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Goshen Wind Energy Centre – Turbine T84 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	2015.01.28
2	Issued Edition 3.0 test report	2017.11.07

This report in its entirety, including appendices contains 78 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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Note N6.040.17

1 Introduction

Aercoustics Engineering Limited (Aercoustics) was retained by Goshen Wind LP to conduct an acoustic measurement of turbine T84 at the Goshen 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 T84.

2 Wind Turbine Information

2.1 Wind turbine equipment specific information

Wind turbine specific equipment information for turbine T84 was provided by Nextera and is summarized in Tables 1 – 5.

Table 1 - Wind Turbine Details

Wind Turbine Details	
Manufacturer	GE
Model Number	1.6 – 100 ESS
Turbine ID	WGS1-0084

Table 2 - Operating Details

Operating Details	
Vertical or Horizontal axis wind turbine	Horizontal
Upwind or downwind rotor	Upwind
Hub height	79.7m
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 Speed
Power curve	See Figure B.01
Rotational speed at each integer standardised wind speed	See Figure B.02
Rated power output	1.62MW
Control software version	4.07.03

Table 3 - Rotor Details

Rotor Details	
Rotor control devices	Electric Motors
Presence of vortex generators, stall strips, serrated trailing edges	Serrated trailing edges
Blade type	TBI
Serial number	20423, 50383, 20424
Number of blades	3

Table 4 - Gearbox Details

Gearbox Details	
Manufacturer	Rexroth
Model number	GPV457.1
Serial number	737-5205

Table 5 - Generator Details

Generator Details	
Manufacturer	HITACHI
Model number	-
Serial number	530493-9

2.2 Wind Turbine Location

Turbine T84 is located in the municipality of South Huron, approximately 600m West of Mollard Line, and 1,170m East of Klondyke Road. The area surrounding T84 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 T84 is summarized in Table 6.

Table 6 - Acoustic Measurement Equipment

Equipment	Manufacturer Name & Model	Serial Number
Acoustic Data acquisition system	LMS SCADA Mobile	53103922
Microphone	B&K 4189	2625197
Pre-amplifier	B&K 2671	2614901
Acoustic calibrator	B&K 4231	2513183

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 T84. 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	G4420002
Serial to Analog Converter	NOKEVAL 7470	A159784

3.2 Measurement Setup

3.2.1 Microphone Placement

The measurement microphone was setup 130m 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 T84. 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 T84 were taken, the surrounding land was cleared farmland. 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
January 19, 2016	Background	11:03am	12:03pm
	Turbine ON	12:29pm	1:29pm
	Turbine ON	1:34pm	2:34pm
	Turbine ON	2:44pm	3:58pm
	Turbine ON	4:03pm	4:28pm
January 25, 2016	Turbine ON	7:26pm	8:09pm

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 T84's power curve (as per the standard), while wind direction was provided by T84's yaw position. Background data was obtained from an anemometer located 10m above ground level near T84.

Temperature and pressure readings during the measurement period were provided by the 10m anemometer, located near turbine T84 for the duration of Aercoustics measurements.

3.5 Turbine operational information

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

4 Measurement Results

4.1 Deviations from IEC-61400-11 Edition 3.0

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

The acoustic signal to noise ratio for the noise levels is $>12.9\text{dB}$ for the entire wind speed range. This deviation is therefore considered to be negligible to the assessment of the maximum sound power of this turbine for this test. This method is in accordance with recommendations made by the convenor of the IEC 61400-11 working group and detailed in Note N6.023.17 and provided in Appendix F.

4.2 Special Notes & Considerations

T57 was turned off for duration of test.

4.3 Analysis Details

The following section outlines analysis of the measurement data acquired for T84. 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	49.0	101	36.1	16	48.8
7.5	50.7	227	36.6	26	50.5
8	51.9	235	35.9	53	51.8
8.5	52.9	153	37.4	56	52.7
9	53.3	101	38.0	53	53.1
9.5	53.7	56	37.5	42	53.6
10	53.6	43	39.3	44	53.4
10.5	53.7	33	38.4	20	53.6
11	53.8	12	39.6	10	53.6

4.6 Sound Power Level of Turbine

The calculated sound power level of the turbine T84 (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	97.7	0.7
7.5	99.4	0.7
8	100.6	0.7
8.5	101.6	0.7
9	102.0	0.7
9.5	102.4	0.7
10	102.3	0.7
10.5	102.4	0.7
11	102.5	0.8

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

Wind Speed (m/s)	Apparent L_{WA} , (dBA)	Uncertainty (dB)
5	97.8	0.6
6	101.2	0.7
7	102.3	0.7
8	102.6	0.6

4.7 Tonality Analysis

The tonality analysis for Turbine T84 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 (%)
7.5	527	-3.3	-0.9	66	227	29%
8	543	-1.4	0.9	97	235	41%
8.5	535	-0.1	2.2	74	153	48%
9	544	-0.2	2.2	65	101	64%
9.5	544	-3.6	-1.2	12	56	21%
10	574	-5.1	-2.8	28	43	65%
10.5	551	-3.3	-0.9	7	33	21%

5 Closure

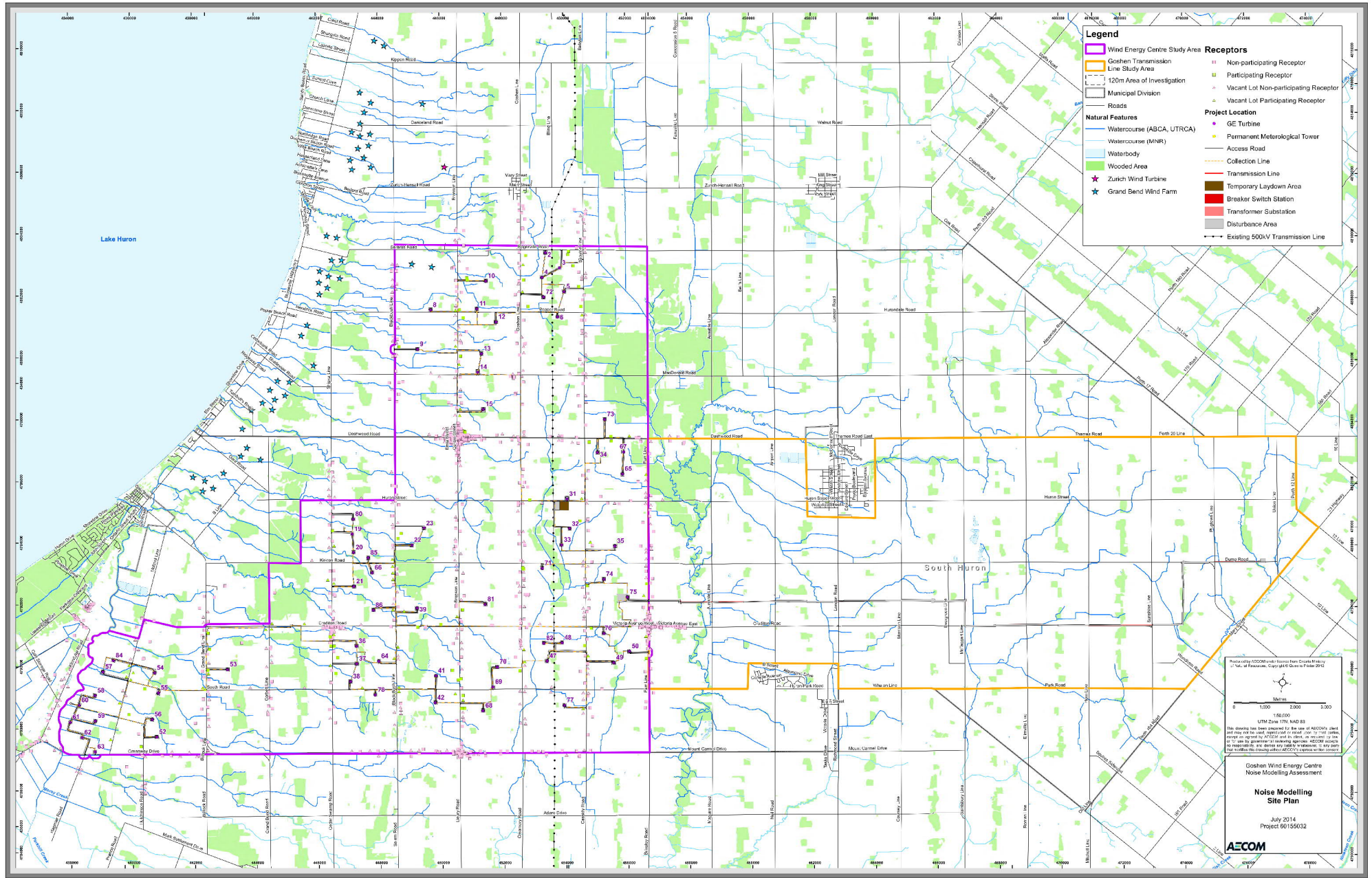
Measurements and analysis were carried on Turbine T84 of the Goshen Wind Energy Centre, located in the municipality of South Huron as per International IEC 61400-11 (Edition 3.0, released 2012-11), “Wind turbine generator systems – Part 11: Acoustic noise measurement techniques”.

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



14461.02.T84.RP2

Project Name

Scale: NTS
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Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

Figure Title

Site Plan

Figure A.01





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 Reviewed by: AM
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 Revision: 1

Project Name

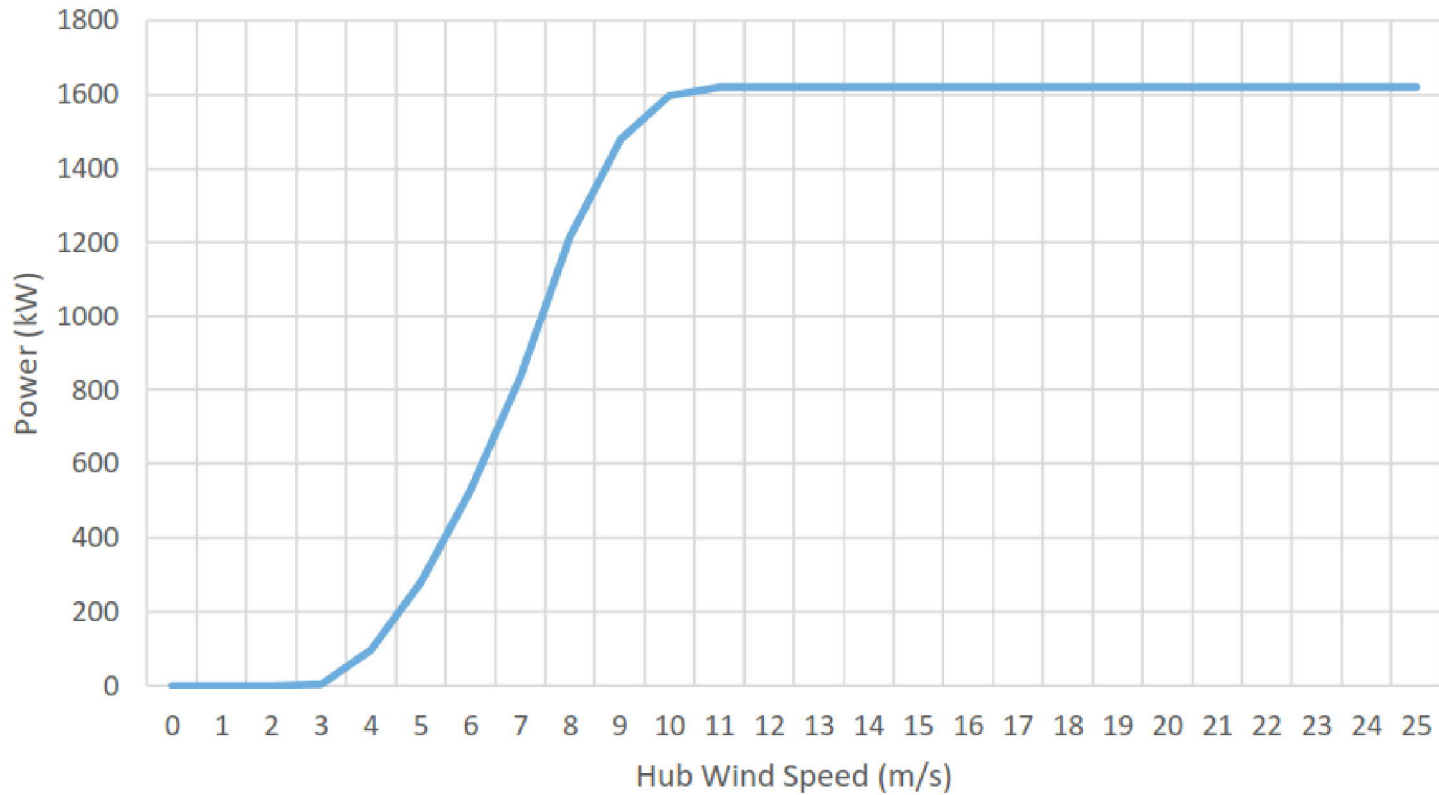
Goshen Wind Energy Centre - Turbine T26 - IEC61400-11 Edition 3.0

Figure Title

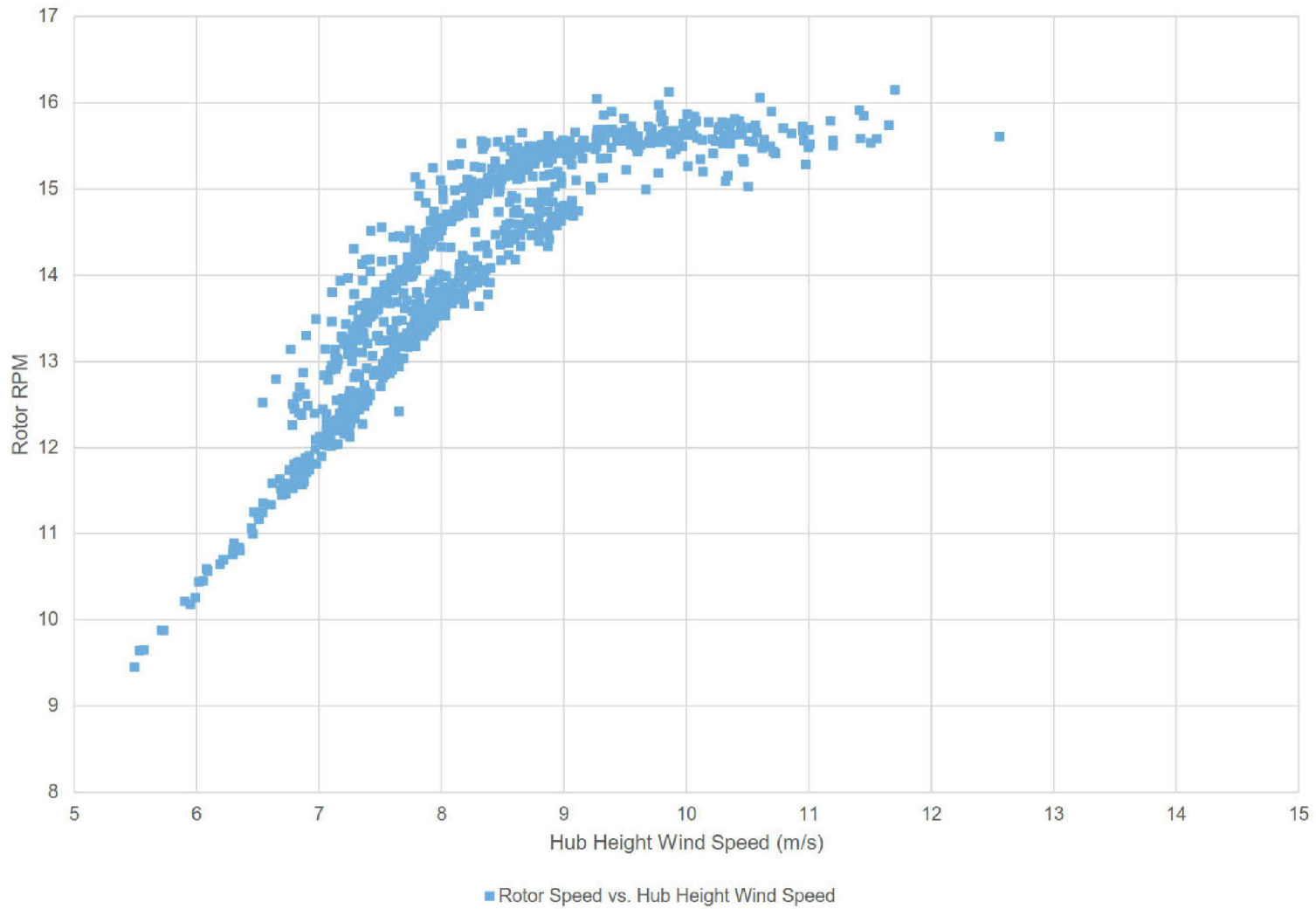
Site Photos

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	834
8	1215
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
22	1620
23	1620
24	1620
25	1620



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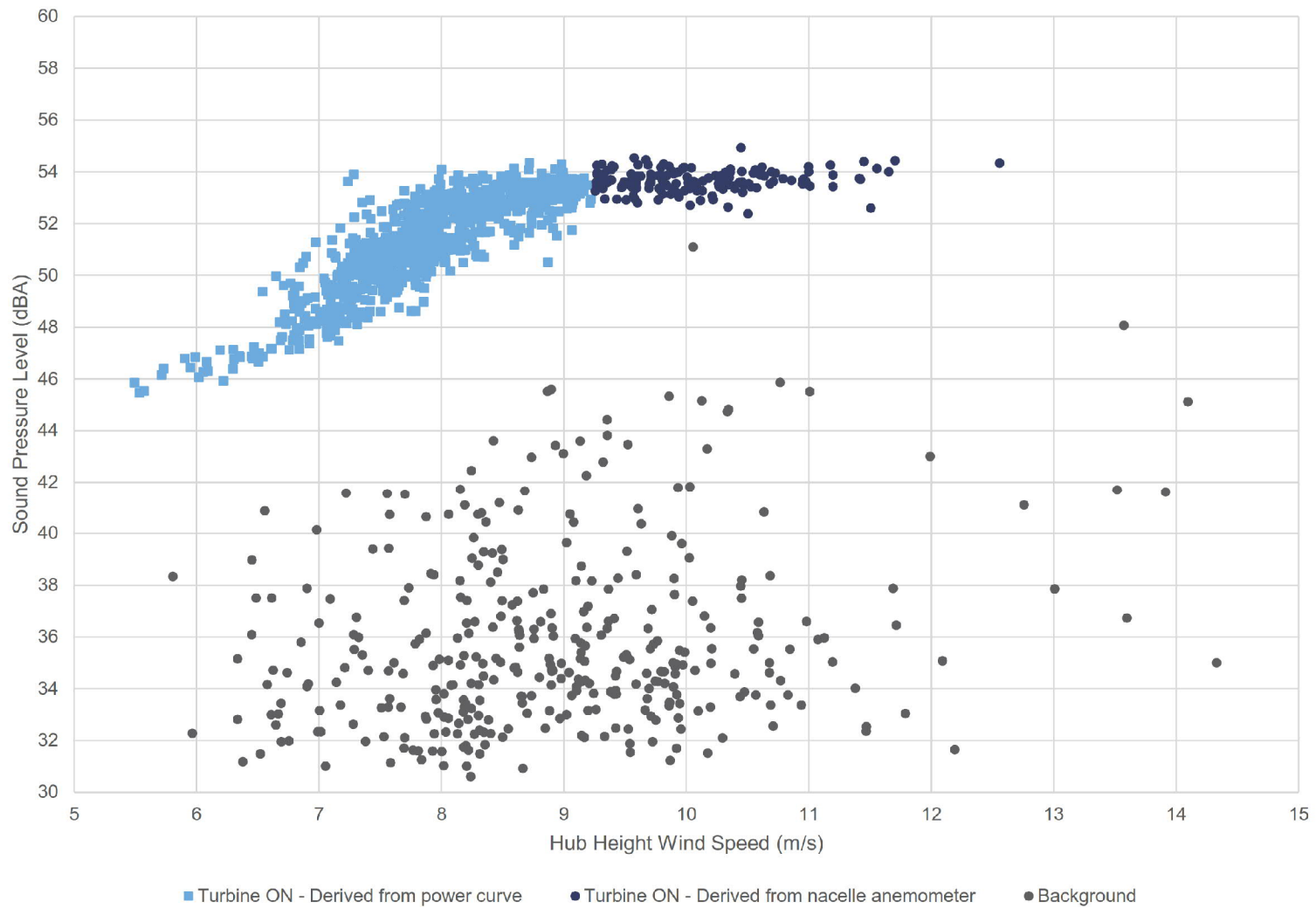
Figure Title

Rotor RPM vs Wind Speed

Figure B.02

Appendix C

Apparent Sound Power Level



14461.02.T84.RP2

Scale: NTS
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 Date: Oct 31, 2017
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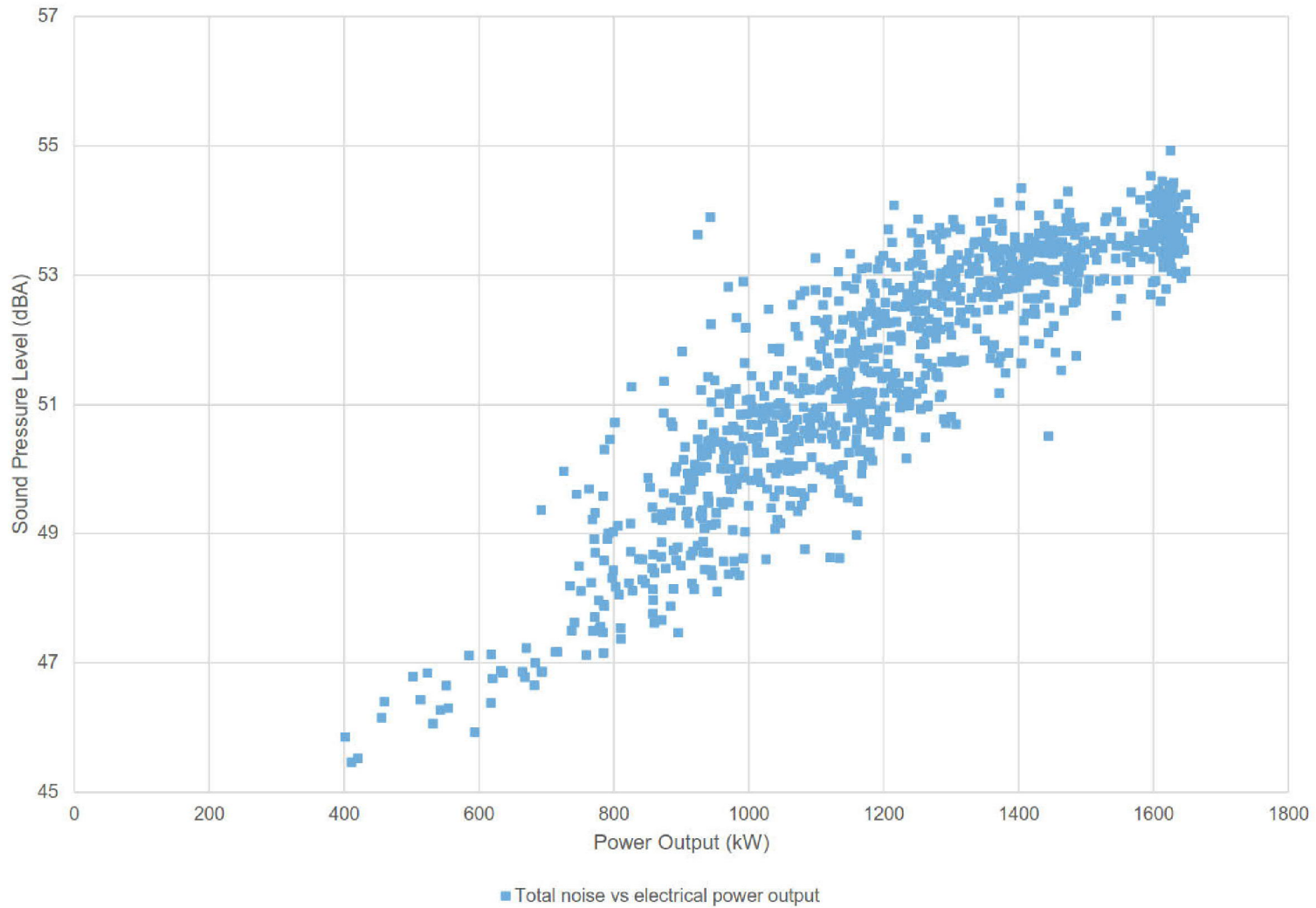
Project Name


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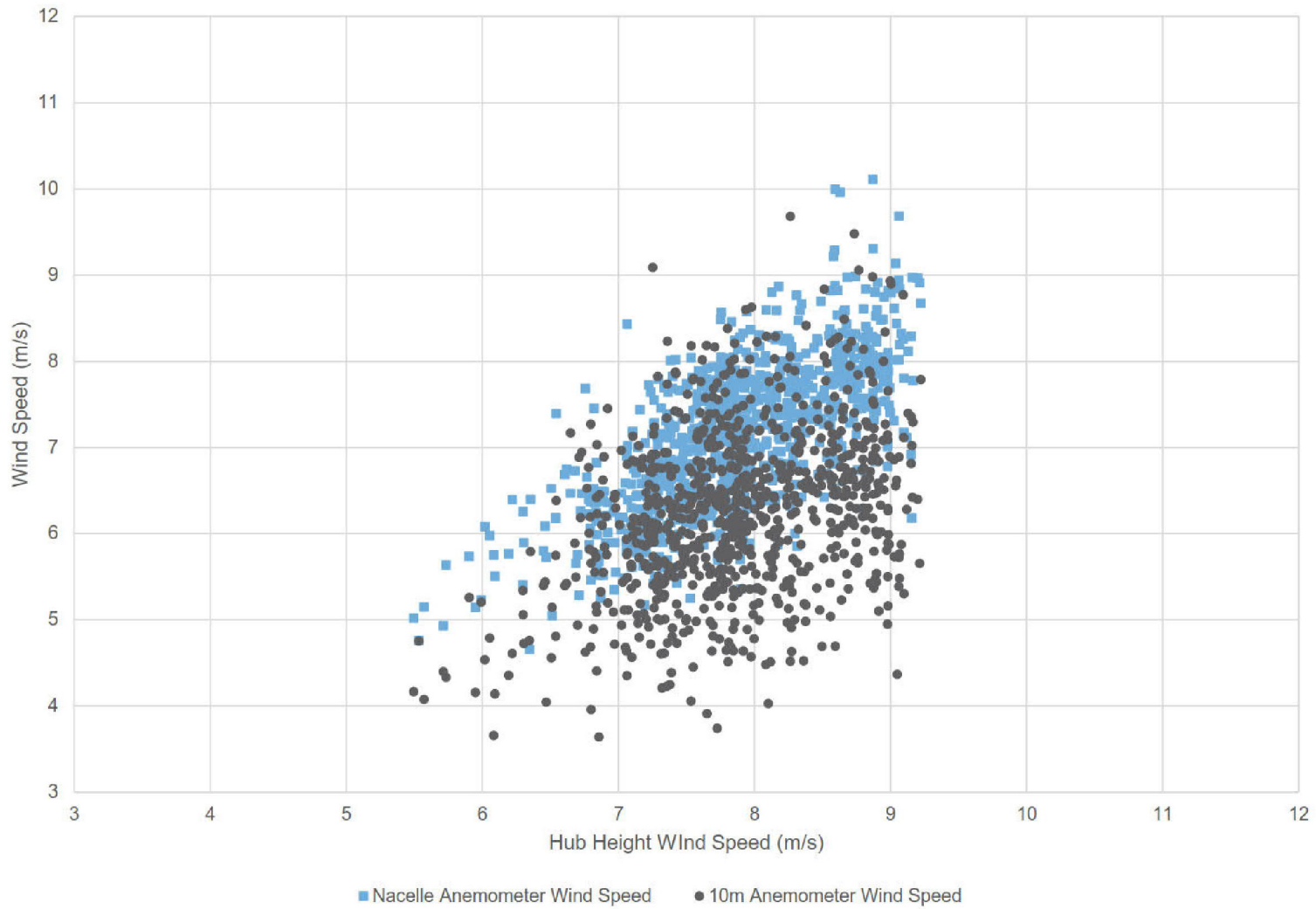
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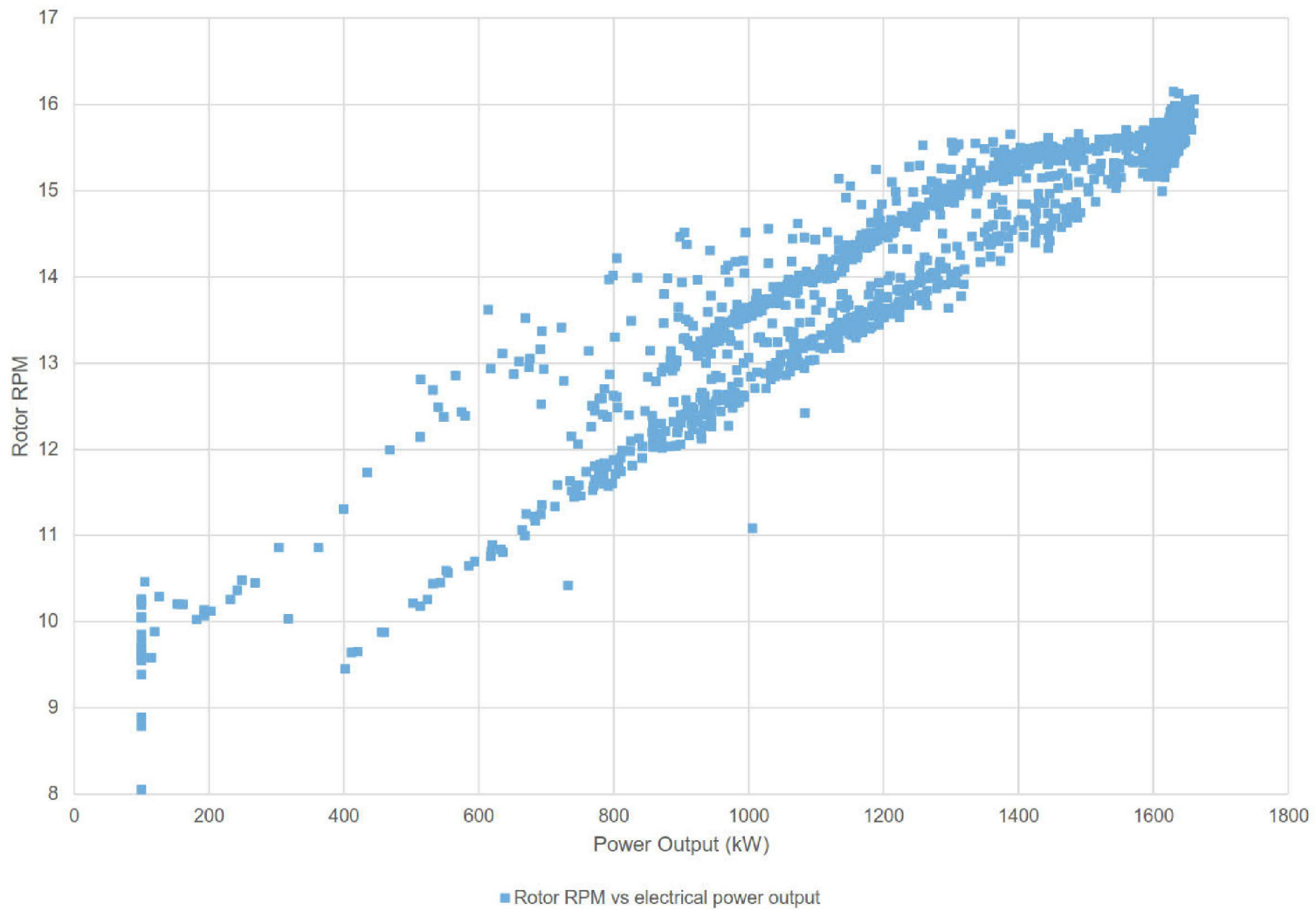
Plot of overall measurement data pairs at position 1 (Turbine ON & Background)

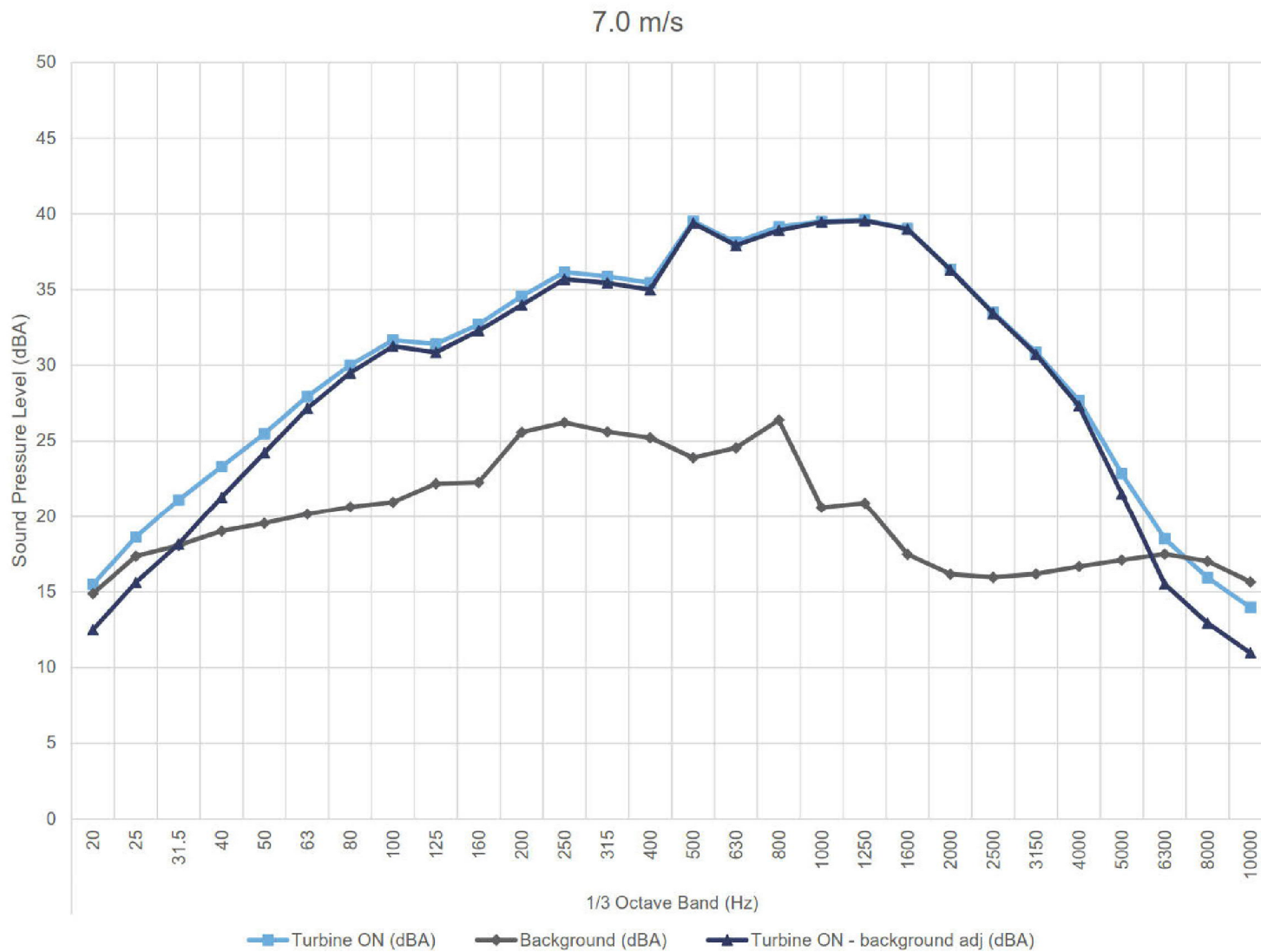
Figure C.01



	14461.02.T84.RP2	Project Name	
	Scale: NTS Drawn by: ADT Reviewed by: AM Date: Sept 28, 2017 Revision: 1	Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0	
		Figure Title	Figure C.02
		Plot of measured total noise vs electrical power output	







14461.02.T84.RP2

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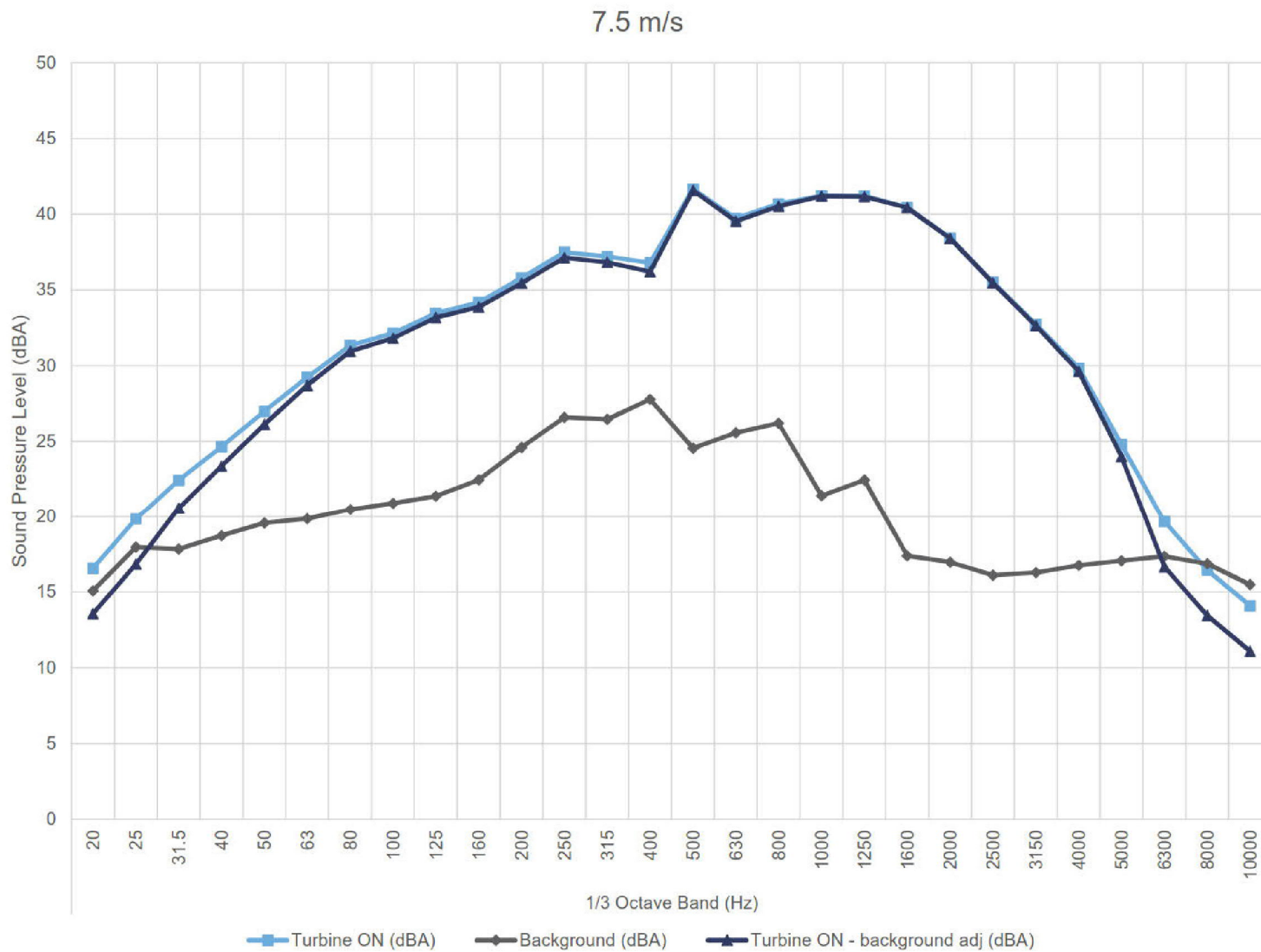
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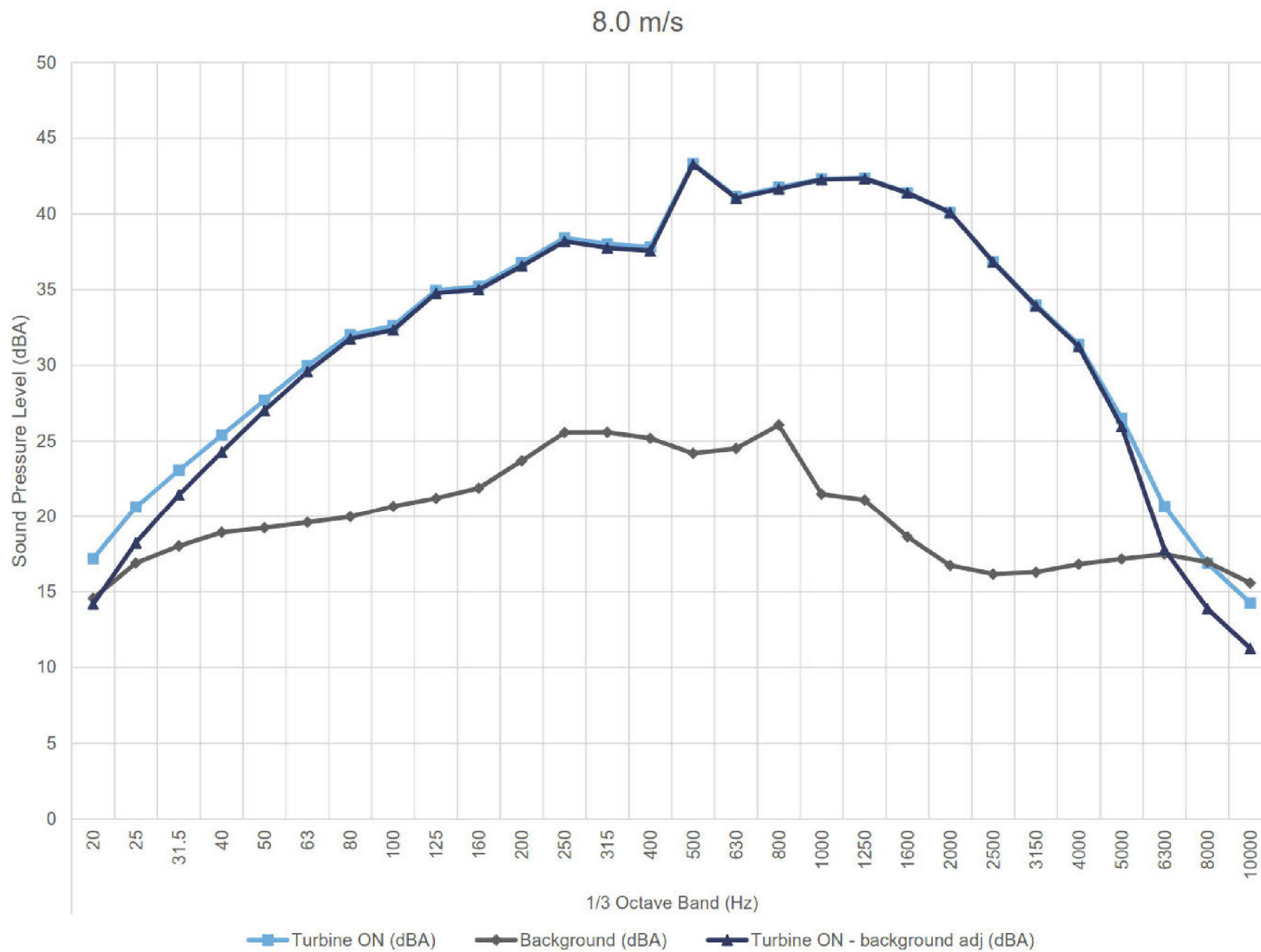
Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum at 1/3 Octave at 7.0 m/s

Figure C.05





14461.02.T84.RP2

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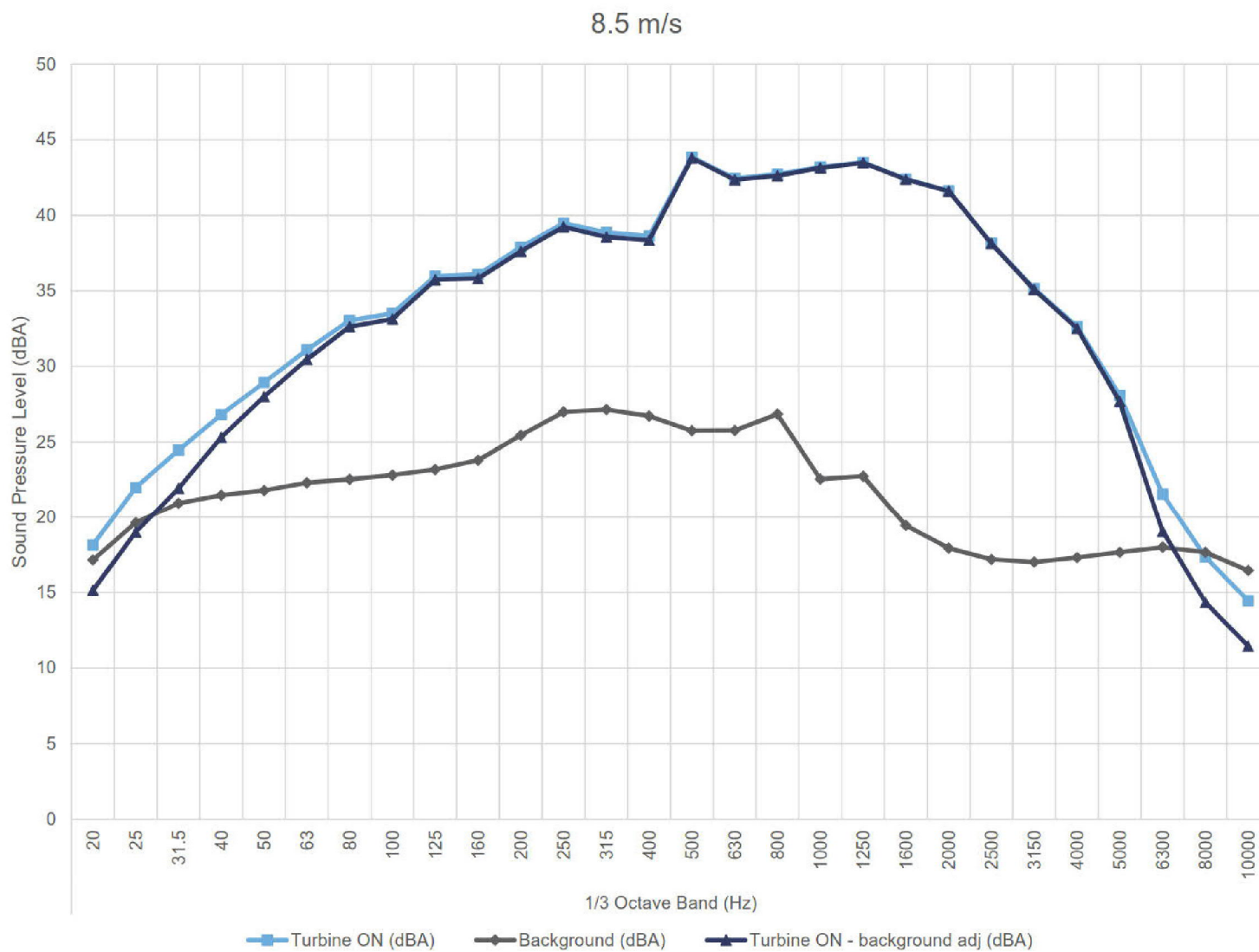
Project Name

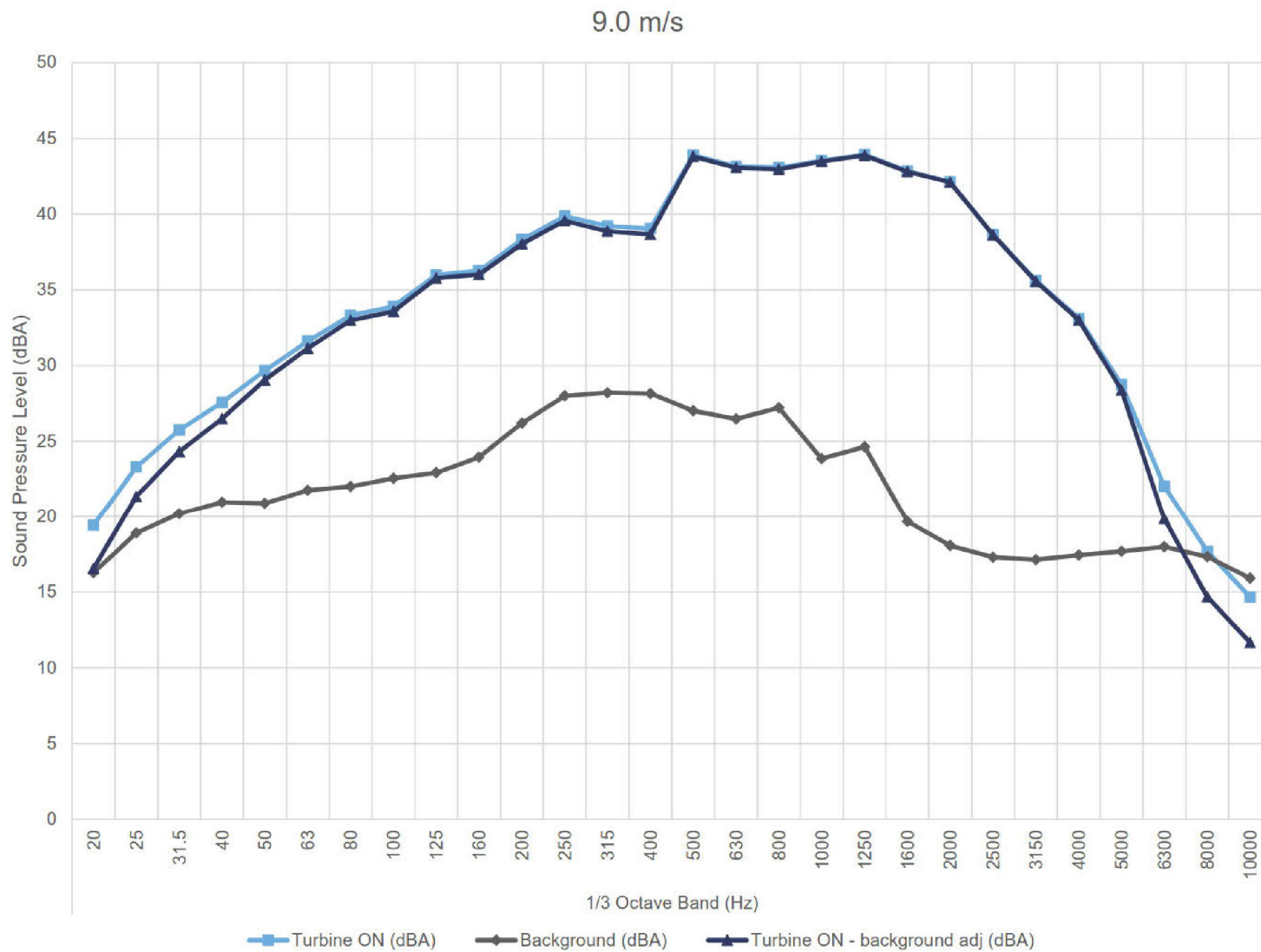
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Figure Title

Plot of sound pressure spectrum at 1/3 Octave at 8.0 m/s

Figure C.07





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 Date: Sept 28, 2017
 Revision: 1

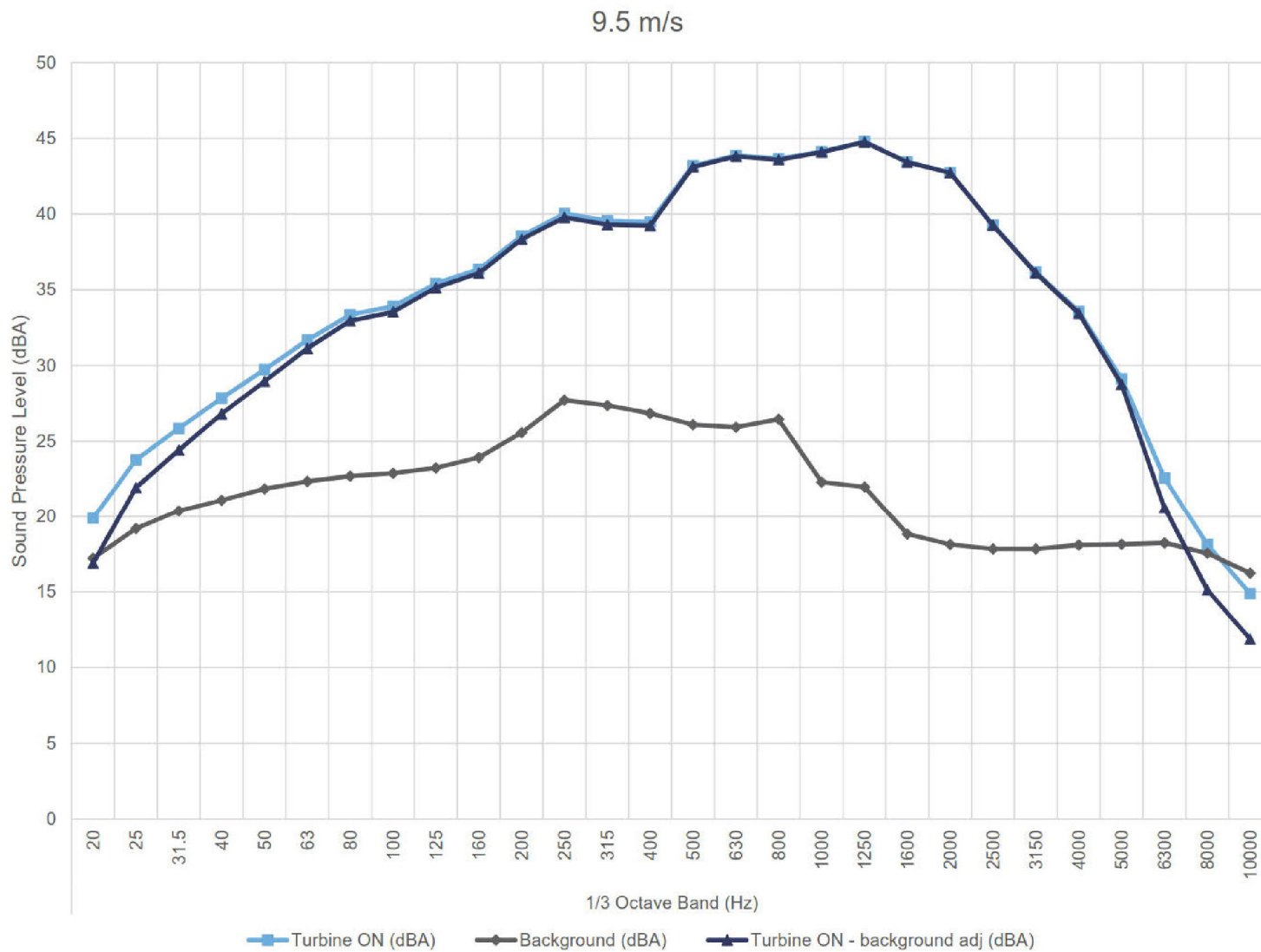
Project Name

Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum at 1/3 Octave at 9.0 m/s

Figure C.09



14461.02.T84.RP2

Scale: NTS
 Drawn by: ADT
 Reviewed by: AM
 Date: Sept 28, 2017
 Revision: 1

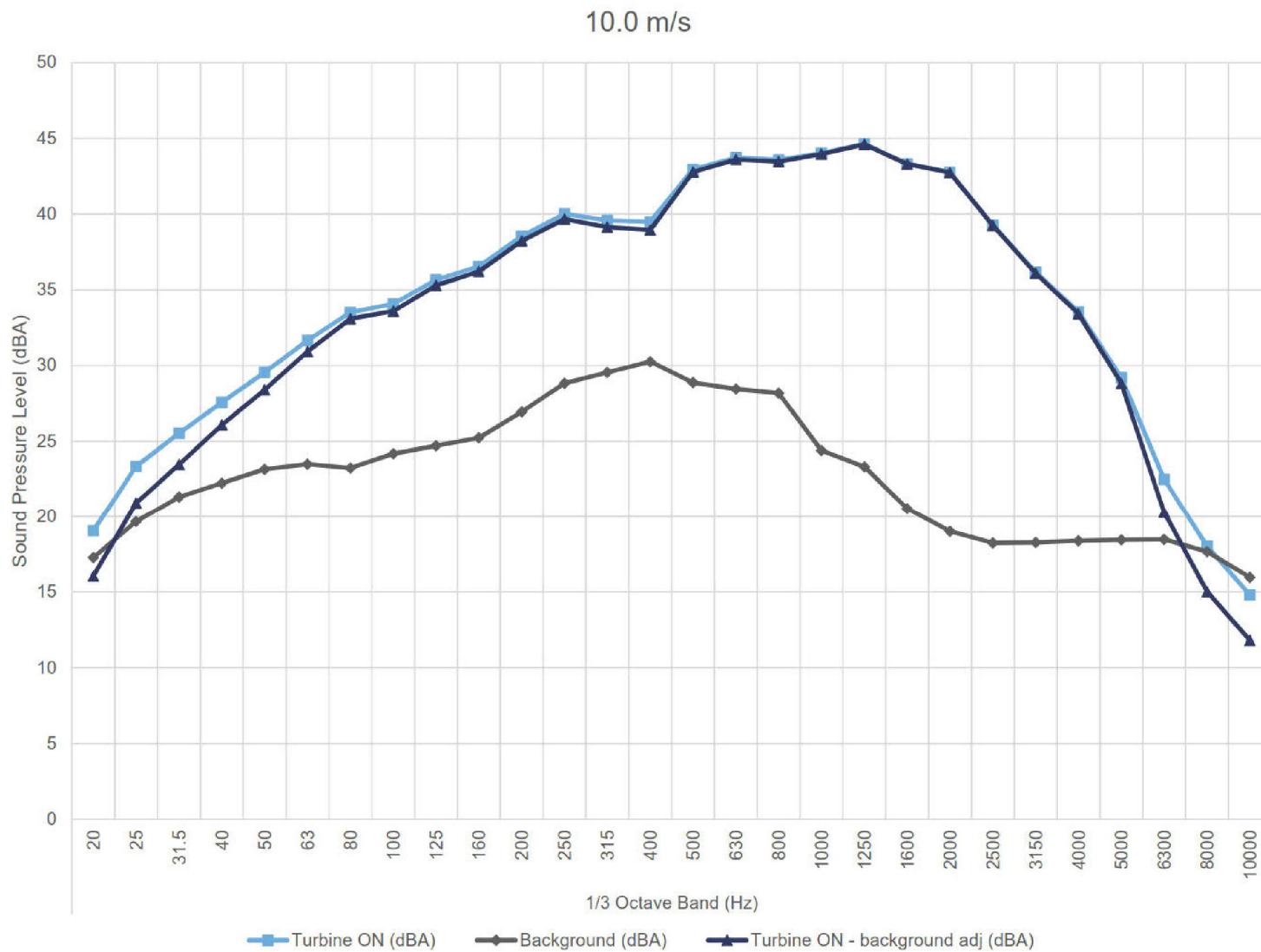
Project Name

Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

Figure Title

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

Figure C.10



14461.02.T84.RP2

Scale: NTS
 Drawn by: ADT
 Reviewed by: AM
 Date: Sept 28, 2017
 Revision: 1

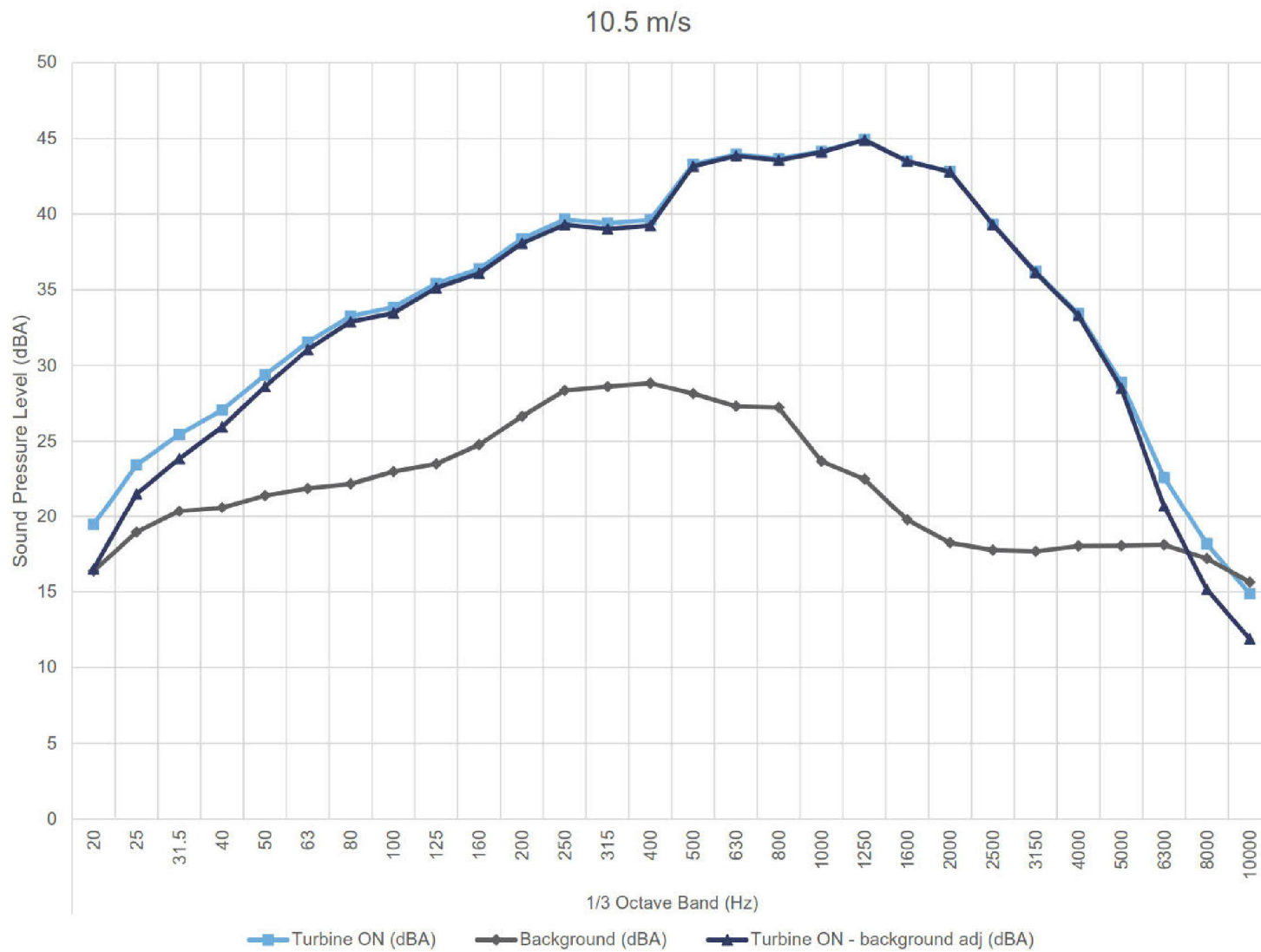
Project Name

Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

Figure Title

Plot of sound pressure spectrum at 1/3 Octave at 10.0 m/s

Figure C.11



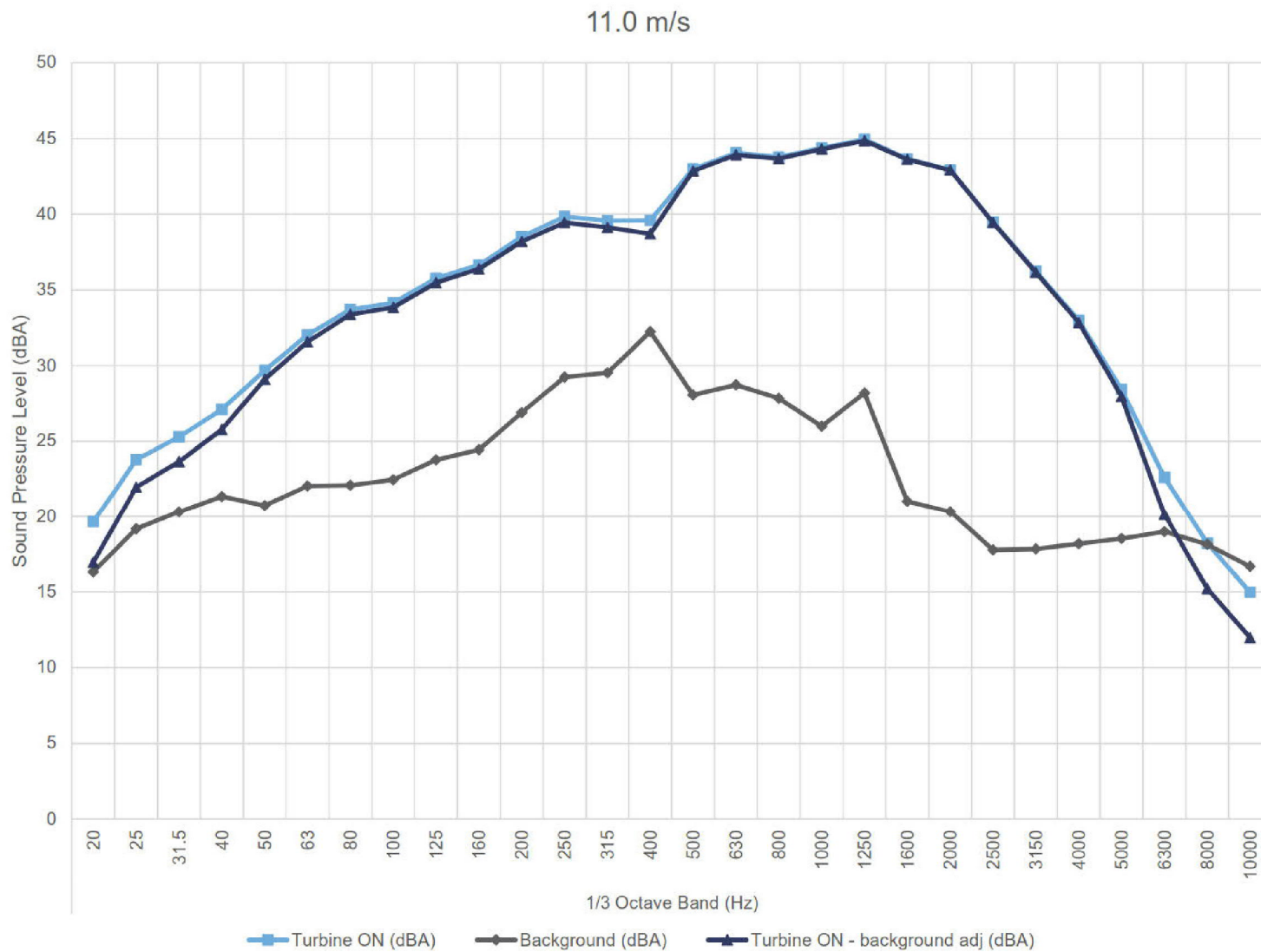


Table C.01 Detailed apparent sound power level data at hub height

Project: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
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1/3 Octave values marked with brackets [] denote less than 3 dB difference between Turbine ON and Background

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

Wind Bin (m/s)	Parameter	1/3 Octave Band (Hz)																		Overall										
		20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000		1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
7.0	Turbine ON (dBA)	15.5	18.6	21.1	23.3	25.5	28.0	30.0	31.7	31.4	32.7	34.6	36.2	35.9	35.4	39.5	38.1	39.2	39.5	39.6	39.0	36.4	33.5	30.9	27.7	22.9	18.5	16.0	14.0	49.0
	Background (dBA)	14.9	17.4	18.1	19.0	19.6	20.2	20.6	21.0	22.2	22.3	25.6	26.2	25.6	25.2	23.9	24.6	26.4	20.6	20.9	17.5	16.2	16.0	16.2	16.7	17.1	17.5	17.0	15.7	36.1
	Turbine ON - background adj (dBA)	[12.5]	[15.6]	18.2	21.3	24.2	27.2	29.5	31.3	30.9	32.3	34.0	35.7	35.5	35.0	39.4	37.9	38.9	39.5	39.6	39.0	36.3	33.4	30.7	27.3	21.5	[15.5]	[13]	[11]	48.8
	Signal to noise (dB)	0.6	1.3	3.1	4.3	5.9	7.8	9.4	10.7	9.2	10.4	9.0	9.9	10.3	10.2	15.6	13.6	12.8	18.9	18.7	21.5	20.2	17.5	14.7	11.0	5.8	1.0	-1.1	-1.7	12.9
	Uncertainty (dB)	2.6	2.6	2.2	1.5	1.1	0.9	0.9	0.8	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	1.1	1.7	1.7	3.0	0.7
7.5	PWL (dBA)	[61.4]	[64.5]	67.0	70.2	73.1	76.0	78.4	80.1	79.7	81.2	82.8	84.6	84.3	83.9	88.3	86.8	87.8	88.3	88.4	87.9	85.2	82.3	79.6	76.2	70.4	[64.4]	[61.8]	[59.8]	97.7
	Turbine ON (dBA)	16.6	19.8	22.4	24.7	27.0	29.2	31.3	32.1	33.5	34.2	35.8	37.5	37.2	36.8	41.7	39.7	40.7	41.2	41.2	40.4	38.4	35.5	32.7	29.8	24.8	19.7	16.4	14.1	50.7
	Background (dBA)	15.1	18.0	17.8	18.7	19.6	19.9	20.5	20.9	21.4	22.5	24.6	26.6	26.5	27.8	24.6	25.6	26.2	21.4	22.4	17.4	17.0	16.1	16.3	16.8	17.1	17.4	16.9	15.5	36.6
	Turbine ON - background adj (dBA)	[13.6]	[16.8]	20.6	23.4	26.1	28.7	31.0	31.8	33.2	33.9	35.4	37.1	36.8	36.2	41.6	39.5	40.5	41.2	41.2	40.4	38.4	35.5	32.6	29.6	24.0	[16.7]	[13.4]	[11.1]	50.5
	Signal to noise (dB)	1.5	1.9	4.6	5.9	7.4	9.4	10.9	11.3	12.1	11.7	11.2	10.9	10.7	9.0	17.1	14.1	14.5	19.8	18.8	23.0	21.5	19.4	16.4	13.1	7.7	2.3	-0.4	-1.4	14.1
8.0	Uncertainty (dB)	2.5	2.6	1.4	1.2	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	1.0	1.8	1.8	3.2	0.7
	PWL (dBA)	[62.4]	[65.7]	69.4	72.2	75.0	77.6	79.8	80.7	82.0	82.7	84.3	86.0	85.7	85.1	90.4	88.4	89.4	90.0	90.0	89.3	87.3	84.3	81.5	78.5	72.9	[65.5]	[62.3]	[60]	99.4
	Turbine ON (dBA)	17.2	20.6	23.1	25.4	27.7	30.0	32.0	32.6	35.0	35.2	36.8	38.4	38.0	37.8	43.3	41.1	41.8	42.3	42.4	41.4	40.1	36.9	34.0	31.4	26.5	20.7	16.9	14.3	51.9
	Background (dBA)	14.6	16.9	18.0	18.9	19.2	19.6	20.0	20.7	21.2	21.9	23.7	25.6	25.6	25.2	24.2	24.5	26.1	21.5	21.1	18.6	16.7	16.2	16.3	16.8	17.2	17.5	17.0	15.6	35.9
	Turbine ON - background adj (dBA)	[14.2]	18.2	21.5	24.3	27.0	29.6	31.8	32.4	34.8	35.0	36.6	38.2	37.8	37.6	43.3	41.0	41.6	42.3	42.3	41.4	40.1	36.8	33.9	31.2	26.0	17.8	[13.9]	[11.3]	51.8
8.5	Signal to noise (dB)	2.6	3.7	5.1	6.5	8.5	10.4	12.1	12.0	13.7	13.3	13.1	12.9	12.4	12.6	19.1	16.6	15.7	20.8	21.3	22.8	23.4	20.7	17.7	14.6	9.3	3.2	-0.1	-1.3	16.0
	Uncertainty (dB)	2.3	1.9	1.2	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.6	1.7	3.0	0.7
	PWL (dBA)	[63]	67.1	70.3	73.2	75.9	78.5	80.6	81.2	83.6	83.9	85.4	87.1	86.6	86.4	92.1	89.9	90.5	91.1	91.2	90.3	89.0	85.7	82.8	80.1	74.8	66.7	[62.8]	[60.1]	100.6
	Turbine ON (dBA)	18.1	22.0	24.5	26.8	28.9	31.1	33.0	33.5	36.0	36.1	37.9	39.5	38.9	38.6	43.9	42.4	42.7	43.2	43.5	42.4	41.6	38.2	35.2	32.7	28.1	21.6	17.3	14.5	52.9
	Background (dBA)	17.2	19.6	20.9	21.5	21.8	22.3	22.5	22.8	23.2	23.8	25.5	27.0	27.2	26.7	25.8	25.8	26.9	22.6	22.7	19.4	17.9	17.2	17.0	17.3	17.7	18.0	17.7	16.5	37.4
9.0	Turbine ON - background adj (dBA)	[15.1]	[19]	21.9	25.3	28.0	30.5	32.6	33.1	35.7	35.8	37.6	39.2	38.6	38.3	43.8	42.4	42.6	43.1	43.5	42.4	41.6	38.1	35.1	32.5	27.7	19.0	[14.3]	[11.5]	52.7
	Signal to noise (dB)	1.0	2.4	3.5	5.3	7.1	8.8	10.5	10.7	12.8	12.3	12.4	12.5	11.7	11.9	18.1	16.7	15.9	20.6	20.8	23.0	23.7	21.0	18.1	15.3	10.4	3.6	-0.3	-2.0	15.4
	Uncertainty (dB)	2.4	2.4	1.7	1.2	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.5	1.8	3.2	0.7
	PWL (dBA)	[64]	[67.9]	70.8	74.2	76.9	79.3	81.5	82.0	84.6	84.7	86.5	88.1	87.4	87.2	92.7	91.2	91.5	92.0	92.3	91.2	90.5	87.0	84.0	81.4	76.5	67.9	[63.2]	[60.3]	101.6
	Turbine ON (dBA)	19.4	23.3	25.7	27.6	29.7	31.6	33.3	33.9	36.0	36.3	38.3	39.9	39.2	39.0	43.9	43.1	43.1	43.5	43.9	42.8	42.1	38.6	35.6	33.1	28.7	22.0	17.7	14.7	53.3
9.5	Background (dBA)	16.3	18.9	20.2	21.0	20.9	21.8	22.0	22.6	22.9	24.0	26.2	28.0	28.2	28.2	27.0	26.5	27.2	23.9	24.6	19.7	18.1	17.3	17.1	17.4	17.7	18.0	17.3	15.9	38.0
	Turbine ON - background adj (dBA)	16.5	21.4	24.3	26.5	29.1	31.1	33.0	33.6	35.8	36.0	38.0	39.6	38.9	38.7	43.8	43.1	43.0	43.5	43.9	42.8	42.1	38.6	35.6	33.0	28.4	19.9	[14.7]	[11.7]	53.1
	Signal to noise (dB)	3.1	4.4	5.5	6.6	8.8	9.8	11.3	11.3	13.1	12.3	12.1	11.9	11.0	10.9	16.9	16.7	15.9	19.7	19.3	23.2	24.1	21.4	18.5	15.7	11.0	4.0	0.4	-1.3	15.3
	Uncertainty (dB)	2.2	1.6	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.3	1.6	2.9	0.7
	PWL (dBA)	65.4	70.2	73.2	75.4	77.9	80.0	81.8	82.4	84.6	84.9	86.9	88.4	87.7	87.5	92.7	91.9	91.8	92.3	92.7	91.7	91.0	87.5	84.4	81.9	77.3	68.7	[63.5]	[60.5]	102.0
10.0	Turbine ON (dBA)	19.9	23.8	25.9	27.8	29.7	31.7	33.3	33.9	35.4	36.4	38.6	40.0	39.6	39.5	43.2	43.9	43.7	44.1	44.8	43.5	42.7	39.3	36.2	33.6	29.1	22.6	18.1	14.9	53.7
	Background (dBA)	17.2	19.2	20.4	21.1	21.9	22.4	22.7	22.9	23.2	23.9	25.6	27.7	27.4	26.8	26.1	25.9	26.5	22.3	22.0	18.8	18.1	17.8	17.8	18.1	18.1	18.2	17.5	16.2	37.5
	Turbine ON - background adj (dBA)	[16.9]	21.9	24.4	26.8	29.0	31.1	33.0	33.5	35.1	36.1	38.3	39.8	39.3	39.2	43.1	43.8	43.6	44.1	44.8	43.4	42.7	39.3	36.1	33.4	28.8	20.6	[15.1]	[11.9]	53.6
	Signal to noise (dB)	2.7	4.6	5.5	6.7	7.9	9.3	10.6	11.0	12.2	12.4	13.0	12.3	12.2	12.6	17.1	17.9	17.2	21.8	22.8	24.6	24.6	21.4	18.3	15.5	11.0	4.3	0.6	-1.3	16.2
	Uncertainty (dB)	2.4	1.7	1.3	1.1	1.0	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	1.3	1.7	3.1	0.7
10.5	PWL (dBA)	[65.8]	70.8	73.3	75.7	77.8	80.0	81.8	82.4	84.0	85.0	87.2	88.6	88.2	88.1	92.0	92.7	92.4	93.0	93.6	92.3	91.6	88.1	85.0	82.3	77.6	69.4	[64]	[60.8]	102.4
	Turbine ON (dBA)	19.0	23.3	25.5	27.6	29.5	31.7	33.5	34.1	35.7	36.6	38.5	40.0	39.6	39.5	43.0	43.7	43.6	44.0	44.6	43.3	42.8	39.3	36.2	33.6	29.2	22.5	18.0	14.8	53.6
	Background (dBA)	17.3	19.7	21.3	22.2	23.2	23.5	23.2	24.2	24.7	25.2	27.0	28.8	29.5	30.3	28.9	28.5	28.2	24.4	23.3	20.5	19.0	18.2	18.3	18.4	18.4	18.5	17.7	16.0	39.3
	Turbine ON - background adj (dBA)	[16]	20.9	23.5	26.1	28.4	30.9	33.1	33.6	35.3	36.2	38.2	39.7	39.1	39.0	42.8	43.6	43.5	44.0	44.6	43.3	42.7	39.2	36.1	33.4	28.8	20.3	[15]	[11.8]	53.4
	Signal to noise (dB)	1.8	3.7	4.2	5.4	6.4	8.2	10.3	9.9	10.9	11.3	11.6	11.2	10.1	9.2	14.1	15.3	15.4	19.6	21.3	22.8	23.7	21.0	17.9	15.2	10.8	4.0	0.4	-1.2	14.3
11.0	Uncertainty (dB)	2.4	2.0	1.5	1.2	1.1	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.7	0.8	0.8	0.8	1.3	1.7	3.0	0.7
	PWL (dBA)	[64.9]	69.8	72.3	75.0	77.3	79.8	81.9	82.5	84.2	85.1	87.1	88.5	88.0	87.8	91.6	92.5	92.3	92.8	93.5	92.2	91.6	88.1	85.0	82.3	77.7	69.1	[63.9]	[60.7]	102.3
	Turbine ON (dBA)	19.5	23.4	25.5	27.1	29.4	31.5	33.2	33.8	35.4	36.4	3																		

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

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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		
11.0	Turbine ON (dBA)	19.6	23.8	25.3	27.1	29.7	32.0	33.7	34.1	35.7	36.7	38.5	39.8	39.6	39.6	43.0	44.0	43.8	44.4	44.9	43.6	42.9	39.5	36.2	33.0	28.4	22.6	18.2	15.0	53.8	
	Background (dBA)	16.3	19.2	20.3	21.3	20.7	22.0	22.1	22.5	23.8	24.4	26.9	29.2	29.5	32.2	28.1	28.7	27.8	26.0	28.2	21.0	20.3	17.8	17.8	18.2	18.5	19.0	18.1	16.7	39.6	
	Turbine ON - background adj (dBA)	16.9	22.0	23.6	25.8	29.1	31.6	33.4	33.8	35.5	36.4	38.2	39.4	39.1	38.7	42.8	43.9	43.7	44.3	44.8	43.6	42.9	39.4	36.2	32.8	28.0	20.1	[15.2]	[12]	53.6	
	Signal to noise (dB)	3.3	4.6	5.0	5.8	8.9	10.0	11.6	11.7	12.0	12.2	11.6	10.6	10.0	7.3	14.9	15.3	15.9	18.4	16.8	22.6	22.6	21.7	18.4	14.8	9.9	3.6	0.1	-1.7	14.2	
	Uncertainty (dB)	2.8	2.1	1.6	1.4	1.1	1.0	1.0	1.0	0.9	0.9	0.8	0.8	0.8	1.1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.6	1.9	3.2	0.8
	PWL (dBA)	65.8	70.8	72.5	74.6	77.9	80.4	82.2	82.7	84.3	85.2	87.1	88.3	88.0	87.6	91.7	92.8	92.5	93.2	93.7	92.5	91.8	88.3	85.0	81.7	76.8	69.0	[64.1]	[60.8]	102.5	

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

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 Report ID: 14461.02.T84.RP2

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)	15.0	18.0	20.7	22.9	25.2	27.7	30.2	31.4	31.6	33.3	34.8	36.3	35.9	35.7	39.4	38.2	39.2	39.6	39.8	39.2	36.5	33.6	31.0	27.8	23.0	18.6	16.0	14.0	49.1
	Background (dBA)	14.6	17.2	17.5	18.4	19.3	19.6	20.4	20.8	22.2	22.5	25.1	26.5	26.1	25.3	24.3	24.8	26.2	20.3	20.0	17.0	16.2	15.9	16.1	16.6	17.1	17.6	17.3	16.1	36.1
	Turbine ON - background adj (dBA)	[12]	[15]	17.7	21.0	23.9	26.9	29.7	31.0	31.0	32.9	34.3	35.8	35.4	35.3	39.3	38.0	39.0	39.5	39.8	39.1	36.5	33.6	30.8	27.4	21.7	[15.6]	[13]	[11]	48.9
	Signal to noise (dB)	0.4	0.8	3.1	4.5	5.9	8.1	9.7	10.6	9.4	10.8	9.6	9.8	9.8	10.4	15.1	13.4	13.0	19.2	19.8	22.1	20.4	17.7	14.9	11.2	5.9	1.0	-1.3	-2.1	13.0
	Uncertainty (dB)	2.2	2.2	1.8	1.2	1.0	0.8	0.8	0.7	0.8	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.9	1.5	1.5	2.7	0.6
	PWL (dBA)	[60.9]	[63.9]	66.6	69.9	72.8	75.8	78.5	79.9	79.9	81.8	83.1	84.7	84.3	84.2	88.1	86.9	87.8	88.4	88.6	88.0	85.4	82.4	79.7	76.3	70.6	[64.5]	[61.9]	[59.8]	97.8
6.0	Turbine ON (dBA)	18.0	21.7	24.2	26.4	28.5	30.7	32.6	33.2	35.4	35.7	37.4	39.0	38.5	38.3	43.5	42.0	42.3	42.8	43.0	42.0	41.0	37.6	34.7	32.1	27.5	21.2	17.2	14.4	52.4
	Background (dBA)	16.3	18.8	20.1	20.8	21.0	21.5	21.7	22.2	22.6	23.2	25.0	26.7	26.9	26.9	25.9	25.8	26.8	22.6	22.3	19.3	17.7	17.0	16.9	17.2	17.6	17.9	17.4	16.1	37.1
	Turbine ON - background adj (dBA)	[15]	[18.7]	22.0	24.9	27.7	30.1	32.2	32.8	35.2	35.4	37.2	38.8	38.2	38.0	43.5	41.9	42.2	42.8	43.0	42.0	41.0	37.6	34.6	32.0	27.0	18.5	[14.2]	[11.4]	52.3
	Signal to noise (dB)	1.7	2.9	4.1	5.5	7.6	9.2	10.9	11.0	12.8	12.5	12.3	11.6	11.5	17.7	16.1	15.5	20.2	20.7	22.7	23.3	20.7	17.8	14.9	9.9	3.4	-0.2	-1.7	15.3	
	Uncertainty (dB)	2.2	2.2	1.4	1.1	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	0.7	0.7	0.6	0.7	0.8	0.8	0.8	1.5	1.7	3.1	0.7	
	PWL (dBA)	[63.9]	[67.6]	70.9	73.8	76.6	79.0	81.1	81.7	84.1	84.3	86.0	87.6	87.1	86.8	92.3	90.7	91.1	91.6	91.9	90.8	89.8	86.5	83.5	80.8	75.9	67.4	[63.1]	[60.3]	101.2
7.0	Turbine ON (dBA)	19.4	23.4	25.5	27.5	29.5	31.6	33.3	33.9	35.6	36.4	38.5	40.0	39.5	39.4	43.2	43.7	43.6	44.0	44.6	43.3	42.7	39.2	36.1	33.5	29.0	22.5	18.0	14.8	53.6
	Background (dBA)	17.0	19.2	20.5	21.4	22.1	22.6	22.7	23.4	23.8	24.6	26.5	28.4	28.6	29.0	27.6	27.1	27.3	23.7	23.9	19.8	18.5	17.8	17.8	18.0	18.1	18.2	17.5	15.9	38.5
	Turbine ON - background adj (dBA)	[16.4]	21.3	23.8	26.2	28.6	31.0	32.9	33.5	35.3	36.1	38.2	39.7	39.1	39.0	43.1	43.6	43.5	44.0	44.6	43.3	42.7	39.2	36.0	33.3	28.6	20.4	[15]	[11.8]	53.4
	Signal to noise (dB)	2.4	4.2	5.0	6.1	7.3	9.0	10.6	10.5	11.8	11.8	12.0	11.6	10.9	10.5	15.7	16.6	16.2	20.3	20.8	23.5	24.2	21.4	18.3	15.4	10.9	4.2	0.6	-1.1	15.1
	Uncertainty (dB)	2.2	1.7	1.2	1.1	1.0	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	1.3	1.7	3.0	0.7
	PWL (dBA)	[65.2]	70.2	72.7	75.1	77.5	79.9	81.8	82.4	84.1	85.0	87.1	88.5	88.0	87.9	92.0	92.5	92.3	92.8	93.5	92.2	91.5	88.0	84.9	82.2	77.5	69.3	[63.9]	[60.7]	102.3
8.0	Turbine ON (dBA)	20.5	24.3	26.5	27.8	30.0	32.0	33.5	34.1	35.5	36.5	38.4	39.7	39.5	39.8	43.0	44.2	43.9	44.4	45.2	43.7	43.0	39.5	36.3	33.3	28.6	22.8	18.4	15.1	53.9
	Background (dBA)	15.3	18.1	19.4	19.8	20.0	21.0	21.2	21.6	22.6	23.1	25.1	27.4	27.4	29.5	26.5	26.9	26.6	23.9	25.3	19.7	18.8	17.4	17.5	18.0	18.1	18.3	17.5	16.0	37.8
	Turbine ON - background adj (dBA)	19.0	23.2	25.6	27.0	29.5	31.6	33.2	33.8	35.3	36.3	38.2	39.4	39.3	39.4	42.9	44.1	43.8	44.4	45.1	43.7	43.0	39.5	36.3	33.2	28.2	20.9	[15.4]	[12.1]	53.7
	Signal to noise (dB)	5.2	6.2	7.2	7.9	9.9	10.9	12.3	12.5	12.9	13.5	13.3	12.3	12.1	10.3	16.5	17.3	17.2	20.6	19.9	24.0	24.3	22.1	18.8	15.4	10.5	4.5	0.9	-0.9	16.0
	Uncertainty (dB)	1.5	1.3	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.6	0.6	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.1	1.6	2.8	0.6
	PWL (dBA)	67.8	72.0	74.4	75.9	78.4	80.4	82.1	82.7	84.2	85.2	87.0	88.3	88.1	88.2	91.8	93.0	92.6	93.2	94.0	92.5	91.9	88.3	85.1	82.1	77.1	69.8	[64.2]	[60.9]	102.6

Table C.03 Type B measurement uncertainty summary

Project: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
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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: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP1

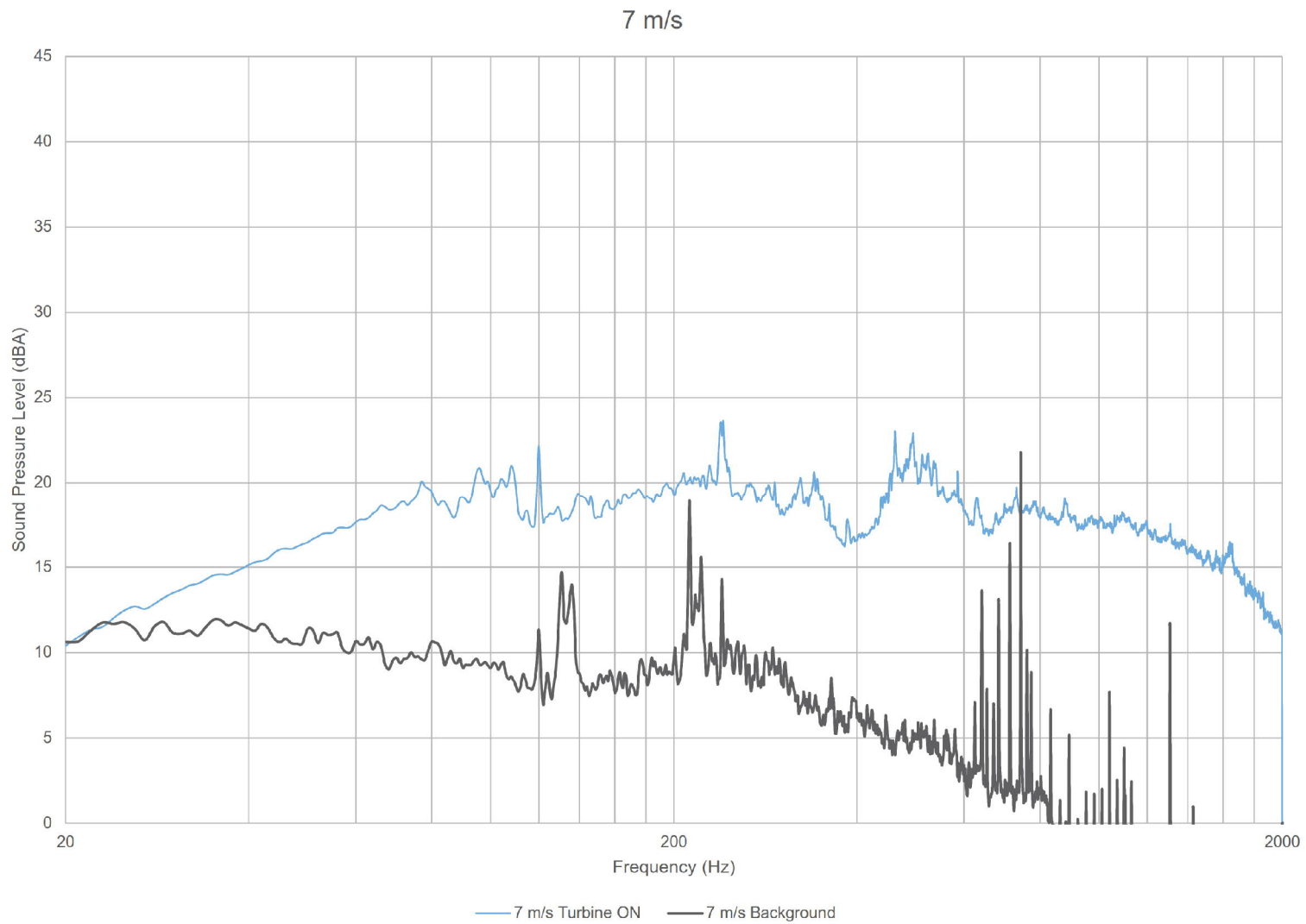
Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																	Overall													
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800		1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000		
7.0	Turbine ON	7.04	101	Average (dBA)	15.5	18.7	21.2	23.4	25.6	28.1	30.1	31.7	31.6	32.8	34.7	36.3	36.0	35.4	39.7	38.2	39.3	39.7	39.7	39.1	36.5	33.7	31.0	27.9	23.0	18.6	16.0	14.0	49.2		
				Uncertainty A (dB)	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0
				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	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	0.8	0.8	0.8	0.8	1.4	
	Background	7.01	16	Average (dBA)	14.9	17.4	18.1	19.1	19.6	20.2	20.7	21.0	22.2	22.3	25.6	26.3	25.7	25.3	23.9	24.6	26.4	20.6	20.9	17.5	16.2	16.0	16.2	16.7	17.1	17.5	17.0	15.6	36.2		
7.5	Turbine ON	7.50	227	Average (dBA)	16.6	19.8	22.4	24.7	27.0	29.2	31.3	32.1	33.5	34.2	35.8	37.5	37.2	36.8	41.7	39.7	40.7	41.2	41.2	40.4	38.4	35.5	32.7	29.8	24.8	19.7	16.4	14.1	50.7		
				Uncertainty A (dB)	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0		
				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)	1.0	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
	Background	7.52	26	Average (dBA)	15.1	18.0	17.8	18.7	19.6	19.8	20.5	20.9	21.3	22.5	24.6	26.6	26.5	27.9	24.6	25.6	26.2	21.4	22.5	17.4	17.0	16.1	16.3	16.8	17.1	17.4	16.9	15.5	36.6		
8.0	Turbine ON	7.97	235	Average (dBA)	17.1	20.5	23.0	25.3	27.6	29.9	32.0	32.6	34.9	35.2	36.7	38.3	38.0	37.8	43.3	41.1	41.7	42.2	42.3	41.3	40.0	36.8	33.9	31.3	26.4	20.6	16.9	14.3	51.8		
				Uncertainty A (dB)	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0		
				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)	1.0	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
	Background	8.06	53	Average (dBA)	14.5	16.8	18.1	19.0	19.2	19.6	19.9	20.7	21.2	21.8	23.6	25.4	25.5	24.8	24.2	24.4	26.1	21.5	20.9	18.8	16.7	16.2	16.3	16.8	17.2	17.5	17.0	15.6	35.8		
8.5	Turbine ON	8.51	153	Average (dBA)	17.2	19.7	21.0	21.5	21.9	22.3	22.6	22.8	23.2	23.8	25.4	27.0	27.1	26.7	25.7	25.7	26.8	22.5	22.7	19.4	17.9	17.2	17.0	17.3	17.7	18.0	17.7	16.5	37.4		
				Uncertainty A (dB)	0.7	0.8	0.8	0.7	0.6	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.5	0.4	0.3	0.4	0.5	0.4	0.3	0.2	0.2	0.2	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	0.8	1.4
				Combined Uncertainty (dB)	1.2	1.2	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	1.5
	Background	8.48	56	Average (dBA)	18.2	22.0	24.5	26.8	29.0	31.1	33.1	33.5	36.0	36.1	37.9	39.5	38.9	38.7	43.9	42.5	42.7	43.2	43.5	42.4	41.6	38.2	35.2	32.7	28.1	21.6	17.4	14.5	52.9		
9.0	Turbine ON	8.94	101	Average (dBA)	19.4	23.2	25.7	27.5	29.7	31.6	33.3	33.9	36.1	36.3	38.3	39.8	39.2	39.0	44.0	43.0	43.0	43.4	43.8	42.7	42.0	38.6	35.5	33.1	28.7	22.0	17.6	14.6	53.2		
				Uncertainty A (dB)	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0		
				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	0.8	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
	Background	9.03	53	Average (dBA)	16.2	18.9	20.2	21.0	20.8	21.7	22.0	22.5	22.9	24.0	26.2	28.1	28.3	28.2	27.1	26.5	27.2	23.9	24.7	19.7	18.1	17.3	17.1	17.4	17.7	18.0	17.3	15.9	38.0		
9.5	Turbine ON	9.47	56	Average (dBA)	19.9	23.8	25.9	27.8	29.7	31.7	33.3	33.9	35.4	36.3	38.6	40.0	39.6	39.5	43.2	43.9	43.7	44.1	44.8	43.5	42.7	39.3	36.2	33.6	29.1	22.6	18.1	14.9	53.7		
				Uncertainty A (dB)	0.4	0.3	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4
				Combined Uncertainty (dB)	1.1	1.1	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4
	Background	9.52	42	Average (dBA)	17.3	19.2	20.4	21.1	21.9	22.4	22.7	22.9	23.2	23.9	25.5	27.7	27.3	26.8	26.1	25.9	26.4	22.2	21.9	18.8	18.1	17.9	17.9	18.1	18.2	18.2	17.6	16.2	37.5		
10.0	Turbine ON	9.96	43	Average (dBA)	17.3	19.7	21.4	22.4	23.3	23.6	23.3	24.3	24.8	25.3	27.0	28.9	29.6	30.4	28.9	28.6	28.3	24.5	23.4	20.6	19.1	18.3	18.3	18.4	18.5	18.5	17.7	16.0	39.3		
				Uncertainty A (dB)	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.9	0.7	0.6	0.4	0.5	0.5	0.5	0.5	0.5	0.4	0.3	0.3	0.3	0.2	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	0.8	1.4
				Combined Uncertainty (dB)	1.3	1.3	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.8	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	1.5
	Background	9.96	44	Average (dBA)	19.0	23.3	25.5	27.6	29.6	31.7	33.5	34.1	35.7	36.6	38.6	40.1	39.6	39.5	42.9	43.7	43.6	44.0	44.6	43.3	42.8	39.3	36.2	33.6	29.2	22.5	18.0	14.8	53.6		

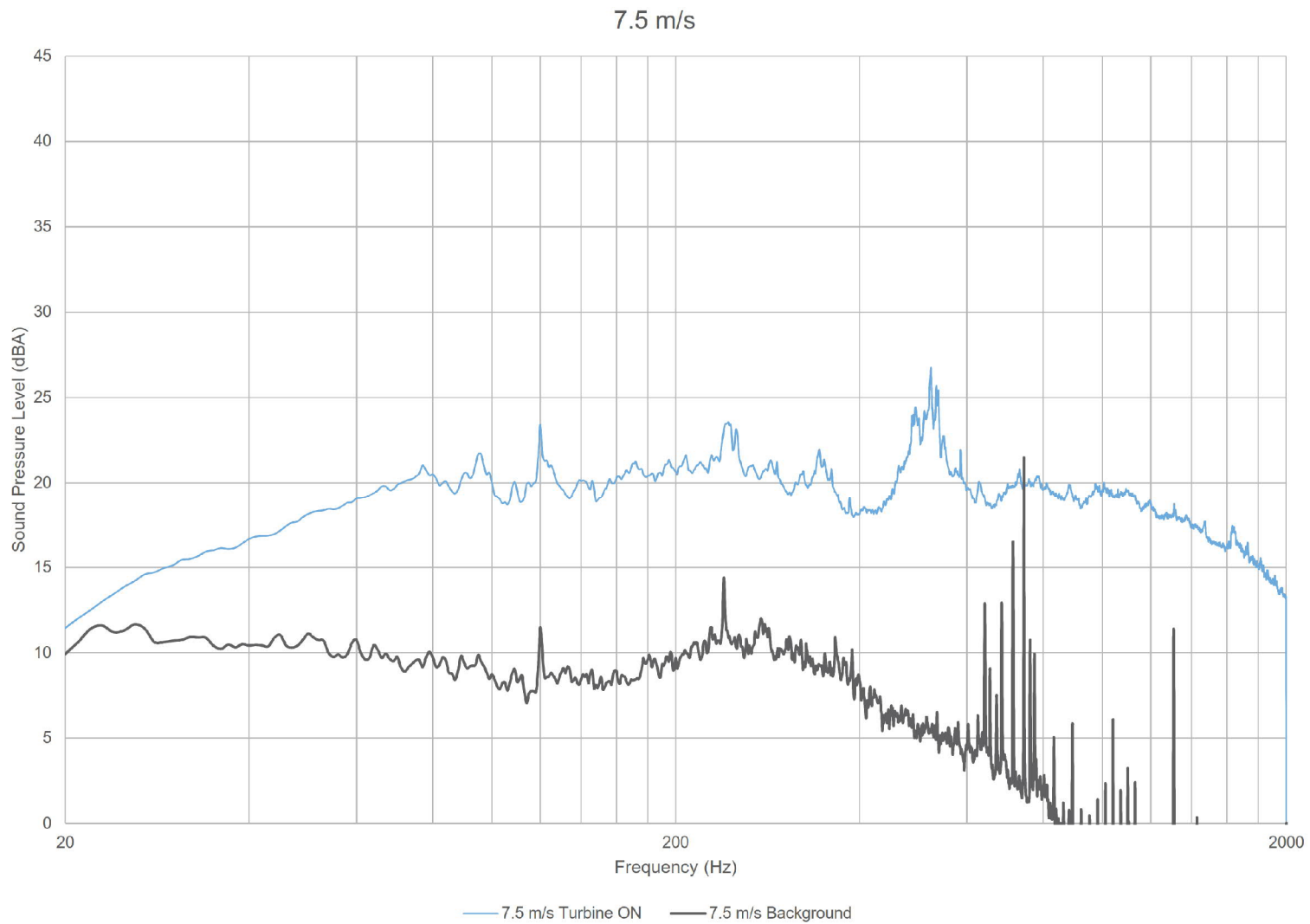
Table C.04 Detailed measurement uncertainty at hub height

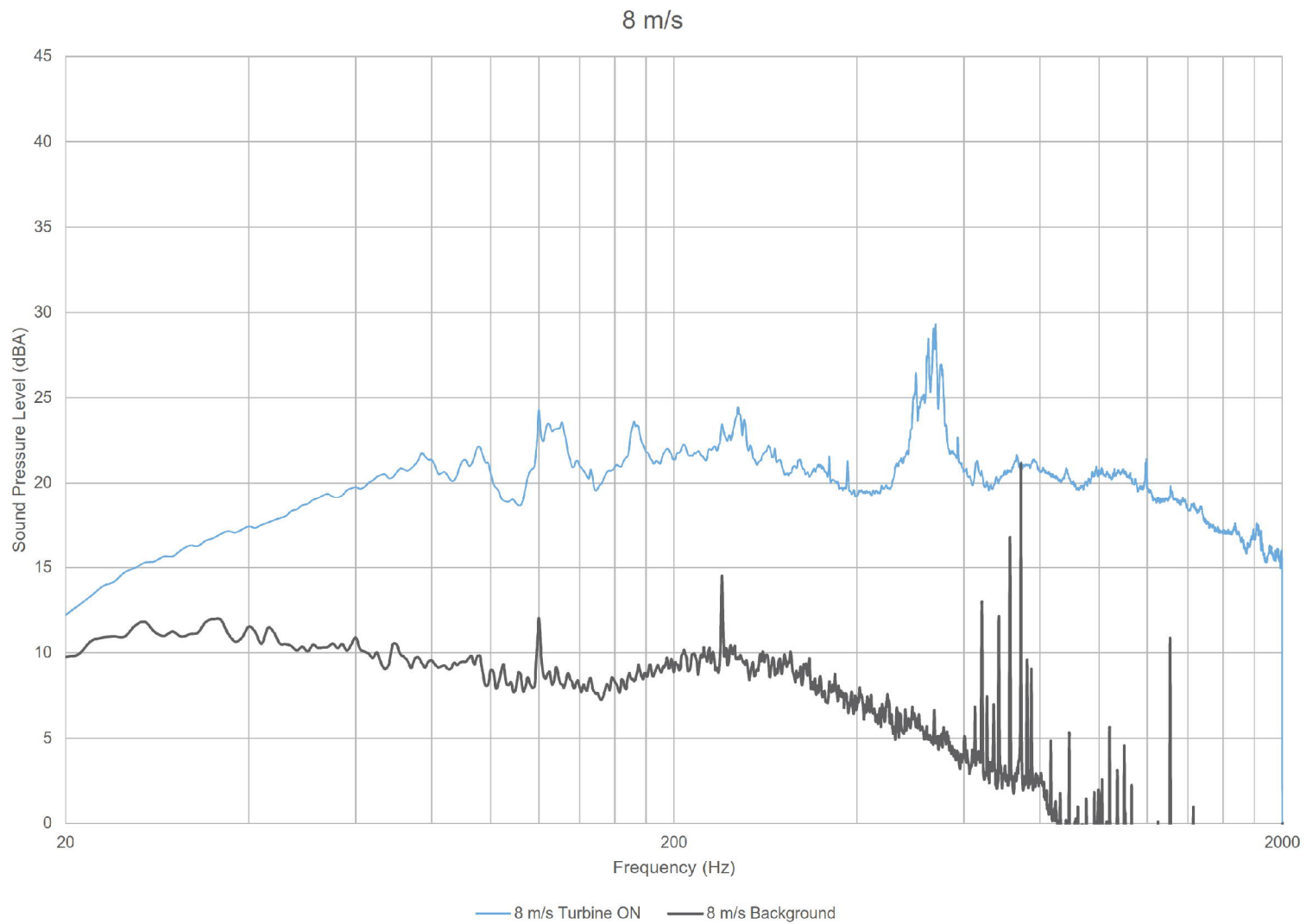
Project: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
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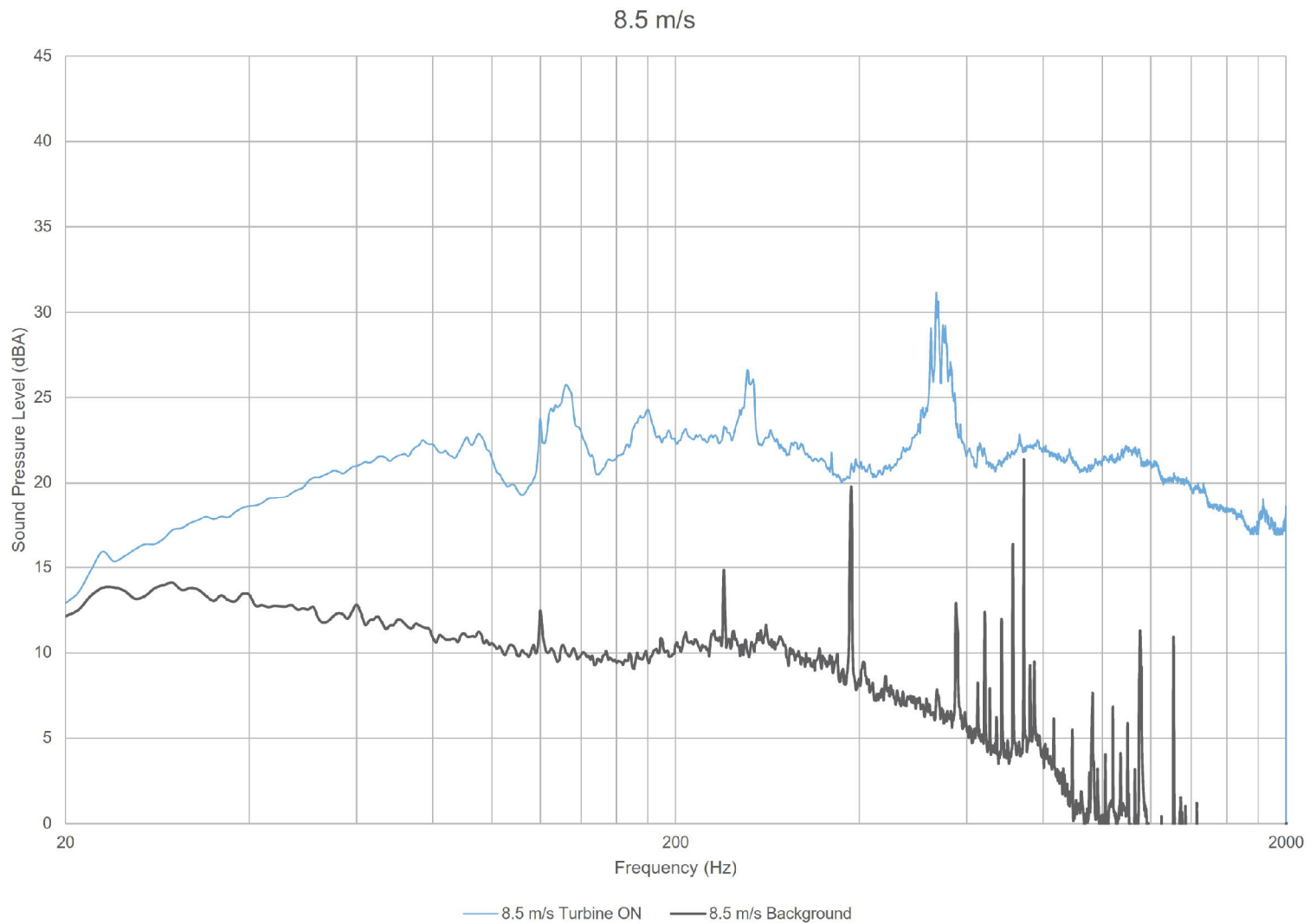
Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																			Overall										
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250		1600	2000	2500	3150	4000	5000	6300	8000	10000	
10.5	Turbine ON	10.46	33	Average (dBA)	19.4	23.4	25.5	27.1	29.3	31.5	33.2	33.8	35.4	36.4	38.4	39.6	39.4	39.6	43.3	43.9	43.7	44.1	44.9	43.5	42.8	39.3	36.2	33.5	28.9	22.6	18.2	14.9	53.7	
				Uncertainty A (dB)	0.5	0.4	0.5	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
				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	0.8
				Combined Uncertainty (dB)	1.1	1.1	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
10.5	Background	10.53	20	Average (dBA)	16.3	18.9	20.3	20.5	21.3	21.8	22.1	22.9	23.4	24.7	26.6	28.3	28.5	28.7	28.1	27.2	27.2	23.6	22.5	19.7	18.2	17.7	17.6	18.0	18.0	18.1	17.2	15.6	38.3	
				Uncertainty A (dB)	1.2	1.2	1.2	1.2	1.1	0.9	1.0	1.0	1.0	1.1	1.2	1.1	1.3	1.5	1.2	1.0	0.8	0.9	0.9	0.7	0.7	0.6	0.5	0.4	0.4	0.3	0.3	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	0.8	0.8	0.8	0.8	0.8	0.8	0.8
				Combined Uncertainty (dB)	1.5	1.6	1.4	1.4	1.3	1.2	1.3	1.3	1.3	1.4	1.4	1.3	1.5	1.6	1.4	1.2	1.1	1.1	1.1	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.5
11.0	Turbine ON	11.01	12	Average (dBA)	19.6	23.8	25.3	27.1	29.7	32.0	33.7	34.1	35.8	36.7	38.5	39.8	39.6	39.6	43.0	44.0	43.8	44.4	44.9	43.6	42.9	39.5	36.2	33.0	28.4	22.6	18.2	15.0	53.8	
				Uncertainty A (dB)	0.7	0.6	0.4	0.4	0.5	0.5	0.4	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.2	0.3	0.1	0.1	0.1
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
				Combined Uncertainty (dB)	1.2	1.2	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
11.0	Background	10.95	10	Average (dBA)	16.5	19.4	20.6	21.6	20.9	22.3	22.3	22.6	24.0	24.7	27.2	29.6	29.9	32.9	28.3	29.1	28.1	26.5	28.9	21.4	20.7	17.9	17.9	18.2	18.6	19.1	18.2	16.8	40.0	
				Uncertainty A (dB)	2.0	2.0	2.0	1.9	1.5	1.6	1.4	1.4	1.3	1.7	1.7	1.8	2.3	3.5	1.8	1.8	0.9	2.0	2.9	1.6	1.6	1.6	0.9	0.7	0.6	0.6	0.8	0.7	0.8	
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.8
				Combined Uncertainty (dB)	2.2	2.2	2.1	2.0	1.7	1.8	1.6	1.6	1.5	1.8	1.8	2.0	2.4	3.5	2.0	1.9	1.1	2.1	3.0	1.7	1.8	1.2	1.0	1.0	1.0	1.1	1.1	1.1	1.6	

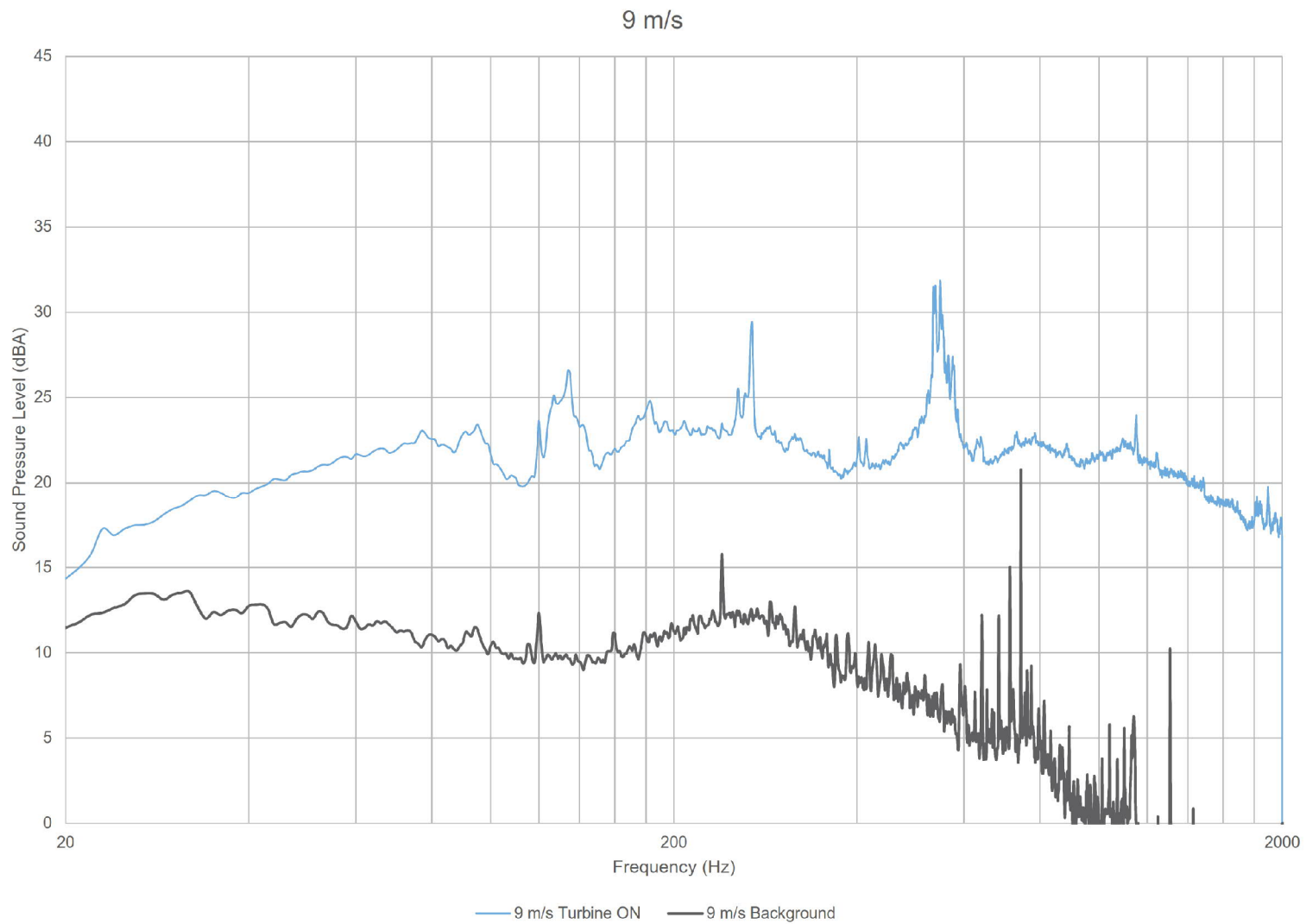
Appendix D Tonality Assessment

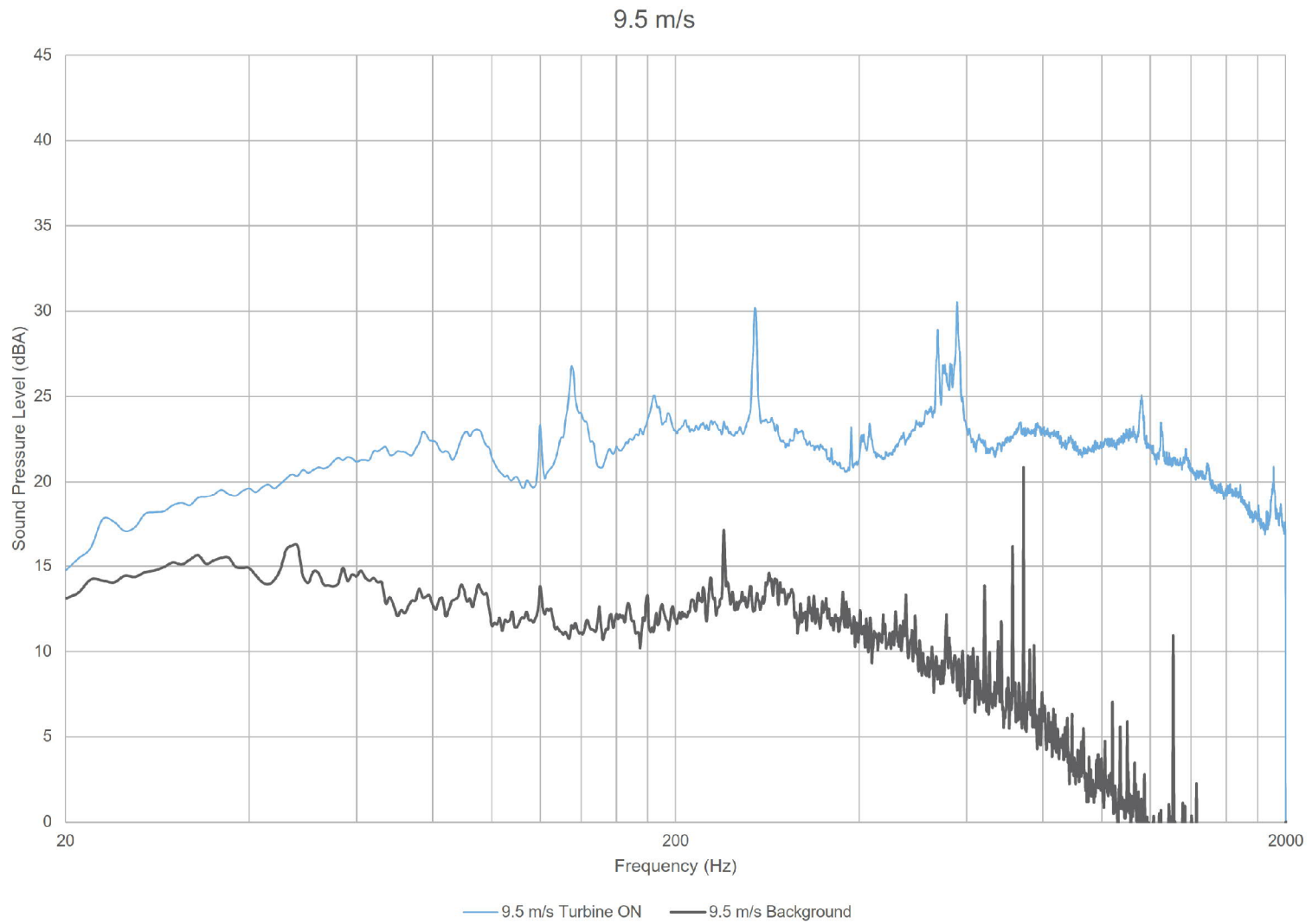












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Goshen Wind Energy Centre - Turbine T84 - IEC61400-11 Edition 3.0

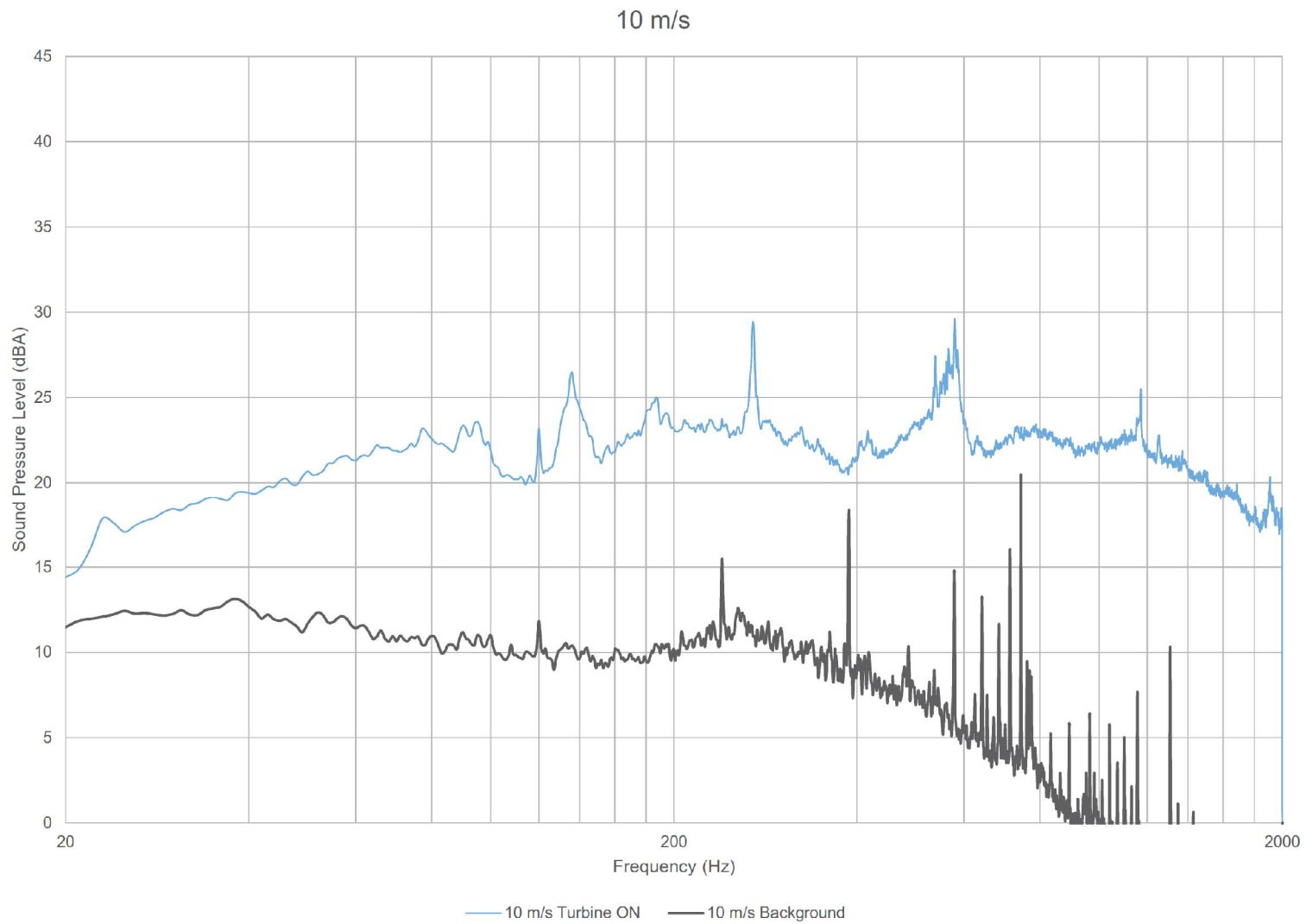


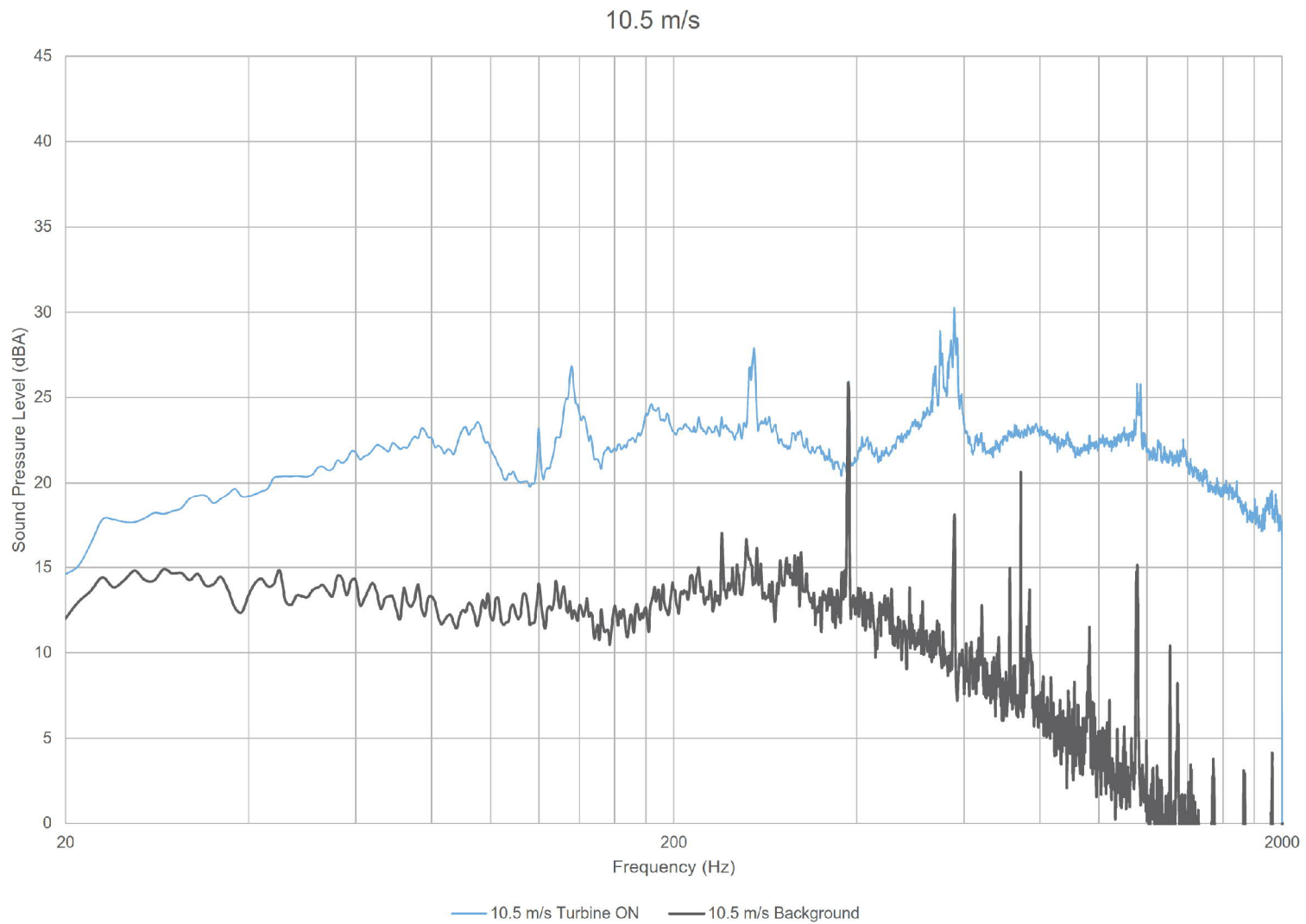
Scale: NTS
 Drawn by: AM
 Reviewed by: PA
 Date: Oct 31, 2017
 Revision: 1

Figure Title

Plot of narrow band spectra – Turbine ON vs. Background at 9.5 m/s

Figure D.06





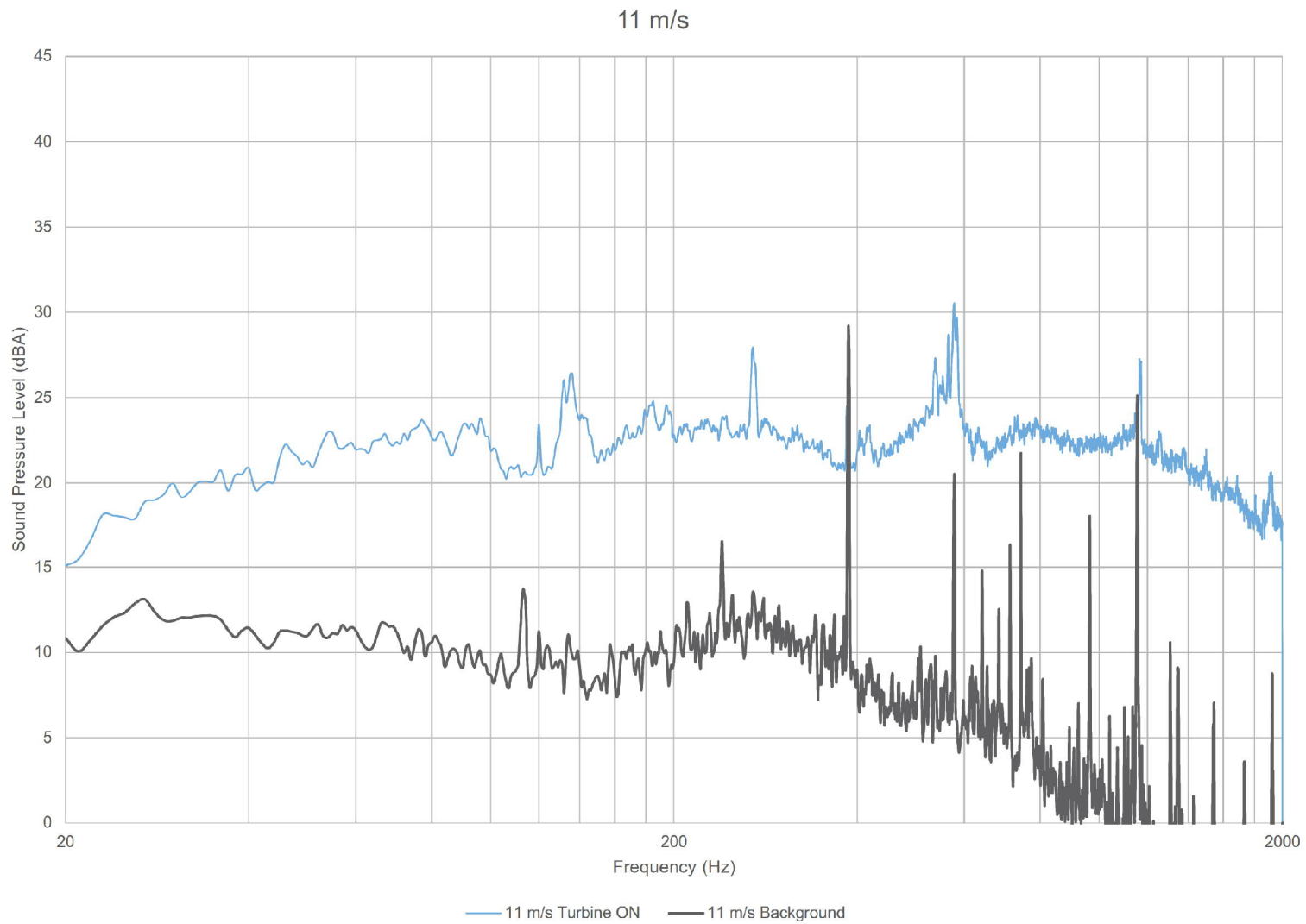


Table D.01 Tonality Assessment Table - 7 m/s

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
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Created on: 10/31/2017

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.02 Tonality Assessment Table - 7.5 m/s

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP2

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 Created on: 10/31/2017

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)
1073	518			22.2	41.2	30.7	-10.5	-2.3	-8.2
600	518			21.8	40.8	31.6	-9.2	-2.3	-6.8
774	518			22.1	41.1	37.5	-3.6	-2.3	-1.3
601	519			22.0	41.0	35.7	-5.2	-2.3	-2.9
778	520			22.3	41.3	29.5	-11.8	-2.3	-9.5
1041	520			22.0	41.0	37.5	-3.5	-2.3	-1.2
122	521			23.1	42.0	35.1	-7.0	-2.3	-4.6
1046	521			21.9	40.9	35.5	-5.4	-2.3	-3.1
277	521			23.1	42.0	38.4	-3.7	-2.3	-1.4
1049	521			22.3	41.2	36.9	-4.4	-2.3	-2.0
1208	521			22.9	41.9	36.6	-5.3	-2.3	-3.0
1169	521			22.8	41.7	30.6	-11.1	-2.3	-8.8
1071	522			22.4	41.4	35.7	-5.6	-2.3	-3.3
343	522			23.7	42.6	32.9	-9.7	-2.3	-7.4
372	522			22.2	41.2	35.7	-5.5	-2.3	-3.2
286	522			22.3	41.3	37.2	-4.0	-2.3	-1.7
543	522			22.5	41.5	37.8	-3.7	-2.3	-1.4
373	522			22.1	41.1	38.6	-2.5	-2.3	-0.1
693	522			22.8	41.8	30.5	-11.3	-2.3	-9.0
1253	522			22.3	41.3	36.9	-4.4	-2.3	-2.0
155	522			22.8	41.8	41.8	0.0	-2.3	2.4
71	523			22.8	41.8	34.6	-7.2	-2.3	-4.8
777	523			22.8	41.8	38.1	-3.6	-2.3	-1.3
1023	523			23.7	42.6	38.7	-4.0	-2.3	-1.6
1030	523			22.1	41.1	40.5	-0.6	-2.3	1.7
1033	524			22.4	41.4	36.7	-4.7	-2.3	-2.4
747	524			22.7	41.7	38.1	-3.5	-2.3	-1.2
1251	524			21.9	40.9	29.1	-11.9	-2.3	-9.5
514	524			22.4	41.4	31.7	-9.7	-2.3	-7.3
209	524			22.6	41.6	37.9	-3.8	-2.3	-1.4
1044	524			22.2	41.2	34.9	-6.3	-2.3	-4.0
57	524			23.2	42.2	42.4	0.2	-2.3	2.5
290	524			23.2	42.2	36.8	-5.4	-2.3	-3.1
1183	524			22.4	41.4	36.7	-4.7	-2.3	-2.4
604	524			22.0	41.0	32.3	-8.7	-2.3	-6.4
1018	524			22.0	41.0	38.5	-2.5	-2.3	-0.2
641	525			22.2	41.2	36.5	-4.7	-2.3	-2.4
701	525			23.3	42.3	37.5	-4.8	-2.3	-2.4
1180	525			22.4	41.4	35.0	-6.4	-2.3	-4.1
292	526			22.8	41.8	38.6	-3.2	-2.3	-0.9
689	526			22.5	41.5	28.6	-12.9	-2.3	-10.5
1045	527			22.7	41.7	38.4	-3.3	-2.3	-0.9
1072	529			22.6	41.6	39.0	-2.6	-2.3	-0.2
210	530			22.7	41.7	39.7	-1.9	-2.3	0.4
1048	532			22.5	41.5	39.7	-1.7	-2.3	0.6
264	534			23.6	42.6	43.7	1.1	-2.3	3.4
70	535			24.0	43.0	42.1	-0.8	-2.3	1.5
686	535			22.8	41.8	40.4	-1.5	-2.3	0.9
528	535			22.6	41.7	36.9	-4.8	-2.3	-2.4
278	535			23.1	42.1	41.3	-0.8	-2.3	1.5
11	535			22.7	41.7	42.6	0.9	-2.3	3.2
1171	536			24.1	43.1	39.7	-3.4	-2.3	-1.0
262	536			22.8	41.9	39.1	-2.7	-2.3	-0.4
56	536			23.7	42.7	40.7	-2.0	-2.3	0.3
208	537			22.6	41.6	37.1	-4.5	-2.3	-2.2
749	537			23.3	42.4	38.1	-4.2	-2.3	-1.9
58	538			23.6	42.6	44.8	2.2	-2.3	4.5
248	538			23.0	42.0	39.1	-2.9	-2.3	-0.6
1250	538			22.7	41.7	41.1	-0.6	-2.3	1.8
247	538			23.1	42.1	37.3	-4.8	-2.3	-2.5
1057	539			19.6	38.6	28.0	-10.6	-2.3	-8.3
394	539			23.4	42.4	35.6	-6.8	-2.3	-4.5
1047	539			23.0	42.0	43.5	1.5	-2.3	3.8

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

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP2

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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)
293	539			22.5	41.6	38.2	-3.3	-2.3	-1.0
268	540			24.0	43.0	41.3	-1.8	-2.3	0.6
117	547			24.8	43.8	43.8	0.0	-2.4	2.3
Average	528						-3.3	-2.3	-0.9

Table D.03 Tonality Assessment Table - 8 m/s

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP2

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 Created on: 10/31/2017

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)
467	531			22.9	41.9	35.7	-6.2	-2.3	-3.9
275	532			23.1	42.1	43.8	1.7	-2.3	4.0
1031	532			22.3	41.3	43.9	2.6	-2.3	4.9
1191	532			22.6	41.6	38.1	-3.5	-2.3	-1.2
1232	533			23.7	42.7	39.7	-2.9	-2.3	-0.6
201	533			23.3	42.3	41.9	-0.4	-2.3	1.9
1019	533			22.7	41.8	42.7	1.0	-2.3	3.3
369	533			23.8	42.8	34.8	-8.1	-2.3	-5.7
629	534			23.7	42.7	32.5	-10.2	-2.3	-7.9
622	534			22.8	41.8	33.3	-8.5	-2.3	-6.1
512	534			22.5	41.5	43.1	1.6	-2.3	3.9
439	534			23.0	42.0	43.0	1.0	-2.3	3.3
1029	534			23.7	42.7	43.0	0.3	-2.3	2.6
154	534			23.7	42.7	43.2	0.5	-2.3	2.8
1032	534			22.7	41.7	44.3	2.6	-2.3	4.9
276	534			22.7	41.7	42.8	1.1	-2.3	3.4
608	534			22.0	41.0	38.0	-3.0	-2.3	-0.7
1182	535			23.2	42.2	40.7	-1.5	-2.3	0.9
203	535			23.2	42.2	41.7	-0.5	-2.3	1.8
516	535			22.9	42.0	37.8	-4.2	-2.3	-1.8
1281	535			23.0	42.0	42.0	0.0	-2.3	2.3
731	535			23.0	42.1	41.2	-0.9	-2.3	1.5
750	535			23.9	42.9	42.9	0.0	-2.3	2.4
590	535			23.1	42.1	39.2	-2.9	-2.3	-0.5
410	535			22.6	41.7	40.0	-1.7	-2.3	0.7
462	535			23.2	42.2	41.2	-1.0	-2.3	1.4
746	535			24.0	43.0	39.8	-3.2	-2.3	-0.9
1279	535			23.9	42.9	31.3	-11.7	-2.3	-9.4
204	536			23.1	42.2	45.0	2.8	-2.3	5.2
1168	536			23.1	42.1	38.8	-3.3	-2.3	-1.0
55	536			23.9	42.9	34.3	-8.6	-2.3	-6.3
492	538			23.3	42.4	36.8	-5.6	-2.3	-3.3
513	538			22.5	41.5	42.8	1.3	-2.3	3.6
490	538			23.5	42.5	38.2	-4.3	-2.3	-2.0
688	538			23.4	42.4	35.1	-7.3	-2.3	-5.0
1021	538			22.6	41.6	43.8	2.1	-2.3	4.5
583	538			23.4	42.4	32.0	-10.4	-2.3	-8.1
1181	538			23.6	42.6	39.2	-3.4	-2.3	-1.1
1269	538			23.1	42.2	40.1	-2.1	-2.3	0.3
291	538			23.8	42.9	40.6	-2.2	-2.3	0.1
357	538			22.9	41.9	36.6	-5.3	-2.3	-3.0
588	538			22.6	41.6	41.2	-0.4	-2.3	2.0
437	539			22.9	42.0	42.8	0.8	-2.3	3.2
602	539			22.8	41.9	40.3	-1.6	-2.3	0.7
511	539			22.8	41.8	44.0	2.2	-2.3	4.6
587	539			23.2	42.2	41.8	-0.4	-2.3	1.9
586	539			23.3	42.3	42.1	-0.2	-2.3	2.1
285	539			23.0	42.0	43.0	1.0	-2.3	3.4
1254	539			23.0	42.0	40.8	-1.2	-2.3	1.2
603	539			22.3	41.4	42.7	1.3	-2.3	3.6
273	540			23.7	42.8	42.0	-0.7	-2.3	1.6
309	540			24.0	43.1	36.4	-6.6	-2.3	-4.3
1190	540			22.6	41.6	40.3	-1.3	-2.3	1.0
216	540			24.2	43.3	45.9	2.7	-2.3	5.0
310	540			23.3	42.4	43.5	1.1	-2.3	3.4
638	540			23.0	42.1	34.0	-8.0	-2.3	-5.7
1255	541			23.2	42.3	36.9	-5.4	-2.3	-3.1
274	542			23.7	42.7	46.2	3.5	-2.3	5.9
687	542			24.6	43.6	32.7	-11.0	-2.3	-8.6
402	542			23.4	42.5	34.6	-7.9	-2.3	-5.5
637	546			23.6	42.6	35.7	-7.0	-2.3	-4.6
1268	546			23.8	42.8	38.5	-4.3	-2.3	-2.0
59	547			23.6	42.7	45.9	3.2	-2.4	5.5

Table D.03 Tonality Assessment Table - 8 m/s

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
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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)
211	548			23.1	42.1	35.5	-6.7	-2.4	-4.3
700	548			23.7	42.8	39.4	-3.4	-2.4	-1.0
362	548			22.8	41.8	40.6	-1.2	-2.4	1.1
607	549			23.2	42.2	38.3	-4.0	-2.4	-1.6
151	549			24.8	43.9	40.2	-3.7	-2.4	-1.3
434	549			23.0	42.0	40.7	-1.3	-2.4	1.1
436	549			22.7	41.8	41.1	-0.7	-2.4	1.6
348	549			23.5	42.6	36.6	-6.0	-2.4	-3.6
138	549			22.9	42.0	45.0	3.0	-2.4	5.4
599	550			23.0	42.1	36.4	-5.6	-2.4	-3.3
660	550			23.4	42.5	36.8	-5.7	-2.4	-3.4
411	550			23.6	42.7	41.8	-0.9	-2.4	1.5
627	550			22.6	41.7	29.1	-12.6	-2.4	-10.2
269	551			24.3	43.3	41.7	-1.6	-2.4	0.8
1167	551			23.7	42.7	44.5	1.8	-2.4	4.1
10	551			24.3	43.4	40.8	-2.6	-2.4	-0.2
1265	552			23.5	42.6	39.6	-3.0	-2.4	-0.6
327	552			23.9	42.9	39.5	-3.4	-2.4	-1.1
1172	553			24.5	43.5	41.8	-1.7	-2.4	0.6
412	553			23.2	42.3	44.2	1.9	-2.4	4.3
136	553			24.5	43.6	32.5	-11.1	-2.4	-8.7
1173	553			23.5	42.5	39.6	-2.9	-2.4	-0.6
665	553			23.1	42.2	34.8	-7.4	-2.4	-5.0
363	553			22.9	42.0	40.2	-1.7	-2.4	0.6
326	554			23.3	42.4	39.1	-3.3	-2.4	-0.9
1209	556			24.4	43.4	35.3	-8.2	-2.4	-5.8
527	556			23.1	42.2	40.6	-1.6	-2.4	0.8
361	557			23.0	42.1	35.9	-6.1	-2.4	-3.8
325	557			24.2	43.3	33.1	-10.2	-2.4	-7.8
60	559			24.8	43.9	41.1	-2.8	-2.4	-0.5
1233	561			23.7	42.8	30.0	-12.7	-2.4	-10.4
699	561			24.4	43.5	37.9	-5.6	-2.4	-3.2
723	577			21.9	41.1	33.3	-7.7	-2.4	-5.3
110	579			21.5	40.6	28.2	-12.4	-2.4	-10.0
Average	543						-1.5	-2.3	0.9

Table D.04 Tonality Assessment Table - 8.5 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)
77	505			22.5	41.5	44.5	3.0	-2.3	5.3
76	505			22.9	41.8	39.8	-2.0	-2.3	0.3
383	514			21.7	40.7	39.1	-1.6	-2.3	0.7
534	519			21.7	40.7	38.9	-1.8	-2.3	0.5
1154	523			22.4	41.4	43.0	1.6	-2.3	3.9
95	523			22.8	41.8	39.5	-2.3	-2.3	0.1
1161	523			23.4	42.4	41.4	-1.0	-2.3	1.3
1176	523			22.2	41.2	42.9	1.7	-2.3	4.0
1155	523			22.6	41.5	44.6	3.0	-2.3	5.3
1203	524			22.1	41.1	44.4	3.3	-2.3	5.7
1201	524			24.3	43.3	39.5	-3.8	-2.3	-1.4
761	525			22.6	41.6	41.2	-0.4	-2.3	1.9
382	526			22.5	41.5	43.0	1.5	-2.3	3.8
1153	528			22.8	41.8	39.1	-2.7	-2.3	-0.3
381	530			22.4	41.4	41.2	-0.2	-2.3	2.1
1258	532			23.7	42.7	35.6	-7.2	-2.3	-4.8
1222	533			22.8	41.8	41.6	-0.2	-2.3	2.1
1061	533			22.7	41.7	41.0	-0.6	-2.3	1.7
1260	533			23.8	42.8	39.5	-3.3	-2.3	-1.0
1062	533			22.7	41.7	43.8	2.1	-2.3	4.5
311	534			25.3	44.3	40.9	-3.5	-2.3	-1.1
698	534			23.1	42.1	43.3	1.2	-2.3	3.6
200	534			23.5	42.5	46.4	3.9	-2.3	6.3
421	534			23.9	42.9	45.1	2.2	-2.3	4.5
1196	534			24.0	43.0	40.3	-2.7	-2.3	-0.4
427	534			23.0	42.0	38.9	-3.1	-2.3	-0.7
328	534			24.3	43.3	36.4	-6.9	-2.3	-4.6
498	534			23.4	42.4	32.7	-9.8	-2.3	-7.4
465	534			22.7	41.8	42.6	0.9	-2.3	3.2
721	535			22.8	41.8	47.9	6.0	-2.3	8.4
1234	535			24.9	43.9	31.3	-12.5	-2.3	-10.2
466	535			23.0	42.0	44.4	2.4	-2.3	4.7
358	535			25.0	44.0	36.0	-8.0	-2.3	-5.7
770	535			23.2	42.2	43.0	0.8	-2.3	3.1
519	535			22.5	41.5	45.2	3.7	-2.3	6.0
1230	535			24.4	43.4	36.3	-7.1	-2.3	-4.8
132	536			23.6	42.7	45.9	3.2	-2.3	5.6
1283	536			23.5	42.5	42.6	0.1	-2.3	2.4
1175	536			23.2	42.2	44.4	2.2	-2.3	4.5
745	536			25.3	44.3	37.3	-7.0	-2.3	-4.7
308	536			23.9	43.0	36.4	-6.5	-2.3	-4.2
1264	537			24.7	43.7	35.5	-8.2	-2.3	-5.9
1165	537			24.2	43.2	35.0	-8.2	-2.3	-5.9
324	537			23.8	42.8	36.2	-6.6	-2.3	-4.3
773	537			22.9	42.0	43.3	1.3	-2.3	3.6
342	537			24.0	43.1	34.9	-8.1	-2.3	-5.8
558	537			23.4	42.5	33.0	-9.5	-2.3	-7.1
52	537			24.8	43.8	38.5	-5.3	-2.3	-3.0
585	538			23.6	42.7	32.5	-10.2	-2.3	-7.9
670	538			22.7	41.7	37.4	-4.3	-2.3	-2.0
684	538			23.7	42.7	34.0	-8.7	-2.3	-6.3
772	538			23.4	42.4	43.7	1.2	-2.3	3.6
1174	538			24.0	43.0	44.6	1.5	-2.3	3.9
1248	538			24.4	43.4	31.2	-12.2	-2.3	-9.8
582	539			23.4	42.4	34.7	-7.7	-2.3	-5.3
722	539			23.9	43.0	47.6	4.6	-2.3	7.0
570	539			24.0	43.1	41.3	-1.8	-2.3	0.5
280	539			23.3	42.3	45.3	3.0	-2.3	5.4
581	539			23.4	42.4	34.1	-8.3	-2.3	-6.0
461	539			23.1	42.1	38.9	-3.3	-2.3	-0.9
584	539			23.8	42.8	29.9	-12.9	-2.3	-10.6
732	539			23.8	42.8	45.9	3.1	-2.3	5.5
580	541			23.4	42.5	32.6	-9.9	-2.3	-7.5

Table D.04 Tonality Assessment Table - 8.5 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)
215	542			24.7	43.8	41.9	-1.8	-2.3	0.5
1282	542			23.5	42.6	45.9	3.3	-2.3	5.6
1210	542			24.2	43.2	42.4	-0.8	-2.3	1.5
524	546			23.2	42.3	39.4	-2.9	-2.3	-0.5
717	547			24.3	43.3	41.7	-1.6	-2.4	0.7
283	547			23.4	42.5	45.5	3.0	-2.4	5.3
140	548			24.6	43.7	40.6	-3.1	-2.4	-0.8
118	548			24.4	43.5	43.4	-0.1	-2.4	2.2
771	548			23.4	42.4	45.6	3.2	-2.4	5.5
464	548			23.0	42.0	44.6	2.6	-2.4	5.0
539	548			22.8	41.9	41.5	-0.3	-2.4	2.0
Average	535						-0.1	-2.3	2.2

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)
508	534			23.6	42.6	33.7	-9.0	-2.3	-6.6
422	534			23.7	42.7	48.4	5.7	-2.3	8.0
165	534			23.9	42.9	44.1	1.2	-2.3	3.6
720	534			23.9	42.9	44.8	1.9	-2.3	4.2
271	534			24.2	43.2	37.1	-6.1	-2.3	-3.8
367	534			24.2	43.2	33.0	-10.2	-2.3	-7.9
354	534			22.8	41.8	46.2	4.4	-2.3	6.7
42	535			24.4	43.4	36.0	-7.4	-2.3	-5.0
1223	535			23.4	42.4	45.7	3.4	-2.3	5.7
405	535			23.3	42.3	37.7	-4.7	-2.3	-2.4
742	535			24.9	43.9	37.3	-6.7	-2.3	-4.3
1296	535			24.0	43.0	47.8	4.8	-2.3	7.1
474	536			24.9	43.9	41.9	-2.0	-2.3	0.3
206	536			24.0	43.0	35.1	-7.9	-2.3	-5.6
625	537			23.7	42.7	33.9	-8.8	-2.3	-6.5
229	537			24.1	43.1	30.8	-12.3	-2.3	-9.9
214	537			24.6	43.7	31.0	-12.6	-2.3	-10.3
592	537			23.8	42.8	31.8	-11.0	-2.3	-8.7
560	537			23.9	42.9	32.7	-10.2	-2.3	-7.9
694	538			25.0	44.0	43.5	-0.5	-2.3	1.8
321	538			24.2	43.2	39.9	-3.3	-2.3	-1.0
1239	538			24.6	43.6	37.4	-6.2	-2.3	-3.9
149	538			25.0	44.0	36.8	-7.2	-2.3	-4.9
333	538			23.9	42.9	34.2	-8.7	-2.3	-6.4
565	538			23.5	42.6	36.0	-6.6	-2.3	-4.2
555	538			23.8	42.8	34.6	-8.2	-2.3	-5.8
1162	538			24.4	43.4	43.3	-0.2	-2.3	2.2
1261	538			24.1	43.1	38.4	-4.7	-2.3	-2.4
337	538			23.9	42.9	33.8	-9.1	-2.3	-6.7
489	538			23.9	43.0	30.0	-13.0	-2.3	-10.6
352	539			22.5	41.5	46.8	5.2	-2.3	7.5
426	539			23.5	42.5	48.2	5.6	-2.3	8.0
1297	539			24.0	43.1	45.0	1.9	-2.3	4.2
545	539			24.6	43.7	31.8	-11.8	-2.3	-9.5
356	540			22.9	41.9	43.1	1.2	-2.3	3.6
645	542			23.7	42.7	41.7	-1.0	-2.3	1.4
1200	544			23.6	42.6	42.0	-0.5	-2.3	1.8
353	545			22.7	41.8	44.7	2.9	-2.3	5.3
81	547			24.5	43.6	46.8	3.3	-2.4	5.6
612	548			22.8	41.8	45.1	3.3	-2.4	5.6
284	548			23.2	42.2	43.7	1.4	-2.4	3.8
131	548			24.4	43.4	47.5	4.1	-2.4	6.4
83	548			24.0	43.1	40.2	-2.9	-2.4	-0.5
129	548			22.9	42.0	44.1	2.1	-2.4	4.5
646	548			22.8	41.9	44.2	2.3	-2.4	4.6
130	548			24.1	43.2	43.8	0.6	-2.4	2.9
697	549			24.6	43.6	40.5	-3.2	-2.4	-0.8
166	550			23.8	42.8	43.5	0.6	-2.4	3.0
199	550			23.8	42.8	44.9	2.1	-2.4	4.4
351	551			24.7	43.7	37.4	-6.3	-2.4	-4.0
672	552			23.6	42.6	43.1	0.5	-2.4	2.9
674	553			24.0	43.0	35.5	-7.5	-2.4	-5.1
128	553			23.5	42.6	46.6	4.0	-2.4	6.4
535	553			22.8	41.9	43.5	1.6	-2.4	4.0
554	553			23.5	42.6	45.0	2.4	-2.4	4.7
294	555			25.1	44.2	41.6	-2.5	-2.4	-0.2
591	556			24.3	43.3	31.0	-12.3	-2.4	-10.0
447	556			24.4	43.4	37.3	-6.2	-2.4	-3.8
523	559			24.4	43.5	41.4	-2.1	-2.4	0.3
61	559			25.3	44.4	40.6	-3.8	-2.4	-1.4
610	559			24.0	43.1	38.6	-4.5	-2.4	-2.1
538	560			23.4	42.5	42.3	-0.2	-2.4	2.1
259	561			24.2	43.3	40.7	-2.5	-2.4	-0.2
619	563			23.7	42.8	32.3	-10.5	-2.4	-8.1
669	563			23.4	42.5	40.0	-2.5	-2.4	-0.1
Average	544						-0.2	-2.3	2.2

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)
1228	535			24.6	43.6	38.5	-5.1	-2.3	-2.8
423	537			25.1	44.1	46.5	2.3	-2.3	4.7
481	538			24.1	43.1	30.8	-12.4	-2.3	-10.0
146	538			24.5	43.6	33.0	-10.6	-2.3	-8.3
1263	538			24.1	43.1	36.6	-6.5	-2.3	-4.1
323	538			24.4	43.4	35.8	-7.6	-2.3	-5.3
330	538			24.2	43.3	37.2	-6.0	-2.3	-3.7
488	539			23.7	42.7	36.1	-6.6	-2.3	-4.3
302	548			24.3	43.3	32.7	-10.6	-2.4	-8.3
8	556			23.5	42.6	42.3	-0.3	-2.4	2.1
400	563			24.2	43.3	37.3	-5.9	-2.4	-3.6
212	564			24.1	43.2	42.8	-0.3	-2.4	2.0
Average	544						-3.6	-2.3	-1.2

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

Project: Goshen Wind Energy Centre- Turbine T84 - IEC 61400-11 Measurement
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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)
556	538			24.0	43.0	35.3	-7.7	-2.3	-5.4
550	539			24.0	43.0	30.4	-12.7	-2.3	-10.3
1224	556			23.9	43.0	43.7	0.7	-2.4	3.1
537	561			24.0	43.1	41.2	-1.9	-2.4	0.4
618	565			23.4	42.5	38.0	-4.5	-2.4	-2.1
25	565			24.4	43.5	43.7	0.2	-2.4	2.6
536	572			23.8	42.9	39.1	-3.8	-2.4	-1.5
673	573			23.8	42.9	37.3	-5.6	-2.4	-3.2
313	573			24.5	43.6	36.7	-6.8	-2.4	-4.5
32	577			24.8	43.9	41.3	-2.6	-2.4	-0.2
695	577			23.8	43.0	36.6	-6.4	-2.4	-4.0
475	579			24.7	43.8	30.9	-12.9	-2.4	-10.5
254	579			24.0	43.1	37.6	-5.5	-2.4	-3.1
35	579			24.8	44.0	38.7	-5.3	-2.4	-2.9
39	579			24.0	43.2	36.5	-6.7	-2.4	-4.3
633	579			23.9	43.0	34.7	-8.3	-2.4	-5.9
743	579			24.2	43.4	37.0	-6.4	-2.4	-4.0
1164	579			23.8	42.9	37.9	-5.0	-2.4	-2.6
336	581			23.7	42.9	36.8	-6.1	-2.4	-3.7
616	581			23.6	42.7	37.7	-5.1	-2.4	-2.7
250	581			24.4	43.5	34.3	-9.2	-2.4	-6.8
234	581			24.2	43.3	37.1	-6.2	-2.4	-3.8
66	584			24.6	43.7	32.4	-11.3	-2.4	-8.9
43	584			24.9	44.0	36.9	-7.2	-2.4	-4.8
319	585			23.8	42.9	33.5	-9.4	-2.4	-7.0
48	585			24.2	43.3	34.0	-9.3	-2.4	-6.9
1245	585			24.1	43.3	33.7	-9.6	-2.4	-7.2
1229	585			24.4	43.6	39.5	-4.1	-2.4	-1.7
Average	574						-5.1	-2.4	-2.8

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

Project: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP2

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)
624	538			24.1	43.1	32.3	-10.8	-2.3	-8.4
322	539			24.5	43.5	33.7	-9.8	-2.3	-7.5
20	548			25.0	44.1	42.7	-1.4	-2.4	1.0
733	548			24.7	43.7	45.6	1.8	-2.4	4.2
520	553			24.3	43.3	35.5	-7.8	-2.4	-5.4
198	565			24.1	43.2	39.4	-3.8	-2.4	-1.4
682	568			23.7	42.8	37.0	-5.9	-2.4	-3.5
Average	551						-3.3	-2.4	-0.9

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)
No Reportable Tones									

Appendix E Measurement Data

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	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1	11.5	54.4	1624	300.0	302.9	7.5	15.8	10.3	7.0	-8	100.6	67
2	11.0	54.0	1614	300.0	307.0	7.8	15.7	9.9	6.0	-8	100.6	66
3			1607	300.0	302.9	7.4	15.5	8.0	8.1	-8	100.6	66
4			1622	300.0	302.9	6.5	15.4	7.7	7.6	-8	100.6	66
5	9.3	53.9	1629	300.0	302.9	7.6	15.7	8.3	6.9	-8	100.6	66
6	53.9	1619	300.0	301.9	7.4	15.6	10.1	6.9	-8	100.6	66	
7	10.7	53.9	1612	300.0	297.4	6.5	15.4	9.6	7.2	-8	100.6	66
8	9.3	53.3	1512	300.0	297.0	5.0	15.1	8.4	7.6	-8	100.6	66
9	8.7	53.1	1410	300.0	297.0	5.1	15.4	9.0	7.0	-8	100.6	66
10	7.8	53.3	1151	300.0	297.0	5.3	15.1	7.7	6.8	-8	100.6	65
11	7.4	52.8	970	300.0	297.0	5.2	14.1	6.6	7.3	-8	100.6	65
12	7.1	51.4	875	300.0	297.0	5.2	13.8	7.2	7.1	-8	100.6	65
13	7.0	51.3	827	300.0	297.0	5.2	13.5	6.4	6.5	-8	100.6	65
14	6.7	50.0	726	300.0	297.0	5.2	12.8	6.5	7.2	-8	100.6	65
15	6.8	49.7	767	300.0	297.0	3.0	12.3	6.4	6.8	-8	100.6	65
16	7.2	48.2	916	300.0	297.0	1.3	12.5	6.5	-8	100.6	65	
17	7.1	48.1	889	300.0	297.0	1.3	12.3	6.1	6.0	-8	100.6	65
18	7.2	47.5	896	300.0	297.0	1.3	12.3	6.3	5.2	-8	100.6	65
19	7.8	48.6	1135	300.0	297.0	2.0	13.4	7.9	6.4	-8	100.6	65
20	10.5	52.4	1545	300.0	297.0	3.6	15.0	9.4	6.9	-8	100.6	65
21	9.5	53.4	1646	300.0	297.0	4.8	15.6	8.5	7.6	-8	100.6	66
22	10.6	53.9	1661	300.0	297.0	6.6	16.1	9.5	8.4	-8	100.6	66
23	11.4	53.7	1625	300.0	297.0	7.6	15.9	10.3	8.3	-8	100.6	66
24	10.4	54.0	1600	300.0	297.0	6.7	15.5	9.3	10.7	-8	100.6	66
25	10.0	53.6	1605	300.0	297.0	5.4	15.3	9.0	10.8	-8	100.6	66
26	10.6	53.9	1635	300.0	297.0	5.9	15.6	9.6	8.6	-8	100.6	66
27	11.4	53.7	1628	300.0	297.0	7.6	15.9	10.3	8.3	-8	100.6	66
28	11.0	53.7	1623	300.0	297.0	6.4	15.6	9.9	6.9	-8	100.6	65
29	9.6	54.3	1624	300.0	297.0	6.4	15.6	8.6	8.3	-8	100.6	65
30	9.4	54.0	1596	300.0	297.0	5.2	15.4	8.4	7.5	-8	100.6	65
31	9.6	53.8	1624	300.0	297.0	5.0	15.6	8.6	7.6	-8	100.6	65
32	9.8	53.8	1552	300.0	297.0	5.0	15.5	8.8	7.7	-8	100.6	65
33	10.4	53.6	1601	300.0	297.0	5.0	15.8	9.4	8.0	-8	100.6	65
34	9.8	54.2	1625	300.0	297.0	5.7	15.8	8.8	8.8	-8	100.6	66
35	10.0	54.0	1604	300.0	297.0	5.9	15.5	9.0	8.0	-8	100.6	66
36	10.5	53.9	1617	300.0	297.0	4.9	15.5	9.5	7.5	-8	100.6	66
37	10.1	53.6	1638	300.0	297.0	5.9	15.8	9.1	7.6	-8	100.6	66
38	9.6	53.8	1605	300.0	297.0	5.3	15.5	8.6	7.5	-8	100.6	66
39	10.2	53.9	1625	300.0	297.0	5.0	15.6	9.2	7.4	-8	100.6	66
40	10.5	48.5	1624	300.0	297.0	4.2	15.6	9.4	7.7	-8	100.6	66
41			1542	300.0	297.0	4.1	15.3	8.3	9.0	-8	100.6	66
42	8.9	53.7	1485	300.0	297.0	3.4	15.4	7.8	8.0	-8	100.6	66
43	9.8	53.5	1590	300.0	297.0	3.9	15.7	8.8	8.5	-8	100.6	66
44			1635	300.0	297.0	4.5	15.8	8.3	8.3	-8	100.6	66
45			1560	300.0	297.0	4.8	15.7	7.8	7.3	-8	100.6	66
46	9.4	54.2	1611	300.0	297.0	4.4	15.6	8.5	8.1	-8	100.6	66
47			1626	300.0	297.0	4.5	15.7	7.8	7.7	-8	100.6	66
48	9.8	54.3	1629	300.0	297.0	5.5	15.8	8.8	8.4	-8	100.6	66
49			1624	300.0	297.0	5.7	15.7	8.3	8.6	-8	100.6	66
50			1609	300.0	297.0	5.8	15.6	8.0	8.8	-8	100.6	66
51	8.8	53.1	1417	300.0	297.0	5.1	15.3	7.9	9.1	-8	100.6	66
52	8.5	53.4	1350	300.0	297.0	5.3	15.5	7.7	8.9	-8	100.6	66
53	9.1	53.7	1489	300.0	297.0	5.3	15.7	8.3	8.8	-8	100.6	66
54	9.4	54.2	1595	300.0	297.0	5.4	15.7	8.4	7.9	-8	100.6	66
55	8.1	53.6	1254	300.0	297.0	5.3	15.3	7.6	8.0	-8	100.6	66
56	7.6	52.5	1085	300.0	297.0	5.2	14.4	6.4	7.8	-8	100.6	65
57	7.4	51.6	994	300.0	297.0	4.0	14.0	6.3	7.9	-8	100.6	65
58	7.7	52.7	1116	300.0	297.0	3.6	14.5	7.9	7.0	-8	100.6	66
59	7.9	52.3	1192	300.0	297.0	3.7	14.7	7.3	5.8	-8	100.6	66
60	8.2	53.6	1271	300.0	297.0	3.9	15.1	7.8	6.7	-8	100.6	66
61	8.9	53.4	1444	300.0	297.0	3.5	15.3	8.1	6.2	-8	100.6	66
62			1561	300.0	297.0	3.5	15.6	7.5	7.0	-8	100.6	66
63	8.7	53.4	1395	300.0	297.0	3.5	15.3	6.9	8.2	-8	100.6	66
64	10.9	53.5	1643	300.0	297.0	4.0	15.7	9.8	6.8	-8	100.6	66
65			1628	300.0	297.0	4.9	15.7	8.1	7.2	-8	100.6	66
66	9.9	53.9	1621	300.0	297.0	5.1	15.7	8.9	7.5	-8	100.6	66
67			1579	300.0	297.0	4.1	15.3	8.3	7.4	-8	100.6	66
68			1560	300.0	297.0	3.4	15.5	8.2	6.4	-8	100.6	66
69	8.3	53.6	1286	300.0	297.0	4.4	15.3	7.9	8.5	-8	100.6	66
70	7.7	53.3	1099	300.0	297.0	4.3	14.4	7.4	4.9	-8	100.6	67
71	7.3	52.2	944	300.0	297.0	4.3	13.8	6.8	5.0	-8	100.6	67
72	6.9	50.5	794	300.0	297.0	4.3	12.9	5.2	6.3	-8	100.6	67
73	6.5	49.4	693	300.0	297.0	4.3	12.5	6.2	5.7	-8	100.6	67
74	6.8	49.7	763	300.0	297.0	4.3	13.1	6.7	5.3	-8	100.6	67
75	7.9	51.8	1178	300.0	297.0	2.0	13.8	5.4	7.0	-8	100.6	67
76	8.4	51.7	1315	300.0	297.0	1.7	13.8	7.4	8.4	-8	100.6	67
77	8.3	52.8	1296	300.0	297.0	1.7	13.6	7.4	7.4	-8	100.6	67
78	7.8	52.0	1134	300.0	297.0	1.9	13.3	6.1	7.8	-8	100.6	67
79	7.3	49.3	930	300.0	297.0	1.7	12.1	6.5	6.5	-8	100.6	67
80	7.9	49.0	1160	300.0	297.0	1.9	13.3	7.0	8.2	-8	100.6	67
81	9.0	53.4	1479	300.0	297.0	3.2	14.8	8.8	8.9	-8	100.6	68
82	10.7	53.6	1600	300.0	297.0	3.9	15.4	9.6	8.3	-8	100.6	68
83	8.8	53.4	1426	300.0	297.0	4.0	14.8	8.0	8.1	-8	100.6	68
84	7.9	51.6	1172	300.0	297.0	2.8	13.6	7.0	7.3	-8	100.6	68
85	7.6	50.4	1048	300.0	297.0	2.1	13.1	7.1	6.6	-8	100.6	68
86	7.3	49.4	962	300.0	297.0	1.7	12.6	6.8	6.9	-8	100.6	68
87	7.4	49.7	974	300.0	297.0	1.6	13.3	7.3	5.6	-8	100.6	68
88	7.4	50.9	998	300.0	297.0	1.6	13.6	5.4	4.7	-8	100.6	68

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

Data Point #	Standardized Wind Speed	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
89	7.3	50.2	964	300.0	297.0	1.6	13.4	6.3	5.3	-8	100.6	65
90	7.3	50.4	954	300.0	297.0	1.6	13.4	6.8	4.6	-8	100.6	65
91	7.3	50.5	944	300.0	297.0	1.6	13.3	6.7	5.3	-8	100.6	65
92	7.5	50.8	1020	300.0	297.0	1.7	13.7	6.3	5.7	-8	100.6	65
93	7.8	51.5	1140	300.0	297.0	2.1	13.7	5.8	5.4	-8	100.6	66
94	8.0	52.6	1224	300.0	297.0	2.4	13.5	7.6	5.2	-8	100.6	66
95	8.3	51.4	1281	300.0	297.0	2.7	14.0	7.6	5.1	-8	100.6	66
96	7.9	51.0	1169	300.0	297.0	2.5	13.4	6.1	6.1	-8	100.6	66
97	7.9	51.0	1162	300.0	297.0	2.2	13.4	7.5	7.0	-8	100.6	66
98	7.8	51.0	1157	300.0	297.0	2.3	13.4	8.0	5.3	-8	100.6	66
99	7.3	50.0	964	300.0	297.0	1.9	12.6	6.7	5.4	-8	100.6	65
100	6.8	48.7	773	300.0	297.0	1.4	11.7	6.4	5.7	-8	100.6	65
101	6.5	46.7	682	300.0	297.0	1.2	11.2	6.5	4.6	-8	100.6	65
102	6.8	47.1	759	300.0	297.0	1.2	11.7	7.7	4.6	-8	100.6	65
103	7.3	48.6	963	300.0	297.0	0.1	12.6	6.3	4.8	-8	100.6	65
104	7.8	50.5	1141	300.0	297.0	0.1	13.4					

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	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
177	8.1	51.2	1232	300.0	291.1	2.3	13.8	7.7	6.6	-8	100.6	63
178	7.9	51.1	1180	300.0	291.1	2.5	13.4	7.1	6.4	-8	100.6	63
179	7.8	50.5	1123	300.0	291.1	2.1	13.2	7.1	6.7	-8	100.6	63
180	7.4	50.0	994	300.0	291.1	1.9	12.6	6.3	6.8	-8	100.6	63
181	7.2	48.7	917	300.0	291.1	1.4	12.2	6.2	6.0	-8	100.6	63
182	7.5	48.6	1026	300.0	291.1	1.6	12.7	7.7	6.3	-8	100.6	63
183	7.9	50.7	1194	300.0	291.1	2.2	13.6	8.6	6.6	-8	100.6	63
184	7.8	51.1	1130	300.0	291.1	2.2	13.2	6.7	5.4	-8	100.6	63
185	7.7	50.6	1091	300.0	291.1	2.0	13.0	7.4	5.5	-8	100.6	63
186	8.0	51.2	1201	300.0	291.1	2.1	13.3	7.2	7.1	-8	100.6	63
187	8.0	51.2	1201	300.0	291.1	2.2	13.5	7.0	6.6	-8	100.6	63
188	7.9	51.0	1179	300.0	291.1	2.3	13.4	7.7	6.1	-8	100.6	63
189	7.9	50.9	1196	300.0	291.1	2.4	13.6	6.8	4.9	-8	100.6	64
190	8.2	51.5	1262	300.0	291.1	2.5	14.0	8.9	5.2	-8	100.6	64
191	8.0	52.1	1204	300.0	291.1	2.5	13.8	7.4	6.4	-8	100.6	64
192	7.7	51.0	1082	300.0	291.1	2.2	13.2	6.2	6.4	-8	100.6	64
193	7.2	49.5	900	300.0	291.2	1.6	12.3	6.6	5.9	-8	100.6	64
194	6.8	48.6	786	300.0	291.2	1.3	11.8	5.6	5.1	-8	100.6	64
195	6.7	48.2	735	300.0	291.2	1.3	11.6	6.7	5.9	-8	100.6	65
196	7.3	48.4	935	300.0	291.2	1.4	12.6	6.7	6.4	-8	100.6	65
197	8.6	51.6	1371	300.0	291.2	2.7	14.7	8.9	6.3	-8	100.6	65
198	10.5	53.5	1522	300.0	291.2	3.8	15.3	9.4	5.5	-8	100.6	65
199	8.9	53.6	1446	300.0	291.2	3.6	15.0	7.9	5.8	-8	100.6	65
200	8.4	53.1	1331	300.0	291.1	2.7	14.5	7.5	7.0	-8	100.6	65
201	8.0	52.8	1214	300.0	291.1	2.5	14.3	8.0	4.8	-8	100.6	65
202	7.8	52.3	1166	300.0	291.1	2.2	14.3	6.6	6.0	-8	100.6	64
203	7.9	52.9	1160	300.0	291.1	2.2	14.3	7.8	7.8	-8	100.6	64
204	8.1	52.7	1238	300.0	291.1	2.4	14.6	7.3	6.5	-8	100.6	64
205	8.9	52.9	1453	300.0	291.1	2.9	15.3	8.9	5.9	-8	100.6	64
206	8.9	53.3	1451	300.0	291.1	3.6	15.5	8.3	5.5	-8	100.6	64
207	8.0	53.0	1305	300.0	291.1	3.0	15.0	7.1	6.8	-8	100.6	64
208	7.7	52.3	1117	300.0	291.1	2.4	14.0	7.1	6.3	-8	100.6	64
209	7.7	50.8	1088	300.0	291.1	2.0	14.0	7.1	6.4	-8	100.6	64
210	7.7	51.7	1116	300.0	291.1	2.0	14.2	7.5	6.4	-8	100.6	64
211	7.8	51.8	1138	300.0	291.1	2.1	14.1	8.0	6.0	-8	100.6	64
212	9.5	52.9	1521	300.0	291.1	2.9	15.2	8.5	5.4	-8	100.6	64
213	9.6	53.4	1573	300.0	291.1	3.9	15.5	8.6	6.4	-8	100.6	64
214	9.0	54.0	1476	300.0	291.1	3.8	15.5	7.5	5.9	-8	100.6	64
215	8.3	53.7	1306	300.0	291.1	3.0	15.0	7.2	5.9	-8	100.6	64
216	8.1	53.1	1251	300.0	291.1	2.5	14.7	6.9	6.9	-8	100.6	64
217	8.6	53.7	1376	300.0	291.1	2.7	15.3	8.0	6.0	-8	100.6	64
218	8.7	53.5	1395	300.0	291.1	3.4	15.3	9.0	6.9	-8	100.6	64
219	9.0	53.5	1465	300.0	291.1	3.3	15.5	8.7	6.6	-8	100.6	65
220	8.6	53.1	1451	300.0	291.1	3.0	15.2	8.5	6.6	-8	100.6	65
221	8.6	53.4	1381	300.0	291.1	3.0	15.2	7.4	7.7	-8	100.6	65
222	9.3	53.5	1545	300.0	291.1	3.3	15.5	8.3	7.6	-8	100.6	65
223	9.0	53.8	1477	300.0	291.1	4.0	15.5	7.4	8.9	-8	100.6	65
224	8.5	53.5	1360	300.0	291.1	3.1	15.2	6.4	6.4	-8	100.6	65
225	8.3	52.8	1296	300.0	291.1	2.8	14.9	6.6	7.0	-8	100.6	64
226	8.4	52.7	1308	300.0	291.1	2.5	15.0	7.7	7.3	-8	100.6	64
227	8.6	53.2	1365	300.0	291.1	3.0	15.3	7.4	7.2	-8	100.6	64
228	8.5	53.1	1341	300.0	291.1	3.0	15.1	7.1	6.6	-8	100.6	64
229	9.1	53.1	1494	300.0	291.1	3.2	15.4	8.1	7.4	-8	100.6	64
230	8.8	53.0	1431	300.0	291.1	3.4	15.5	8.2	7.3	-8	100.6	64
231	8.9	53.4	1449	300.0	291.1	3.2	15.5	8.0	7.0	-8	100.6	64
232	9.8	53.7	1628	300.0	291.1	4.1	15.8	8.8	6.8	-8	100.6	64
233	9.5	53.6	1612	300.0	291.1	4.2	15.6	8.6	6.9	-8	100.6	64
234	10.1	53.6	1619	300.0	291.1	3.5	15.6	9.0	8.2	-8	100.6	64
235	9.3	53.6	1564	300.0	291.1	3.5	15.6	8.3	8.8	-8	100.6	64
236	9.6	53.4	1611	300.0	291.1	3.6	15.7	8.7	8.7	-8	100.6	64
237	10.0	53.3	1625	300.0	291.1	3.7	15.7	9.0	8.5	-8	100.6	63
238	9.9	54.2	1638	300.0	291.1	5.8	16.1	8.9	9.7	-8	100.6	63
239	11.7	54.4	1630	300.0	291.1	7.5	16.1	10.5	9.4	-8	100.6	63
240	11.2	54.3	1605	300.0	291.1	7.8	15.8	10.0	7.8	-8	100.6	63
241	12.6	54.3	1608	300.0	291.1	7.4	15.6	11.3	8.1	-8	100.6	63
242	11.6	54.1	1617	300.0	291.1	7.5	15.6	10.4	7.6	-8	100.6	63
243	11.2	53.4	1619	300.0	291.1	7.1	15.5	10.1	7.8	-8	100.6	63
244	11.0	53.6	1606	300.0	291.1	6.1	15.3	9.9	7.0	-8	100.6	63
245	8.3	53.0	1300	300.0	291.1	4.2	15.2	8.5	6.3	-8	100.6	63
246	7.8	52.6	1134	300.0	291.1	5.2	15.1	7.5	5.9	-8	100.6	63
247	7.5	52.5	1029	300.0	291.1	5.2	14.6	7.0	6.0	-8	100.6	63
248	7.4	52.2	995	300.0	291.1	5.2	14.5	6.2	7.9	-8	100.6	63
249	8.5	53.4	1344	300.0	291.1	3.8	15.2	8.7	6.7	-8	100.6	64
250	9.8	53.9	1624	300.0	291.1	3.6	15.7	8.8	6.4	-8	100.6	64
251	9.8	53.8	1635	300.0	291.1	4.9	15.9	8.8	6.3	-8	100.6	64
252	10.3	53.5	1619	300.0	291.1	5.0	15.8	9.3	7.7	-8	100.6	64
253	10.3	53.5	1619	300.0	291.1	4.9	15.7	9.2	8.4	-8	100.6	64
254	9.9	53.5	1617	300.0	291.1	5.1	15.6	8.9	7.2	-8	100.6	64
255	10.3	53.7	1622	300.0	291.1	5.2	15.6	9.3	6.7	-8	100.6	64
256	10.5	54.0	1627	300.0	291.8	5.1	15.6	9.4	6.8	-8	100.6	63
257	10.4	54.0	1625	300.0	291.7	5.9	15.7	9.4	6.9	-8	100.6	63
258	10.6	54.2	1609	300.0	303.8	5.3	15.5	9.5	7.1	-8	100.6	63
259	8.8	53.6	1435	300.0	306.8	3.6	15.1	8.3	6.3	-8	100.6	63
260	8.6	53.3	1363	300.0	306.8	2.9	15.2	7.6	6.1	-8	100.6	63
261	8.0	53.5	1213	300.0	306.8	4.4	15.1	7.6	6.5	-8	100.6	64
262	7.4	52.9	992	300.0	306.8	5.0	14.2	5.6	5.9	-8	100.6	64
263	7.2	51.8	901	300.0	306.8	5.0	13.9	6.1	6.8	-8	100.6	64
264	7.3	53.9	943	300.0	306.8	5.0	14.3	7.1	6.3	-8	100.6	64

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

Data Point #	Standardized Wind Speed	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
265	7.2	53.6	925	300.0	305.8	5.0	14.0	7.6	6.9	-8	100.6	64
266	6.9	50.7	802	300.0	305.8	5.0	13.3	6.5	6.9	-8	100.6	64
267	7.1	50.9	874	300.0	305.8	3.1	13.5	5.9	6.9	-8	100.6	64
268	7.7	51.3	1113	300.0	305.8	1.9	14.1	5.7	7.6	-8	100.6	64
269	8.2	53.3	1256	300.0	305.8	3.0	14.8	6.4	8.3	-8	100.6	64
270	8.3	53.1	1294	300.0	305.8	2.8	14.9	7.6	7.0	-8	100.6	64
271	8.8	53.1	1429	300.0	305.8	3.0	15.4	7.5	6.4	-8	100.6	64
272	8.5	53.5	1346	300.0	305.8	2.9	15.1	7.3	4.7	-8	100.6	64
273	8.1	52.7	1236	300.0	305.8	2.6	14.6	6.4	6.2	-8	100.6	65
274	8.0	53.2	1211	300.0	305.8	2.3	14.6	8.1	6.1	-8	100.6	65
275	7.9	53.1	1176	300.0	305.8	2.2	14.3	6.8	6.0	-8	100.6	65
276	7.8	52.4	1152	300.0	305.8	2.1	14.3	6.1	6.5	-8	100.6	65
277	7.6	52.7	1074	300.0	305.8	2.0	13.8	5.9	7.2	-8	100.6	65
278	7.7	51.3	1082	300.0	305.8	1.9						

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	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
353	8.9	52.7	1439	300.0	308.7	2.9	14.6	8.1	6.7	-8	100.6	62
354	8.8	52.4	1425	300.0	308.7	3.3	14.4	7.9	7.0	-8	100.6	62
355			1515	300.0	308.7	3.3	14.9	8.1	6.1	-8	100.6	62
356	9.0	52.6	1481	300.0	308.7	3.4	14.7	7.3	6.9	-8	100.6	62
357	8.0	52.3	1209	300.0	308.7	3.1	14.0	6.4	6.8	-8	100.6	62
358	8.6	51.9	1381	300.0	308.7	2.5	14.8	6.4	5.4	-8	100.6	62
359			1567	300.0	308.7	3.6	15.5	7.9	6.5	-8	100.6	62
360	10.0	53.8	1641	300.0	308.7	5.1	15.9	9.0	7.1	-8	100.6	62
361	8.2	52.3	1280	300.0	308.7	3.4	15.1	7.5	6.5	-8	100.6	63
362	8.2	52.2	1280	300.0	308.7	3.3	14.9	6.8	5.9	-8	100.6	63
363	8.2	52.0	1278	300.0	308.7	2.9	14.8	7.1	6.4	-8	100.6	64
364	8.4	52.3	1312	300.0	308.7	2.8	14.9	7.6	5.6	-8	100.6	64
365	8.4	52.4	1315	300.0	308.7	2.8	15.0	7.2	5.2	-8	100.6	64
366	8.8	52.6	1414	300.0	308.7	3.3	15.3	7.7	7.2	-8	100.6	64
367	9.0	53.1	1474	300.0	308.7	3.8	15.5	7.9	6.0	-8	100.6	64
368	9.0	53.4	1473	300.0	308.7	3.6	15.4	7.0	4.9	-8	100.6	64
369	7.9	52.8	1185	300.0	308.7	2.8	14.4	6.6	4.6	-8	100.6	64
370	7.4	51.1	972	300.0	308.7	2.0	13.3	5.7	4.7	-8	100.6	64
371	7.4	49.9	993	300.0	308.7	1.9	13.6	6.8	5.5	-8	100.6	64
372	7.7	51.2	1091	300.0	308.7	1.8	14.0	6.2	6.5	-8	100.6	64
373	7.7	51.2	1106	300.0	308.7	2.0	14.1	6.8	7.4	-8	100.6	64
374	7.8	51.4	1124	300.0	308.7	2.0	14.0	6.6	6.7	-8	100.6	64
375	7.8	51.1	1139	300.0	308.7	2.1	13.8	6.9	6.3	-8	100.6	64
376	7.7	51.3	1108	300.0	308.7	2.1	13.7	6.4	5.3	-8	100.6	64
377	7.5	51.3	1018	300.0	308.7	1.9	13.3	7.0	4.8	-8	100.6	64
378	7.1	49.4	857	300.0	308.7	1.5	12.4	5.9	4.6	-8	100.6	64
379	7.0	48.7	847	300.0	308.7	1.2	12.4	6.2	5.4	-8	100.6	64
380	7.6	49.6	1067	300.0	308.7	1.7	13.4	7.7	6.5	-8	100.6	64
381	8.4	50.7	1307	300.0	308.7	2.7	13.9	7.6	7.3	-8	100.6	64
382	8.5	51.7	1359	300.0	308.7	2.9	14.2	7.4	7.7	-8	100.6	64
383	8.7	51.7	1391	300.0	308.7	2.6	13.9	7.1	7.1	-8	100.6	64
384	8.2	51.0	1265	300.0	308.7	2.5	13.8	7.9	7.3	-8	100.6	64
385	7.9	50.8	1193	300.0	308.7	2.4	13.4	7.4	6.5	-8	100.6	64
386	7.9	50.5	1191	300.0	308.7	2.2	13.6	7.5	6.8	-8	100.6	64
387	8.6	51.8	1483	300.0	308.7	2.3	13.9	7.5	6.9	-8	100.6	65
388	7.6	50.5	1067	300.0	308.7	2.1	13.3	6.7	6.8	-8	100.6	65
389	7.3	50.2	930	300.0	308.7	1.6	12.7	6.3	6.1	-8	100.6	65
390	7.3	49.4	932	300.0	308.7	1.5	12.7	5.4	5.7	-8	100.6	65
391	7.4	49.4	1000	300.0	308.7	1.5	13.1	6.4	6.0	-8	100.6	65
392	7.5	49.9	1014	300.0	308.7	1.3	13.3	7.3	5.9	-8	100.6	65
393	7.4	50.3	984	300.0	308.7	1.6	13.6	6.4	6.0	-8	100.6	65
394	7.7	50.8	1090	300.0	308.7	1.8	14.0	7.2	6.3	-8	100.6	65
395	8.4	52.5	1328	300.0	308.7	2.3	15.1	7.7	6.5	-8	100.6	65
396			1567	300.0	308.7	3.4	15.5	7.4	6.7	-8	100.6	65
397			1600	300.0	308.7	3.7	15.6	7.8	7.1	-8	100.6	65
398			1634	300.0	308.7	4.0	15.8	8.0	8.1	-8	100.6	64
399			1633	300.0	308.7	5.3	15.9	7.9	7.5	-8	100.6	64
400	9.6	53.4	1578	300.0	308.7	4.6	15.5	8.6	7.2	-8	100.6	64
401	8.4	52.8	1315	300.0	308.7	3.1	15.1	8.1	6.5	-7	100.6	64
402	8.1	52.4	1252	300.0	308.7	2.7	14.7	7.2	6.9	-7	100.6	64
403	8.5	52.2	1339	300.0	308.7	2.6	15.0	6.7	7.3	-7	100.6	64
404	8.8	53.1	1423	300.0	308.7	3.0	15.4	7.5	6.7	-7	100.6	63
405	8.8	53.0	1419	300.0	308.7	3.1	15.4	7.7	7.0	-7	100.6	63
406	9.0	53.1	1473	300.0	308.7	3.2	15.5	8.1	6.3	-7	100.6	63
407	8.6	53.2	1373	300.0	308.7	3.1	15.3	7.8	6.4	-7	100.6	63
408	8.3	53.0	1285	300.0	308.7	2.7	14.9	7.2	6.7	-7	100.6	63
409	7.8	52.4	1153	300.0	308.7	2.7	14.3	6.7	5.8	-7	100.6	63
410	7.8	51.8	1149	300.0	308.7	2.5	14.4	7.3	4.7	-7	100.6	63
411	8.1	52.6	1246	300.0	308.7	2.2	14.7	7.7	4.5	-7	100.6	63
412	8.1	53.7	1242	300.0	308.7	2.7	14.7	6.4	4.0	-7	100.6	63
413	7.7	52.3	1111	300.0	308.7	2.2	14.0	6.1	3.7	-7	100.6	63
414	7.5	51.3	1038	300.0	308.7	1.9	13.7	6.5	4.1	-7	100.6	63
415	7.4	50.7	1004	300.0	308.7	1.7	13.6	6.7	5.1	-7	100.6	63
416	7.3	50.4	944	300.0	308.7	1.6	13.1	6.6	6.8	-7	100.6	64
417	6.9	49.0	792	300.0	308.7	1.3	11.6	5.5	6.5	-7	100.6	64
418	6.5	46.9	694	300.0	308.7	1.2	11.4	7.4	6.4	-7	100.6	64
419	6.8	47.7	772	300.0	308.7	1.2	11.8	6.4	7.3	-7	100.6	64
420	7.2	48.1	920	300.0	308.7	0.5	12.3	6.8	6.6	-7	100.6	64
421	8.3	53.8	1290	300.0	308.7	0.3	13.9	6.9	6.9	-7	100.6	64
422	8.9	53.5	1447	300.0	308.7	1.9	14.4	7.3	7.2	-7	100.6	64
423	9.7	54.5	1613	300.0	308.7	2.2	15.0	8.7	8.2	-7	100.6	63
424	10.8	53.7	1651	300.0	308.7	3.7	15.7	9.7	7.7	-7	100.6	63
425			1515	300.0	308.7	3.6	15.3	7.2	7.3	-7	100.6	63
426	9.0	53.9	1471	300.0	308.7	3.1	14.7	7.8	7.8	-7	100.6	63
427	8.4	53.3	1310	300.0	308.7	2.8	14.1	6.8	4.5	-7	100.6	63
428	7.8	51.0	1153	300.0	308.7	2.4	13.4	6.8	5.1	-7	100.6	64
429	7.5	50.4	1012	300.0	308.7	1.9	13.8	7.1	5.7	-7	100.6	64
430	7.5	50.5	1015	300.0	308.7	1.7	13.6	6.9	5.8	-7	100.6	65
431	7.8	50.7	1129	300.0	308.7	2.0	14.2	6.4	6.4	-7	100.6	65
432	8.4	52.6	1314	300.0	308.7	2.6	15.1	7.4	6.6	-7	100.6	65
433	8.3	52.5	1286	300.0	308.7	2.8	14.9	7.3	6.8	-7	100.6	65
434	8.1	52.7	1237	300.0	308.7	2.4	14.7	7.0	6.7	-7	100.6	64
435	7.9	51.8	1162	300.0	308.7	2.3	14.3	6.3	6.2	-7	100.6	63
436	8.0	52.0	1226	300.0	308.7	2.2	14.6	7.8	7.5	-7	100.6	63
437	8.1	52.5	1239	300.0	308.7	2.7	14.7	7.1	5.5	-7	100.6	63
438	7.8	51.6	1156	300.0	308.7	2.4	14.3	6.8	4.9	-7	100.6	63
439	7.9	51.8	1173	300.0	308.7	2.1	14.4	7.2	5.9	-7	100.6	63
440	7.8	52.1	1138	300.0	308.7	2.1	13.8	6.9	6.1	-7	100.6	63

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

Data Point #	Standardized Wind Speed	Ureq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
441	7.4	49.9	981	300.0	308.7	1.9	12.7	6.3	6.0	-7	100.6	63
442	7.3	48.7	940	300.0	308.7	1.5	12.5	6.5	6.1	-7	100.6	63
443	7.7	49.7	1074	300.0	308.7	1.9	13.3	7.2	6.4	-7	100.6	63
444	8.0	50.7	1204	300.0	308.7	2.4	13.8	8.4	7.6	-7	100.6	63
445	7.9	50.7	1166	300.0	308.7	2.5	13.5	7.4	6.4	-7	100.6	63
446	7.7	50.2	1093	300.0	308.7	2.1	13.2	6.2	6.8	-7	100.6	63
447	8.9	50.5	1444	300.0	308.7	2.4	14.3	10.1	7.5	-7	100.6	63
448	11.0	53.4	1631	300.0	308.7	3.8	15.5	9.9	8.1	-7	100.6	63
449	10.9	53.7	1627	300.0	308.7	4.5	15.6	9.8	7.9	-7	100.6	63
450			1611	300.0	308.7	4.4	15.6	9.2	7.3	-7	100.6	63
451			1549	300.0	308.7	3.6	15.3	7.2	6.8	-7	100.6	63
452	8.6	53.0	1376	300.0	308.7	3.6	14.9	7.4	6.1	-7	100.6	63
453	7.9	52.1	1167	300.0	308.7	3.2	14.5	7.4	6.4	-7	100.6	63
454	7.4	51.4	1004	300.0	308.7	3.1	13.6	6.0	6.4	-7	100.6	63
455	7.2	49.8	918	300.								

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	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 (kPa)	Relative Humidity (%)
529	7.4	50.5	993	300.0	308.7	1.9	13.5	5.8	6.3	-7	100.6	63
530	7.2	50.0	937	300.0	308.7	1.5	13.0	5.5	6.7	-7	100.6	63
531	7.2	48.6	892	300.0	308.7	1.5	12.0	6.1	5.7	-7	100.6	62
532	7.1	47.9	884	300.0	308.7	1.3	12.0	6.7	6.8	-7	100.6	62
533	7.8	48.6	1121	300.0	308.7	1.9	13.2	8.5	6.1	-7	100.6	62
534	8.3	50.7	1292	300.0	308.7	3.0	13.9	7.8	6.4	-7	100.6	62
535	8.9	51.5	1464	300.0	308.7	3.2	14.6	8.5	7.1	-7	100.6	62
536	10.1	52.9	1599	300.0	308.7	3.6	15.3	9.1	7.6	-7	100.6	63
537	9.8	52.9	1545	300.0	308.7	3.6	15.2	8.8	7.1	-7	100.6	63
538	8.2	50.3	1503	300.0	308.7	3.4	15.0	8.9	5.7	-7	100.6	63
539	8.6	52.7	1360	300.0	308.7	3.3	14.4	7.8	6.1	-7	100.6	63
540	7.9	51.2	1164	300.0	308.7	2.6	13.6	7.2	7.0	-7	100.6	63
541	7.6	49.7	1045	300.0	308.7	2.0	13.0	6.1	7.8	-7	100.6	63
542	7.5	49.7	1028	300.0	308.7	1.9	13.2	6.5	7.6	-7	100.6	63
543	7.6	50.6	1096	300.0	308.7	1.9	13.9	6.1	6.6	-7	100.6	63
544	8.3	52.4	1296	300.0	308.7	2.5	15.0	8.8	7.2	-7	100.6	63
545	9.0	53.7	1473	300.0	308.7	3.4	15.5	8.8	7.2	-7	100.6	63
546	9.3	53.8	1608	300.0	308.7	4.1	15.7	8.4	7.0	-7	100.6	63
547	9.6	53.9	1628	300.0	308.7	4.4	15.7	8.6	8.1	-7	100.6	63
548	9.5	53.5	1619	300.0	308.7	4.7	15.7	8.5	7.3	-7	100.6	63
549	16.18	53.1	1627	300.0	308.7	4.3	15.6	8.2	6.3	-7	100.6	63
550	9.8	53.1	1627	300.0	308.7	4.5	15.6	8.8	6.8	-7	100.6	63
551	9.3	53.3	1635	300.0	308.7	4.6	15.9	8.4	9.3	-7	100.6	63
552	9.4	54.1	1633	300.0	308.7	6.4	15.9	8.4	7.6	-7	100.6	63
553	9.6	54.5	1596	300.0	308.7	6.4	15.5	8.6	5.8	-7	100.6	63
554	8.9	54.1	1499	300.0	308.7	3.7	15.0	8.0	6.3	-7	100.6	64
555	9.0	54.3	1482	300.0	308.7	3.4	15.5	8.4	6.4	-7	100.6	64
556	10.1	53.3	1544	300.0	308.7	3.7	15.6	9.1	6.7	-7	100.6	64
557	9.6	53.4	1525	300.0	308.7	3.6	15.6	8.6	7.2	-7	100.6	64
558	8.7	53.4	1408	300.0	308.7	3.5	15.4	7.6	6.1	-7	100.6	64
559	8.7	53.4	1408	300.0	308.7	3.5	15.4	7.6	7.4	-7	100.6	64
560	8.8	53.5	1428	300.0	308.7	3.5	15.5	8.3	6.6	-7	100.6	65
561	9.2	53.5	1497	300.0	308.7	3.4	15.5	8.2	7.0	-7	100.6	65
562	8.5	53.5	1335	300.0	308.7	3.3	15.1	7.4	5.4	-7	100.6	65
563	8.7	53.2	1328	300.0	308.7	3.0	15.2	7.7	7.7	-7	100.6	65
564	8.7	53.2	1328	300.0	308.7	3.4	15.6	7.0	7.4	-7	100.6	65
565	8.8	53.5	1438	300.0	308.7	3.6	15.5	8.1	7.9	-7	100.6	65
566	8.7	54.1	1454	300.0	308.7	3.2	15.4	7.5	7.8	-7	100.6	65
567	8.7	54.1	1463	300.0	308.7	3.5	15.6	6.7	8.2	-7	100.6	65
568	8.5	53.7	1363	300.0	308.7	3.5	15.1	6.7	7.8	-7	100.6	65
569	8.3	53.4	1284	300.0	308.7	2.9	14.9	6.3	8.1	-7	100.6	65
570	8.3	52.9	1284	300.0	308.7	2.8	14.7	7.0	9.7	-7	100.6	65
571	10.0	53.3	1635	300.0	308.7	4.2	15.6	9.0	10.4	-7	100.6	65
572	9.3	54.2	1648	300.0	308.7	6.6	16.0	8.3	10.7	-7	100.6	65
573	9.7	54.3	1611	300.0	308.7	6.6	15.7	8.3	7.4	-7	100.6	65
574	9.3	54.0	1613	300.0	308.7	6.3	15.6	8.3	7.8	-7	100.6	63
575	16.13	53.2	1538	300.0	308.7	4.6	15.1	8.3	7.8	-7	100.6	63
576	8.4	53.2	1324	300.0	308.7	3.1	15.2	7.4	7.2	-7	100.6	63
577	8.5	52.9	1345	300.0	308.7	3.3	15.1	7.6	6.6	-7	100.6	63
578	8.2	52.6	1280	300.0	308.7	3.7	15.1	8.0	7.9	-7	100.6	63
579	7.9	52.4	1189	300.0	308.7	5.0	15.2	7.7	7.1	-7	100.6	62
580	8.6	52.7	1362	300.0	308.7	4.7	15.6	8.8	8.2	-7	100.6	62
581	8.5	53.1	1337	300.0	308.7	4.8	15.5	7.4	7.5	-7	100.6	62
582	8.3	53.2	1302	300.0	308.7	5.1	15.6	7.6	7.0	-7	100.6	62
583	8.2	53.2	1258	300.0	308.7	5.0	15.5	8.6	6.0	-7	100.6	62
584	8.4	53.1	1312	300.0	308.7	4.4	15.5	7.9	5.4	-7	100.6	63
585	8.7	53.2	1407	300.0	308.7	3.2	15.4	7.4	6.6	-7	100.6	63
586	8.2	52.5	1262	300.0	308.7	3.1	14.7	6.8	7.2	-7	100.6	63
587	8.0	52.8	1224	300.0	308.7	2.3	14.6	7.0	7.2	-7	100.6	63
588	8.0	52.5	1217	300.0	308.7	2.5	14.6	6.7	6.4	-7	100.6	63
589	7.8	52.3	1140	300.0	308.7	2.1	14.2	6.3	8.4	-7	100.6	63
590	7.9	51.9	1191	300.0	308.7	2.2	14.4	6.6	8.6	-7	100.6	63
591	8.9	52.9	1444	300.0	308.7	2.8	15.3	8.1	9.0	-7	100.6	63
592	8.9	53.4	1465	300.0	308.7	3.9	15.5	8.0	6.8	-7	100.6	63
593	8.9	53.7	1536	300.0	308.7	3.6	15.6	8.2	5.0	-7	100.6	63
594	8.9	53.7	1451	300.0	308.7	3.6	15.5	7.4	5.4	-7	100.6	63
595	9.8	53.9	1642	300.0	308.7	4.5	16.0	8.8	5.4	-7	100.6	63
596	10.0	54.1	1607	300.0	308.7	5.1	15.7	9.0	5.0	-7	100.6	63
597	9.0	53.0	1481	300.0	308.7	3.7	15.3	8.6	8.3	-7	100.6	63
598	8.4	53.3	1327	300.0	308.7	3.1	15.1	7.8	6.5	-7	100.6	64
599	8.0	52.9	1205	300.0	308.7	2.7	14.6	6.6	6.6	-7	100.6	64
600	7.6	51.2	1065	300.0	308.7	2.5	13.8	6.6	6.3	-7	100.6	64
601	7.6	51.2	1069	300.0	308.7	2.5	14.0	6.7	6.7	-7	100.6	64
602	7.8	51.2	1141	300.0	308.7	2.4	14.4	6.4	7.4	-7	100.6	63
603	7.9	52.4	1188	300.0	308.7	2.4	14.4	6.4	7.9	-7	100.6	63
604	7.7	51.6	1119	300.0	308.7	2.2	14.1	6.9	7.3	-7	100.6	63
605	8.0	52.2	1224	300.0	308.7	2.5	14.6	6.9	6.4	-7	100.6	63
606	7.7	50.8	1100	300.0	308.7	1.9	14.0	7.9	6.8	-7	100.6	63
607	8.0	52.5	1227	300.0	308.7	2.6	14.7	7.0	6.2	-7	100.6	63
608	7.8	51.7	1154	300.0	308.7	2.4	14.2	6.9	6.2	-7	100.6	63
609	8.0	51.0	1204	300.0	308.7	2.3	13.6	6.9	6.9	-7	100.6	63
610	9.1	51.8	1486	300.0	308.7	2.5	14.9	8.7	6.2	-7	100.6	63
611	9.0	52.5	1542	300.0	308.7	3.8	15.2	8.1	7.5	-7	100.6	63
612	9.0	52.5	1468	300.0	308.7	3.6	14.8	7.8	8.3	-7	100.6	63
613	9.6	53.0	1642	300.0	308.7	4.3	15.5	8.6	8.8	-7	100.6	63
614	10.3	53.3	1637	300.0	308.7	5.8	15.7	9.3	9.3	-7	100.6	62
615	10.5	53.4	1624	300.0	308.7	5.8	15.7	9.5	8.3	-7	100.6	61
616	10.1	53.3	1614	300.0	308.7	5.6	15.6	9.1	7.8	-7	100.6	61

***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 (kPa)	Relative Humidity (%)
617			1616	300.0	308.7	4.7	15.4	8.1	6.8	-7	100.6	61
618	9.9	53.1	1615	300.0	308.7	4.6	15.4	8.9	6.7	-7	100.6	61
619	8.9	52.9	1445	300.0	308.7	3.5	15.3	8.3	7.1	-7	100.6	61
620	8.6	52.9	1365	300.0	308.7	3.2	15.3	7.5	6.6	-7	100.6	61
621	7.9	52.6	1181	300.0	308.7	2.7	14.4	6.5	7.1	-7	100.6	61
622	7.8	51.3	1147	300.0	308.7	2.2	14.2	6.6	7.1	-7	100.6	61
623			1509	300.0	308.7	2.6	15.2	7.9	6.5	-7	100.6	61
624	10.7	53.5	1514	300.0	308.7	3.8	15.5	9.6	5.9	-7	100.6	61
625	8.8	53.6	1415	300.0	308.7	3.2	15.5	6.7	5.7	-7	100.6	61
626	8.6	53.4	1371	300.0	308.7	3.1	15.3	6.5	5.7	-7	100.6	61
627	8.0	52.3	1204	300.0	308.7	2.7	14.5	6.8	6.1	-7	100.6	62
628	7.7	50.9	1095	300.0	308.7	2.1	13.9	7.5	7.1	-7	100.6	62
629	8.0	51.4	1198	300.0	308.7	2.1	14.5	8.1	6.6	-7	100.6	62
630	8.5	52.4	1337	300.0	308.7	2.6	15.1	8.3				

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	U-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 (kPa)	Relative Humidity (%)
705	7.6	50.8	1066	300.0	306.2	2.0	12.9	7.5	5.8	-7	100.6	62
706	7.2	49.7	915	300.0	305.9	1.8	12.3	6.9	5.0	-7	100.6	62
707	6.9	48.3	798	300.0	305.8	1.2	11.6	6.5	6.1	-7	100.6	62
708	7.1	48.0	859	300.0	305.8	1.2	12.0	8.4	6.8	-7	100.6	62
709	7.2	48.8	895	300.0	305.8	1.3	12.2	7.4	6.1	-7	100.6	62
710	7.4	49.1	976	300.0	305.8	1.5	12.5	7.3	6.8	-7	100.6	62
711	7.7	50.0	1106	300.0	305.8	2.0	13.2	7.2	6.4	-7	100.6	62
712	7.9	50.5	1160	300.0	305.8	2.2	13.3	8.2	6.3	-7	100.6	62
713	7.7	50.7	1120	300.0	305.8	2.2	13.2	7.7	5.7	-7	100.6	62
714	7.2	49.8	912	300.0	305.8	1.8	12.2	6.9	5.0	-7	100.6	62
715	7.4	48.4	970	300.0	305.8	1.5	12.3	7.4	4.2	-7	100.6	62
716	8.6	51.2	1371	300.0	305.8	2.1	14.4	10.0	4.7	-7	100.6	62
717	8.4	53.7	1314	300.0	305.8	3.9	14.3	7.8	5.0	-7	100.6	63
718	8.0	51.5	1217	300.0	305.8	2.4	13.7	7.7	6.7	-7	100.6	63
719	9.2	53.9	1505	300.0	305.8	2.5	15.0	8.7	7.8	-7	100.6	63
720	8.8	53.4	1426	300.0	305.8	3.8	14.7	7.6	6.8	-7	100.6	63
721	8.5	52.8	1359	300.0	305.8	3.0	14.4	8.3	7.4	-7	100.6	63
722	8.6	53.8	1375	300.0	305.8	2.8	14.5	7.5	7.1	-7	100.6	63
723	8.2	52.1	1284	300.0	297.3	2.5	13.7	7.2	5.9	-7	100.6	64
724	8.1	51.2	1249	300.0	294.1	2.4	13.8	8.8	5.5	-7	100.6	64
725	7.8	50.9	1153	300.0	294.1	2.3	13.3	6.7	6.0	-7	100.6	64
726	7.6	50.5	1068	300.0	294.1	2.0	13.2	7.2	6.1	-7	100.6	65
727	7.7	50.6	1082	300.0	294.1	1.9	13.5	6.7	6.0	-7	100.6	64
728	7.4	50.3	983	300.0	294.1	1.8	12.9	6.3	5.9	-7	100.6	64
729	7.0	48.7	826	300.0	294.1	1.3	12.1	5.9	4.7	-7	100.6	64
730	7.1	48.1	858	300.0	294.1	1.2	12.3	6.9	4.4	-7	100.6	64
731	7.8	49.7	1136	300.0	294.1	2.0	13.7	7.9	4.9	-7	100.6	64
732	8.7	52.8	1391	300.0	294.1	3.2	14.5	8.0	6.7	-7	100.6	64
733	10.3	54.0	1546	300.0	294.1	3.6	15.1	9.3	6.6	-7	100.6	64
734	9.7	53.9	1637	300.0	294.1	4.2	15.5	8.7	5.1	-7	100.6	64
735	11.0	53.7	1634	300.0	294.1	4.6	15.7	8.9	6.2	-7	100.6	64
736			1564	300.0	294.1	3.7	15.4	8.1	7.1	-7	100.6	64
737			1570	300.0	294.1	3.3	15.3	8.0	7.0	-7	100.6	64
738	8.6	53.9	1362	300.0	294.1	3.5	15.2	6.9	6.3	-7	100.6	64
739	8.3	53.9	1448	300.0	294.1	3.1	15.4	6.8	5.1	-7	100.6	64
740	9.0	54.3	1473	300.0	294.1	3.4	15.5	8.8	5.2	-7	100.6	64
741	9.1	53.6	1484	300.0	294.1	3.6	15.6	8.0	4.4	-7	100.6	64
742	8.9	53.4	1446	300.0	294.1	3.2	15.5	7.4	5.4	-7	100.6	64
743	9.9	54.0	1613	300.0	294.1	3.6	15.6	8.9	7.4	-7	100.6	64
744	9.3	54.3	1567	300.0	294.1	3.4	15.6	8.4	7.3	-7	100.6	64
745	8.6	54.1	1371	300.0	294.1	3.6	15.4	8.0	8.3	-7	100.6	64
746	8.0	53.7	1207	300.0	294.1	3.0	14.5	6.7	8.6	-7	100.6	64
747	7.6	52.2	1069	300.0	294.1	2.1	13.9	7.1	8.0	-7	100.6	64
748	7.3	50.9	956	300.0	294.1	1.8	13.3	5.6	6.8	-7	100.6	64
749	7.6	50.6	1057	300.0	294.1	1.8	13.9	7.0	7.2	-7	100.6	64
750	8.2	53.0	1255	300.0	294.1	2.8	14.1	7.4	6.7	-7	100.6	64
751	7.3	51.2	930	300.0	294.1	2.2	12.2	5.6	6.7	-7	100.6	64
752	6.7	48.1	751	300.0	294.1	1.3	11.5	6.5	6.9	-7	100.6	64
753	6.8	47.1	785	300.0	294.1	1.2	11.6	6.8	6.4	-7	100.6	64
754	7.4	48.6	992	300.0	294.1	1.5	12.6	7.3	7.4	-7	100.6	64
755	8.2	50.9	1256	300.0	294.1	2.7	13.8	8.3	7.2	-7	100.6	64
756	8.1	52.7	1253	300.0	294.1	2.2	14.0	6.7	6.0	-7	100.6	64
757	7.8	50.8	1147	300.0	294.1	2.4	13.5	6.6	5.8	-7	100.6	64
758	7.6	49.7	1063	300.0	294.1	2.0	13.1	7.2	6.3	-7	100.6	64
759	7.6	49.2	1047	300.0	294.1	1.9	13.0	6.7	6.2	-7	100.6	64
760	7.9	49.8	1168	300.0	294.1	2.1	13.5	7.3	6.1	-7	100.6	64
761	8.3	51.1	1283	300.0	294.1	3.1	14.1	8.2	6.5	-7	100.6	64
762	7.9	51.5	1192	300.0	294.1	2.7	13.7	8.1	6.7	-7	100.6	64
763	7.5	50.0	1033	300.0	294.1	2.1	13.0	7.3	6.2	-7	100.6	64
764	7.3	49.1	935	300.0	294.1	1.6	12.5	6.4	5.1	-7	100.6	64
765	7.3	49.2	932	300.0	294.1	1.6	12.6	6.9	5.4	-7	100.6	64
766	7.1	48.5	877	300.0	294.1	1.4	12.2	6.8	6.2	-7	100.6	64
767	7.3	48.3	946	300.0	294.1	1.4	12.5	7.8	5.5	-7	100.6	64
768	7.9	50.6	1162	300.0	294.1	2.2	13.9	7.7	5.4	-7	100.6	64
769	8.2	51.6	1265	300.0	294.1	3.1	14.6	7.1	6.7	-7	100.6	64
770	8.4	51.7	1309	300.0	294.1	2.9	14.4	7.8	7.5	-7	100.6	64
771	8.6	52.8	1382	300.0	294.1	3.0	14.7	8.1	7.2	-7	100.6	64
772	8.6	53.5	1362	300.0	294.1	3.3	14.6	7.3	5.0	-7	100.6	64
773	8.3	52.8	1293	300.0	294.1	2.6	14.3	7.7	5.6	-7	100.6	64
774	7.7	51.7	1116	300.0	294.1	2.4	14.0	7.8	5.2	-7	100.6	64
775	7.5	50.9	1014	300.0	294.1	1.8	13.6	6.8	5.5	-7	100.6	64
776	7.4	50.5	1005	300.0	294.1	1.6	13.6	7.7	6.2	-7	100.6	64
777	7.2	49.8	930	300.0	294.1	1.4	11.1	7.2	7.0	-7	100.6	64
778	7.5	51.4	1043	300.0	294.1	1.9	13.7	6.1	6.4	-7	100.6	64
779	7.5	50.7	1013	300.0	294.1	1.7	13.7	7.1	6.5	-7	100.6	64
780	7.6	51.2	1075	300.0	294.1	1.9	13.5	6.3	5.9	-7	100.6	65
781	9.19	49.8	1248	300.0	294.1	3.6	14.6	6.2	5.9	-7	100.6	65
782			813	300.0	294.1	1.2	12.0	6.3	6.2	-7	100.6	65
783			744	300.0	294.1	1.2	11.6	5.6	5.3	-7	100.6	65
784			790	300.0	294.1	1.2	11.8	6.0	4.4	-7	100.6	65
785			985	300.0	294.1	3.3	12.8	6.9	3.3	-7	100.6	65
786			1009	300.0	294.1	0.4	12.7	6.4	3.4	-7	100.6	65
787			899	300.0	294.1	0.4	12.1	6.4	4.0	-7	100.6	65
788			945	300.0	294.1	0.4	12.3	6.7	5.6	-7	100.6	65
789			1136	300.0	294.1	2.1	13.4	7.5	6.8	-7	100.6	65
790			1248	300.0	294.1	3.6	14.6	8.1	6.9	-7	100.6	65
791			1275	300.0	294.1	4.0	15.0	8.3	6.7	-7	100.6	65
792			1271	300.0	294.1	4.3	15.1	7.6	6.3	-7	100.6	64

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

Data Point #	Standardized Wind Speed	U-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 (kPa)	Relative Humidity (%)
793			1198	300.0	294.1	4.2	14.8	6.3	6.2	-7	100.6	64
794			1073	300.0	294.1	4.3	14.6	6.1	6.2	-7	100.6	64
795			966	300.0	294.1	4.2	14.1	5.8	6.3	-7	100.6	64
796			896	300.0	294.1	4.2	13.7	6.3	6.1	-7	100.6	64
797			907	300.0	294.1	4.0	13.5	6.4	6.1	-7	100.6	64
798			912	300.0	294.1	3.7	13.5	6.3	6.7	-7	100.6	63
799			856	300.0	294.1	3.8	13.5	5.9	6.0	-7	100.6	63
800			880	300.0	294.1	4.7	14.0	6.8	5.3	-7	100.6	63
801			898	300.0	294.1	5.8	14.5	7.1	5.5	-7	100.6	63
802			905	300.0	294.1	6.2	14.5	7.4	4.9	-7	100.6	63
803			908	300.0	294.1	5.9	14.4	6.3	5.3	-7	100.6	63
804			835	300.0	294.1	5.7	14.0	6.7	6.2	-7	100.6	63
805			799	300.0	294.1	6.1	14.0	6.9	6.7	-7	100.6	63
806			805	300.0	294.1	6.9	14.2	7.3	6.2	-7	100.6	63
807			793	300.0	294.1	6.8	14.0	6.2	6.4	-7	100.6	63
808			723	300.0	294.1	6.0	13.4	5.4	7.2	-7	100.6	63
809			63									

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 (kPa)	Relative Humidity (%)
881		100	300.0	294.1	82.2	0.4	8.6	7.0	-7	100.6	61	
882		100	300.0	294.1	82.2	0.5	7.7	6.0	-7	100.6	61	
883		100	300.0	294.1	82.2	0.5	7.6	5.2	-7	100.6	61	
884		100	300.0	294.1	82.2	0.4	6.8	4.9	-7	100.6	61	
885		100	300.0	294.1	82.2	0.3	6.6	5.1	-7	100.6	61	
886		100	300.0	294.1	82.2	0.3	7.9	5.1	-7	100.6	61	
887		100	300.0	294.1	82.2	0.3	7.4	4.6	-7	100.6	61	
888		100	300.0	294.1	82.2	0.5	6.6	4.0	-7	100.6	62	
889		100	300.0	294.1	82.2	0.5	7.0	4.4	-7	100.6	62	
890		100	300.0	294.1	82.2	0.5	5.7	4.9	-7	100.6	62	
891		100	300.0	294.1	82.2	0.5	5.5	4.9	-7	100.6	62	
892		100	300.0	294.1	82.2	0.5	6.9	5.5	-7	100.6	62	
893		100	300.0	294.1	82.2	0.5	5.8	6.6	-7	100.6	62	
894		100	300.0	294.1	82.2	0.4	5.8	5.9	-7	100.6	61	
895		100	300.0	294.1	82.2	0.3	5.7	6.2	-7	100.6	61	
896		100	300.0	294.1	82.2	0.3	6.1	8.3	-7	100.6	61	
897		100	300.0	294.1	82.2	0.5	6.2	8.5	-7	100.6	61	
898		100	300.0	294.1	82.2	0.5	5.8	7.3	-7	100.6	61	
899		100	300.0	294.1	82.2	0.5	5.8	6.6	-7	100.6	61	
900		100	300.0	294.1	82.2	0.6	5.9	7.5	-7	100.6	61	
901		100	300.0	294.1	82.2	0.6	6.8	8.5	-7	100.6	61	
902		100	300.0	294.1	82.2	0.4	8.2	6.9	-7	100.6	61	
903		100	300.0	294.1	82.2	0.3	7.9	7.6	-7	100.6	61	
904		100	300.0	294.1	82.2	0.4	7.7	8.4	-7	100.6	61	
905		100	300.0	294.9	82.2	0.6	8.9	7.3	-7	100.6	61	
906		100	300.0	300.6	82.2	0.6	8.0	8.1	-7	100.6	61	
907		100	300.0	307.0	82.2	0.4	6.5	8.0	-7	100.6	61	
908		100	300.0	308.7	82.2	0.3	7.1	9.2	-7	100.6	61	
909		100	300.0	308.7	82.2	0.4	8.0	9.0	-7	100.6	61	
910		100	300.0	308.7	82.2	0.3	8.6	8.1	-7	100.6	61	
911		100	300.0	308.7	82.2	0.5	9.2	8.1	-7	100.6	61	
912		100	300.0	308.7	82.2	0.4	8.6	8.0	-7	100.6	61	
913		100	300.0	308.7	82.2	0.5	6.9	9.0	-7	100.6	61	
914		100	300.0	308.7	82.2	0.6	6.9	8.1	-7	100.6	61	
915		100	300.0	308.7	82.2	0.5	6.9	6.9	-7	100.6	61	
916		100	300.0	308.7	82.2	0.3	6.8	7.6	-7	100.6	61	
917		100	300.0	308.7	82.2	0.3	7.0	7.4	-7	100.6	61	
918		100	300.0	308.7	82.2	0.5	5.6	7.3	-7	100.6	61	
919		100	300.0	308.7	82.2	0.5	5.1	7.1	-7	100.6	61	
920		100	300.0	308.7	82.2	0.7	6.3	8.0	-7	100.6	61	
921		100	300.0	308.7	82.2	0.0	6.4	7.9	-7	100.6	61	
922		100	300.0	308.7	82.2	0.0	7.3	7.7	-7	100.6	61	
923		100	300.0	308.7	82.2	0.4	6.3	6.9	-7	100.6	61	
924		100	300.0	308.7	82.2	0.4	5.2	6.1	-7	100.6	63	
925		100	300.0	308.7	82.2	0.4	6.8	6.0	-7	100.6	62	
926		100	300.0	308.7	82.2	0.3	7.3	6.3	-7	100.6	62	
927		100	300.0	308.7	82.2	0.3	6.7	6.7	-7	100.6	62	
928		100	300.0	308.7	82.2	0.3	5.8	5.6	-7	100.6	62	
929		100	300.0	308.7	82.2	0.3	5.9	6.0	-7	100.6	62	
930		100	300.0	308.7	82.2	0.3	6.1	5.3	-7	100.6	63	
931		100	300.0	308.7	82.2	0.4	6.3	5.1	-7	100.6	63	
932		100	300.0	308.7	82.2	0.4	6.7	5.5	-7	100.6	63	
933		100	300.0	308.7	82.2	0.5	7.7	6.5	-7	100.6	63	
934		100	300.0	308.7	82.2	0.5	6.5	6.4	-7	100.6	63	
935		100	300.0	308.7	82.2	0.4	5.5	6.3	-7	100.6	63	
936		100	300.0	308.7	82.2	0.3	4.7	6.1	-7	100.6	63	
937		100	300.0	308.7	82.2	0.3	5.2	6.3	-7	100.6	63	
938		100	300.0	308.7	82.2	0.4	5.1	5.9	-7	100.6	63	
939		100	300.0	308.7	82.2	0.4	4.9	6.1	-7	100.6	63	
940		100	300.0	308.7	82.2	0.4	5.2	6.6	-7	100.6	63	
941		100	300.0	308.7	82.2	0.2	7.4	6.2	-7	100.6	63	
942		100	300.0	308.7	82.2	0.0	6.9	6.1	-7	100.6	63	
943		100	300.0	308.7	82.2	0.0	5.4	5.2	-7	100.6	63	
944		100	300.0	308.7	82.2	0.0	5.3	5.1	-7	100.6	63	
945		100	300.0	308.7	82.2	0.0	4.6	5.6	-7	100.6	63	
946		100	300.0	308.7	82.2	0.0	4.4	5.5	-7	100.6	63	
947		100	300.0	308.7	82.2	0.2	4.1	5.3	-7	100.6	63	
948		100	300.0	308.7	82.2	0.2	4.7	5.0	-7	100.6	63	
949		100	300.0	308.7	82.2	0.4	4.5	5.1	-7	100.6	63	
950		100	300.0	308.7	82.2	0.3	4.5	4.6	-7	100.6	63	
951		100	300.0	308.7	82.2	0.4	5.3	4.7	-7	100.6	63	
952		100	300.0	308.7	82.2	0.3	5.0	5.3	-7	100.6	63	
953		100	300.0	308.7	82.2	0.3	5.2	5.9	-7	100.6	63	
954		100	300.0	308.8	82.2	0.3	4.7	6.2	-7	100.6	63	
955		100	300.0	308.8	82.2	0.3	5.2	4.6	-7	100.6	63	
956		100	300.0	308.8	78.4	0.3	5.9	5.5	-7	100.6	63	
957		100	300.0	308.8	60.2	1.2	5.1	4.1	-7	100.6	63	
958		100	300.0	308.8	60.2	1.2	5.7	5.0	-7	100.6	63	
959		100	300.0	308.8	60.2	1.2	4.7	5.5	-7	100.6	64	
960		100	300.0	308.8	60.2	1.2	5.1	6.4	-7	100.6	64	
961		100	300.0	308.8	60.2	1.0	5.9	6.1	-7	100.6	64	
962		100	300.0	308.8	59.3	1.3	5.6	5.3	-7	100.6	64	
963		100	300.0	308.8	49.6	1.6	5.9	5.1	-7	100.6	64	
964		100	300.0	308.8	35.0	2.7	5.4	4.2	-7	100.6	64	
965		100	300.0	308.8	19.2	4.9	6.8	4.6	-7	100.6	64	
966		100	300.0	308.8	13.3	7.4	5.9	4.5	-7	100.6	64	
967		100	300.0	308.8	11.7	8.9	5.8	4.2	-7	100.6	63	
968		100	300.0	308.8	12.6	9.8	5.3	4.3	-7	100.6	63	

***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 (kPa)	Relative Humidity (%)
969		100	300.0	308.8	11.8	9.5	5.8	5.5	-7	100.6	63	
970		100	300.0	308.8	11.2	5.7	5.1	5.6	-7	100.6	63	
971		100	300.0	308.8	29.4	0.6	6.0	6.6	-7	100.6	63	
972		100	300.0	308.8	76.9	0.0	7.7	5.8	-7	100.6	63	
973		100	300.0	308.8	82.2	0.1	8.1	7.1	-7	100.6	62	
974		100	300.0	308.8	82.2	0.5	6.8	7.3	-7	100.6	62	
975		100	300.0	308.8	82.0	0.3	6.7	6.7	-7	100.6	62	
976		100	300.0	308.8	65.2	1.0	6.3	6.2	-7	100.6	62	
977		100	300.0	308.8	60.2	1.6	7.9	5.9	-7	100.6	62	
978		100	300.0	308.8	60.2	1.5	7.2	6.7	-7	100.6	62	
979		100	300.0	308.8	60.2	1.4	6.2	7.9	-7	100.6	62	
980		100	300.0	308.8	60.2	1.4	6.7	6.6	-7	100.6	62	
981		100	300.0	308.8	60.2	1.4	6.3	7.1	-7	100.6	62	
982		100	300.0	308.8	57.9	1.5	5.9	6.8	-7	100.6	62	
983		100	300.0	308.8	47.3	2.3	8.2	6.2	-7	100.6	62	
984		100	300.0	308.8	34.2	3.6	7.9	6.8	-7	100.6	62	
985		100	300.0	308.8	22.2	5.8	9.0	5.9	-7	100.6	62	
986		100	300.0	308.8	18.3	8.1	8.8	6.7	-7	100.6	62	
987		100	300.0	308.8	17.2	9.4	9.2	6.1	-7	100.6	62	
988		100	300.0	308.8	17.6	9.7	8.2	6.1	-7	100.6	62	
989		100	300.0	308.8	17.0	9.6	7.3	7.6	-7	100.6	62	
990		100	300.0	306.4	17.4	9.7	7.8	6.9	-7	100.6	63	
991		100	300.0	300.0	17.0	9.6	7.1	6.5	-7	100.6	63	
992		100	300.0									

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	URef	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1057	7.7	48.8	1084	300.0	300.0	0.9	12.4	6.7	5.3	-7	100.6	61
1058	7.7	48.7	1083	300.0	300.0	0.9	12.9	7.6	5.3	-7	100.6	61
1059	8.1	51.2	1237	300.0	300.0	0.4	13.7	8.1	6.2	-7	100.6	61
1060	8.0	51.0	1202	300.0	300.0	2.3	13.6	7.8	5.4	-7	100.6	61
1061	8.3	51.2	1286	300.0	300.0	2.3	14.1	8.1	4.9	-7	100.6	61
1062	8.3	52.2	1284	300.0	300.0	2.7	14.2	7.4	4.5	-7	100.6	62
1063	7.5	50.8	1025	300.0	300.0	2.3	12.9	6.1	5.0	-7	100.6	63
1064	7.0	48.6	843	300.0	300.0	1.4	12.0	6.5	4.9	-7	100.6	63
1065	7.2	48.1	919	300.0	300.0	1.3	12.5	7.7	4.9	-7	100.6	63
1066	7.6	48.4	1079	300.0	300.0	0.9	13.2	7.0	5.7	-7	100.6	63
1067	7.8	50.7	1121	300.0	300.0	2.1	13.4	6.4	5.5	-7	100.6	63
1068	7.4	50.1	985	300.0	300.0	1.9	13.2	7.7	4.9	-7	100.6	62
1069	7.4	50.3	992	300.0	300.0	1.6	13.6	7.0	5.8	-7	100.6	62
1070	7.6	50.8	1062	300.0	300.0	1.8	13.9	7.4	5.0	-7	100.6	62
1071	7.7	50.7	1091	300.0	300.0	1.8	14.0	7.7	5.0	-7	100.6	62
1072	7.7	51.3	1117	300.0	300.0	2.0	14.2	7.2	4.8	-7	100.6	62
1073	7.4	51.1	997	300.0	299.9	1.9	13.5	6.7	5.2	-7	100.6	62
1074	7.2	49.3	909	300.0	299.9	1.5	12.5	6.4	5.6	-7	100.6	63
1075	6.7	48.5	749	300.0	299.9	1.2	11.6	6.3	6.2	-7	100.6	63
1076	6.3	46.8	621	300.0	299.9	1.2	10.9	5.9	4.7	-7	100.6	63
1077	6.1	46.3	543	300.0	299.9	1.1	10.4	6.0	4.8	-7	100.6	63
1078	6.0	46.1	532	300.0	299.9	0.9	10.4	6.1	4.5	-7	100.6	63
1079	6.3	46.5	555	300.0	299.9	2.2	10.6	5.5	4.1	-7	100.6	63
1080	6.1	46.6	552	300.0	299.9	0.1	10.6	5.7	3.7	-7	100.6	63
1081	5.9	46.4	514	300.0	299.9	0.2	10.2	5.1	4.2	-7	100.6	63
1082	6.2	45.9	594	300.0	299.9	0.2	10.7	6.4	4.6	-7	100.6	63
1083	6.2	48.1	954	300.0	299.9	0.2	12.6	7.5	6.2	-7	100.6	63
1084	8.0	50.5	1222	300.0	299.9	0.3	13.7	7.7	5.4	-7	100.6	63
1085	8.0	51.4	1213	300.0	299.9	0.5	13.6	7.5	5.2	-7	100.6	63
1086	8.0	51.0	1225	300.0	299.9	1.3	13.9	8.2	6.4	-7	100.6	63
1087	8.1	51.8	1207	300.0	299.9	2.0	14.0	7.5	6.7	-7	100.6	63
1088	7.8	50.6	1143	300.0	299.9	2.2	13.6	7.5	4.7	-7	100.6	63
1089	7.5	50.0	1043	300.0	299.9	2.0	13.2	6.8	5.4	-7	100.6	63
1090	7.2	49.3	929	300.0	299.9	1.6	12.6	6.6	6.1	-7	100.6	63
1091	7.1	48.9	906	300.0	299.9	1.3	12.6	6.0	6.0	-7	100.6	63
1092	6.9	48.4	800	300.0	299.9	1.2	11.9	5.5	5.5	-7	100.6	63
1093	6.5	47.0	684	300.0	299.9	1.2	11.2	5.0	5.1	-7	100.6	63
1094	6.6	47.2	717	300.0	299.9	1.2	11.6	6.8	5.4	-7	100.6	63
1095	6.8	48.0	778	300.0	299.9	0.3	11.7	6.5	4.9	-7	100.6	63
1096	7.1	48.9	860	300.0	299.9	0.2	12.2	7.0	5.1	-7	100.6	63
1097	7.1	48.9	871	300.0	299.9	0.2	12.2	5.9	5.4	-7	100.6	63
1098	7.4	48.6	979	300.0	299.9	0.2	12.6	7.1	4.2	-7	100.6	63
1099	8.0	50.5	1225	300.0	299.9	0.2	13.7	8.3	5.0	-7	100.6	63
1100	8.0	51.6	1206	300.0	299.9	0.5	13.6	6.3	5.3	-7	100.6	63
1101	7.3	50.3	944	300.0	299.9	1.2	12.4	5.7	5.6	-7	100.6	63
1102	6.7	47.5	738	300.0	299.9	1.2	11.5	5.6	5.5	-7	100.6	63
1103	6.5	47.2	670	300.0	299.9	1.2	11.2	5.6	4.0	-7	100.6	63
1104	6.2	47.1	586	300.0	299.9	1.0	10.6	5.8	4.4	-7	100.6	65
1105	5.9	46.8	502	300.0	299.9	0.3	10.2	5.7	5.3	-7	100.6	65
1106	5.7	46.4	460	300.0	299.9	0.3	9.9	5.6	4.3	-7	100.6	65
1107	5.6	45.5	421	300.0	299.9	0.3	9.6	5.1	4.1	-7	100.6	65
1108	5.5	45.5	411	300.0	299.9	0.3	9.6	4.8	4.8	-7	100.6	65
1109	5.5	45.9	402	300.0	299.9	0.3	9.5	5.0	4.2	-7	100.6	65
1110	5.7	46.2	456	300.0	300.0	0.3	9.9	4.9	4.4	-7	100.6	65
1111	6.0	46.8	524	300.0	300.0	0.3	10.3	5.2	5.2	-7	100.6	65
1112	6.3	47.1	618	300.0	300.0	0.3	10.8	6.3	5.1	-7	100.6	65
1113	6.8	47.9	785	300.0	300.0	0.3	11.7	6.4	4.4	-7	100.6	65
1114	7.2	48.8	924	300.0	300.0	0.3	12.3	6.6	4.7	-7	100.6	65
1115	7.3	49.1	945	300.0	300.0	0.3	12.3	6.5	6.0	-7	100.6	65
1116	7.2	49.7	906	300.0	300.0	0.1	12.4	6.0	5.1	-7	100.6	64
1117	7.3	50.0	959	300.0	300.0	0.5	12.8	5.9	5.4	-7	100.6	63
1118	7.2	49.3	908	300.0	300.0	1.4	12.6	5.2	5.7	-7	100.6	63
1119	7.0	48.6	837	300.0	300.0	1.2	12.1	6.2	6.1	-7	100.6	63
1120	7.3	49.1	862	300.0	300.0	1.4	12.9	7.1	6.0	-7	100.6	63
1121	7.6	50.1	1059	300.0	300.0	1.8	13.4	6.7	6.7	-7	100.6	63
1122	7.6	50.8	1072	300.0	300.0	1.8	13.0	6.1	4.0	-7	100.6	63
1123	7.7	50.0	1112	300.0	300.0	1.9	13.2	7.1	5.7	-7	100.6	63
1124	7.9	50.3	1167	300.0	300.0	2.2	13.4	6.8	7.8	-7	100.6	63
1125	7.9	51.7	1178	300.0	300.0	2.4	13.4	6.9	7.9	-7	100.6	63
1126	7.8	50.3	1149	300.0	300.0	2.3	13.3	6.9	7.9	-7	100.6	63
1127	7.6	49.6	1078	300.0	300.0	2.0	13.0	6.4	7.6	-7	100.6	63
1128	7.5	49.1	1040	300.0	300.0	1.8	12.8	7.0	6.7	-7	100.6	63
1129	7.6	49.3	1073	300.0	300.0	1.8	13.0	7.3	6.5	-7	100.6	62
1130	7.8	50.0	1133	300.0	300.0	2.0	13.3	7.1	6.5	-7	100.6	62
1131	7.9	50.3	1181	300.0	300.0	2.3	13.4	7.8	6.6	-7	100.6	62
1132	7.9	50.7	1171	300.0	300.0	2.3	13.5	7.6	5.3	-7	100.6	62
1133	7.6	50.0	1082	300.0	300.0	2.0	12.5	6.6	6.6	-7	100.6	62
1134	7.5	49.4	1033	300.0	300.0	1.7	12.8	6.4	6.8	-7	100.6	63
1135	7.5	49.2	1042	300.0	300.0	1.7	12.9	6.4	6.8	-7	100.6	63
1136	7.4	49.8	971	300.0	300.0	1.7	12.6	6.1	7.7	-7	100.6	63
1137	7.0	48.3	803	300.0	300.0	1.4	11.9	6.0	7.0	-7	100.6	63
1138	6.9	48.2	803	300.0	300.0	1.2	11.7	6.2	5.8	-7	100.6	63
1139	6.9	48.1	808	300.0	300.0	1.2	11.8	6.2	5.8	-7	100.6	63
1140	6.8	47.5	784	300.0	300.0	0.6	11.7	6.2	5.7	-7	100.6	63
1141	7.2	48.5	899	300.0	300.0	0.2	12.4	6.8	6.8	-7	100.6	63
1142	7.3	49.6	940	300.0	300.0	0.2	12.5	6.9	6.9	-7	100.6	63
1143	7.2	49.2	912	300.0	300.0	0.2	12.4	5.8	6.5	-7	100.6	63
1144	7.2	48.7	914	300.0	300.0	0.6	12.4	6.8	6.1	-7	100.6	63

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

Data Point #	Standardized Wind Speed	URef	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1145	7.1	48.5	857	300.0	300.0	1.3	12.2	5.8	5.9	-7	100.6	63
1146	6.8	47.5	771	300.0	300.0	1.2	11.6	6.1	5.2	-7	100.6	64
1147	6.7	47.2	713	300.0	300.0	1.2	11.3	6.7	5.4	-7	100.6	64
1148	6.4	46.8	636	300.0	300.0	0.9	10.8	6.4	5.8	-7	100.6	64
1149	6.3	46.4	618	300.0	300.0	0.5	10.8	5.4	5.3	-7	100.6	64
1150	6.5	46.9	692	300.0	300.0	0.4	11.2	6.2	4.8	-7	100.6	64
1151	6.8	47.5	769	300.0	300.0	0.4	11.5	6.2	5.8	-7	100.6	64
1152	7.4	48.4	980	300.0	300.0	0.3	12.5	6.0	5.5	-7	100.6	64
1153	8.3	50.9	1300	300.0	300.0	0.5	14.0	8.1	6.0	-7	100.6	64
1154	8.6	51.7	1374	300.0	300.0	1.5	14.2	9.1	5.9	-7	100.6	64
1155	8.4	52.3	1320	300.0	300.0	2.3	14.1	7.0	5.6	-7	100.6	64
1156	8.1	51.4	1237	300.0	300.0	2.7	13.9	8.0	4.5	-7	100.6	64
1157	8.0	51.4	1206	300.0	301.9	2.3	13.8	7.5	4.6	-7	100.6	64
1158	7.7	50.6	1									

Table E.01 Measurement data - Turbine ON

Project: Goshen Wind Energy Centre - Turbine T84 - IEC 61400-11 Measurement
 Report ID: 14461.02.T84.RP2

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

Data Point #	Standardized Wind Speed	Lidex	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1233	8.0	52.3	1219	300.0	294.1	3.1	14.9	7.4	5.4	-7	100.6	63
1234	8.7	53.3	1410	300.0	294.1	3.1	15.4	8.3	5.7	-7	100.6	64
1235			1578	300.0	294.1	3.6	15.6	8.0	6.7	-7	100.6	63
1236			1533	300.0	294.1	3.7	15.6	8.3	7.1	-7	100.6	64
1237	9.3	53.9	1531	300.0	294.1	3.6	15.6	8.4	6.6	-7	100.6	64
1238			1532	300.0	294.1	3.6	15.6	8.3	6.6	-7	100.6	63
1239	9.2	53.7	1498	300.0	294.1	3.7	15.6	7.8	7.3	-7	100.6	63
1240			1520	300.0	294.1	3.3	15.6	7.3	7.6	-7	100.6	63
1241			1617	300.0	294.1	3.6	15.6	7.9	7.2	-7	100.6	63
1242			1579	300.0	294.1	3.2	15.6	8.2	6.9	-7	100.6	63
1243	10.2	53.8	1630	300.0	294.1	4.1	15.8	9.2	7.4	-7	100.6	63
1244	10.4	54.1	1626	300.0	294.1	4.8	15.8	9.3	6.8	-7	100.6	63
1245	10.0	54.1	1622	300.0	294.1	5.4	15.8	9.0	7.1	-7	100.6	63
1246	9.4	53.7	1598	300.0	294.1	4.5	15.5	8.4	7.1	-7	100.6	63
1247	9.2	1407	1407	300.0	294.1	4.2	15.5	9.0	6.4	-7	100.6	63
1248	8.6	53.3	1365	300.0	294.1	4.4	15.4	8.3	6.0	-7	100.6	63
1249	8.0	53.1	1218	300.0	294.1	4.3	15.0	7.8	5.5	-7	100.6	63
1250	7.7	52.8	1083	300.0	294.1	4.2	14.5	7.0	5.6	-7	100.6	63
1251	7.3	51.4	940	300.0	294.1	4.2	13.6	6.7	5.7	-7	100.6	63
1252	7.2	49.9	909	300.0	294.1	2.0	13.3	7.1	5.8	-7	100.6	63
1253	7.6	50.7	1067	300.0	294.1	1.8	13.9	7.0	6.8	-7	100.6	63
1254	7.9	51.6	1172	300.0	294.1	2.4	14.4	7.3	6.6	-7	100.6	63
1255	8.3	52.3	1266	300.0	294.1	2.6	14.7	7.6	5.9	-7	100.6	63
1256	9.0	52.9	1483	300.0	294.1	3.6	15.4	9.1	6.6	-7	100.6	63
1257	8.7	53.1	1393	300.0	294.1	3.4	15.4	8.4	6.5	-7	100.6	63
1258	8.7	52.9	1390	300.0	294.1	3.0	15.3	8.6	6.8	-7	100.6	63
1259	8.7	52.9	1388	300.0	294.1	3.1	15.3	7.7	7.7	-7	100.6	63
1260	8.7	52.9	1400	300.0	294.1	3.2	15.4	7.9	7.9	-7	100.6	63
1261	8.8	53.1	1431	300.0	294.1	3.3	15.5	8.8	6.6	-7	100.6	63
1262	9.5	53.5	1586	300.0	294.1	3.8	15.7	8.5	7.9	-7	100.6	63
1263	9.3	53.7	1537	300.0	294.1	3.9	15.6	8.4	7.1	-7	100.6	63
1264	8.6	53.3	1364	300.0	294.1	3.3	15.3	7.7	5.8	-7	100.6	62
1265	8.1	52.7	1248	300.0	294.1	2.6	14.7	7.5	5.7	-7	100.6	62
1266	7.8	51.7	1157	300.0	294.1	2.3	14.3	7.3	5.3	-7	100.6	62
1267	7.8	1148	1148	300.0	294.1	2.1	14.2	7.8	7.8	-7	100.6	62
1268	8.0	52.0	1212	300.0	294.1	2.4	14.6	7.3	5.1	-7	100.6	62
1269	8.0	52.3	1202	300.0	294.1	2.6	14.5	6.8	6.1	-7	100.6	62
1270	8.1	51.7	1253	300.0	294.1	2.6	14.1	7.6	6.4	-7	100.6	62
1271	7.8	51.2	1152	300.0	294.1	2.3	13.5	8.5	6.0	-7	100.6	62
1272	7.8	50.0	1126	300.0	294.1	2.1	13.4	7.2	5.9	-7	100.6	62
1273	7.9	50.1	1169	300.0	294.1	2.2	13.6	8.1	6.8	-7	100.6	62
1274	7.8	50.4	1129	300.0	294.1	2.2	13.4	7.7	6.3	-7	100.6	62
1275	7.6	50.0	1071	300.0	294.1	1.9	13.1	7.8	6.1	-7	100.6	62
1276	7.3	50.0	934	300.0	294.1	1.7	13.2	7.6	5.9	-7	100.6	62
1277	7.3	50.2	935	300.0	294.1	1.4	13.3	7.3	6.4	-7	100.6	62
1278	7.4	50.0	974	300.0	294.1	1.5	13.5	7.6	6.4	-7	100.6	62
1279	7.9	51.1	1174	300.0	294.1	2.1	14.5	8.3	6.9	-7	100.6	62
1280	8.3	53.0	1293	300.0	294.1	2.9	14.9	6.0	7.2	-7	100.6	62
1281	8.0	52.6	1202	300.0	294.1	2.5	14.5	5.9	8.0	-7	100.6	62
1282	8.5	52.9	1355	300.0	294.1	2.7	14.6	6.9	8.0	-7	100.6	62
1283	8.6	52.7	1368	300.0	294.1	3.2	14.5	9.2	6.7	-7	100.6	62
1284	8.2	51.9	1256	300.0	294.1	3.0	14.0	7.7	6.0	-7	100.6	62
1285	8.0	51.0	1227	300.0	294.1	2.3	13.8	7.4	6.3	-7	100.6	62
1286	7.8	51.1	1133	300.0	294.1	2.3	13.5	7.4	6.4	-7	100.6	62
1287	7.3	49.5	941	300.0	294.1	1.8	12.5	5.9	5.2	-7	100.6	62
1288	7.3	48.4	944	300.0	294.1	1.5	12.4	6.4	6.1	-7	100.6	63
1289	7.8	49.9	1123	300.0	294.1	2.0	13.3	8.6	5.5	-7	100.6	63
1290	7.6	50.5	1074	300.0	294.1	2.1	13.0	6.2	5.1	-7	100.6	63
1291	7.1	49.2	872	300.0	294.1	1.6	12.0	5.6	4.6	-7	100.6	63
1292	6.9	47.4	811	300.0	294.1	1.2	11.7	6.0	5.2	-7	100.6	63
1293	7.1	47.7	871	300.0	294.1	1.2	12.1	6.3	6.1	-7	100.6	63
1294	7.4	48.3	986	300.0	294.1	1.5	12.5	7.8	6.2	-7	100.6	63
1295	8.1	50.2	1234	300.0	294.1	2.4	13.7	7.6	7.4	-7	100.6	63
1296	8.8	53.4	1426	300.0	294.1	3.3	14.5	8.6	6.3	-7	100.6	63
1297	8.8	53.0	1430	300.0	294.1	3.5	14.5	8.2	6.6	-7	100.6	63
1298	8.0	52.4	1202	300.0	294.1	3.1	13.6	7.1	5.8	-7	100.6	63
1299	7.3	49.5	959	300.0	294.1	2.0	12.4	5.6	5.3	-7	100.6	63
1300	7.0	48.2	823	300.0	294.1	1.4	12.4	6.2	5.1	-7	100.6	63
1301	7.4	49.3	963	300.0	294.1	1.5	13.7	6.6	4.4	-7	100.6	63
1302	7.6	51.0	1044	300.0	294.1	1.8	13.8	7.4	4.5	-7	100.6	63
1303	7.3	50.7	932	300.0	294.1	1.7	13.2	6.1	5.9	-7	100.6	63
1304	6.9	49.1	806	300.0	294.1	1.2	12.5	5.9	6.2	-7	100.6	63
1305	6.9	49.0	800	300.0	294.1	1.2	12.6	6.4	6.6	-7	100.6	63
1306	7.3	49.5	941	300.0	294.1	1.5	12.5	6.5	6.2	-7	100.6	64
1307	7.0	48.1	828	300.0	294.1	1.3	11.8	5.5	6.3	-7	100.6	64
1308	6.7	47.6	742	300.0	294.1	1.1	11.4	5.7	4.9	-7	100.6	64
1309	6.5	46.8	698	300.0	294.1	0.5	11.1	6.1	5.4	-7	100.6	64
1310	6.4	46.9	665	300.0	294.1	0.4	11.1	5.8	5.4	-7	100.6	64
1311	6.3	46.9	633	300.0	294.1	0.4	10.8	4.7	4.8	-7	100.6	64

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

Data Point #	Standardized Wind Speed	Lidex	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1321			1626	178.0	177.1	5.5	15.5	8.3				
1322			1632	178.0	177.1	5.8	15.7	10.0				
1323			1618	178.0	177.1	5.5	15.5	8.6				
1324			1633	178.0	177.1	6.2	15.7	9.3				
1325			1625	178.0	177.1	6.5	15.7	9.2				
1326			1623	178.0	177.1	6.6	15.7	8.6				
1327			1611	178.0	177.1	6.1	15.4	9.2				
1328			1630	178.0	177.1	6.1	15.6	8.4				
1329			1631	178.0	177.1	6.8	15.7	10.0				
1330			1699	178.0	177.1	6.3	15.5	10.1				
1331			1618	178.0	177.1	5.4	15.4	8.7				
1332			1625	178.0	177.1	5.3	15.4	8.3				
1333			1636	178.0	177.1	5.2	15.6	8.8				
1334			1625	178.0	177.1	6.1	15.7	8.8				
1335			1619	178.0	177.1	5.2	15.5	7.7				
1336			1636	178.0	177.1	5.9	15.7	8.7				
1337			1638	178.0	177.1	7.6	15.9	10.2				
1338			1614	178.0	177.1	7.6	15.7	11.2				
1339			1618	178.0	177.1	7.7	15.6	10.0				
1340			1608	178.0	177.1	6.6	15.4	8.9				
1341			1625	178.0	177.1	6.1	15.4	8.6				
1342			1630	178.0	177.1	6.0	15.5	9.0				
1343			1646	178.0	177.1	6.3	15.3	8.2				
1344			1654	178.0	177.1	7.7	16.0	9.8				
1345			1607	178.0	177.1	7.7	15.6	10.4				
1346			1612	178.0	177.1	6.4	15.4	9.3				
1347			1641	178.0	177.1	7.3	15.6	9.6				
1348			1625	178.0	177.1	6.8	15.6	9.3				
13												

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	9.7	33.2	0.0	7.5	-8	100.6	66
2	10.2	33.3	0.0	8.0	-8	100.6	66
3	9.1	32.2	0.0	7.1	-8	100.6	66
4	8.4	43.6	0.0	6.6	-8	100.6	66
5	8.8	36.6	0.0	6.9	-8	100.6	65
6	8.9	33.1	0.0	6.9	-8	100.6	65
7	9.0	32.9	0.0	7.0	-8	100.6	65
8	9.5	32.4	0.0	7.4	-8	100.6	65
9	9.2	42.3	0.0	7.2	-8	100.6	65
10	9.5	43.5	0.0	7.4	-8	100.6	65
11	8.9	43.4	0.0	7.0	-8	100.6	65
12	9.4	37.8	0.0	7.3	-8	100.6	65
13	9.5	41.2	0.0	6.6	-8	100.6	65
14	8.6	36.2	0.0	6.7	-8	100.6	65
15	10.5	38.2	0.0	8.2	-8	100.6	65
16	9.4	34.7	0.0	7.4	-8	100.6	65
17	8.4	31.8	0.0	6.5	-8	100.6	65
18	8.2	31.6	0.0	6.4	-8	100.6	65
19	8.4	32.8	0.0	6.5	-8	100.6	65
20	8.6	37.2	0.0	6.7	-8	100.6	65
21	8.2	33.2	0.0	6.4	-8	100.6	65
22	9.2	34.3	0.0	7.2	-8	100.6	65
23	10.2	35.5	0.0	8.0	-8	100.6	65
24	10.8	34.3	0.0	8.4	-8	100.6	65
25	9.7	32.9	0.0	7.8	-8	100.6	65
26	8.1	34.1	0.0	6.3	-8	100.6	65
27	7.6	40.7	0.0	5.9	-8	100.6	65
28	8.6	37.5	0.0	6.5	-8	100.6	65
29	6.9	37.9	0.0	5.4	-8	100.6	65
30	8.3	39.0	0.0	6.4	-8	100.6	66
31	8.4	40.4	0.0	6.5	-8	100.6	66
32	7.7	41.5	0.0	6.0	-8	100.6	66
33	8.0	33.6	0.0	6.9	-8	100.6	66
34	8.5	35.0	0.0	6.6	-8	100.6	66
35	8.2	33.3	0.0	6.4	-8	100.6	65
36	7.1	31.0	0.0	5.5	-8	100.6	65
37	8.2	30.6	0.0	6.4	-8	100.6	65
38	8.2	31.5	0.0	6.5	-8	100.6	65
39	8.0	31.0	0.0	6.3	-8	100.6	65
40	8.6	34.8	0.0	6.7	-8	100.6	65
41	8.0	32.9	0.0	6.3	-8	100.6	65
42	7.9	31.6	0.0	6.2	-8	100.6	65
43	7.6	33.3	0.0	5.9	-8	100.6	65
44	7.1	34.2	0.0	5.6	-8	100.6	65
45	9.3	33.2	0.0	7.2	-8	100.6	65
46	9.9	31.2	0.0	7.7	-8	100.6	65
47	8.7	30.9	0.0	6.8	-8	100.6	63
48	7.5	33.3	0.0	5.9	-8	100.6	62
49	8.0	35.1	0.0	6.2	-8	100.6	62
50	7.9	32.9	0.0	6.1	-8	100.6	62
51	9.0	34.4	0.0	7.0	-8	100.6	62
52	8.3	33.0	0.0	6.5	-8	100.6	62
53	8.8	32.5	0.0	6.5	-8	100.6	62
54	8.3	39.3	0.0	6.5	-8	100.6	62
55	8.3	34.1	0.0	6.5	-8	100.6	62
56	7.9	34.9	0.0	6.2	-8	100.6	62
57	7.9	32.3	0.0	6.2	-8	100.6	62
58	7.5	32.1	0.0	5.9	-8	100.6	62
59	7.8	31.6	0.0	6.1	-8	100.6	62
60	6.7	32.0	0.0	5.2	-8	100.6	62
61	7.3	36.0	0.0	5.7	-8	100.6	62
62	8.0	32.3	0.0	6.3	-8	100.6	62
63	8.2	31.8	0.0	6.4	-8	100.6	62
64	9.9	31.7	0.0	7.7	-8	100.6	62
65	10.3	32.1	0.0	8.0	-8	100.6	62
66	9.5	31.5	0.0	7.4	-8	100.6	62
67	9.7	32.0	0.0	7.6	-8	100.6	62
68	9.9	33.3	0.0	7.7	-8	100.6	62
69	9.1	35.4	0.0	7.1	-8	100.6	62
70	8.2	37.4	0.0	6.4	-8	100.6	62
71	7.6	41.5	0.0	5.9	-8	100.6	62
72	7.2	41.6	0.0	5.6	-8	100.6	62
73	7.9	36.1	0.0	5.7	-8	100.6	62
74	7.6	35.0	0.0	5.9	-8	100.6	62
75	7.4	32.0	0.0	5.8	-8	100.6	62
76	6.8	32.0	0.0	5.3	-8	100.6	62
77	6.6	32.6	0.0	5.2	-8	100.6	63
78	6.7	33.0	0.0	5.2	-8	100.6	63
79	6.3	35.1	0.0	4.9	-8	100.6	63
80	7.4	39.4	0.0	5.8	-8	100.6	63
81	9.1	40.4	0.0	7.1	-8	100.6	63
82	9.1	40.7	0.0	7.1	-8	100.6	63
83	7.9	38.4	0.0	6.2	-8	100.6	63

***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	9.2	38.2	0.0	7.2	-8	100.6	63
85	9.1	35.9	0.0	7.1	-8	100.6	63
86	9.2	36.4	0.0	7.2	-8	100.6	63
87	7.4	34.7	0.0	5.8	-8	100.6	63
88	7.9	36.1	0.0	6.1	-8	100.6	63
89	8.2	42.4	0.0	6.4	-8	100.6	63
90	8.1	34.1	0.0	6.3	-8	100.6	64
91	8.1	32.3	0.0	6.3	-8	100.6	64
92	7.2	33.4	0.0	5.6	-8	100.6	64
93	8.4	32.3	0.0	6.6	-8	100.6	64
94	8.2	31.7	0.0	6.4	-8	100.6	64
95	8.2	33.6	0.0	6.4	-8	100.6	64
96	7.8	31.6	0.0	6.5	-8	100.6	64
97	7.7	33.3	0.0	6.0	-8	100.6	64
98	7.6	34.7	0.0	5.9	-8	100.6	64
99	7.6	31.1	0.0	5.9	-8	100.6	64
100	7.7	32.1	0.0	6.0	-8	100.6	64
101	6.7	33.4	0.0	5.2	-8	100.6	64
102	6.0	32.3	0.0	4.7	-8	100.6	64
103	6.6	33.0	0.0	5.2	-8	100.6	64
104	7.0	32.3	0.0	5.5	-8	100.6	64
105	8.3	32.2	0.0	6.4	-8	100.6	64
106	8.5	36.8	0.0	6.6	-8	100.6	64
107	8.0	31.6	0.0	6.2	-8	100.6	64
108	7.3	32.6	0.0	5.7	-8	100.6	64
109	6.5	31.5	0.0	5.1	-8	100.6	64
110	6.4	31.2	0.0	5.0	-8	100.6	64
111	8.1	32.7	0.0	6.3	-8	100.6	64
112	8.5	32.5	0.0	6.7	-8	100.6	64
113	6.6	34.7	0.0	5.2	-8	100.6	65
114	8.2	34.2	0.0	6.4	-8	100.6	65
115	9.9	41.8	0.0	7.7	-8	100.6	65
116	8.4	39.2	0.0	6.6	-8	100.6	65
117	6.5	36.1	0.0	5.0	-8	100.6	65
118	6.6	40.9	0.0	5.1	-8	100.6	65
119	8.4	38.1	0.0	6.6	-8	100.6	65
120	9.5	39.3	0.0	7.4	-8	100.6	65
121	9.0	35.0	0.0	7.0	-8	100.6	65
122	8.0	34.0	0.0	6.2	-8	100.6	65
123	7.0	33.2	0.0	5.5	-8	100.6	65
124	7.3	36.8	0.0	5.7	-8	100.6	65
125	9.2	32.1	0.0	7.1	-8	100.6	65
126	8.7	31.7	0.0	6.7	-8	100.6	65
127	8.5	32.1	0.0	6.6	-8	100.6	66
128	9.2	33.8	0.0	7.2	-8	100.6	66
129	10.7	38.4	0.0	8.3	-8	100.6	66
130	10.2	43.3	0.0	7.9	-8	100.6	66
131	8.7	33.7	0.0	6.8	-8	100.6	66
132	8.3	40.7	0.0	6.5	-8	100.6	66
133	10.5	37.5	0.0	8.2	-8	100.6	66
134	9.6	38.4	0.0	7.5	-8	100.6	66
135	10.0	35.4	0.0	7.8	-8	100.6	66
136	9.8	34.7	0.0	7.7	-8	100.6	66
137	9.1	35.2	0.0	7.1	-8	100.6	66
138	9.9	35.5	0.0	7.8	-8	100.6	65
139	9.5	35.1	0.0	7.4	-8	100.6	65
140	9.7	33.6	0.0	7.6	-8	100.6	65
141	10.4	34.6	0.0	8.1	-8	100.6	65
142	12.2	31.6	0.0	9.5	-8	100.6	65
143	14.3	35.0	0.0	11.2	-8	100.6	66
144	11.7	36.4	0.0	9.1	-8	100.6	66
145	10.2	36.3	0.0	8.0	-8	100.6	66
146	9.3	36.1	0.0	7.3	-8	100.6	66
147	9.6	41.0	0.0	7.5	-8	100.6	66
148	8.3	40.8	0.0	6.5	-8	100.6	66
149	9.7	35.5	0.0	7.6	-8	100.6	66
150	10.6	35.5	0.0	8.2	-8	100.6	66
151	11.5	32.5	0.0	8.9	-8	100.6	66
152	10.1	33.1	0.0	7.9	-8	100.6	66
153	9.9	33.5	0.0	7.7	-8	100.6	66
154	8.7	43.0	0.0	6.8	-8	100.6	66
155	8.1	40.7	0.0	6.3	-8	100.6	66
156	8.9	34.7	0.0	6.9	-8	100.6	66
157	7.8	35.7	0.0	6.1	-8	100.6	66
158	9.1	34.1	0.0	7.1	-8	100.6	66
159	9.5	31.9	0.0	7.4	-8	100.6	66
160	8.2	31.0	0.0	6.4	-8	100.6	66
161	9.3	32.1	0.0	7.3	-8	100.6	66
162	7.8	31.3	0.0	6.1	-8	100.6	66
163	8.6	34.8	0.0	6.7	-8	100.6	66
164	8.3	33.5	0.0	6.5	-8	100.6	66
165	8.1	35.1	0.0	6.3	-8	100.6	66
166	9.8	34.7	0.0	7.6	-8	100.6	66

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

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
167	9.9	35.0	0.0	7.7	-8	100.6	66
168	9.4	33.8	0.0	7.4	-8	100.6	66
169	11.7	37.9	0.0	9.1	-8	100.6	66
170	9.9	34.6	0.0	7			

Table E.02 Measurement data - Background

Project: Goshen Wind Energy Centre - Turbine T84 - 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	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
250	6.5	39.0	0.0	5.0	-8	100.6	64
251	6.5	37.5	0.0	5.1	-8	100.6	65
252	9.4	36.3	0.0	7.3	-8	100.6	65
253	10.9	33.4	0.0	8.5	-8	100.6	65
254	11.5	32.4	0.0	8.9	-8	100.6	65
255	10.7	35.0	0.0	8.3	-8	100.6	65
256	9.6	40.4	0.0	7.5	-8	100.6	65
257	9.9	35.0	0.0	7.7	-8	100.6	64
258	10.1	36.8	0.0	7.9	-8	100.6	64
259	13.6	36.7	0.0	10.6	-8	100.6	64
260	13.0	37.9	0.0	10.1	-8	100.6	64
261	11.8	33.0	0.0	9.2	-8	100.6	64
262	12.1	35.1	0.0	9.4	-8	100.6	64
263	10.7	34.6	0.0	8.3	-8	100.6	64
264	9.9	45.3	0.0	7.7	-8	100.6	64
265	10.3	44.7	0.0	8.1	-8	100.6	64
266	8.7	41.7	0.0	6.8	-8	100.6	64
267	9.4	43.8	0.0	7.3	-8	100.6	64
268	10.0	41.8	0.0	7.8	-8	100.6	64
269	8.6	37.4	0.0	6.7	-8	100.6	64
270	8.8	37.8	0.0	6.9	-8	100.6	64
271	9.4	33.9	0.0	7.3	-8	100.6	64
272	9.5	35.2	0.0	7.4	-8	100.6	64
273	8.2	34.9	0.0	6.4	-8	100.6	64
274	6.9	34.2	0.0	5.4	-8	100.6	64
275	5.8	38.3	0.0	4.5	-8	100.6	64
276	7.0	40.1	0.0	5.4	-8	100.6	65
277	8.4	36.4	0.0	6.8	-8	100.6	65
278	10.7	33.4	0.0	8.3	-8	100.6	65
279	9.2	35.7	0.0	7.2	-8	100.6	65
280	8.3	38.8	0.0	6.5	-8	100.6	65
281	9.1	38.7	0.0	7.1	-8	100.6	64
282	8.4	35.2	0.0	6.6	-8	100.6	64
283	8.5	37.4	0.0	6.6	-8	100.6	64
284	8.2	38.2	0.0	6.4	-8	100.6	64
285	8.2	36.1	0.0	6.4	-8	100.6	64
286	7.2	34.8	0.0	5.6	-8	100.6	64
287	8.6	35.1	0.0	6.7	-8	100.6	64
288	8.6	35.6	0.0	6.7	-8	100.6	64
289	9.1	34.4	0.0	7.1	-8	100.6	64
290	10.1	34.7	0.0	7.9	-8	100.6	64
291	10.6	36.6	0.0	8.3	-8	100.6	64
292	8.9	45.5	0.0	6.9	-8	100.6	64
293	8.6	40.9	0.0	6.7	-8	100.6	64
294	9.3	42.8	0.0	7.3	-8	100.6	64
295	10.3	44.8	0.0	8.1	-8	100.6	64
296	10.8	45.9	0.0	8.4	-8	100.6	64
297	9.1	43.6	0.0	7.1	-8	100.6	64
298	8.9	35.2	0.0	6.9	-8	100.6	64
299	8.2	41.1	0.0	6.4	-8	100.6	64
300	12.0	43.0	0.0	9.4	-8	100.6	64
301				7.7	-8	100.6	64
302				8.3	-8	100.6	64
303				7.0	-8	100.6	64
304				6.6	-8	100.6	64
305	8.3	39.8	0.0	6.4	-8	100.6	65
306	8.6	36.6	0.0	6.7	-8	100.6	65
307	8.3	34.5	0.0	6.5	-8	100.6	65
308	9.1	34.3	0.0	7.1	-8	100.6	65
309	8.5	39.0	0.0	6.6	-8	100.6	65
310	7.8	35.9	0.0	6.1	-8	100.6	65
311	9.6	34.2	0.0	7.5	-8	100.6	65
312	8.2	35.3	0.0	6.4	-8	100.6	65
313	8.4	34.3	0.0	6.6	-8	100.6	65
314	8.3	32.4	0.0	6.5	-8	100.6	65
315	8.3	35.2	0.0	6.5	-8	100.6	65
316	9.4	32.5	0.0	7.3	-8	100.6	65
317	8.3	32.3	0.0	6.5	-8	100.6	64
318	9.2	33.2	0.0	7.2	-8	100.6	64
319	8.9	34.9	0.0	6.9	-8	100.6	64
320	8.7	33.7	0.0	6.8	-8	100.6	64
321	8.9	34.7	0.0	7.0	-8	100.6	64
322	9.2	35.1	0.0	7.2	-8	100.6	64
323	8.6	34.6	0.0	6.7	-8	100.6	64
324	7.3	35.5	0.0	5.7	-8	100.6	65
325	6.9	35.8	0.0	5.3	-8	100.6	65
326	6.6	34.2	0.0	5.1	-8	100.6	65
327	7.0	36.5	0.0	5.5	-8	100.6	65
328	7.7	34.6	0.0	6.0	-8	100.6	65
329	6.7	34.6	0.0	5.3	-8	100.6	65
330	7.6	33.6	0.0	5.9	-8	100.6	65
331	9.5	35.3	0.0	7.4	-8	100.6	65
332	10.8	33.8	0.0	8.4	-8	100.6	65

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

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (C)	Pressure (kPa)	Relative Humidity (%)
333	9.4	36.6	0.0	7.3	-8	100.6	65
334	9.0	34.6	0.0	7.1	-8	100.6	65
335	9.7	35.7	0.0	7.6	-8	100.6	65
336	8.2	33.1	0.0	6.4	-8	100.6	65
337	7.6	39.4	0.0	5.9	-8	100.6	65
338	8.8	36.3	0.0	6.8	-8	100.6	65
339	9.8	35.8	0.0	7.6	-8	100.6	65
340	11.4	34.0	0.0	8.9	-8	100.6	65
341	10.6	40.8	0.0	8.3	-8	100.6	65
342	13.6	48.1	0.0	10.6	-8	100.6	64
343	14.1	45.1	0.0	11.0	-8	100.6	64
344	13.5	41.7	0.0	10.5	-8	100.6	64
345	13.9	41.6	0.0	10.9	-8	100.6	64
346	12.8	41.1	0.0	9.9	-8	100.6	64
347	11.0	45.5	0.0	8.6	-8	100.6	64
348	9.4	44.4	0.0	7.3	-8	100.6	64
349	10.1	51.1	0.0	7.8	-8	100.6	64
350	8.2	41.7	0.0	6.4	-8	100.6	64
351	9.8	34.7	0.0	7.6	-8	100.6	64
352	9.9	33.5	0.0	7.7	-8	100.6	64
353	9.8	32.8	0.0	7.6	-8	100.6	64
354	10.0	32.4	0.0	7.8	-8	100.6	64
355	10.7	32.6	0.0	8.4	-8	100.6	64
356	9.0	33.0	0.0	7.0	-8	100.6	64
357	9.1	33.7	0.0	7.1	-8	100.6	64
358	9.9	34.1	0.0	7.7	-8	100.6	64
359	9.2	34.2	0.0	7.2	-8	100.6	64
360	9.7	37.1	0.0	7.6	-8	100.6	64
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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 (%)
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Appendix F

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

Note N6.040.17

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

Project number: 35.6539.01

Project manager: Bo Søndergaard

Author: Bo Søndergaard

Date: 7/11/2017

Controlled by: -

To : Aercoustics Engineering Limited
Att.: Payam Ashtiani

From : Bo Søndergaard

1. Purpose

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

2. Comment

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

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

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

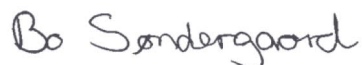
judgement on the anemometer position in a given situation. In the Danish regulations, it is stated that the anemometer has to be close to the wind turbine in a position where neither the wind turbine nor objects in the terrain is expected to influence the wind speed measurements.

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

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

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

SWECO Danmark A/S



Bo Søndergaard

Acoustica

End of Report
