

REPORT ID: **15427.00.T16.RP3**

East Durham Wind Energy Centre – Turbine T16 IEC 61400-11 Edition 3.0 Measurement Report

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Revision History

Revision Number	Description	Date
1	Issued Edition 2.1 test report	2016/08/16
2	Issued Edition 3.0 test report	2017/11/07
3	Update to Section 4.1 – Microphone location Deviation	2019/07/02

This report in its entirety, including appendices contains 82 pages.

Statement 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 East Durham Wind LP to conduct an acoustic measurement of turbine T16 at the East Durham Wind Energy Centre. 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 T16.

2 Wind Turbine Information

2.1 Wind turbine equipment specific information

Wind turbine specific equipment information for turbine T16 was provided by East Durham Wind LP and is summarized in Tables 1 – 5.

Table 1 - Wind Turbine Details

Wind Turbine Details	
Manufacturer	GE
Model Number	1.6 ESS
Turbine ID	16133871

Table 2 - Operating Details

Operating Details	
Vertical or Horizontal axis wind turbine	HORIZONTAL
Upwind or downwind rotor	UPWIND
Hub height	80m
Horizontal distance from rotor centre to tower axis	4100mm
Diameter of rotor	100m
Tower type (lattice or tube)	TUBE
Passive stall, active stall, or pitch controlled turbine	PITCH CONTROLLED
Constant or variable speed	VARIABLE
Power curve	OEM Power Curve
Rotational speed at each integer standardised wind speed	9.75 to 16.7 rpm @ 3 to 11 m/s, respectively
Rated power output	1.6 MWs
Control software version	44.75.09

Table 3 - Rotor Details

Rotor Details	
Rotor control devices	ADVANCED LOAD CONTROL
Presence of vortex generators, stall strips, serrated trailing edges	NO VORTEX STRIPS, DOES HAVE SERRATED TRAILING EDGES
Blade type	LM Glassfiber 48.7P
Serial number	138, 139, 140
Number of blades	3

Table 4 - Gearbox Details

Gearbox Details	
Manufacturer	Bosch Rexroth
Model number	GPV457.1 PALL 60 Hz
Serial number	737000003594

Table 5 - Generator Details

Generator Details	
Manufacturer	GE Vietnam Co.
Model number	109W3457P001
Serial number	WTG-1404-128

2.2 Wind Turbine Location

Turbine T16 is located in the municipality of West Grey, Ontario and is located approximately 925m East of Boot Jack Ranch Road and 451m South of Grey Road 4. The area surrounding T16 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 T16 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	2625197
Pre-amplifier	B&K 2671	2614901
Acoustic calibrator	B&K 4231	1807640

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 utilized from the yaw position from turbine T16. Data for background measurements was obtained from a 10m high anemometer, which was placed as per guidelines outlined in IEC-61400-11.

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 157m 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 T16. 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 monitoring 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 T16 were taken, the surrounding land covered with medium height grass. 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
June 8, 2016	Turbine ON	1:30pm	2:10pm
	Background	2:22pm	2:58pm
	Turbine ON	3:08pm	3:39pm
	Background	3:46pm	4:16pm
	Turbine ON	4:23pm	4:53pm

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 T16's power curve (as per the standard), while wind direction was provided by T16's yaw position. Background data was obtained from an anemometer located 10m above ground level near T16.

Temperature and pressure readings during the measurement period were provided by the 10m anemometer, located near turbine T16 for the duration of Aeroacoustics 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 Aeroacoustics data acquisition system.

4 Measurement Results

4.1 Deviations from IEC-61400-11 Edition 3.0

The IEC 61400-11 standard specifies that the horizontal distance R_0 from the wind turbine vertical centerline to the microphone position should be 130m with a tolerance of $\pm 20\%$. A nearby tree line is located at approximately 113m from the test turbine. To minimize the influence from background noise from the tree line on the measured sound levels the microphone was placed at a distance of 157m from the wind turbine vertical centerline.

This is considered a minor deviation from IEC 61400-11 Edition 3.0 standard and has been accounted for in the slant distance calculation R_1 used to estimate the sound power values for Turbine T16.

4.2 Special Notes & Considerations

T17 was parked for the duration of the test at T16.

4.3 Analysis Details

The following section outlines analysis of the measurement data acquired for T16. 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	50.3	21	46.0	12	48.6*
7.5	51.7	38	46.1	10	50.4*
8	52.9	31	46.1	14	51.9
8.5	53.4	22	47.3	10	52.3
9	54.1	16	47.9	43	52.9
9.5	54.4	40	47.7	25	53.3
10	54.4	48	48.2	25	53.2
10.5	54.5	26	47.8	13	53.5
11	54.4	17	49.1	10	53.1*

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

4.6 Sound Power Level of Turbine

The calculated sound power level of the turbine T16 (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	98.7*	1.2
7.5	100.5*	1.1
8	102.0	0.9
8.5	102.4	1.0
9	103.0	1.0
9.5	103.4	0.9
10	103.3	1.0
10.5	103.5	1.0
11	103.1*	1.1

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

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

Wind Speed (m/s)	Apparent L_{WA} , (dBA)	Uncertainty (dB)
5	98.3*	1.2
6	102.1	1.0
7	103.3	1.0
8	103.4*	1.0

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

4.7 Tonality Analysis

The tonality analysis for Turbine T16 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 (%)
7	525	-2.3	0.1	17	21	81%
8	608	-3.8	-1.4	20	31	65%
8.5	267	-4.5	-2.4	21	22	95%
	617	-1.9	0.5	19	22	86%
9	135	-4.0	-2.0	15	16	94%
	617	-2.0	0.4	13	16	81%
9.5	136	-1.1	0.9	36	40	90%
	271	-1.8	0.2	29	40	73%
	610	0.9	3.3	24	40	60%
	1267	-5.4	-2.3	22	40	55%
	1814	-4.8	-1.3	19	40	48%
10	138	-2.3	-0.2	44	48	92%
	275	-3.5	-1.4	37	48	77%
	613	-0.3	2.1	15	48	31%
	646	-1.6	0.9	22	48	46%
	1290	-4.9	-1.8	19	48	40%
10.5	137	-1.3	0.7	25	26	96%
	272	-2.3	-0.2	20	26	77%
	628	-1.5	1.0	24	26	92%
11	139	-1.6	0.4	17	17	100%
	277	-4.1	-2.0	16	17	94%
	627	-1.0	1.4	13	17	76%

*Denotes masking noise is influenced by background

5 Closure

Measurements and analysis were carried on Turbine T16 of the East Durham Wind Energy Centre, located in the municipality of West Grey 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”.

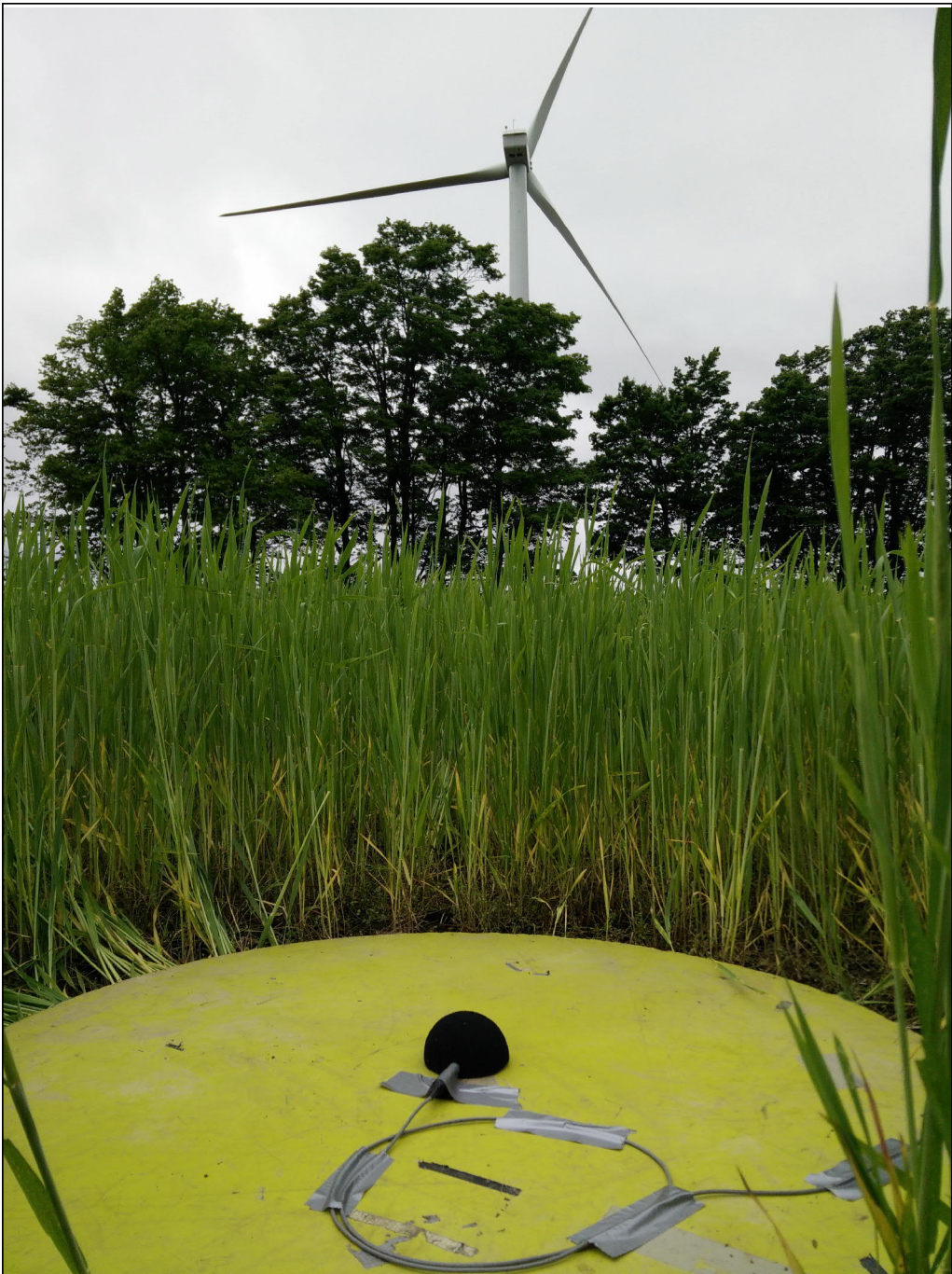
Appendix A Site Details



Legend

- East Durham T16
- 📌 East Durham Turbine

	15427.00.T16.RP3	Project Name East Durham Wind Energy Centre - Turbine T16 - IEC61400-11 Edition 3.0	Figure A.01
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 21, 2017 Revision: 1	Figure Title Site Plan	



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Project Name



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 Reviewed by: PA
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 Revision: 1

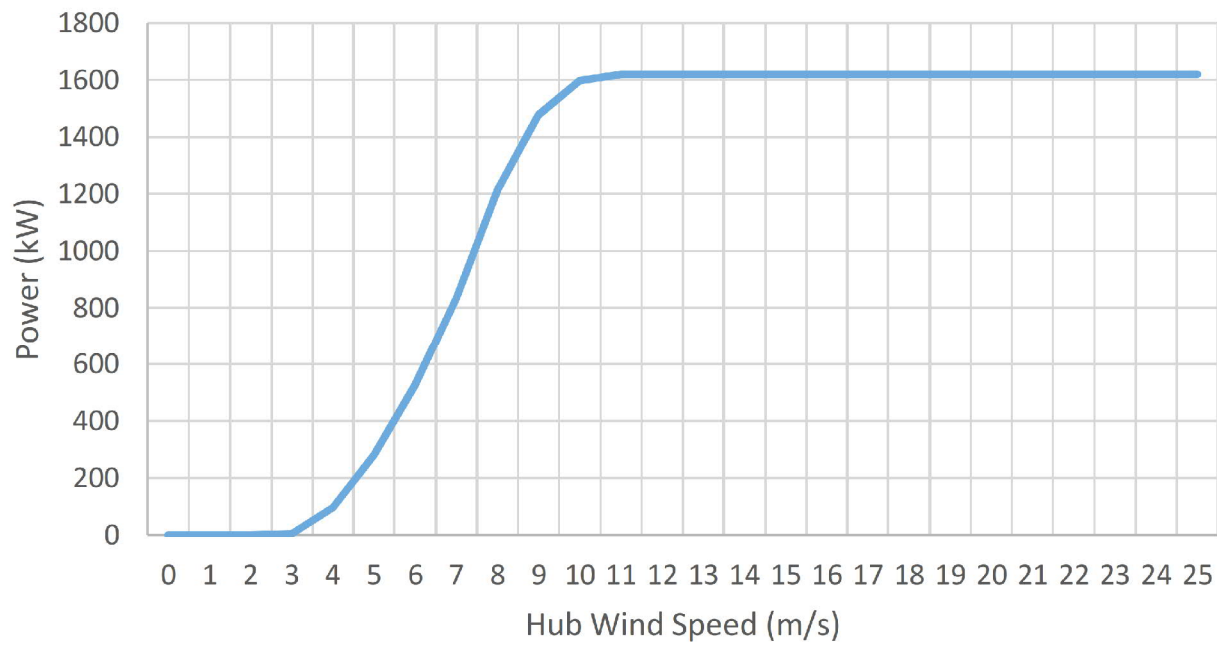
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Figure Title

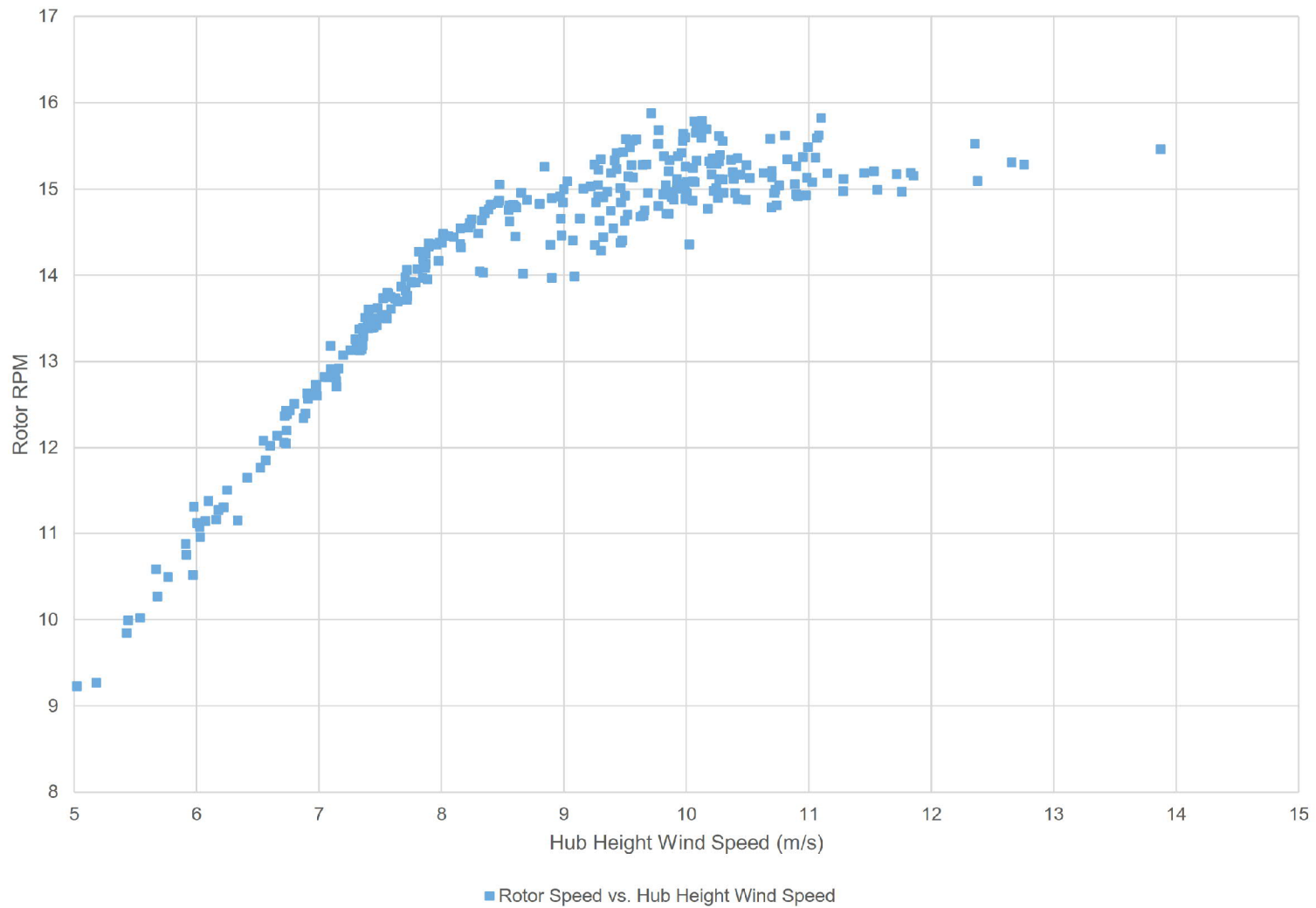
Site Photos

Figure A.02

Appendix B Turbine Information



Power Curve	
Hub Wind Speed (m/s)	Power [kW]
0	0
1	0
2	0
3	4
4	97
5	280
6	526
7	835
8	1216
9	1478
10	1597
11	1620
12	1620
13	1620
14	1620
15	1620
16	1620
17	1620
18	1620
19	1620
20	1620
21	1620
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23	1620
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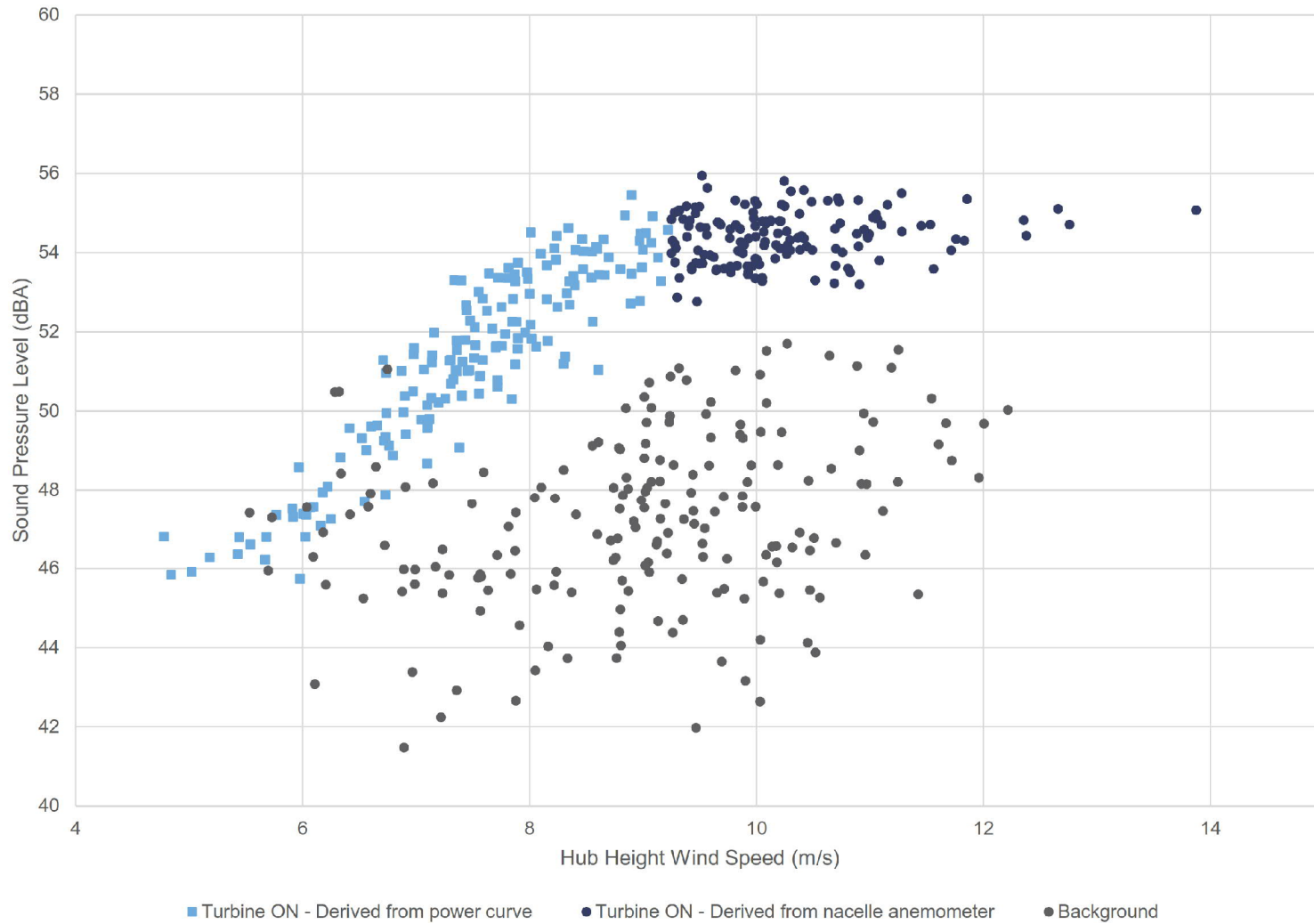
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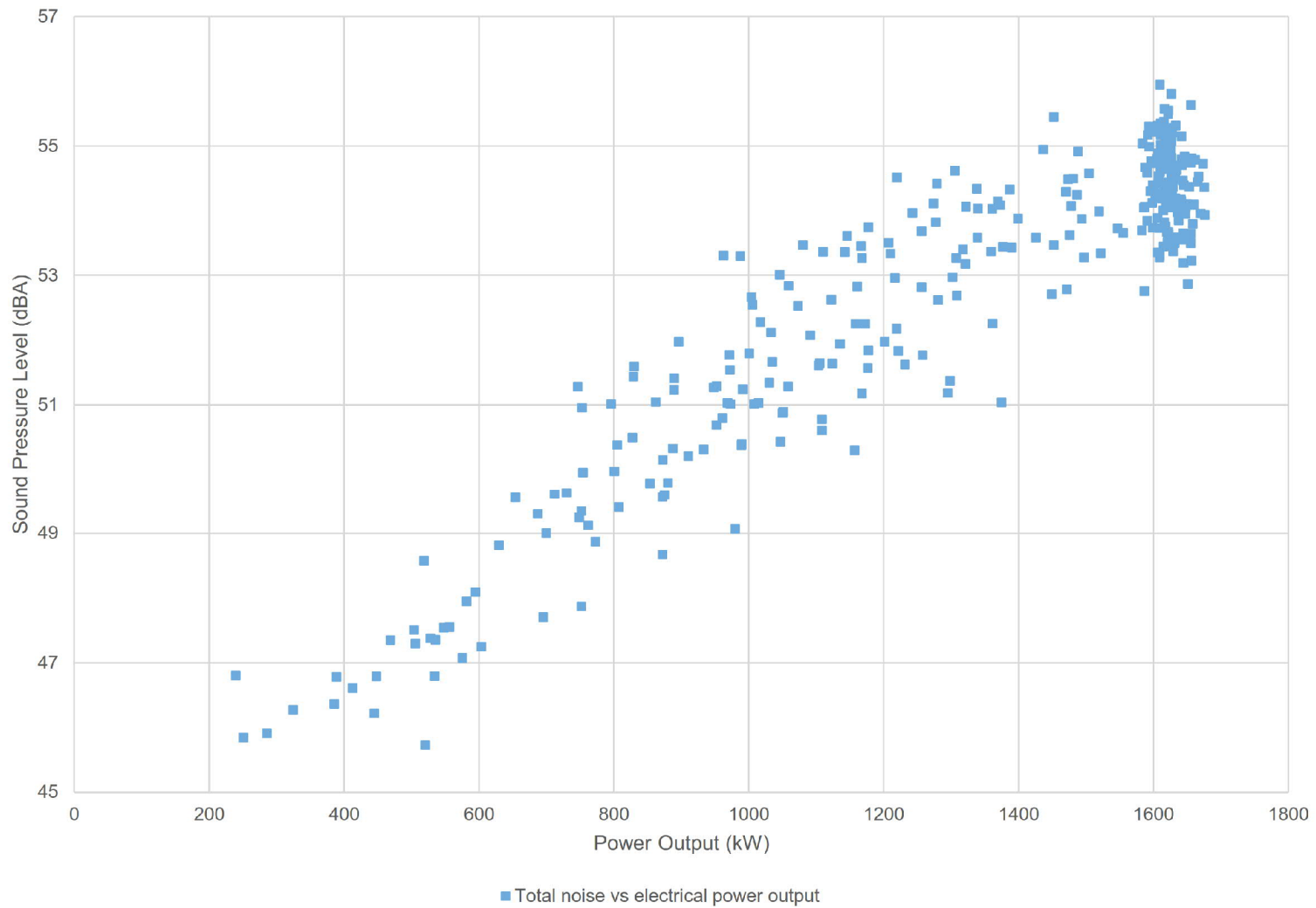
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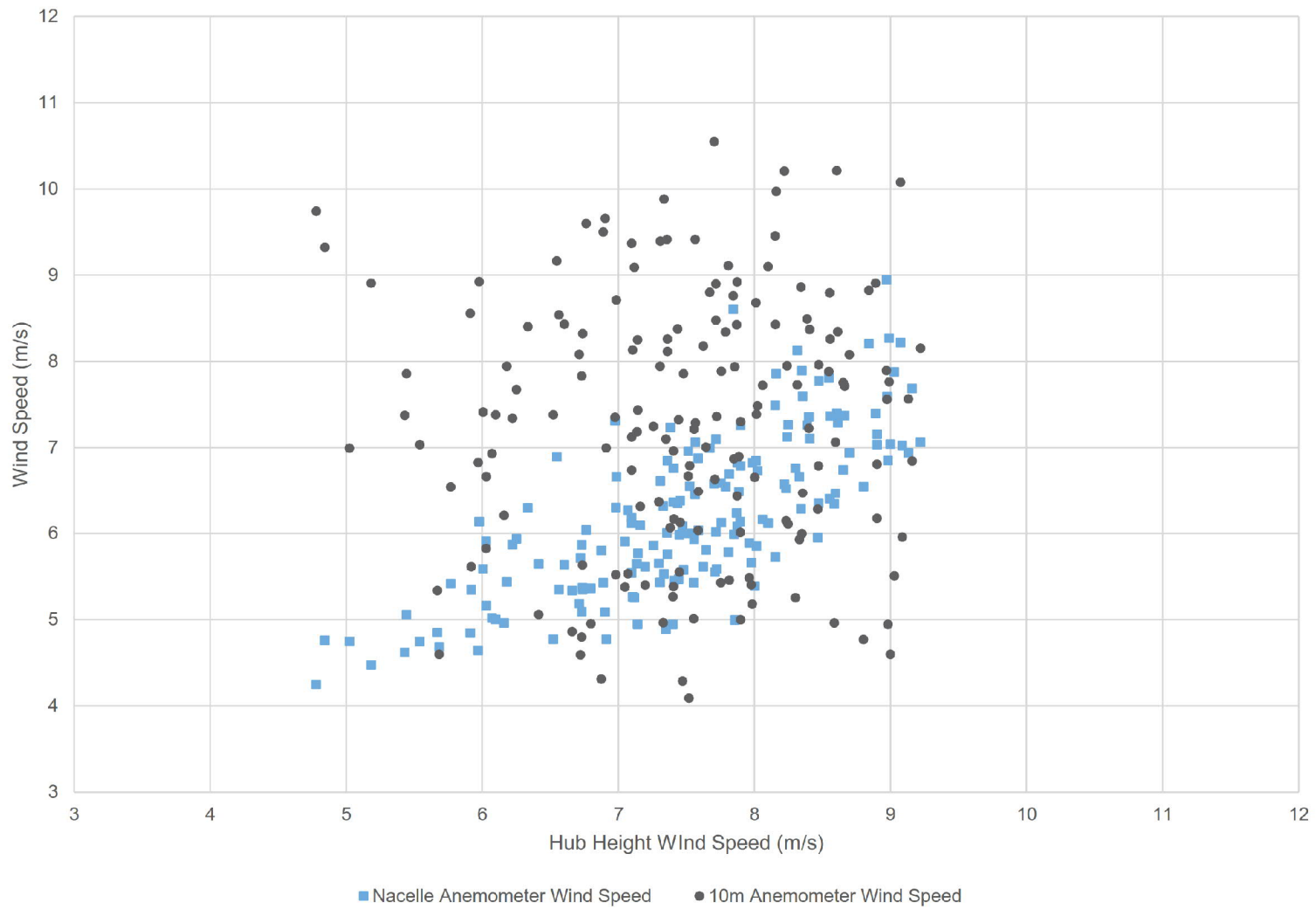
Rotor RPM vs. wind speed

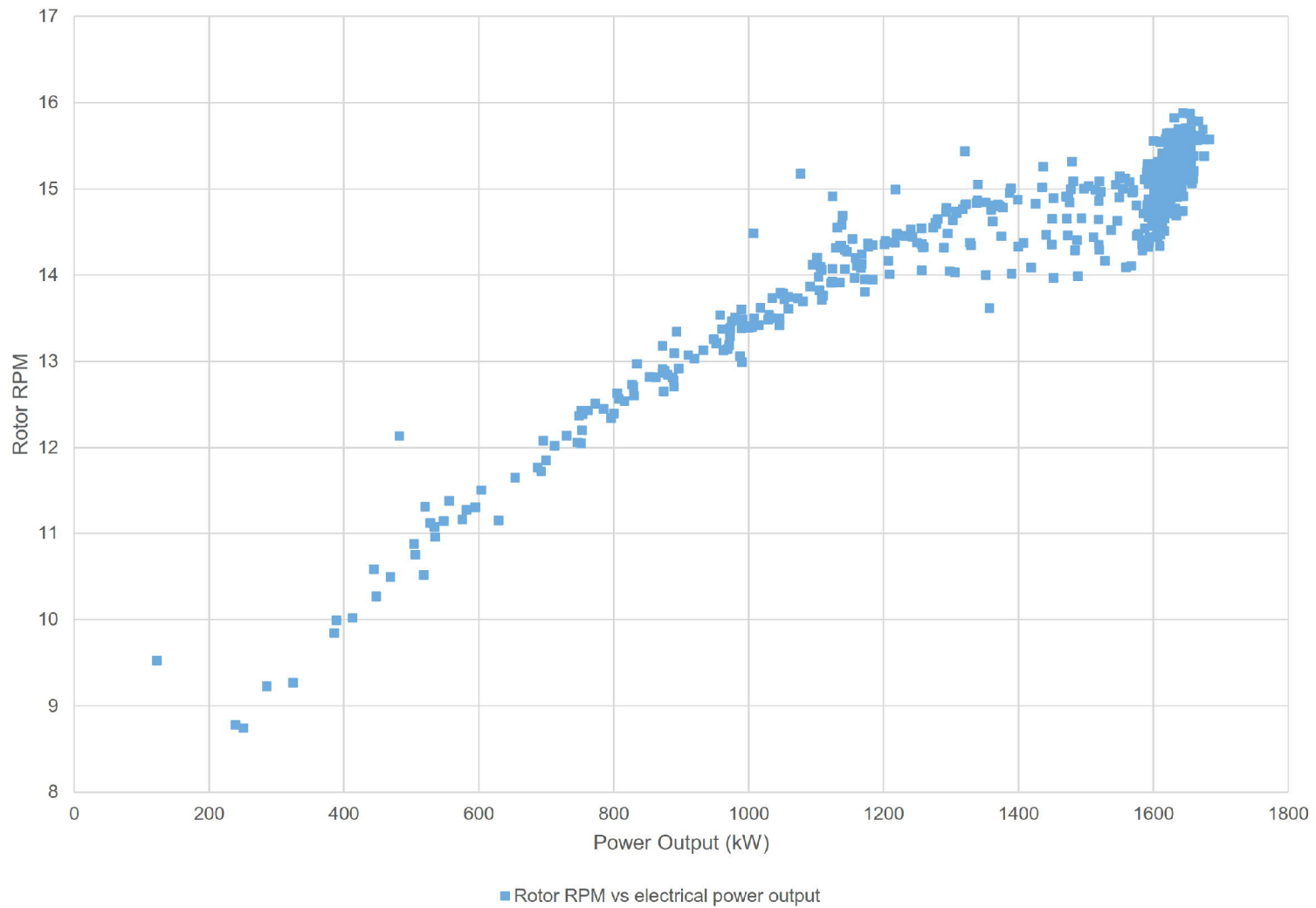
Figure B.02

Appendix C Apparent Sound Power Level

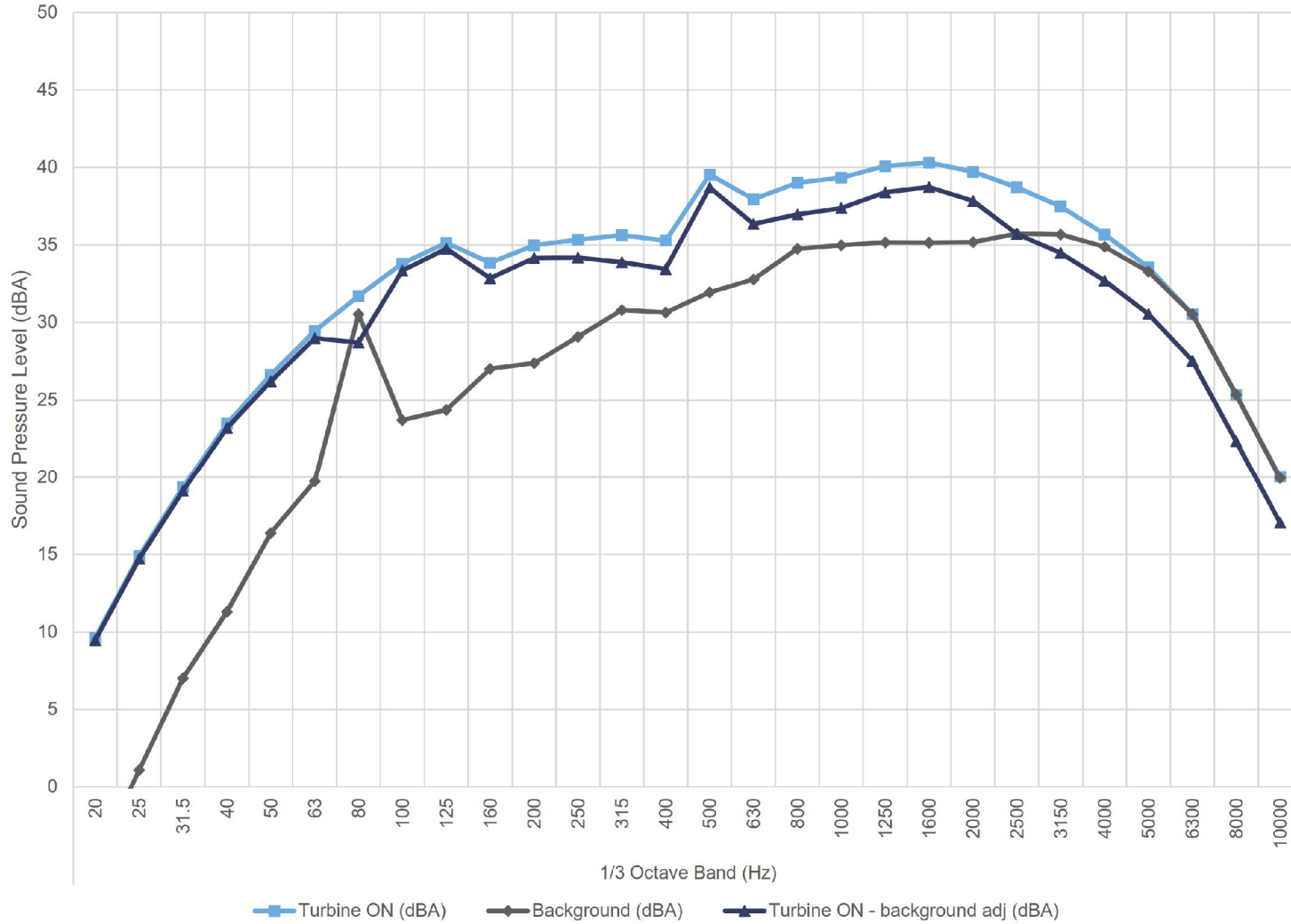








7.0 m/s - Hub Height



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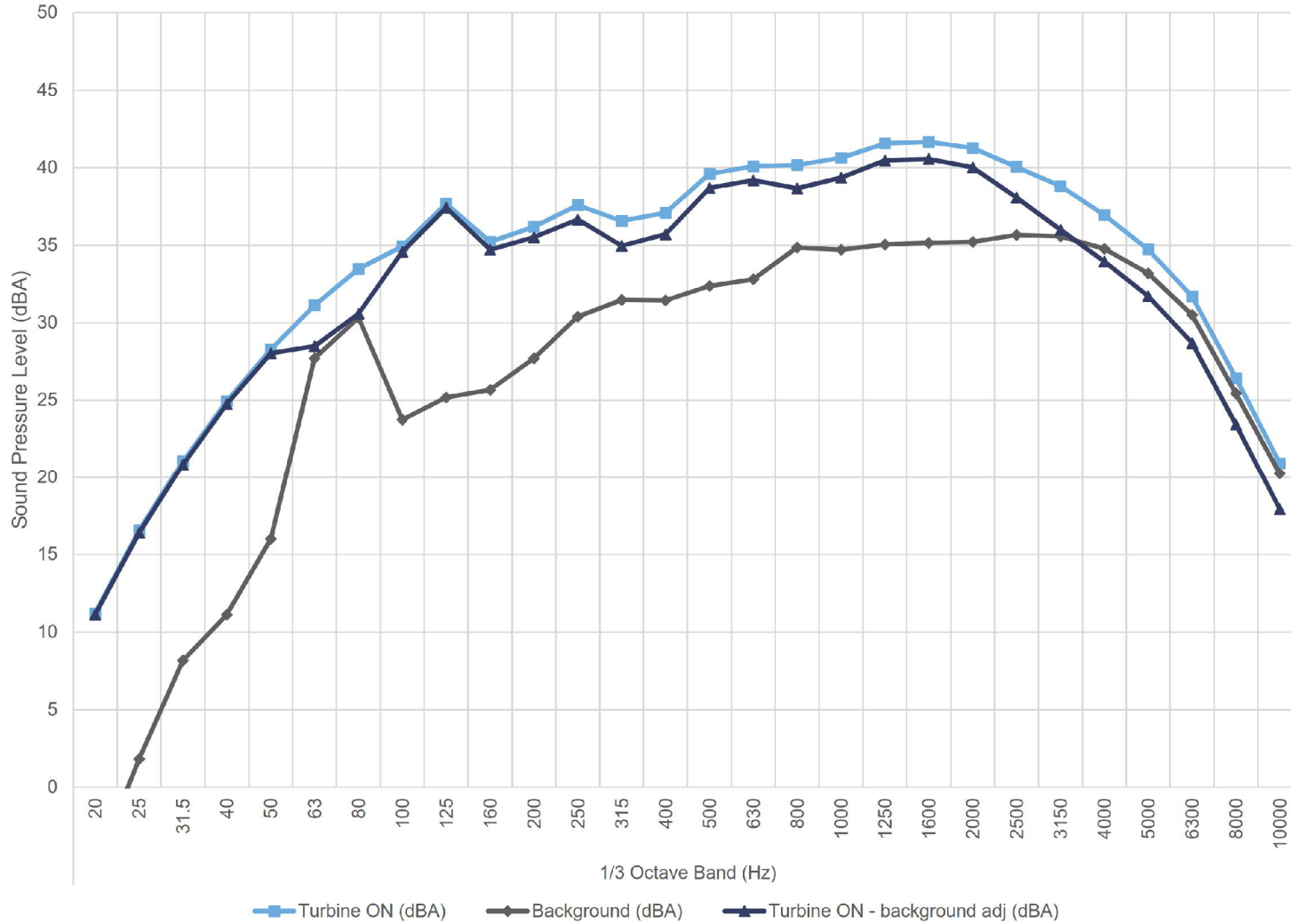
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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 7 m/s

Figure C.05

7.5 m/s - Hub Height



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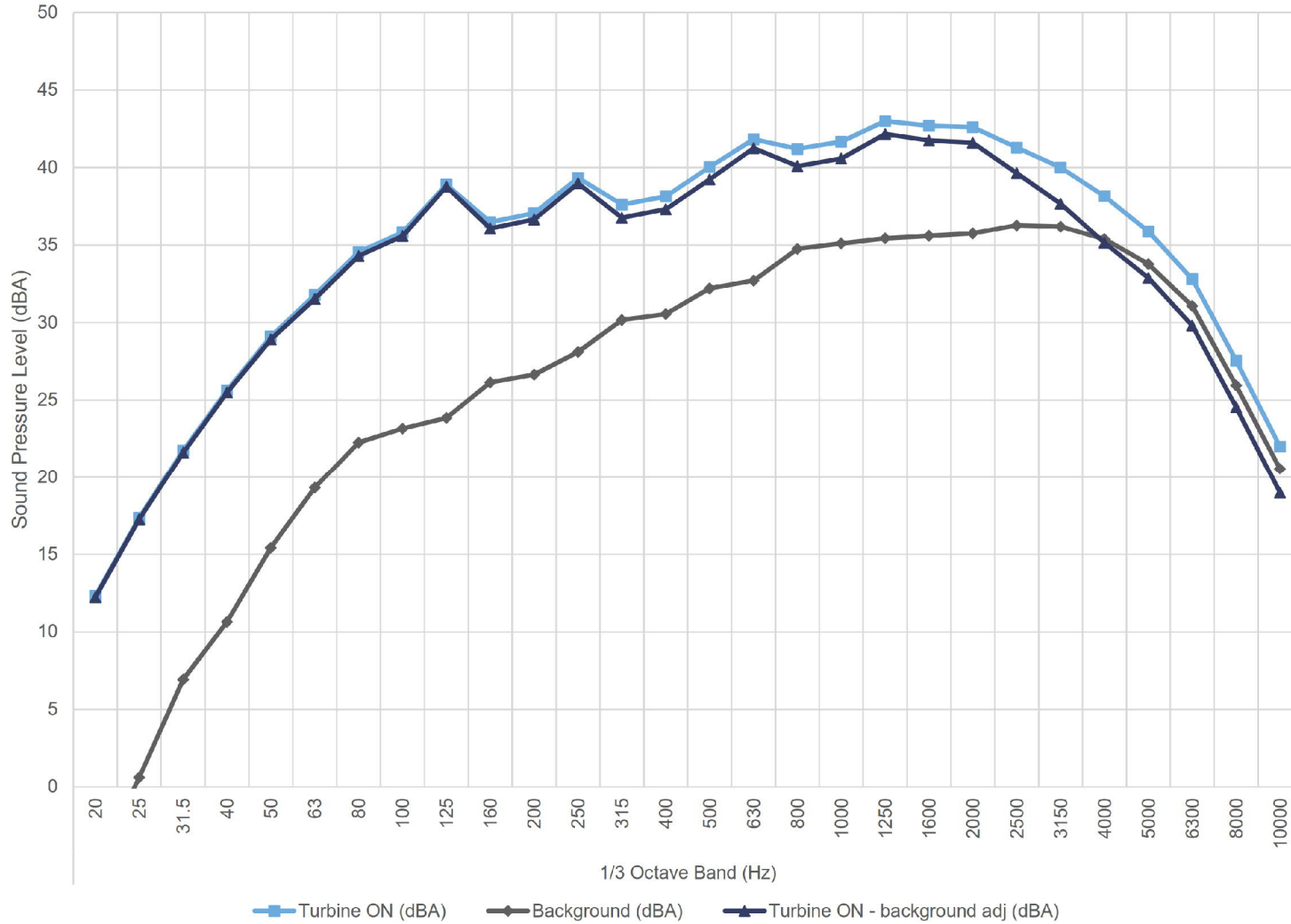
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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 7.5 m/s

Figure C.06

8.0 m/s - Hub Height



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 Date: Sept 21, 2017
 Revision: 1

Project Name

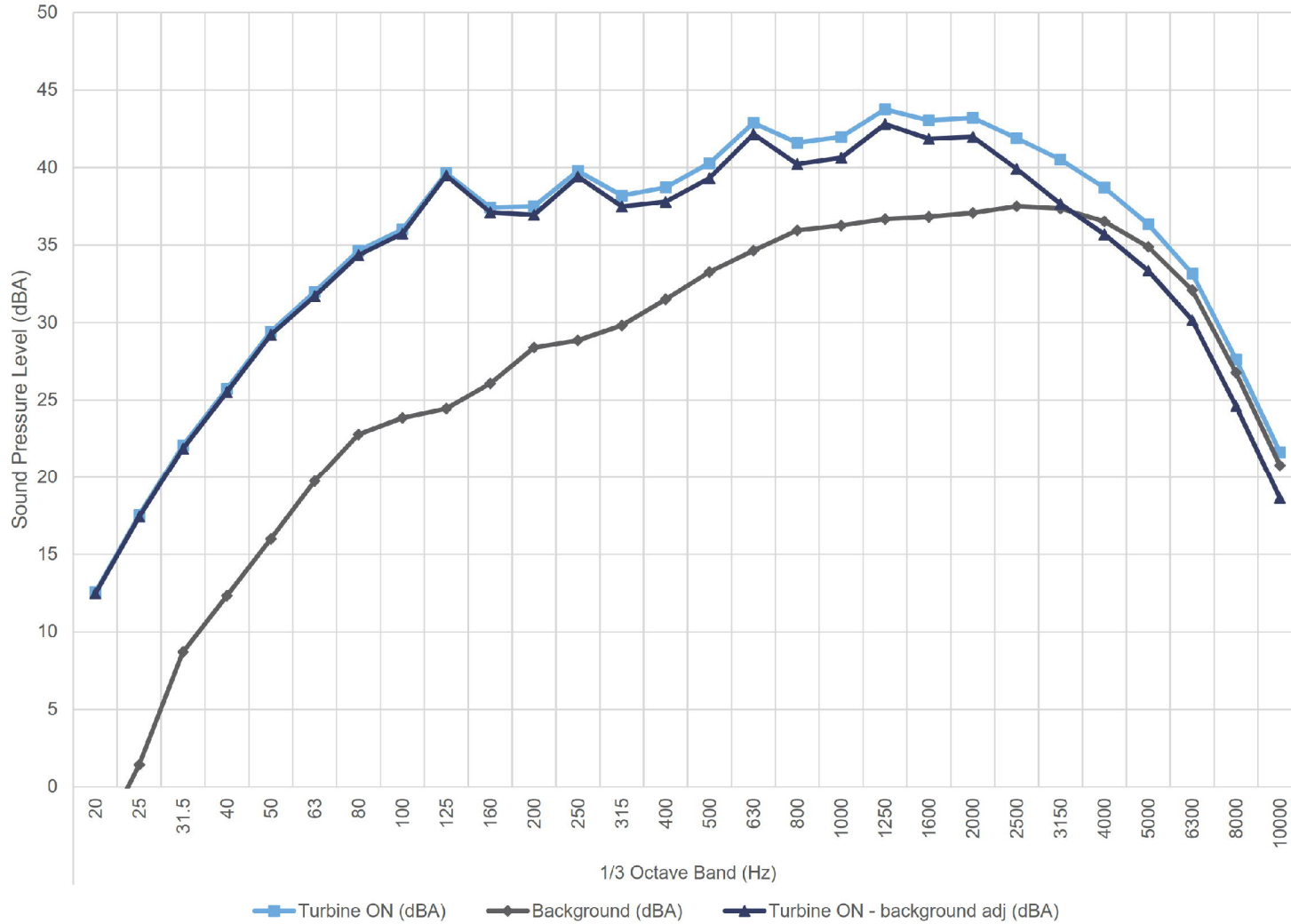
East Durham Wind Energy Centre - Turbine T16 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 8 m/s

Figure C.07

8.5 m/s - Hub Height



15427.00.T16.RP3

Scale: NTS
 Drawn by: AM
 Reviewed by: PA
 Date: Sept 21, 2017
 Revision: 1

Project Name

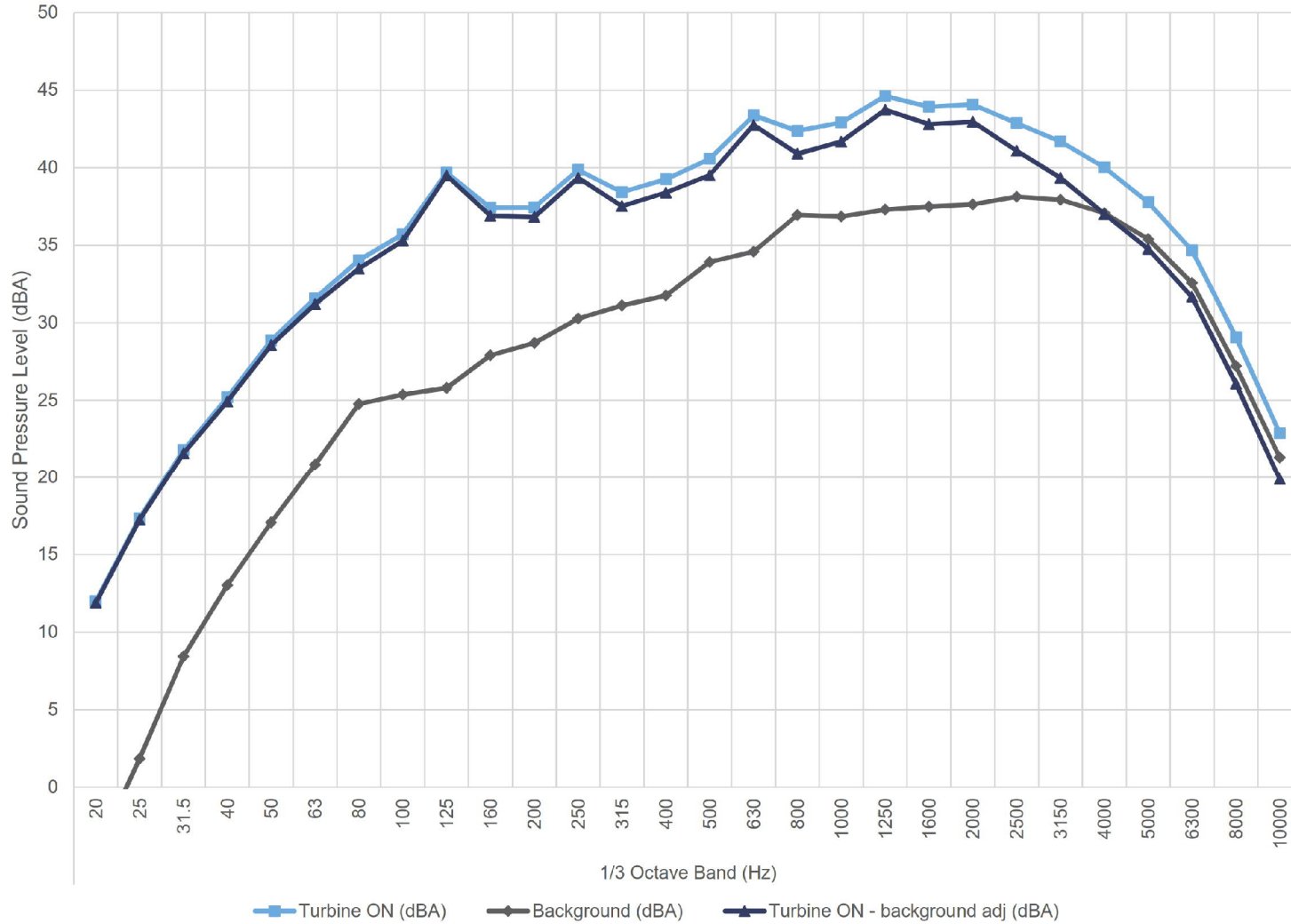
East Durham Wind Energy Centre - Turbine T16 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 8.5 m/s

Figure C.08

9.0 m/s - Hub Height



15427.00.T16.RP3

Scale: NTS
 Drawn by: AM
 Reviewed by: PA
 Date: Sept 21, 2017
 Revision: 1

Project Name

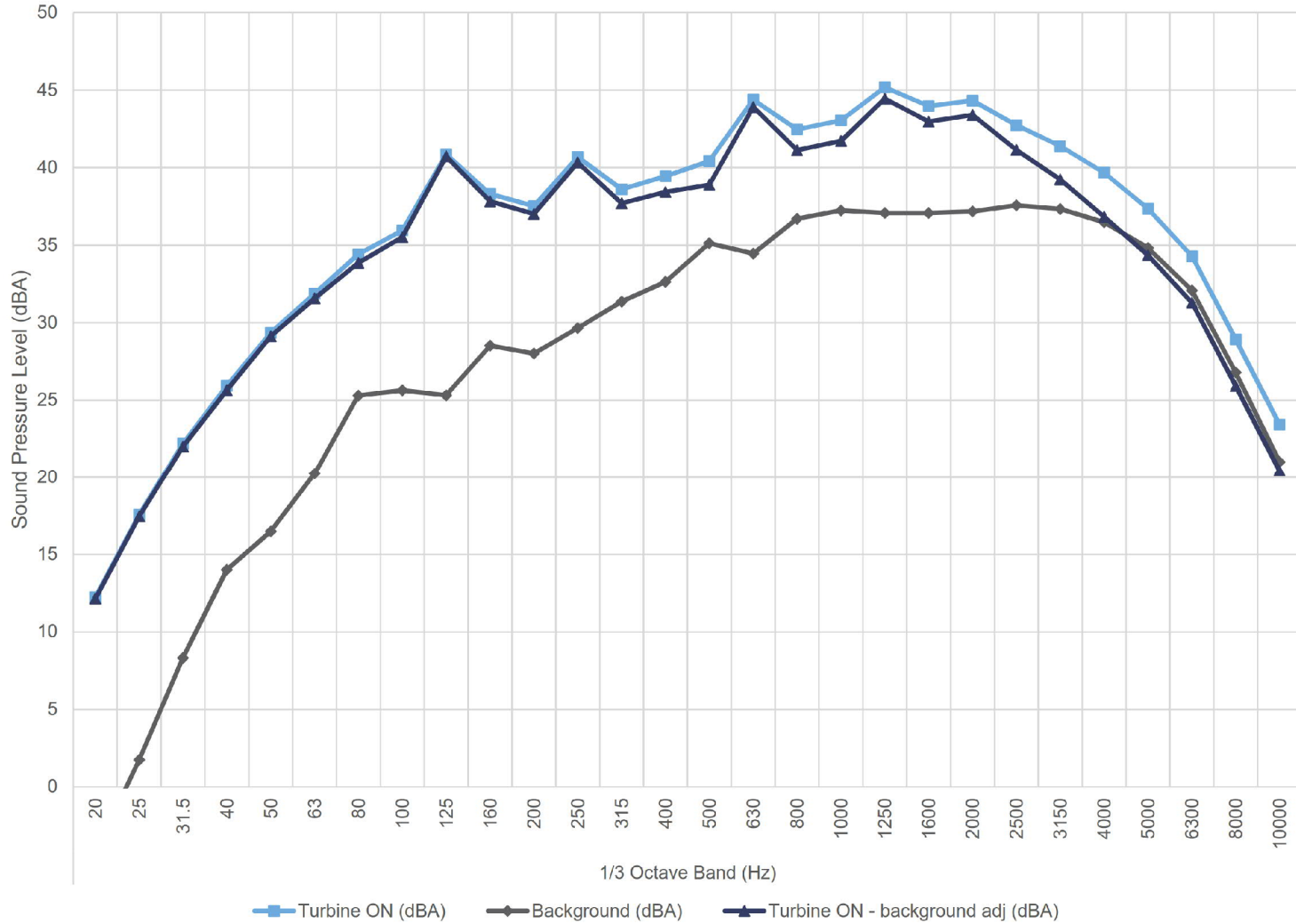
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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 9 m/s

Figure C.09

9.5 m/s - Hub Height



15427.00.T16.RP3

Scale: NTS
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 Reviewed by: PA
 Date: Sept 21, 2017
 Revision: 1

Project Name

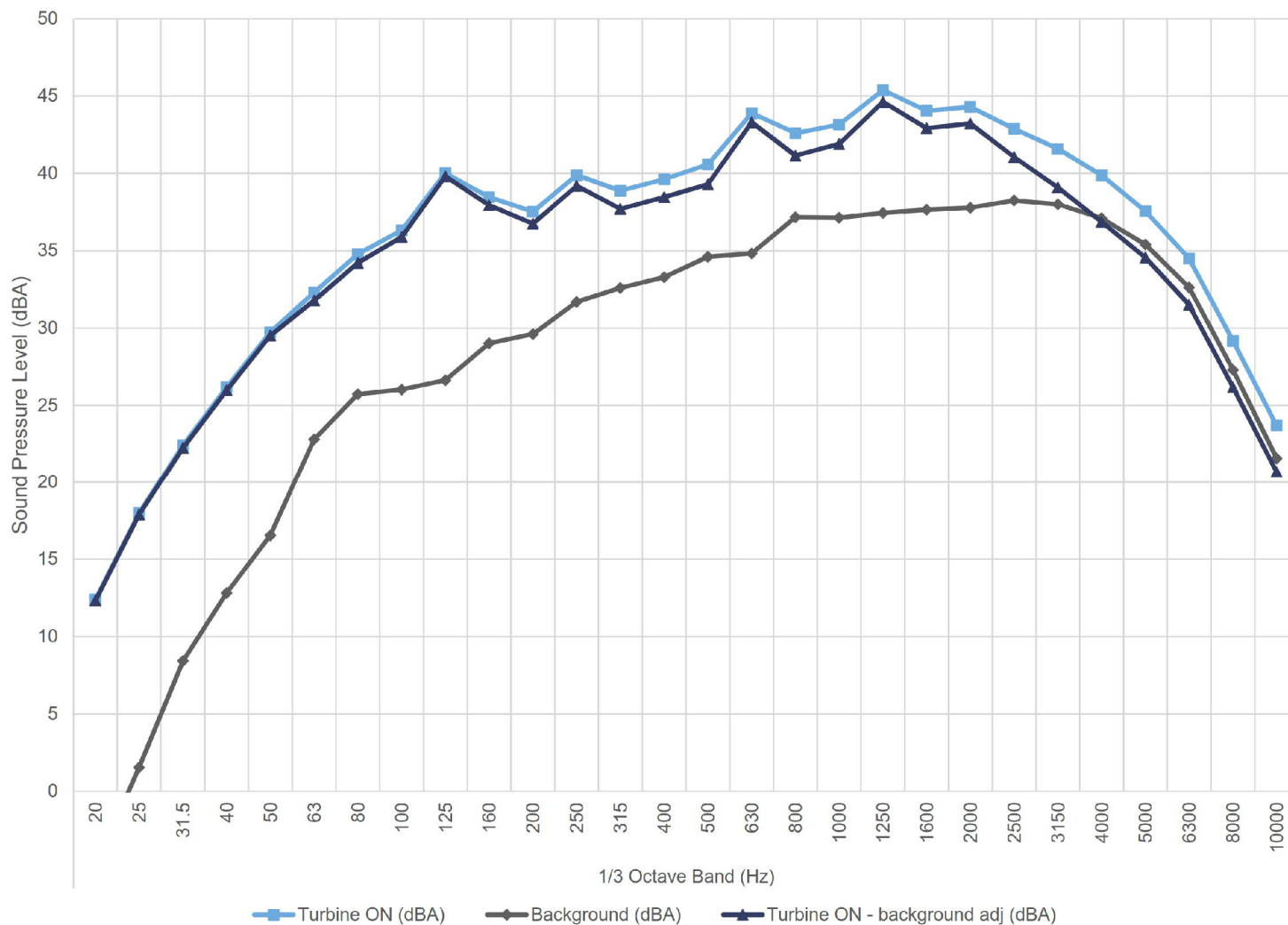
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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 9.5 m/s

Figure C.10

10.0 m/s - Hub Height



15427.00.T16.RP3

Scale: NTS
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 Reviewed by: PA
 Date: Sept 21, 2017
 Revision: 1

Project Name

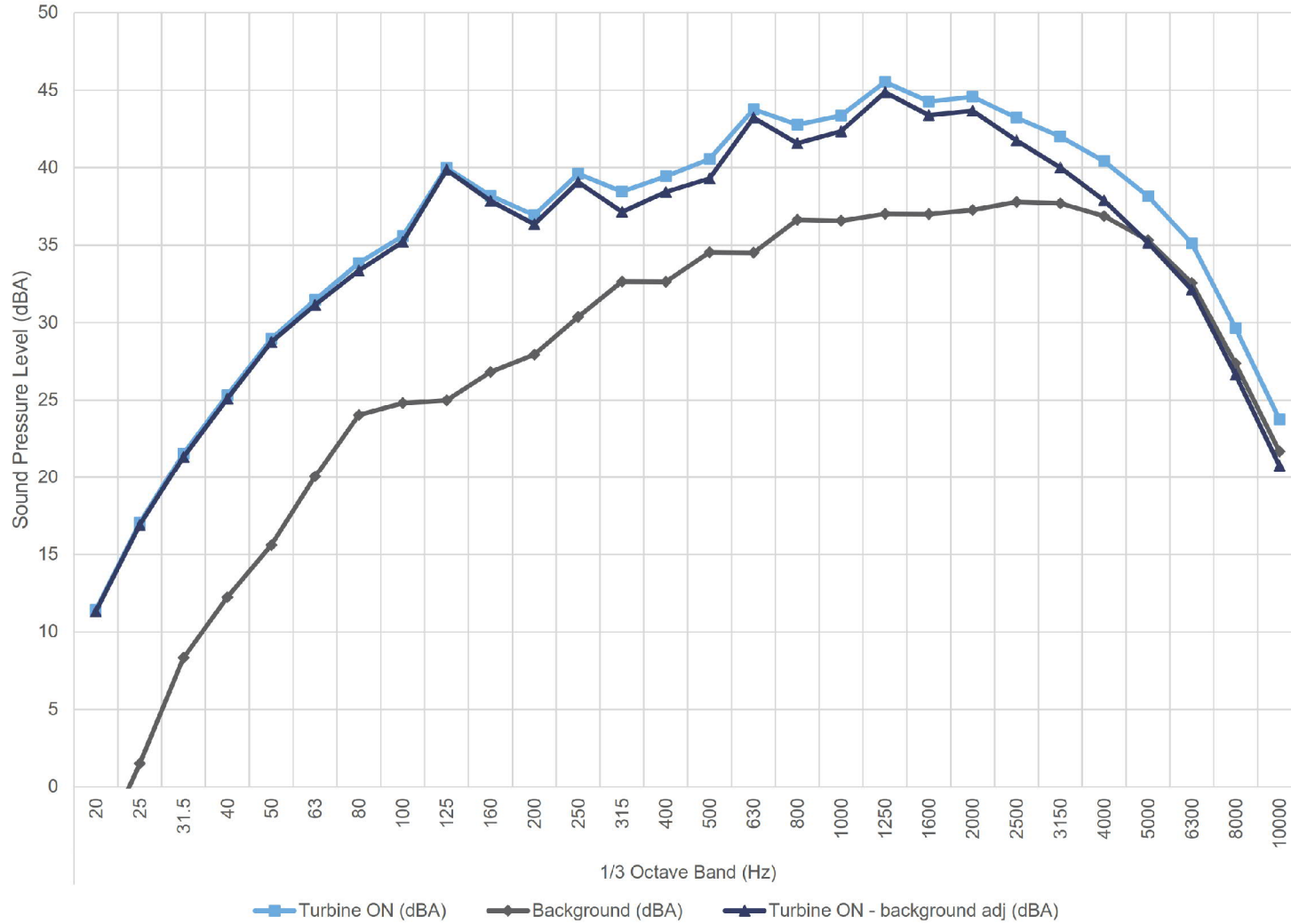
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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 10 m/s

Figure C.11

10.5 m/s - Hub Height



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Scale: NTS
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 Date: Sept 21, 2017
 Revision: 1

Project Name

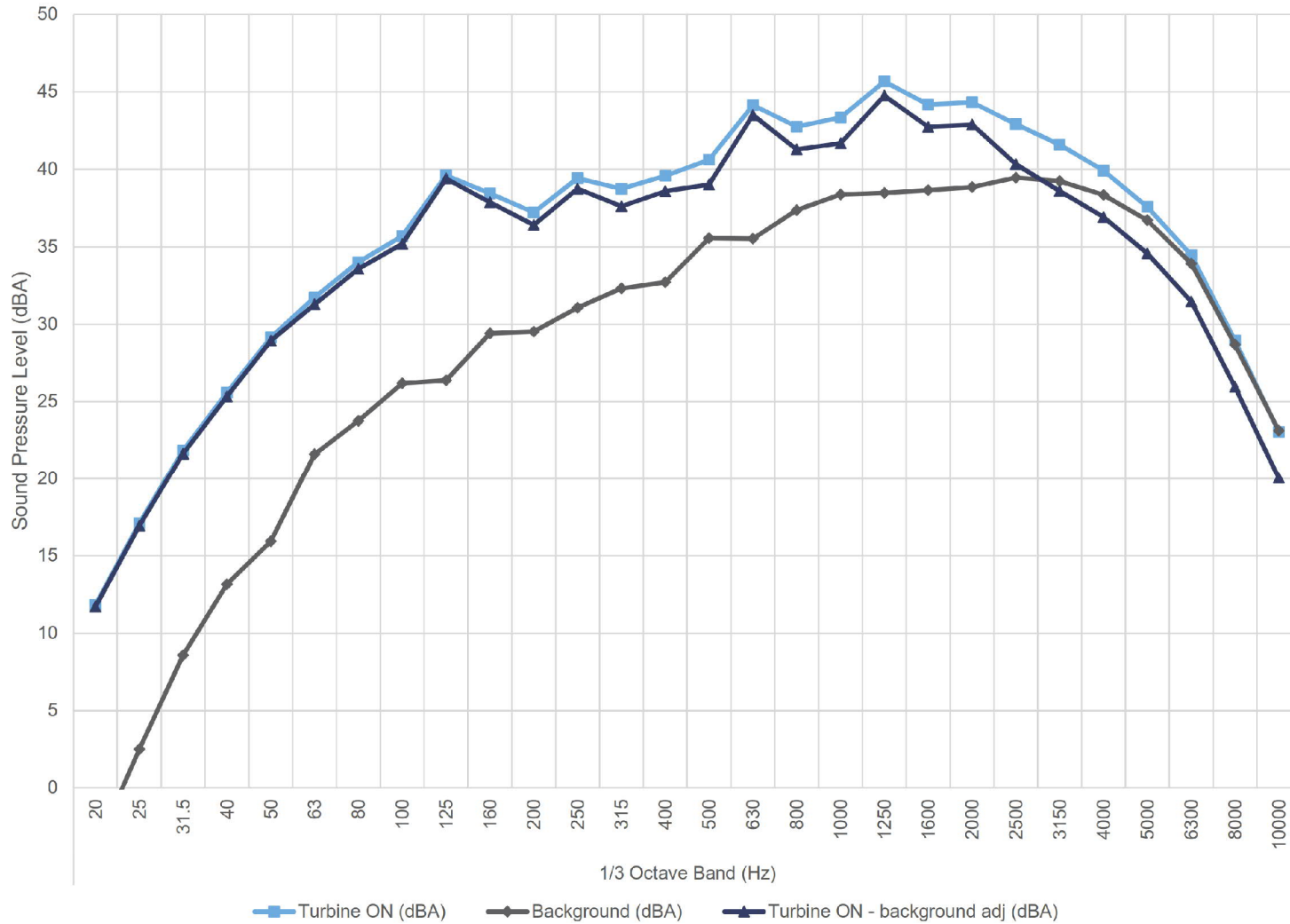
East Durham Wind Energy Centre - Turbine T16 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 10.5 m/s

Figure C.12

11.0 m/s - Hub Height



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 Revision: 1

Project Name

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Figure Title

Plot of sound pressure spectrum in 1/3 Octave at 11 m/s

Figure C.13

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

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement
 Report ID: 15427.00.T16.RP3

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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
7.0	Turbine ON (dBA)	9.6	14.9	19.4	23.5	26.6	29.5	31.7	33.8	35.1	33.9	35.0	35.4	35.6	35.3	39.5	38.0	39.0	39.4	40.1	40.3	39.7	38.7	37.5	35.7	33.6	30.6	25.3	20.0	50.3
	Background (dBA)	-4.9	1.1	7.0	11.3	16.4	19.7	30.5	23.7	24.4	27.0	27.4	29.1	30.8	30.7	32.0	32.8	34.8	35.0	35.2	35.2	35.2	35.7	35.7	34.9	33.3	30.5	25.4	19.9	46.0
	Turbine ON - background adj (dBA)	9.5	14.7	19.1	23.2	26.2	29.0	[28.7]	33.4	34.8	32.9	34.2	34.2	33.9	33.5	38.7	36.4	37.0	37.4	38.4	38.7	37.8	[35.7]	[34.5]	[32.7]	[30.6]	[27.6]	[22.3]	[17]	48.6*
	Signal to noise (dB)	14.5	13.8	12.3	12.2	10.3	9.7	1.2	10.1	10.8	6.8	7.2	6.3	4.8	4.6	7.6	5.2	4.3	4.4	4.9	5.2	4.5	3.0	1.8	0.8	0.3	0.0	0.0	0.1	4.3
	Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	0.9	3.3	0.9	0.9	1.0	0.8	0.9	1.1	1.1	0.9	1.1	1.2	1.2	1.1	1.1	1.2	1.9	1.9	1.9	2.0	2.0	1.9	3.1	1.2
7.5	PWL (dBA)	59.5	64.8	69.2	73.3	76.3	79.1	[78.8]	83.5	84.9	83.0	84.3	84.0	83.5	88.8	86.5	87.1	87.5	88.5	88.8	87.9	[85.8]	[84.6]	[82.8]	[80.6]	[77.6]	[72.4]	[67.1]	98.7*	
	Turbine ON (dBA)	11.2	16.6	21.1	25.0	28.3	31.1	33.5	34.9	37.7	35.2	36.2	37.6	36.6	37.1	39.6	40.1	40.2	40.6	41.6	41.7	41.3	40.0	38.8	36.9	34.7	31.7	26.5	20.9	51.7
	Background (dBA)	-5.3	1.8	8.2	11.1	16.0	27.7	30.3	23.8	25.2	25.7	27.7	30.4	31.5	31.4	32.4	32.8	34.9	34.7	35.0	35.2	35.2	35.7	35.6	34.8	33.2	30.5	25.4	20.3	46.1
	Turbine ON - background adj (dBA)	11.1	16.4	20.8	24.8	28.0	28.5	30.6	34.6	37.4	34.7	35.5	36.7	35.0	35.7	38.7	39.2	38.7	39.4	40.5	40.6	40.0	38.1	36.0	[33.9]	[31.7]	[28.7]	[23.5]	[17.9]	50.4*
	Signal to noise (dB)	16.5	14.7	12.9	13.8	12.3	3.4	3.1	11.2	12.5	9.5	8.5	7.2	5.1	5.6	7.2	7.3	5.3	5.9	6.5	6.5	6.0	4.4	3.2	2.2	1.6	1.2	1.0	0.7	5.6
8.0	Uncertainty (dB)	1.0	1.1	0.9	0.8	0.9	3.1	3.3	0.9	0.9	0.9	0.8	0.9	1.2	1.1	0.9	0.9	1.0	1.0	0.9	0.9	1.0	1.4	1.8	1.9	1.9	1.9	1.9	3.2	1.1
	PWL (dBA)	61.2	66.5	70.9	74.9	78.1	78.6	80.7	84.7	87.5	84.8	85.6	86.8	85.1	85.8	88.8	89.3	88.8	89.5	90.6	90.7	90.1	88.2	86.1	[84]	[81.8]	[78.8]	[73.5]	[68]	100.5*
	Turbine ON (dBA)	12.3	17.4	21.7	25.6	29.1	31.8	34.6	35.8	38.9	36.5	37.1	39.3	37.6	38.1	40.0	41.8	41.2	41.7	43.0	42.7	42.6	41.3	40.0	38.2	35.9	32.8	27.5	22.0	52.9
	Background (dBA)	-5.3	0.6	6.9	10.6	15.4	19.3	22.3	23.2	23.9	26.1	26.7	28.1	30.2	30.5	32.2	32.7	34.8	35.1	35.4	35.6	35.8	36.3	36.2	35.4	33.8	31.1	26.0	20.6	46.1
	Turbine ON - background adj (dBA)	12.2	17.3	21.6	25.5	28.9	31.5	34.3	35.6	38.8	36.1	36.6	39.0	36.8	37.3	39.2	41.3	40.1	40.6	42.2	41.8	41.6	39.6	37.7	[35.2]	[32.9]	[29.8]	[24.5]	[19]	51.9
8.5	Signal to noise (dB)	17.6	16.7	14.8	15.0	13.7	12.5	12.3	12.7	15.0	10.4	10.4	11.2	7.4	7.6	7.8	9.1	6.4	6.6	7.6	7.1	6.8	5.0	3.8	2.8	2.1	1.7	1.6	1.4	6.7
	Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.9	0.9	1.2	1.5	1.9	1.9	2.0	1.9	3.2	0.9	
	PWL (dBA)	62.3	67.4	71.7	75.6	79.0	81.6	84.4	85.7	88.9	86.2	86.7	89.1	86.8	87.4	89.3	91.3	90.2	90.7	92.3	91.8	91.7	89.7	87.8	[85.2]	[83]	[79.9]	[74.6]	[69.1]	102.0
	Turbine ON (dBA)	12.6	17.5	22.1	25.7	29.4	32.0	34.6	36.0	39.6	37.4	37.5	39.8	38.2	38.7	40.3	42.9	41.6	42.0	43.8	43.0	43.2	41.9	40.5	38.7	36.3	33.2	27.6	21.6	53.4
	Background (dBA)	-4.2	1.4	8.7	12.3	16.0	19.7	22.8	23.9	24.5	26.1	28.4	28.8	29.8	31.5	33.3	34.7	36.0	36.3	36.7	36.8	37.1	37.5	37.4	36.5	34.9	32.1	26.8	20.8	47.3
9.0	Turbine ON - background adj (dBA)	12.5	17.4	21.9	25.5	29.2	31.7	34.3	35.7	39.5	37.1	36.9	39.4	37.5	37.8	39.3	42.2	40.2	40.6	42.8	41.9	42.0	39.9	37.7	[35.7]	[33.3]	[30.2]	[24.6]	[18.6]	52.3
	Signal to noise (dB)	16.7	16.1	13.4	13.4	12.2	11.8	12.2	15.2	11.4	9.1	10.9	8.4	7.2	7.0	8.2	5.7	5.7	7.1	6.2	6.1	4.4	3.2	2.2	1.5	1.1	0.9	0.9	6.1	
	Uncertainty (dB)	1.0	1.1	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.4	1.8	1.9	2.0	2.0	2.0	3.2	1.0
	PWL (dBA)	62.6	67.5	72.0	75.6	79.3	81.8	84.4	85.8	89.6	87.2	87.0	89.5	87.6	87.9	89.4	92.3	90.3	90.7	92.9	92.0	92.1	90.0	87.8	[85.8]	[83.4]	[80.2]	[74.7]	[68.7]	102.4
	Turbine ON (dBA)	12.0	17.3	21.8	25.2	28.9	31.6	34.0	35.7	39.7	37.4	37.4	39.8	38.4	39.2	40.6	43.4	42.4	42.9	44.6	43.9	44.1	42.9	41.7	40.0	37.8	34.7	29.1	22.9	54.1
9.5	Background (dBA)	-4.3	1.8	8.4	13.0	17.1	20.8	24.8	25.4	25.8	27.9	28.7	30.3	31.1	31.8	33.9	34.6	36.9	36.8	37.3	37.5	37.6	38.1	37.9	37.1	35.4	32.6	27.2	21.3	47.9
	Turbine ON - background adj (dBA)	11.9	17.2	21.6	24.9	28.6	31.2	33.5	35.3	39.5	36.9	36.8	39.3	37.5	38.4	39.5	42.8	40.9	41.7	43.7	42.8	43.0	41.1	39.3	[37]	[34.8]	[31.7]	[26.1]	[19.9]	52.9
	Signal to noise (dB)	16.3	15.5	13.4	12.2	11.8	10.7	9.3	10.3	13.9	9.5	8.8	9.6	7.3	7.5	6.6	8.8	5.4	6.1	7.3	6.4	6.4	4.7	3.8	2.9	2.4	2.1	1.9	1.6	6.2
	Uncertainty (dB)	1.1	1.2	1.0	0.9	1.0	1.0	1.0	0.9	0.9	1.0	0.8	0.9	0.9	0.9	0.9	1.0	1.0	0.9	1.0	1.0	1.0	1.3	1.6	2.0	2.1	2.1	2.1	3.4	1.0
	PWL (dBA)	62.0	67.3	71.7	75.0	78.7	81.3	83.6	85.4	89.6	87.0	86.9	89.4	87.6	88.5	89.6	92.9	91.0	91.8	93.8	92.9	93.1	91.2	89.4	[87.1]	[84.9]	[81.8]	[76.2]	[70]	103.0
10.0	Turbine ON (dBA)	12.2	17.6	22.2	25.9	29.4	31.9	34.4	36.0	40.9	38.3	37.5	40.7	38.6	39.4	40.4	44.4	42.5	43.0	45.2	44.0	44.3	42.7	41.4	39.7	37.3	34.3	28.9	23.4	54.4
	Background (dBA)	-4.2	1.8	8.3	14.0	16.5	20.2	25.3	25.6	25.3	28.5	28.0	29.6	31.4	32.6	35.1	34.5	36.7	37.2	37.1	37.1	37.2	37.6	37.3	36.5	34.8	32.1	26.8	21.0	47.7
	Turbine ON - background adj (dBA)	12.1	17.5	22.0	25.7	29.1	31.6	33.9	35.5	40.7	37.8	37.0	40.3	37.7	38.4	38.9	43.9	41.1	41.7	44.5	43.0	43.4	41.1	39.2	36.8	[34.3]	[31.3]	[25.9]	[20.4]	53.3
	Signal to noise (dB)	16.5	15.8	13.9	11.9	12.9	11.6	9.1	10.3	15.5	9.8	9.5	11.0	7.3	6.8	5.3	9.9	5.8	5.8	8.1	6.9	7.2	5.2	4.1	3.2	2.5	2.2	2.1	2.4	6.7
	Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.7	0.7	0.8	0.9	1.0	0.8	0.9	0.9	0.8	0.8	0.8	1.2	1.4	1.7	1.9	1.9	1.9	3.1	0.9
10.5	PWL (dBA)	62.2	67.5	72.1	75.7	79.2	81.7	83.9	85.6	90.8	87.9	87.1	90.4	87.8	88.5	89.0	94.0	91.2	91.8	94.5	93.1	93.5	91.2	89.3	86.9	[84.4]	[81.4]	[76]	[70.5]	103.4
	Turbine ON (dBA)	12.4	18.0	22.4	26.2	29.7	32.3	34.8	36.3	40.0	38.5	37.5	39.9	38.9	39.6	40.6	43.9	42.6	43.2	45.4	44.1	44.3	42.9	41.6	39.9	37.6	34.5	29.2	23.7	54.4
	Background (dBA)	-4.9	1.5	8.4	12.8	16.5	22.8	25.7	26.0	26.6	29.0	29.6	31.7	32.6	33.3	34.6	34.8	37.2	37.1	37.5	37.7	37.8	38.3	38.0	37.1	35.4	32.6	27.3	21.6	48.2
	Turbine ON - background adj (dBA)	12.3	17.9	22.3	26.0	29.5	31.8	34.2	35.9	39.8	37.9	36.8	39.2	37.7	38.5	39.3	43.3	41.1	41.9	44.6	42.9	43.2	41.0	39.1	[36.9]	[34.6]	[31.5]	[26.2]	[20.7]	53.2
	Signal to noise (dB)	17.3	16.4	14.0	13.4	13.2	9.5	9.1	10.3	13.4	9.4	7.9	8.2	6.3	6.3	6.0	9.0	5.4	6.0	7.9	6.4	6.5	4.6	3.6	2.8	2.2	1.9	1.9	2.1	6.2
11.0	Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	1.0	1.0	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	0.8	1.0	1.0	0.9	0.9	0.9	1.3	1.6	1.9	1.9	1.9	3.3	1.0	
	PWL (dBA)	62.4	68.0	72.3	76.1	79.6	81.9	84.3	86.0	89.9	88.0	86.8	89.3	87.8	88.6	89.4	93.4	91.2	92.0	94.7	93.0	93.3	91.1	89.2	[87]	[84.7]	[81.6]	[76.3]	[70.8]	103.3
	Turbine ON (dBA)	11.4	17.0	21.6	25.3	29.0	31.5	33.8	35.6	40.0	38.2	36.9	39.6	38.5	39.4	40.5	43.8	42.8	43.4	45.5	44.3	44.6	43.2	42.0	40.4	38				

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

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement
 Report ID: 15427.00.T16.RP3

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	
11.0	Turbine ON (dBA)	11.8	17.1	21.8	25.6	29.1	31.7	34.0	35.7	39.6	38.4	37.2	39.4	38.7	39.6	40.6	44.1	42.8	43.3	45.7	44.2	44.3	42.9	41.6	39.9	37.6	34.5	28.9	23.0	54.4
	Background (dBA)	-4.0	2.5	8.6	13.1	15.9	21.6	23.8	26.2	26.4	29.4	29.5	31.1	32.3	32.7	35.5	35.5	37.4	38.4	38.5	38.6	38.9	39.5	39.2	38.3	36.7	33.9	28.7	23.1	49.1
	Turbine ON - background adj (dBA)	11.7	16.9	21.6	25.3	28.9	31.3	33.6	35.2	39.4	37.9	36.4	38.7	37.6	38.6	39.0	43.5	41.3	41.7	44.8	42.7	42.9	40.3	[38.6]	[36.9]	[34.6]	[31.5]	[25.9]	[20]	53.1*
	Signal to noise (dB)	15.8	14.6	13.3	12.4	13.2	10.1	10.2	9.5	13.2	9.0	7.7	8.4	6.4	6.9	5.1	8.6	5.4	5.0	7.2	5.5	5.5	3.5	2.4	1.6	0.9	0.5	0.3	-0.1	5.3
	Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.9	0.8	1.0	0.8	1.0	1.0	0.9	1.0	1.0	1.7	2.0	2.0	2.0	2.0	2.0	3.3	1.1
	PWL (dBA)	61.8	67.0	71.7	75.4	79.0	81.4	83.7	85.3	89.5	88.0	86.5	88.8	87.7	88.7	89.1	93.6	91.4	91.8	94.8	92.8	93.0	90.4	[88.7]	[87]	[84.7]	[81.5]	[76]	[70.1]	103.1*

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

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement

Report ID: 15247.00.T16.RP3

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)	9.7	15.0	19.6	23.5	26.9	29.6	31.9	33.8	35.6	34.0	35.0	35.7	35.6	35.6	38.7	38.3	39.0	39.4	40.2	40.4	39.8	38.8	37.6	35.8	33.7	30.7	25.6	20.4	50.4
	Background (dBA)	-5.2	1.4	7.7	11.2	15.9	25.0	29.8	24.5	25.3	27.7	28.1	30.5	31.5	31.8	33.2	33.6	35.6	35.9	36.1	36.3	36.4	37.0	36.8	36.0	34.4	31.6	26.4	20.7	47.0
	Turbine ON - background adj (dBA)	9.6	14.8	19.3	23.3	26.5	27.8	[28.9]	33.3	35.2	32.8	34.0	34.2	33.4	33.2	37.2	36.5	36.4	36.9	38.0	38.2	37.2	[35.8]	[34.6]	[32.8]	[30.7]	[27.7]	[22.6]	[17.4]	48.2*
	Signal to noise (dB)	14.9	13.6	11.9	12.3	10.9	4.7	2.2	9.3	10.3	6.3	6.9	5.2	4.0	3.8	5.5	4.7	3.4	3.5	4.0	4.1	3.4	1.9	0.7	-0.2	-0.7	-0.9	-0.7	-0.3	3.3
	Uncertainty (dB)	0.9	0.9	0.8	0.8	0.8	1.2	2.2	0.8	0.8	1.0	0.8	1.0	1.1	1.2	0.9	1.0	1.3	1.3	1.1	1.1	1.3	1.7	1.7	1.7	1.7	1.7	1.7	2.9	1.2
	PWL (dBA)	59.6	64.9	69.4	73.4	76.6	77.9	[79]	83.3	85.3	82.9	84.1	84.3	83.5	83.3	87.3	86.6	86.5	86.9	88.1	88.3	87.3	[85.9]	[84.7]	[82.9]	[80.8]	[77.8]	[72.7]	[67.5]	98.3*
6.0	Turbine ON (dBA)	12.3	17.4	21.9	25.6	29.1	31.8	34.5	35.8	39.2	37.0	37.3	39.5	37.9	38.5	40.2	42.4	41.5	41.9	43.6	43.0	43.0	41.7	40.4	38.6	36.3	33.1	27.7	22.0	53.2
	Background (dBA)	-4.6	1.5	8.1	12.3	16.7	20.3	24.0	24.5	24.6	26.8	27.6	28.8	30.1	31.2	33.3	34.2	36.2	36.3	36.7	36.8	36.9	37.4	37.2	36.3	34.7	31.9	26.6	20.9	47.2
	Turbine ON - background adj (dBA)	12.3	17.3	21.7	25.4	28.9	31.5	34.1	35.5	39.1	36.5	36.8	39.2	37.1	37.6	39.2	41.7	40.0	40.6	42.6	41.8	41.8	39.7	37.6	[35.6]	[33.3]	[30.1]	[24.7]	[19]	52.1
	Signal to noise (dB)	17.0	16.0	13.8	13.3	12.4	11.6	10.5	11.3	14.6	10.2	9.7	10.7	7.8	7.3	6.9	8.2	5.3	5.7	6.9	6.2	6.1	4.3	3.2	2.2	1.6	1.2	1.1	1.2	6.0
	Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.9	0.7	0.7	0.8	0.8	0.8	0.8	1.0	0.9	0.9	0.9	0.9	1.3	1.6	1.8	1.8	1.8	1.8	3.1	1.0
	PWL (dBA)	62.3	67.4	71.8	75.5	79.0	81.6	84.2	85.6	89.2	86.6	86.8	89.3	87.2	87.7	89.3	91.8	90.1	90.7	92.7	91.9	91.9	89.8	87.7	[85.7]	[83.3]	[80.2]	[74.8]	[69.1]	102.1
7.0	Turbine ON (dBA)	12.2	17.7	22.2	25.9	29.4	32.0	34.5	36.0	40.3	38.3	37.4	40.1	38.7	39.5	40.5	44.0	42.5	43.1	45.2	44.0	44.3	42.8	41.5	39.8	37.5	34.5	29.1	23.5	54.3
	Background (dBA)	-4.5	1.7	8.6	13.4	16.4	21.5	25.2	25.8	26.3	28.7	29.2	31.2	32.3	32.9	34.7	34.7	37.0	37.1	37.4	37.5	37.7	38.2	38.0	37.1	35.4	32.6	27.3	21.4	48.1
	Turbine ON - background adj (dBA)	12.1	17.5	22.0	25.7	29.2	31.6	33.9	35.6	40.1	37.8	36.7	39.6	37.5	38.4	39.2	43.5	41.1	41.8	44.5	42.9	43.2	41.0	39.0	[36.8]	[34.5]	[31.5]	[26.1]	[20.5]	53.2
	Signal to noise (dB)	16.7	15.9	13.6	12.5	13.0	10.5	9.3	10.3	14.0	9.6	8.2	9.0	6.4	6.6	5.8	9.3	5.6	6.0	7.9	6.5	6.6	4.6	3.5	2.7	2.1	1.8	1.8	2.1	6.2
	Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.9	0.8	0.8	0.9	0.9	0.9	0.8	1.0	0.9	0.8	0.9	0.9	1.3	1.6	1.8	1.8	1.8	1.8	3.1	1.0
	PWL (dBA)	62.2	67.6	72.1	75.8	79.3	81.7	84.0	85.7	90.2	87.8	86.8	89.6	87.6	88.5	89.3	93.6	91.2	91.9	94.5	93.0	93.3	91.1	89.1	[86.9]	[84.6]	[81.6]	[76.2]	[70.6]	103.3
8.0	Turbine ON (dBA)	11.5	17.0	21.7	25.4	28.9	31.6	33.8	35.6	39.6	38.2	37.1	39.5	38.6	39.6	40.7	43.9	42.9	43.5	45.6	44.3	44.5	43.2	41.9	40.3	38.0	35.0	29.5	23.8	54.5
	Background (dBA)	-4.4	1.9	8.1	12.5	15.7	20.3	23.2	25.2	25.3	28.1	28.5	30.1	31.9	32.4	35.1	35.2	37.2	37.7	38.1	38.2	38.4	38.9	38.7	37.8	36.1	33.3	28.1	22.4	48.6
	Turbine ON - background adj (dBA)	11.4	16.8	21.5	25.2	28.7	31.2	33.4	35.2	39.4	37.8	36.4	39.0	37.6	38.7	39.3	43.3	41.5	42.1	44.8	43.1	43.2	41.1	39.1	[37.3]	[35]	[32]	[26.5]	[20.8]	53.3*
	Signal to noise (dB)	15.9	15.1	13.6	13.0	13.2	11.2	10.6	10.4	14.3	10.1	8.6	9.4	6.7	7.2	5.6	8.7	5.7	5.7	7.5	6.1	6.0	4.2	3.2	2.5	1.9	1.6	1.5	1.4	5.9
	Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.8	0.8	0.9	0.8	0.9	0.9	0.9	0.8	0.9	0.9	1.4	1.7	1.8	1.8	1.8	1.8	3.0	1.0
	PWL (dBA)	61.4	66.9	71.6	75.3	78.8	81.3	83.5	85.3	89.5	87.9	86.5	89.1	87.7	88.8	89.4	93.4	91.6	92.2	94.9	93.2	93.3	91.2	89.2	[87.4]	[85.1]	[82.1]	[76.6]	[70.9]	103.4*

Table C.03 Type B measurement uncertainty summary

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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 measurement uncertainty at hub height

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement
Report ID: 15427.00.T16.RP3

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Created on: 11/6/2017

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		
7.0	Turbine ON	7.02	21	Average (dBA)	9.6	14.9	19.4	23.5	26.7	29.5	31.8	33.8	35.2	33.9	35.0	35.4	35.7	35.3	39.6	38.0	39.1	39.4	40.2	40.4	39.8	38.8	37.5	35.7	33.6	30.6	25.4	20.0	50.4		
				Uncertainty A (dB)	0.4	0.4	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.4		0.4	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	0.7	0.7	0.7	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	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	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	0.9	0.9		0.9	1.5
Background	7.05	12	Average (dBA)	-4.8	1.1	6.9	11.3	16.5	19.4	31.0	23.5	24.2	26.8	27.2	28.8	30.7	30.4	31.7	32.6	34.6	34.7	34.9	34.9	34.9	35.4	35.4	34.6	33.0	30.3	25.1	19.8	45.8			
			Uncertainty A (dB)	0.5	0.4	0.6	0.6	0.7	0.7	3.0	0.7	0.5	1.1	0.8	0.8	0.6	0.4	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	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	0.7	0.7	0.7	0.8	0.8	0.8	0.8		0.8	1.4	
			Combined Uncertainty (dB)	1.1	1.1	1.0	1.0	1.1	1.1	3.1	1.1	1.0	1.3	1.1	1.1	0.9	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.0	1.0	1.0		1.0	1.5	
7.5	Turbine ON	7.49	38	Average (dBA)	11.2	16.5	21.1	24.9	28.3	31.1	33.4	34.9	37.7	35.2	36.2	37.5	36.5	37.1	39.6	40.0	40.2	40.6	41.5	41.2	40.0	38.8	36.9	34.7	31.7	26.4	20.9	51.7			
				Uncertainty A (dB)	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.2	0.1	0.2	0.2	0.2	0.1	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4		0.3	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	0.7	0.7	0.7	0.8	0.8	0.8		0.8	0.8	1.4
				Combined Uncertainty (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	0.7	0.7	0.7	0.8	0.8	0.9		0.9	0.9	1.5
Background	7.54	10	Average (dBA)	-5.3	1.9	8.3	11.1	16.0	28.4	30.3	23.8	25.3	25.6	27.8	30.5	31.5	31.5	32.4	32.8	34.9	34.7	35.1	35.2	35.3	35.7	35.6	34.8	33.2	30.5	25.5	20.3	46.1			
			Uncertainty A (dB)	0.5	0.4	0.6	0.4	0.5	3.5	3.2	0.9	1.1	1.0	1.1	1.3	1.2	1.0	1.0	0.6	0.4	0.3	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6		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	0.7	0.7	0.7	0.8	0.8	0.8	0.8		0.8	1.4	
			Combined Uncertainty (dB)	1.1	1.1	1.0	0.9	0.9	3.6	3.3	1.2	1.4	1.3	1.3	1.4	1.4	1.2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	1.0	1.0	1.0	1.0	1.0		1.0	1.5	
8.0	Turbine ON	7.98	31	Average (dBA)	12.3	17.4	21.7	25.6	29.1	31.8	34.6	35.8	38.9	36.4	37.0	39.3	37.6	38.1	40.0	41.8	41.2	41.7	43.0	42.7	42.6	41.3	40.0	38.1	35.9	32.8	27.5	22.0	52.9		
				Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	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	0.8	0.7	0.7	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
				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	0.7	0.7	0.7	0.8	0.9	0.9	0.9		0.9	1.5
Background	8.02	14	Average (dBA)	-5.3	0.6	6.9	10.6	15.4	18.9	21.9	23.1	23.8	26.2	26.6	28.0	30.1	30.5	32.2	32.7	34.8	35.1	35.5	35.6	35.8	36.3	36.2	35.4	33.8	31.1	26.0	20.6	46.2			
			Uncertainty A (dB)	0.4	0.2	0.4	0.4	0.5	0.6	0.8	0.8	0.5	1.0	0.7	0.4	0.6	0.5	0.4	0.4	0.4	0.5	0.4	0.5	0.6	0.6	0.6	0.6	0.6	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	0.7	0.7	0.7	0.7	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	
			Combined Uncertainty (dB)	1.1	1.0	0.9	0.9	1.0	1.0	1.2	1.1	0.9	1.3	1.0	0.8	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0		0.9	1.5	
8.5	Turbine ON	8.49	22	Average (dBA)	12.6	17.5	22.1	25.7	29.4	32.0	34.7	36.0	39.6	37.4	37.5	39.8	38.2	38.7	40.3	42.9	41.6	42.0	43.7	43.0	43.2	41.9	40.5	38.7	36.3	33.1	27.6	21.6	53.4		
				Uncertainty A (dB)	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5		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	0.7	0.7	0.8	0.8	0.8	0.8	0.8		1.4	
				Combined Uncertainty (dB)	1.0	1.1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.9	0.9		0.9	1.5
Background	8.54	10	Average (dBA)	-4.1	1.5	8.9	12.5	16.1	19.8	22.9	23.9	24.5	26.1	28.5	28.9	29.8	31.6	33.4	34.8	36.1	36.4	36.8	36.9	37.2	37.6	37.5	36.6	35.0	32.2	26.8	20.8	47.4			
			Uncertainty A (dB)	0.6	0.5	0.7	0.4	0.4	0.4	0.6	0.7	0.6	1.0	1.1	0.6	0.6	0.7	0.5	0.7	0.5	0.5	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.5	0.5	0.4		0.3		
			Uncertainty B (dB)	1.0	1.0	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	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8		1.4		
			Combined Uncertainty (dB)	1.2	1.1	1.0	0.9	0.9	0.9	1.0	1.1	1.0	1.2	1.3	0.9	0.9	1.0	0.8	1.0	0.8	0.9	0.9	0.9	0.9	0.9	1.0	1.0	1.0	1.0	1.0	0.9		0.9	1.5	
9.0	Turbine ON	9.00	16	Average (dBA)	12.0	17.3	21.8	25.2	28.9	31.6	34.0	35.7	39.7	37.4	37.4	39.8	38.4	39.2	40.6	43.4	42.4	42.9	44.6	43.9	44.1	42.9	41.7	40.0	37.8	34.7	29.1	22.9	54.1		
				Uncertainty A (dB)	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.5		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	0.7	0.7	0.7	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	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9		0.9	1.5
Background	8.99	43	Average (dBA)	-4.3	1.8	8.4	13.0	17.1	20.9	24.8	25.4	25.8	27.9	28.7	30.3	31.1	31.7	33.9	34.6	36.9	36.8	37.3	37.5	37.6	38.1	37.9	37.1	35.4	32.6	27.2	21.3	47.9			
			Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.4	0.5	0.6	0.5	0.5	0.6	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.3	0.3		0.2		
			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	0.7	0.7	0.8	0.8	0.8	0.8	0.8		1.4		
			Combined Uncertainty (dB)	1.0	1.0	0.9	0.9	0.9	0.9	1.0	0.9	0.9	1.0	0.8	0.8	0.8	0.7	0.7	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	1.5	
9.5	Turbine ON	9.46	40	Average (dBA)	12.2	17.5	22.2	25.9	29.3	31.8	34.4	35.9	40.9	38.3	37.5	40.7	38.6	39.4	40.4	44.4	42.5	43.0	45.2	44.0	44.3	42.7	41.4	39.7	37.3	34.3	28.9	23.4	54.4		
				Uncertainty A (dB)	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.2	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	0.2	0.2	0.2	0.3	0.3		0.3	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	0.7	0.7	0.7	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																										

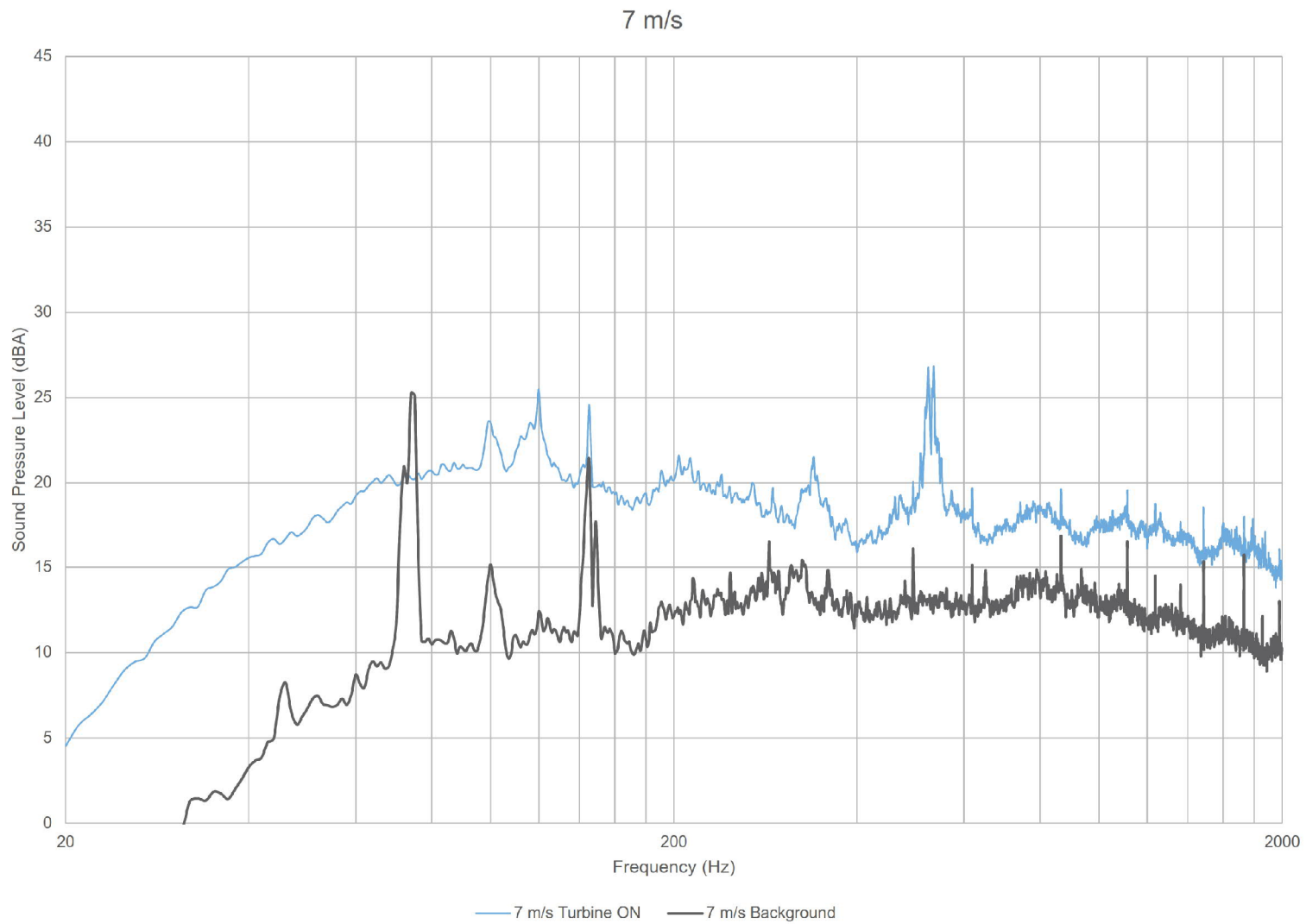
Table C.04 Detailed measurement uncertainty at hub height

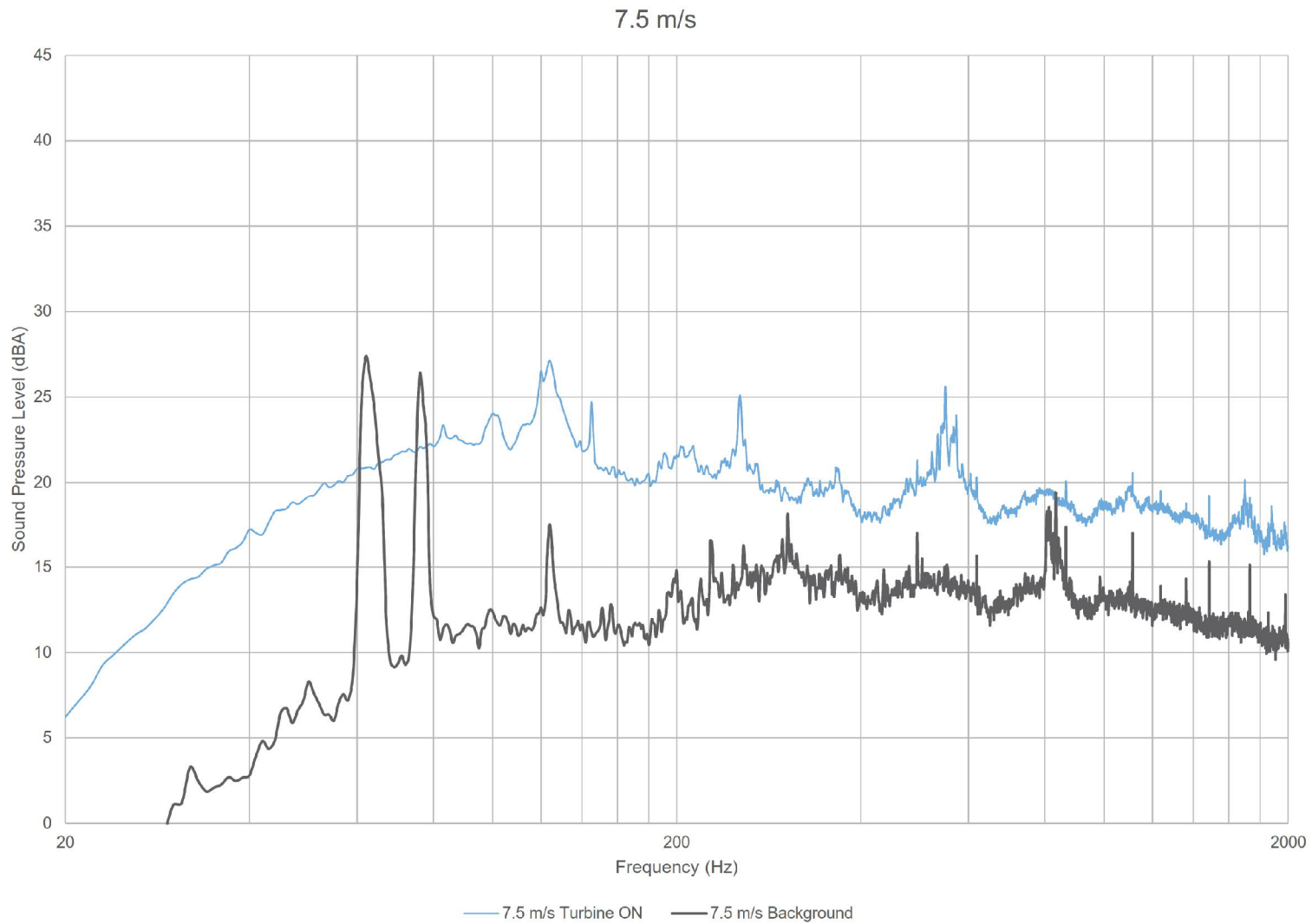
Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement
 Report ID: 15427.00.T16.RP3

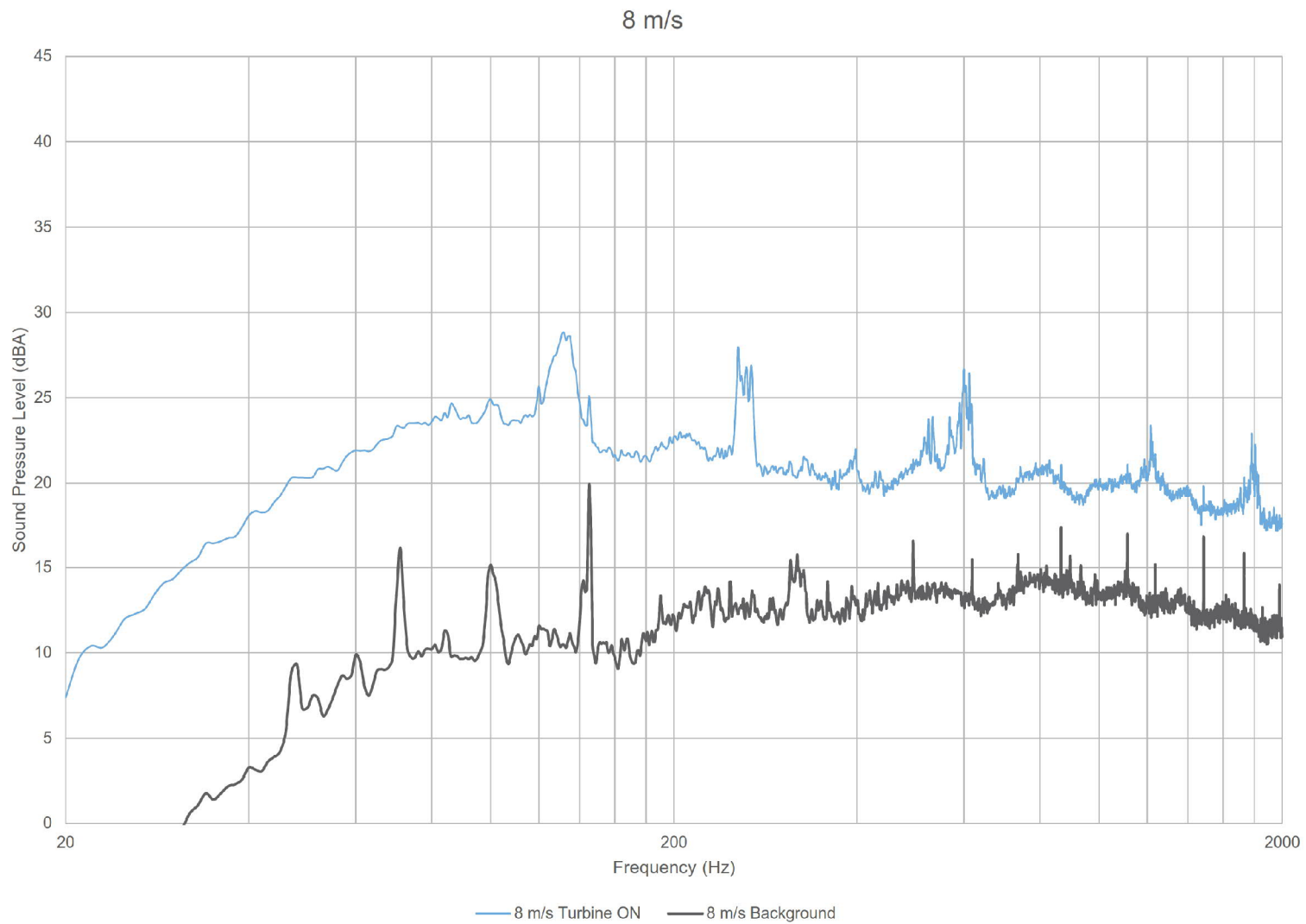
Page 2 of 2
 Created on: 11/6/2017

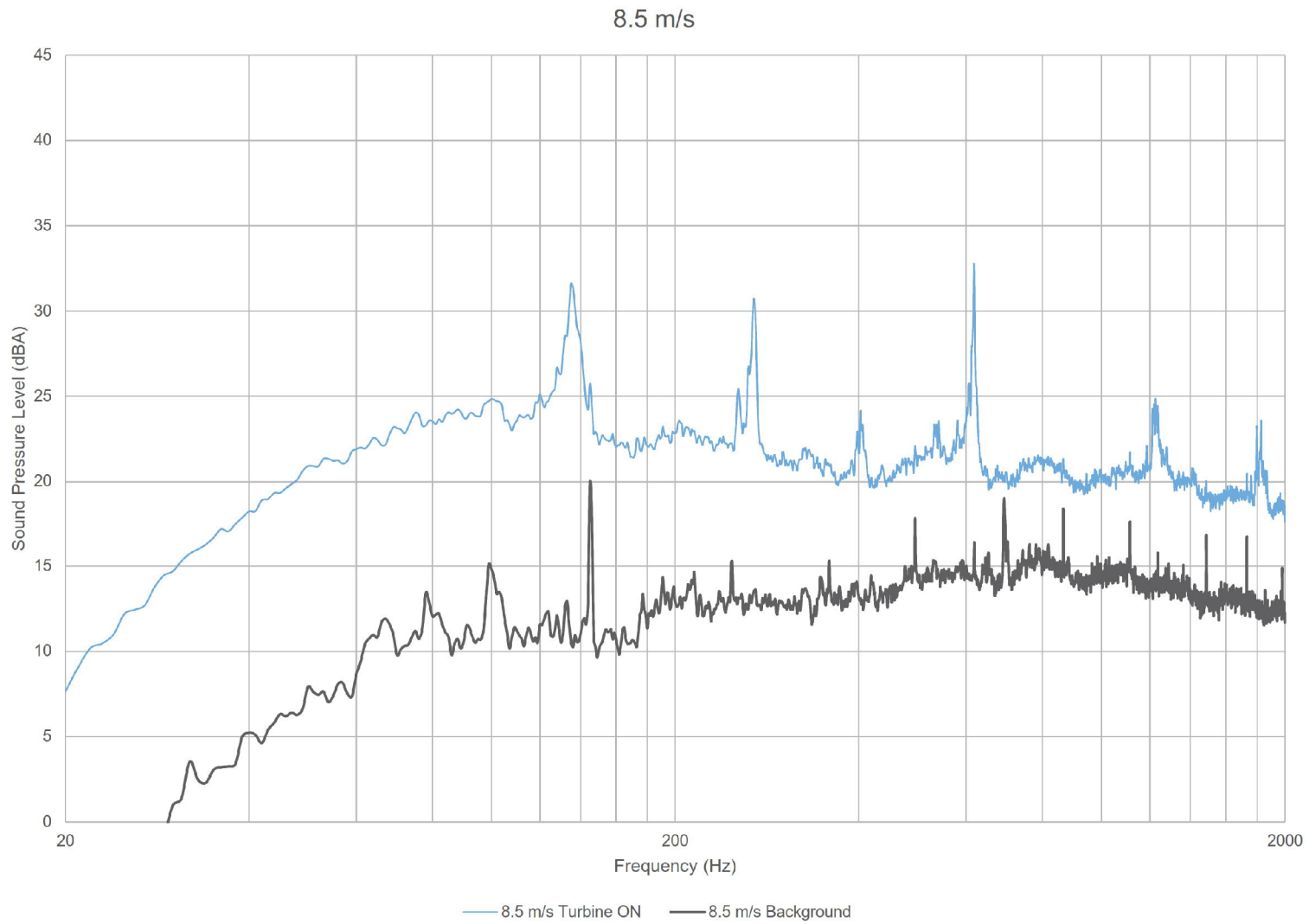
Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																		Overall												
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000		1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
10.5	Turbine ON	10.47	26	Average (dBA)	11.4	17.0	21.5	25.3	28.9	31.4	33.8	35.6	40.0	38.2	36.9	39.6	38.4	39.4	40.5	43.7	42.8	43.4	45.5	44.3	44.6	43.2	42.0	40.5	38.2	35.2	29.7	23.8	54.5		
				Uncertainty A (dB)	0.3	0.4	0.3	0.3	0.4	0.3	0.3	0.2	0.4	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.3	0.3	0.4	0.4	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	0.7	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	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.5	
Background	10.49	13	Average (dBA)	-4.7	1.5	8.3	12.2	15.6	20.0	24.0	24.8	25.0	26.8	27.9	30.4	32.7	32.6	34.5	34.5	36.6	36.6	37.0	37.0	37.3	37.8	37.7	36.9	35.3	32.5	27.4	21.7	47.8			
			Uncertainty A (dB)	0.4	0.4	0.7	0.5	0.5	0.6	0.8	0.8	0.8	1.0	0.9	1.0	1.1	0.7	0.7	0.5	0.6	0.6	0.8	0.9	1.0	1.1	1.2	1.1	1.1	1.1	1.0	1.0	0.7			
			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	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
			Combined Uncertainty (dB)	1.1	1.1	1.0	0.9	1.0	1.0	1.1	1.2	1.1	1.2	1.1	1.2	1.3	1.0	1.0	0.9	0.9	0.9	1.0	1.1	1.2	1.4	1.4	1.4	1.4	1.4	1.4	1.3	1.6			
11.0	Turbine ON	10.96	17	Average (dBA)	11.8	17.1	21.8	25.6	29.2	31.7	34.0	35.7	39.6	38.5	37.3	39.4	38.8	39.6	40.6	44.2	42.7	43.3	45.7	44.1	44.3	42.9	41.6	39.9	37.5	34.4	28.9	22.9	54.4		
				Uncertainty A (dB)	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.2	0.2	0.3	0.2	0.1	0.1	0.3	0.1	0.2	0.3	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.4	0.4	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	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4	
				Combined Uncertainty (dB)	1.2	1.1	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	0.9	0.9	1.5		
Background	11.02	10	Average (dBA)	-4.0	2.5	8.6	13.2	15.9	21.7	23.7	26.2	26.4	29.5	29.6	31.1	32.3	32.7	35.6	35.6	37.4	38.5	38.5	38.7	38.9	39.5	39.3	38.4	36.8	34.0	28.7	23.2	49.2			
			Uncertainty A (dB)	0.6	0.4	0.7	0.8	0.5	1.0	0.8	0.9	0.7	1.0	0.7	0.6	0.5	0.3	0.5	0.4	0.4	0.5	0.5	0.6	0.8	0.9	0.9	0.9	0.9	0.9	0.9	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	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
			Combined Uncertainty (dB)	1.2	1.1	1.0	1.1	1.0	1.3	1.1	1.2	1.0	1.3	1.0	0.9	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.9	1.1	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.7			

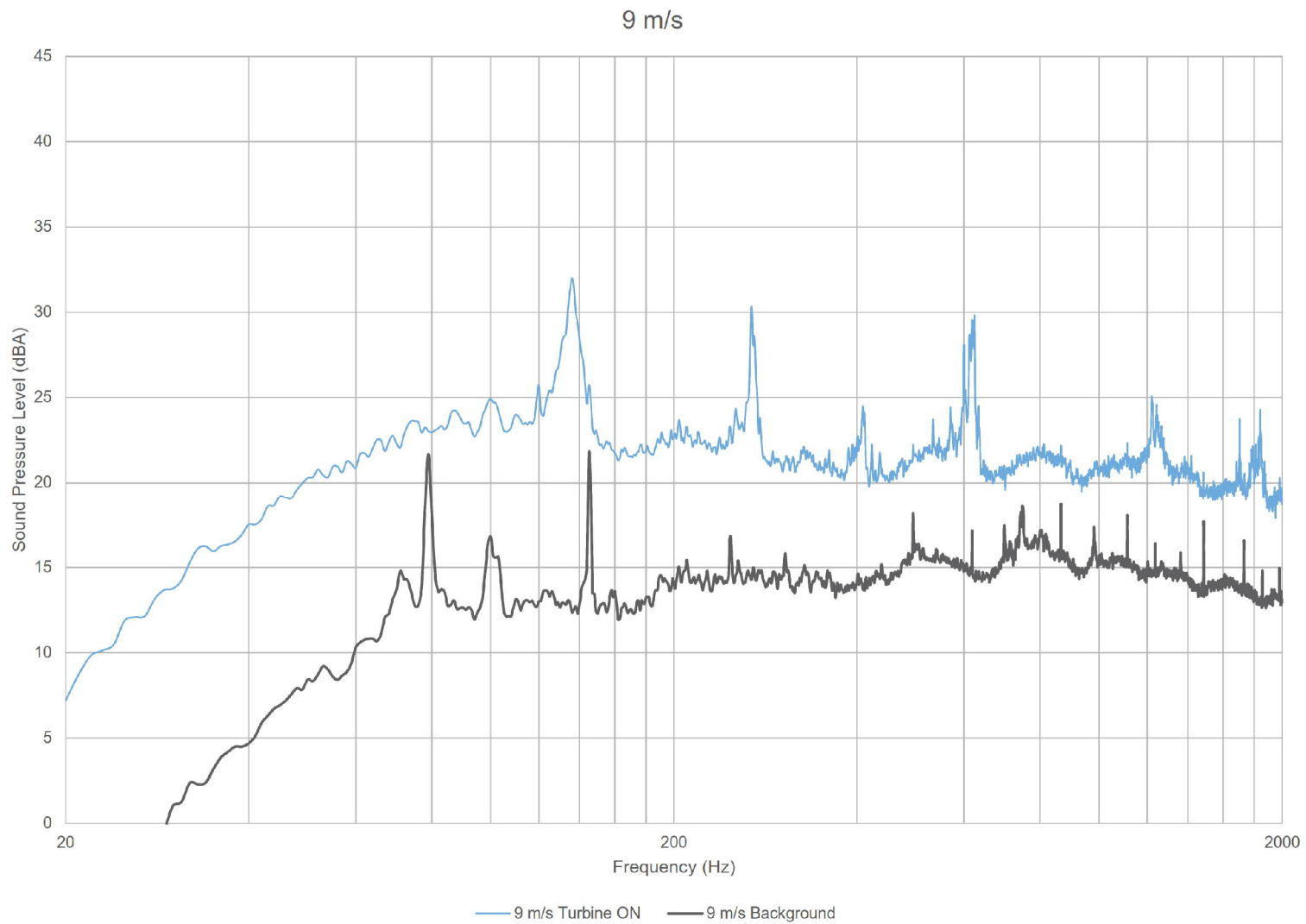
Appendix D Tonality Assessment











15427.00.T16.RP3

Scale: NTS
 Drawn by: AM
 Reviewed by: PA
 Date: Sept 21, 2017
 Revision: 1

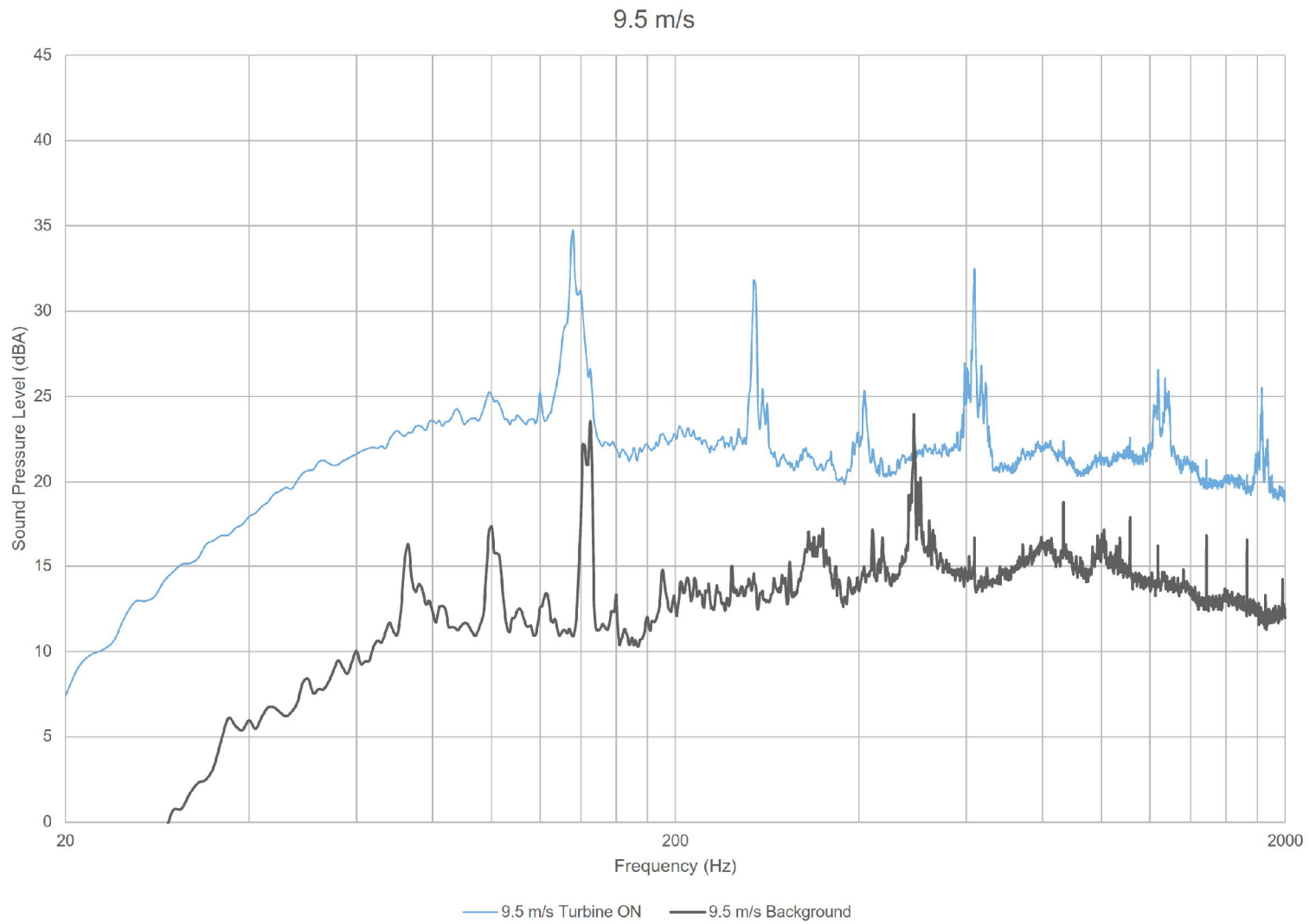
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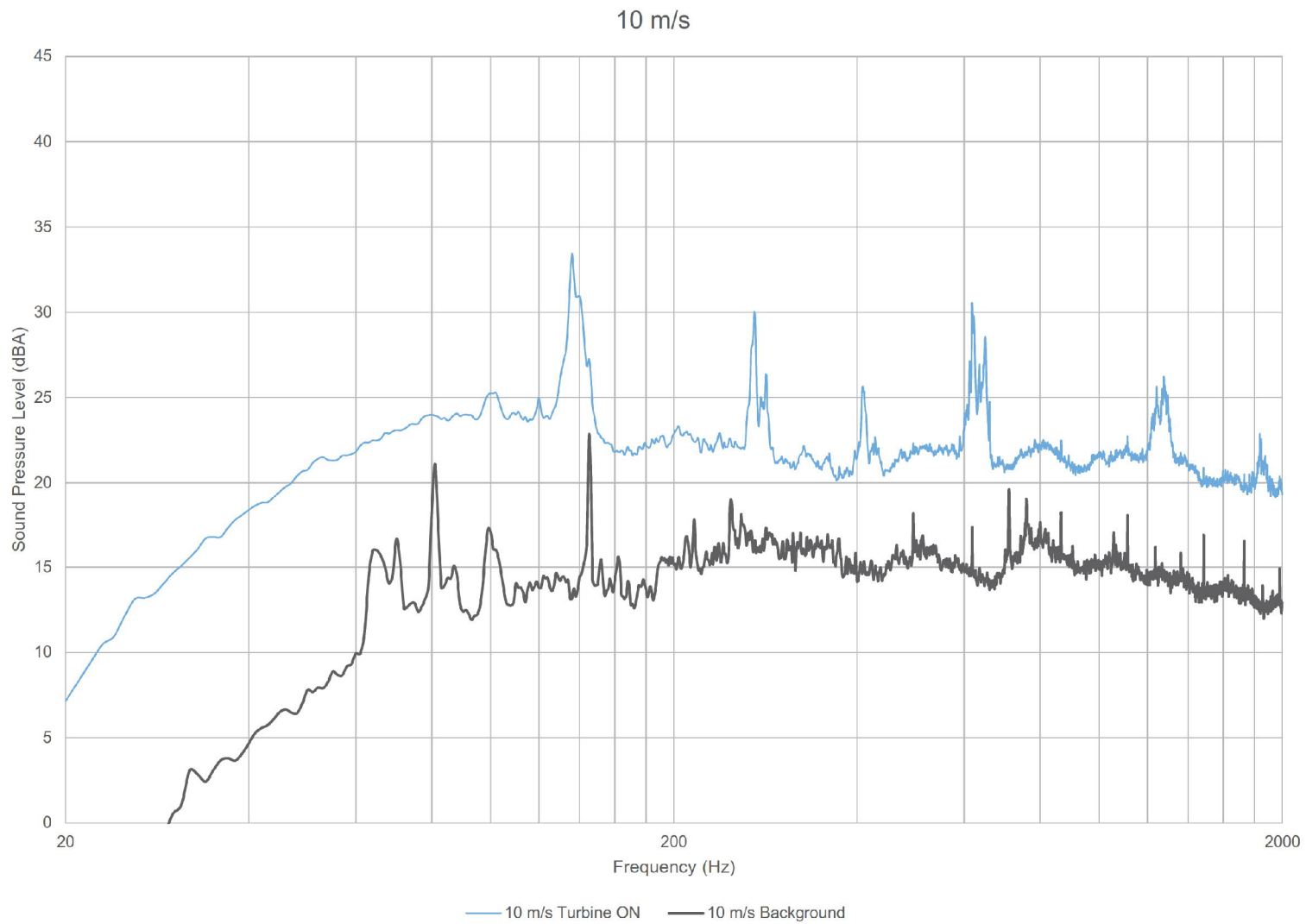
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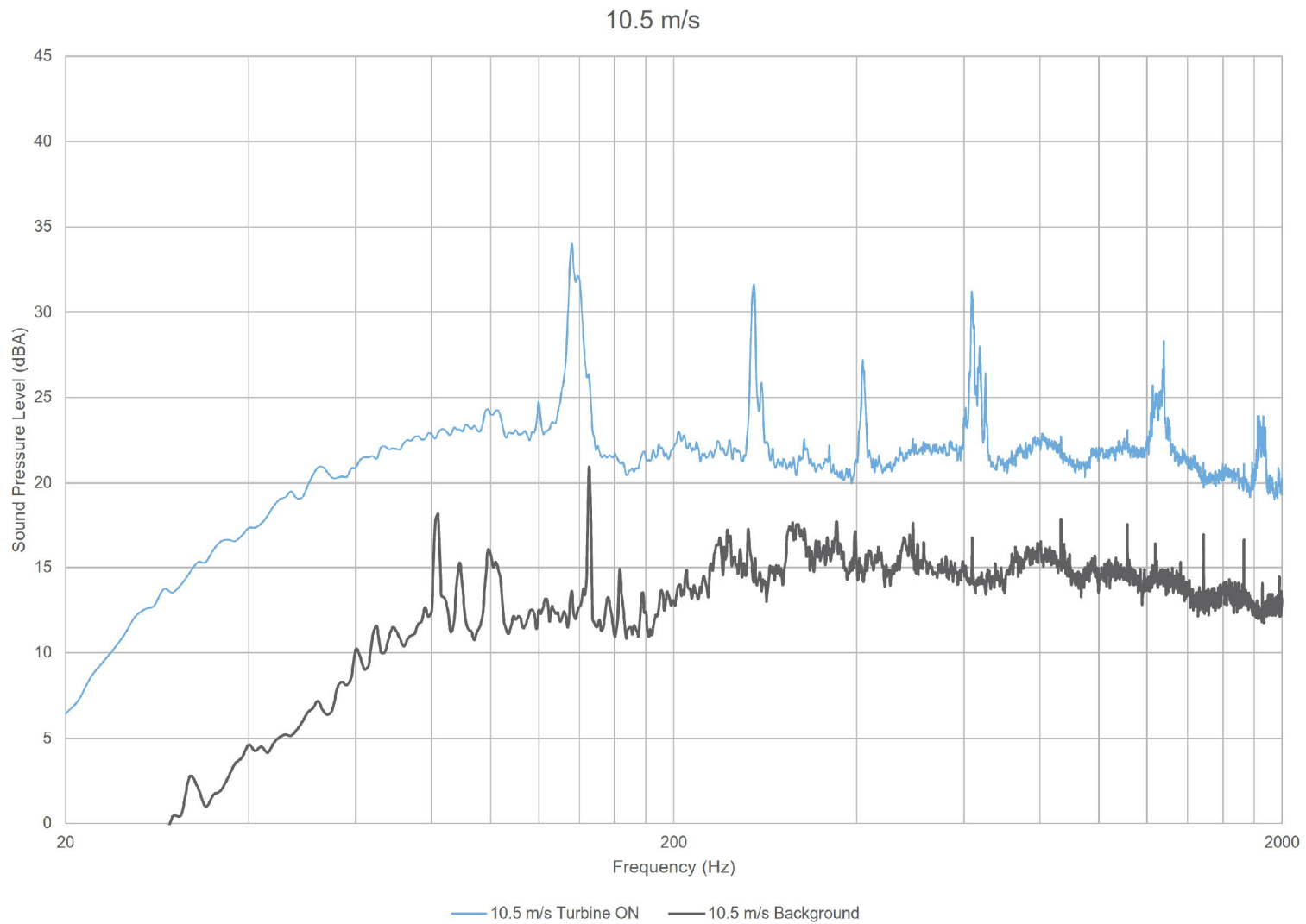
Figure Title

Plot of narrow band spectra – Turbine ON vs. Background at 9 m/s

Figure D.05







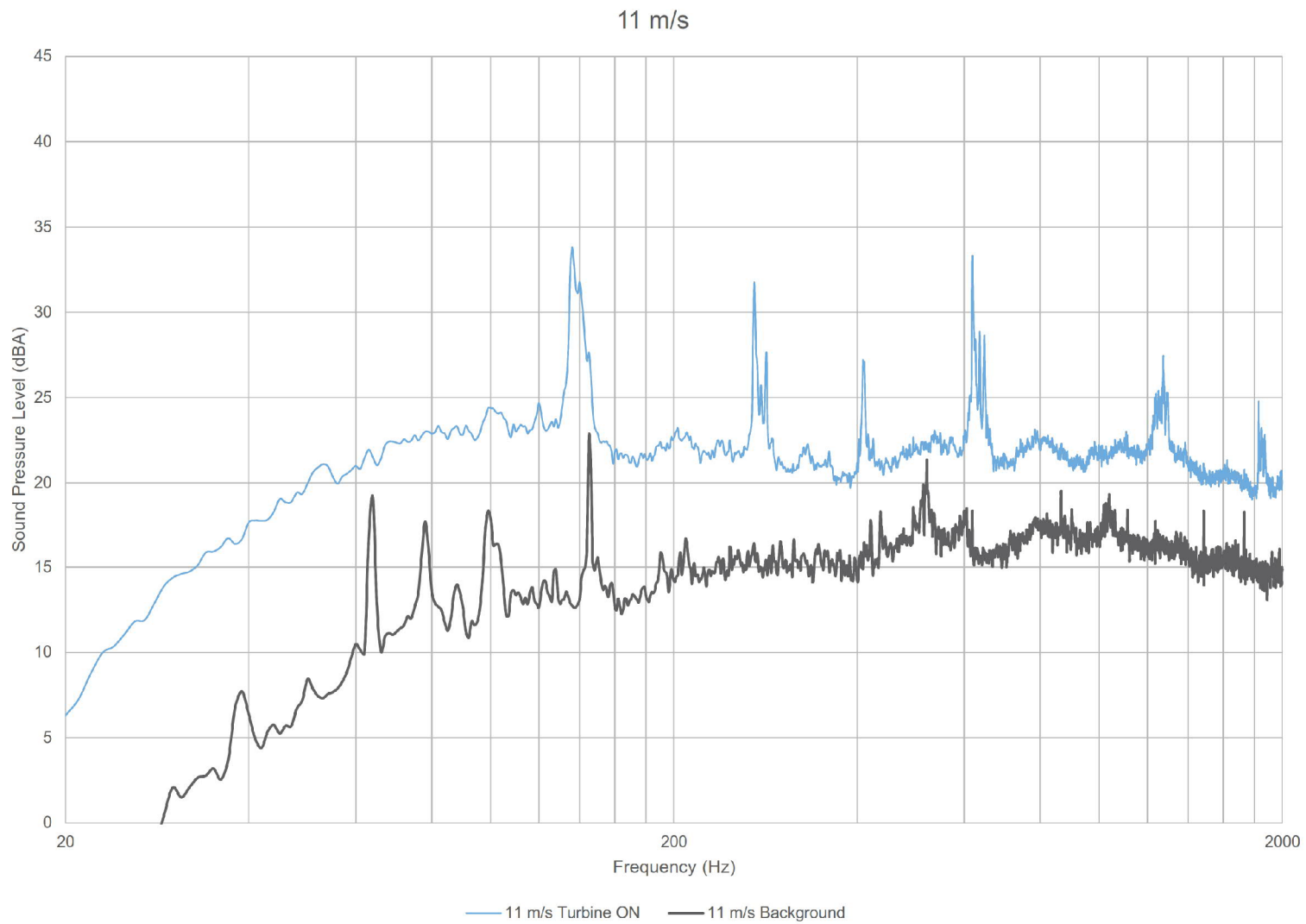


Table D.01 Tonality Assessment Table - 7 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
564	508			19.2	38.1	33.1	-5.1	-2.3	-2.7
221	509			18.4	37.3	31.9	-5.4	-2.3	-3.1
37	518			20.1	39.0	39.2	0.2	-2.3	2.5
487	522			20.7	39.7	35.3	-4.4	-2.3	-2.1
220	523			19.3	38.3	31.0	-7.3	-2.3	-5.0
38	524			19.4	38.4	40.5	2.1	-2.3	4.4
375	524			19.1	38.1	26.2	-11.9	-2.3	-9.6
393	524			18.3	37.3	39.3	2.1	-2.3	4.4
574	525			20.2	39.2	31.0	-8.2	-2.3	-5.9
374	525			18.4	37.4	34.2	-3.2	-2.3	-0.9
489	525			19.4	38.4	26.4	-12.0	-2.3	-9.7
418	527			19.4	38.4	34.6	-3.8	-2.3	-1.5
392	531			18.1	37.1	36.7	-0.4	-2.3	2.0
490	533			18.9	37.9	28.9	-9.0	-2.3	-6.6
402	534			19.5	38.5	30.5	-7.9	-2.3	-5.6
573	535			18.8	37.8	39.2	1.3	-2.3	3.7
417	536			20.7	39.7	39.4	-0.3	-2.3	2.0
Average	525						-2.3	-2.3	0.1

Table D.02 Tonality Assessment Table - 7.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

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Created on: 10/26/2017

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.03 Tonality Assessment Table - 8 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement
 Report ID: 15427.00.T16.RP3

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 Created on: 10/26/2017

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)
388	590			20.4	39.5	37.7	-1.8	-2.4	0.6
551	598			21.3	40.4	31.0	-9.5	-2.4	-7.1
377	598			20.6	39.8	32.0	-7.8	-2.4	-5.4
426	599			20.2	39.4	39.1	-0.3	-2.4	2.1
533	599			20.8	40.0	35.6	-4.5	-2.4	-2.1
427	600			20.0	39.2	37.1	-2.1	-2.4	0.3
389	602			19.7	38.9	33.7	-5.1	-2.4	-2.7
372	604			21.5	40.7	37.1	-3.6	-2.4	-1.2
32	604			20.8	40.0	36.6	-3.4	-2.4	-1.0
571	605			21.4	40.6	37.7	-3.0	-2.4	-0.6
560	605			21.7	40.9	28.4	-12.5	-2.4	-10.1
415	609			21.5	40.7	32.6	-8.1	-2.4	-5.7
254	612			22.2	41.4	34.8	-6.7	-2.4	-4.2
44	612			21.2	40.5	38.0	-2.5	-2.4	-0.1
81	612			21.2	40.5	33.7	-6.7	-2.4	-4.3
577	612			20.4	39.6	29.4	-10.2	-2.4	-7.8
547	613			21.8	41.1	39.3	-1.8	-2.4	0.6
87	618			22.6	41.8	37.9	-3.9	-2.4	-1.5
256	618			22.2	41.5	36.6	-4.9	-2.4	-2.5
5	646			22.8	42.1	42.3	0.2	-2.5	2.6
Average	607.8						-3.8	-2.4	-1.4

Table D.04 Tonality Assessment Table - 8.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
79	253			22.5	41.0	35.2	-5.8	-2.1	-3.7
27	254			22.1	40.5	37.5	-3.1	-2.1	-1.0
29	263			22.7	41.1	29.0	-12.1	-2.1	-10.0
549	264			21.3	39.8	37.7	-2.0	-2.1	0.1
6	264			23.2	41.7	35.8	-5.9	-2.1	-3.8
593	266			21.4	39.9	27.9	-12.0	-2.1	-9.9
494	267			22.6	41.1	32.8	-8.3	-2.1	-6.2
553	267			21.7	40.1	30.0	-10.1	-2.1	-8.1
497	268			21.9	40.4	37.2	-3.2	-2.1	-1.1
496	268			21.5	40.0	37.7	-2.3	-2.1	-0.2
592	268			20.7	39.1	37.4	-1.7	-2.1	0.4
40	269			22.8	41.3	39.3	-2.0	-2.1	0.1
548	270			21.4	39.9	38.7	-1.2	-2.1	0.9
217	270			22.0	40.5	35.1	-5.4	-2.1	-3.3
550	270			22.3	40.8	37.6	-3.1	-2.1	-1.0
562	270			22.4	40.9	32.8	-8.1	-2.1	-6.0
41	270			22.6	41.1	38.4	-2.6	-2.1	-0.5
568	270			22.5	41.0	28.7	-12.2	-2.1	-10.2
458	271			22.7	41.1	32.2	-9.0	-2.1	-6.9
370	271			22.7	41.2	33.7	-7.5	-2.1	-5.4
255	271			22.1	40.5	36.8	-3.8	-2.1	-1.7
Average	267						-4.5	-2.1	-2.4

Table D.04 Tonality Assessment Table - 8.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
497	606			21.3	40.5	38.8	-1.7	-2.4	0.7
593	607			21.2	40.4	37.0	-3.4	-2.4	-1.0
496	614			20.7	39.9	35.5	-4.5	-2.4	-2.0
40	615			21.3	40.5	39.2	-1.3	-2.4	1.1
592	615			20.5	39.7	36.3	-3.4	-2.4	-1.0
562	616			22.3	41.6	37.3	-4.2	-2.4	-1.8
550	617			22.0	41.2	40.9	-0.3	-2.4	2.1
549	617			20.5	39.8	37.6	-2.1	-2.4	0.3
217	617			21.9	41.1	37.5	-3.6	-2.4	-1.2
553	618			21.0	40.2	34.6	-5.6	-2.4	-3.2
41	618			21.4	40.7	43.5	2.8	-2.4	5.2
548	619			21.1	40.3	42.9	2.5	-2.4	5.0
255	619			22.2	41.5	40.4	-1.0	-2.4	1.4
458	619			22.8	42.1	34.6	-7.5	-2.4	-5.1
568	620			20.8	40.1	29.2	-10.9	-2.4	-8.4
6	622			22.4	41.7	41.4	-0.3	-2.4	2.1
29	623			21.0	40.3	37.7	-2.5	-2.4	-0.1
370	624			22.2	41.5	38.9	-2.6	-2.4	-0.2
494	626			21.5	40.7	32.5	-8.2	-2.4	-5.8
Average	617						-1.9	-2.4	0.5

Table D.05 Tonality Assessment Table - 9 m/s

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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)
483	129			22.4	40.7	33.9	-6.8	-2.0	-4.8
457	132			23.8	42.1	35.5	-6.6	-2.0	-4.6
532	134			23.3	41.6	39.8	-1.8	-2.0	0.2
591	134			22.1	40.4	38.4	-2.0	-2.0	0.0
570	135			23.7	42.0	37.7	-4.3	-2.0	-2.3
503	135			24.8	43.1	38.2	-4.9	-2.0	-2.9
215	135			24.0	42.3	39.2	-3.1	-2.0	-1.1
460	135			21.8	40.1	37.8	-2.3	-2.0	-0.2
28	136			25.0	43.3	38.5	-4.9	-2.0	-2.8
382	136			22.8	41.1	37.3	-3.8	-2.0	-1.8
371	136			24.2	42.5	39.5	-3.0	-2.0	-1.0
380	137			22.0	40.3	38.5	-1.8	-2.0	0.2
561	137			24.1	42.4	36.9	-5.4	-2.0	-3.4
45	137			24.7	43.0	35.5	-7.5	-2.0	-5.5
459	140			22.1	40.4	28.8	-11.6	-2.0	-9.6
Average	135						-4.0	-2.0	-2.0

Table D.05 Tonality Assessment Table - 9 m/s

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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Created on: 7/2/2019

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)
591	600			21.1	40.3	37.4	-2.9	-2.4	-0.5
215	600			21.4	40.6	44.0	3.4	-2.4	5.8
45	611			21.6	40.8	33.1	-7.8	-2.4	-5.3
532	612			22.1	41.3	36.6	-4.7	-2.4	-2.3
28	613			21.4	40.6	39.4	-1.3	-2.4	1.2
570	618			21.3	40.5	37.0	-3.5	-2.4	-1.1
503	619			22.9	42.1	35.9	-6.2	-2.4	-3.8
382	621			22.5	41.7	39.6	-2.2	-2.4	0.2
460	622			22.0	41.2	39.8	-1.4	-2.4	1.0
380	623			21.8	41.0	38.6	-2.4	-2.4	0.0
371	624			22.3	41.6	40.9	-0.6	-2.4	1.8
561	628			21.7	41.0	38.3	-2.6	-2.4	-0.2
459	633			22.6	41.9	34.5	-7.3	-2.4	-4.9
	617						-2.0	-2.4	0.4

Table D.06 Tonality Assessment Table - 9.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
26	131			23.0	41.3	39.9	-1.5	-2.0	0.6
74	131			23.9	42.2	36.8	-5.4	-2.0	-3.4
586	131			22.5	40.8	40.3	-0.5	-2.0	1.5
369	131			24.4	42.7	39.9	-2.8	-2.0	-0.8
587	134			22.5	40.8	41.1	0.4	-2.0	2.4
585	134			21.8	40.1	40.7	0.6	-2.0	2.6
582	134			25.2	43.5	36.0	-7.5	-2.0	-5.5
443	135			24.3	42.6	40.3	-2.4	-2.0	-0.4
519	135			21.5	39.8	42.4	2.5	-2.0	4.5
319	135			22.3	40.6	42.5	1.9	-2.0	3.9
52	135			23.3	41.6	40.9	-0.7	-2.0	1.3
432	135			22.2	40.5	40.7	0.2	-2.0	2.2
531	135			22.9	41.2	41.1	-0.1	-2.0	1.9
77	135			22.2	40.5	41.8	1.3	-2.0	3.3
366	136			23.3	41.6	44.2	2.6	-2.0	4.6
433	136			23.3	41.6	43.0	1.4	-2.0	3.4
365	136			22.0	40.2	40.6	0.4	-2.0	2.4
523	136			23.3	41.6	40.1	-1.6	-2.0	0.4
148	136			24.4	42.7	41.3	-1.4	-2.0	0.6
413	136			24.6	42.9	32.4	-10.5	-2.0	-8.5
524	136			23.1	41.4	40.8	-0.6	-2.0	1.4
309	136			24.8	43.1	42.7	-0.4	-2.0	1.6
18	136			23.7	42.0	34.4	-7.6	-2.0	-5.6
515	136			21.0	39.3	41.1	1.8	-2.0	3.8
430	137			22.6	40.9	36.5	-4.4	-2.0	-2.4
343	137			23.8	42.1	41.2	-0.9	-2.0	1.1
504	139			24.3	42.6	37.4	-5.2	-2.0	-3.1
584	139			21.2	39.5	39.2	-0.3	-2.0	1.7
479	139			22.8	41.1	38.4	-2.7	-2.0	-0.7
454	139			23.1	41.4	38.2	-3.2	-2.0	-1.2
321	140			23.0	41.3	39.5	-1.8	-2.0	0.2
341	140			23.7	42.0	37.8	-4.2	-2.0	-2.2
450	140			22.4	40.7	37.1	-3.6	-2.0	-1.5
14	141			22.7	41.0	38.1	-3.0	-2.0	-0.9
248	142			22.6	40.9	35.3	-5.5	-2.0	-3.5
225	145			24.4	42.7	32.8	-9.9	-2.0	-7.9
Average	136						-1.1	-2.0	0.9

Table D.06 Tonality Assessment Table - 9.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
582	254			23.2	41.7	32.3	-9.4	-2.1	-7.3
26	264			21.6	40.0	33.5	-6.5	-2.1	-4.5
523	265			22.2	40.7	36.4	-4.3	-2.1	-2.2
587	267			21.8	40.3	35.3	-5.0	-2.1	-2.9
524	267			21.8	40.3	38.9	-1.3	-2.1	0.8
585	268			20.7	39.1	38.0	-1.1	-2.1	1.0
319	268			21.2	39.6	40.3	0.7	-2.1	2.8
432	268			21.6	40.1	38.4	-1.7	-2.1	0.4
52	269			21.6	40.0	37.4	-2.6	-2.1	-0.6
531	269			22.4	40.8	44.5	3.7	-2.1	5.8
584	270			20.6	39.0	42.1	3.1	-2.1	5.2
443	270			22.0	40.4	38.8	-1.6	-2.1	0.5
366	271			23.5	41.9	35.3	-6.6	-2.1	-4.5
148	271			22.3	40.8	37.4	-3.4	-2.1	-1.3
309	271			24.1	42.6	36.0	-6.6	-2.1	-4.5
77	271			20.9	39.4	41.2	1.9	-2.1	3.9
433	271			21.4	39.8	41.7	1.9	-2.1	4.0
515	271			20.8	39.3	40.8	1.5	-2.1	3.6
519	271			21.3	39.8	42.0	2.2	-2.1	4.3
18	272			21.8	40.2	29.1	-11.1	-2.1	-9.0
343	272			21.8	40.3	38.1	-2.2	-2.1	-0.1
454	276			22.4	40.8	29.3	-11.5	-2.1	-9.5
479	278			21.5	40.0	34.0	-6.0	-2.1	-3.9
430	278			21.2	39.7	28.4	-11.2	-2.1	-9.2
512	278			21.5	40.0	28.4	-11.6	-2.1	-9.5
450	278			21.1	39.6	31.0	-8.6	-2.1	-6.5
365	278			21.9	40.4	30.7	-9.7	-2.1	-7.6
321	279			22.0	40.5	37.2	-3.3	-2.1	-1.2
504	280			22.8	41.2	28.8	-12.4	-2.1	-10.3
Average	271						-1.8	-2.1	0.2

Table D.06 Tonality Assessment Table - 9.5 m/s

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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)
582	580			22.2	41.4	35.0	-6.4	-2.4	-4.0
74	588			21.8	40.9	40.5	-0.5	-2.4	1.9
369	591			21.3	40.4	39.4	-1.1	-2.4	1.3
52	596			21.5	40.6	40.9	0.2	-2.4	2.6
586	596			20.9	40.1	41.5	1.4	-2.4	3.8
524	603			20.9	40.1	39.8	-0.3	-2.4	2.2
26	603			21.9	41.1	38.7	-2.3	-2.4	0.1
523	604			21.5	40.7	39.1	-1.6	-2.4	0.8
587	611			21.2	40.4	39.1	-1.3	-2.4	1.1
585	612			21.3	40.5	36.8	-3.8	-2.4	-1.3
319	615			21.6	40.8	43.5	2.7	-2.4	5.1
531	615			21.3	40.6	42.6	2.0	-2.4	4.4
584	616			21.0	40.2	43.6	3.4	-2.4	5.8
519	617			22.2	41.5	44.8	3.4	-2.4	5.8
443	618			21.7	41.0	42.9	2.0	-2.4	4.4
343	618			22.2	41.4	43.0	1.5	-2.4	4.0
309	618			23.5	42.7	43.4	0.7	-2.4	3.1
77	619			21.0	40.2	44.2	3.9	-2.4	6.4
148	620			22.0	41.2	37.0	-4.3	-2.4	-1.8
433	620			21.8	41.0	44.7	3.6	-2.4	6.1
515	620			22.1	41.3	42.0	0.7	-2.4	3.1
366	620			22.5	41.8	43.4	1.6	-2.4	4.1
365	621			22.9	42.1	38.5	-3.7	-2.4	-1.2
432	621			22.1	41.3	42.7	1.3	-2.4	3.8
Average	610						0.9	-2.4	3.3

Table D.06 Tonality Assessment Table - 9.5 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement
 Report ID: 15427.00.T16.RP3

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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)
77	1238			22.0	43.0	35.1	-8.0	-3.0	-5.0
433	1238			22.2	43.2	39.0	-4.2	-3.0	-1.2
366	1239			22.3	43.3	38.6	-4.7	-3.0	-1.7
515	1241			22.4	43.4	38.3	-5.2	-3.0	-2.1
432	1242			22.8	43.8	39.3	-4.5	-3.0	-1.5
519	1243			22.5	43.6	38.7	-4.9	-3.0	-1.9
321	1260			23.6	44.7	39.5	-5.1	-3.0	-2.1
454	1261			23.4	44.5	32.3	-12.3	-3.0	-9.2
343	1267			22.9	44.0	34.3	-9.7	-3.0	-6.7
365	1269			22.7	43.9	31.6	-12.3	-3.0	-9.3
450	1270			22.2	43.3	40.5	-2.9	-3.0	0.2
18	1271			21.9	43.0	33.1	-9.9	-3.0	-6.9
430	1271			21.7	42.9	36.8	-6.1	-3.0	-3.1
479	1272			22.4	43.5	35.9	-7.5	-3.0	-4.5
14	1274			21.9	43.1	28.4	-14.7	-3.1	-11.7
341	1278			21.8	43.0	41.3	-1.7	-3.1	1.4
504	1282			22.3	43.5	36.7	-6.7	-3.1	-3.7
569	1287			22.1	43.2	41.8	-1.4	-3.1	1.6
512	1289			22.4	43.6	36.0	-7.6	-3.1	-4.5
248	1290			22.3	43.5	41.5	-2.0	-3.1	1.1
413	1292			22.1	43.3	39.8	-3.5	-3.1	-0.4
284	1306			22.7	44.0	29.5	-14.5	-3.1	-11.4
Average	1267						-5.4	-3.0	-2.3

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)
74	1760			20.0	42.4	28.2	-14.2	-3.4	-10.8
586	1780			18.7	41.2	35.0	-6.2	-3.4	-2.8
369	1784			19.8	42.3	35.1	-7.2	-3.4	-3.8
443	1787			20.0	42.5	38.9	-3.5	-3.4	-0.1
432	1804			21.1	43.7	37.9	-5.8	-3.4	-2.4
587	1806			19.2	41.7	32.4	-9.3	-3.4	-5.9
524	1807			19.0	41.5	34.4	-7.1	-3.4	-3.7
523	1807			19.2	41.8	35.6	-6.2	-3.4	-2.8
531	1820			18.8	41.4	39.9	-1.4	-3.4	2.0
319	1822			20.9	43.5	41.0	-2.4	-3.4	1.0
584	1825			18.9	41.5	36.4	-5.1	-3.4	-1.7
343	1828			20.2	42.8	39.1	-3.8	-3.4	-0.4
309	1830			21.0	43.6	41.6	-2.0	-3.4	1.5
77	1832			19.6	42.2	38.8	-3.4	-3.4	0.0
366	1832			19.8	42.5	39.6	-2.9	-3.4	0.5
515	1833			20.3	42.9	37.0	-6.0	-3.4	-2.5
433	1835			19.9	42.5	38.3	-4.2	-3.4	-0.8
365	1836			20.2	42.8	33.7	-9.1	-3.4	-5.7
519	1837			20.7	43.3	37.3	-6.0	-3.4	-2.6
Average	1814						-4.8	-3.4	-1.3

Table D.07 Tonality Assessment Table - 10 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
280	130			24.4	42.6	39.1	-3.6	-2.0	-1.6
447	135			23.3	41.6	38.8	-2.7	-2.0	-0.7
590	135			21.2	39.5	40.4	0.9	-2.0	2.9
518	135			21.8	40.1	42.1	2.0	-2.0	4.0
583	135			24.1	42.4	37.2	-5.2	-2.0	-3.2
15	135			22.6	40.8	39.9	-0.9	-2.0	1.1
16	136			23.1	41.4	39.0	-2.5	-2.0	-0.4
576	136			26.5	44.8	35.3	-9.4	-2.0	-7.4
12	136			22.0	40.3	36.6	-3.7	-2.0	-1.7
76	136			21.6	39.8	40.3	0.4	-2.0	2.5
501	136			21.9	40.2	40.5	0.3	-2.0	2.3
223	136			24.0	42.3	40.6	-1.7	-2.0	0.3
142	136			23.2	41.5	41.2	-0.3	-2.0	1.7
476	136			22.5	40.8	42.5	1.7	-2.0	3.7
73	136			23.6	41.9	40.9	-1.0	-2.0	1.0
2	136			24.0	42.3	40.5	-1.8	-2.0	0.2
320	136			23.1	41.4	41.8	0.4	-2.0	2.4
338	136			23.6	41.9	42.5	0.6	-2.0	2.6
514	136			23.8	42.1	41.3	-0.8	-2.0	1.2
521	136			22.0	40.3	40.6	0.4	-2.0	2.4
305	136			23.4	41.7	42.1	0.4	-2.0	2.5
516	136			21.4	39.7	40.9	1.3	-2.0	3.3
527	137			25.9	44.2	38.2	-6.0	-2.0	-4.0
339	137			24.5	42.8	40.9	-1.9	-2.0	0.1
451	137			22.1	40.3	39.4	-0.9	-2.0	1.1
525	138			23.5	41.8	39.5	-2.3	-2.0	-0.3
510	138			25.7	44.0	36.8	-7.2	-2.0	-5.2
480	139			22.8	41.1	37.1	-3.9	-2.0	-1.9
51	139			23.6	41.9	40.4	-1.5	-2.0	0.5
150	140			24.4	42.7	35.0	-7.7	-2.0	-5.6
557	140			22.2	40.5	28.7	-11.8	-2.0	-9.8
1	140			24.8	43.1	30.9	-12.2	-2.0	-10.2
91	140			24.4	42.7	38.3	-4.4	-2.0	-2.4
589	140			23.1	41.4	29.6	-11.8	-2.0	-9.8
347	140			21.8	40.1	38.3	-1.8	-2.0	0.2
92	141			22.3	40.6	36.5	-4.0	-2.0	-2.0
511	141			23.7	42.0	30.2	-11.8	-2.0	-9.8
247	142			22.0	40.3	34.4	-5.9	-2.0	-3.9
313	142			23.5	41.8	33.5	-8.4	-2.0	-6.3
505	142			23.3	41.6	31.0	-10.7	-2.0	-8.7
97	143			24.6	42.9	36.0	-6.9	-2.0	-4.9
246	145			23.8	42.1	36.1	-6.0	-2.0	-4.0
507	145			22.9	41.2	32.6	-8.6	-2.0	-6.6
46	145			24.4	42.7	37.4	-5.3	-2.0	-3.3
Average	138						-2.3	-2.0	-0.2

Table D.07 Tonality Assessment Table - 10 m/s

Project: East Durham Wind Energy Centre- Turbine T16 - IEC 61400-11 Measurement

Report ID: 15427.00.T16.RP3

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)
320	263			21.8	40.3	35.9	-4.4	-2.1	-2.4
2	265			21.9	40.4	39.0	-1.4	-2.1	0.7
51	267			22.8	41.2	30.5	-10.7	-2.1	-8.6
15	267			21.0	39.4	36.3	-3.1	-2.1	-1.0
590	268			20.8	39.3	35.1	-4.2	-2.1	-2.1
338	268			21.3	39.7	38.2	-1.5	-2.1	0.6
476	269			21.4	39.9	39.3	-0.5	-2.1	1.6
501	269			20.8	39.2	37.8	-1.5	-2.1	0.6
16	270			21.4	39.9	35.7	-4.1	-2.1	-2.0
583	270			22.0	40.5	34.3	-6.2	-2.1	-4.1
73	271			22.0	40.4	41.1	0.7	-2.1	2.8
514	271			21.4	39.8	39.7	-0.1	-2.1	2.0
305	271			22.1	40.5	39.5	-1.0	-2.1	1.0
12	272			20.8	39.3	33.9	-5.3	-2.1	-3.2
525	272			22.6	41.1	31.9	-9.1	-2.1	-7.0
518	272			21.2	39.7	42.3	2.6	-2.1	4.7
76	272			20.9	39.3	38.2	-1.2	-2.1	0.9
142	272			21.6	40.1	34.0	-6.1	-2.1	-4.0
521	272			21.5	39.9	37.0	-2.9	-2.1	-0.9
516	272			21.7	40.2	38.1	-2.1	-2.1	0.0
223	273			23.0	41.5	32.7	-8.8	-2.1	-6.7
451	273			20.5	39.0	32.5	-6.5	-2.1	-4.4
92	273			21.8	40.2	29.3	-11.0	-2.1	-8.9
339	276			22.4	40.8	31.8	-9.1	-2.1	-7.0
480	278			21.7	40.2	36.4	-3.8	-2.1	-1.7
589	280			21.6	40.1	27.7	-12.3	-2.1	-10.2
347	280			21.5	40.0	34.4	-5.6	-2.1	-3.5
91	280			23.0	41.5	30.8	-10.6	-2.1	-8.5
557	283			22.2	40.7	37.1	-3.6	-2.1	-1.5
447	283			21.9	40.3	34.3	-6.1	-2.1	-4.0
150	283			22.1	40.6	37.6	-3.0	-2.1	-0.9
97	283			22.5	40.9	34.9	-6.0	-2.1	-3.9
507	284			21.4	39.9	29.9	-9.9	-2.1	-7.8
246	284			22.7	41.2	36.2	-5.0	-2.1	-2.9
247	284			21.3	39.8	36.3	-3.5	-2.1	-1.4
505	284			21.6	40.1	33.2	-6.9	-2.1	-4.8
528	284			23.3	41.7	35.2	-6.5	-2.1	-4.4
Average	275						-3.5	-2.1	-1.4

Table D.07 Tonality Assessment Table - 10 m/s

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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)
280	590			21.5	40.6	35.9	-4.7	-2.4	-2.3
320	601			22.1	41.2	39.9	-1.4	-2.4	1.0
338	607			21.5	40.7	42.0	1.3	-2.4	3.7
15	612			21.4	40.6	37.0	-3.7	-2.4	-1.3
590	612			21.1	40.3	39.6	-0.7	-2.4	1.7
518	613			21.9	41.1	42.2	1.1	-2.4	3.5
51	617			23.6	42.8	37.8	-5.0	-2.4	-2.6
16	617			21.5	40.7	39.0	-1.7	-2.4	0.7
223	618			22.0	41.3	38.8	-2.5	-2.4	0.0
2	618			21.9	41.1	40.0	-1.2	-2.4	1.3
476	618			22.3	41.5	43.8	2.2	-2.4	4.7
305	618			21.4	40.7	41.3	0.7	-2.4	3.1
521	618			21.8	41.0	42.5	1.4	-2.4	3.9
73	618			22.3	41.6	43.8	2.3	-2.4	4.7
583	619			22.8	42.0	40.5	-1.5	-2.4	0.9
Average	613						-0.3	-2.4	2.1

Table D.07 Tonality Assessment Table - 10 m/s

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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)
1	633			22.4	41.7	37.0	-4.7	-2.4	-2.2
510	636			21.8	41.1	37.5	-3.5	-2.4	-1.1
480	636			22.4	41.7	41.1	-0.6	-2.4	1.9
90	637			23.4	42.7	33.0	-9.7	-2.4	-7.3
347	639			22.4	41.7	39.7	-2.0	-2.5	0.4
91	640			22.4	41.7	37.8	-3.9	-2.5	-1.5
589	641			21.8	41.1	39.7	-1.4	-2.5	1.1
226	643			23.0	42.3	35.2	-7.1	-2.5	-4.7
511	644			21.4	40.7	34.5	-6.1	-2.5	-3.7
447	646			22.5	41.8	41.1	-0.7	-2.5	1.7
150	647			22.5	41.9	41.4	-0.5	-2.5	2.0
557	647			23.0	42.3	39.5	-2.8	-2.5	-0.4
313	649			22.6	41.9	38.0	-3.9	-2.5	-1.5
12	649			22.4	41.8	39.0	-2.8	-2.5	-0.3
247	649			21.6	40.9	42.4	1.5	-2.5	3.9
507	650			21.5	40.8	42.3	1.5	-2.5	3.9
505	651			21.6	40.9	43.3	2.4	-2.5	4.8
246	651			21.9	41.3	41.7	0.5	-2.5	2.9
498	652			22.1	41.4	34.7	-6.7	-2.5	-4.2
97	655			22.2	41.6	40.8	-0.7	-2.5	1.7
528	655			22.3	41.6	39.1	-2.5	-2.5	0.0
46	661			23.0	42.3	42.2	-0.2	-2.5	2.3
Average	646						-1.6	-2.5	0.9

Table D.07 Tonality Assessment Table - 10 m/s

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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)
480	1270			22.9	44.0	40.2	-3.9	-3.0	-0.8
223	1270			22.1	43.2	37.1	-6.1	-3.0	-3.0
528	1277			22.3	43.5	35.3	-8.1	-3.1	-5.1
347	1278			23.0	44.2	42.4	-1.7	-3.1	1.3
90	1278			23.4	44.5	38.4	-6.1	-3.1	-3.0
589	1282			22.3	43.5	39.4	-4.1	-3.1	-1.0
557	1284			24.0	45.1	41.1	-4.0	-3.1	-1.0
511	1285			21.9	43.0	36.7	-6.3	-3.1	-3.2
91	1285			23.4	44.6	35.9	-8.7	-3.1	-5.7
97	1287			22.9	44.1	40.9	-3.2	-3.1	-0.1
150	1288			22.2	43.4	42.4	-1.0	-3.1	2.0
447	1292			22.4	43.5	40.0	-3.5	-3.1	-0.5
247	1297			21.8	43.0	39.4	-3.6	-3.1	-0.5
313	1298			22.8	44.0	30.9	-13.1	-3.1	-10.0
507	1300			22.2	43.4	32.9	-10.5	-3.1	-7.5
505	1302			22.2	43.4	40.6	-2.8	-3.1	0.3
246	1305			22.4	43.6	39.1	-4.5	-3.1	-1.4
583	1309			23.6	44.8	35.9	-8.9	-3.1	-5.8
46	1320			23.6	44.9	29.8	-15.1	-3.1	-12.0
Average	1290						-4.9	-3.1	-1.8

Table D.08 Tonality Assessment Table - 10.5 m/s

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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)
306	135			22.8	41.1	40.7	-0.4	-2.0	1.6
93	135			22.8	41.1	41.5	0.4	-2.0	2.4
442	135			22.2	40.5	42.0	1.5	-2.0	3.5
21	136			23.1	41.4	40.5	-0.9	-2.0	1.1
13	136			22.2	40.5	38.6	-2.0	-2.0	0.0
350	136			23.2	41.5	43.0	1.5	-2.0	3.6
304	136			21.9	40.2	41.7	1.6	-2.0	3.6
452	136			23.2	41.5	42.1	0.6	-2.0	2.6
440	136			22.4	40.7	40.4	-0.3	-2.0	1.7
508	136			23.2	41.5	36.2	-5.3	-2.0	-3.3
252	136			21.4	39.7	40.6	0.9	-2.0	2.9
279	136			24.5	42.8	41.9	-0.9	-2.0	1.1
588	136			22.9	41.2	39.9	-1.3	-2.0	0.7
75	137			24.3	42.6	37.2	-5.5	-2.0	-3.5
431	137			22.2	40.5	38.6	-1.9	-2.0	0.1
346	137			23.7	42.0	40.5	-1.5	-2.0	0.5
262	137			23.8	42.1	37.1	-5.0	-2.0	-3.0
448	138			22.7	41.0	36.8	-4.3	-2.0	-2.2
22	139			21.3	39.6	37.1	-2.5	-2.0	-0.5
251	139			20.7	39.0	37.1	-1.9	-2.0	0.1
342	139			21.1	39.4	39.5	0.1	-2.0	2.1
249	139			20.7	39.0	34.9	-4.1	-2.0	-2.1
580	139			25.0	43.3	35.8	-7.5	-2.0	-5.5
435	140			23.9	42.2	36.8	-5.4	-2.0	-3.4
499	140			23.3	41.6	31.0	-10.6	-2.0	-8.6
Average	137						-1.3	-2.0	0.7

Table D.08 Tonality Assessment Table - 10.5 m/s

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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)
21	267			21.2	39.7	38.5	-1.2	-2.1	0.9
279	268			22.0	40.5	38.0	-2.5	-2.1	-0.4
93	268			21.4	39.8	41.2	1.3	-2.1	3.4
306	269			21.3	39.8	39.3	-0.5	-2.1	1.6
588	269			21.9	40.4	35.5	-4.8	-2.1	-2.7
508	269			21.8	40.3	33.9	-6.4	-2.1	-4.3
442	270			21.3	39.8	42.7	3.0	-2.1	5.0
580	271			23.1	41.5	29.4	-12.1	-2.1	-10.0
440	271			21.4	39.9	40.4	0.6	-2.1	2.6
350	271			21.8	40.2	38.5	-1.7	-2.1	0.4
252	271			20.9	39.4	37.8	-1.6	-2.1	0.5
452	272			22.0	40.4	39.2	-1.3	-2.1	0.8
304	272			23.2	41.7	40.1	-1.6	-2.1	0.5
13	272			20.9	39.3	36.2	-3.2	-2.1	-1.1
346	274			21.8	40.2	32.9	-7.4	-2.1	-5.3
431	275			21.4	39.8	32.1	-7.7	-2.1	-5.6
22	278			21.2	39.6	27.9	-11.8	-2.1	-9.7
342	278			20.6	39.1	35.7	-3.4	-2.1	-1.3
448	278			22.3	40.8	28.5	-12.2	-2.1	-10.1
499	280			22.3	40.8	35.8	-5.0	-2.1	-2.9
	272.15						-2.3	-2.1	-0.2

Table D.08 Tonality Assessment Table - 10.5 m/s

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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)
21	612			21.4	40.6	39.8	-0.8	-2.4	1.6
306	617			21.5	40.7	40.4	-0.3	-2.4	2.1
442	617			22.2	41.4	44.3	2.9	-2.4	5.3
304	618			22.3	41.5	41.1	-0.4	-2.4	2.0
440	619			21.5	40.7	42.1	1.4	-2.4	3.8
252	619			22.1	41.3	40.7	-0.6	-2.4	1.8
350	620			22.9	42.1	43.3	1.2	-2.4	3.6
93	620			21.8	41.1	42.0	0.9	-2.4	3.3
279	621			21.9	41.1	30.1	-11.0	-2.4	-8.6
508	622			22.9	42.1	37.1	-5.1	-2.4	-2.6
431	623			21.9	41.2	37.7	-3.4	-2.4	-1.0
346	628			23.0	42.3	34.9	-7.4	-2.4	-5.0
448	628			22.8	42.1	36.6	-5.5	-2.4	-3.0
262	629			22.6	41.8	32.6	-9.2	-2.4	-6.8
251	633			22.3	41.6	35.8	-5.9	-2.4	-3.4
22	635			21.5	40.8	38.8	-2.0	-2.4	0.4
75	636			22.6	41.8	33.6	-8.3	-2.4	-5.8
342	637			22.0	41.3	39.0	-2.3	-2.4	0.2
452	637			22.3	41.6	42.5	0.9	-2.4	3.3
13	638			21.4	40.7	37.4	-3.2	-2.5	-0.8
435	639			21.5	40.7	36.7	-4.1	-2.5	-1.6
249	639			22.6	41.9	38.0	-3.9	-2.5	-1.4
588	641			22.0	41.3	40.4	-0.9	-2.5	1.6
499	651			22.3	41.6	42.7	1.1	-2.5	3.5
Average	628						-1.5	-2.4	1.0

Table D.09 Tonality Assessment Table - 11 m/s

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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)
102	135			22.1	40.4	42.0	1.6	-2.0	3.6
23	136			21.0	39.3	38.6	-0.7	-2.0	1.3
317	136			21.6	39.9	44.1	4.2	-2.0	6.3
441	136			21.5	39.8	40.6	0.8	-2.0	2.8
281	137			25.3	43.6	41.6	-2.0	-2.0	0.0
302	137			23.9	42.2	41.4	-0.8	-2.0	1.3
250	137			20.8	39.1	38.6	-0.4	-2.0	1.6
352	138			23.9	42.2	40.5	-1.7	-2.0	0.3
381	139			22.9	41.2	37.5	-3.8	-2.0	-1.8
50	140			22.7	41.0	36.8	-4.2	-2.0	-2.2
436	140			20.6	38.9	37.2	-1.7	-2.0	0.4
348	140			21.4	39.7	34.8	-4.9	-2.0	-2.9
19	140			23.2	41.5	33.5	-8.0	-2.0	-5.9
227	141			25.4	43.7	34.8	-8.8	-2.0	-6.8
224	143			23.8	42.1	33.4	-8.7	-2.0	-6.7
286	143			23.8	42.1	30.2	-11.9	-2.0	-9.9
7	143			23.9	42.2	33.8	-8.5	-2.0	-6.4
Average	139						-1.6	-2.0	0.4

Table D.09 Tonality Assessment Table - 11 m/s

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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)
317	271			21.1	39.6	42.4	2.8	-2.1	4.8
102	271			21.1	39.6	39.0	-0.6	-2.1	1.5
441	272			21.1	39.6	34.5	-5.1	-2.1	-3.0
23	272			20.6	39.0	37.6	-1.4	-2.1	0.7
250	273			20.9	39.4	33.7	-5.7	-2.1	-3.6
281	273			22.6	41.1	29.7	-11.4	-2.1	-9.3
302	274			23.8	42.2	35.9	-6.3	-2.1	-4.3
352	276			21.1	39.6	34.5	-5.1	-2.1	-3.0
436	278			21.1	39.6	33.1	-6.4	-2.1	-4.3
19	278			21.2	39.6	30.2	-9.4	-2.1	-7.3
381	279			22.0	40.5	29.9	-10.5	-2.1	-8.4
348	279			20.5	39.0	31.9	-7.1	-2.1	-5.0
227	284			23.7	42.1	37.5	-4.7	-2.1	-2.6
224	284			22.5	41.0	30.6	-10.4	-2.1	-8.3
7	284			21.8	40.3	33.0	-7.3	-2.1	-5.2
50	284			22.2	40.7	35.1	-5.6	-2.1	-3.5
Average	277						-4.1	-2.1	-2.0

Table D.09 Tonality Assessment Table - 11 m/s

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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)
7	614			23.0	42.2	40.6	-1.6	-2.4	0.8
102	619			21.9	41.1	42.0	0.9	-2.4	3.3
317	619			22.5	41.7	46.9	5.2	-2.4	7.6
281	621			22.1	41.3	33.2	-8.1	-2.4	-5.7
23	622			21.2	40.5	39.9	-0.6	-2.4	1.9
250	623			22.1	41.3	39.7	-1.6	-2.4	0.9
441	625			22.1	41.4	40.9	-0.5	-2.4	2.0
302	626			22.3	41.5	36.7	-4.9	-2.4	-2.5
352	632			22.2	41.5	38.4	-3.1	-2.4	-0.6
436	635			23.2	42.5	36.4	-6.1	-2.4	-3.7
348	636			22.3	41.6	38.3	-3.2	-2.4	-0.8
19	636			21.3	40.6	38.4	-2.2	-2.4	0.2
381	637			22.0	41.3	37.1	-4.2	-2.4	-1.7
Average	627						-1.0	-2.4	1.4

Appendix E Measurement Data

Table E.01 Measurement data - Turbine ON

Project: East Durham Wind Energy Centre - Turbine T16 - IEC 61400-11 Measurement
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***Blank data denotes values that were omitted in the analysis due to an extraneous event during recording

Data Point #	Standardized Wind Speed	Wind	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 (hPa)	Relative Humidity (%)
1	10.1	54.8	1621	349.6	359.3	15.3	8.3	7.9	6	95.5	79	
2		9.8	1591	349.6	359.3	14.8	8.0	6.6	6	95.5	79	
3			1595	349.6	359.3	14.4	7.5	6.9	6	95.5	79	
4			1520	349.6	359.3	14.3	5.8	6.9	6	95.5	78	
5	8.0	54.5	1220	349.6	359.3	14.5	5.9	7.4	6	95.5	78	
6	8.7	53.9	1399	349.6	359.3	14.9	6.9	8.1	6	95.5	78	
7	11.1	54.7	1632	349.6	359.3	15.8	9.1	9.9	6	95.5	78	
8			1590	349.6	359.3	15.2	7.6	9.0	6	95.5	78	
9			1593	349.6	359.3	14.9	6.8	8.6	6	95.5	78	
10			1528	349.6	359.3	14.2	7.2	8.4	6	95.5	78	
11	11.7	54.1	1627	349.6	359.3	15.2	9.6	8.8	6	95.5	78	
12	10.0	53.8	1591	349.6	359.3	15.3	8.2	9.9	6	95.5	78	
13	10.5	53.3	1610	349.6	359.3	15.1	8.7	9.5	6	95.5	78	
14	9.5	53.7	1608	349.6	359.3	15.1	7.8	8.4	6	95.5	78	
15	10.1	53.3	1609	349.6	359.3	14.9	8.3	8.4	6	95.5	78	
16	9.8	53.7	1622	349.6	359.3	15.0	8.1	7.4	6	95.5	78	
17			1617	349.6	359.3	14.9	6.9	7.4	6	95.5	79	
18	9.6	53.5	1645	349.6	359.3	15.3	7.9	7.2	6	95.5	79	
19	10.8	53.5	1632	349.6	359.3	15.3	8.9	7.5	6	95.5	79	
20			1605	349.6	359.3	15.0	7.6	8.2	6	95.5	79	
21	10.3	54.1	1619	349.6	359.3	14.9	8.4	7.9	6	95.5	79	
22	10.5	54.1	1638	349.6	359.3	15.3	8.6	8.7	6	95.5	79	
23	10.8	54.0	1615	349.6	359.3	15.0	8.9	8.1	6	95.5	79	
24	11.8	54.3	1628	349.6	359.3	15.2	9.7	7.3	6	95.5	79	
25			1602	349.6	359.3	14.8	8.7	8.4	6	95.5	79	
26	9.5	55.0	1594	349.6	359.3	14.4	7.8	8.3	6	95.5	79	
27	8.7	53.4	1380	349.6	359.3	14.0	7.4	7.7	6	95.5	79	
28	9.0	53.6	1476	349.6	359.3	14.8	8.3	7.8	6	95.5	79	
29	8.6	53.4	1377	349.6	359.3	14.8	7.3	8.3	6	95.5	79	
30	7.8	51.9	1135	349.6	359.3	13.9	6.5	8.3	6	95.5	79	
31	7.7	52.1	1091	349.6	359.3	13.9	7.0	8.9	6	95.5	79	
32	8.0	52.2	1219	349.6	359.3	14.5	6.8	8.7	6	95.5	78	
33	7.9	53.3	1168	349.6	359.3	14.1	6.1	8.9	6	95.5	79	
34	7.4	51.8	972	349.6	359.3	13.2	6.0	9.4	6	95.5	78	
35	7.6	53.9	1059	349.6	359.3	13.8	6.5	9.4	6	95.5	78	
36	7.7	51.6	1104	349.6	359.3	14.0	6.6	10.5	6	95.5	78	
37	7.1	51.4	889	349.6	359.3	12.7	5.8	7.4	6	95.5	78	
38	7.0	50.5	828	349.6	359.3	12.7	7.3	7.4	6	95.5	78	
39	7.4	51.3	973	349.6	359.3	13.4	6.8	8.3	6	95.5	78	
40	8.1	52.3	1362	349.6	359.3	14.6	7.4	8.5	6	95.5	78	
41	8.4	54.1	1322	349.6	359.3	14.8	7.1	8.4	6	95.5	78	
42	7.7	53.4	1110	349.6	359.3	13.8	5.6	7.4	6	95.5	78	
43	7.5	51.3	1031	349.6	359.3	13.5	7.0	6.7	6	95.5	78	
44	8.2	52.6	1281	349.6	359.3	14.6	7.3	6.1	6	95.5	78	
45	8.9	53.5	1452	349.6	359.3	14.9	7.0	6.8	6	95.5	78	
46	10.1	54.5	1667	349.6	359.3	15.8	8.3	6.2	6	95.5	79	
47			1613	349.6	359.3	15.5	7.2	6.9	6	95.5	80	
48			1601	349.6	359.3	15.3	7.3	7.3	6	95.5	80	
49			1606	349.6	359.3	15.0	7.3	7.5	6	95.5	80	
50			1644	349.6	359.3	15.5	9.1	7.1	6	95.5	80	
51	10.0	55.3	1593	349.6	356.1	15.1	8.2	7.5	6	95.5	80	
52	9.4	54.7	1588	349.6	355.4	14.5	7.7	7.7	6	95.5	79	
53			1650	349.6	355.4	15.2	7.6	7.2	6	95.5	79	
54			1647	349.6	355.4	15.5	8.6	8.4	6	95.5	79	
55			1618	349.6	355.4	15.3	9.2	9.1	6	95.5	79	
56			1620	349.6	355.4	15.2	9.7	8.2	6	95.5	79	
57			1618	349.6	355.4	15.1	9.9	7.5	6	95.5	79	
58			1622	349.6	355.4	15.1	8.7	9.1	6	95.5	79	
59			1623	349.6	356.1	15.1	8.0	8.9	6	95.5	78	
60			1621	349.6	350.6	15.1	9.3	8.0	6	95.5	78	
61			1620	349.6	349.6	15.0	8.7	8.1	6	95.5	78	
62			1628	349.6	349.6	15.0	8.2	7.5	6	95.5	78	
63			1626	349.6	349.6	15.2	9.3	8.5	6	95.5	78	
64			1617	349.6	349.6	15.0	9.3	8.6	6	95.5	78	
65			1622	349.6	349.6	14.9	8.0	8.6	6	95.5	78	
66			1631	349.6	349.6	15.1	9.1	9.1	6	95.5	78	
67			1619	349.6	349.6	15.0	9.3	9.0	6	95.5	78	
68			1619	349.6	349.6	15.0	9.0	8.2	6	95.5	78	
69			1617	349.6	349.6	15.0	8.8	7.2	6	95.5	78	
70			1618	349.6	349.6	14.8	7.7	7.4	6	95.5	78	
71			1649	349.6	349.6	15.3	9.1	7.6	6	95.5	78	
72			1619	349.6	349.6	15.2	9.5	6.7	6	95.5	78	
73	9.9	55.2	1605	349.6	349.6	14.9	8.2	6.9	6	95.5	78	
74	9.3	55.0	1584	349.6	349.6	14.3	7.0	7.0	6	95.5	78	
75	10.7	54.1	1661	349.6	349.6	15.2	8.8	8.4	6	95.5	78	
76	10.0	53.8	1616	349.6	349.6	15.1	8.2	9.0	6	95.5	78	
77	9.3	55.0	1611	349.6	349.6	14.9	7.6	8.9	6	95.5	78	
78			1598	349.6	349.6	14.6	7.5	8.9	6	95.5	78	
79	8.3	54.6	1306	349.6	349.6	14.0	6.3	8.9	6	95.5	78	
80	7.8	53.4	1143	349.6	349.6	14.1	5.8	9.1	6	95.5	78	
81	8.2	52.8	1256	349.6	349.6	14.5	7.5	9.5	6	95.5	78	
82	7.9	53.4	1166	349.6	349.5	14.1	6.2	8.4	6	95.5	78	
83	7.4	51.8	1001	349.6	349.5	13.4	6.3	8.4	6	95.5	78	
84	7.5	52.3	1018	349.6	349.5	13.6	5.6	7.9	6	95.5	78	
85	7.4	51.5	972	349.6	349.5	13.3	5.8	8.1	6	95.5	78	
86	7.3	51.3	953	349.6	349.5	13.2	6.6	9.4	6	95.5	78	
87	8.2	51.8	1258	349.6	349.6	14.3	7.9	10.0	6	95.5	78	
88	9.6	54.4	1666	349.6	349.6	15.6	7.9	9.8	6	95.5	78	

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

Data Point #	Standardized Wind Speed	Wind	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 (hPa)	Relative Humidity (%)
89			1631	349.6	349.6	15.6	7.2	8.5	6	95.5	78	
90	10.0	54.9	1630	349.6	349.6	15.6	8.2	8.4	6	95.5	78	
91	10.2	54.8	1605	349.6	349.6	15.3	8.4	8.8	6	95.5	78	
92	10.1	54.8	1607	349.6	349.6	15.2	8.3	7.7	6	95.5	78	
93	10.5	55.3	1603	349.6	349.6	14.9	8.6	7.4	6	95.5	78	
94			1609	349.6	349.6	14.7	6.6	7.0	6	95.5	79	
95			1614	349.6	349.6	14.5	7.4	5.5	6	95.5	80	
96			1657	349.6	349.6	15.1	7.6	5.4	6	95.5	80	
97	10.1	54.7	1674	349.6	349.6	15.7	8.3	7.5	6	95.5	80	
98	13.9	55.1	1622	349.6	349.6	15.5	11.4	7.8	6	95.5	80	
99	11.9	55.3	1611	349.6	349.6	15.2	9.8	7.0	6	95.5	80	
100	11.8	54.3	1615	349.6	349.6	15.0	9.7	7.6	6	95.5	80	
101	11.6	53.6	1622	349.6	349.6	15.0	9.5	9.9	6	95.5	80	
102	11.0	54.4	1620	349.6	349.6	14.9	9.0	10.4	6	95.5	80	
103			1604	349.6	349.6	14.6	8.4	8.5	6	95.5	80	
104			1611	349.6	349.6	14.5	7.3	7.7	6	95.5	80	
105			1640	349.6	349.6	14.7	7.1	7.5	6	95.5	80	
106			1683	349.6	349.6	15.6	8.3	6.6	6	95.5	80	
107			1592	349.6	349.6	15.1	7.4	8.1	6	95.5	80	
108			1618	349.6	349.6	15.1	7.2	8.3	6	95.5	80	
109			1637	349.6	349.6	15.5	9.3	8.0	6	95.5	80	
110			1615	349.6	349.6	15.3	10.8	6.1	6	95.5	80	
111			1615	349.6	349.6	15.1	10.5	9.1	6			

Table E.01 Measurement data - Turbine ON

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

Data Point #	Standardized Wind Speed	Lid	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 (hPa)	Relative Humidity (%)
177			1140	349.6	352.5	14.7	6.9	8.2	6	95.5	77	
178			1125	349.6	352.5	14.9	7.7	9.3	6	95.5	77	
179			1102	349.6	352.5	14.2	6.9	10.2	6	95.5	77	
180			1046	349.6	352.5	13.4	5.9	11.5	6	95.5	77	
181			990	349.6	352.5	13.0	6.5	11.8	6	95.5	77	
182			816	349.6	352.5	12.5	5.8	10.5	6	95.5	77	
183			785	349.6	352.5	12.5	6.0	10.3	6	95.5	77	
184			890	349.6	352.5	13.1	6.3	9.9	6	95.5	77	
185			958	349.6	352.5	13.5	5.8	8.7	6	95.5	77	
186			874	349.6	352.5	12.7	5.2	8.1	6	95.5	77	
187			893	349.6	352.5	13.3	6.2	9.6	6	95.5	77	
188			1077	349.6	352.5	15.2	8.7	9.0	6	95.5	77	
189			1218	349.6	352.5	15.0	9.6	9.3	6	95.5	77	
190			1329	349.6	352.5	14.3	7.6	9.5	6	95.5	77	
191			1419	349.6	352.5	14.1	7.0	10.3	6	95.5	77	
192			1029	349.6	352.5	13.5	6.7	9.3	6	95.5	77	
193			1203	349.6	352.5	14.4	6.6	9.0	6	95.5	77	
194			1321	349.6	352.5	15.4	7.7	9.6	6	95.5	77	
195			1435	349.6	352.5	15.0	6.6	10.7	6	95.5	77	
196			1450	349.6	352.5	14.7	7.3	10.9	6	95.5	77	
197			1408	349.6	352.5	14.4	6.1	10.4	6	95.5	77	
198			1184	349.6	352.5	13.9	6.4	10.1	6	95.5	77	
199			1124	349.6	352.5	14.1	5.9	8.9	6	95.5	77	
200			1209	349.6	352.5	14.0	6.6	8.6	6	95.5	77	
201			1601	349.6	352.5	15.1	7.4	8.3	6	95.5	77	
202			1655	349.6	352.5	15.4	8.1	6.8	6	95.5	78	
203			1648	349.6	352.5	15.7	7.7	6.9	6	95.5	78	
204			1622	349.6	352.5	15.5	7.3	7.7	6	95.5	78	
205			1613	349.6	352.5	15.4	8.0	7.1	6	95.5	78	
206			1607	349.6	352.5	15.1	8.7	7.3	6	95.5	78	
207			1593	349.6	352.5	14.7	8.8	7.0	6	95.5	78	
208			1626	349.6	352.5	14.7	8.3	7.7	6	95.5	78	
209			1610	349.6	352.5	14.8	7.4	6.4	6	95.5	78	
210			1617	349.6	352.5	14.7	6.9	6.5	6	95.5	78	
211			1623	349.6	352.5	14.9	7.5	6.9	6	95.5	78	
212			1624	349.6	352.5	14.8	7.3	6.3	6	95.5	78	
213			1643	349.6	352.5	15.1	7.7	6.2	6	95.5	78	
214			1601	349.6	352.5	14.8	6.7	6.5	6	95.5	78	
215	9.1	53.9	1484	349.6	352.5	14.7	6.0	7.6	6	95.5	79	
216			1616	349.6	352.5	15.2	7.3	7.7	6	95.5	78	
217	8.6	54.0	1361	349.6	352.5	14.8	6.4	8.8	6	95.5	79	
218	7.9	52.8	1161	349.6	352.5	14.1	5.0	7.9	6	95.5	79	
219	7.4	52.7	1004	349.6	352.5	13.4	5.5	7.3	6	95.5	79	
220	7.0	51.6	830	349.6	352.5	12.6	6.7	8.7	6	95.5	79	
221	6.9	50.0	801	349.6	352.5	12.4	5.4	9.5	6	95.5	77	
222	7.8	50.3	1157	349.6	352.5	14.0	8.6	8.8	6	95.5	77	
223	10.1	53.4	1629	349.6	352.5	15.1	8.3	8.7	6	95.5	77	
224	11.1	53.8	1658	349.6	352.5	15.6	9.1	7.6	6	95.5	77	
225	9.7	53.6	1644	349.6	352.5	15.9	8.0	8.5	6	95.5	77	
226	10.2	55.2	1592	349.6	352.5	15.3	8.4	8.6	6	95.5	77	
227	11.1	54.8	1624	349.6	352.5	15.6	9.1	9.1	6	95.5	77	
228			1598	349.6	352.5	15.1	9.2	8.9	6	95.5	77	
229			1604	349.6	352.5	14.9	7.9	9.7	6	95.5	77	
230			1622	349.6	352.5	14.9	7.7	8.5	6	95.5	77	
231			1622	349.6	352.5	14.9	7.9	8.0	6	95.5	77	
232			1627	349.6	352.5	14.9	8.4	7.2	6	95.5	77	
233			1646	349.6	352.5	15.3	8.4	8.7	6	95.5	77	
234			1592	349.6	352.5	14.8	8.1	9.3	6	95.5	77	
235			1601	349.6	352.5	14.6	7.3	9.7	6	95.5	77	
236			1484	349.6	352.5	14.3	7.0	8.7	6	95.5	77	
237			1352	349.6	352.5	14.8	6.9	7.5	6	95.5	77	
238			1007	349.6	352.5	14.5	5.8	7.9	6	95.5	76	
239			482	349.6	352.5	12.1	7.9	7.0	6	95.5	76	
240			123	349.6	352.5	9.5	6.7	7.9	6	95.5	76	
241			100	349.6	352.5	7.4	6.7	7.5	6	95.5	76	
242			100	349.6	352.5	9.5	9.5	9.1	6	95.5	76	
243			100	349.6	352.5	2.9	7.7	10.3	6	95.5	76	
244			100	349.6	352.5	3.4	8.0	7.9	6	95.5	76	
245			1569	349.6	352.5	15.1	7.4	10.6	6	95.5	76	
246	10.1	54.8	1657	349.6	352.5	15.8	8.3	10.0	7	95.5	76	
247	10.1	54.3	1624	349.6	352.5	15.6	8.3	7.9	7	95.5	76	
248	9.5	54.6	1618	349.6	352.5	15.6	7.8	6.0	7	95.5	76	
249	10.3	53.5	1607	349.6	352.5	15.3	8.5	6.5	7	95.5	76	
250	11.0	54.9	1607	349.6	352.5	15.1	9.1	7.0	7	95.5	75	
251	10.4	55.0	1625	349.6	352.5	15.2	8.5	8.2	7	95.5	75	
252	10.7	54.7	1597	349.6	352.5	14.8	8.8	8.3	7	95.5	75	
253			1588	349.6	352.5	14.1	7.3	8.9	7	95.5	75	
254	8.2	53.7	1257	349.6	352.5	14.4	5.7	8.4	7	95.5	75	
255	8.7	54.3	1387	349.6	352.5	15.0	6.7	7.8	7	95.5	74	
256	8.1	54.0	1243	349.6	352.5	14.4	6.1	9.1	7	95.5	74	
257	7.3	53.3	963	349.6	352.5	13.1	5.5	9.9	7	95.5	74	
258	6.7	51.3	747	349.6	352.5	12.1	5.2	8.7	7	95.5	74	
259	6.7	49.9	754	349.6	352.5	12.4	5.3	8.3	7	95.5	74	
260	8.3	51.4	1299	349.6	352.5	14.0	8.1	7.7	7	95.5	74	
261			1646	349.6	352.5	15.6	7.5	7.1	7	95.5	72	
262	10.6	55.3	1606	349.6	352.5	15.2	8.8	6.6	6	95.5	71	
263			1619	349.6	352.5	15.3	8.6	6.8	7	95.5	71	
264			1616	349.6	352.5	15.2	9.3	7.5	7	95.5	71	

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

Data Point #	Standardized Wind Speed	Lid	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 (hPa)	Relative Humidity (%)
265			1621	349.6	350.0	15.1	9.3	7.3	7	95.5	71	
266			1616	349.6	343.6	15.0	9.0	7.6	7	95.5	71	
267			1617	349.6	337.1	14.9	8.5	7.5	7	95.5	73	
268			1634	349.6	334.9	15.1	8.6	6.8	7	95.5	74	
269			1613	349.6	334.9	14.9	8.4	6.6	7	95.5	74	
270			1633	349.6	335.0	15.2	10.1	6.0	7	95.5	74	
271			1605	349.6	334.9	14.9	8.6	5.3	7	95.5	74	
272			1623	349.6	335.0	14.8	8.0	5.3	7	95.5	74	
273			1645	349.6	335.6	15.4	9.7	5.8	7	95.6	76	
274			1610	349.6	341.2	15.1	8.6	5.5	7	95.6	76	
275			1619	349.6	346.4	15.0	7.3	8.4	7	95.6	76	
276			1600	349.6	346.6	14.7	7.3	7.5	7	95.6	76	
277			1653	349.6	346.6	15.2	7.8	7.6	7	95.6	76	
278			1606	349.6	346.6	15.1	7.5	7.9	7	95.6	76	
279	10.4	54.4	1611	349.6	346.6	15.0	8.6	6.4	7	95.6	75	
280	10.0	53.7	1583	349.6	346.6	14.4	8.3	7.7	7	95.6	75	
281	10.9	53.2	1645	349.6	346.6	14.9	9.0	9.2	7	95.6	75	
282			1613	349.6	346.6	14.7	7.5	9.6	7	95.6	75	
283			1578	349.6	346.6	14.5	6.5	9.9	7	95.6	75	
284	9.6	53.9	1676	349.6	346.6	15.6	7.9	8.3	7	95.6	75	
285			1627	349.6	346.6	15.5	7.4	7.9	7	95.6	75	
286			1623	349.6	346.6	15.6	8.9	10.6	7	95.6	76	
287	10.8	53.6	1623	349.6	346.6	14.8	7.6	9.2	7	95.6	76	
288			1613	349.6	346.6	14.9	5.5	9.3	7	95.6	76	
289			1602	349.6	346.6	14.6	5.8	10.2	7			

Table E.01 Measurement data - Turbine ON

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

Data Point #	Standardized Wind Speed	Lid	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 (hPa)	Relative Humidity (%)
353			1620	349.6	346.6	15.1	8.6	9.2	7	95.6	75	
354			1626	349.6	346.6	15.1	7.7	8.6	7	95.6	75	
355			1624	349.6	346.6	15.1	8.7	8.5	7	95.6	75	
356			1622	349.6	346.6	15.1	7.8	6.8	7	95.6	75	
357			1618	349.6	346.6	15.0	9.5	6.8	7	95.6	75	
358			1636	349.6	346.6	14.7	7.4	8.2	7	95.6	75	
359			1605	349.6	346.6	14.5	6.3	7.2	7	95.6	75	
360			1609	349.6	346.6	14.3	6.3	7.8	7	95.6	75	
361			1250	349.6	346.6	14.4	6.9	7.8	7	95.6	75	
362			1473	349.6	346.6	14.9	6.1	8.3	7	95.6	75	
363			1655	349.6	346.6	15.9	6.7	6.8	7	95.6	75	
364			1610	349.6	346.6	15.5	8.1	5.9	7	95.6	75	
365	9.4	54.4	1599	349.6	346.6	15.2	7.7	8.2	7	95.6	75	
366	9.4	54.8	1607	349.6	346.6	15.0	7.7	7.1	7	95.6	75	
367			1603	349.6	346.6	14.7	7.4	8.2	7	95.6	75	
368			1609	349.6	346.6	14.6	7.0	8.1	7	95.6	75	
369	9.3	54.0	1520	349.6	346.6	14.3	7.6	7.1	7	95.6	75	
370	8.6	54.1	1372	349.6	346.6	14.8	6.5	7.1	7	95.6	75	
371	9.2	54.6	1504	349.6	346.6	15.0	7.1	8.2	7	95.6	75	
372	8.2	54.1	1274	349.6	346.6	14.6	6.6	10.2	7	95.6	75	
373	7.6	52.5	1073	349.6	346.6	13.7	5.6	8.2	7	95.6	75	
374	7.1	50.3	888	349.6	346.6	12.8	5.6	7.2	7	95.6	75	
375	7.1	49.6	873	349.6	346.6	12.9	6.2	7.1	7	95.6	75	
376	7.6	50.4	1047	349.6	346.6	13.8	5.9	7.2	7	95.6	75	
377	7.9	51.8	1177	349.6	346.6	14.3	7.3	7.3	7	95.6	75	
378	7.7	51.6	1105	349.6	346.6	13.8	5.6	6.6	7	95.6	75	
379	7.9	51.2	1168	349.6	346.6	14.2	6.8	6.8	7	95.6	75	
380	9.2	53.3	1497	349.6	346.6	15.0	7.7	6.8	7	95.6	75	
381	10.9	54.2	1632	349.6	346.6	15.3	9.0	9.6	7	95.6	76	
382	9.0	54.5	1482	349.6	346.6	15.1	7.9	5.5	7	95.6	76	
383	8.2	53.8	1277	349.6	346.6	14.6	6.5	6.6	7	95.6	76	
384	7.6	52.8	1059	349.6	346.6	13.6	6.0	6.5	7	95.6	76	
385	7.3	50.3	933	349.6	346.6	13.1	5.9	7.2	7	95.6	76	
386	7.3	51.3	948	349.6	346.6	13.3	5.7	6.4	7	95.6	76	
387	7.6	50.9	1051	349.6	346.6	13.8	7.1	7.1	7	95.6	76	
388	7.8	52.3	1159	349.6	346.6	14.2	6.0	6.9	7	95.6	76	
389	8.0	51.8	1222	349.6	346.6	14.5	6.7	7.5	7	95.6	76	
390	7.8	51.6	1124	349.6	346.6	13.9	6.1	7.9	7	95.6	76	
391	7.3	50.7	952	349.6	346.6	13.2	5.4	7.9	7	95.6	76	
392	7.1	49.6	875	349.6	346.6	12.9	5.3	8.1	7	95.6	76	
393	6.9	49.4	808	349.6	346.6	12.6	4.8	7.0	7	95.6	76	
394	6.5	49.3	688	349.6	346.6	11.8	4.8	7.4	7	95.6	76	
395	6.0	48.6	519	349.6	346.6	10.5	4.6	6.8	7	95.6	76	
396	5.4	46.4	386	349.6	346.6	9.8	4.6	7.4	7	95.6	76	
397	5.2	46.3	325	349.6	346.6	9.3	4.5	8.9	7	95.6	76	
398	4.8	46.8	240	349.6	346.6	8.8	4.2	9.7	7	95.6	76	
399	4.8	45.8	252	349.6	346.6	8.7	4.8	9.3	7	95.6	75	
400	5.0	45.9	286	349.6	346.6	9.2	4.7	7.0	7	95.6	75	
401	6.0	45.7	521	349.6	346.6	11.3	6.1	8.9	7	95.6	75	
402	7.1	48.7	872	349.6	346.6	13.2	6.1	9.4	7	95.6	75	
403	7.1	49.8	880	349.6	346.6	12.8	5.3	9.1	7	95.6	75	
404	6.6	49.0	770	349.6	346.6	11.9	5.3	8.5	7	95.6	75	
405	6.2	48.1	595	349.6	346.6	11.3	5.9	7.3	7	95.6	76	
406	6.1	47.5	548	349.6	346.6	11.1	5.0	6.9	7	95.6	76	
407	6.0	47.4	536	349.6	346.6	11.0	5.2	6.7	7	95.6	76	
408	5.8	47.4	469	349.6	346.6	10.5	5.4	6.5	7	95.6	76	
409	5.5	46.6	413	349.6	346.6	10.0	4.7	7.0	7	95.6	76	
410	5.4	46.8	389	349.6	346.6	10.0	5.1	7.9	7	95.6	76	
411	6.0	47.4	528	349.6	346.6	11.1	5.6	7.4	7	95.6	76	
412	7.4	49.1	980	349.6	346.6	13.5	7.2	6.1	7	95.6	76	
413	9.3	52.9	1651	349.6	346.6	15.3	7.7	7.1	7	95.6	76	
414			1604	349.6	346.6	15.1	7.4	6.9	7	95.6	76	
415	8.2	54.4	1279	349.6	346.6	14.6	7.1	7.9	7	95.6	76	
416	7.6	53.5	1081	349.6	346.6	13.7	5.8	7.7	7	95.6	76	
417	7.2	52.0	896	349.6	346.6	12.9	6.1	6.3	7	95.6	76	
418	7.0	51.4	829	349.6	346.6	12.7	6.3	5.5	7	95.6	77	
419	6.7	51.0	753	349.6	346.6	12.2	5.4	5.6	7	95.6	77	
420	6.4	49.6	654	349.6	346.6	11.7	5.6	7.7	7	95.6	77	
421	6.8	48.8	773	349.6	346.6	12.5	5.4	5.0	7	95.6	77	
422	7.4	50.4	989	349.6	346.6	13.6	6.4	5.4	7	95.6	77	
423	7.6	51.3	1059	349.6	346.6	13.7	6.9	6.0	7	95.6	76	
424	7.5	51.0	1008	349.6	346.6	13.5	6.4	6.1	7	95.6	76	
425	7.4	50.4	920	349.6	346.6	13.4	6.8	6.8	7	95.6	76	
426	7.9	51.6	1177	349.6	346.6	14.4	6.1	7.7	7	95.6	76	
427	8.0	52.0	1202	349.6	346.6	14.4	5.9	5.5	7	95.6	76	
428	7.5	51.0	1015	349.6	346.6	13.4	6.1	4.3	7	95.6	76	
429			1639	349.6	346.6	15.3	7.6	4.9	7	95.6	76	
430	9.4	53.6	1622	349.6	349.6	15.2	7.8	6.3	8	95.6	73	
431	10.7	53.7	1620	349.6	349.6	15.1	8.8	5.7	8	95.6	73	
432	9.7	54.8	1597	349.6	349.6	14.8	8.0	5.8	8	95.6	73	
433	9.3	55.1	1627	349.6	349.6	14.9	7.7	5.8	8	95.6	73	
434			1643	349.6	349.6	15.2	7.5	5.5	8	95.6	74	
435	10.3	54.2	1641	349.6	349.6	15.4	8.5	8.1	8	95.6	74	
436	11.1	55.0	1626	349.6	349.6	15.4	9.1	8.0	8	95.6	74	
437	12.8	54.7	1622	349.6	349.6	15.3	10.5	8.0	8	95.6	74	
438	12.4	54.4	1613	349.6	349.6	15.1	10.2	9.1	8	95.6	74	
439	11.3	55.5	1622	349.6	349.6	15.0	9.3	8.3	8	95.6	74	
440	10.3	55.5	1623	349.6	349.6	15.0	8.5	8.1	8	95.6	72	

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

Data Point #	Standardized Wind Speed	Lid	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 (hPa)	Relative Humidity (%)
441	10.9	54.5	1626	349.6	349.6	15.1	9.0	9.8	8	95.6	72	
442	10.4	55.6	1617	349.6	349.6	14.9	8.6	9.7	8	95.6	72	
443	9.4	55.2	1611	349.6	349.6	14.7	7.7	7.6	8	95.6	72	
444			1613	349.6	349.6	14.6	7.5	7.1	8	95.6	72	
445			1625	349.6	349.6	14.7	7.3	6.8	8	95.6	72	
446			1616	349.6	349.6	14.5	7.4	6.7	8	95.6	73	
447	9.9	54.4	1675	349.6	349.6	15.4	8.2	6.7	8	95.6	73	
448	10.4	54.4	1629	349.6	349.6	15.3	8.5	9.5	8	95.6	73	
449			1605	349.6	349.6	15.0	7.5	9.3	8	95.6	73	
450	9.6	54.6	1634	349.6	349.6	15.3	7.9	8.1	8	95.6	73	
451	9.9	53.4	1615	349.6	349.6	15.1	8.2	7.8	8	95.6	73	
452	10.4	54.1	1625	349.6	349.6	15.1	8.6	6.6	8	95.6	75	
453			1636	349.6	349.6	15.4	7.0	7.6	8	95.6	75	
454	9.3	53.8	1618	349.6	349.6	15.2	7.6	9.3	8	95.6	75	
455			1594	349.6	349.6	14.9	7.9	9.6	8	95.6	75	
456			1357	349.6	349.6	13.6	6.6	8.8	8	95.6	75	
457	8.9	52.7	1449	349.6	349.6	14.4	7.4	8.9	8	95.6	75	
458	8.5	54.0	1340	349.6	349.6	15.1	7.8	8.0	8	95.6	70	
459	8.8	54.9	1437	349.6	349.6	15.3	8.2	8.8	8	95.6	70	
460	9.0	54.3	1470	349.6	349.6	14.9	8.9	7.9	8	95.6	70	
461			1519	349.6	349.6							

Table E.02 Measurement data - Background

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***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	8.2	45.6	0.0	7.6	7	95.5	76
2	8.7	46.2	0.0	8.1	7	95.5	76
3	10.5	46.5	0.0	9.7	7	95.5	77
4	9.6	47.4	0.0	8.9	7	95.5	77
5	9.2	46.9	0.0	8.6	7	95.5	77
6	9.3	45.7	0.0	8.7	7	95.5	77
7	9.4	44.7	0.0	8.7	7	95.5	77
8	9.1	44.7	0.0	8.5	7	95.5	76
9	6.9	48.1	0.0	6.4	7	95.5	75
10	6.6	48.6	0.0	6.2	7	95.5	75
11	6.3	50.5	0.0	5.8	7	95.5	75
12			0.0	7.5	7	95.5	75
13			0.0	7.0	7	95.5	74
14	9.2	48.8	0.0	8.5	7	95.5	75
15			0.0	7.3	7	95.5	75
16			0.0	7.3	7	95.5	75
17	9.2	50.9	0.0	8.6	7	95.5	75
18			0.0	7.5	7	95.5	75
19			0.0	8.1	7	95.5	75
20			0.0	8.0	7	95.5	75
21			0.0	8.3	7	95.5	76
22			0.0	8.9	7	95.5	76
23	10.4	46.9	0.0	9.6	7	95.5	76
24	10.2	48.6	0.0	9.5	7	95.5	76
25	9.9	49.3	0.0	9.2	7	95.5	76
26			0.0	8.8	7	95.5	76
27	9.1	50.7	0.0	8.4	7	95.5	73
28			0.0	7.3	7	95.5	73
29			0.0	6.8	7	95.5	73
30			0.0	8.8	7	95.5	73
31			0.0	7.2	7	95.5	73
32			0.0	9.0	7	95.5	73
33			0.0	8.0	7	95.5	73
34			0.0	5.6	7	95.5	73
35			0.0	6.2	7	95.5	73
36	6.0	47.5	0.0	5.6	7	95.5	73
37	7.6	45.9	0.0	7.0	7	95.5	73
38	7.6	45.4	0.0	7.1	7	95.5	73
39	8.3	48.5	0.0	7.7	7	95.5	74
40	9.2	49.9	0.0	8.6	7	95.5	74
41			0.0	7.3	7	95.5	74
42			0.0	7.5	7	95.5	74
43			0.0	7.1	7	95.5	74
44	7.5	47.6	0.0	7.0	7	95.5	74
45	9.9	47.6	0.0	9.2	7	95.5	75
46	10.2	46.2	0.0	9.5	7	95.5	75
47	10.3	46.5	0.0	9.6	7	95.5	75
48	10.2	45.4	0.0	9.5	7	95.5	75
49	8.8	44.1	0.0	8.2	7	95.5	75
50	7.6	45.8	0.0	7.0	7	95.5	75
51	7.0	46.0	0.0	6.5	7	95.5	74
52	6.6	47.9	0.0	6.1	7	95.5	74
53	7.6	48.4	0.0	7.1	7	95.5	74
54			0.0	7.8	7	95.5	74
55			0.0	7.2	7	95.5	74
56			0.0	7.0	7	95.5	74
57			0.0	7.2	7	95.5	74
58			0.0	9.3	7	95.5	74
59			0.0	8.1	7	95.5	74
60			0.0	5.7	7	95.5	74
61			0.0	6.0	7	95.5	74
62			0.0	5.9	7	95.5	74
63			0.0	7.8	7	95.5	74
64			0.0	7.7	7	95.5	76
65			0.0	6.5	7	95.5	76
66	10.9	49.9	0.0	10.2	7	95.5	76
67			0.0	8.6	7	95.5	76
68			0.0	7.7	7	95.5	76
69			0.0	8.3	7	95.5	75
70			0.0	7.7	7	95.5	75
71			0.0	7.7	7	95.5	75
72			0.0	7.4	7	95.5	75
73			0.0	8.6	7	95.5	75
74			0.0	8.2	7	95.5	74
75	10.9	51.1	0.0	10.1	7	95.5	73
76			0.0	10.5	7	95.5	73
77			0.0	9.6	7	95.5	73
78			0.0	8.0	7	95.5	73
79			0.0	6.7	7	95.5	73
80			0.0	6.1	7	95.5	73
81			0.0	6.3	7	95.5	76
82			0.0	8.7	7	95.5	76
83			0.0	9.2	7	95.5	76

***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			0.0	8.1	7	95.5	76
85	8.3	43.7	0.0	7.7	7	95.5	76
86	10.0	44.2	0.0	9.7	7	95.5	75
87	9.3	44.4	0.0	8.6	7	95.5	72
88	9.0	46.1	0.0	8.4	7	95.5	72
89	9.0	48.1	0.0	8.4	7	95.5	72
90	9.0	47.7	0.0	8.3	7	95.5	72
91	11.8	49.2	0.0	10.8	7	95.5	72
92	10.9	49.0	0.0	10.1	7	95.5	71
93	9.4	47.2	0.0	8.7	7	95.5	71
94			0.0	8.6	7	95.5	71
95			0.0	8.9	7	95.5	71
96			0.0	9.3	7	95.5	71
97			0.0	8.9	7	95.5	71
98			0.0	9.4	7	95.5	72
99			0.0	7.9	7	95.5	74
100			0.0	6.9	7	95.5	74
101			0.0	7.0	7	95.5	74
102			0.0	6.7	7	95.5	74
103	7.2	46.5	0.0	6.7	7	95.5	74
104	9.7	45.4	0.0	9.0	7	95.5	74
105	7.9	47.4	0.0	7.3	7	95.5	73
106			0.0	7.4	7	95.5	73
107	9.4	47.5	0.0	8.8	7	95.5	73
108	10.0	47.6	0.0	9.3	7	95.5	73
109	8.9	47.2	0.0	8.3	7	95.5	73
110	8.4	47.4	0.0	7.8	7	95.5	73
111	8.4	45.4	0.0	7.8	7	95.5	72
112			0.0	8.6	7	95.5	72
113			0.0	8.9	7	95.5	72
114			0.0	8.8	7	95.5	72
115			0.0	7.8	7	95.5	72
116			0.0	9.5	7	95.5	72
117			0.0	9.0	7	95.5	72
118			0.0	7.8	7	95.5	72
119			0.0	6.7	7	95.5	72
120			0.0	6.5	7	95.5	72
121	6.6	47.6	0.0	6.1	7	95.5	72
122	7.2	45.4	0.0	6.7	7	95.5	72
123	7.3	45.8	0.0	6.8	7	95.5	74
124	6.2	46.9	0.0	5.7	7	95.5	74
125	6.3	48.4	0.0	5.9	7	95.5	74
126			0.0	6.6	7	95.5	74
127			0.0	6.0	7	95.5	74
128			0.0	6.9	7	95.5	74
129			0.0	8.2	7	95.5	73
130			0.0	8.9	7	95.5	73
131			0.0	8.0	7	95.5	73
132			0.0	6.6	7	95.5	73
133			0.0	7.4	7	95.5	73
134			0.0	8.8	7	95.5	73
135			0.0	8.0	7	95.5	73
136			0.0	6.6	7	95.5	73
137			0.0	5.6	7	95.5	73
138			0.0	6.0	7	95.5	73
139			0.0	7.2	7	95.5	73
140	9.2	47.6	0.0	8.5	7	95.5	73
141	9.2	48.2	0.0	8.5	7	95.5	74
142	8.8	45.0	0.0	8.2	7	95.5	74
143	8.1	48.1	0.0	7.5	7	95.5	74
144			0.0	9.0	7	95.5	74
145			0.0	8.6	7	95.5	74
146	9.1	50.1	0.0	8.4	7	95.5	73
147	10.0	50.9	0.0	9.3	7	95.5	72
148			0.0	7.2	7	95.5	72
149			0.0	6.6	7	95.5	72
150	9.2	49.7	0.0	8.6	7	95.5	72
151	10.9	48.2	0.0	10.1	7	95.5	72
152	9.7	46.2	0.0	9.0	7	95.5	72
153	9.0	48.0	0.0	8.4	7	95.5	72
154			0.0	9.1	7	95.5	72
155			0.0	9.2	7	95.5	72
156			0.0	9.1	7	95.5	72
157			0.0	7.8	7	95.5	72
158			0.0	7.4	7	95.5	72
159			0.0	6.7	7	95.5	74
160			0.0	6.9	7	95.5	74
161			0.0	6.4	7	95.5	74
162			0.0	7.7	7	95.5	74
163			0.0	7.9	7	95.5	74
164			0.0	7.5	7	95.5	74
165			0.0	8.1	7	95.5	74
166			0.0	9.4	7	95.5	74

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Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
167			0.0	10.7	7	95.5	74
168	10.1	46.5	0.0	9.4	7	95.5	74
169			0.0	8.9	7	95.5	74
170	10.5	48.2	0.0	9.7	7	95.5	74
171	10.0	48.6	0.0	9.2	7	95.5	72
172	10.1	46.3	0.0	9.4	7	95.5	72
173	10.0	42.6	0.0	9.3	7	95.5	72
174	9.5	42.0	0.0	8.8	7	95.5	72
175	9.9	43.2	0.0	9.2	7	95.5	72
176	10.5	43.9	0.0	9.8	7	95.5	72
177	9.7	45.5	0.0	9.0	7	95.5	72
178	10.5	44.1	0.0	9.7	7	95.5	72
179	9.7	43.6	0.0	9.0	7	95.5	72
180	8.1	43.4	0.0	7.5	7	95.5	72
181	7.2	42.2	0.0	6.7	7	95.5	72
182	6.9	41.5	0.0	6.4	7	95.5	72
183	8.1	45.5	0.0	7.5	7	95.5	75
184	7.0	45.6	0.0	6.5	7	95.5	75
185	5.7	47.3	0.0	5.3	7	95.5	75
186	6.2	45.6					

End of Report
