0	11.8	13.9	15.9	20.0	22.2	24.0	28.9	25.5	25.9	27.6	28.0	29.1	27.7	26.9	26.6	26.1	25.8	26.0	26.3	26.1	25.2	26.1	22.4	21.2	25.8	18.6		39.6
	Turbine ON - background adj (dBA)	10.1	17.4	19.2	23.4	26.6	30.8	32.8	34.6	38.3	37.7	38.2	40.1	40.4	40.7	44.9	43.7	44.1	45.6	45.1	45.1	44.4	43.9	43.3	41.5	39.0	35.6	28.0	19.6		55.3
	Signal to noise (dB)	4.7	8.1	8.1	9.9	11.1	11.1	11.0	10.9	9.9	12.4	12.6	12.7	12.6	11.9	17.2	16.9	17.6	19.5	19.4	19.1	18.1	17.8	18.2	15.5	16.7	14.5	4.3	3.5		15.8
	Uncertainty (dB)	1.8	1.2	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.4	2.8		0.7
	PWL (dBA)	60.5	67.7	69.6	73.7	77.0	81.1	83.1	84.9	88.7	88.0	88.6	90.5	90.7	91.1	95.2	94.1	94.5	95.9	95.4	95.5	94.7	94.2	93.7	91.9	89.4	85.9	78.4	70.0		105.7
12.0	Turbine ON (dBA)	12.0	18.1	20.0	23.8	27.0	30.9	32.9	34.6	38.7	37.8	38.3	40.2	40.4	40.8	44.9	43.6	44.0	45.5	45.1	45.1	44.4	43.9	43.3	41.6	39.0	35.7	30.1	22.2		55.3
	Background (dBA)	8.6	11.5	13.0	14.9	16.3	19.1	21.5	22.8	29.3	27.4	27.0	30.4	31.7	29.5	29.1	28.4	27.8	27.2	26.7	26.9	27.1	26.9	26.0	27.0	22.6	21.2	27.6	19.4		40.9
	Turbine ON - background adj (dBA)	9.4	17.0	19.1	23.2	26.6	30.6	32.6	34.3	38.2	37.4	37.9	39.7	39.8	40.5	44.8	43.5	43.9	45.4	45.0	45.1	44.3	43.8	43.3	41.4	38.9	35.5	[27.1]	[19.2]		55.2
	Signal to noise (dB)	3.5	6.6	7.0	8.8	10.7	11.8	11.5	11.8	9.4	10.4	11.3	9.8	8.7	11.3	15.8	15.3	16.3	18.2	18.3	18.2	17.3	17.0	17.3	14.6	16.4	14.5	2.6	2.8		14.4
	Uncertainty (dB)	2.3	1.3	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.9	3.1		0.7
	PWL (dBA)	59.8	67.4	69.4	73.5	77.0	80.9	83.0	84.7	88.5	87.7	88.3	90.1	90.1	90.8	95.2	93.8	94.3	95.8	95.3	95.4	94.7	94.2	93.6	91.8	89.3	85.9	[77.5]	[69.6]		105.5
12.5	Turbine ON (dBA)	11.9	18.4	20.4	23.9	27.5	31.2	33.2	35.1	39.1	37.9	38.4	40.1	40.3	40.7	44.9	43.6	44.0	45.5	45.1	45.2	44.5	43.9	43.3	41.6	39.1	35.7	30.1	22.1		55.4
	Background (dBA)	8.0	9.7	12.6	14.4	15.3	19.4	21.0	22.7	27.5	27.2	25.9	27.5	27.7	27.0	28.0	27.4	27.2	26.8	26.6	27.0	27.2	27.0	26.2	26.5	22.5	20.6	24.7	18.3		39.7
	Turbine ON - background adj (dBA)	9.6	17.8	19.6	23.4	27.2	30.9	33.0	34.8	38.7	37.5	38.1	39.9	40.1	40.5	44.8	43.5	43.9	45.4	45.1	45.1	44.4	43.9	43.3	41.5	39.0	35.6	28.6	19.7		55.2
	Signal to noise (dB)	3.9	8.7	7.8	9.6	12.2	11.8	12.2	12.4	11.5	10.8	12.5	12.7	12.7	13.7	16.8	16.2	16.8	18.7	18.5	18.2	17.2	16.9	17.2	15.1	16.6	15.1	5.4	3.7		15.7
	Uncertainty (dB)	2.1	1.2	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.2	2.6		0.7
	PWL (dBA)	60.0	68.2	70.0	73.8	77.6	81.2	83.3	85.2	89.1	87.9	88.5	90.2	90.4	90.9	95.1	93.9	94.3	95.8	95.4	95.5	94.7	94.2	93.6	91.8	89.3	85.9	79.0	70.0		105.6

Table C.02 Detailed apparent sound power level data at 10m height

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

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1/3 Octave values marked with brackets [ ] denote less than 3 dB difference between Turbine ON and Background

Overall levels marked with an asterisk * denote 3 to 6 dB difference between Turbine ON and Background, while Overall values with less than 3 dB difference between Turbine ON and Background are not reported

Wind Bin (m/s)	Parameter	1/3 Octave Band (Hz)																													Overall
		20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
5.0	Turbine ON (dBA)	10.8	13.8	17.4	20.6	24.0	28.3	29.8	34.5	36.2	35.3	36.1	37.9	38.3	39.5	39.2	40.2	40.2	41.0	40.7	40.7	39.9	39.3	38.9	37.9	34.4	30.8	25.7	22.2		51.5
	Background (dBA)	8.3	10.6	12.8	14.5	15.8	19.0	20.6	22.0	23.6	24.4	25.1	26.2	26.5	26.6	27.5	27.6	27.2	26.4	25.2	24.8	24.7	24.2	23.6	29.3	20.7	19.2	28.0	22.7		39.0
	Turbine ON - background adj (dBA)	[7.8]	10.9	15.6	19.3	23.3	27.8	29.3	34.2	36.0	35.0	35.8	37.5	38.0	39.3	38.9	39.9	40.0	40.9	40.6	40.6	39.7	39.2	38.8	37.2	34.2	30.5	[22.7]	[19.2]		51.2
	Signal to noise (dB)	2.5	3.2	4.7	6.0	8.2	9.4	9.2	12.5	12.7	10.9	11.0	11.7	11.8	12.9	11.7	12.6	13.0	14.7	15.5	15.9	15.2	15.2	15.3	8.6	13.7	11.7	-2.3	-0.5		12.5
	Uncertainty (dB)	2.3	2.1	1.3	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.8	0.8	1.8	3.1		0.7
	PWL (dBA)	[58.1]	61.3	66.0	69.7	73.7	78.2	79.6	84.6	86.4	85.3	86.1	87.9	88.4	89.7	89.3	90.3	90.3	91.2	91.0	90.9	90.1	89.6	89.1	87.6	84.5	80.9	[73.1]	[69.5]		101.6
6.0	Turbine ON (dBA)	12.3	16.7	20.5	23.9	27.0	31.0	33.2	35.5	38.3	37.9	38.9	40.8	41.1	41.6	44.3	43.4	43.5	44.5	44.0	43.9	43.2	42.7	42.3	40.6	37.9	34.5	28.9	22.2		54.7
	Background (dBA)	9.1	11.7	13.6	15.0	16.2	19.2	20.9	22.0	25.4	24.4	25.7	28.2	27.1	26.5	27.7	27.5	27.4	26.7	25.8	25.6	25.5	25.2	24.4	29.0	21.3	19.4	26.9	21.7		39.4
	Turbine ON - background adj (dBA)	9.5	15.0	19.5	23.3	26.6	30.7	33.0	35.3	38.1	37.8	38.6	40.5	40.9	41.5	44.2	43.3	43.4	44.4	43.9	43.9	43.2	42.7	42.2	40.3	37.8	34.4	[25.9]	[19.2]		54.6
	Signal to noise (dB)	3.2	5.0	6.9	8.8	10.8	11.8	12.3	13.5	12.9	13.5	13.2	12.5	14.0	15.1	16.6	15.9	16.0	17.8	18.2	18.4	17.7	17.6	17.9	11.7	16.6	15.1	2.0	0.5		15.3
	Uncertainty (dB)	2.1	1.5	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.8	3.1		0.7
	PWL (dBA)	59.9	65.4	69.9	73.6	76.9	81.1	83.3	85.7	88.4	88.1	89.0	90.9	91.3	91.8	94.6	93.6	93.7	94.7	94.3	94.2	93.5	93.0	92.5	90.7	88.2	84.7	[76.3]	[69.5]		104.9
7.0	Turbine ON (dBA)	12.1	17.3	20.5	24.1	27.3	31.3	33.6	35.5	38.6	38.2	38.9	40.9	41.2	41.5	45.2	43.9	44.2	45.5	44.8	44.8	44.1	43.6	43.1	41.4	38.8	35.4	29.8	22.0		55.4
	Background (dBA)	9.0	12.0	13.3	15.0	16.1	19.4	21.3	24.8	25.4	25.1	26.9	28.2	28.6	28.1	28.5	28.0	27.6	27.0	26.3	26.2	26.2	25.8	24.8	28.2	21.9	19.8	25.7	20.5		39.8
	Turbine ON - background adj (dBA)	9.2	15.7	19.6	23.5	27.0	31.0	33.3	35.1	38.4	38.0	38.6	40.6	40.9	41.3	45.1	43.8	44.1	45.4	44.7	44.7	44.0	43.5	43.0	41.2	38.7	35.3	27.7	[19]		55.2
	Signal to noise (dB)	3.1	5.3	7.2	9.1	11.2	11.9	12.2	10.7	13.2	13.1	12.0	12.7	12.6	13.4	16.7	16.0	16.5	18.4	18.5	18.6	17.9	17.8	18.3	13.2	17.0	15.6	4.2	1.5		15.6
	Uncertainty (dB)	2.1	1.4	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.8	0.8	0.8	0.8	0.8	1.3	3.0		0.7
	PWL (dBA)	59.5	66.1	69.9	73.9	77.4	81.4	83.6	85.5	88.7	88.3	89.0	91.0	91.3	91.7	95.5	94.2	94.4	95.8	95.1	95.1	94.4	93.9	93.4	91.6	89.1	85.7	78.1	[69.3]		105.6
8.0	Turbine ON (dBA)	11.9	18.0	20.1	23.8	27.0	31.0	33.1	34.9	38.6	37.9	38.4	40.3	40.6	41.0	45.0	43.8	44.1	45.6	45.0	45.1	44.4	43.9	43.3	41.6	39.1	35.7	30.1	22.2		55.4
	Background (dBA)	8.9	12.0	13.6	15.4	16.4	19.3	21.5	22.9	27.6	26.2	26.0	28.4	30.1	28.3	28.2	27.6	27.3	26.7	26.1	26.2	26.3	26.0	25.0	26.3	21.9	20.4	26.4	18.9		39.9
	Turbine ON - background adj (dBA)	8.9	16.8	19.0	23.2	26.6	30.7	32.8	34.6	38.3	37.6	38.2	40.1	40.2	40.8	44.9	43.7	44.0	45.5	45.0	45.0	44.3	43.8	43.3	41.5	39.0	35.6	27.7	19.4		55.3
	Signal to noise (dB)	3.0	6.0	6.5	8.5	10.6	11.7	11.6	12.0	11.0	11.7	12.5	12.0	10.5	12.8	16.8	16.2	16.9	18.8	18.9	18.9	18.1	17.9	18.3	15.3	17.1	15.3	3.7	3.2		15.5
	Uncertainty (dB)	2.3	1.4	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.5	3.0		0.7
	PWL (dBA)	59.3	67.1	69.3	73.5	77.0	81.1	83.1	85.0	88.6	88.0	88.5	90.4	90.5	91.1	95.3	94.0	94.4	95.9	95.3	95.4	94.7	94.2	93.6	91.8	89.3	85.9	78.0	69.7		105.6
9.0	Turbine ON (dBA)	12.1	18.6	20.4	23.8	27.3	31.2	33.2	34.9	38.7	37.9	38.3	40.1	40.2	40.5	44.9	43.4	43.9	45.4	45.0	45.1	44.4	43.9	43.3	41.5	39.0	35.7	30.1	22.1		55.3
	Background (dBA)	7.2	9.4	12.3	13.8	15.0	19.1	20.7	22.2	26.5	27.7	25.3	26.9	27.2	26.3	27.6	27.0	26.9	26.5	26.3	26.6	26.9	26.6	25.7	26.1	22.1	20.2	25.1	18.5		39.3
	Turbine ON - background adj (dBA)	10.4	18.1	19.7	23.4	27.1	30.9	33.0	34.6	38.5	37.5	38.1	39.9	40.0	40.3	44.8	43.3	43.8	45.3	45.0	45.1	44.3	43.8	43.2	41.4	38.9	35.5	28.5	19.6		55.2
	Signal to noise (dB)	4.9	9.3	8.1	10.0	12.4	12.1	12.5	12.7	12.2	10.3	13.0	13.2	13.1	14.2	17.2	16.4	17.0	18.9	18.7	18.5	17.5	17.2	17.5	15.4	16.9	15.4	5.0	3.6		15.9
	Uncertainty (dB)	1.6	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	1.2	2.5		0.7
	PWL (dBA)	60.8	68.5	70.0	73.7	77.4	81.3	83.3	85.0	88.8	87.9	88.5	90.3	90.4	90.7	95.1	93.7	94.2	95.7	95.3	95.4	94.7	94.1	93.5	91.7	89.3	85.9	78.8	70.0		105.5

Table C.03 Type B measurement uncertainty summary

Overall Equipment Uncertainties		
	Typical values	Used values
Calibration	0.2 dB	0.2 dB
Board	0.3 dB	0.3 dB
Distance	0.1 dB	0.1 dB
Air absorption	0 dB	0 dB
Weather	0.5 dB	0.5 dB

1/3 Octave Band Uncertainties		
Frequency (Hz)	Microphone Uncertainty	Overall (including overall equipment Uncertainties)
20	0.8 dB	1 dB
25	0.8 dB	1 dB
31.5	0.5 dB	0.8 dB
40	0.5 dB	0.8 dB
50	0.5 dB	0.8 dB
63	0.5 dB	0.8 dB
80	0.5 dB	0.8 dB
100	0.5 dB	0.8 dB
125	0.5 dB	0.8 dB
160	0.5 dB	0.8 dB
200	0.3 dB	0.7 dB
250	0.3 dB	0.7 dB
315	0.3 dB	0.7 dB
400	0.3 dB	0.7 dB
500	0.3 dB	0.7 dB
630	0.3 dB	0.7 dB
800	0.3 dB	0.7 dB
1000	0.3 dB	0.7 dB
1250	0.3 dB	0.7 dB
1600	0.3 dB	0.7 dB
2000	0.3 dB	0.7 dB
2500	0.5 dB	0.8 dB
3150	0.5 dB	0.8 dB
4000	0.5 dB	0.8 dB
5000	0.5 dB	0.8 dB
6300	0.5 dB	0.8 dB
8000	0.5 dB	0.8 dB
10000	1.3 dB	1.4 dB

Table C.04 Detailed measruement uncertainty at hub height

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

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Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																													Overall
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
7.5	Turbine ON	7.53	64	Average (dBA)	11.7	14.1	17.7	20.9	23.8	28.2	29.9	35.0	36.1	35.7	36.5	38.2	38.8	40.1	39.7	40.7	40.7	41.6	41.3	41.3	40.4	39.9	39.5	38.4	34.9	31.4	26.2	22.5	52.0	
				Uncertainty A (dB)	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.5		
	Background	7.50	66	Average (dBA)	7.8	9.8	12.1	14.2	15.4	18.9	20.4	21.6	23.6	25.0	25.3	25.7	25.9	25.9	27.4	27.7	27.4	26.5	25.3	25.0	25.0	24.5	24.1	29.2	20.8	19.4	27.6	24.0	39.0	
				Uncertainty A (dB)	0.8	0.6	0.5	0.5	0.3	0.3	0.2	0.3	0.4	0.5	0.5	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.4	0.6	0.6	0.6	0.6	0.4	0.4	0.8	0.8		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.2	1.0	0.9	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.0	1.0	0.9	0.9	1.1	1.6		
8.0	Turbine ON	7.99	77	Average (dBA)	11.9	15.8	19.5	22.8	25.7	30.3	31.9	34.9	37.4	37.2	38.0	39.9	40.3	41.2	42.5	42.4	42.5	43.3	43.0	43.0	42.2	41.7	41.2	39.7	36.7	33.3	27.8	22.4	53.7	
				Uncertainty A (dB)	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.5		
	Background	8.01	82	Average (dBA)	7.1	10.0	12.1	13.4	15.2	18.8	20.9	21.3	24.6	24.1	24.5	26.7	26.0	25.7	27.3	27.0	26.9	26.3	25.1	24.8	24.7	24.3	23.5	29.2	20.7	18.9	27.7	22.1	38.8	
				Uncertainty A (dB)	0.8	0.6	0.5	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.5	0.5	0.5	0.5	0.3	0.3	0.7	0.6		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.2	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.9	1.1	1.6		
8.5	Turbine ON	8.51	38	Average (dBA)	12.0	16.4	20.7	24.1	27.3	31.1	33.4	36.0	38.5	38.2	39.1	41.1	41.4	41.7	44.6	43.7	43.7	44.6	44.2	44.1	43.5	43.0	42.5	40.8	38.1	34.7	29.0	21.3	54.9	
				Uncertainty A (dB)	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.0	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	8.49	102	Average (dBA)	9.7	12.0	14.1	15.5	16.4	19.4	21.2	21.7	23.6	23.8	24.1	26.1	26.4	26.4	27.8	27.9	27.8	26.9	25.8	25.5	25.3	25.0	24.2	29.7	21.3	19.4	26.9	22.0	39.2	
				Uncertainty A (dB)	0.7	0.6	0.5	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.6	0.5		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.2	1.2	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	1.0	0.9	0.9	0.9	0.9	1.0	1.5		
9.0	Turbine ON	8.99	38	Average (dBA)	12.8	17.3	21.2	24.7	27.7	31.6	34.2	35.8	38.8	38.3	39.2	41.2	41.5	41.7	45.2	43.9	44.0	45.1	44.5	44.5	43.8	43.3	42.8	41.2	38.6	35.2	29.6	21.8	55.2	
				Uncertainty A (dB)	0.3	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	8.98	80	Average (dBA)	9.4	11.9	13.5	15.2	16.4	19.0	20.5	22.7	26.7	25.1	27.0	28.5	27.7	26.6	27.8	27.4	27.3	26.7	26.2	26.3	26.4	26.0	25.1	27.9	21.9	19.9	27.3	21.7	39.7	
				Uncertainty A (dB)	0.9	0.8	0.6	0.5	0.4	0.3	0.2	0.4	0.5	0.4	0.5	0.5	0.4	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.4	0.4	0.6	0.5		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.3	1.0	0.9	0.9	0.8	0.8	0.9	1.0	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.0	0.9	0.9	0.9	0.9	1.0	1.5		
9.5	Turbine ON	9.48	37	Average (dBA)	12.5	17.1	20.9	24.4	27.6	31.5	34.0	35.9	38.7	38.3	39.3	41.3	41.6	41.9	45.4	44.1	44.3	45.5	44.8	44.7	44.0	43.5	43.0	41.4	38.8	35.4	29.7	21.9	55.5	
				Uncertainty A (dB)	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	9.45	100	Average (dBA)	8.9	11.8	13.5	15.0	16.1	19.2	21.3	24.5	26.4	24.8	26.7	29.7	28.7	28.3	28.1	27.4	27.1	26.4	25.4	25.2	25.1	24.8	23.9	27.8	20.9	19.2	24.8	20.1	39.6	
				Uncertainty A (dB)	0.8	0.7	0.5	0.4	0.3	0.2	0.2	0.4	0.4	0.3	0.4	0.5	0.4	0.4	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.3	0.3	0.4	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.2	1.0	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	0.8	0.9	0.9	1.5		
10.0	Turbine ON	9.97	31	Average (dBA)	11.8	16.8	20.4	24.1	27.4	31.2	33.4	35.5	38.6	38.2	38.8	40.8	41.1	41.5	45.1	43.8	44.1	45.4	44.6	44.7	44.0	43.5	43.0	41.4	38.8	35.4	29.8	22.0	55.3	
				Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	9.96	67	Average (dBA)	9.5	12.1	13.5	15.4	16.3	19.5	21.0	24.2	24.4	24.5	25.7	27.3	28.2	26.9	27.9	27.6	27.5	27.0	26.2	25.8	25.7	25.4	24.4	28.9	21.6	19.3	25.4	21.0	39.4	
				Uncertainty A (dB)	0.9	0.8	0.6	0.6	0.4	0.4	0.3	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.4	0.5	0.5	0.5	0.4	0.3	0.3	0.6	0.5		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.3	1.0	1.0	0.9	0.9	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.0	0.9	0.9	0.9	0.9	1.0	1.5		
10.5	Turbine ON	10.46	17	Average (dBA)	12.4	18.3	20.5	24.0	27.3	31.4	33.3	35.2	38.7	38.2	38.7	40.5	40.8	41.2	45.2	43.8	44.1	45.6	45.0	45.0	44.3	43.8	43.3	41.6	39.0	35.6	29.9	22.2	55.4	
				Uncertainty A (dB)	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.3	0.2	0.2	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.2	1.1	0.9	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	10.47	49	Average (dBA)	8.9	12.6	13.4	14.8	16.0	19.3	21.5	25.1	25.5	26.1	29.0	29.7	29.5	28.9	29.7	29.0	28.5	28.0	27.5	27.8	27.8	27.3	26.4	28.4	23.3	21.2	26.8	20.4	40.9	
				Uncertainty A (dB)	1.0	1.0	0.7	0.5	0.4	0.4	0.4	0.7	0.4	0.5	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.5	0.5	0.7	0.8	0.8	0.8	0.5	0.6	0.6	0.8	0.6		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.4	1.1	1.0	0.9	0.9	0.9	1.0	0.9	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	0.8	0.9	1.0	1.0	1.1	1.1	0.9	1.0	1.0	1.1	1.5		

Table C.04 Detailed measruement uncertainty at hub height

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

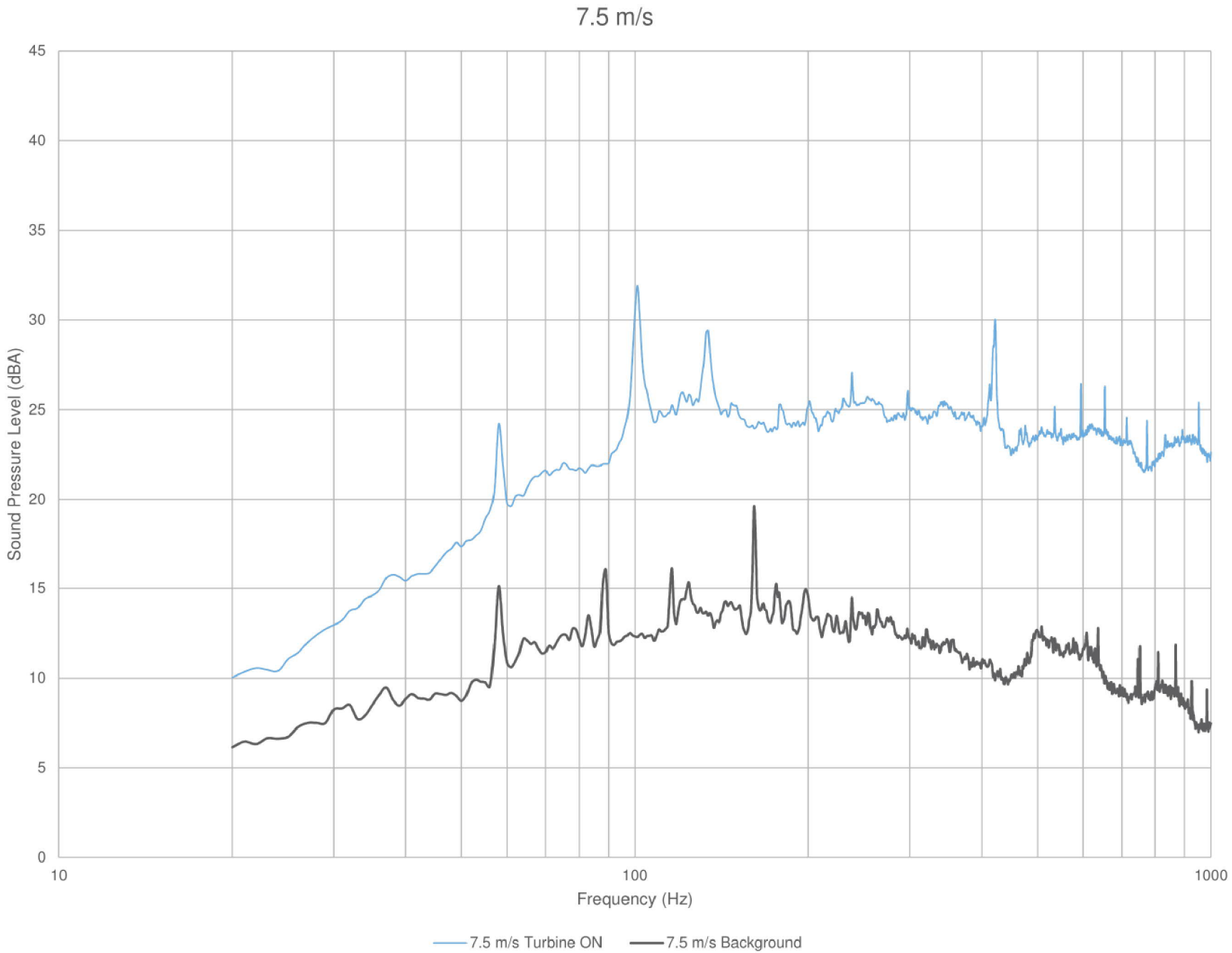
Created on: 1/23/2018

Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																													Overall
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
11.0	Turbine ON	10.99	33	Average (dBA)	11.9	17.8	20.3	23.9	27.0	31.0	33.2	35.0	38.4	38.0	38.5	40.5	40.7	41.1	45.0	43.9	44.2	45.6	45.0	45.0	44.3	43.8	43.3	41.6	39.0	35.7	30.0	22.1	55.4	
				Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	11.01	50	Average (dBA)	9.8	13.0	14.5	16.2	16.7	18.9	20.9	21.8	24.4	25.7	25.2	27.1	29.9	26.3	27.8	27.6	27.4	26.8	26.1	26.1	26.0	25.5	24.4	26.1	21.3	19.2	25.8	18.7	39.3	
				Uncertainty A (dB)	1.2	1.1	0.9	0.7	0.5	0.3	0.3	0.3	0.3	0.5	0.4	0.4	0.7	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.3	0.4	0.4	0.6	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.6	1.5	1.2	1.1	1.0	0.9	0.9	0.9	0.9	1.0	0.8	0.8	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.5		
11.5	Turbine ON	11.46	40	Average (dBA)	11.9	18.1	19.9	23.8	27.0	31.1	33.1	34.9	38.8	37.9	38.5	40.4	40.6	41.0	44.9	43.8	44.2	45.6	45.1	45.2	44.4	43.9	43.4	41.6	39.1	35.7	30.1	22.2	55.4	
				Uncertainty A (dB)	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	11.49	33	Average (dBA)	7.2	10.0	11.8	13.9	15.9	20.0	22.2	24.1	28.9	25.5	25.9	27.6	27.9	29.1	27.7	26.8	26.6	26.1	25.7	26.0	26.3	26.1	25.2	26.1	22.3	21.2	25.8	18.6	39.6	
				Uncertainty A (dB)	1.2	1.0	0.8	0.6	0.6	0.6	0.6	0.7	1.0	0.6	0.5	0.5	0.6	0.9	0.4	0.3	0.3	0.3	0.4	0.5	0.6	0.7	0.6	0.4	0.6	0.7	0.6	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.6	1.4	1.1	1.0	1.0	1.0	1.0	1.1	1.3	1.0	0.9	0.9	0.9	1.1	0.8	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.5		
12.0	Turbine ON	11.94	31	Average (dBA)	12.1	18.1	20.0	23.8	27.0	30.9	32.9	34.6	38.7	37.8	38.3	40.2	40.4	40.8	44.9	43.6	44.0	45.5	45.1	45.1	44.4	43.9	43.3	41.6	39.0	35.7	30.1	22.2	55.3	
				Uncertainty A (dB)	0.5	0.2	0.4	0.4	0.4	0.3	0.3	0.3	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	11.99	29	Average (dBA)	8.6	11.6	13.0	15.0	16.4	19.1	21.5	22.8	29.3	27.4	27.0	30.4	31.8	29.6	29.1	28.4	27.8	27.3	26.7	26.9	27.1	26.9	26.0	27.0	22.6	21.3	27.6	19.5	41.0	
				Uncertainty A (dB)	1.3	1.2	1.0	0.8	0.6	0.5	0.5	0.6	1.1	0.9	0.7	1.0	1.2	0.9	0.5	0.5	0.4	0.4	0.4	0.5	0.6	0.6	0.7	0.4	0.6	0.6	0.8	0.6		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.7	1.5	1.2	1.1	1.0	0.9	0.9	1.0	1.4	1.2	1.0	1.2	1.4	1.2	0.9	0.9	0.8	0.8	0.8	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.2	1.6		
12.5	Turbine ON	12.45	24	Average (dBA)	11.9	18.4	20.4	23.9	27.5	31.2	33.2	35.1	39.1	37.9	38.4	40.1	40.3	40.7	44.9	43.6	44.0	45.5	45.1	45.2	44.5	43.9	43.3	41.6	39.1	35.7	30.1	22.1	55.4	
				Uncertainty A (dB)	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	12.46	22	Average (dBA)	8.0	9.6	12.4	14.4	15.2	19.4	21.1	22.8	27.8	27.4	26.0	27.6	27.8	27.2	28.1	27.5	27.2	26.8	26.6	27.1	27.3	27.1	26.3	26.5	22.6	20.7	24.7	18.1	39.8	
				Uncertainty A (dB)	1.5	1.1	1.1	0.9	0.5	0.5	0.5	0.5	1.0	0.9	0.5	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.8	0.8	0.4	0.6	0.6	0.5	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.8	1.5	1.3	1.2	1.0	1.0	0.9	0.9	1.3	1.2	0.9	0.8	0.9	0.9	0.8	0.8	0.8	0.8	0.9	0.9	1.0	1.1	1.1	0.9	1.0	1.0	1.0	1.5		

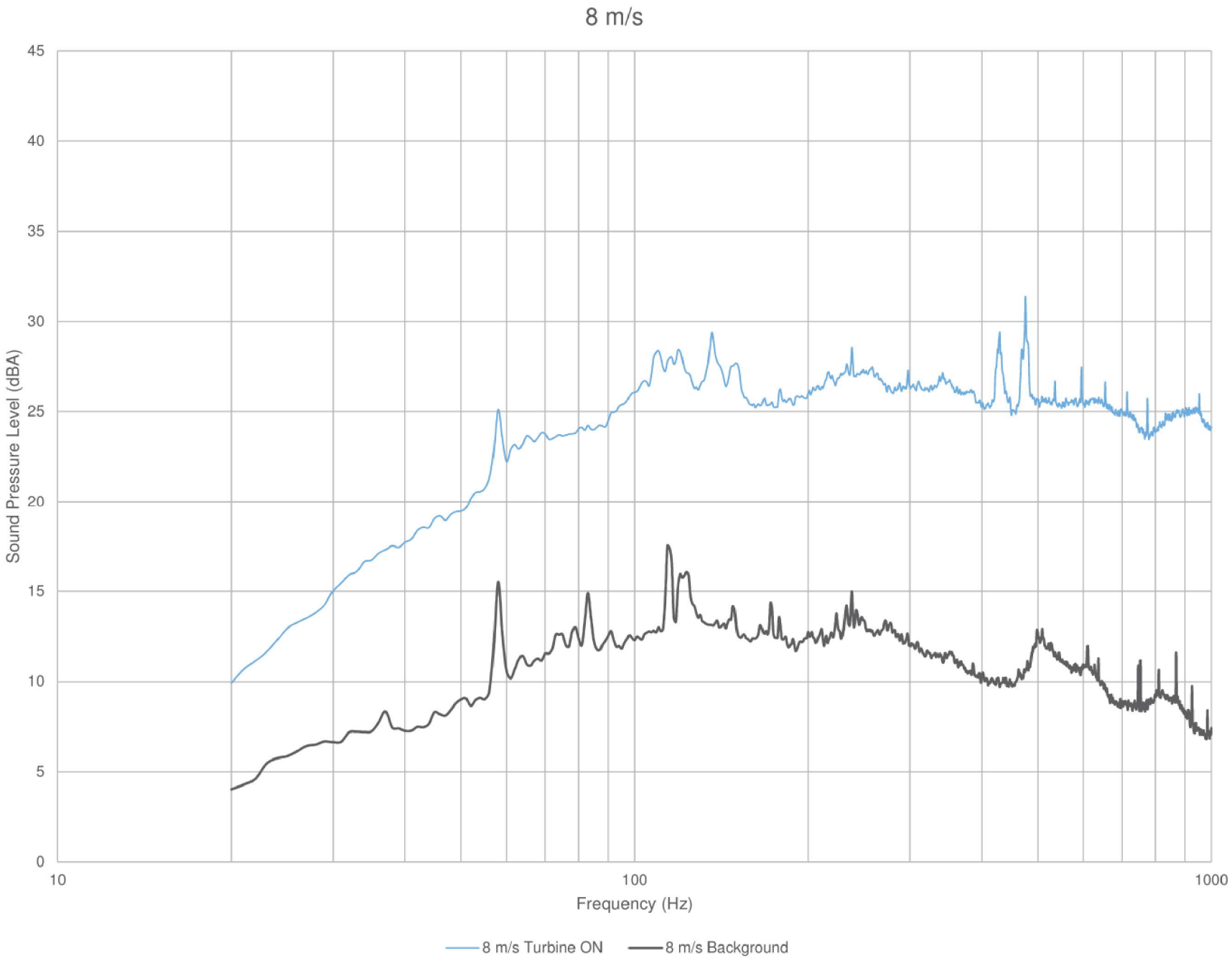
Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

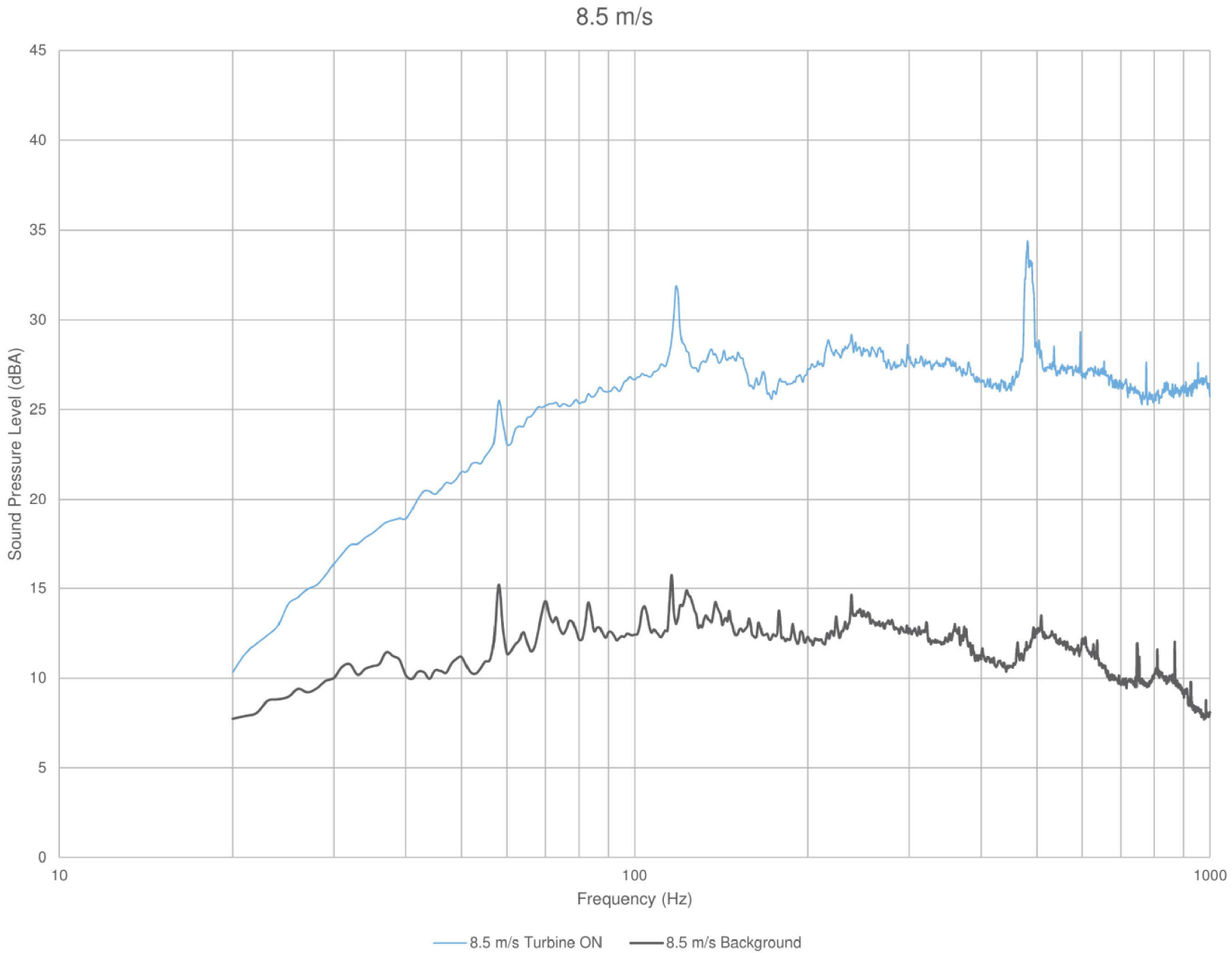
Appendix D
Tonality Assessment



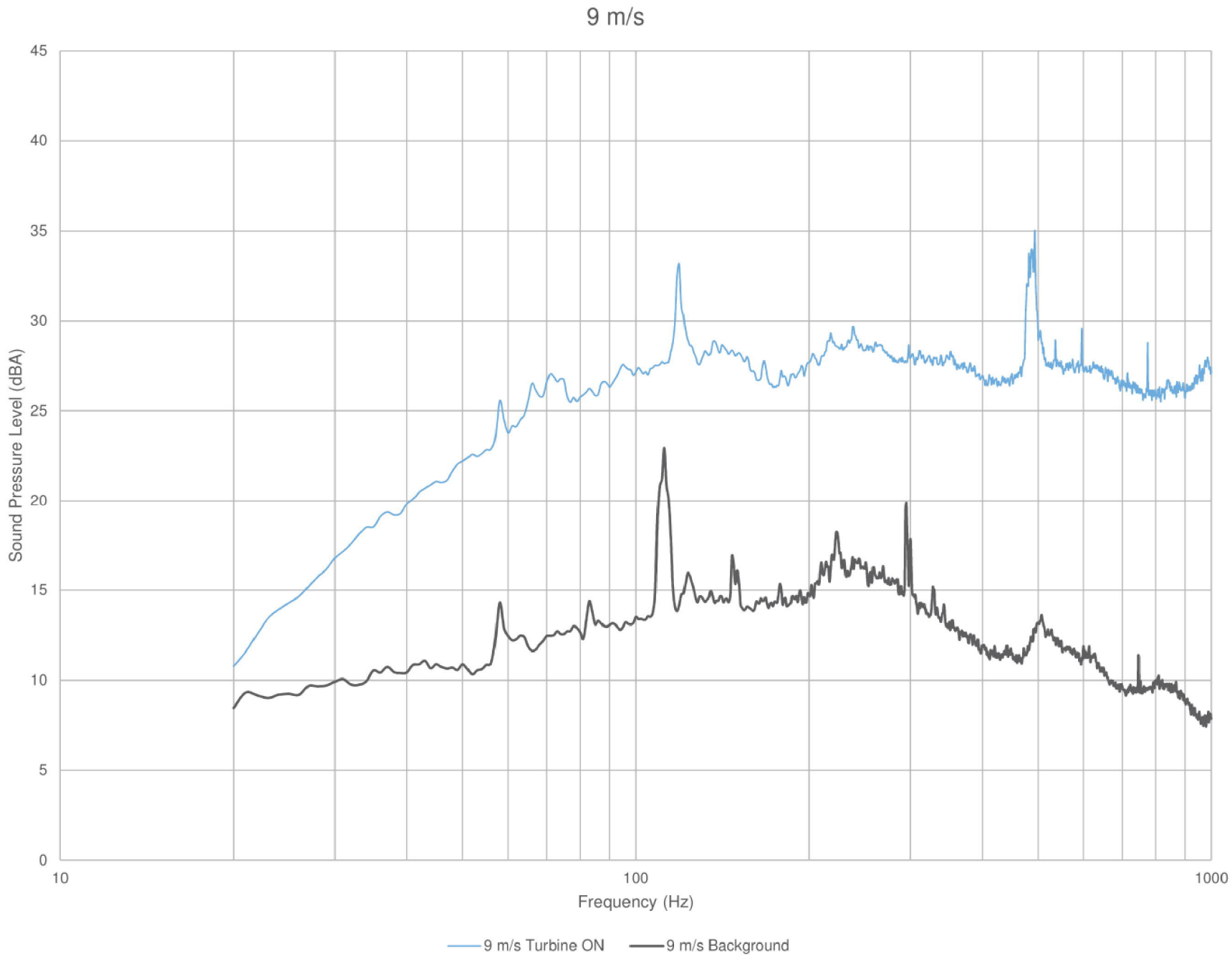
aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 7.5 m/s	**Figure D.01**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 8 m/s
		Figure D.02

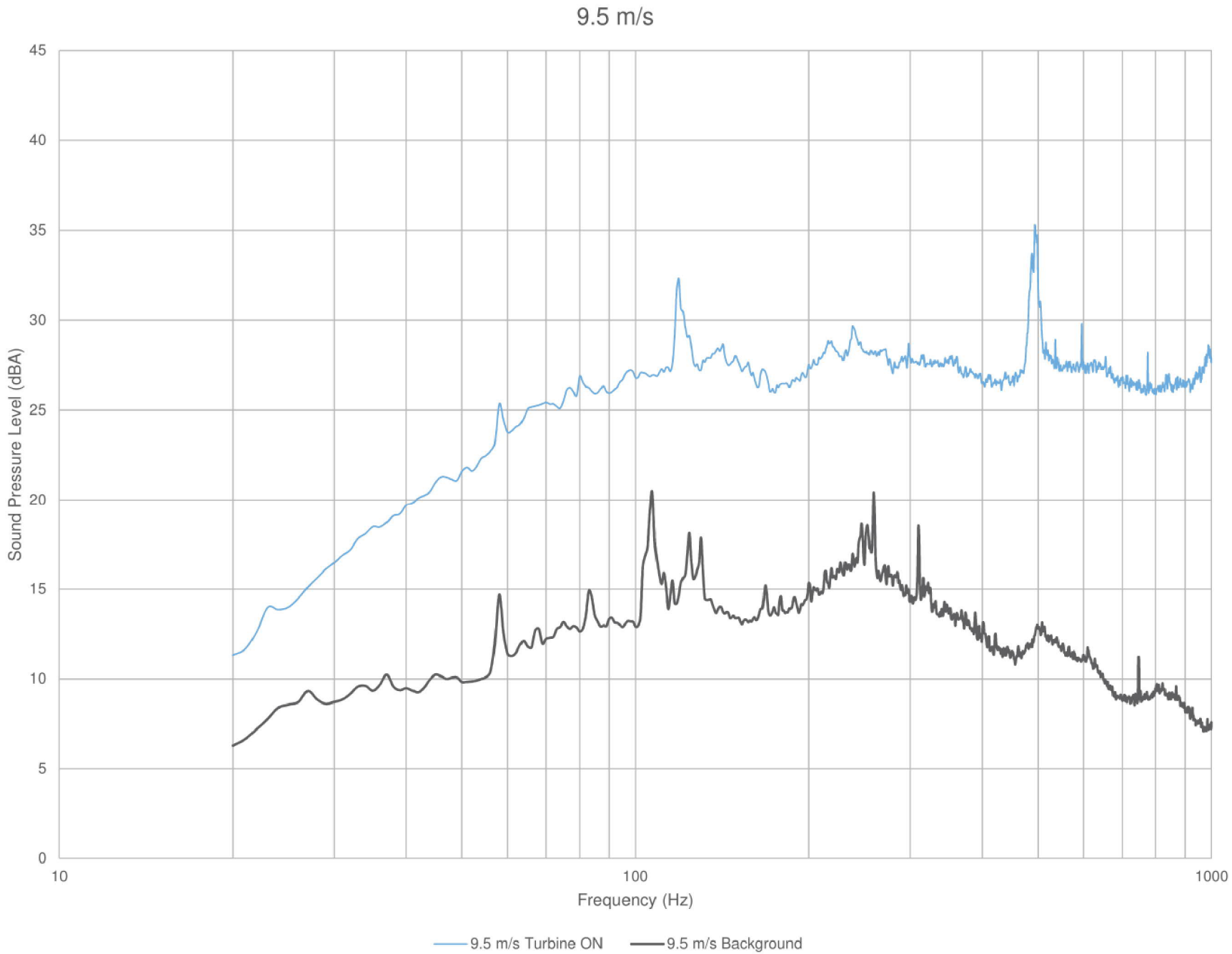


aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 8.5 m/s	**Figure D.03**

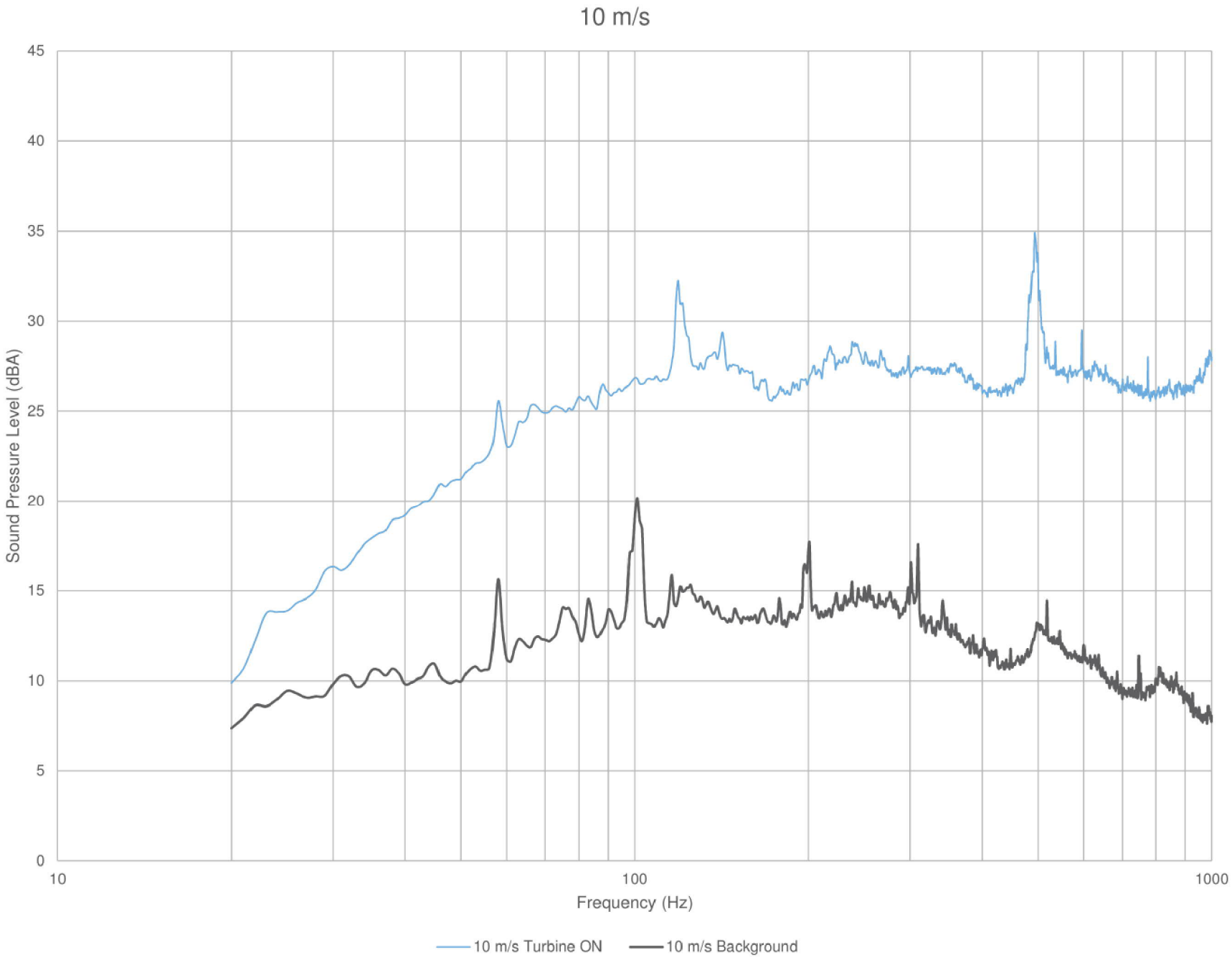


aercoustics	Project ID: 14284.00.T60.RP5 Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	**Project Name** Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0 **Figure Title** Plot of narrow band spectra – Turbine ON vs. Background at 9 m/s

Figure D.04



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 9.5 m/s	**Figure D.05**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
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		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 10 m/s	**Figure D.06**

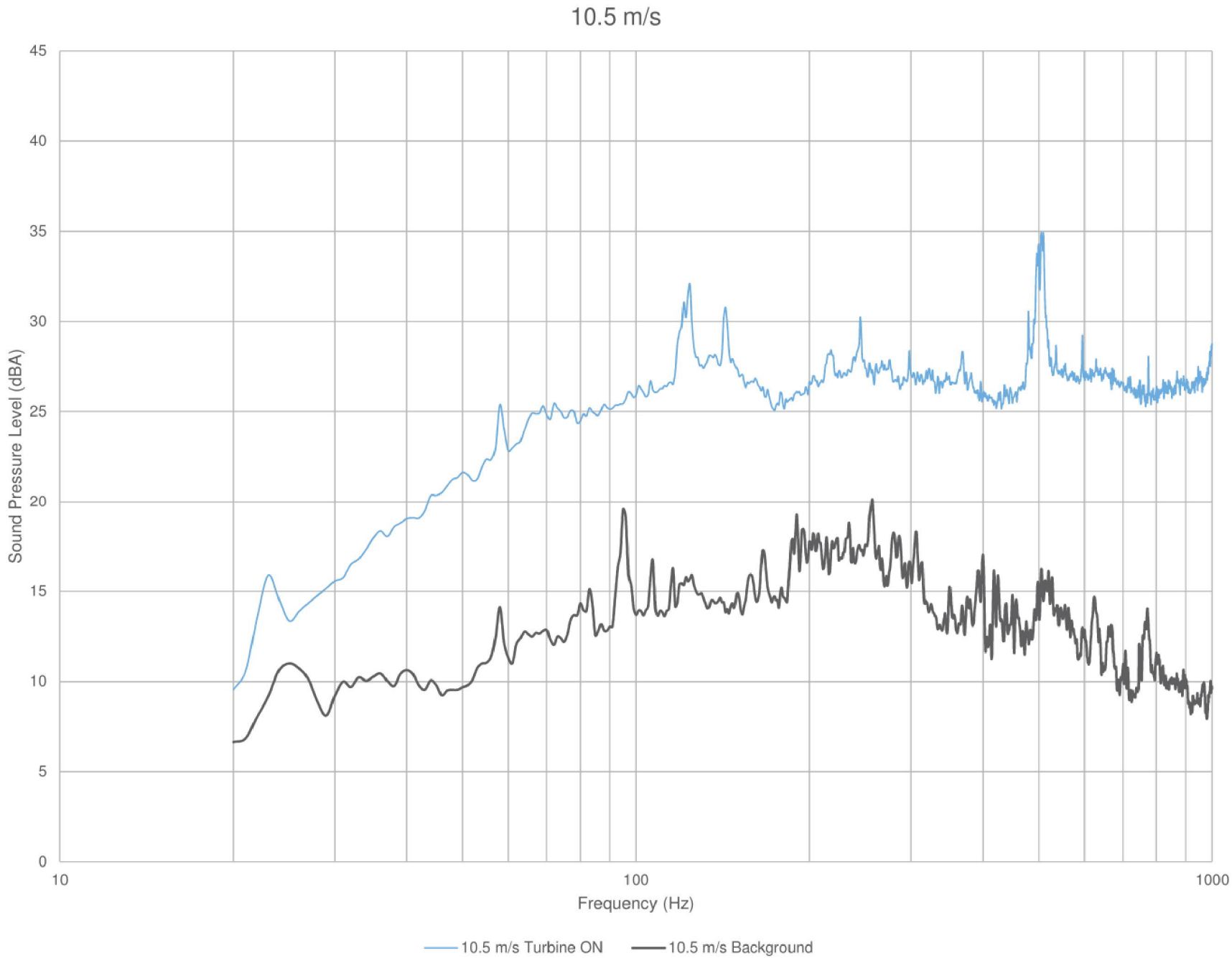

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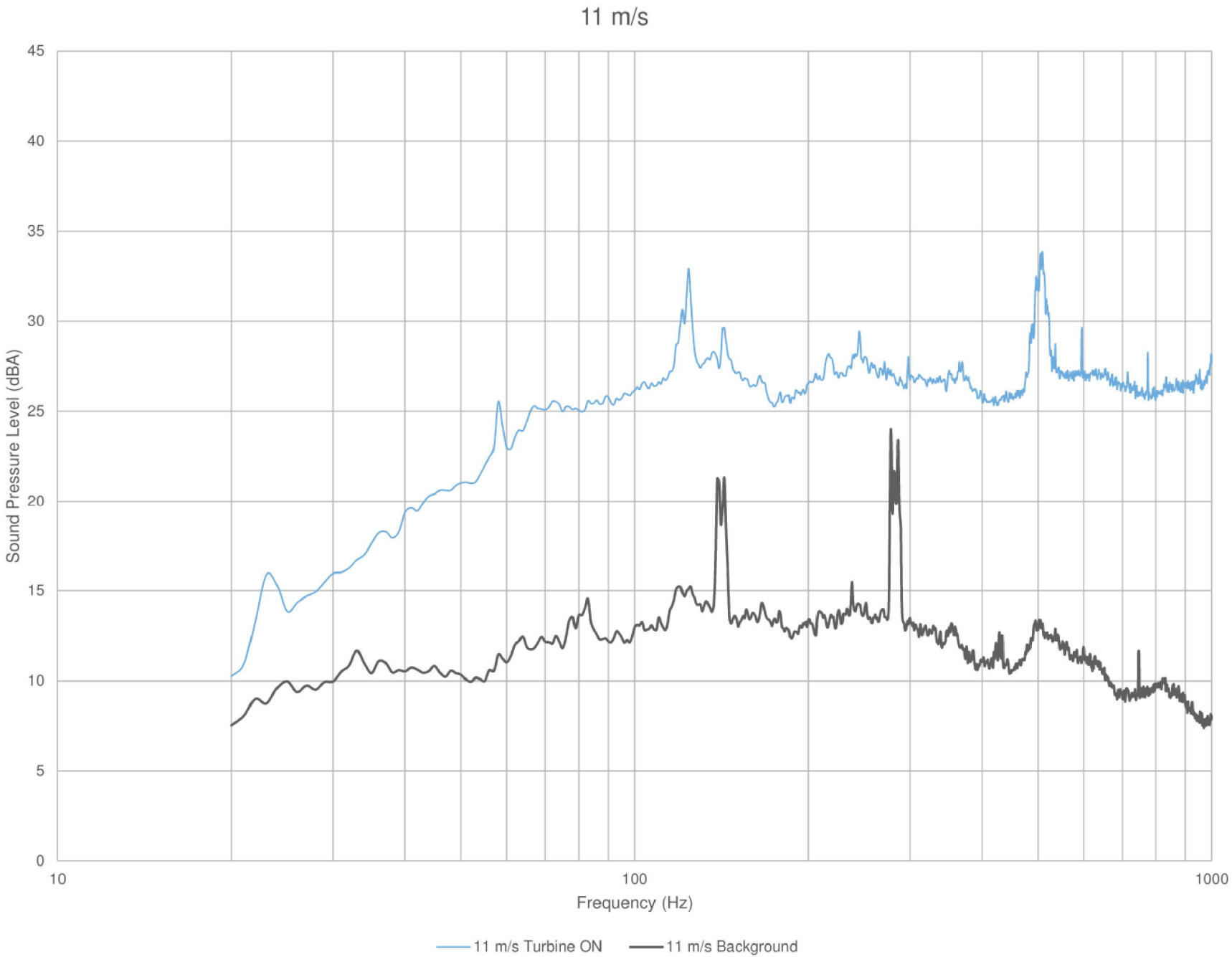
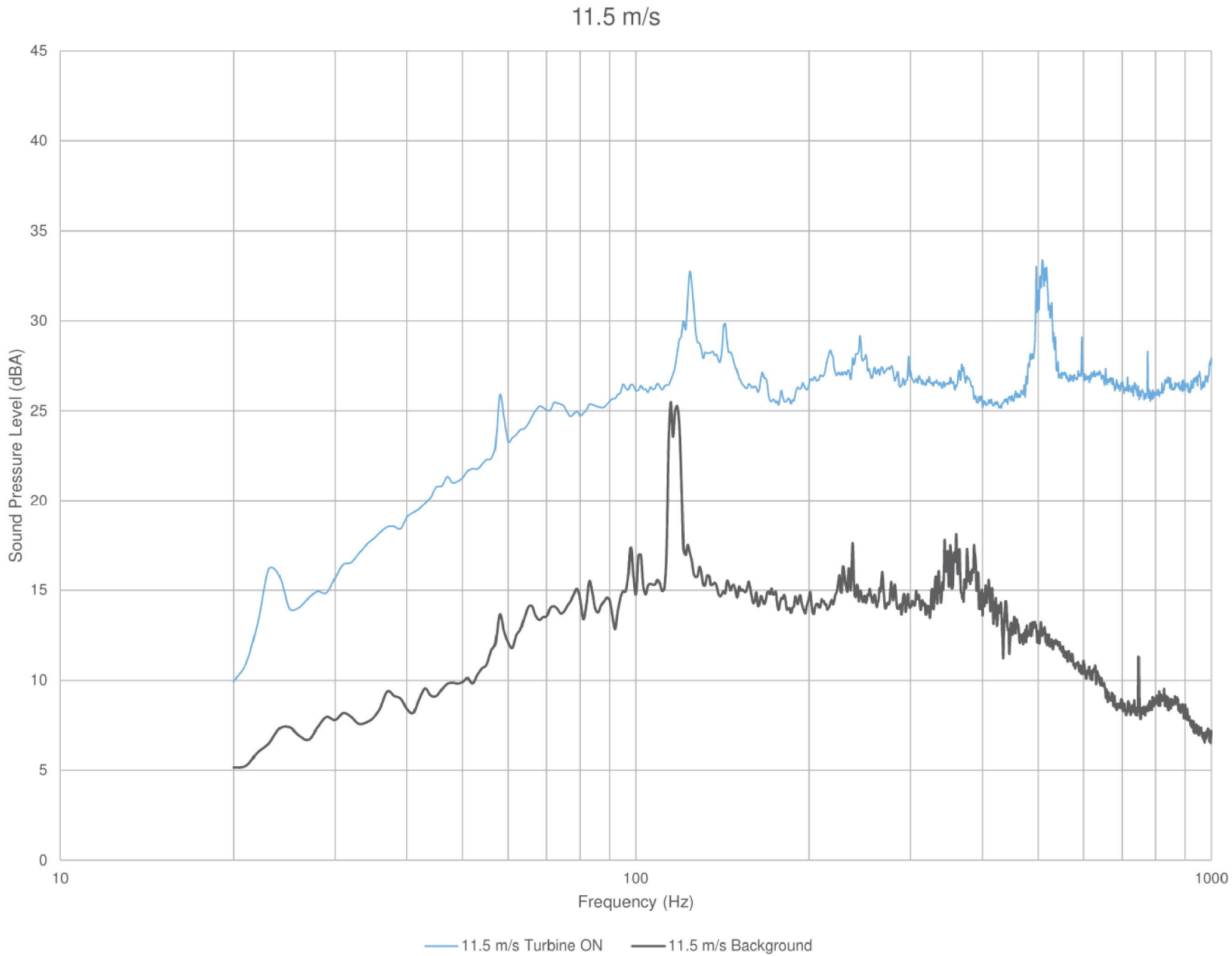
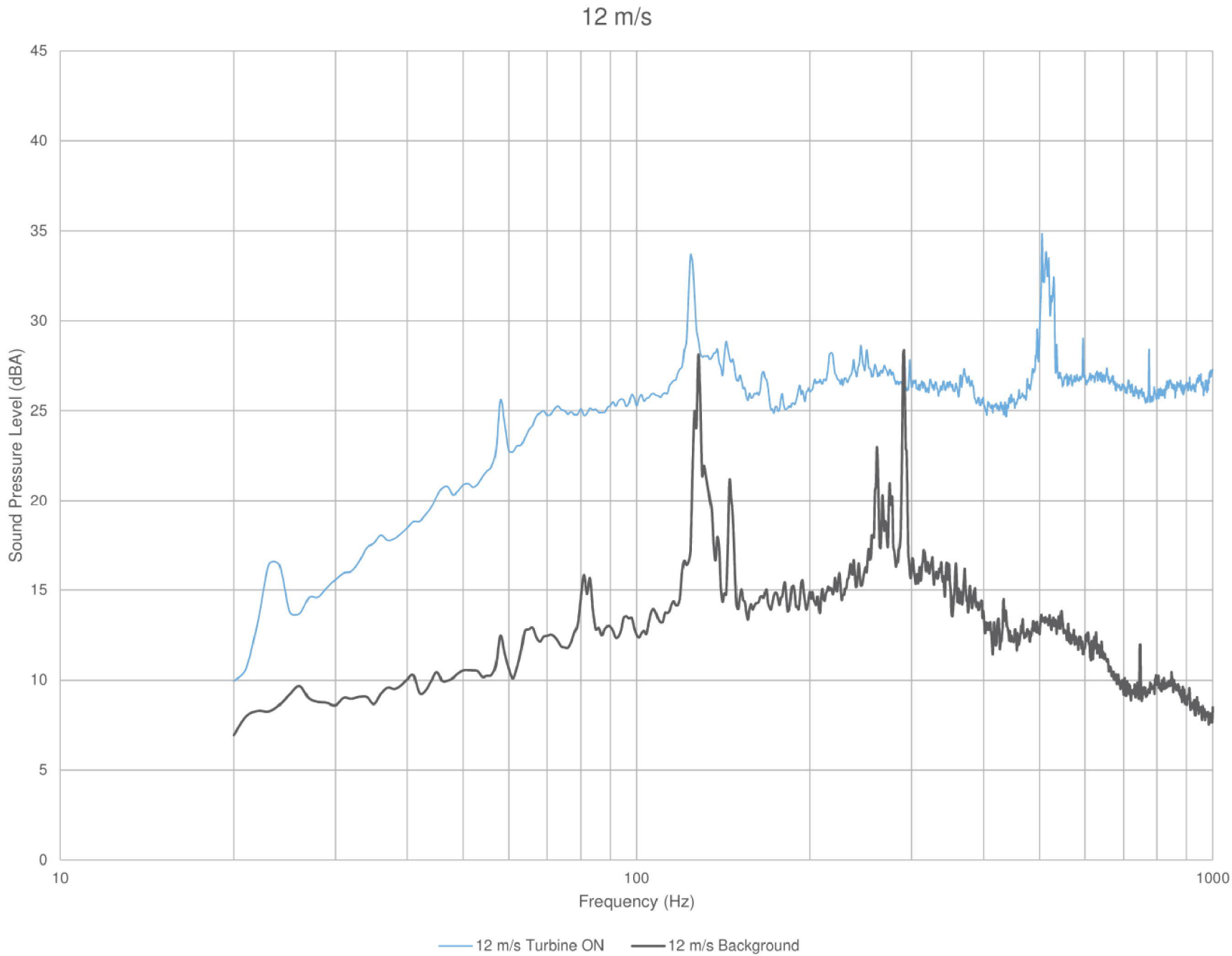
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 10.5 m/s	**Figure D.07**



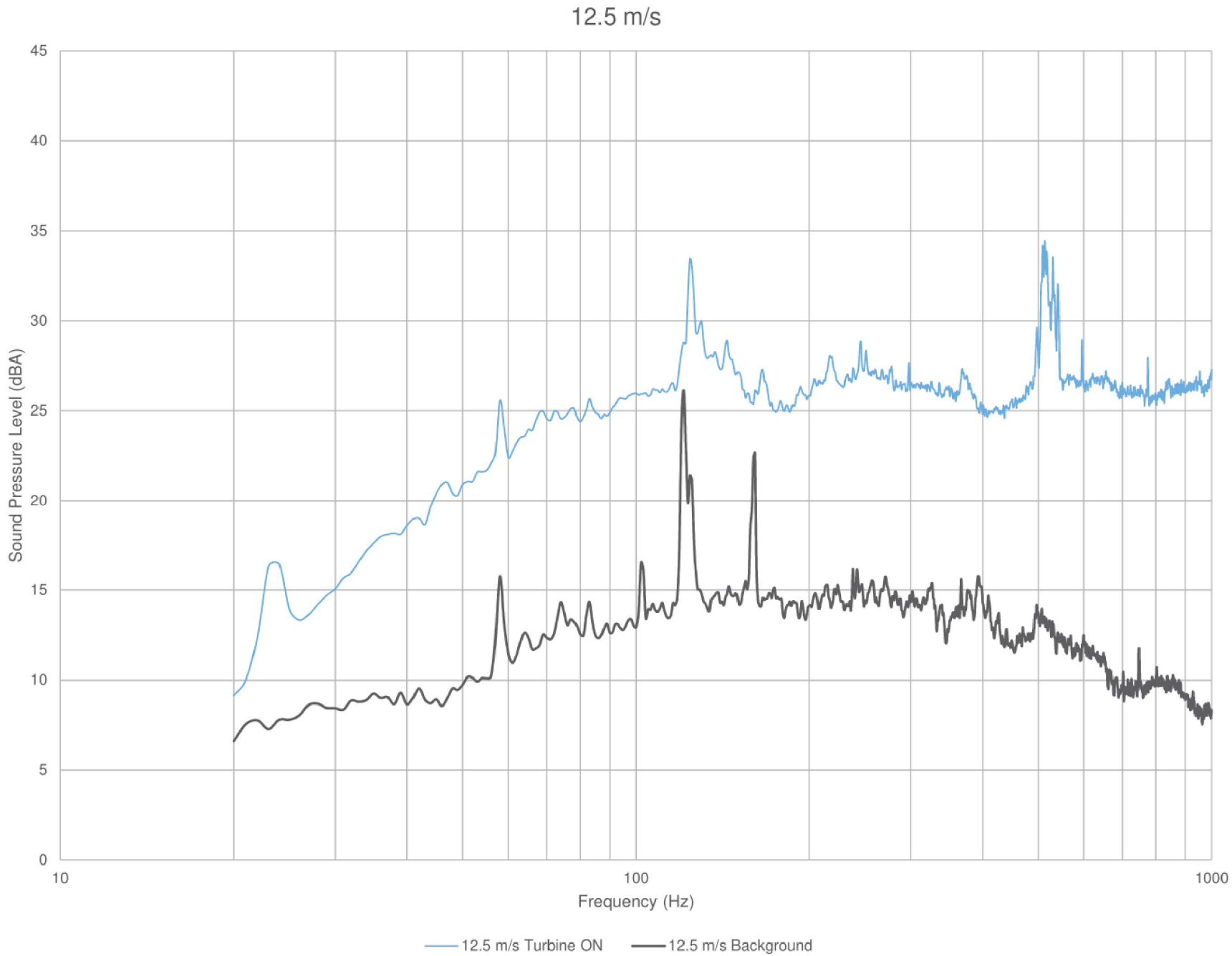
aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 11 m/s	**Figure D.08**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 11.5 m/s
		Figure D.09



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 12 m/s	**Figure D.11**



aercoustics	Project ID: 14284.00.T60.RP5	**Project Name**	
	Scale: NTS Drawn by: KC Reviewed by: PA Date: January 2018 Revision: 1	Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Edition 3.0	
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 8 m/s	**Figure D.11**

Table D.01 Tonality Assessment Table - 7.5 m/s

Project: Grand Renewables Wind Farm - T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
No Reportable Tones									

Table D.02 Tonality Assessment Table - 8.0 m/s

Project: Grand Renewables Wind Farm - T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
509	468			27.0	45.9	40.3	-5.6	-2.3	-3.3
198	468			24.7	43.5	33.9	-9.6	-2.3	-7.3
366	469			26.4	45.3	40.6	-4.7	-2.3	-2.4
197	469			25.0	43.9	37.3	-6.6	-2.3	-4.3
60	470			25.4	44.3	34.9	-9.4	-2.3	-7.1
415	470			25.7	44.6	34.9	-9.6	-2.3	-7.4
471	471			27.0	45.9	38.4	-7.5	-2.3	-5.2
470	471			27.4	46.3	35.0	-11.3	-2.3	-9.1
279	473			26.0	44.8	32.1	-12.7	-2.3	-10.5
196	474			24.9	43.8	39.3	-4.4	-2.3	-2.2
195	474			25.0	43.9	41.9	-2.0	-2.3	0.3
392	475			26.5	45.3	37.1	-8.3	-2.3	-6.0
370	476			27.5	46.4	41.2	-5.2	-2.3	-2.9
324	476			26.6	45.5	42.6	-2.8	-2.3	-0.6
379	476			26.1	45.0	44.7	-0.3	-2.3	2.0
357	476			26.8	45.6	33.1	-12.5	-2.3	-10.3
414	476			26.7	45.5	43.6	-2.0	-2.3	0.3
510	477			26.9	45.8	40.2	-5.6	-2.3	-3.3
59	478			25.8	44.7	42.2	-2.5	-2.3	-0.2
498	479			27.5	46.4	40.1	-6.3	-2.3	-4.0
663	481			27.0	45.9	41.0	-4.8	-2.3	-2.5
249	481			26.9	45.8	45.8	0.0	-2.3	2.3
384	482			27.3	46.1	35.8	-10.4	-2.3	-8.1
314	482			27.0	45.9	44.0	-1.9	-2.3	0.4
Average	475						-4.7	-2.3	-2.4

Table D.03 Tonality Assessment Table - 8.5 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
619	475			27.9	46.8	35.6	-11.2	-2.3	-8.9
369	477			27.4	46.3	42.1	-4.1	-2.3	-1.9
662	477			27.1	46.0	42.6	-3.4	-2.3	-1.1
323	478			27.5	46.4	44.1	-2.3	-2.3	0.0
666	479			27.0	45.9	40.0	-5.9	-2.3	-3.6
365	479			27.7	46.5	35.4	-11.1	-2.3	-8.8
325	479			28.0	46.9	34.7	-12.2	-2.3	-10.0
313	480			27.0	45.9	43.0	-2.9	-2.3	-0.6
356	480			28.0	46.8	44.0	-2.8	-2.3	-0.6
275	481			27.3	46.2	43.3	-2.9	-2.3	-0.7
391	481			26.3	45.2	44.8	-0.3	-2.3	1.9
671	482			27.9	46.8	42.5	-4.2	-2.3	-1.9
504	483			28.2	47.1	39.1	-8.0	-2.3	-5.7
378	483			26.8	45.7	46.9	1.2	-2.3	3.5
500	483			28.4	47.3	38.1	-9.2	-2.3	-7.0
315	485			27.1	46.0	41.7	-4.2	-2.3	-2.0
306	485			27.1	46.0	41.2	-4.8	-2.3	-2.5
508	485			27.7	46.6	46.3	-0.3	-2.3	2.0
355	486			27.7	46.6	38.4	-8.3	-2.3	-6.0
615	487			27.0	45.9	45.0	-0.9	-2.3	1.3
194	487			26.6	45.5	43.3	-2.2	-2.3	0.0
423	488			27.5	46.4	34.5	-11.9	-2.3	-9.6
483	490			27.7	46.6	43.8	-2.9	-2.3	-0.6
464	490			27.4	46.3	45.5	-0.7	-2.3	1.6
58	491			26.2	45.1	44.5	-0.6	-2.3	1.6
248	492			27.7	46.7	44.0	-2.7	-2.3	-0.4
247	493			27.1	46.0	42.6	-3.4	-2.3	-1.1
278	494			27.7	46.6	37.1	-9.5	-2.3	-7.2
364	494			27.9	46.8	37.7	-9.1	-2.3	-6.8
277	494			27.7	46.6	40.9	-5.7	-2.3	-3.4
469	498			28.5	47.4	40.8	-6.6	-2.3	-4.3
250	502			28.2	47.1	41.0	-6.1	-2.3	-3.8
Average	486						-3.7	-2.3	-1.4

Table D.04 Tonality Assessment Table - 9.0 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
367	476			29.1	48.0	39.0	-9.0	-2.3	-6.8
468	477			27.4	46.3	41.8	-4.5	-2.3	-2.2
659	478			28.4	47.3	46.5	-0.7	-2.3	1.5
354	480			27.0	45.9	45.7	-0.2	-2.3	2.1
604	482			28.8	47.7	40.6	-7.0	-2.3	-4.8
432	482			27.2	46.1	46.1	0.0	-2.3	2.3
474	482			27.7	46.6	43.1	-3.6	-2.3	-1.3
462	482			26.7	45.5	46.2	0.6	-2.3	2.9
377	483			26.6	45.5	44.1	-1.4	-2.3	0.9
482	483			27.5	46.4	39.6	-6.8	-2.3	-4.5
305	486			26.8	45.7	46.5	0.9	-2.3	3.1
613	487			27.5	46.4	45.5	-0.9	-2.3	1.4
436	488			28.2	47.1	39.5	-7.7	-2.3	-5.4
502	488			28.3	47.2	38.4	-8.8	-2.3	-6.5
616	489			28.5	47.4	39.0	-8.4	-2.3	-6.1
463	489			27.0	45.9	41.3	-4.6	-2.3	-2.3
334	489			27.6	46.5	42.8	-3.7	-2.3	-1.4
312	489			28.0	46.9	38.7	-8.2	-2.3	-5.9
465	490			28.1	47.0	39.7	-7.2	-2.3	-4.9
274	490			27.2	46.1	42.2	-3.9	-2.3	-1.6
661	490			27.5	46.4	42.3	-4.1	-2.3	-1.8
333	492			28.0	46.9	36.2	-10.7	-2.3	-8.4
485	492			28.1	47.0	38.0	-9.0	-2.3	-6.7
359	492			28.1	47.0	38.9	-8.1	-2.3	-5.8
413	493			27.7	46.6	46.2	-0.4	-2.3	1.9
412	493			28.0	46.9	47.4	0.5	-2.3	2.8
614	494			28.5	47.4	40.7	-6.7	-2.3	-4.4
434	496			27.6	46.5	45.1	-1.4	-2.3	0.9
484	498			27.7	46.6	38.3	-8.4	-2.3	-6.1
433	498			28.3	47.2	40.0	-7.2	-2.3	-4.9
505	504			28.5	47.4	34.8	-12.6	-2.3	-10.3
Average	488						-3.4	-2.3	-1.1

Table D.05 Tonality Assessment Table - 9.5 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
407	488			27.7	46.6	45.4	-1.2	-2.3	1.0
268	488			27.5	46.4	44.3	-2.0	-2.3	0.3
543	488			27.9	46.8	43.0	-3.7	-2.3	-1.5
618	489			27.7	46.6	44.4	-2.2	-2.3	0.1
692	490			28.5	47.4	36.1	-11.3	-2.3	-9.0
322	492			27.0	45.9	42.3	-3.5	-2.3	-1.2
332	493			27.3	46.3	44.2	-2.1	-2.3	0.2
406	493			27.5	46.4	45.6	-0.8	-2.3	1.5
409	493			27.4	46.3	44.2	-2.2	-2.3	0.1
660	494			28.4	47.3	38.1	-9.2	-2.3	-6.9
273	494			27.4	46.4	41.5	-4.9	-2.3	-2.6
408	494			28.1	47.0	42.5	-4.5	-2.3	-2.2
271	495			27.2	46.2	45.9	-0.2	-2.3	2.1
337	495			28.0	46.9	41.3	-5.6	-2.3	-3.3
693	495			27.8	46.7	42.3	-4.3	-2.3	-2.1
390	496			26.7	45.6	46.9	1.2	-2.3	3.5
269	496			28.1	47.0	43.7	-3.3	-2.3	-1.0
622	496			28.2	47.1	40.6	-6.5	-2.3	-4.2
270	498			27.5	46.4	44.4	-2.0	-2.3	0.3
411	498			27.1	46.0	45.3	-0.7	-2.3	1.6
621	498			28.1	47.0	40.5	-6.5	-2.3	-4.2
410	498			27.2	46.1	48.1	1.9	-2.3	4.2
251	503			27.3	46.2	43.3	-3.0	-2.3	-0.7
435	504			28.1	47.0	38.0	-9.0	-2.3	-6.7
617	505			28.0	46.9	39.5	-7.4	-2.3	-5.1
336	505			27.6	46.5	44.5	-2.0	-2.3	0.3
512	516			29.1	48.0	36.8	-11.2	-2.3	-8.9
Average	496						-2.8	-2.3	-0.5

Table D.06 Tonality Assessment Table - 10.0 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
439	492			27.9	46.8	42.9	-3.9	-2.3	-1.6
454	493			27.8	46.7	45.9	-0.8	-2.3	1.5
301	493			26.8	45.7	41.8	-3.9	-2.3	-1.6
291	493			26.9	45.9	47.3	1.5	-2.3	3.8
266	493			27.3	46.2	46.9	0.7	-2.3	3.0
438	494			27.4	46.3	42.3	-4.0	-2.3	-1.7
568	494			28.4	47.4	43.2	-4.2	-2.3	-1.9
456	495			27.8	46.7	37.8	-8.9	-2.3	-6.6
331	495			27.0	45.9	43.6	-2.3	-2.3	0.0
624	495			27.2	46.1	41.7	-4.3	-2.3	-2.0
612	495			27.3	46.2	44.3	-1.9	-2.3	0.4
437	496			28.1	47.0	43.2	-3.9	-2.3	-1.6
389	496			26.5	45.4	44.1	-1.3	-2.3	1.0
405	496			27.3	46.2	45.5	-0.7	-2.3	1.6
478	497			27.0	45.9	41.0	-5.0	-2.3	-2.7
272	497			27.1	46.1	40.1	-5.9	-2.3	-3.6
518	499			27.8	46.7	40.5	-6.2	-2.3	-3.9
320	499			27.4	46.3	43.7	-2.6	-2.3	-0.3
252	503			27.3	46.2	44.8	-1.4	-2.3	0.9
545	504			28.6	47.6	40.1	-7.5	-2.3	-5.2
375	508			27.6	46.5	41.7	-4.8	-2.3	-2.5
546	512			28.2	47.2	38.0	-9.1	-2.3	-6.8
672	518			28.7	47.7	41.6	-6.1	-2.3	-3.8
Average	498						-2.9	-2.3	-0.6

Table D.07 Tonality Assessment Table - 10.5 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
452	494			27.8	46.7	44.5	-2.2	-2.3	0.1
674	495			27.6	46.6	44.7	-1.9	-2.3	0.4
402	496			27.1	46.0	43.6	-2.5	-2.3	-0.2
457	498			27.3	46.2	39.6	-6.6	-2.3	-4.3
348	499			27.5	46.5	48.8	2.4	-2.3	4.7
473	500			28.0	46.9	42.5	-4.4	-2.3	-2.1
527	501			27.1	46.0	38.0	-8.0	-2.3	-5.7
525	504			27.6	46.6	40.9	-5.7	-2.3	-3.4
609	505			26.4	45.4	45.8	0.5	-2.3	2.8
259	506			27.1	46.0	43.2	-2.9	-2.3	-0.6
256	507			27.2	46.1	45.8	-0.3	-2.3	2.0
677	509			27.2	46.1	44.2	-1.9	-2.3	0.4
388	509			27.1	46.1	45.6	-0.5	-2.3	1.8
579	509			28.4	47.4	39.3	-8.1	-2.3	-5.8
303	510			28.2	47.1	45.9	-1.2	-2.3	1.1
673	520			27.6	46.6	42.2	-4.5	-2.3	-2.1
Average	504						-2.1	-2.3	0.2

Table D.08 Tonality Assessment Table - 11.0 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
516	484			27.0	45.9	43.6	-2.3	-2.3	0.0
265	488			27.0	45.9	42.9	-3.0	-2.3	-0.7
302	493			27.9	46.8	43.7	-3.1	-2.3	-0.8
330	494			26.6	45.5	44.4	-1.1	-2.3	1.2
300	495			26.8	45.7	44.3	-1.4	-2.3	0.9
267	496			27.0	45.9	42.7	-3.3	-2.3	-1.0
519	497			27.4	46.3	39.9	-6.5	-2.3	-4.2
577	497			27.1	46.0	43.2	-2.8	-2.3	-0.5
304	498			27.4	46.3	43.6	-2.7	-2.3	-0.4
297	499			28.2	47.1	44.3	-2.9	-2.3	-0.6
351	501			27.5	46.4	42.6	-3.8	-2.3	-1.5
426	503			26.4	45.4	43.4	-1.9	-2.3	0.4
506	503			27.3	46.2	41.5	-4.7	-2.3	-2.4
400	504			28.1	47.0	43.0	-4.1	-2.3	-1.8
288	504			27.2	46.2	44.0	-2.2	-2.3	0.1
430	505			27.1	46.1	43.3	-2.8	-2.3	-0.5
345	505			27.4	46.3	43.7	-2.6	-2.3	-0.3
264	505			27.3	46.3	49.6	3.3	-2.3	5.6
447	508			26.7	45.7	45.0	-0.7	-2.3	1.6
644	508			27.4	46.3	43.3	-3.1	-2.3	-0.8
514	509			27.0	45.9	44.0	-1.9	-2.3	0.4
446	510			26.7	45.7	40.0	-5.7	-2.3	-3.4
292	510			28.1	47.1	38.8	-8.2	-2.3	-5.9
262	512			27.0	46.0	42.3	-3.7	-2.3	-1.4
338	512			28.5	47.5	35.4	-12.1	-2.3	-9.8
479	513			27.7	46.7	41.8	-4.9	-2.3	-2.6
593	514			27.3	46.3	43.5	-2.8	-2.3	-0.4
513	516			27.1	46.1	40.4	-5.6	-2.3	-3.3
678	517			28.0	47.0	42.6	-4.4	-2.3	-2.1
564	521			26.9	45.9	42.5	-3.4	-2.3	-1.1
592	522			27.6	46.6	46.8	0.2	-2.3	2.5
298	523			27.4	46.4	44.4	-2.0	-2.3	0.3
Average	505						-2.6	-2.3	-0.3

Table D.09 Tonality Assessment Table - 11.5m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
425	503			26.4	45.4	46.8	1.4	-2.3	3.7
559	503			26.0	44.9	44.3	-0.7	-2.3	1.6
289	504			28.2	47.1	41.9	-5.2	-2.3	-2.9
541	504			26.1	45.1	41.9	-3.2	-2.3	-0.9
403	505			27.3	46.3	40.8	-5.5	-2.3	-3.2
623	505			27.9	46.8	41.9	-4.9	-2.3	-2.6
681	506			27.0	46.0	43.0	-3.0	-2.3	-0.7
569	507			28.4	47.3	36.1	-11.2	-2.3	-8.9
676	508			27.1	46.1	42.8	-3.3	-2.3	-0.9
682	508			28.7	47.6	39.8	-7.8	-2.3	-5.5
328	508			27.2	46.1	44.1	-2.1	-2.3	0.3
347	509			27.5	46.5	43.1	-3.4	-2.3	-1.1
431	509			27.7	46.7	40.7	-6.0	-2.3	-3.7
346	510			27.3	46.3	43.3	-3.0	-2.3	-0.7
398	511			27.7	46.7	43.4	-3.2	-2.3	-0.9
480	514			27.8	46.7	36.1	-10.6	-2.3	-8.3
450	514			26.7	45.6	46.3	0.6	-2.3	2.9
326	515			27.4	46.4	44.4	-2.0	-2.3	0.3
548	515			27.0	46.0	40.6	-5.4	-2.3	-3.0
636	517			26.8	45.8	41.0	-4.8	-2.3	-2.4
261	517			26.9	45.9	46.3	0.4	-2.3	2.7
628	518			27.2	46.2	35.4	-10.7	-2.3	-8.4
688	518			26.5	45.5	47.1	1.6	-2.3	3.9
595	519			26.0	45.0	46.8	1.8	-2.3	4.1
260	522			28.1	47.0	45.3	-1.7	-2.3	0.6
570	523			27.3	46.3	45.8	-0.4	-2.3	1.9
444	527			26.8	45.8	41.7	-4.1	-2.3	-1.8
339	528			27.7	46.7	40.1	-6.6	-2.3	-4.3
565	529			27.1	46.1	44.7	-1.3	-2.3	1.0
606	532			27.1	46.1	45.8	-0.3	-2.3	2.0
Average	514						-2.3	-2.3	0.0

Table D.10 Tonality Assessment Table - 12.0 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
540	502			26.1	45.0	45.3	0.3	-2.3	2.6
602	504			27.1	46.1	43.3	-2.8	-2.3	-0.5
376	504			27.4	46.3	41.8	-4.5	-2.3	-2.2
657	504			27.2	46.1	40.3	-5.9	-2.3	-3.5
596	505			26.1	45.0	49.5	4.5	-2.3	6.8
583	506			26.6	45.6	39.9	-5.6	-2.3	-3.3
344	506			26.3	45.3	39.3	-5.9	-2.3	-3.6
515	509			27.4	46.3	38.7	-7.6	-2.3	-5.3
263	511			27.2	46.1	44.7	-1.5	-2.3	0.8
689	513			26.3	45.3	43.7	-1.6	-2.3	0.7
581	513			27.5	46.5	44.7	-1.8	-2.3	0.5
258	513			27.1	46.1	42.6	-3.5	-2.3	-1.1
295	513			26.7	45.6	45.8	0.1	-2.3	2.5
451	514			27.6	46.6	43.3	-3.2	-2.3	-0.9
424	514			27.1	46.1	38.1	-8.0	-2.3	-5.7
687	516			26.5	45.5	45.6	0.2	-2.3	2.5
254	517			26.9	45.8	43.2	-2.6	-2.3	-0.3
428	519			27.1	46.1	44.1	-1.9	-2.3	0.4
294	519			27.0	46.0	45.2	-0.8	-2.3	1.5
443	519			27.9	46.9	36.1	-10.8	-2.3	-8.5
445	519			26.6	45.6	38.8	-6.8	-2.3	-4.5
460	519			27.7	46.7	35.7	-11.0	-2.3	-8.7
342	521			26.3	45.3	44.9	-0.4	-2.3	1.9
526	524			27.3	46.3	43.4	-2.8	-2.3	-0.5
605	525			29.1	48.1	44.6	-3.4	-2.3	-1.1
560	526			27.4	46.4	42.1	-4.2	-2.3	-1.9
449	528			26.6	45.6	43.1	-2.5	-2.3	-0.2
340	530			28.6	47.6	42.0	-5.7	-2.3	-3.3
637	530			26.9	45.9	45.6	-0.3	-2.3	2.1
594	530			27.1	46.1	47.1	1.0	-2.3	3.4
Average	516						-2.1	-2.3	0.2

Table D.11 Tonality Assessment Table - 12.5 m/s

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
563	512			26.3	45.3	40.4	-4.9	-2.3	-2.5
561	512			26.1	45.1	43.1	-2.0	-2.3	0.4
327	512			27.4	46.4	42.9	-3.5	-2.3	-1.2
640	513			26.2	45.2	46.1	1.0	-2.3	3.3
476	513			27.7	46.7	37.2	-9.5	-2.3	-7.2
686	514			26.5	45.5	44.5	-0.9	-2.3	1.4
601	517			26.9	45.9	40.8	-5.1	-2.3	-2.8
257	517			27.0	46.0	46.7	0.6	-2.3	3.0
253	518			27.3	46.3	45.9	-0.4	-2.3	2.0
440	522			27.9	46.9	35.3	-11.6	-2.3	-9.3
654	524			27.6	46.6	40.1	-6.5	-2.3	-4.2
341	528			26.9	45.9	46.7	0.8	-2.3	3.2
571	530			27.1	46.1	45.2	-0.8	-2.3	1.5
556	530			26.3	45.3	46.2	0.9	-2.3	3.2
645	530			26.6	45.7	47.0	1.4	-2.3	3.7
549	541			27.0	46.1	48.5	2.4	-2.3	4.8
Average	521						-1.0	-2.3	1.3

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix E
Measurement Data

Table E.01 Measurement data - Turbine ON

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1	6.7	50.7	706	191.4	193.7	2.4	11.6	5.4	5.1	21.3	99.6	58
2	6.5	49.1	639	191.4	193.7	2.0	11.2	6.0	4.8	21.3	99.6	58
3	6.4	49.3	617	191.4	193.7	2.0	11.1	5.7	4.7	21.3	99.6	58
4	6.6	48.9	672	191.4	193.7	2.0	11.4	6.1	6.6	21.3	99.6	58
5	6.5	49.4	646	191.4	193.6	2.0	11.3	6.0	6.5	21.3	99.6	58
6	6.1	48.3	514	191.4	193.6	2.0	10.4	5.0	5.6	21.3	99.6	58
7	5.6	46.6	403	191.4	193.7	2.5	9.5	4.7	6.3	21.3	99.6	58
8	5.5	46.2	378	191.4	193.7	3.0	9.3	4.7	4.5	21.3	99.6	58
9	5.6	46.3	404	191.4	193.7	3.0	9.5	5.3	5.3	21.3	99.6	58
10	5.7	46.3	410	191.4	193.7	3.0	9.6	4.9	6.2	21.3	99.6	58
11	5.6	46.7	405	191.4	193.7	3.0	9.5	4.9	6.2	21.3	99.6	58
12	5.2	46.0	309	191.4	193.7	2.9	8.7	2.9	6.4	21.3	99.6	60
13	4.8	44.4	230	191.4	193.6	2.4	7.9	2.4	7.0	21.2	99.6	60
14	4.5	43.0	190	191.4	191.4	1.8	7.4	2.0	5.2	21.2	99.6	60
15	4.9	43.6	250	191.4	189.9	1.8	8.0	4.7	6.0	21.2	99.6	60
16	5.6	45.3	387	191.4	189.9	1.9	9.4	4.9	7.7	21.2	99.6	60
17	6.3	47.1	580	191.4	189.9	2.0	10.9	5.7	6.5	21.2	99.6	60
18	7.2	49.7	880	191.4	189.9	2.0	12.3	7.1	5.4	21.2	99.6	60
19	7.7	52.3	1088	191.4	189.9	2.4	12.8	8.0	7.5	21.2	99.6	60
20	7.7	52.1	1063	191.4	189.9	3.0	12.7	7.4	8.1	21.2	99.6	60
21	7.8	52.2	1125	191.4	189.9	3.0	12.8	6.8	6.1	21.2	99.6	60
22	7.8	52.2	1096	191.4	189.9	3.0	12.8	7.7	6.4	21.2	99.6	60
23	7.6	51.9	1028	191.4	189.9	3.0	12.7	7.1	7.0	21.2	99.6	60
24	7.8	52.2	1125	191.4	189.9	3.0	12.8	7.2	7.2	21.2	99.6	60
25	7.9	52.0	1147	191.4	189.9	2.6	12.8	7.0	5.4	21.1	99.6	60
26	7.6	52.1	1045	191.4	189.9	2.0	12.7	7.0	5.2	21.1	99.6	60
27	7.3	51.5	933	191.4	189.9	2.0	12.6	6.8	4.5	21.1	99.6	60
28	7.3	51.3	921	191.4	189.9	2.0	12.6	6.9	4.1	21.1	99.6	60
29	7.2	51.3	885	191.4	189.9	2.0	12.4	6.5	4.5	21.1	99.6	60
30	7.0	50.8	806	191.4	189.9	2.0	12.0	6.4	4.2	21.1	99.6	62
31	6.9	50.7	753	191.4	189.9	2.3	11.8	6.4	4.7	21.0	99.6	63
32	7.1	50.5	844	191.4	189.9	3.0	12.2	7.1	4.4	21.0	99.6	63
33	7.5	51.9	976	191.4	189.9	3.0	12.6	7.3	3.2	21.0	99.6	63
34	7.3	51.5	897	191.4	189.9	3.0	12.4	7.0	3.7	21.0	99.6	63
35	7.2	51.0	863	191.4	189.9	3.0	12.3	6.5	4.9	21.0	99.6	63
36	7.0	50.9	791	191.4	189.9	3.0	12.0	6.4	4.4	21.1	99.6	62
37	6.8	50.1	727	191.4	192.0	2.8	11.7	6.2	3.3	21.1	99.6	62
38	6.6	50.2	668	191.4	193.5	2.0	11.4	5.9	3.9	21.1	99.6	62
39	6.4	49.3	597	191.4	193.5	2.0	11.0	5.4	4.4	21.1	99.6	62
40	6.1	48.5	529	191.4	193.5	2.0	10.5	5.0	3.3	21.1	99.6	62
41	6.1	47.8	510	191.4	193.5	2.0	10.4	4.8	4.2	21.1	99.6	62
42	6.2	47.6	532	191.4	193.5	2.0	10.5	5.8	5.7	21.3	99.6	62
43	6.3	48.6	568	191.4	193.6	2.2	10.8	5.1	5.5	21.3	99.6	62
44	6.3	48.7	576	191.4	193.6	3.0	10.9	4.9	6.0	21.3	99.6	62
45	6.5	48.7	632	191.4	193.6	3.0	11.2	6.5	5.5	21.3	99.6	62
46	6.9	50.4	767	191.4	193.6	3.0	11.8	6.4	6.4	21.3	99.6	62
47	7.0	51.0	777	191.4	193.6	3.0	11.9	5.9	4.4	21.3	99.6	62
48	6.5	50.3	652	191.4	191.9	3.0	11.3	4.6	4.6	21.4	99.6	63
49	6.3	48.4	578	191.4	187.5	2.9	10.9	5.0	4.2	21.4	99.6	63
50	6.2	48.5	548	191.4	186.7	2.0	10.7	6.0	5.1	21.4	99.6	63
51	6.0	47.0	482	191.4	186.7	2.0	10.2	6.1	4.3	21.4	99.6	63
52	5.8	46.4	445	191.4	186.7	2.0	9.9	5.1	4.9	21.4	99.6	63
53	5.8	47.2	440	191.4	188.5	2.0	9.9	4.3	4.7	21.4	99.6	63
54	6.1	47.6	519	191.4	189.9	2.0	10.4	5.2	4.5	21.5	99.6	63
55	6.5	48.8	649	191.4	189.8	2.1	11.3	5.4	3.8	21.5	99.6	63
56	7.4	50.4	938	191.4	186.3	3.0	12.4	6.1	4.4	21.5	99.6	63
57	8.0	53.0	1216	191.4	184.4	3.0	13.6	8.3	5.1	21.5	99.6	63
58	8.6	54.5	1484	191.4	184.4	2.9	14.7	8.2	6.8	21.5	99.6	63
59	8.2	54.9	1267	191.4	184.4	3.0	14.4	7.2	6.9	21.5	99.6	63
60	7.8	54.2	1100	191.4	184.4	3.0	14.0	7.1	7.5	21.5	99.6	63
61	7.5	53.1	985	191.4	184.4	3.0	12.6	6.1	6.5	21.5	99.6	63
62	7.4	51.3	948	191.4	184.4	2.0	12.6	6.6	5.2	21.5	99.6	63
63	7.5	51.4	998	191.4	184.4	2.0	12.7	6.8	5.6	21.5	99.6	63
64	7.3	51.0	902	191.4	184.3	2.0	12.5	6.2	5.3	21.5	99.6	63
65	7.2	51.5	885	191.4	184.3	2.0	12.4	6.7	6.0	21.5	99.6	63
66	7.4	51.9	967	191.4	184.3	2.0	12.6	6.6	5.7	21.5	99.6	64
67	7.9	52.2	1160	191.4	184.3	2.0	12.8	7.1	3.5	21.5	99.6	65
68	7.9	51.7	1137	191.4	184.3	2.9	12.8	7.2	5.7	21.5	99.6	65
69	7.6	52.5	1042	191.4	184.4	3.0	12.7	7.0	5.9	21.5	99.6	65
70	7.4	51.8	956	191.4	184.4	3.0	12.6	6.8	5.2	21.5	99.6	65
71	7.4	51.9	965	191.4	184.4	3.0	12.6	6.8	4.9	21.5	99.6	65
72	7.5	52.1	995	191.4	184.4	3.0	12.7	6.8	2.7	21.5	99.6	64
73	7.4	51.8	949	191.4	184.4	3.0	12.6	6.4	4.0	21.5	99.6	64
74	8.1	52.2	1227	191.4	184.4	2.1	12.9	7.7	5.3	21.5	99.6	64
75	8.0	52.3	1209	191.4	184.4	2.0	12.9	7.9	6.3	21.5	99.6	64
76	7.6	52.0	1041	191.4	184.4	2.0	12.7	6.3	4.8	21.5	99.6	64
77	7.4	51.3	959	191.4	184.4	2.0	12.6	5.9	5.3	21.5	99.6	64
78	7.2	51.2	891	191.4	184.3	2.0	12.4	5.9	4.7	21.5	99.6	64
79	6.8	50.5	729	191.4	184.3	2.0	11.7	4.6	4.4	21.4	99.6	64
80	6.8	50.0	741	191.4	184.4	2.8	11.7	5.5	5.5	21.4	99.6	64
81	7.2	51.5	875	191.4	184.4	3.0	12.3	6.5	5.2	21.4	99.6	64
82	7.3	51.8	898	191.4	184.4	3.0	12.4	6.6	5.5	21.4	99.6	64
83	7.7	51.9	1070	191.4	184.4	3.0	12.8	6.9	5.8	21.4	99.6	64
84	7.9	52.3	1164	191.4	184.4	3.0	12.9	7.1	6.1	21.4	99.6	64
85	8.1	52.6	1255	191.4	183.5	3.0	13.1	7.6	7.8	21.4	99.6	64
86	8.0	53.0	1189	191.4	181.0	2.2	13.4	7.3	7.0	21.4	99.6	64
87	8.0	52.7	1189	191.4	181.0	2.0	12.9	7.0	6.5	21.4	99.6	64
88	8.0	52.6	1199	191.4	181.0	2.0	12.9	7.4	5.1	21.4	99.6	64

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
89	8.0	52.6	1210	191.4	181.0	2.0	12.9	7.6	6.9	21.4	99.6	64
90	8.0	52.6	1217	191.4	181.0	2.0	12.9	7.4	6.6	21.3	99.6	64
91	8.1	52.7	1234	191.4	181.0	2.0	12.9	7.0	6.8	21.2	99.6	64
92	8.0	52.6	1207	191.4	181.0	2.7	12.9	6.8	6.0	21.2	99.6	64
93	7.6	52.1	1036	191.4	181.8	3.0	12.7	6.8	7.1	21.2	99.6	64
94	7.5	52.0	991	191.4	185.5	3.0	12.7	6.9	6.0	21.2	99.6	64
95	7.5	52.5	1002	191.4	186.1	3.0	12.7	7.3	5.7	21.2	99.6	64
96	7.2	51.3	857	191.4	186.1	3.0	12.3	5.9	6.0	21.2	99.6	64
97	6.8	50.7	729	191.4	186.0	3.0	11.7	5.5	5.4	21.1	99.6	64
98	7.0	50.7	812	191.4	186.0	2.3	12.1	6.7	5.3	21.1	99.6	64
99	7.0	51.1	808	191.4	186.1	2.0	12.0	6.0	5.6	21.1	99.6	64
100	6.7	50.0	687	191.4	186.1	2.0	11.4	5.8	6.1	21.1	99.6	64
101	7.0	50.1	780	191.4	186.1	2.0	11.9	5.9	6.5	21.1	99.6	64
102	7.3	51.2	906	191.4	186.1	2.0	12.5	6.5	4.6	21.1	99.6	64
103	7.4	51.5	961	191.4	186.1	2.0	12.6	6.9	4.3	21.0	99.6	65
104	7.2	51.4	880	191.4	186.1	2.6	12.4	6.7	3.7	21.0	99.6	65
105	7.0	51.0	804	191.4	186.1	3.0	12.0	6.4	3.8	21.0	99.6	65
106	6.9	50.6	749	191.4	186.1	3.0	11.8	6.0	5.0	21.0	99.6	65
107	6.6	49.7	660	191.4	186.1	3.0	11.3	5.9	4.9	21.0	99.6	65
108	6.7	49.9	708	191.4	186.1	3.0	11.6	6.8	5.5	21.0	99.6	65
109	6.9	50.5	752	191.4	188.5	3.0	11.8	7.3	4.5	21.0	99.6	66
110	7.0	50.5	796	191.4	191.0	2.4	12.0	6.2	4.7	21.0	99.6	66
111	7.2	50.8	891	191.4	191.0	2.0	12.4	6.4	4.7	21.0	99.6	66
112	7.2	51.1	892	191.4	191.0	2.0	12.4	6.9	3.7	21.0	99.6	66
113	7.1	51.1	829	191.4	191.0	2.0	12.2	6.4	3.9	21.0	99.6	66
114	6.8	50.6	734	191.4	191.0	2.0	11.7	5.9	5.0	21.1	99.6	67
115	6.4	49.3	600	191.4	191.4	2.0	11.0	5.8	6.4	21.1	99.6	67
116	6.4	48.9	600	191.4	194.5	2.5	11.0	5.9	4.8	21.1	99.6	67
117	6.4	49.0	605	191.4	194.9	3.0	11.0	5.7	5.2	21.1	99.6	67
118	6.1	48.1	519	191.4	194.9	3.0	10.5	4.2	5.2	21.1	99.6	67
119	6.1	47.8	513	191.4	192.1	3.0	10.5	5.4	5.6	21.1	99.6	67
120	5.8	47.4	444	191.4	189.8	3.0	9.8	4.2	5.0	21.1	99.6	67
121	5.4	46.6	355	191.4	189.8	2.9	9.2	4.3	4.7	21.1	99.6	67
122	5.5	45.2	365	191.4	189.8	2.5	9.2	4.5	5.3	21.1	99.6	67
123	5.6	45.9	397	191.4	189.8	2.0	9.4	4.6	5.8	21.1	99.6	67
124	5.9	46.2	455	191.4	189.7	2.0	9.9	5.1	5.5	21.1	99.6	67
125	6.4	47.5	611	191.4	189.7	2.0	11.1	6.3	4.0	21.1	99.6	67
126	7.0	49.9	809	191.4	189.7	2.0	12.1	6.7	6.2	21.2	99.6	67
127	7.4	51.2	964	191.4	189.7	2.0	12.6	6.9	6.5	21.2	99.6	67
128	7.8	52.0	1117	191.4	189.8	2.4	12.8	7.0	6.1	21.2	99.6	67
129	7.6	52.3	1043	191.4	189.8	3.0	12.7	7.1	6.5	21.2	99.6	67
130	7.6	51.8	1026	191.4	189.8	3.0	12.7	8.0	6.3	21.2	99.6	67
131	7.4	52.3	962	191.4	189.8	3.0	12.6	6.8	6.0	21.2	99.6	67
132	7.3	52.3	924	191.4	189.8	3.0	12.6	6.3	4.8	21.2	99.6	67
133	7.3	51.8	901	191.4	189.8	3.0	12.5	6.5	4.3	21.2	99.6	67
134	7.3	51.2	893	191.4	189.8	2.6	12.4	5.5	4.4	21.2	99.6	67
135	7.1	51.1	815	191.4	189.8	2.0	12.1	5.8	4.9	21.2	99.6	67
136	6.5	49.8	643	191.4	189.8	2.0	11.2	5.8	5.1	21.2	99.6	67
137	6.3	48.4	573	191.4	189.8	2.0	10.8	5.5	5.2	21.2	99.6	67
138	6.6	49.1	665	191.4	189.6	2.0	11.4	5.9	6.4	21.3	99.6	67
139	6.6	50.0	666	191.4	186.1	2.0	11.4	5.6	5.5	21.3	99.6	67
140	6.1	48.5	510	191.4	184.2	2.3	10.4	4.8	6.3	21.3	99.6	67
141	5.5	46.6	382	191.4	184.1	2.9	9.3	4.1	6.3	21.3	99.6	67
142	5.5	46.3	364	191.4	184.1	2.9	9.2	4.6	5.8	21.3	99.6	67
143	5.5	46.0	365	191.4	183.9	2.9	9.2	3.9	5.2	21.3	99.6	67
144	5.8	46.5	441	191.4	180.7	3.0	9.8	5.3	5.2	21.3	99.6	68
145	6.5	50.9	637	191.4	180.1	3.0	11.2	4.9	5.6	21.3	99.6	69
146	7.0	52.0	800	191.4	182.7	2.8	12.0	5.8	6.3	21.3	99.6	69
147	7.3	51.4	900	191.4	185.2	2.0	12.5	6.9	6.2	21.3	99.6	69
148	7.2	52.0	889	191.4	185.2	2.0	12.4	7.1	7.2	21.3	99.6	69
149	7.1	51.4	848	191.4	185.2	2.0	12.2	6.1	5.3	21.3	99.6	69
150	7.5	51.7	1007	191.4	185.2	2.0	12.7	6.7	6.1	21.3	99.6	69
151	8.1	52.4	1234	191.4	185.2	2.0	12.9	7.9	6.6	21.3	99.6	70
152	8.2	52.4	1295	191.4	185.2	2.2	13.0	7.5	4.7	21.3	99.6	70
153	8.2	52.9	1275	191.4	185.2	3.0	13.2	7.7	4.2	21.3	99.6	70
154	8.1	52.8	1252	191.4	185.2	3.0	13.3	7.9	5.5	21.3	99.6	70
155	8.1	53.2	1222	191.4	185.2	3.0	13.4	7.4	5.3	21.3	99.6	70
156	8.0	53.1	1182	191.4	185.2	3.0	13.5	7.0	6.0	21.3	99.6	71
157	7.9	53.1	1142	191.4	186.7	3.0	12.9	6.6	4.5	21.2	99.6	71
158	7.5	51.9	974	191.4	189.7	2.9	12.6	6.8	5.0	21.2	99.6	71
159	7.4	51.6	947	191.4	189.8	2.0	12.6	6.4	6.2	21.2	99.6	71
160	7.1	51.1	832	191.4	189.8	2.0	12.1	6.1	6.1	21.2	99.6	71
161	6.8	50.8	737	191.4	189.9	2.0	11.7	5.3	5.6	21.2	99.6	71
162	6.3	50.2	590	191.4	191.5	2.0	11.0	4.8	4.9	21.2	99.6	71
163	6.0	48.6	486	191.4	194.4	2.0	10.2	4.6	6.0	21.2	99.6	72
164	5.8	46.8	450	191.4	194.5	2.1	9.9	4.5	4.3	21.2	99.6	72
165	6.1	48.1	501	191.4	194.5	3.0	10.3	5.1	4.5	21.2	99.6	72
166	6.6	49.3	668	191.4	194.6	3.0	11.3	6.5	4.0	21.2	99.6	72
167	6.7	49.7	689	191.4	194.5	3.0	11.4	6.1	5.1	21.2	99.6	72
168	6.7	49.7	703	191.4	194.5	3.0	11.5	6.1	4.4	21.2	99.6	72
169	6.6	50.1	665	191.4	194.4	3.0	11.4	5.6	4.0	21.2	99.6	72
170	6.4	48.9	603	191.4	191.1	3.0	11.1	5.2	3.4	21.2	99.6	72
171	6.7	49.3	706	191.4	189.4	2.0	11.5	5.9	3.7	21.2	99.6	72
172	6.8	49.6	731	191.4	189.4	2.0	11.7	6.0	2.1	21.2	99.6	72
173	6.7	49.9	704	191.4	189.4	2.0	11.6	5.7	3.3	21.2	99.6	72
174	6.6	49.3	671	191.4	189.4	2.0	11.4	6.0	5.3	21.2	99.6	72
175	6.7	49.5	687	191.4	189.4	2.0	11.4	5.5	6.0	21.2	99.6	72
176	6.3	48.9	581	191.4	191.7	2.0	10.9	5.0	6.7	21.2	99.6	72

Table E.01 Measurement data - Turbine ON

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
177	6.4	48.3	598	191.4	195.0	3.0	11.0	6.0	6.2	21.2	99.6	72
178	6.8	49.7	744	191.4	195.1	3.0	11.7	7.0	6.4	21.2	99.6	72
179	7.1	50.8	848	191.4	195.1	3.0	12.2	6.7	6.1	21.2	99.6	72
180	7.1	51.3	837	191.4	195.1	3.0	12.1	5.7	5.3	21.2	99.6	72
181	6.9	50.5	761	191.4	195.1	3.0	11.9	6.1	5.2	21.2	99.6	72
182	6.7	50.5	707	191.4	195.1	3.0	11.6	5.0	6.0	21.2	99.6	72
183	6.9	49.8	760	191.4	195.1	2.1	11.8	6.4	6.0	21.2	99.6	72
184	7.3	51.1	904	191.4	195.1	2.0	12.4	6.6	5.6	21.2	99.6	72
185	7.4	51.5	954	191.4	195.1	2.0	12.6	6.8	4.8	21.2	99.6	72
186	7.4	51.7	944	191.4	194.3	2.0	12.6	6.8	3.3	21.2	99.6	73
187	7.4	51.8	936	191.4	191.2	2.0	12.6	7.5	3.4	21.1	99.6	73
188	7.3	51.6	924	191.4	191.0	2.0	12.5	6.9	3.7	21.1	99.6	73
189	8.0	51.8	1205	191.4	191.0	2.8	12.9	7.5	5.2	21.1	99.6	73
190	7.8	52.4	1123	191.4	191.0	3.0	12.8	7.2	6.1	21.1	99.6	73
191	7.4	52.0	936	191.4	191.0	3.0	12.6	6.7	5.1	21.1	99.6	73
192	7.6	51.9	1051	191.4	190.9	3.0	12.7	6.7	6.0	21.1	99.6	73
193	8.0	52.8	1208	191.4	190.9	3.0	13.5	7.6	5.6	21.1	99.6	73
194	8.5	54.5	1429	191.4	190.9	2.9	14.6	8.2	5.9	21.1	99.6	73
195	8.2	54.6	1274	191.4	190.9	2.2	14.4	7.7	5.1	21.1	99.6	73
196	7.9	53.9	1160	191.4	191.0	2.0	14.2	7.6	6.8	21.1	99.6	73
197	7.8	54.1	1105	191.4	194.0	2.0	14.2	7.4	6.2	21.1	99.6	73
198	7.8	54.1	1101	191.4	195.2	2.0	13.4	7.0	4.9	21.1	99.6	74
199	6.8	51.5	740	191.4	195.2	2.0	11.7	5.8	5.8	21.1	99.6	74
200	6.2	49.4	549	191.4	195.2	2.0	10.7	4.8	6.3	21.1	99.6	74
201	5.9	47.5	453	191.4	195.2	2.8	9.9	5.2	5.1	21.1	99.6	74
202	5.6	46.4	390	191.4	197.1	3.0	9.4	4.3	4.7	21.1	99.6	74
203	5.4	45.6	353	191.4	199.0	2.9	9.1	3.3	4.5	21.1	99.6	74
204	5.4	45.3	360	191.4	199.0	2.9	9.1	3.8	5.4	21.1	99.6	75
205	5.6	46.7	401	191.4	198.4	3.0	9.5	4.6	3.7	21.0	99.6	75
206	5.9	47.2	454	191.4	195.3	3.0	9.9	4.8	2.5	21.0	99.6	75
207	6.1	48.0	505	191.4	195.1	2.3	10.4	5.8	2.2	21.0	99.6	75
208	6.2	47.7	534	191.4	195.1	2.0	10.5	5.7	2.6	21.0	99.6	75
209	5.9	48.1	461	191.4	195.1	2.0	10.0	4.5	2.7	21.0	99.6	75
210	5.9	46.1	453	191.4	195.2	2.0	9.9	5.0	3.9	21.1	99.6	76
211	5.6	45.7	396	191.4	197.9	2.0	9.5	4.9	3.7	21.1	99.6	76
212	5.5	45.5	384	191.4	200.2	2.0	9.3	5.4	3.5	21.1	99.6	76
213	5.4	45.2	354	191.4	200.2	2.5	9.1	4.7	3.5	21.1	99.6	76
214	5.6	45.4	390	191.4	200.2	3.0	9.4	5.2	3.6	21.1	99.6	76
215	5.7	46.0	425	191.4	200.2	3.0	9.7	5.6	4.6	21.1	99.6	76
216	5.7	45.9	411	191.4	200.8	3.0	9.7	4.7	4.7	21.2	99.6	75
217	5.8	46.5	440	191.4	203.5	3.0	9.8	4.6	4.4	21.2	99.6	75
218	5.9	46.6	470	191.4	203.6	3.0	10.0	5.1	6.3	21.2	99.6	75
219	6.1	48.0	529	191.4	203.6	2.4	10.5	6.0	6.0	21.2	99.6	75
220	6.4	48.8	596	191.4	203.6	2.0	11.0	5.6	5.7	21.2	99.6	75
221	6.4	49.0	597	191.4	203.6	2.0	11.0	6.0	4.8	21.2	99.6	75
222	6.3	48.7	580	191.4	203.7	2.0	10.9	6.1	5.7	21.3	99.6	74
223	6.3	48.6	570	191.4	203.7	2.0	10.8	5.6	5.4	21.3	99.6	74
224	6.3	49.0	574	191.4	203.6	2.0	10.8	6.3	4.3	21.3	99.6	74
225	6.2	48.4	540	191.4	203.6	2.5	10.6	5.7	4.5	21.3	99.6	74
226	6.1	48.0	527	191.4	203.6	3.0	10.5	5.7	5.1	21.3	99.6	74
227	6.1	47.8	507	191.4	203.7	3.0	10.4	5.1	4.8	21.3	99.6	74
228	6.0	48.0	491	191.4	203.7	3.0	10.2	5.0	4.4	21.3	99.6	75
229	5.6	47.4	406	191.4	203.6	3.0	9.5	3.6	5.8	21.2	99.6	75
230	5.3	46.1	326	191.4	203.6	2.9	8.8	3.4	5.2	21.2	99.6	75
231	5.2	45.6	306	191.4	203.6	2.4	8.7	4.2	6.4	21.2	99.6	75
232	5.1	44.9	292	191.4	203.6	1.9	8.5	4.4	6.1	21.2	99.6	75
233	5.1	44.9	287	191.4	203.6	1.9	8.5	4.2	5.3	21.2	99.6	75
234	5.0	45.2	268	191.4	203.6	1.9	8.3	3.7	6.0	21.2	99.6	76
235	5.1	44.4	281	191.4	203.6	1.9	8.4	3.3	4.4	21.1	99.6	76
236	5.2	44.8	306	191.4	203.3	1.9	8.7	3.6	4.0	21.1	99.6	76
237	5.7	45.6	416	191.4	199.4	2.4	9.6	4.8	5.4	21.1	99.6	76
238	6.3	47.6	568	191.4	197.8	3.0	10.8	5.8	4.8	21.1	99.6	76
239	6.7	49.4	698	191.4	197.7	3.0	11.5	6.7	5.3	21.1	99.6	76
240	6.7	49.7	707	191.4	197.7	3.0	11.6	6.5	4.7	21.2	99.6	75
241	6.8	49.9	727	191.4	197.7	3.0	11.7	5.8	4.7	21.2	99.6	75
242	6.8	50.1	718	191.4	197.8	3.0	11.7	6.0	4.3	21.2	99.6	75
243	6.7	50.0	694	191.4	195.0	2.7	11.6	5.9	3.4	21.2	99.6	75
244	6.8	49.8	729	191.4	192.1	2.0	11.7	6.5	4.0	21.2	99.6	75
245	7.0	50.4	789	191.4	192.0	2.0	12.0	6.2	3.0	21.2	99.6	75
246	7.7	53.9	1089	214.7	214.1	2.7	14.1	6.5	3.7	22.0	99.6	68
247	8.6	54.9	1485	214.7	214.1	1.9	14.8	7.8	4.8	22.0	99.6	68
248	8.6	55.2	1497	214.7	214.0	1.9	14.7	7.0	5.9	22.0	99.6	68
249	8.2	54.9	1308	214.7	214.0	1.9	14.4	7.3	7.2	22.0	99.6	68
250	8.4	54.8	1407	214.7	213.9	1.8	14.6	6.2	7.8	22.0	99.6	68
251	9.4	55.4	1810	214.7	210.7	0.4	15.1	8.5	7.5	22.0	99.6	68
252	10.0	55.2	2028	214.7	209.7	0.3	15.2	9.4	6.1	22.0	99.6	68
253	12.3	55.5	2247	214.7	209.7	1.6	15.6	10.5	5.9	22.0	99.6	68
254	12.1	55.6	2245	214.7	209.8	2.6	15.6	10.3	5.7	22.0	99.6	69
255	12.6	55.0	2246	214.7	209.8	3.0	15.5	10.8	5.2	22.0	99.6	69
256	10.6	55.7	2227	214.7	209.8	1.1	15.3	9.0	4.0	22.0	99.6	69
257	12.3	55.4	2247	214.7	209.8	1.8	15.6	10.5	5.3	22.0	99.6	69
258	12.1	55.3	2253	214.7	209.8	1.7	15.5	10.4	5.4	22.0	99.6	69
259	10.7	55.3	2229	214.7	209.7	1.1	15.3	9.2	5.7	22.0	99.6	69
260	11.3	55.6	2236	214.7	209.7	1.2	15.5	9.7	6.1	22.0	99.6	68
261	11.7	55.7	2246	214.7	209.7	2.1	15.5	10.0	5.8	22.0	99.6	68
262	11.2	55.2	2239	214.7	209.8	1.2	15.4	9.6	6.5	22.0	99.6	68
263	12.2	55.3	2246	214.7	209.8	0.9	15.4	10.4	7.0	22.0	99.6	68
264	11.1	55.6	2213	214.7	209.8	0.4	15.2	9.5	6.0	22.0	99.6	68

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
265	11.2	55.2	2092	214.7	212.4	0.1	14.8	9.6	6.4	22.0	99.6	68
266	10.1	55.0	2043	214.7	214.6	0.4	14.9	9.1	5.8	22.0	99.6	68
267	11.1	55.4	2110	214.7	214.6	0.1	14.9	9.5	4.6	22.0	99.6	68
268	9.3	54.9	1791	214.7	214.6	1.5	14.7	8.6	3.8	22.0	99.6	68
269	9.4	55.7	1820	214.7	214.6	1.4	14.9	7.4	3.8	22.0	99.6	68
270	9.5	55.6	1839	214.7	212.8	1.3	15.0	7.3	6.6	22.0	99.6	68
271	9.6	55.2	1879	214.7	210.4	1.1	15.0	8.2	6.9	22.0	99.6	68
272	9.8	55.0	1956	214.7	210.4	0.7	15.0	6.9	8.3	22.1	99.6	67
273	9.7	55.0	1907	214.7	210.4	1.0	14.9	8.8	6.5	22.1	99.6	67
274	8.9	54.8	1606	214.7	210.4	2.3	14.7	8.2	7.6	22.1	99.6	67
275	8.4	54.8	1395	214.7	211.2	2.9	14.5	6.8	5.9	22.1	99.6	67
276	8.7	55.1	1536	214.7	214.0	2.9	14.9	7.8	6.2	22.1	99.6	67
277	8.7	55.4	1535	214.7	214.1	2.8	14.9	8.2	5.5	22.1	99.6	67
278	8.7	55.2	1505	214.7	214.1	2.9	14.8	8.0	5.2	22.1	99.6	69
279	7.8	54.1	1115	214.7	214.1	3.0	14.1	6.6	5.4	22.1	99.6	69
280	7.7	53.3	1071	214.7	214.1	3.0	12.9	6.8	3.8	22.1	99.6	69
281	7.4	51.0	946	214.7	214.1	3.0	12.6	6.4	4.0	22.1	99.6	69
282	7.6	51.5	1041	214.7	214.1	2.8	12.7	7.4	3.3	22.1	99.6	69
283	7.4	51.3	939	214.7	214.1	2.0	12.6	5.9	3.2	22.1	99.6	69
284	7.5	51.1	1012	214.7	214.1	2.0	12.7	6.5	4.2	22.1	99.6	70
285	7.6	51.4	1017	214.7	214.1	2.0	12.7	6.4	4.8	22.1	99.6	70
286	7.2	51.4	889	214.7	214.1	2.0	12.4	5.7	3.1	22.1	99.6	70
287	7.1	50.6	845	214.7	214.1	2.0	12.2	5.3	4.7	22.1	99.6	70
288	11.1	55.5	2200	214.7	214.1	0.2	15.1	9.5	7.3	22.2	99.6	68
289	11.3	55.7	2219	214.7	214.1	0.8	15.4	9.7	8.8	22.2	99.6	68
290	11.6	55.6	2228	214.7	214.1	2.5	15.6	10.0	8.1	22.2	99.6	68
291	9.9	55.0	2008	214.7	214.1	0.4	14.7	8.7	7.2	22.2	99.6	68
292	11.2	55.1	2117	214.7	214.1	0.3	15.2	9.6	5.6	22.2	99.6	67
293	13.0	55.3	2241	214.7	214.1	1.3	15.6	11.1	5.2	22.2	99.6	67
294	12.2	55.5	2240	214.7	214.1	2.9	15.7	10.4	8.3	22.2	99.6	67
295	12.1	55.2	2244	214.7	214.1	3.1	15.5	10.4	5.9	22.2	99.6	67
296	12.3	55.4	2230	214.7	214.1	2.1	15.4	10.6	5.4	22.2	99.6	67
297	10.8	56.0	2201	214.7	214.1	0.5	15.2	9.2	5.9	22.2	99.6	67
298	10.8	55.5	2239	214.7	214.1	2.7	15.6	9.2	5.4	22.1	99.5	67
299			2131	214.7	214.1	0.1	14.9	7.5	3.8	22.1	99.5	67
300	11.2	55.0	2130	214.7	214.1	0.0	14.9	9.6	6.7	22.1	99.5	67
301	9.9	54.9	2000	214.7	214.1	0.5	14.8	9.1	5.9	22.1	99.5	67
302	11.2	54.9	2069	214.7	214.1	0.3	15.0	9.6	5.9	22.1	99.5	67
303	10.5	55.9	2219	214.7	213.5	0.5	15.3	9.0	5.6	22.1	99.5	67
304	11.2	55.5	2116	214.7	211.1	0.0	14.8	9.6	5.8	22.1	99.6	68
305	9.2	54.6	1744	214.7	211.0	1.6	14.6	8.0	8.2	22.1	99.6	68
306	8.6	54.8	1474	214.7	211.0	2.8	14.6	6.8	7.1	22.1	99.6	68
307	7.9	54.4	1162	214.7	212.5	3.0	14.2	7.1	7.5	22.1	99.6	68
308	7.7	53.1	1060	214.7	214.8	3.0	13.0	5.7	7.4	22.1	99.6	68
309	6.8	50.7	734	214.7	214.8	3.0	11.7	5.6	5.6	22.1	99.6	68
310	7.4	50.2	949	214.7	214.8	3.0	12.4	6.7	5.4	22.1	99.6	68
311	8.7	53.7	1525	214.7	214.8	1.9	14.7	9.3	4.8	22.1	99.6	68
312	9.0	55.9	1669	214.7	214.8	1.9	14.8	8.7	5.5	22.1	99.6	68
313	8.3	55.1	1344	214.7	214.9	2.9	14.5	8.7	3.7	22.1	99.6	68
314	8.2	54.4	1288	214.7	214.8	2.9	14.4	7.2	5.2	22.1	99.6	68
315	8.4	55.1	1372	214.7	214.9	3.0	14.5	7.0	4.9	22.1	99.6	68
316	7.8	54.3	1132	214.7	215.0	3.0	13.5	5.2	5.0	22.1	99.6	68
317	7.3	51.9	901	214.7	214.9	3.0	12.4	5.3	4.3	22.1	99.6	68
318	7.9	51.6	1168	214.7	214.9	3.0	13.1	8.3	4.6	22.1	99.6	68
319	9.1	54.4	1695	214.7	214.9	1.5	15.0	9.3	4.2	22.1	99.6	68
320	9.9	55.7	1977	214.7	215.0	0.6	15.1	10.8	5.9	22.1	99.6	68
321	12.3	55.3	2082	214.7	215.0	0.2	15.0	10.5	4.9	22.1	99.6	68
322	9.6	54.7	1874	214.7	215.0	1.0	14.8	8.9	3.7	22.2	99.6	68
323	8.5	54.7	1433	214.7	215.0	2.7	14.5	7.2	2.8	22.2	99.6	68
324	7.9	54.6	1167	214.7	215.0	2.9	14.3	7.1	3.4	22.2	99.6	68
325	8.7	54.5	1533	214.7	215.0	2.6	14.8	7.3	3.9	22.2	99.6	68
326	11.4	55.3	2116	214.7	215.0	0.0	15.4	9.8	5.7	22.2	99.6	68
327	12.7	55.7	2243	214.7	214.9	0.6	15.5	10.9	6.8	22.3	99.5	68
328	11.7	55.2	2232	214.7	214.9	0.5	15.4	10.0	7.3	22.3	99.5	66
329	11.7	55.5	2221	214.7	215.0	0.5	15.3	10.0	6.7	22.3	99.5	66
330	10.9	54.9	2082	214.7	214.9	0.2	14.8	9.3	5.4	22.3	99.5	66
331	10.0	54.9	2018	214.7	214.8	0.4	14.8	9.3	4.2	22.3	99.5	66
332	9.5	55.1	1838	214.7	215.4	1.2	14.8	8.8	3.2	22.3	99.5	66
333	9.2	55.3	1742	214.7	218.1	1.8	14.8	8.5	4.6	22.3	99.5	67
334	8.8	55.2	1553	214.7	218.3	2.7	14.7	8.2	4.4	22.3	99.6	69
335	8.8	55.5	1553	214.7	218.3	2.8	14.9	7.6	6.7	22.3	99.6	69
336	9.6	55.8	1889	214.7	218.4	1.1	15.1	8.5	6.4	22.3	99.6	69
337	9.3	55.3	1783	214.7	218.4	1.5	14.9	7.3	6.7	22.3	99.6	69
338	10.8	55.5	2095	214.7	218.2	0.1	15.3	9.3	6.4	22.3	99.6	69
339	11.4	55.6	2231	214.7	215.3	2.3	15.6	9.7	6.2	22.3	99.6	68
340	12.2	55.3	2232	214.7	214.6	1.7	15.6	10.5	6.1	22.3	99.6	65
341	12.4	55.9	2240	214.7	214.6	4.6	15.8	10.6	8.0	22.3	99.6	65
342	12.2	55.1	2235	214.7	214.6	4.3	15.4	10.4	7.4	22.3	99.6	65
343	13.2	55.1	2246	214.7	214.6	5.0	15.6	11.3	7.4	22.3	99.6	65
344	12.0	54.5	2222	214.7	214.6	3.5	15.3	10.3	6.1	22.3	99.6	65
345	11.2	55.2	2231	214.7	214.6	3.1	15.4	9.6	5.5	22.3	99.6	65
346	11.3	55.4	2215	214.7	214.6	1.4	15.3	9.7	6.4	22.2	99.6	66
347	11.3	55.3	2217	214.7	214.6	0.6	15.3	9.7	6.1	22.2	99.6	66
348	10.6	55.4	2080	214.7	214.6	0.1	14.8	9.1	8.5	22.2	99.6	66
349	9.9	54.8	1995	214.7	214.6	0.8	14.9	8.8	8.1	22.2	99.6	66
350			2203	214.7	214.6	0.3	15.2	8.7	6.2	22.2	99.6	66
351	10.8	55.2	2186	214.7	214.6	0.3	15.2	9.2	6.1	22.2	99.6	66
352	11.3	55.2	2174	214.7	215.9	0.2	15.0	9.7	6.1	22.1	99.6	66

Table E.01 Measurement data - Turbine ON

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
353			2157	214.7	218.9	0.1	15.0	8.1	5.7	22.1	99.6	66
354	9.0	55.0	1679	214.7	219.0	2.0	14.5	7.4	5.6	22.1	99.6	66
355	8.7	55.2	1505	214.7	217.8	2.8	14.6	6.8	5.1	22.1	99.6	66
356	8.4	55.2	1388	214.7	213.6	2.9	14.5	6.4	4.2	22.1	99.6	66
357	7.9	55.1	1139	214.7	212.8	3.0	14.1	6.7	5.4	22.1	99.6	66
358	8.1	53.9	1235	214.7	212.8	2.9	14.3	7.4	6.1	22.2	99.6	66
359	8.9	55.4	1616	214.7	212.8	2.4	14.9	9.2	6.1	22.2	99.6	66
360	8.6	55.4	1479	214.7	212.8	2.9	14.7	7.3	5.7	22.2	99.6	66
361	7.8	55.1	1121	214.7	212.8	3.0	14.1	5.6	6.0	22.2	99.6	66
362	8.1	53.2	1225	214.7	212.8	3.0	13.4	7.0	5.7	22.2	99.6	66
363	7.8	53.6	1103	214.7	212.9	3.0	14.1	7.0	4.6	22.2	99.6	66
364	8.4	54.2	1373	214.7	216.2	2.9	14.6	7.2	4.2	22.2	99.6	66
365	8.6	55.3	1464	214.7	217.7	2.9	14.7	7.1	3.7	22.2	99.6	66
366	7.8	54.4	1105	214.7	217.7	3.0	14.2	6.3	5.2	22.2	99.6	66
367	8.8	54.6	1575	214.7	217.7	2.3	14.9	6.7	5.1	22.2	99.6	66
368			2094	214.7	217.5	0.2	15.2	8.7	4.3	22.2	99.6	66
369	8.6	55.1	1462	214.7	214.1	2.3	14.4	7.3	3.8	22.2	99.6	66
370	8.1	54.9	1248	214.7	213.1	2.9	14.4	5.8	5.3	22.2	99.6	66
371	7.8	54.7	1101	214.7	213.1	3.0	13.8	5.1	7.9	22.2	99.6	66
372	7.3	52.7	926	214.7	213.1	3.0	12.3	4.6	7.5	22.2	99.6	66
373	6.5	50.4	640	214.7	213.1	3.0	11.2	4.6	5.1	22.2	99.6	66
374	7.2	51.7	893	214.7	213.1	2.9	12.4	6.5	6.7	22.2	99.6	66
375	10.0	54.9	2025	214.7	213.1	0.7	15.3	11.1	7.6	22.3	99.5	66
376	11.8	55.4	2084	214.7	213.1	0.1	15.0	10.1	8.2	22.3	99.5	64
377	9.1	54.6	1687	214.7	213.1	1.9	14.6	9.6	8.2	22.3	99.5	64
378	8.4	54.5	1386	214.7	213.1	3.0	14.5	8.0	8.1	22.3	99.5	64
379	8.1	54.5	1236	214.7	213.1	3.0	14.3	7.4	7.5	22.3	99.5	64
380	7.7	54.0	1089	214.7	213.4	3.0	14.1	5.9	6.9	22.3	99.5	64
381	7.9	53.1	1139	214.7	217.3	3.0	13.2	5.5	4.5	22.3	99.5	64
382	7.9	52.4	1146	214.7	221.4	3.0	13.1	7.1	3.4	22.3	99.5	65
383	8.3	53.9	1316	214.7	222.0	2.9	14.4	8.0	4.6	22.3	99.5	65
384	8.1	55.1	1221	214.7	222.0	3.0	14.3	6.8	3.5	22.3	99.5	65
385	7.8	53.5	1130	214.7	222.0	3.0	13.2	5.2	3.4	22.3	99.5	65
386	7.1	51.4	813	214.7	221.0	3.0	12.1	4.9	4.7	22.3	99.5	65
387	7.9	51.2	1147	214.7	217.9	1.5	13.4	7.2	5.8	22.4	99.5	65
388	10.4	54.6	2141	214.7	217.8	1.4	15.4	8.9	7.1	22.4	99.6	65
389	10.0	55.0	2017	214.7	217.7	0.4	14.9	8.3	6.6	22.4	99.6	65
390	9.5	54.9	1856	214.7	217.7	0.2	14.8	10.6	5.7	22.4	99.6	65
391	8.4	54.6	1400	214.7	217.7	1.9	14.5	8.0	6.1	22.4	99.6	65
392	7.8	54.2	1115	214.7	217.7	2.0	14.2	6.5	4.8	22.4	99.6	65
393	7.7	53.8	1076	214.7	217.7	2.9	13.9	6.4	5.1	22.4	99.6	65
394	7.9	52.6	1139	214.7	217.7	3.0	13.1	6.6	6.6	22.4	99.6	65
395	8.1	51.8	1226	214.7	217.7	3.0	13.0	8.1	5.2	22.4	99.6	65
396	8.5	53.5	1453	214.7	217.7	2.3	14.6	8.9	5.4	22.4	99.6	65
397			2172	214.7	217.7	0.3	15.4	8.6	5.0	22.4	99.6	65
398	11.5	55.6	2201	214.7	217.6	0.6	15.2	9.8	5.4	22.4	99.6	65
399	10.2	55.0	2057	214.7	217.7	0.3	14.9	8.8	4.0	22.4	99.6	65
400	10.8	55.6	2215	214.7	217.7	0.4	15.3	9.2	4.1	22.4	99.6	66
401			2153	214.7	217.7	0.1	15.0	8.5	5.2	22.4	99.6	66
402	10.4	55.1	2104	214.7	217.7	0.2	14.9	8.9	6.1	22.4	99.6	66
403	11.5	55.3	2214	214.7	217.7	0.4	15.2	9.8	7.1	22.4	99.6	66
404			2072	214.7	217.0	0.2	14.8	8.4	7.0	22.4	99.6	66
405	9.9	55.0	1992	214.7	213.3	0.5	14.9	8.4	8.8	22.4	99.5	66
406	9.7	55.3	1939	214.7	212.6	0.7	14.9	8.9	9.4	22.3	99.5	66
407	9.3	55.1	1768	214.7	212.6	1.6	14.8	8.0	7.9	22.3	99.5	66
408	9.5	55.3	1843	214.7	212.5	1.2	14.9	9.4	7.8	22.3	99.5	66
409	9.4	55.9	1825	214.7	212.6	1.4	14.9	8.7	7.0	22.3	99.5	66
410	9.4	55.3	1829	214.7	212.6	1.4	15.0	8.4	6.2	22.3	99.5	66
411	9.5	55.5	1837	214.7	212.6	1.3	14.9	9.6	7.2	22.3	99.5	66
412	9.2	55.2	1730	214.7	212.6	1.8	14.9	8.0	6.9	22.3	99.5	66
413	8.9	55.5	1635	214.7	212.6	2.3	14.8	8.0	6.9	22.3	99.5	66
414	8.2	54.9	1290	214.7	212.6	3.0	14.4	7.7	6.5	22.3	99.5	66
415	7.8	54.0	1123	214.7	213.2	3.0	13.6	6.5	6.4	22.3	99.5	66
416	7.0	51.7	807	214.7	217.4	3.0	12.0	5.4	5.5	22.3	99.5	66
417	6.7	50.2	711	214.7	219.6	3.0	11.6	5.5	6.4	22.3	99.5	66
418	6.7	50.4	689	214.7	219.6	3.0	11.5	5.4	5.1	22.3	99.5	67
419	6.9	51.2	770	214.7	219.7	3.0	11.8	5.2	4.5	22.3	99.5	67
420	7.5	51.8	1000	214.7	219.7	3.0	12.7	6.4	4.8	22.3	99.5	67
421	7.2	51.9	862	214.7	219.7	3.0	12.3	6.1	5.3	22.3	99.5	67
422	7.8	52.9	1120	214.7	219.7	3.0	12.8	6.5	5.8	22.3	99.5	67
423	8.3	54.1	1327	214.7	219.7	1.9	14.2	6.7	4.0	22.3	99.5	67
424	11.8	55.1	2187	214.7	219.7	1.2	15.5	10.1	5.1	22.3	99.5	68
425	11.7	55.3	2227	214.7	219.7	1.5	15.3	10.0	4.6	22.3	99.5	68
426	11.1	55.3	2185	214.7	219.7	1.2	15.0	9.5	4.8	22.3	99.5	68
427			2160	214.7	219.7	1.1	14.9	8.4	6.2	22.3	99.5	68
428	12.0	55.5	2253	214.7	219.7	2.6	15.5	10.3	7.0	22.3	99.5	68
429			2219	214.7	219.7	1.2	15.3	8.8	6.7	22.3	99.5	68
430	11.2	55.1	2216	214.7	219.8	0.4	15.2	9.6	7.7	22.3	99.5	67
431	11.3	55.4	2185	214.7	219.7	0.3	15.1	9.7	7.7	22.3	99.5	67
432	9.2	54.8	1742	214.7	219.7	1.7	14.5	9.4	7.2	22.3	99.5	67
433	9.1	55.4	1710	214.7	219.7	2.0	14.9	7.0	6.7	22.3	99.5	67
434	9.0	55.5	1676	214.7	219.7	2.0	14.8	8.0	5.0	22.3	99.5	67
435	9.5	55.2	1860	214.7	219.7	1.3	15.1	8.8	6.1	22.3	99.5	68
436	9.2	55.3	1743	214.7	219.7	1.7	14.9	7.5	5.7	22.3	99.5	68
437	9.8	55.5	1947	214.7	219.7	0.7	15.0	9.7	4.8	22.3	99.5	68
438	10.0	55.5	2038	214.7	219.7	0.3	15.0	8.3	3.7	22.3	99.5	68
439	10.0	55.1	2033	214.7	219.7	0.5	15.0	7.5	3.7	22.3	99.5	68
440	12.6	55.5	2243	214.7	219.7	3.4	16.0	10.8	4.7	22.3	99.5	68

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
441			2148	214.7	219.7	3.5	15.3	8.5	4.1	22.3	99.5	68
442	9.8	55.1	1969	214.7	219.9	0.7	14.9	7.8	3.3	22.3	99.5	69
443	12.0	55.5	2206	214.7	223.4	1.0	15.3	10.3	4.1	22.3	99.5	69
444	11.6	55.3	2251	214.7	224.9	3.2	15.7	10.0	3.7	22.3	99.5	69
445	12.0	55.2	2252	214.7	224.9	4.1	15.6	10.3	2.9	22.3	99.5	69
446	10.9	55.3	2236	214.7	224.9	3.5	15.4	9.3	5.1	22.3	99.5	69
447	11.0	55.3	2228	214.7	224.9	2.4	15.4	9.4	9.1	22.3	99.5	69
448	12.9	55.7	2248	214.7	224.9	3.6	15.8	11.0	6.4	22.3	99.5	69
449	12.1	55.3	2239	214.7	224.8	4.7	15.6	10.4	8.2	22.3	99.5	69
450	11.3	54.6	2238	214.7	224.8	3.7	15.4	9.6	5.8	22.3	99.5	69
451	11.9	55.7	2211	214.7	223.4	2.4	15.3	10.2	3.1	22.3	99.5	69
452	10.4	55.6	2110	214.7	220.4	0.1	14.9	8.9	4.9	22.3	99.5	69
453	10.2	55.7	2068	214.7	220.4	0.2	14.8	9.9	7.7	22.4	99.5	69
454	10.0	55.4	2018	214.7	220.3	0.5	14.9	8.0	6.7	22.4	99.5	70
455	9.3	55.4	1771	214.7	220.3	1.6	14.7	8.0	4.8	22.4	99.5	70
456	9.8	55.5	1973	214.7	220.4	0.9	15.1	9.3	4.6	22.4	99.5	70
457	10.6	55.4	2154	214.7	220.4	0.1	15.1	9.0	4.8	22.4	99.5	70
458			2198	214.7	220.4	0.3	15.2	8.4	5.0	22.4	99.5	70
459	11.4	55.4	2123	214.7	220.4	0.1	14.8	9.8	5.3	22.4	99.5	70
460	12.1	55.5	2232	214.7	220.4	1.2	15.4	10.4	6.0	22.4	99.5	70
461			2132	214.7	220.4	0.2	15.0	8.6	4.2	22.4	99.5	70
462	9.1	54.8	1685	214.7	220.4	2.0	14.6	8.8	3.5	22.4	99.5	70
463	8.9	54.9	1623	214.7	220.4	2.3	14.8	8.5	5.1	22.4	99.5	70
464	8.7	55.3	1511	214.7	220.4	2.9	14.8	8.2	4.7	22.4	99.5	70
465	8.9	55.5	1603	214.7	220.4	2.5	14.9	9.1	4.9	22.5	99.5	70
466	9.3	55.6	1779	214.7	221.0	1.7	15.1	7.6	4.1	22.5	99.5	70
467			2195	214.7	224.7	0.3	15.3	8.6	5.5	22.5	99.5	70
468	8.8	55.0	1565	214.7	225.2	2.2	14.4	6.3	6.6	22.5	99.5	70
469	8.7	55.4	1538	214.7	225.1	2.7	14.8	7.7	4.9	22.5	99.5	70
470	8.1	55.4	1266	214.7	225.1	3.0	14.3	7.0	3.0	22.5	99.5	70
471	7.8	54.4	1123	214.7	225.0	2.9	14.2	6.3	4.7	22.6	99.5	71
472	8.9	54.9	1633	214.7	221.6	2.1	14.9	7.4	3.7	22.6	99.5	71
473	10.5	56.0	2069	214.7	219.1	0.2	15.1	9.0	2.9	22.6	99.5	71
474	8.9	55.4	1642	214.7	219.0	1.8	14.6	6.2	4.0	22.6	99.5	71
475	8.8	55.3	1585	214.7	219.1	2.5	14.9	7.7	5.4	22.6	99.5	71
476	12.6	55.7	2169	214.7	219.1	0.2	15.4	10.8	5.9	22.6	99.5	71
477	12.9	55.2	2146	214.7	219.1	0.1	14.9	11.1	6.0	22.6	99.5	71
478	10.2	54.9	2059	214.7	219.1	0.3	14.9	9.8	4.4	22.6	99.5	70
479	11.1	55.4	2234	214.7	219.1	0.8	15.4	9.5	3.3	22.6	99.5	70
480	11.3	55.6	2220	214.7	219.1	0.5	15.3	9.6	6.4	22.6	99.5	70
481	9.5	55.2	1859	214.7	219.1	1.1	14.6	7.0	6.4	22.6	99.5	70
482	9.1	55.1	1694	214.7	219.1	2.0	14.7	7.4	5.4	22.6	99.5	70
483	8.6	54.9	1498	214.7	219.1	2.9	14.8	8.2	4.9	22.7	99.5	70
484	8.9	55.4	1641	214.7	219.0	2.3	15.0	7.6	3.8	22.7	99.5	71
485	8.8	55.1	1595	214.7	219.0	2.5	14.9	7.8	4.0	22.7	99.5	71
486	9.1	55.4	1698	214.7	219.0	2.0	14.9	8.9	4.5	22.7	99.5	71
487	8.2	54.7	1280	214.7	219.0	2.9	14.3	7.0	4.1	22.7	99.5	71
488	7.4	52.6	961	214.7	219.0	3.0	12.5	5.9	3.8	22.7	99.5	71
489	7.5	51.3	977	214.7	219.0	3.0	12.5	6.4	3.3	22.7	99.5	72
490	8.0	52.2	1180	214.7	219.0	3.0	12.8	6.7	2.8	22.7	99.5	72
491	7.4	51.9	943	214.7	219.0	3.0	12.4	6.7	4.9	22.7	99.5	72
492	6.8	51.0	715	214.7	218.3	3.0	11.6	4.8	4.9	22.7	99.5	72
493	6.6	49.5	681	214.7	214.6	3.0	11.4	5.3	4.5	22.7	99.5	72
494	7.2	50.7	882	214.7	213.9	3.0	12.3	6.8	5.8	22.7	99.5	72
495	7.2	52.5	884	214.7	213.8	2.4	12.3	5.0	8.4	22.8	99.5	71
496	7.1	52.3	836	214.7	213.8	2.0	12.2	4.8	7.8	22.8	99.5	70
497	7.9	53.9	1158	214.7	213.8	2.0	13.0	6.6	4.9	22.8	99.5	70
498	8.2	54.9	1285	214.7	216.2	2.9	14.3	5.8	7.8	22.1	99.5	70
499	8.0	54.6	1204	214.7	220.4	2.8	14.2	5.5	6.9	22.1	99.5	70
500	8.5	54.7	1444	214.7	221.1	2.8	14.6	6.8	5.5	22.1	99.5	70
501	9.3	56.2	1768	214.7	221.1	1.7	15.1	8.3	5.8	22.1	99.5	71
502	8.9	55.2	1598	214.7	221.2	2.3	14.7	7.3	6.1	22.1	99.5	71
503	7.9	54.8	1144	214.7	220.4	2.9	14.2	5.2	6.4	22.1	99.5	71
504	8.4	54.4	1382	214.7	216.6	2.8	14.5	6.3	6.2	22.1	99.5	71
505	9.1	55.7	1714	214.7	216.2	2.0	15.1	7.4	5.6	22.1	99.5	71
506	11.0	55.7	2104	214.7	216.2	0.0	15.3	9.4	4.1	22.1	99.5	71
507	9.9	55.3	1984	214.7	216.2	0.5	14.8	9.9	6.1	22.1	99.5	71
508	8.7	55.3	1512	214.7	216.2	2.8	14.6	8.0	5.8	22.1	99.5	71
509	8.1	55.0	1224	214.7	216.2	2.9	14.3	6.4	6.3	22.1	99.5	71
510	8.2	54.2	1271	214.7	217.0	2.9	14.3	6.5	7.1	22.1	99.5	71
511	8.0	55.0	1219	214.7	220.8	2.9	14.2	6.2	4.8	22.1	99.5	71
512	9.3	55.1	1763	214.7	221.2	1.6	15.1	7.2	3.0	22.1	99.5	71
513	11.0	55.8	2235	214.7	218.5	1.2	15.6	9.4	3.7	22.1	99.5	71
514	11.0	55.1	2220	214.7	216.6	0.6	15.3	9.5	4.6	22.1	99.5	71
515	12.0	55.2	2224	214.7	216.6	0.4	15.3	10.2	4.3	22.1	99.5	71
516	11.1	55.1	2093	214.7	216.5	0.1	14.9	9.5	5.1	22.1	99.5	71
517	9.5	55.5	1832	214.7	216.5	1.3	14.7	7.8	6.9	22.1	99.5	71
518	10.0	55.2	2022	214.7	216.5	0.5	15.1	8.0	8.3	22.1	99.5	70
519	10.9	55.4	2133	214.7	216.6	0.0	15.0	9.3	8.5	22.1	99.5	70
520	9.5	55.2	1864	214.7	216.6	0.9	14.7	6.6	5.6	22.1	99.5	70
521	9.4	55.1	1810	214.7	218.2	1.5	15.0	7.4	4.1	22.1	99.5	70
522	11.5	55.8	2244	214.7	221.6	1.5	15.6	9.8	4.5	22.1	99.5	70
523			2134	214.7	221.8	0.5	15.0	7.2	6.8	22.1	99.5	70
524	9.5	55.3	1839	214.7	221.7	1.3	14.8	7.1	5.4	22.1	99.5	71
525	10.6	55.5	2204	214.7	218.8	0.3	15.2	9.1	3.4	22.1	99.5	71
526	12.2	55.5	2248	214.7	217.2	2.6	15.7	10.4	3.5	22.1	99.5	71
527	10.7	55.5	2206	214.7	217.2	1.4	15.2	9.1	4.0	22.1	99.5	71
528	11.5	55.4	2211	214.7	217.2	0.5	15.3	9.8	3.9	22.1	99.5	71

Table E.01 Measurement data - Turbine ON

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
529			2121	214.7	217.2	0.2	15.0	8.7	3.8	22.1	99.5	71
530	9.2	56.0	1756	214.7	217.1	1.8	14.7	6.6	6.5	22.1	99.5	71
531	9.4	56.3	1819	214.7	217.1	1.1	14.8	6.5	6.9	22.1	99.5	71
532	9.6	56.1	1894	214.7	217.1	1.1	15.2	6.9	6.9	22.1	99.5	71
533	13.1	56.5	2249	214.7	217.1	4.7	16.1	11.2	7.3	22.1	99.5	71
534	12.8	55.4	2225	214.7	217.1	5.0	16.5	10.9	6.2	22.1	99.5	71
535	13.4	55.4	2241	214.7	217.1	5.9	15.9	11.4	6.1	22.1	99.5	71
536	13.7	55.3	2230	214.7	217.1	7.4	15.6	11.7	6.7	22.1	99.5	70
537	14.0	54.4	2225	214.7	217.1	6.4	15.4	12.0	8.4	22.1	99.5	70
538	13.2	55.2	2243	214.7	217.1	6.8	15.6	11.3	7.1	22.1	99.5	70
539	13.2	54.9	2221	214.7	217.1	6.2	15.3	11.3	6.7	22.1	99.5	70
540	12.0	54.6	2191	214.7	217.1	3.9	15.2	10.3	6.6	22.1	99.5	70
541	11.4	54.8	2217	214.7	217.1	2.7	15.3	9.7	7.2	22.1	99.5	70
542	10.1	55.0	2047	214.7	218.1	0.1	14.8	7.9	6.8	22.1	99.5	70
543	9.3	55.3	1789	214.7	221.8	1.5	14.7	7.7	6.7	22.1	99.5	70
544	9.2	55.5	1722	214.7	222.4	1.9	14.8	7.7	6.1	22.1	99.5	70
545	9.9	55.9	1980	214.7	222.4	0.6	15.1	8.6	5.7	22.1	99.5	70
546	10.2	55.7	2068	214.7	222.4	0.3	15.1	9.2	5.3	22.1	99.5	70
547	13.2	55.7	2252	214.7	222.4	2.6	15.8	11.3	4.8	22.1	99.5	70
548	11.7	55.8	2244	214.7	222.6	4.5	15.7	10.0	4.5	22.1	99.5	70
549	12.7	55.3	2241	214.7	222.5	6.7	16.1	10.9	4.4	22.1	99.5	70
550	15.5	55.2	2236	214.7	222.5	9.2	15.8	13.3	6.7	22.1	99.5	70
551	15.3	54.3	2182	214.7	222.5	7.1	15.0	13.0	9.1	22.1	99.5	70
552			2167	214.7	222.6	3.0	15.0	8.4	8.8	22.1	99.5	70
553	13.7	55.7	2236	214.7	222.5	5.0	16.0	11.7	7.2	22.1	99.5	70
554	11.0	56.0	2221	214.7	222.5	6.3	15.4	9.5	5.6	22.1	99.5	71
555	10.6	54.9	2213	214.7	221.7	4.0	15.3	9.1	3.8	22.0	99.5	71
556	12.4	55.2	2246	214.7	218.9	6.5	16.0	10.6	5.6	22.0	99.5	71
557	14.2	55.1	2229	214.7	218.7	7.9	15.7	12.2	7.4	22.0	99.5	71
558	14.5	54.6	2213	214.7	218.7	6.7	15.3	12.4	7.1	22.0	99.5	71
559	11.5	54.4	2195	214.7	218.7	4.3	15.1	9.9	5.9	22.0	99.5	71
560	11.9	55.3	2246	214.7	218.8	4.8	15.7	10.2	5.3	22.0	99.5	71
561	12.7	55.2	2241	214.7	218.8	5.2	15.5	10.9	3.8	22.0	99.5	71
562	12.6	54.9	2215	214.7	218.7	3.8	15.3	10.8	5.4	22.0	99.5	71
563	12.6	55.2	2227	214.7	218.8	2.8	15.3	10.8	5.9	22.0	99.5	71
564	11.1	55.1	2242	214.7	218.8	2.7	15.5	9.5	5.8	22.0	99.5	71
565	11.7	55.2	2243	214.7	218.8	3.4	15.7	10.0	4.9	22.0	99.5	71
566	11.4	55.3	2206	214.7	218.8	2.8	15.3	9.8	4.3	22.0	99.5	70
567	10.1	55.1	2044	214.7	218.7	0.4	14.7	8.9	5.4	22.0	99.5	70
568	9.8	55.7	1957	214.7	218.7	0.8	14.9	8.6	5.5	22.0	99.5	70
569	11.6	55.5	2152	214.7	218.7	0.4	15.2	9.9	8.8	22.0	99.5	70
570	11.4	56.0	2242	214.7	218.7	3.3	15.8	9.7	8.3	22.0	99.5	70
571	12.6	55.9	2238	214.7	218.1	6.5	16.1	10.8	6.9	22.0	99.5	70
572	13.0	55.0	2249	214.7	214.7	7.1	15.6	11.1	7.2	22.0	99.5	70
573	13.8	54.8	2238	214.7	214.2	6.6	15.5	11.8	6.8	22.0		70
574	13.3	54.8	2224	214.7	214.3	6.1	15.3	11.4	7.4	22.0	99.5	70
575	12.6	54.7	2220	214.7	214.3	4.8	15.3	10.8	6.9	22.0	99.5	70
576	12.9	55.0	2223	214.7	215.4	4.0	15.4	11.1	7.9	22.0	99.5	70
577	11.1	55.1	2173	214.7	218.3	0.4	15.0	9.5	6.6	22.0	99.5	70
578			2171	214.7	218.4	0.1	14.9	8.2	5.5	22.0	99.5	70
579	10.6	55.7	2225	214.7	218.4	0.6	15.3	9.1	5.8	22.0	99.5	70
580			2248	214.7	218.5	2.2	15.6	8.6	6.8	22.0	99.5	70
581	12.0	55.5	2249	214.7	218.5	1.8	15.5	10.3	7.1	22.0	99.5	70
582	13.5	55.7	2243	214.7	218.5	5.3	16.1	11.6	5.6	22.0	99.5	70
583	12.0	55.2	2224	214.7	218.5	5.4	15.4	10.3	6.2	22.0	99.5	70
584	13.0	54.5	2240	214.7	218.5	4.3	15.5	11.2	7.7	22.0	99.5	70
585	13.4	55.3	2246	214.7	218.5	6.4	15.8	11.5	7.3	22.0	99.5	70
586	12.8	55.3	2245	214.7	218.5	6.3	15.5	10.9	8.2	22.0	99.5	70
587	13.3	55.6	2231	214.7	218.5	7.0	15.5	11.4	5.9	22.0	99.5	70
588	13.1	55.1	2199	214.7	218.5	4.6	15.1	11.2	6.4	22.0	99.5	70
589	12.8	54.6	2248	214.7	218.5	5.6	15.7	10.9	6.6	22.0	99.5	70
590	12.4	54.9	2184	214.7	218.5	3.1	15.1	10.6	6.5	22.0	99.5	70
591			2177	214.7	218.5	0.2	15.0	7.4	8.2	22.0	99.5	70
592	11.1	56.1	2245	214.7	218.5	2.0	15.6	9.5	8.9	22.0	99.5	70
593	10.9	55.6	2251	214.7	218.4	2.5	15.5	9.3	8.9	22.0	99.5	70
594	12.1	55.6	2251	214.7	218.4	5.3	15.9	10.3	8.3	22.0	99.5	70
595	11.7	55.1	2246	214.7	218.4	6.4	15.6	10.0	6.4	22.0	99.5	70
596	11.9	55.3	2214	214.7	218.4	5.2	15.3	10.2	7.4	22.0	99.5	70
597	13.2	55.2	2247	214.7	218.4	6.7	15.8	11.3	7.5	22.0	99.5	70
598	13.3	55.0	2237	214.7	218.4	6.9	15.5	11.4	6.4	22.0	99.5	70
599	13.4	54.7	2214	214.7	218.5	5.5	15.3	11.5	6.3	22.0	99.5	70
600	13.4	55.2	2209	214.7	218.5	4.1	15.2	11.5	4.8	22.0	99.5	70
601	12.7	55.3	2230	214.7	218.5	4.1	15.6	10.9	3.6	22.0	99.5	70
602	11.8	55.3	2209	214.7	218.5	2.4	15.2	10.1	4.7	22.0	99.5	70
603	10.0	55.4	2037	214.7	218.5	0.3	14.8	9.1	7.2	22.0	99.5	70
604	8.9	55.3	1608	214.7	218.5	2.5	14.6	7.5	5.4	22.0	99.5	70
605	12.0	56.1	2149	214.7	218.5	0.8	15.6	10.3	4.9	22.0	99.5	70
606	11.7	56.2	2253	214.7	218.4	5.1	16.1	10.0	5.8	22.0	99.5	70
607	13.5	55.7	2241	214.7	218.2	7.1	15.8	11.6	6.0	22.0	99.5	70
608	12.8	54.4	2211	214.7	215.6	5.8	15.3	10.9	5.1	22.0	99.5	70
609	10.7	55.0	2193	214.7	215.2	4.0	15.2	9.2	8.1	22.0	99.5	70
610	12.5	55.3	2207	214.7	215.2	1.6	15.2	10.7	7.2	22.0	99.5	70
611	11.3	55.4	2130	214.7	215.1	0.1	14.9	9.6	6.1	22.0	99.5	70
612	9.8	55.4	1967	214.7	215.4	0.6	14.8	8.0	6.6	22.0	99.5	70
613	9.2	55.2	1734	214.7	218.9	1.7	14.7	8.3	6.5	22.0	99.5	70
614	9.1	55.7	1688	214.7	220.2	2.0	14.9	7.6	6.5	22.0	99.5	70
615	8.7	55.6	1540	214.7	220.2	2.6	14.7	8.9	5.4	22.0	99.5	70
616	8.8	55.5	1560	214.7	220.2	2.7	14.9	7.8	5.9	22.0	99.5	70

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
617	9.5	55.9	1855	214.7	220.2	1.3	15.2	8.3	6.3	22.0	99.5	70
618	9.5	55.8	1837	214.7	220.2	1.2	14.9	8.0	5.7	22.0	99.5	70
619	8.6	55.6	1470	214.7	220.3	2.6	14.5	6.7	4.9	22.0	99.5	70
620	8.7	55.0	1538	214.7	219.2	2.5	14.8	7.4	4.8	22.0	99.5	71
621	9.7	55.6	1932	214.7	216.0	0.9	15.1	8.7	3.8	22.0	99.5	71
622	9.6	55.7	1901	214.7	215.8	1.1	15.0	8.6	3.2	22.0	99.5	71
623	11.6	55.9	2122	214.7	215.8	0.0	15.1	9.9	3.7	22.0	99.5	71
624	9.9	55.3	1989	214.7	215.8	0.6	14.9	10.3	4.8	22.0	99.5	71
625	11.6	55.0	2071	214.7	215.8	0.3	15.0	9.9	4.2	22.0	99.5	71
626	12.0	55.2	2114	214.7	215.8	0.1	15.0	10.3	4.6	22.1	99.5	70
627	13.3	56.5	2247	214.7	215.8	5.0	16.1	11.4	3.9	22.1	99.5	70
628	11.7	55.4	2211	214.7	215.8	4.9	15.4	10.0	6.0	22.1	99.5	70
629	13.8	55.2	2234	214.7	215.8	6.7	16.0	11.8	6.7	22.1	99.5	70
630	14.2	55.3	2242	214.7	215.8	7.6	15.5	12.1	6.3	22.1	99.5	70
631	14.4	54.7	2244	214.7	215.8	7.6	15.5	12.3	7.1	22.1	99.5	70
632	14.6	55.5	2243	214.7	215.8	8.7	15.7	12.5	6.4	22.1	99.5	70
633	14.5	55.3	2228	214.7	215.8	8.4	15.4	12.4	7.2	22.1	99.5	70
634	14.4	54.5	2182	214.7	215.8	6.2	15.1	12.4	5.5	22.1	99.5	70
635	13.1	54.4	2205	214.7	215.8	4.9	15.3	11.2	5.8	22.1	99.5	70
636	11.4	55.2	2226	214.7	215.8	3.8	15.4	9.8	4.2	22.1	99.5	70
637	12.2	55.5	2244	214.7	215.8	5.8	15.9	10.4	6.3	22.1	99.5	70
638	12.3	55.2	2227	214.7	215.8	6.0	15.4	10.6	8.4	22.2	99.5	69
639	13.1	55.2	2229	214.7	215.8	5.3	15.4	11.2	8.0	22.2	99.5	69
640	12.5	55.2	2239	214.7	215.8	5.3	15.5	10.7	6.2	22.2	99.5	69
641	14.6	55.1	2245	214.7	215.8	6.5	15.6	12.5	5.9	22.2	99.5	69
642	13.2	55.0	2230	214.7	215.8	6.3	15.4	11.3	7.7	22.2	99.5	69
643	13.3	54.5	2204	214.7	218.1	4.8	15.2	11.4	5.3	22.2	99.5	69
644	11.2	55.1	2221	214.7	220.2	3.8	15.4	9.6	4.4	22.2	99.5	69
645	12.7	56.0	2236	214.7	220.2	5.9	15.9	10.9	4.7	22.2	99.5	69
646	13.4	55.6	2242	214.7	220.2	7.2	15.6	11.4	6.5	22.2	99.5	69
647	13.0	55.0	2221	214.7	218.0	6.6	15.4	11.1	5.4	22.2	99.5	69
648	14.1	55.2	2226	214.7	216.2	6.7	15.4	12.1	5.3	22.2	99.5	69
649	13.8	54.3	2239	214.7	216.2	6.9	15.6	11.8	8.2	22.2	99.5	69
650	13.0	55.0	2231	214.7	216.2	7.0	15.4	11.1	9.2	22.2	99.5	68
651	13.1	54.8	2213	214.7	216.1	6.2	15.5	11.2	8.3	22.2	99.5	68
652	12.8	55.4	2214	214.7	216.1	6.1	15.4	10.9	6.2	22.2	99.5	68
653	11.5	54.9	2173	214.7	216.1	1.6	15.0	9.8	4.6	22.2	99.5	68
654	12.4	55.9	2241	214.7	216.2	2.2	15.6	10.6	6.1	22.2	99.5	68
655	13.3	55.5	2237	214.7	216.2	4.9	15.9	11.4	5.8	22.2	99.5	68
656	14.0	55.2	2211	214.7	216.2	4.8	15.3	12.0	5.9	22.2	99.5	69
657	12.2	55.1	2195	214.7	216.7	1.8	15.1	10.4	6.4	22.2	99.5	69
658			2105	214.7	220.0	0.0	14.9	7.4	6.3	22.2	99.5	69
659	8.8	55.5	1573	214.7	220.4	2.4	14.5	6.4	5.7	22.2	99.5	69
660	9.3	55.8	1758	214.7	220.4	1.7	15.0	8.5	5.0	22.2	99.5	69
661	8.8	55.5	1560	214.7	220.4	2.6	14.8	8.6	5.2	22.2	99.5	69
662	8.4	55.1	1388	214.7	220.4	2.9	14.5	8.1	5.6	22.2	99.5	69
663	8.1	54.7	1249	214.7	220.4	2.9	14.3	6.8	5.9	22.2	99.5	69
664	8.1	55.1	1262	214.7	220.4	2.9	14.3	6.0	3.9	22.2	99.5	69
665	8.0	55.4	1192	214.7	220.5	2.9	14.3	6.7	2.4	22.2	99.5	69
666	8.3	55.5	1327	214.7	220.6	2.9	14.4	7.0	3.9	22.2	99.5	69
667	7.7	54.1	1078	214.7	220.6	3.0	13.3	5.2	3.9	22.2	99.5	69
668	6.8	52.1	736	214.7	220.5	3.0	11.7	4.5	4.2	22.3	99.5	69
669	6.8	50.7	731	214.7	220.5	3.0	11.7	5.6	5.2	22.3	99.5	69
670	7.8	54.7	1132	214.7	220.5	3.0	13.4	6.4	5.2	22.3	99.5	69
671	8.5	55.8	1419	214.7	220.4	2.7	14.5	6.9	4.8	22.3	99.5	69
672	9.9	55.9	1991	214.7	220.4	0.7	15.4	9.9	3.5	22.3	99.5	69
673	10.3	55.8	2202	214.7	220.4	1.8	15.3	8.8	5.0	22.3	99.5	69
674	10.6	55.0	2180	214.7	220.4	1.2	15.0	9.1	5.1	22.3	99.5	68
675	12.9	55.5	2242	214.7	220.4	3.8	15.8	11.1	4.0	22.3	99.5	67
676	11.4	55.5	2219	214.7	220.4	3.0	15.3	9.7	4.7	22.3	99.5	67
677	10.7	55.5	2191	214.7	220.4	1.3	15.2	9.1	4.9	22.3	99.5	67
678	11.1	55.5	2232	214.7	220.4	1.6	15.5	9.5	5.7	22.3	99.5	67
679			2242	214.7	220.5	2.9	15.6	8.7	7.5	22.3	99.5	67
680			2238	214.7	220.5	2.6	15.5	8.7	5.9	22.3	99.5	67
681	11.7	55.7	2213	214.7	220.5	1.5	15.3	10.0	6.3	22.3	99.5	67
682	11.6	55.5	2230	214.7	220.5	2.4	15.8	10.0	5.8	22.3	99.5	67
683	14.2	56.2	2236	214.7	220.4	7.3	16.0	12.2	4.9	22.3	99.5	67
684	13.2	54.7	2202	214.7	220.4	5.4	15.2	11.3	5.8	22.3	99.5	67
685	12.8	54.7	2226	214.7	220.5	4.4	15.4	11.0	5.8	22.3	99.5	67
686	12.4	54.7	2242	214.7	220.5	4.6	15.5	10.6	4.5	22.3	99.5	68
687	12.2	55.3	2218	214.7	220.5	3.7	15.4	10.5	4.8	22.3	99.5	68
688	11.6	55.5	2238	214.7	220.5	4.2	15.6	9.9	7.6	22.3	99.5	68
689	11.9	54.9	2233	214.7	220.4	3.6	15.4	10.2	7.4	22.3	99.5	68
690	12.8	55.5	2220	214.7	220.5	2.5	15.3	10.9	6.5	22.3	99.5	68
691			2078	214.7	220.5	0.1	14.8	8.5	5.7	22.3	99.5	68
692	9.3	55.3	1786	214.7	220.4	1.5	14.7	8.6	4.8	22.3	99.5	68
693	9.3	55.7	1792	214.7	220.4	1.4	14.9	7.7	6.2	22.3	99.5	68
694												
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Table E.02 Measurement data - Background

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1	8.0	40.0	0.6	5.3	21	99.7	55
2	8.1	38.7	0.5	5.4	21	99.7	55
3	6.3	39.0	0.6	4.1	21	99.7	55
4	5.1	42.0	0.5	3.3	21	99.7	55
5	4.1	38.3	0.5	2.7	21	99.7	57
6	4.8	38.0	0.5	3.2	21	99.7	58
7	4.2	39.6	0.4	2.8	21	99.7	58
8	5.2	38.4	0.4	3.4	21	99.7	58
9	8.0	38.9	0.3	5.3	21	99.7	58
10	8.6	39.1	0.4	5.7	21	99.7	58
11	7.3	37.1	0.3	4.8	21	99.7	57
12	5.8	37.3	0.2	3.8	21	99.7	56
13	4.8	38.0	0.2	3.1	21	99.7	56
14	6.4	38.6	0.4	4.2	21	99.7	56
15	8.6	38.2	0.4	5.7	21	99.7	56
16	8.8	37.6	0.5	5.8	21	99.7	56
17	7.7	38.9	0.3	5.1	21	99.7	55
18	9.4	39.0	0.3	6.2	21	99.7	55
19	9.7	38.4	0.3	6.4	21	99.7	55
20	9.6	39.4	0.2	6.3	21	99.7	55
21	10.6	38.1	0.2	7.0	21	99.7	55
22	10.5	37.8	0.3	7.0	21	99.7	55
23	9.9	38.5	0.3	6.6	21	99.7	53
24	8.4	38.5	0.3	5.5	21	99.7	52
25	6.7	38.3	0.3	4.4	21	99.7	52
26	7.5	38.4	0.3	4.9	21	99.7	52
27	5.8	39.3	0.3	3.8	21	99.7	52
28	8.0	38.1	0.3	5.2	21	99.7	52
29	7.9	38.0	0.2	5.2	21	99.7	52
30	8.6	38.4	0.3	5.6	21	99.7	52
31	8.2	39.3	0.3	5.4	21	99.7	52
32	7.5	38.6	0.3	4.9	21	99.7	52
33	8.7	39.0	0.3	5.8	21	99.7	52
34	8.3	39.0	0.3	5.4	21	99.7	52
35	7.3	40.3	0.2	4.8	21	99.7	53
36	7.4	40.8	0.2	4.9	21	99.7	53
37	9.8	40.2	0.3	6.5	21	99.7	53
38	9.1	39.7	0.2	6.0	21	99.7	53
39	7.9	39.5	0.3	5.2	21	99.7	53
40	8.5	40.4	0.3	5.6	21	99.7	53
41	10.0	39.7	0.2	6.6	21	99.7	54
42	10.4	38.4	0.3	6.9	21	99.6	54
43	9.9	37.5	0.2	6.5	21	99.6	54
44	8.6	37.2	0.2	5.7	21	99.6	54
45	8.1	38.1	0.3	5.4	21	99.6	54
46	9.3	39.2	0.3	6.1	21	99.6	54
47	9.3	36.9	0.4	6.1	21	99.6	54
48	9.4	37.5	0.3	6.2	21	99.6	53
49	9.1	38.6	0.1	6.0	21	99.6	53
50	8.5	38.1	0.3	5.6	21	99.6	53
51	7.5	38.1	0.2	4.9	21	99.6	53
52	6.2	38.1	0.3	4.1	21	99.6	53
53	6.5	38.2	0.3	4.3	21	99.6	54
54	7.2	39.0	0.3	4.8	21	99.6	54
55	7.6	39.5	0.3	5.0	21	99.6	54
56	7.5	39.4	0.3	4.9	21	99.6	54
57	7.4	37.7	0.2	4.9	21	99.6	54
58	7.3	37.9	0.3	4.8	21	99.6	54
59	8.5	36.5	0.4	5.6	21	99.6	55
60	9.1	35.8	0.3	6.0	21	99.6	56
61	8.1	34.5	0.2	5.3	21	99.6	56
62	7.8	35.3	0.2	5.1	21	99.6	56
63	7.6	35.6	0.2	5.0	21	99.6	56
64	7.6	36.6	0.2	5.0	21	99.6	56
65	7.5	38.0	0.2	5.0	21	99.6	55
66	7.9	36.9	0.4	5.2	21	99.6	55
67	7.4	38.7	0.5	4.9	21	99.6	55
68	6.0	36.8	0.5	4.0	21	99.6	55
69	5.1	37.1	0.3	3.4	21	99.6	55
70	6.0	37.4	0.4	3.9	21	99.6	55
71	5.8	37.5	0.3	3.8	21	99.6	56
72	6.3	36.0	0.3	4.2	21	99.6	56
73	9.1	36.2	0.3	6.0	21	99.6	56
74	8.3	37.6	0.3	5.5	21	99.6	56
75	7.1	38.0	0.3	4.7	21	99.6	56
76	6.8	37.4	0.3	4.5	21	99.6	56
77	5.8	39.7	0.3	3.8	21	99.6	56
78	6.8	35.9	0.2	4.5	21	99.6	56
79	8.6	36.1	0.3	5.7	21	99.6	56
80	9.0	35.6	0.3	5.9	21	99.6	56
81	7.1	38.1	0.3	4.7	21	99.6	56
82	7.1	36.3	0.3	4.7	21	99.6	56
83	6.4	36.3	0.3	4.2	21	99.6	55

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
84	7.4	35.9	0.2	4.9	21	99.6	55
85	9.6	36.9	0.2	6.3	21	99.6	55
86	9.4	39.0	0.3	6.2	21	99.6	55
87	8.6	41.5	0.4	5.7	21	99.6	55
88	8.7	41.5	0.4	5.7	21	99.6	55
89	8.6	39.8	0.3	5.7	21	99.7	54
90	6.9	42.0	0.3	4.5	21	99.6	54
91	6.9	38.1	0.2	4.6	21	99.6	54
92	7.6	38.0	0.3	5.0	21	99.7	54
93	6.2	38.7	0.3	4.1	21	99.6	54
94	6.3	39.2	0.3	4.2	21	99.6	54
95	6.1	38.5	0.3	4.0	21	99.6	54
96	5.4	38.1	0.3	3.5	21	99.6	55
97	4.7	38.1	0.3	3.1	21	99.6	55
98	8.1	36.7	0.2	5.3	21	99.6	55
99	10.0	37.2	0.3	6.6	21	99.6	55
100	9.9	37.6	0.1	6.5	21	99.7	55
101	8.2	36.7	0.1	5.4	21	99.6	54
102	7.0	37.5	0.2	4.6	21	99.6	54
103	6.2	37.7	0.3	4.1	21	99.6	54
104	7.0	38.6	0.2	4.6	21	99.6	54
105	8.4	38.4	0.4	5.5	21	99.6	54
106	9.9	38.2	0.4	6.5	21	99.6	54
107	9.5	39.6	0.4	6.3	21	99.6	53
108	10.4	37.4	0.3	6.9	21	99.6	52
109	9.3	35.3	0.3	6.1	21	99.6	52
110	9.9	37.5	0.3	6.5	21	99.6	52
111	9.9	38.1	0.3	6.5	21	99.6	52
112	8.8	37.9	0.3	5.8	21	99.6	52
113	9.3	36.7	0.2	6.1	21	99.6	52
114	8.9	37.3	0.4	5.9	21	99.6	53
115	7.8	39.2	0.4	5.1	21	99.6	53
116	7.5	38.0	0.3	5.0	21	99.6	53
117	6.0	38.1	0.3	4.0	21	99.6	53
118	4.5	37.5	0.3	2.9	21	99.6	53
119	6.8	37.8	0.3	4.5	21	99.6	55
120	8.2	38.3	0.4	5.4	21	99.7	56
121	8.4	38.4	0.4	5.5	21	99.7	56
122	7.5	39.5	0.3	4.9	21	99.6	56
123	7.7	38.7	0.3	5.1	21	99.6	56
124	7.8	39.2	0.2	5.1	21	99.7	56
125	6.8	39.3	0.2	4.5	21	99.7	54
126	6.7	38.3	0.3	4.4	21	99.6	53
127	8.5	38.5	0.3	5.6	21	99.6	53
128	6.6	38.3	0.4	4.3	21	99.6	53
129	8.2	37.9	0.2	5.4	21	99.6	53
130	7.8	37.0	0.2	5.1	21	99.6	53
131	6.7	36.4	0.3	4.4	21	99.6	55
132	5.6	36.2	0.4	3.7	21	99.6	56
133	7.4	33.0	0.3	4.9	21	99.6	56
134	7.1	33.3	0.3	4.7	21	99.6	56
135	6.3	34.1	0.3	4.2	21	99.6	56
136	4.8	35.0	0.1	3.2	21	99.6	56
137	5.7	36.7	0.1	3.8	21	99.6	55
138	6.0	38.8	0.2	4.0	21	99.6	54
139	5.1	37.8	0.2	3.3	21	99.6	54
140	6.0	38.1	0.2	4.0	21	99.6	54
141	5.1	38.0	0.2	3.4	21	99.6	54
142	4.3	37.8	0.3	2.8	21	99.6	54
143	6.0	37.7	0.3	4.0	21	99.6	55
144	9.4	37.5	0.3	6.2	21	99.6	56
145	9.7	36.7	0.4	6.4	21	99.6	56
146	9.0	37.1	0.4	5.9	21	99.6	56
147	8.5	36.8	0.3	5.6	21	99.6	56
148	9.8	39.4	0.3	6.4	21	99.6	56
149	9.4	40.9	0.3	6.2	21	99.6	54
150	8.3	38.4	0.4	5.5	21	99.6	53
151	9.4	39.4	0.4	6.2	21	99.6	53
152	8.0	40.0	0.3	5.3	21	99.6	53
153	8.4	39.8	0.3	5.6	21	99.6	53
154	8.3	39.9	0.3	5.5	21	99.6	53
155	7.1	39.9	0.3	4.7	21	99.6	53
156	5.5	40.4	0.3	3.7	21	99.6	53
157	5.4	40.6	0.4	3.5	21	99.6	53
158	6.9	39.7	0.3	4.5	21	99.6	53
159	8.7	39.3	0.3	5.7	21	99.6	53
160	7.7	39.6	0.3	5.1	21	99.6	53
161	7.4	40.0	0.3	4.9	21	99.6	53
162	10.4	38.6	0.2	6.8	21	99.6	52
163	10.3	39.1	0.3	6.8	21	99.6	52
164	9.8	38.6	0.4	6.4	21	99.6	52
165	8.2	38.0	0.4	5.4	21	99.6	52
166	8.3	37.1	0.3	5.5	21	99.6	52

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
167	8.6	38.5	0.3	5.7	21	99.6	52
168	8.6	37.6	0.3	5.7	21	99.6	52
169	7.2	37.9	0.2	4.7	21	99.6	52
170	7.3	36.4	0.2	4.8	21	99.6	52
171	6.4	36.3	0.2	4.2	21	99.6	52
172	5.1	36.0	0.2	3.4	21	99.6	52
173	3.1	38.5	0.3	2.0	21	99.6	55
174	4.1	37.4	0.4	2.7	21	99.6	56
175	7.2	35.6	0.3	4.7	21	99.6	56
176	8.3	35.7	0.3	5.5	21	99.6	56
177	5.8	36.9	0.2	3.8	21	99.6	56
178	6.5	34.4	0.3	4.3	21	99.6	56
179	8.6	34.5	0.3	5.6	21	99.6	54
180	11.0	34.9	0.2	7.3	21	99.6	53
181	9.0	36.0	0.2	5.9	21	99.6	53
182	8.6	36.1	0.2	5.7	21	99.6	53
183	6.9	36.9	0.4	4.5	21	99.6	53
184	6.6	36.6	0.4	4.4	21	99.6	53
185	6.7	36.3	0.3	4.4	21	99.6	54
186	6.8	35.8	0.3	4.5	21	99.6	55
187	6.5	35.7	0.2	4.3	21	99.6	55
188	6.7	36.8	0.2	4.4	21	99.6	55
189	8.3	36.5	0.3	5.5	21	99.6	55
190	8.1	36.5	0.3	5.3	21	99.6	55
191	8.1	37.5	0.3	5.4	21	99.6	54
192	9.1	36.9	0.2	6.0	21	99.6	53
193	10.1	38.5	0.2	6.6	21	99.6	53
194	8.7	38.3	0.2	5.7	21	99.6	53
195	7.0	37.0	0.3	4.6	21	99.6	53
196	8.2	35.9	0.2	5.4	21	99.6	53
197	9.7	36.6	0.2	6.4	21	99.6	53
198	10.3	36.4	0.3	6.8	21	99.6	53
199	8.6	36.4	0.3	5.7	21	99.6	53
200	8.5	36.4	0.3	5.6	21	99.6	53
201	6.3	35.6	0.3	4.1	21	99.6	53
202	5.3	35.4	0.3	3.5	21	99.6	53
203	5.9	36.4	0.4	3.9	21	99.6	54
204	5.6	36.1	0.4	3.7	21	99.6	55
205	7.9	36.9	0.3	5.2	21	99.6	55
206	7.8	37.7	0.3	5.2	21	99.7	55
207	5.1	36.8	0.4	3.4	21	99.7	55
208	6.8	37.7	0.3	4.5	21	99.7	55
209	9.5	36.1	0.3	6.2	21	99.6	54
210	8.4	34.5	0.3	5.5	22	99.6	71
211	9.3	35.1	0.3	6.1	22	99.6	71
212	8.5	35.9	0.3	5.6	22	99.6	71
213	8.8	38.5	0.3	5.8	22	99.6	72
214	7.6	37.3	0.4	5.0	22	99.6	72
215	10.6	35.2	0.5	7.0	22	99.6	72
216	9.3	35.9	0.4	6.1	22	99.6	72
217	8.5	36.2	0.4	5.6	22	99.6	72
218	8.5	35.8	0.3	5.6	22	99.6	72
219	8.2	36.2	0.3	5.4	22	99.6	71
220	9.2	36.0	0.3	6.0	22	99.6	71
221	10.1	36.9	0.3	6.6	22	99.6	71
222	9.4	36.3	0.3	6.2	22	99.6	71
223	9.0	41.2	0.4	5.9	22	99.6	71
224	9.3	39.8	0.4	6.1	22	99.6	71
225	9.3	40.3	0.5	6.1	22	99.6	70
226	10.8	38.5	0.6	7.1	22	99.6	69
227	11.3	36.9	0.4	7.4	22	99.6	69
228	10.3	36.2	0.3	6.8	22	99.6	69
229	11.0	36.3	0.3	7.2	22	99.6	69
230	11.7	35.5	0.3	7.7	22	99.6	69
231	11.3	37.6	0.4	7.4	22	99.6	69
232	9.3	38.3	0.3	6.2	22	99.6	69
233	9.4	37.3	0.3	6.2	22	99.6	69
234	10.4	40.5	0.4	6.9	22	99.6	69
235	10.2	38.6	0.4	6.7	22	99.6	69
236	8.3	41.0	0.3	5.5	22	99.6	69
237	5.8	42.0	0.3	3.8	22	99.6	69
238	8.4	39.3	0.2	5.6	22	99.6	69
239	10.8	38.2	0.3	7.1	22	99.6	69
240	10.0	36.6	0.3	6.6	22	99.6	69
241	9.5	37.2	0.5	6.3	22	99.6	69
242	9.0	36.2	0.6	6.0	22	99.6	69
243	10.0	36.9	0.6	6.6	22	99.6	65
244	8.0	36.3	0.5	5.3	22	99.6	65
245	6.3	35.7	0.5	4.1	22	99.6	65
246	7.6	36.0	0.4	5.0	22	99.6	65
247	7.4	36.8	0.4	4.9	22	99.6	65
248	8.3	37.2	0.4	5.5	22	99.6	65
249	9.6	38.0	0.6	6.3	22	99.6	65

Table E.02 Measurement data - Background

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
250	10.0	38.8	0.7	6.6	22	99.6	65
251	7.2	37.7	0.7	4.7	22	99.6	65
252	5.1	38.3	0.6	3.4	22	99.6	65
253	7.1	38.8	0.6	4.7	22	99.6	65
254	8.5	38.0	0.5	5.6	22	99.6	65
255	9.1	37.5	0.3	6.0	22	99.6	65
256	11.0	38.7	0.4	7.2	22	99.6	65
257	8.8	39.3	0.5	5.8	22	99.6	65
258	9.1	41.3	0.4	6.0	22	99.6	65
259	10.1	39.0	0.3	6.7	22	99.6	65
260	9.7	37.9	0.3	6.4	22	99.6	65
261	11.2	40.3	0.5	7.4	22	99.6	61
262	9.5	39.2	0.5	6.3	22	99.6	60
263	11.0	39.8	0.4	7.3	22	99.6	60
264	11.8	39.7	0.4	7.8	22	99.6	60
265	11.1	39.7	0.4	7.3	22	99.6	60
266	10.4	37.6	0.4	6.8	22	99.6	60
267	11.1	41.6	0.4	7.3	22	99.6	61
268	11.2	40.2	0.4	7.4	22	99.6	61
269	9.3	38.3	0.4	6.1	22	99.6	61
270	10.0	38.2	0.3	6.6	22	99.6	61
271	11.3	39.6	0.4	7.4	22	99.6	61
272	8.5	37.9	0.4	5.6	22	99.6	61
273	10.5	40.2	0.4	6.9	22	99.6	61
274	9.6	41.8	0.4	6.3	22	99.6	61
275	9.2	40.8	0.4	6.1	22	99.6	61
276	7.5	37.9	0.5	4.9	22	99.6	61
277	10.3	37.0	0.5	6.8	22	99.6	61
278	10.1	41.9	0.4	6.7	22	99.6	61
279	9.3	40.2	0.5	6.1	22	99.6	62
280	8.6	39.7	0.6	5.7	22	99.6	62
281	8.6	38.5	0.5	5.7	22	99.6	62
282	9.0	38.2	0.4	5.9	22	99.6	62
283	9.4	36.6	0.3	6.2	22	99.6	62
284	9.3	37.0	0.4	6.2	22	99.6	62
285	7.5	37.0	0.4	4.9	22	99.6	62
286	8.2	38.5	0.4	5.4	22	99.6	62
287	9.9	37.5	0.4	6.5	22	99.6	62
288	12.5	38.8	0.4	8.3	22	99.6	62
289	13.0	39.6	0.4	8.6	22	99.6	62
290	9.6	39.4	0.4	6.3	22	99.6	62
291	11.1	39.0	0.4	7.3	22	99.6	63
292	11.1	39.5	0.6	7.3	22	99.6	63
293	12.5	38.4	0.5	8.2	22	99.6	63
294	10.0	38.9	0.4	6.6	22	99.6	63
295	10.7	38.9	0.5	7.1	22	99.6	63
296	11.8	38.9	0.5	7.8	22	99.6	63
297	9.6	39.9	0.5	6.3	22	99.6	64
298	8.4	37.9	0.5	5.5	22	99.6	64
299	9.4	37.3	0.4	6.2	22	99.6	64
300	7.2	40.2	0.4	4.7	22	99.6	64
301	11.3	38.7	0.4	7.4	22	99.6	64
302	8.9	39.4	0.6	5.9	22	99.6	64
303	8.3	37.5	0.6	5.5	22	99.6	65
304	8.6	36.8	0.5	5.7	22	99.6	65
305	7.5	37.1	0.5	5.0	22	99.6	65
306	9.7	36.9	0.5	6.4	22	99.6	65
307	9.2	36.3	0.4	6.0	22	99.6	65
308	6.8	36.2	0.2	4.5	22	99.6	65
309	5.9	38.2	0.1	3.9	22	99.6	66
310	5.6	36.9	0.1	3.7	22	99.6	66
311	5.4	36.0	0.3	3.6	22	99.6	66
312	8.1	36.9	0.2	5.4	22	99.6	66
313	6.7	37.6	0.2	4.4	22	99.6	66
314	6.2	38.0	0.2	4.1	22	99.6	66
315	7.1	37.6	0.3	4.7	22	99.6	65
316	7.0	38.7	0.3	4.6	22	99.6	65
317	7.4	38.0	0.2	4.9	22	99.6	65
318	9.4	36.6	0.2	6.2	22	99.6	65
319	8.4	36.8	0.2	5.5	22	99.6	65
320	7.8	36.2	0.4	5.1	22	99.6	65
321	9.3	37.1	0.3	6.1	22	99.6	64
322	8.1	37.8	0.3	5.4	22	99.6	63
323	8.6	38.3	0.5	5.7	22	99.6	63
324	6.5	39.6	0.5	4.3	22	99.6	63
325	6.8	40.0	0.5	4.5	22	99.6	63
326	9.0	39.4	0.4	5.9	22	99.6	63
327	8.7	40.0	0.3	5.8	22	99.6	64
328	7.4	40.6	0.2	4.9	22	99.6	64
329	6.9	40.3	0.2	4.6	22	99.6	64
330	6.1	39.8	0.5	4.0	22	99.6	64
331	7.1	38.1	0.4	4.7	22	99.6	64
332	6.8	40.8	0.4	4.5	22	99.6	64

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
333	7.7	41.0	0.5	5.0	22	99.6	63
334	9.5	40.0	0.5	6.2	22	99.6	63
335	7.9	40.6	0.4	5.2	22	99.6	63
336	8.9	40.3	0.3	5.9	22	99.6	63
337	7.0	42.3	0.5	4.6	22	99.6	63
338	8.1	41.7	0.5	5.3	22	99.6	63
339	9.5	41.3	0.3	6.3	22	99.6	63
340	9.2	43.2	0.4	6.1	22	99.6	63
341	8.8	42.8	0.4	5.8	22	99.6	63
342	9.8	44.6	0.4	6.5	22	99.6	63
343	8.0	42.1	0.4	5.3	22	99.6	63
344	7.3	41.3	0.5	4.8	22	99.6	63
345	5.9	41.2	0.4	3.9	22	99.6	63
346	6.1	41.3	0.3	4.0	22	99.6	63
347	7.7	40.6	0.4	5.1	22	99.6	63
348	8.2	40.6	0.3	5.4	22	99.6	63
349	8.7	40.3	0.3	5.7	22	99.6	63
350	11.9	41.8	0.3	7.9	22	99.6	63
351	11.2	41.4	0.4	7.4	22	99.6	64
352	8.5	43.9	0.2	5.6	22	99.6	64
353	7.0	42.5	0.2	4.6	22	99.6	64
354	6.9	40.8	0.4	4.5	22	99.6	64
355	8.3	41.4	0.3	5.4	22	99.6	64
356	7.9	41.1	0.3	5.2	22	99.6	64
357	8.6	40.5	0.4	5.7	22	99.6	65
358	5.1	39.8	0.4	3.4	22	99.6	65
359	6.4	40.3	0.3	4.2	22	99.6	65
360	5.1	39.8	0.3	3.4	22	99.6	65
361	6.5	41.4	0.3	4.3	22	99.6	65
362	10.5	41.2	0.3	6.9	22	99.6	65
363	7.2	41.0	0.3	4.8	22	99.6	65
364	8.1	40.6	0.3	5.3	22	99.6	65
365	8.5	40.6	0.3	5.6	22	99.6	65
366	6.7	39.5	0.2	4.4	22	99.6	65
367	8.3	40.8	0.3	5.5	22	99.6	65
368	7.2	39.9	0.4	4.7	22	99.6	65
369	7.8	40.1	0.3	5.1	22	99.6	68
370	11.5	38.8	0.3	7.6	22	99.6	68
371	11.1	38.9	0.3	7.3	22	99.6	68
372	12.1	38.5	0.4	8.0	22	99.6	68
373	11.9	39.2	0.7	7.8	22	99.6	68
374	10.0	39.0	0.4	6.6	22	99.6	68
375	7.4	40.4	0.4	4.9	22	99.6	66
376	7.6	39.1	0.4	5.0	22	99.6	66
377	4.9	39.2	0.3	3.3	22	99.6	66
378	4.8	39.1	0.4	3.2	22	99.6	66
379	8.8	39.7	0.4	5.8	22	99.6	66
380	5.6	38.9	0.4	3.7	22	99.6	66
381	6.8	40.3	0.4	4.5	22	99.6	67
382	8.0	39.8	0.5	5.3	22	99.6	67
383	8.7	40.4	0.5	5.8	22	99.6	67
384	9.8	42.5	0.5	6.4	22	99.6	67
385	8.6	39.6	0.4	5.7	22	99.6	67
386	9.2	38.6	0.4	6.1	22	99.6	67
387	7.7	36.7	0.3	5.1	23	99.5	74
388	8.8	37.7	0.3	5.8	23	99.5	74
389	9.5	37.1	0.4	6.3	23	99.5	74
390	14.2	38.2	0.5	9.4	23	99.5	74
391	12.5	38.7	0.4	8.2	23	99.5	73
392	13.1	39.1	0.3	8.7	23	99.5	72
393	12.7	37.6	0.4	8.4	23	99.5	72
394	11.3	37.2	0.5	7.4	23	99.5	72
395	10.0	39.8	0.6	6.6	23	99.5	72
396	9.8	37.2	0.5	6.5	23	99.5	72
397	8.9	40.6	0.4	5.9	23	99.5	73
398	10.5	39.8	0.4	6.9	23	99.5	73
399	10.2	39.3	0.4	6.7	23	99.5	73
400	10.0	36.6	0.4	6.6	23	99.5	73
401	9.4	36.7	0.4	6.2	23	99.5	73
402	8.3	39.4	0.3	5.4	23	99.5	73
403	9.0	43.1	0.5	6.0	23	99.5	74
404	12.4	41.0	0.6	8.1	23	99.5	74
405	12.2	38.3	0.6	8.0	23	99.5	74
406	9.6	38.5	0.4	6.3	23	99.5	74
407	7.9	38.5	0.4	5.2	23	99.5	74
408	8.5	37.2	0.5	5.6	23	99.5	74
409	9.7	37.9	0.3	6.4	23	99.5	74
410	10.1	40.2	0.5	6.7	23	99.5	74
411	9.0	39.5	0.4	5.9	23	99.5	74
412	8.5	37.5	0.4	5.6	23	99.5	74
413	5.8	38.4	0.3	3.8	23	99.5	74
414	7.1	40.2	0.3	4.7	23	99.5	74
415	6.0	42.1	0.4	3.9	23	99.5	75

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
416	9.8	38.1	0.3	6.4	23	99.5	75
417	8.2	37.6	0.2	5.4	23	99.5	75
418	8.1	37.9	0.4	5.3	23	99.5	75
419	7.1	36.4	0.5	4.7	23	99.5	75
420	9.0	35.4	0.4	5.9	23	99.5	75
421	9.1	35.1	0.5	6.0	23	99.5	75
422	9.3	36.2	0.4	6.1	23	99.5	75
423	11.8	37.7	0.4	7.8	23	99.5	75
424	11.2	37.2	0.5	7.4	23	99.5	75
425	9.5	37.3	0.5	6.3	23	99.5	75
426	11.2	35.9	0.8	7.4	23	99.5	75
427	8.8	35.5	0.6	5.8	23	99.5	74
428	10.3	35.7	0.4	6.8	23	99.5	74
429	9.6	37.3	0.4	6.3	23	99.5	74
430	9.3	37.3	0.6	6.2	23	99.5	74
431	8.5	35.9	0.4	5.6	23	99.5	74
432	6.5	36.8	0.4	4.3	23	99.5	74
433	7.6	38.1	0.5	5.0	23	99.5	74
434	10.8	36.8	0.5	7.1	23	99.5	74
435	8.3	36.5	0.4	5.5	23	99.5	74
436	5.8	40.1	0.4	3.8	23	99.5	74
437	8.8	39.4	0.5	5.8	23	99.5	74
438	10.5	40.6	0.3	6.9	23	99.5	74
439	9.8	38.3	0.5	6.4	23	99.5	74
440	8.6	41.0	0.6	5.7	23	99.5	74
441	8.6	38.8	0.4	5.7	23	99.5	74
442	9.8	37.6	0.4	6.5	23	99.5	74
443	12.5	37.6	0.5	8.2	23	99.5	74
444	13.7	38.3	0.4	9.0	23	99.5	74
445	12.0	36.9	0.2	7.9	23	99.5	73
446	10.0	38.4	0.2	6.6	23	99.5	72
447	11.1	37.5	0.5	7.3	23	99.5	72
448	11.0	39.1	0.6	7.3	23	99.5	72
449	8.6	43.0	0.4	5.7	23	99.5	72
450	8.9	37.5	0.3	5.9	23	99.5	72
451	9.3	37.0	0.3	6.2	22	99.5	73
452	9.4	36.4	0.3	6.2	22	99.5	74
453	9.8	36.0	0.4	6.4	22	99.5	74
454	11.3	36.1	0.4	7.4	22	99.5	74
455	13.4	36.2	0.5	8.8	22	99.5	74
456	9.7	36.8	0.6	6.4	22	99.5	74
457	6.3	36.2	0.7	4.1	22	99.5	73
458	8.5	37.2	0.5	5.6	22	99.5	73
459	10.0	41.7	0.3	6.6	22	99.5	73
460	8.5	43.5	0.5	5.6	22	99.5	73
461	8.1	38.5	0.4	5.3	22	99.5	73
462	9.5	35.9	0.3	6.2	22	99.5	73
463	13.3	34.8	0.4	8.7	22	99.5	73
464	11.2	34.8	0.4	7.4	22	99.5	73
465	10.9	36.2	0.5	7.2	22	99.5	73
466	11.4	36.5	0.4	7.5	22	99.5	73
467	6.0	35.9	0.5	4.0	22	99.5	73
468	12.3	38.8	0.6	8.1	22	99.5	73
469	11.7	37.9	0.5	7.7	22	99.5	73
470	8.3	40.2	0.5	5.5	22	99.5	73
471	12.3	37.7	0.5	8.1	22	99.5	73
472	12.9	39.5	0.4	8.5	22	99.5	73
473	10.4	40.5	0.4	6.9	22	99.5	73
474	9.8	39.0	0.5	6.4	22	99.5	73
475	10.9	41.7	0.5	7.2	22	99.5	73
476	11.1	40.5	0.5	7.3	22	99.5	73
477	12.1	41.4	0.5	8.0	22	99.5	73
478	10.3	40.2	0.5	6.8	22	99.5	73
479	9.2	38.9	0.6	6.1	22	99.5	73
480	7.8	39.6	0.4	5.1	22	99.5	73
481	9.9	36.4	0.4	6.5	22	99.5	73
482	9.4	36.1	0.4	6.2	22	99.5	73
483	8.1	37.3	0.4	5.3	22	99.5	73
484	8.9	36.8	0.4	5.9	22	99.5	73
485	9.9	35.9	0.5	6.6	22	99.5	73
486	8.0	37.6	0.5	5.3	22	99.5	73
487	10.1	37.8	0.4	6.7	22	99.5	73
488	10.9	35.5	0.4	7.2	22	99.5	74
489	11.5	35.5	0.4	7.6	22	99.5	74
490	10.7	35.4	0.5	7.1	22	99.5	74
491	11.2	36.6	0.4	7.4	22	99.5	74
492	11.4	38.2	0.4	7.5	22	99.5	74
493	9.4	38.2	0.5	6.2	22	99.5	73
494	10.1	36.6	0.5	6.7	22	99.5	73
495	8.5	38.7	0.5	5.6	22	99.5	73
496	8.1	38.6	0.4	5.4	22	99.5	73
497	9.8	35.9	0.4	6.5	22	99.5	73
498	10.0	36.7	0.6	6.6	22	99.5	73

Table E.02 Measurement data - Background

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
499	7.5	36.1	0.5	5.0	22	99.5	73
500	10.8	35.3	0.3	7.1	22	99.5	74
501	8.9	36.2	0.4	5.9	22	99.5	74
502	10.5	38.1	0.4	6.9	22	99.5	74
503	11.2	41.1	0.5	7.4	22	99.5	74
504	10.7	40.0	0.4	7.1	22	99.5	74
505	9.2	40.5	0.5	6.1	22	99.5	73
506	9.0	37.2	0.5	5.9	22	99.5	73
507	8.0	37.4	0.4	5.3	22	99.5	73
508	8.4	41.6	0.4	5.5	22	99.5	73
509	9.4	39.7	0.4	6.2	22	99.5	73
510	9.4	37.4	0.4	6.2	22	99.5	73
511	9.1	37.1	0.5	6.0	22	99.5	73
512	8.8	40.0	0.4	5.8	22	99.5	73
513	8.8	43.2	0.3	5.8	22	99.5	73
514	9.5	43.8	0.4	6.3	22	99.5	73
515	12.0	45.5	0.3	7.9	22	99.5	73
516	10.0	45.4	0.4	6.6	22	99.5	73
517	7.2	44.0	0.5	4.8	22	99.5	73
518	8.0	42.1	0.4	5.3	22	99.5	73
519	11.5	43.5	0.3	7.6	22	99.5	73
520	11.7	42.4	0.4	7.7	22	99.5	73
521	9.4	41.0	0.3	6.2	22	99.5	73
522	12.3	40.1	0.5	8.1	22	99.5	73
523	9.4	42.2	0.4	6.2	22	99.5	73
524	9.8	40.6	0.6	6.5	22	99.5	73
525	8.6	39.9	0.6	5.7	22	99.5	73
526	10.9	41.7	0.7	7.2	22	99.5	73
527	12.7	41.3	0.6	8.4	22	99.5	73
528	10.9	39.2	0.4	7.2	22	99.5	73
529	10.7	37.3	0.5	7.1	22	99.5	73
530	13.4	37.0	0.5	8.8	22	99.5	72
531	12.8	37.4	0.5	8.4	22	99.5	72
532	9.1	38.5	0.5	6.0	22	99.5	72
533	8.6	37.9	0.3	5.6	22	99.5	72
534	9.1	39.3	0.4	6.0	22	99.5	72
535	10.1	40.7	0.3	6.6	22	99.5	72
536	8.6	42.0	0.3	5.7	22	99.5	72
537	11.0	41.3	0.3	7.2	22	99.5	72
538	10.0	42.6	0.4	6.6	22	99.5	72
539	10.3	41.4	0.4	6.8	22	99.5	72
540	9.8	38.0	0.6	6.4	22	99.5	72
541	8.8	36.9	0.6	5.8	22	99.5	72
542	6.4	36.5	0.3	4.2	22	99.5	72
543	5.4	37.0	0.4	3.6	22	99.5	72
544	7.8	37.1	0.5	5.1	22	99.5	72
545	10.4	36.3	0.4	6.9	22	99.5	72
546	7.1	36.1	0.4	4.7	22	99.5	72
547	7.5	37.3	0.4	5.0	22	99.5	72
548	12.3	39.1	0.4	8.1	22	99.5	71
549	13.3	38.9	0.4	8.8	22	99.5	71
550	13.4	39.7	0.5	8.8	22	99.5	71
551	8.8	40.4	0.6	5.8	22	99.5	71
552	11.8	45.4	0.6	7.8	22	99.5	71
553	11.0	46.1	0.5	7.3	22	99.5	71
554	12.1	45.1	0.4	8.0	22	99.5	71
555	9.3	44.0	0.5	6.1	22	99.5	71
556	8.2	42.2	0.4	5.4	22	99.5	71
557	9.3	41.3	0.2	6.2	22	99.5	71
558	10.3	38.7	0.6	6.8	22	99.5	71
559	8.3	38.3	0.6	5.5	22	99.5	71
560	8.3	37.4	0.4	5.5	22	99.5	72
561	12.5	36.4	0.5	8.3	22	99.5	72
562	11.7	36.2	0.5	7.7	22	99.5	72
563	7.0	36.8	0.6	4.6	22	99.5	72
564	7.2	36.5	0.5	4.7	22	99.5	72
565	6.6	35.9	0.3	4.3	22	99.5	72
566	7.1	37.3	0.4	4.7	22	99.5	72
567	5.9	38.9	0.7	3.9	22	99.5	72
568	10.5	42.6	0.7	6.9	22	99.5	72
569	11.5	40.5	0.8	7.6	22	99.5	72
570			0.6	5.0	22	99.5	72
571			0.5	3.6	22	99.5	72
572			0.4	4.5	22	99.5	72
573			0.6	4.1	22	99.5	72
574	5.7	37.6	0.3	3.8	22	99.5	69
575	8.0	38.2	0.4	5.3	22	99.5	69
576	6.1	37.7	0.5	4.0	22	99.5	69
577	4.4	38.8	0.4	2.9	22	99.5	69
578	4.3	38.8	0.3	2.8	22	99.5	69
579	3.8	37.8	0.3	2.5	22	99.5	69
580	2.5	37.8	0.3	1.6	22	99.5	69
581	4.5	37.7	0.4	3.0	22	99.5	69

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
582	5.9	38.3	0.4	3.9	22	99.5	69
583	5.6	37.0	0.4	3.7	22	99.5	69
584	4.9	37.5	0.4	3.2	22	99.5	69
585	4.4	36.6	0.2	2.9	22	99.5	69
586	5.8	36.7	0.2	3.8	22	99.5	69
587	8.3	37.8	0.3	5.5	22	99.5	69
588	7.7	38.1	0.5	5.1	22	99.5	69
589	7.3	43.9	0.4	4.8	22	99.5	69
590	7.2	39.0	0.3	4.7	22	99.5	69
591	8.0	38.5	0.4	5.3	22	99.5	69
592	7.2	39.7	0.4	4.8	22	99.5	69
593	6.8	38.0	0.4	4.5	22	99.5	69
594	5.4	37.7	0.5	3.6	22	99.5	69
595	5.7	37.6	0.5	3.7	22	99.5	69
596	6.5	36.7	0.5	4.3	22	99.5	69
597	9.4	36.3	0.5	6.2	22	99.5	69
598	9.6	36.3	0.4	6.3	22	99.5	69
599	7.2	37.4	0.3	4.7	22	99.5	69
600	5.1	38.4	0.5	3.4	22	99.5	69
601	5.9	37.0	0.5	3.9	22	99.5	69
602	8.5	36.4	0.4	5.6	22	99.5	69
603	7.9	36.6	0.5	5.2	22	99.5	69
604	8.3	37.1	0.5	5.5	22	99.5	69
605	11.1	36.6	0.4	7.3	22	99.5	69
606	9.4	35.6	0.5	6.2	22	99.5	68
607	9.3	36.1	0.4	6.1	22	99.5	68
608	6.6	35.7	0.5	4.4	22	99.5	68
609	6.1	36.6	0.5	4.0	22	99.5	68
610	5.5	37.5	0.5	3.6	22	99.5	68
611	8.1	37.9	0.6	5.4	22	99.5	68
612	8.9	37.9	0.6	5.9	22	99.5	68
613	12.4	42.0	0.5	8.2	22	99.5	68
614	11.7	39.7	0.5	7.7	22	99.5	68
615	11.9	39.9	0.5	7.8	22	99.5	68
616	10.1	38.7	0.4	6.6	22	99.5	68
617	7.4	37.9	0.5	4.9	22	99.5	68
618	9.2	38.3	0.4	6.1	22	99.5	68
619	8.3	37.2	0.5	5.5	22	99.5	68
620	12.3	38.1	0.6	8.1	22	99.5	68
621	12.1	38.2	0.5	8.0	22	99.5	68
622	12.1	36.9	0.4	8.0	22	99.5	68
623	9.5	37.8	0.5	6.3	22	99.5	68
624	7.3	38.6	0.6	4.8	22	99.5	68
625	9.4	39.5	0.5	6.2	22	99.5	68
626	7.8	41.9	0.5	5.2	22	99.5	68
627	7.6	42.4	0.5	5.0	22	99.5	68
628	12.3	39.1	0.5	8.1	22	99.5	68
629	13.7	40.6	0.8	9.0	22	99.5	68
630	14.4	37.0	0.7	9.5	22	99.5	67
631	8.8	38.3	0.6	5.8	22	99.5	67
632	8.1	39.7	0.4	5.3	22	99.5	67
633	8.7	40.8	0.5	5.7	22	99.5	67
634	12.6	42.7	0.7	8.3	22	99.5	67
635	12.1	44.5	0.5	8.0	22	99.5	67
636	9.9	38.7	0.4	6.5	22	99.5	67
637	11.4	39.6	0.5	7.5	22	99.5	67
638	9.8	39.9	0.5	6.5	22	99.5	67
639	8.9	38.9	0.3	5.9	22	99.5	67
640	9.2	40.7	0.4	6.1	22	99.5	67
641	8.2	39.6	0.4	5.4	22	99.5	67
642	8.3	40.1	0.4	5.5	22	99.5	68
643	7.4	39.1	0.3	4.9	22	99.5	68
644	5.7	37.4	0.5	3.8	22	99.5	68
645	6.2	38.1	0.4	4.1	22	99.5	68
646	12.1	36.7	0.5	7.9	22	99.5	68
647	12.6	38.3	0.5	8.3	22	99.5	68
648	11.6	37.7	0.6	7.6	22	99.5	68
649	14.0	43.7	0.6	9.2	22	99.5	68
650	12.2	45.9	0.5	8.0	22	99.5	68
651	12.4	42.6	0.5	8.2	22	99.5	68
652	11.7	46.0	0.7	7.7	22	99.5	68
653	8.9	45.6	0.6	5.8	22	99.5	68
654	9.5	44.8	0.6	6.2	22	99.5	68
655	10.0	43.4	0.3	6.6	22	99.5	68
656	10.6	45.6	0.3	7.0	22	99.5	68
657	7.2	41.2	0.4	4.8	22	99.5	68
658	7.3	42.0	0.5	4.8	22	99.5	68
659	9.4	39.4	0.6	6.2	22	99.5	68
660	13.8	38.9	0.5	9.1	22	99.5	68
661	14.5	39.1	0.7	9.5	22	99.5	68
662	9.6	39.1	0.6	6.3	22	99.5	68
663	11.0	40.5	0.5	7.3	22	99.5	68
664	10.3	41.4	0.5	6.8	22	99.5	68

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
665	11.8	42.1	0.6	7.8	22	99.5	68
666	10.9	43.9	0.6	7.2	22	99.5	68
667	9.3	43.3	0.4	6.2	22	99.5	68
668	10.4	42.5	0.4	6.8	22	99.5	68
669	9.2	40.7	0.5	6.1	22	99.5	68
670	9.6	40.5	0.6	6.3	22	99.5	68
671	7.8	38.5	0.6	5.1	22	99.5	68
672	10.8	40.4	0.6	7.1	23	99.5	69
673	11.0	37.7	0.4	7.2	23	99.5	69
674	11.7	41.3	0.5	7.7	23	99.5	69
675	8.3	40.9	0.5	5.5	23	99.5	69
676	8.6	39.4	0.5	5.6	23	99.5	69
677	10.7	39.7	0.6	7.1	23	99.5	69
678	9.3	40.5	0.7	6.1	23	99.5	69
679	8.8	42.8	0.7	5.8	23	99.5	69
680	9.5	40.9	0.7	6.2	23	99.5	69
681	6.9	40.5	0.6	4.6	23	99.5	69
682	8.2	39.5	0.5	5.4	23	99.5	69
683	7.3	39.5	0.4	4.8	23	99.5	69
684	9.6	37.4	0.4	6.3	23	99.5	69
685	10.9	37.7	0.6	7.2	23	99.5	69
686	8.2	37.3	0.5	5.4	23	99.5	69
687	6.7	39.9	0.5	4.4	23	99.5	69
688	10.2	39.1	0.5	6.7	23	99.5	69
689	10.4	39.1	0.6	6.9	23	99.5	69
690	12.6	42.8	0.3	8.3	23	99.5	68
691	12.2	40.9	0.4	8.0	23	99.5	68
692	9.3	39.0	0.4	6.1	23	99.5	68
693	9.1	41.2	0.5	6.0	23	99.5	68
694	9.8	41.0	0.5	6.5	23	99.5	68
695	11.1	38.3	0.5	7.3	23	99.5	68
696	11.4	37.7	0.5	7.5	23	99.5	68
697	9.4	36.9	0.5	6.2	23	99.5	68
698	9.7	38.6	0.5	6.4	23	99.5	68
699	9.7	37.1	0.5	6.4	23	99.5	68
700	11.5	38.2	0.5	7.6	23	99.5	68
701	14.8	37.6	0.6	9.8	23	99.5	68
702	13.0	36.8	0.5	8.6	23	99.5	68
703	10.4	37.0	0.5	6.9	23	99.5	68
704	8.9	36.8	0.4	5.9	23	99.5	68
705	9.1	43.1	0.4	6.0	23	99.5	68
706	10.4	38.8	0.3	6.8	23	99.5	68
707	9.3	38.0	0.3	6.2	23	99.5	68
708	9.6	38.0	0.5	6.3	23	99.5	68
709	8.2	39.4	0.4	5.4	23	99.5	68
710	7.5	36.7	0.6	5.0	23	99.5	68
711	6.4	36.5	0.5	4.2	23	99.5	68
712	6.1	39.7	0.6	4.0	23	99.5	68
713	8.0	39.6	0.5	5.3	23	99.5	69
714	7.3	39.3	0.5	4.8	23	99.5	69
715	8.8	42.6	0.4	5.8	23	99.5	69
716	7.9	39.9	0.4	5.2	23	99.5	69
717	10.2	39.5	0.3	6.7	23	99.5	69
718	8.9	38.3	0.3	5.9	23	99.5	69
719	9.3	40.5	0.5	6.1	23	99.5	69
720	8.3	38.7	0.6	5.5	23	99.5	68
721	11.6	37.9	0.3	7.7	23	99.5	68
722	7.6	35.8	0.3	5.0	23	99.5	68
723	7.9	36.2	0.2	5.2	23	99.5	68
724	6.6	38.4	0.5	4.4	23	99.5	68
725	7.1	38.0	0.5	4.7	23	99.5	68
726	9.8	38.9	0.5	6.4	23	99.5	69
727	9.1	38.1	0.5	6.0	23	99.5	69
728	10.0	39.9	0.6	6.6	23	99.5	69
729	12.3	39.5	0.5	8.1	23	99.5	69
730	10.6	39.1	0.6	7.0	23	99.5	69
731	10.1	37.9	0.7	6.7	23	99.5	69
732	12.1	38.5	0.6	8.0	23	99.5	68
733	10.4	50.8	0.4	6.8	23	99.5	68
734	9.3	39.5	0.3	6.1	23	99.5	68
735	7.8	38.7	0.3	5.1	23	99.5	68
736	6.9	38.3	0.2	4.6	23	99.5	68
737	6.3	36.5	0.2	4.2	23	99.5	69
738	7.8	37.0	0.3	5.1	23	99.5	69
739	6.3	37.8	0.5	4.2	23	99.5	69
740	5.2	36.8	0.6	3.4	23	99.5	69
741	6.2	37.9	0.4	4.1	23	99.5	69
742	8.9	41.4	0.2	5.9	23	99.5	69
743	9.1	40.5	0.3	6.0	23	99.5	69
744	9.4	41.8	0.4	6.2	23	99.5	69
745	12.2	39.5	0.6	8.0	23	99.5	69
746	11.8	38.5	0.5	7.8	23	99.5	69
747	8.8	38.3	0.2	5.8	23	99.5	69

Table E.02 Measurement data - Background

Project: Grand Renewable Wind Farm - Turbine T60 - IEC 61400-11 Measurement

Report ID: 14284.00.T60.RP5

Created on: 1/23/2018

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
748	10.3	37.1	0.4	6.8	23	99.5	69
749	11.6	37.1	0.6	7.7	23	99.5	68
750	11.0	36.5	0.4	7.3	23	99.5	67
751	11.1	39.2	0.5	7.3	23	99.5	67
752	10.7	41.5	0.6	7.0	23	99.5	67
753	7.9	38.9	0.6	5.2	23	99.5	67
754	9.6	38.7	0.6	6.3	23	99.5	67
755	8.4	39.8	0.4	5.5	23	99.5	68
756	7.1	41.9	0.5	4.7	23	99.5	68
757	10.0	40.3	0.6	6.6	23	99.5	68
758	10.9	38.8	0.4	7.2	23	99.5	68
759	8.6	37.8	0.4	5.7	23	99.5	68
760	6.4	36.2	0.4	4.2	23	99.5	68
761	5.5	36.9	0.3	3.6	23	99.5	68
762	5.9	35.8	0.2	3.9	23	99.5	68
763	6.4	36.3	0.5	4.2	23	99.5	68
764	4.6	36.3	0.5	3.0	23	99.5	68
765	5.7	35.9	0.5	3.8	23	99.5	68
766	9.9	36.0	0.4	6.6	23	99.5	68
767	6.9	38.4	0.3	4.6	23	99.5	68
768	8.0	38.0	0.4	5.3	23	99.5	69
769	6.0	38.1	0.4	4.0	23	99.5	69
770	7.1	37.4	0.5	4.7	23	99.5	69
771	8.8	36.5	0.2	5.8	23	99.5	69
772	8.7	37.7	0.2	5.7	23	99.5	69
773	8.6	39.2	0.4	5.6	23	99.5	68
774	5.7	38.4	0.3	3.8	23	99.5	68
775	9.3	37.0	0.2	6.1	23	99.5	68
776	11.3	37.0	0.4	7.4	23	99.5	68
777	11.3	36.7	0.3	7.5	23	99.5	68
778	6.5	40.0	0.4	4.3	23	99.5	68
779	8.6	46.2	0.3	5.7	23	99.5	68
780	10.6	44.8	0.5	7.0	23	99.5	66
781	9.0	41.3	0.4	5.9	23	99.5	66
782	7.7	42.5	0.4	5.1	23	99.5	66
783	5.2	41.8	0.6	3.4	23	99.5	66
784	4.8	43.2	0.6	3.2	23	99.5	66
785	5.9	42.2	0.6	3.9	23	99.5	67
786	7.2	40.7	0.3	4.8	23	99.5	68
787	6.6	39.6	0.3	4.4	23	99.5	68
788	5.6	38.7	0.2	3.7	23	99.5	68
789	6.0	39.3	0.4	4.0	23	99.5	68
790	5.4	40.6	0.4	3.5	23	99.5	68
791	6.0	39.6	0.4	4.0	23	99.5	68
792	6.3	38.0	0.7	4.2	23	99.5	68
793	6.8	37.0	0.6	4.5	23	99.5	68
794	4.8	38.3	0.7	3.2	23	99.5	68
795	6.6	38.8	0.6	4.4	23	99.5	68
796	6.3	38.4	0.5	4.2	23	99.5	68
797	7.1	40.8	0.3	4.7	23	99.5	68
798	8.1	40.0	0.3	5.4	23	99.5	67
799	7.2	37.5	0.3	4.7	23	99.5	67
800	7.1	37.2	0.4	4.6	23	99.5	67
801	9.9	38.4	0.3	6.5	23	99.5	67
802	11.1	36.9	0.4	7.3	23	99.5	67
803	10.3	37.6	0.2	6.8	23	99.5	67
804	10.1	36.2	0.4	6.7	23	99.5	67
805	10.5	37.5	0.4	6.9	23	99.5	67
806	11.4	37.3	0.7	7.5	23	99.5	67
807	11.1	38.8	0.5	7.3	23	99.5	67
808	9.0	37.9	0.5	6.0	23	99.5	67
809	7.7	38.9	0.6	5.1	23	99.5	67
810	10.0	37.3	0.5	6.6	23	99.5	67
811	8.2	38.0	0.4	5.4	23	99.5	67
812	8.9	38.6	0.3	5.9	23	99.5	67
813			0.3	5.4	23	99.5	67
814			0.6	6.2	23	99.5	67
815			0.5	7.1	23	99.5	67
816			0.5	6.7	23	99.5	67
817			0.6	6.1	23	99.5	67
818			0.6	5.4	23	99.5	67
819			0.5	5.4	23	99.5	67
820			0.4	6.5	23	99.5	67
821			0.5	6.0	23	99.5	68
822			0.5	5.2	23	99.5	68
823			0.6	5.4	23	99.5	68
824			0.5	5.4	23	99.5	68
825			0.4	5.4	23	99.5	68
826			0.3	5.6	23	99.5	68
827			0.3	4.2	23	99.5	68
828			0.6	4.6	23	99.5	68
829			0.3	3.3	23	99.5	68
830			0.3	4.4	23	99.5	68

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
831			0.5	5.4	23	99.5	68
832			0.5	4.6	23	99.5	68
833			0.5	5.5	23	99.5	68
834	5.9	39.6	0.4	3.9	23	99.5	69
835	8.3	38.2	0.4	5.5	23	99.5	69
836	11.0	36.4	0.4	7.3	23	99.5	69
837	11.9	36.2	0.4	7.8	23	99.5	69
838	14.9	35.8	0.4	9.8	23	99.5	69
839	11.9	36.1	0.5	7.9	23	99.5	69
840	10.5	43.1	0.5	6.9	23	99.5	68
841	7.3	43.1	0.5	4.8	23	99.5	68
842	9.0	40.7	0.5	6.0	23	99.5	68
843	7.2	43.0	0.4	4.8	23	99.5	68
844	10.7	36.6	0.4	7.0	23	99.5	68
845	10.9	37.4	0.5	7.2	23	99.5	68
846	7.7	37.8	0.4	5.0	23	99.5	68
847	7.8	39.3	0.4	5.2	23	99.5	68
848	8.4	37.0	0.4	5.5	23	99.5	68
849	8.4	37.7	0.4	5.6	23	99.5	68
850	8.5	37.8	0.3	5.6	23	99.5	68
851	8.8	37.7	0.4	5.8	23	99.5	68
852	11.0	37.7	0.3	7.2	23	99.5	68
853	10.9	37.1	0.2	7.2	23	99.5	68
854	10.5	36.1	0.3	6.9	23	99.5	68
855	8.6	36.3	0.5	5.7	23	99.5	68
856	6.4	37.1	0.5	4.2	23	99.5	68
857	7.2	37.4	0.5	4.8	23	99.5	68
858	8.2	38.0	0.7	5.4	23	99.5	68
859	6.4	37.8	0.6	4.2	23	99.5	68
860	6.7	36.7	0.4	4.4	23	99.5	68
861	8.4	36.4	0.4	5.5	23	99.5	68
862	6.5	37.2	0.6	4.3	23	99.5	68
863	6.1	38.2	0.4	4.0	23	99.5	69
864	5.5	41.3	0.2	3.7	23	99.5	69
865	5.0	40.7	0.2	3.3	23	99.5	69
866	7.8	38.3	0.3	5.1	23	99.5	69
867	11.1	37.2	0.2	7.3	23	99.5	69
868	7.9	37.0	0.1	5.2	23	99.5	69
869	7.5	37.2	0.2	5.0	23	99.5	69
870	8.9	39.4	0.4	5.9	23	99.5	69
871	8.0	38.8	0.5	5.3	23	99.5	69
872	9.3	36.8	0.3	6.2	23	99.5	69
873	12.5	36.4	0.5	8.2	23	99.5	69
874	13.2	36.9	0.6	8.7	23	99.5	69
875	11.8	37.9	0.4	7.8	23	99.5	68
876	9.1	37.8	0.4	6.0	23	99.5	67
877	11.9	38.3	0.5	7.9	23	99.5	67
878	8.0	38.9	0.3	5.3	23	99.5	67
879	8.6	40.2	0.5	5.6	23	99.5	67
880	9.8	38.3	0.4	6.4	23	99.5	67
881	9.4	37.2	0.5	6.2	23	99.5	67
882	11.0	37.9	0.4	7.2	23	99.5	68
883	10.8	36.9	0.5	7.1	23	99.5	68
884	11.3	37.3	0.6	7.5	23	99.5	68
885	11.4	38.2	0.7	7.5	23	99.5	68
886	7.6	37.5	0.6	5.0	23	99.5	68
887	7.7	38.1	0.5	5.1	23	99.5	68
888	9.1	39.1	0.6	6.0	23	99.5	68
889	6.5	40.9	0.4	4.3	23	99.5	68
890	6.0	45.2	0.4	3.9	23	99.5	68
891	10.0	43.1	0.4	6.6	23	99.5	68
892	9.6	43.5	0.5	6.3	23	99.5	68
893	7.9	42.0	0.6	5.2	23	99.5	68
894	8.5	40.9	0.4	5.6	23	99.5	67
895	9.1	38.4	0.4	6.0	23	99.5	67
896	10.7	38.6	0.4	7.1	23	99.5	67
897	4.9	37.2	0.6	3.2	23	99.5	67
898	7.8	38.1	0.5	5.1	23	99.5	67
899	11.8	37.4	0.5	7.8	23	99.5	67
900	11.7	36.9	0.6	7.7	23	99.5	67
901	10.2	37.9	0.5	6.7	23	99.5	67
902	9.6	36.3	0.5	6.4	23	99.5	67
903	8.0	36.4	0.4	5.3	23	99.5	67
904	7.3	37.4	0.5	4.8	23	99.5	67
905	8.2	39.8	0.5	5.4	23	99.5	67
906	8.5	39.4	0.5	5.6	23	99.5	67
907	5.7	37.6	0.5	3.8	23	99.5	67
908	4.9	38.8	0.4	3.3	23	99.5	67
909	4.2	39.0	0.4	2.8	23	99.5	67
910	6.6	40.1	0.3	4.3	23	99.5	67
911	8.3	38.5	0.4	5.5	23	99.5	67
912	8.6	40.1	0.5	5.6	23	99.5	67
913	7.6	38.1	0.5	5.0	23	99.5	67

***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
914	7.0	38.2	0.5	4.6	23	99.5	67
915	6.9	38.4	0.5	4.5	23	99.5	67
916	7.1	37.9	0.5	4.7	23	99.5	67
917	5.1	39.5	0.6	3.3	23	99.5	67
918	5.3	39.7	0.4	3.5	23	99.5	67
919	6.2	39.6	0.4	4.1	23	99.5	67
920	9.7	38.3	0.2	6.4	23	99.5	67
921	9.3	38.5	0.3	6.1	23	99.5	67
922	5.9	38.6	0.4	3.9	23	99.5	67
923	6.3	37.4	0.4	4.2	23	99.5	67
924	7.7	38.6	0.5	5.1	23	99.5	67
925	5.4	37.1	0.5	3.6	23	99.5	67
926	9.2	37.0	0.6	6.0	23	99.5	67
927	10.0	38.5	0.6	6.6	23	99.5	67
928	9.5	42.1	0.8	6.2	23	99.5	67
929	10.6	45.4	0.7	7.0	23	99.5	67
930	8.8	46.4	0.5	5.8	23	99.5	67
931	9.3	47.6	0.3	6.1	23	99.5	67
932	5.5	47.1	0.4	3.6	23	99.5	67
933	5.6	46.8	0.5	3.7	23	99.5	68
934	6.4	46.7	0.4	4.2	23	99.5	68
935	7.0	46.4	0.3	4.6	23	99.5	68
936	11.4	45.8	0.5	7.5	23	99.5	68
937	9.6	47.0	0.4	6.3	23	99.5	68
938	7.5	41.9	0.4	4.9	23	99.5	68
939	8.2	39.9	0.6	5.4	23	99.5	67
940	9.3	40.5	0.4	6.1	23	99.5	67
941	9.5	42.3	0.3	6.3	23	99.5	67
942	10.6	41.3	0.2	7.0	23	99.5	67
943	10.3	38.8	0.5	6.8	23	99.5	67
944	8.7	37.6	0.6	5.8	23	99.5	67
945	9.5	36.7	0.4	6.3	23	99.5	67
946	8.9	36.4	0.4	5.9	23	99.5	67
947	8.9	38.2	0.4	5.8	23	99.5	67
948	7.3	38.5	0.3	4.8	23	99.5	67
949	5.4	38.9	0.3	3.6	23	99.5	67
950	5.7	38.7	0.4	3.8	23	99.5	67
951	2.8	37.8	0.3	1.9	23	99.5	68
952	6.2	39.8	0.3	4.1	23	99.5	68
953	4.7	38.6	0.3	3.1	23	99.5	68
954	3.0	37.6	0.3	1.9	23	99.5	68
955	7.7	38.3	0.4	5.1	23	99.5	68
956	9.4	39.4	0.6	6.2	23	99.5	68
957	12.7	38.9	0.5	8.4	23	99.5	68
958	12.1	38.9	0.4	8.0	23	99.5	68
959	11.6	38.4	0.4	7.7	23	99.5	68
960	6.5	35.7	0.4	4.3	23	99.5	68
961	5.1	37.0	0.4	3.3	23	99.5	68
962	5.2	37.0	0.5	3.4	23	99.5	68
963	7.3	36.4	0.4	4.8	23	99.5	67
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aercoustics

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 1M4

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix F
Note on anemometer position with IEC 61400-11 Ed 2.1 and Ed 3.0

Note N6.040.17

Note on anemometer position with IEC 61400-11 editions 2.1 and 3.0

Author: Bo Søndergaard

Project number: 35.6539.01
Date: 7/11/2017
Project manager: Bo Søndergaard
Controlled by: -

To : Aercoustics Engineering Limited
Att.: Payam Ashtiani

From : Bo Søndergaard

1. Purpose

In the capacity of convenor for Maintenance Team 11, the workgroup in charge of IEC 61400-11, since 2006, I have been asked to provide background information, and comment on the consequences of changing the anemometer position when going from edition 2.1 to edition 3, and the recommended method for using measurements based on edition 2.1 for an analysis with edition 3.

2. Comment

There are several differences between IEC 61400-11 standard edition 2.1 (November 2006) and edition 3.0 (November 2012). In particular, the general data treatment procedures for noise levels, and the tonality assessment were changed to keep up with the changes in wind turbine design at the time.

However, since edition 1.0 (1998), very few changes have been made to the IEC 61400-11 standard with respect to the measurement setup. In edition 1.0 the prescribed position of the anemometer was upwind (2 to 4 rotor diameters) as it was allowed to use the anemometer for determination of the standardized wind speed with the wind turbine running. At that time the distances were smaller and this setup is maintained in Annex F on small wind turbines in edition 3. Editions 2.0 and 2.1, still allowed such use of the anemometer

In Germany, modified versions of IEC 61400-11 edition 2 were introduced by the FGW. In revision 15 (from 2004), using the power for determination of the standardized wind speed was mandatory. In revision 16 (from 2005), it was stated that the position of the anemometer can deviate from the requirements in IEC 61400-11 edition 2, without specifying position requirements. Germany has had a strong influence on the development of the IEC 61400-11 standard through the experience from several measuring companies and German authorities. The decision to allow alternative positions for the anemometer is very representative of the situation. It is difficult to set up general requirements for the position of the anemometer that works at all sites. As such, it makes sense to allow for an expert

Sweco
Dusager 12
DK-8200 Aarhus
Danmark

Telephone +45 72 20 72 07
Fax +45 82 10 51 55
www.sweco.dk

Sweco Danmark A/S
Reg.no 48233511
Reg. office: Glostrup

Bo Søndergaard

Telephone direct +45 82 10 51 49
Mobile +45 27 23 51 49
bo.sondergaard@sweco.dk

judgement on the anemometer position in a given situation. In the Danish regulations, it is stated that the anemometer has to be close to the wind turbine in a position where neither the wind turbine nor objects in the terrain is expected to influence the wind speed measurements.

The German and Danish considerations on the position of the anemometer is based on the fact that the dominating background noise at the microphone position can be more or less dependent on wind speed; and can be generated by vegetation upwind, downwind or to the side of the wind turbine. This is often reflected in background noise with a weak dependence on wind speed.

Maintenance Team 11, responsible for revising IEC 61400-11, discussed this issue and there was a strong support from the measurement institutes for using the nacelle anemometer for background noise measurements. In most cases, this would give a reasonable correlation between wind speed and background noise. The nacelle anemometer is not influenced by terrain and represents, to a reasonable degree, the wind in the surroundings. However, the manufacturers argued that the nacelle anemometer might not be a part of future designs and could not be guaranteed. There was a general agreement that it was difficult to decide on an optimum position, but in most cases, downwind and to the side would make sense, resulting in Figure 5 of edition 3.0. The position of the anemometer is not considered an important issue and the wording is “guidance” and “acceptable” and not a stronger wording like “shall”. This is a deliberate decision by the Maintenance Team 11 to ensure flexibility when other choices make more sense.

The recommended method when using measurements made according to IEC 61400-11 edition 2.1 for analysis with IEC 61400-11 edition 3.0 is to use the nacelle anemometer for the background noise. This will work well in most cases. Alternatively, to use the measured wind speed at 10 m height if there is no strong influence from the background noise (e.g. when signal to noise ratio is better than 6 dB).

SWECO Danmark A/S

Bo Søndergaard

Bo Søndergaard

Acoustica

Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 0G1

Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

End of Report