aercoustics
Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 1M4
Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

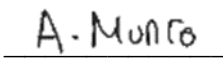
REPORT ID: **14331.01.T29.RP2**

Bluewater Wind Energy Centre – Turbine T29
IEC 61400-11 Edition 3.0 Measurement Report

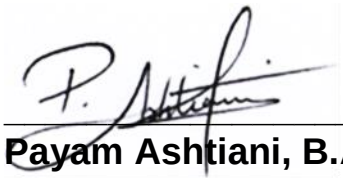
Prepared for:

Varna Wind LP
27 Main Street
Zurich, ON
N0M 2T0

Prepared by:



Allan Munro, B.A.Sc.



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

07 November 2017 – Revision #2

SCC Accredited CB-P/S OCPS Accrédité CCN

Revision History

Revision Number	Description	Date
1	Issued Edition 2.1 test report	February 6, 2015
2	Issued Edition 3.0 test report	November 07, 2017

This report in its entirety, including appendices contains 84 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.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Aercoustics Engineering Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Any use of this report is subject to this Statement of Qualifications and Limitations. Any damages arising from improper use of this report or parts thereof shall be borne by the party making such use.

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

Table of Contents

List of Figures

List of Tables

List of Appendices

1 Introduction

Aercoustics Engineering Limited (Aercoustics) was retained by Varna Wind LP ("Varna") to conduct an acoustic measurement of turbine T29 at the Bluewater 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 T29.

2 Wind Turbine Information

2.1 Wind turbine equipment specific information

Wind turbine specific equipment information for turbine T29 was provided by Varna and is summarized in Tables 1 – 5.

Table 1 - Wind Turbine Details

Wind Turbine Details	
Manufacturer	General Electric
Model Number	1.X 100m
Turbine ID	WTG-29

Table 2 - Operating Details

Operating Details	
Vertical or Horizontal axis wind turbine	HAWT
Upwind or downwind rotor	Upwind
Hub height	82 m
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
Constant or variable speed	Variable
Power curve	See Figure B.01
Rotational speed at each integer standardised wind speed	See Figure B.02
Rated power output	1.6
Control software version	V04.07.02C build 2

Table 3 - Rotor Details

Rotor Details	
Rotor control devices	Electric
Presence of vortex generators, stall strips, serrated trailing edges	Vortex generators, serrated trailing edge
Blade type	TPI
Serial number	D21907-101-03564-W860, D21907-101-03562-W860, D21907-101-03563-W860
Number of blades	3

Table 4 - Gearbox Details

Gearbox Details	
Manufacturer	Nanjing
Model number	FDMD
Serial number	FDMD-2059

Table 5 - Generator Details

Generator Details	
Manufacturer	GE
Model number	1-6-HEAD-30323-P
Serial number	WTG-1303-051

2.2 Wind Turbine Location

Turbine T29 is located in the Bluewater Township, approximately 640m West of Babylon Line, and 880m South of Staffa Road. The area surrounding T29 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 T29 is summarized in Table 6.

Table 6 - Acoustic Measurement Equipment

Equipment	Manufacturer Name & Model	Serial Number
Acoustic Data acquisition system	LMS SCADA Mobile	5310922
Microphone	B&K 4189	2622169
Pre-amplifier	B&K 2671	2614900
Acoustic calibrator	B&K 4231	2513184

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 T29. 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	K242001
Serial to Analog Converter	NOKEVAL 7470	A165152

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 T29. 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 T29 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
December 2, 2014	Background	11:36pm	12:25pm
	Turbine ON	12:38pm	1:34pm
	Turbine ON	1:52pm	2:20pm
	Turbine ON	2:24pm	2:46pm
	Background	2:55pm	3:20pm
	Background	3:25pm	4:05pm
December 8, 2014	Turbine ON	11:03am	12:05pm
	Turbine ON	12:25pm	12:45pm

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 T29's power curve (as per the standard), while wind direction was provided by T29's yaw position. Background data was obtained from an anemometer located 10m above ground level near T29.

Temperature and pressure readings during the measurement period were provided by the 10m anemometer, located near turbine T29 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 >8.9dBA or greater across all wind bins. Additionally, the ambient noise levels are steady across the entire wind speed range, with a slope of -0.05dB per integer wind speed, which indicates that the ambient sound data is not dependant on wind speed/nacelle anemometer location. 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

T28 and T30 were turned off for the duration of testing.

4.3 Analysis Details

The following section outlines analysis of the measurement data acquired for T29. 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	49.7	59	40.8	25	49.1
7.5	51.3	66	40.7	27	50.9
8	52.1	63	39.9	32	51.8
8.5	52.8	51	40.3	40	52.5
9	53.3	61	40.7	37	53.0
9.5	53.8	140	40.6	48	53.6
10	53.8	94	40.5	37	53.6
10.5	54.1	51	40.5	43	53.9
11	54.0	40	40.2	36	53.8

4.6 Sound Power Level of Turbine

The calculated sound power level of the turbine T29 (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	97.9	0.8
7.5	99.7	0.8
8	100.7	0.7
8.5	101.4	0.8
9	101.9	0.7
9.5	102.4	0.8
10	102.5	0.7
10.5	102.7	0.8
11	102.6	0.7

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

Wind Speed (m/s)	Apparent L_{WA}, (dBA)	Uncertainty (dB)
5	98.2	0.8
6	101.2	0.8
7	102.4	0.7
8	102.9	0.7

4.7 Tonality Analysis

The tonality analysis for Turbine T29 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	494	-2.5	-0.2	33	59	56%
7.5	133	0.5	2.5	66	66	100%
	532	-5.1	-2.7	46	66	70%
8	138	-0.8	1.2	63	63	100%
	574	-2.5	-0.1	18	63	29%
8.5	139	-3.5	-1.5	15	51	29%
	585	-2.1	0.3	40	51	78%
9	599	-0.6	1.8	55	61	90%
9.5	616	0.3	2.7	80	140	57%
	641	-0.2	2.2	50	140	36%
	1247	-5.7	-2.6	73	140	52%
10	620	0.2	2.7	69	94	73%
	649	-3.0	-0.5	20	94	21%
10.5	620	0.0	2.4	35	51	69%
	1245	-5.9	-2.8	27	51	53%
11	625	-1.2	1.2	26	40	65%

5 Closure

Measurements and analysis were carried on Turbine T29 of the Bluewater Wind Energy Centre, located in the Bluewater Township as per International IEC 61400-11 (Edition 3.0, released 2012-11), "Wind turbine generator systems – Part 11: Acoustic noise measurement techniques".

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

6 References

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

aercoustics

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

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

Appendix A
Site Details

aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Site Plan

Figure A.01

aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Site Photos

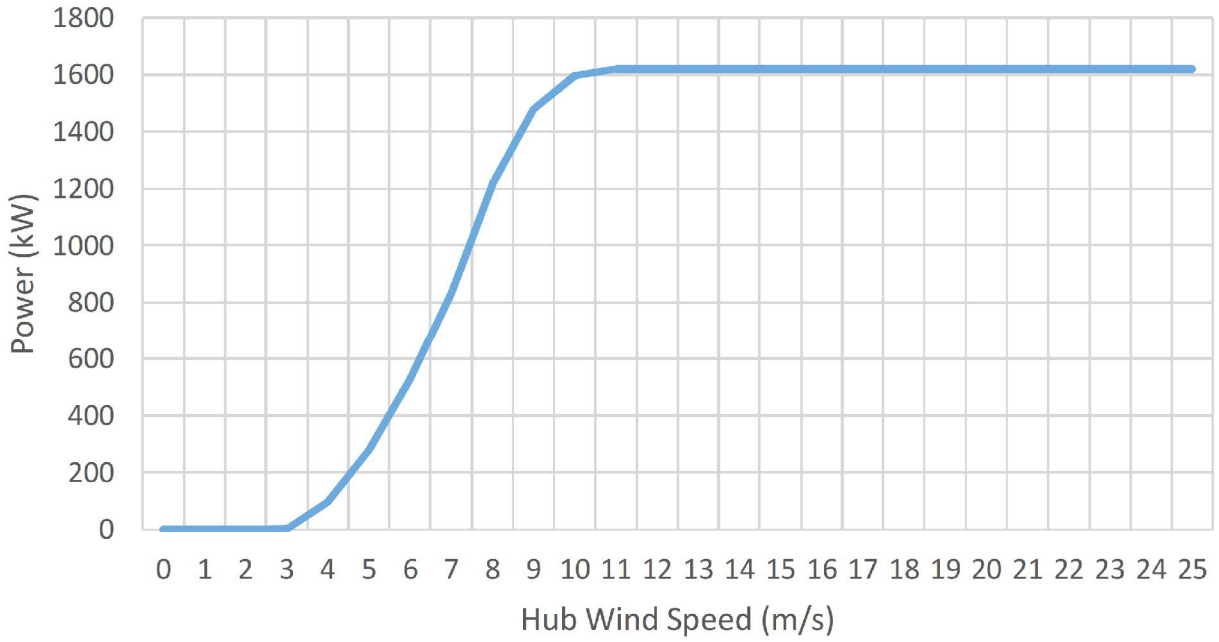
Figure A.02

aercoustics

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

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

Appendix B
Turbine Information



Power Curve	
Hub Wind Speed (m/s)	Power [kW]
0	0
1	0
2	0
3	4
4	97
5	280
6	526
7	835
8	1216
9	1478
10	1597
11	1620
12	1620
13	1620
14	1620
15	1620
16	1620
17	1620
18	1620
19	1620
20	1620
21	1620
22	1620
23	1620
24	1620
25	1620

aercoustics

14331.01.T29.RP2

Scale: NTS
Drawn by: AM
Reviewed by: PA
Date: Sept 29, 2017
Revision: 1

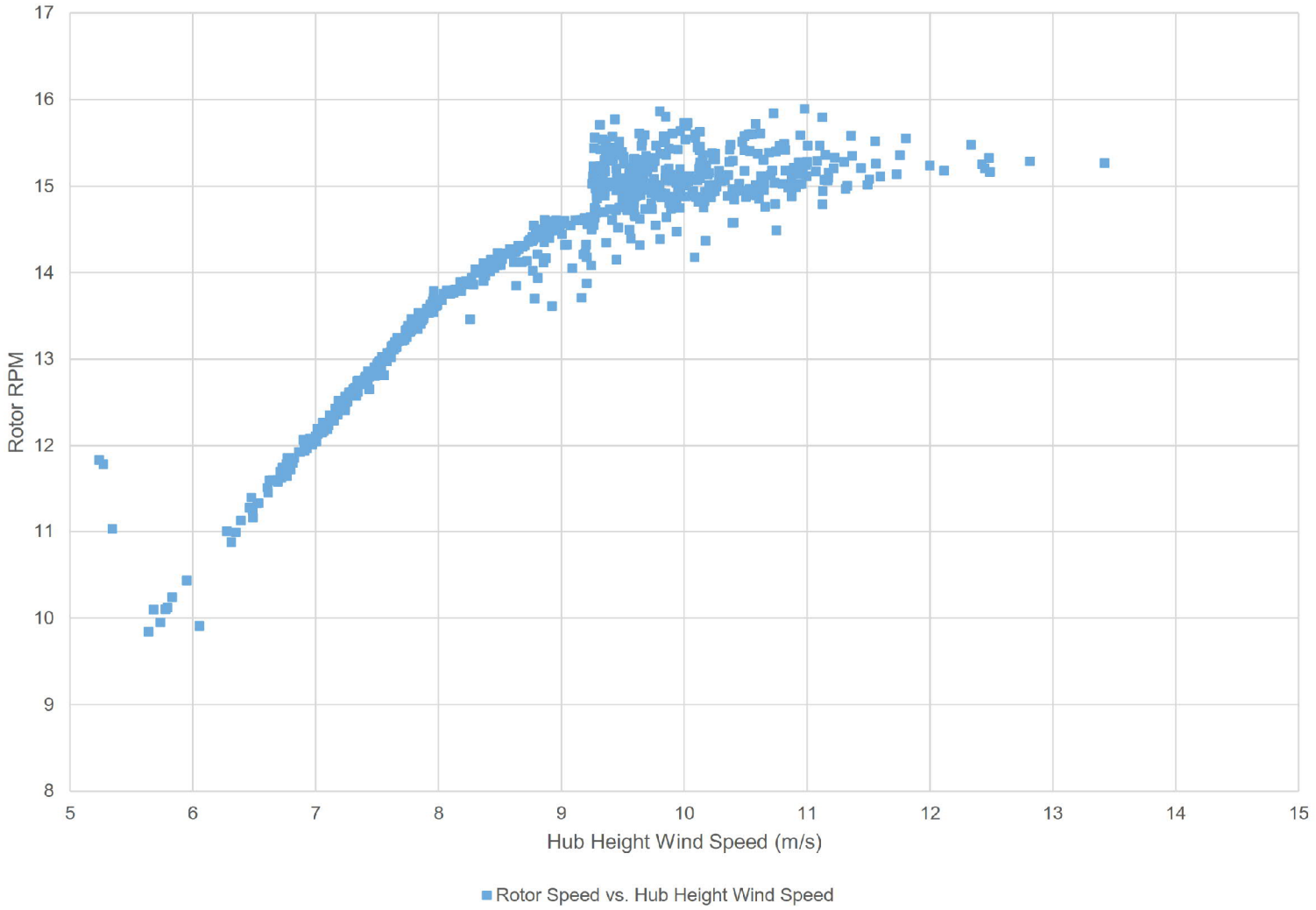
Project Name

Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0

Figure Title

Power Curve

Figure B.01

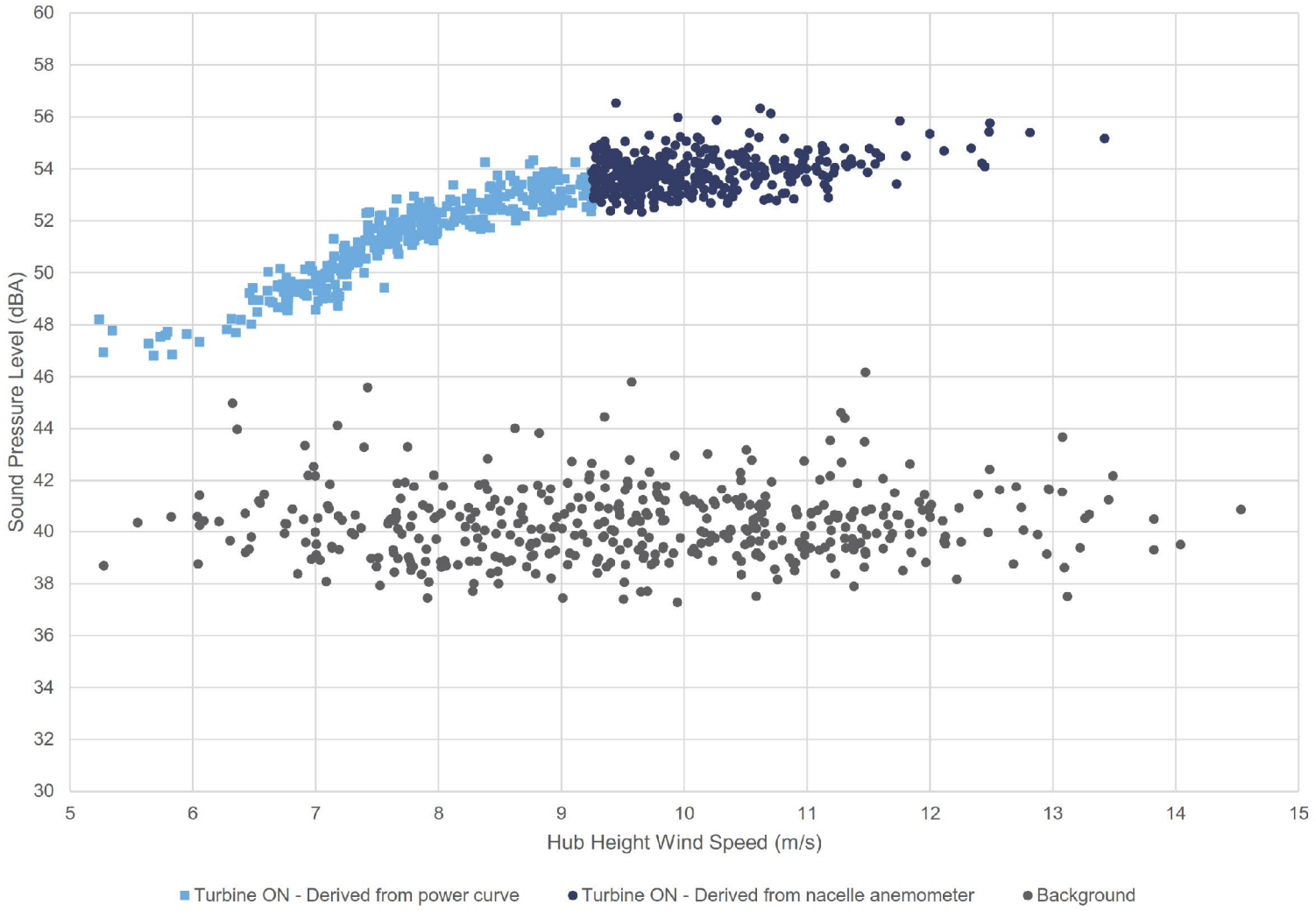


aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Rotor RPM vs. wind speed

Figure B.02

aercoustics
Aercoustics Engineering Ltd.
1004 Middlegate Road, Suite 1100
Mississauga, ON L4Y 1M4
Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

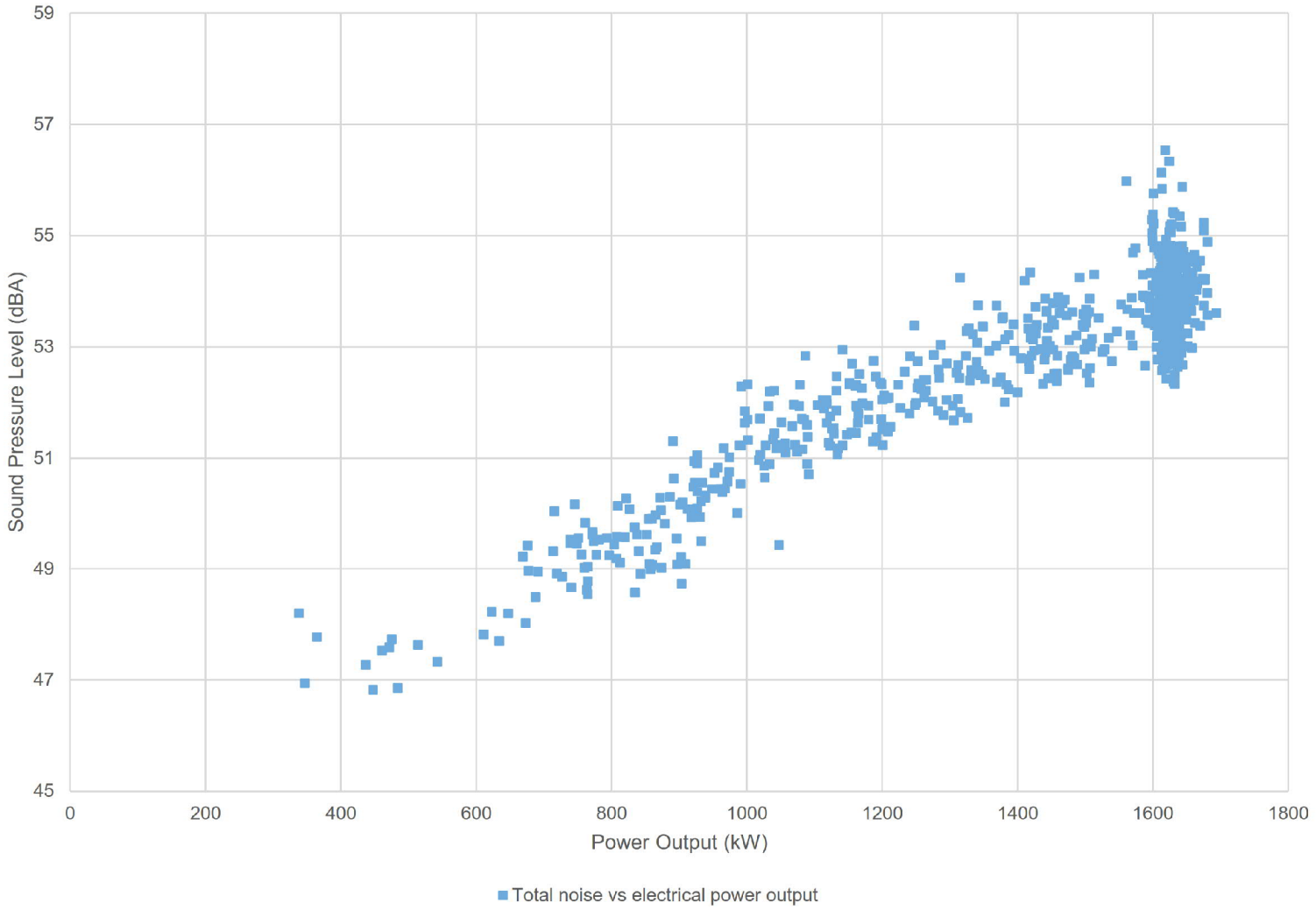
Appendix C
Apparent Sound Power Level



aercoustics

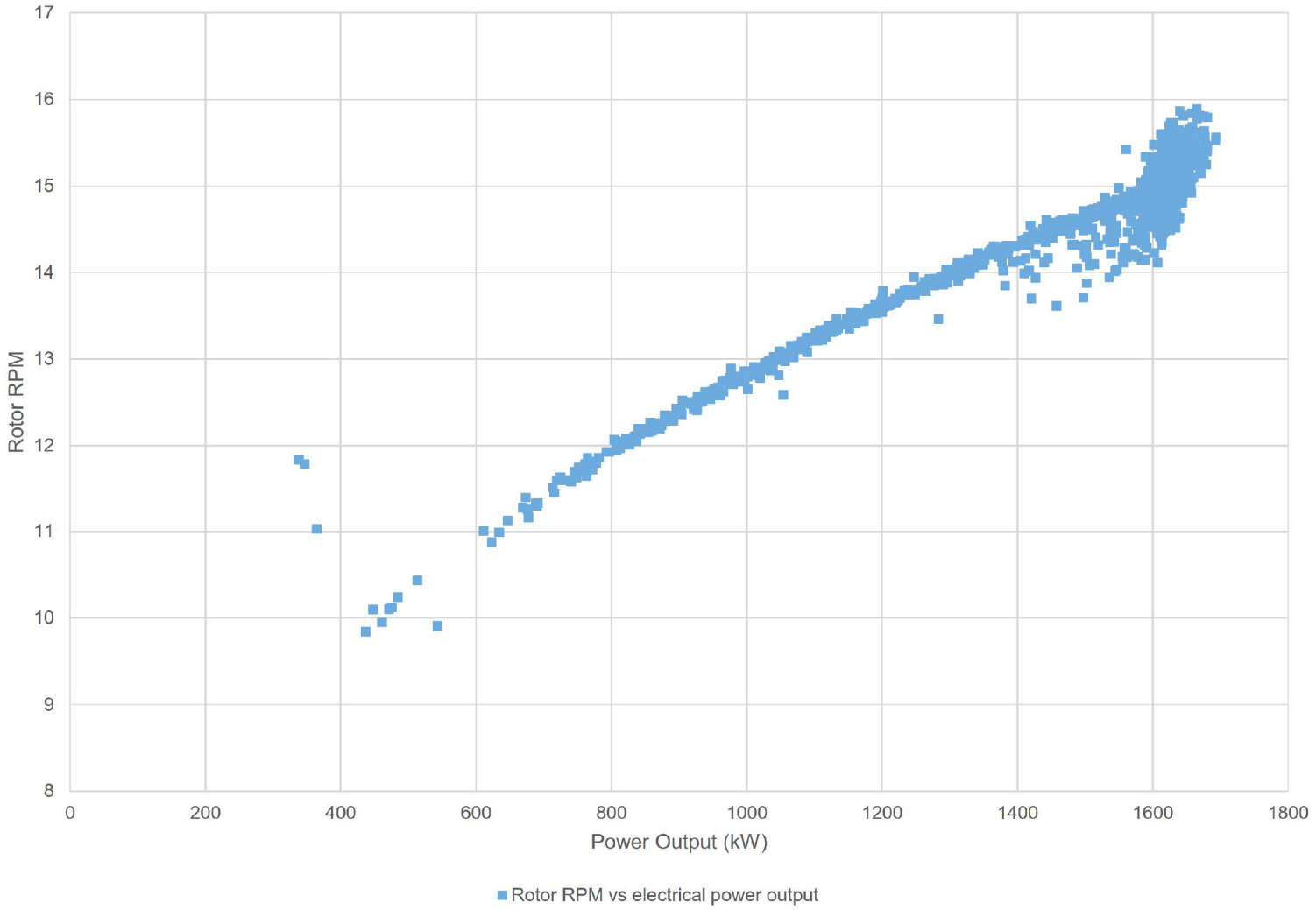
14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of overall measurement data pairs at Position 1 (Turbine ON & Background)

Figure C.01



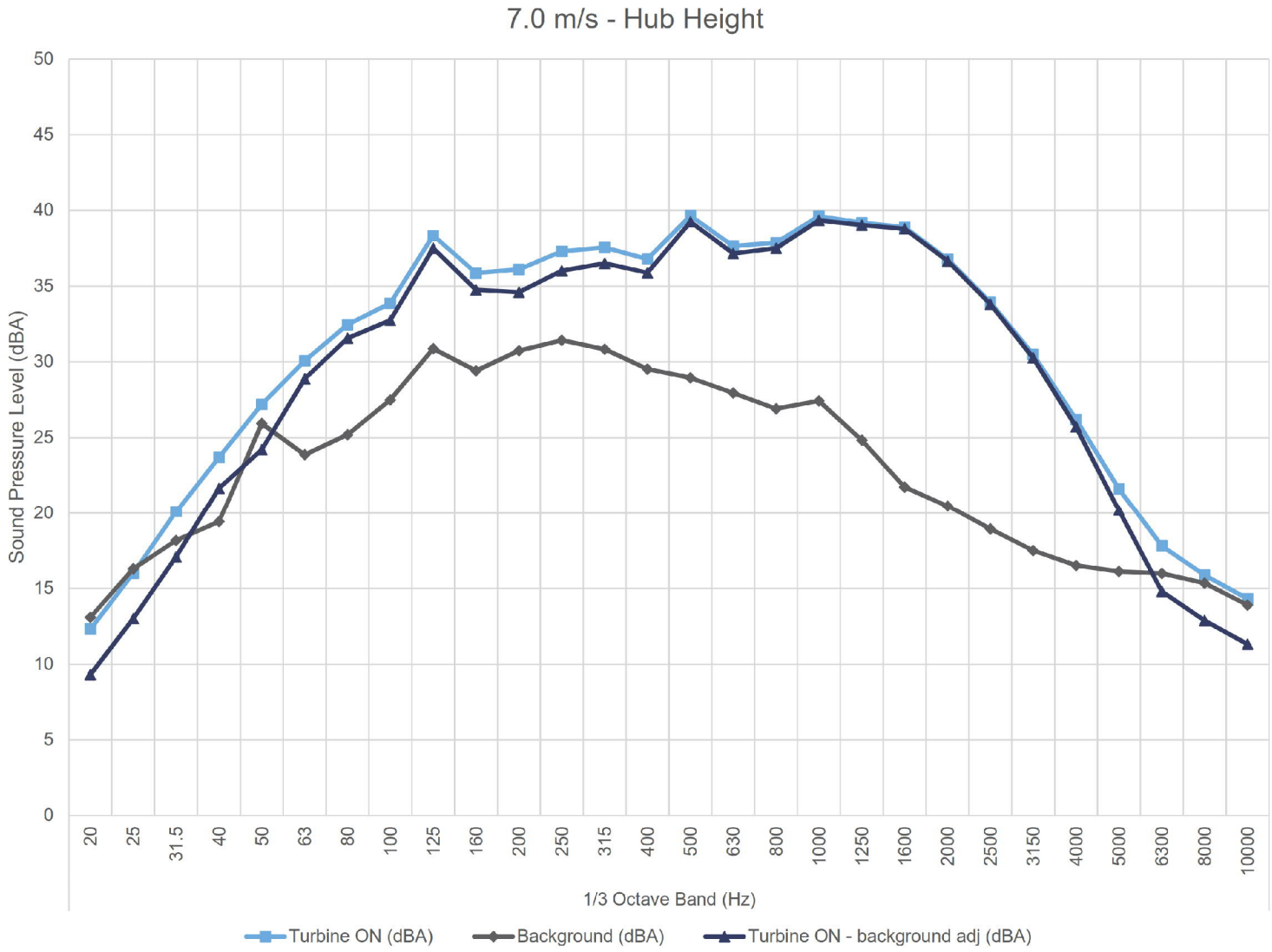
aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of measured total noise vs electrical power output

Figure C.02



aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of rotor RPM vs. electrical power output

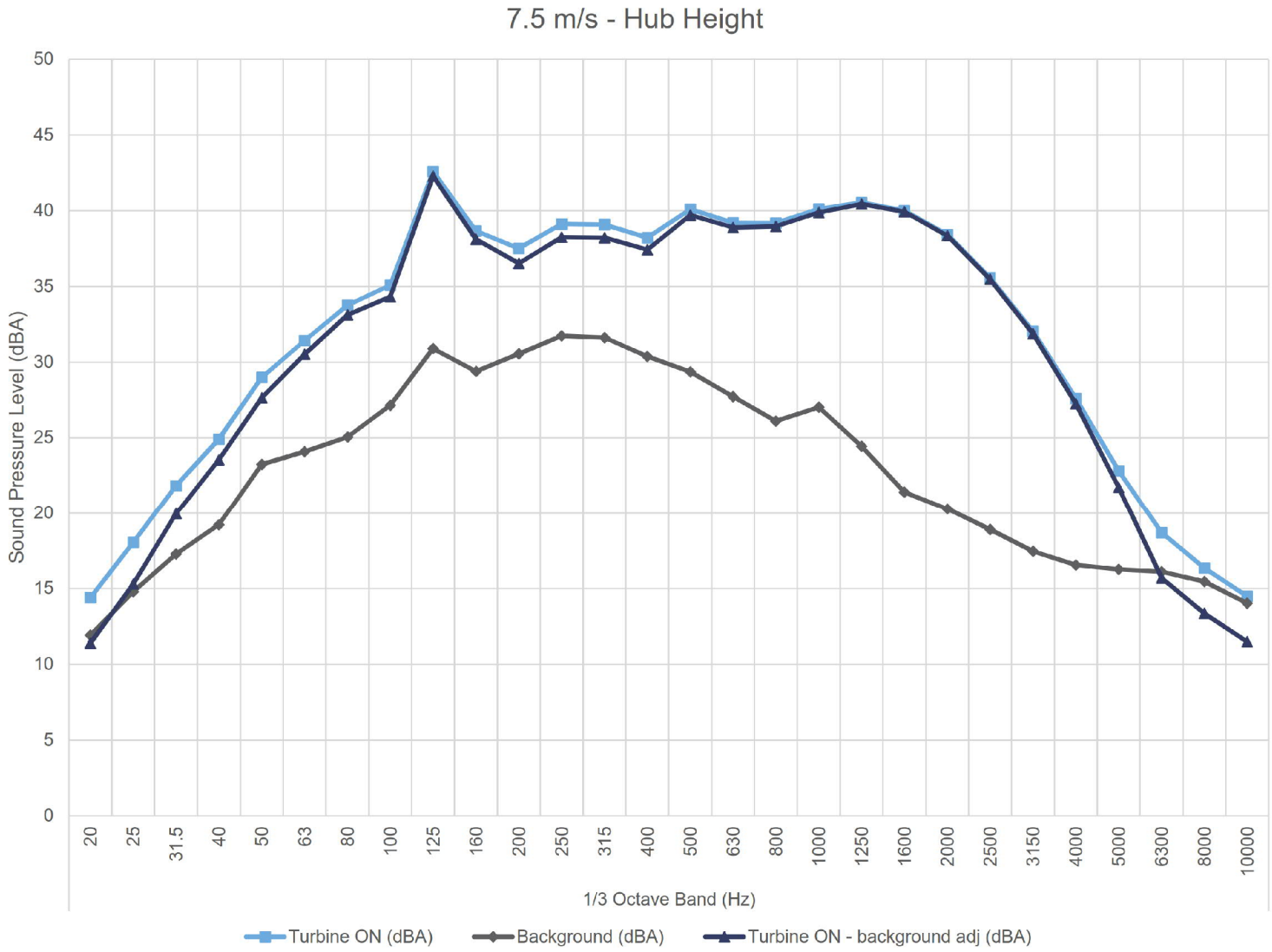
Figure C.04



aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 7 m/s

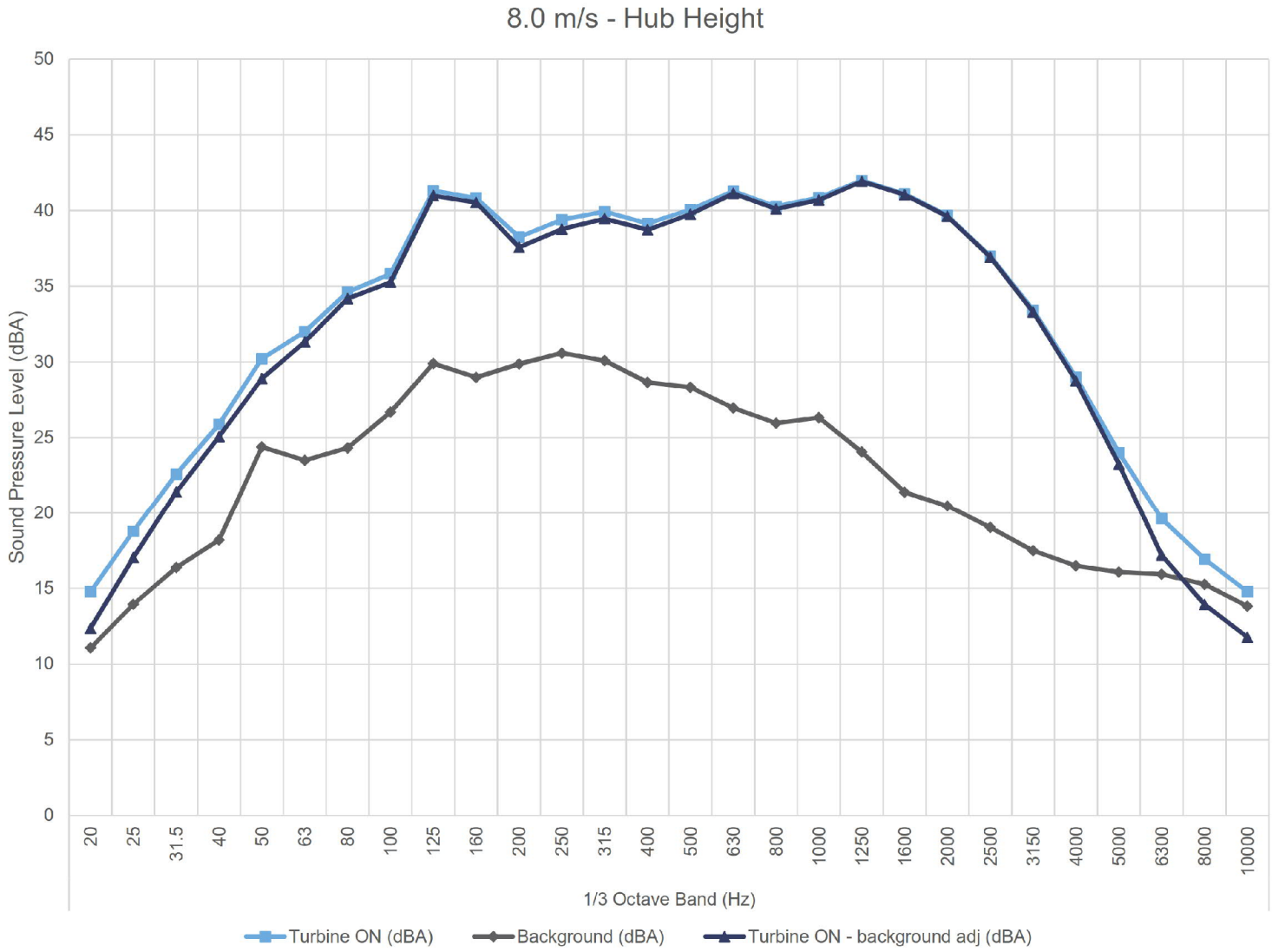
Figure C.05



aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 7.5 m/s

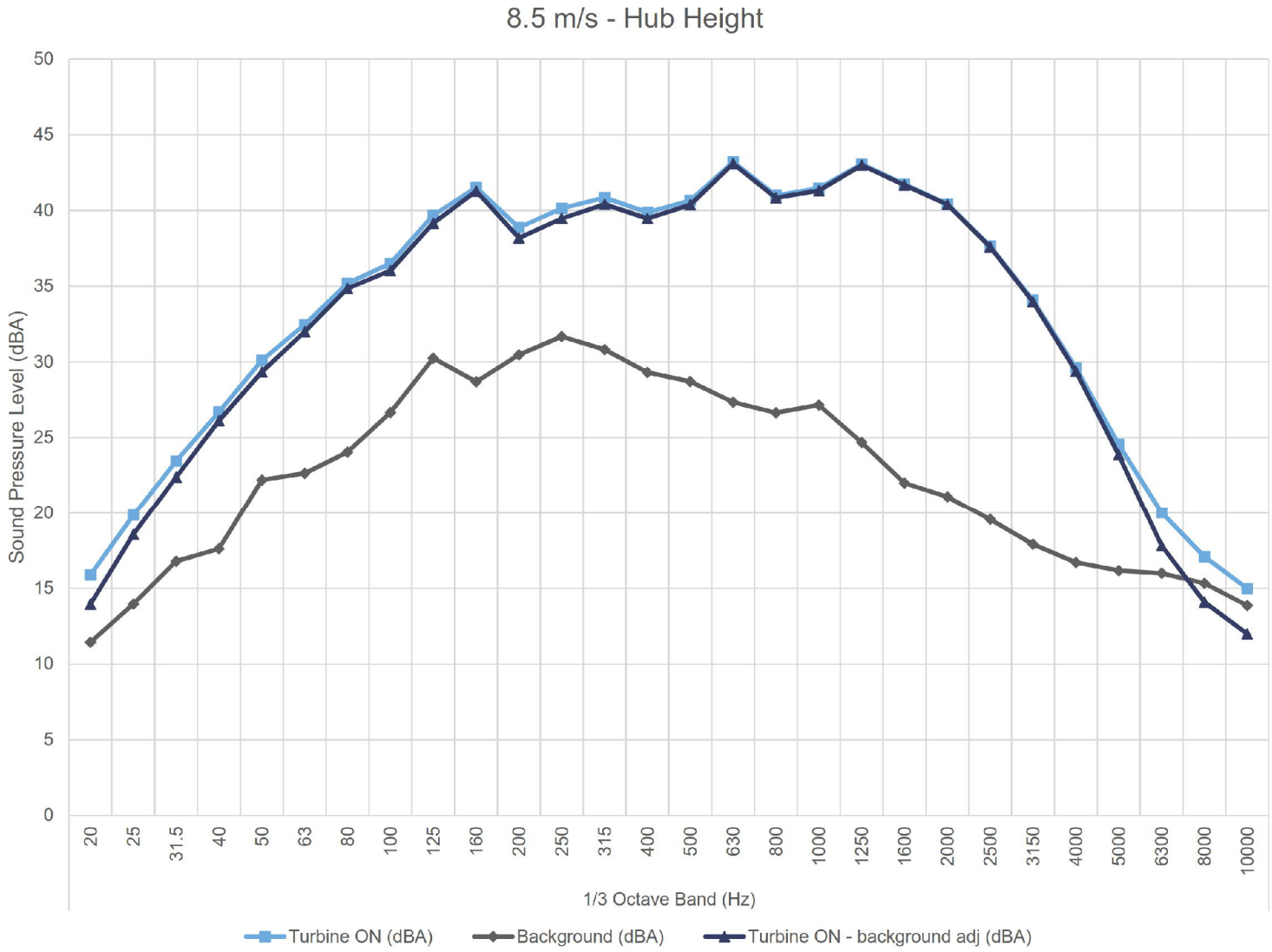
Figure C.06



aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 8 m/s

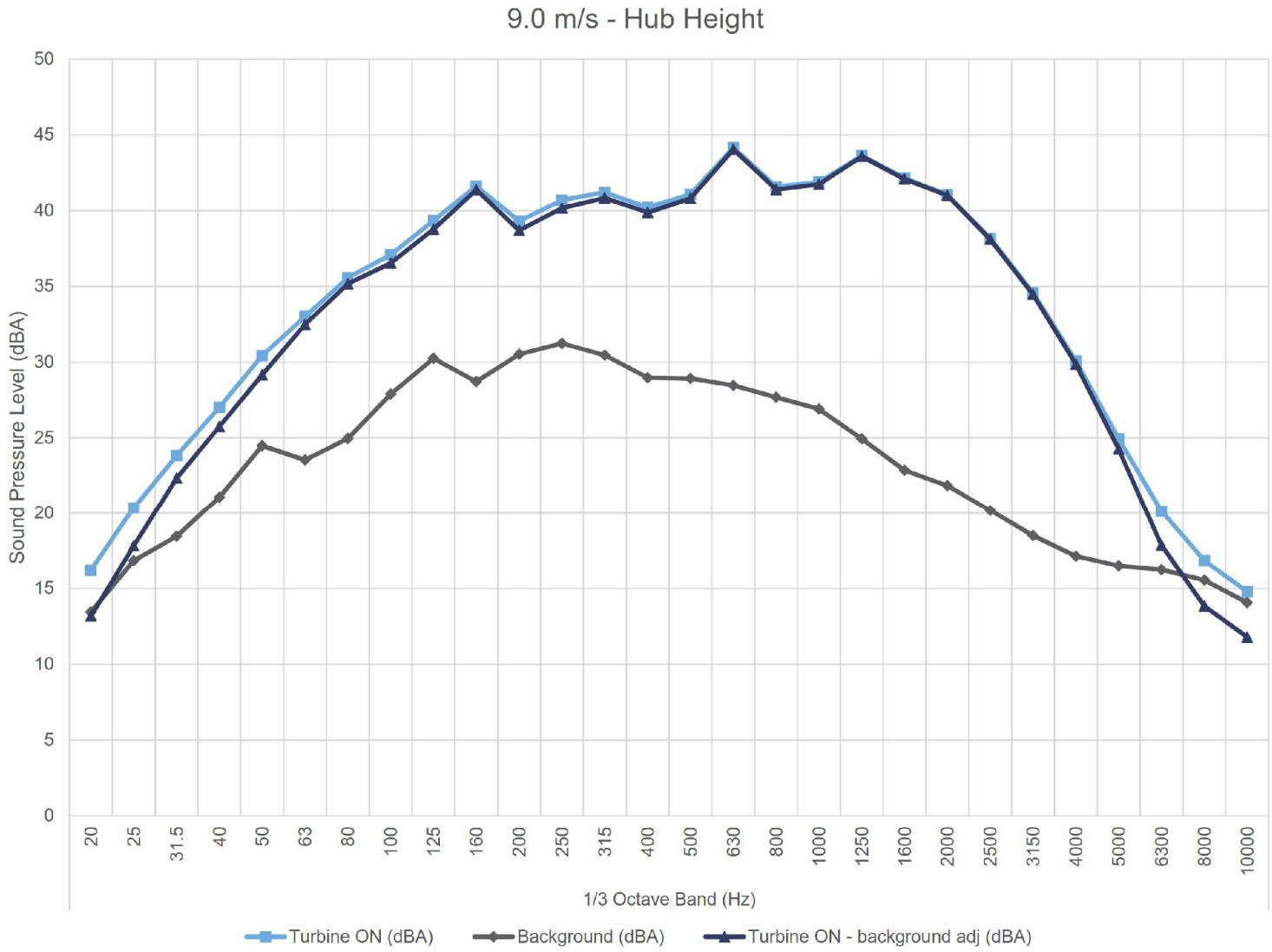
Figure C.07



aercoustics

14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 8.5 m/s

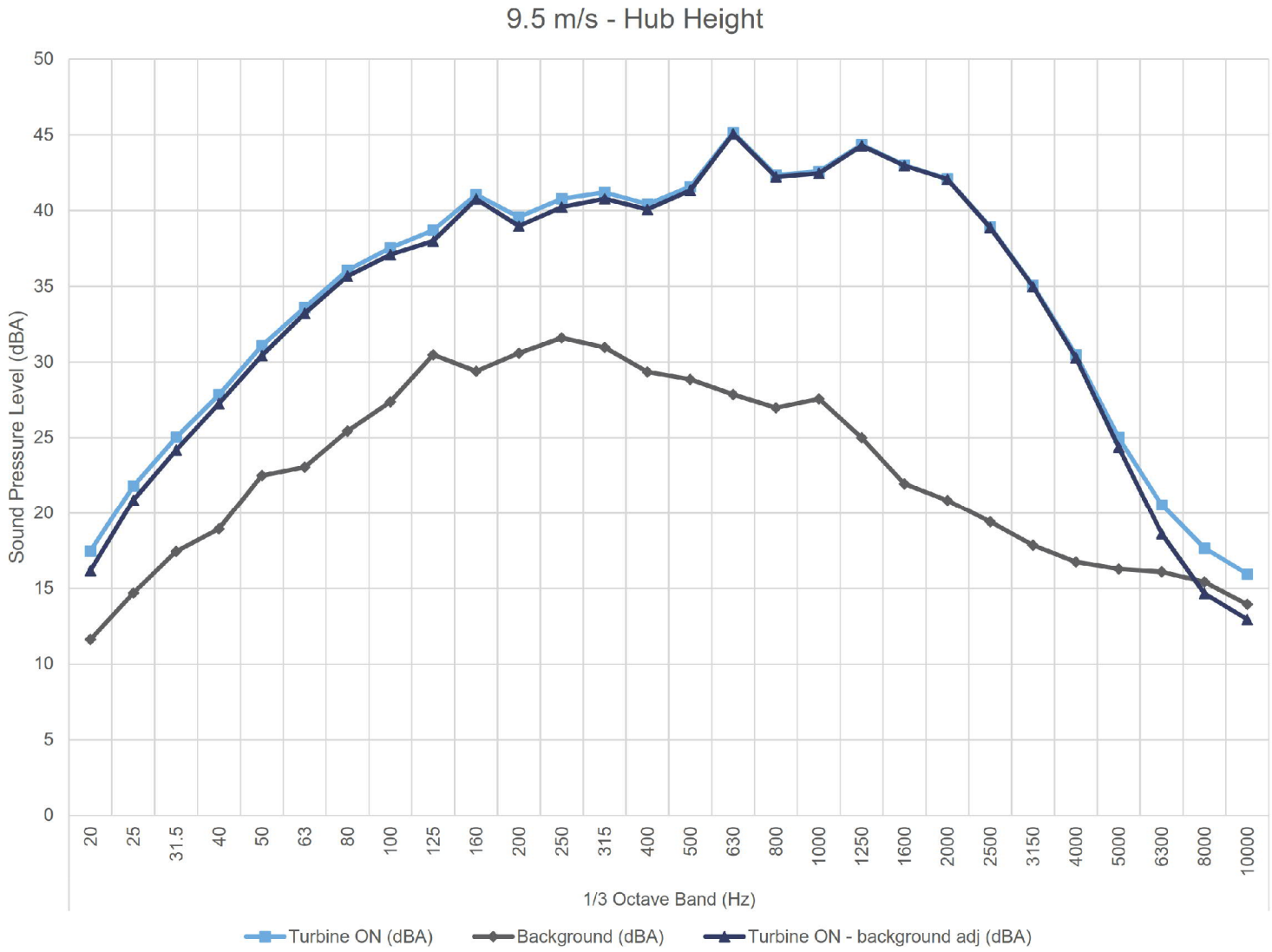
Figure C.08



aercoustics

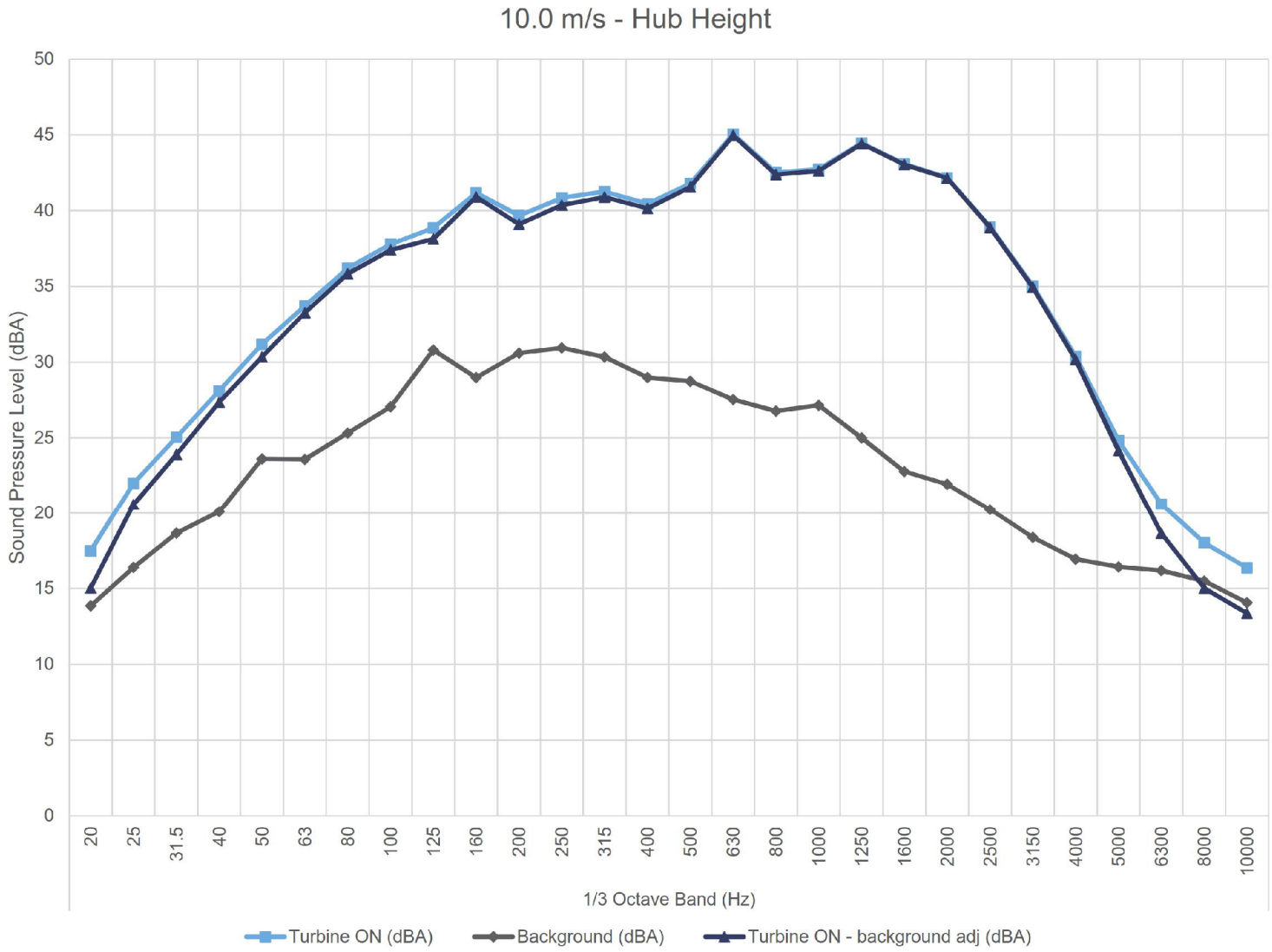
14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 9 m/s

Figure C.09



aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of sound pressure spectrum in 1/3 Octave at 9.5 m/s

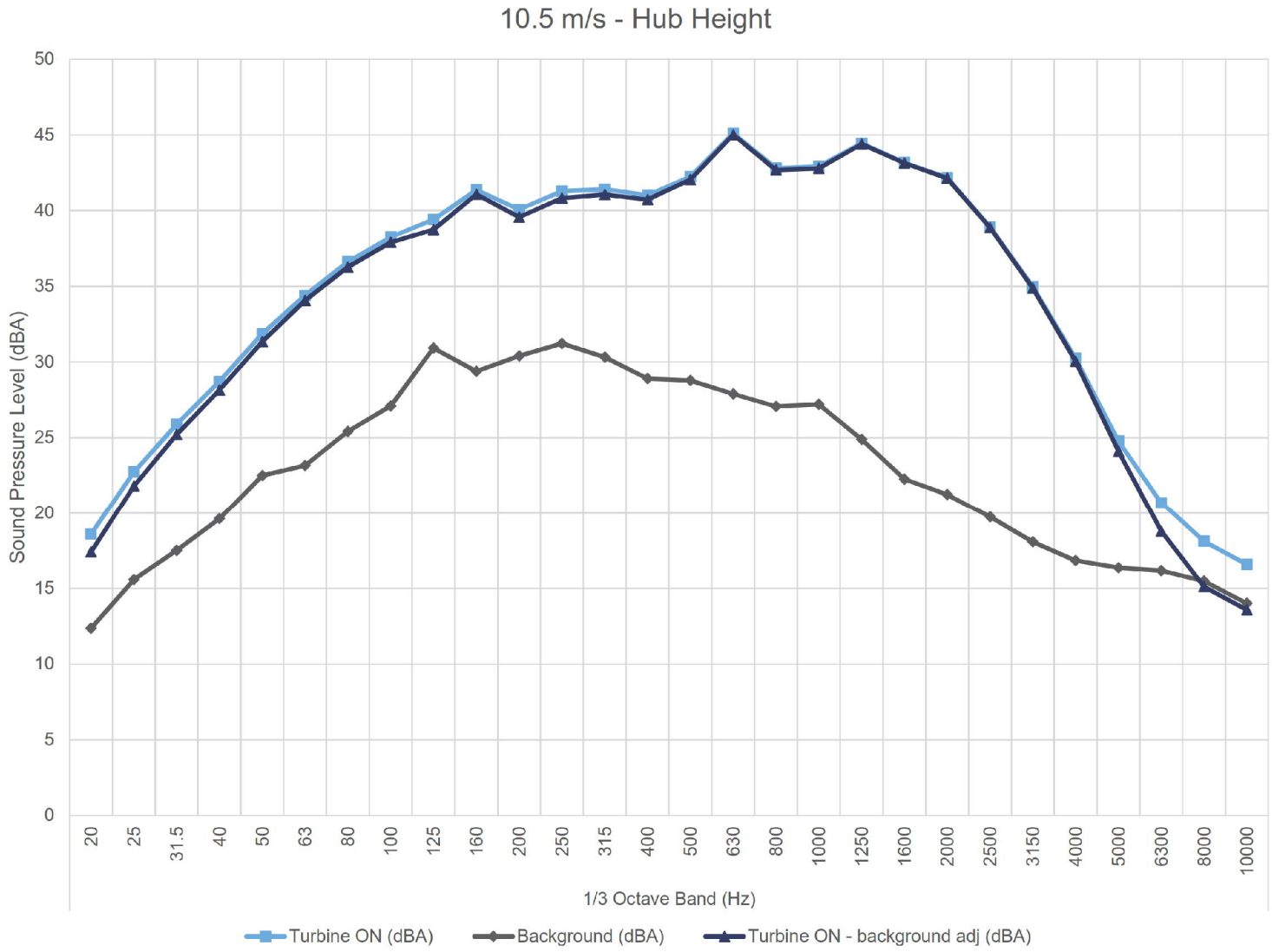
Figure C.10



aercoustics

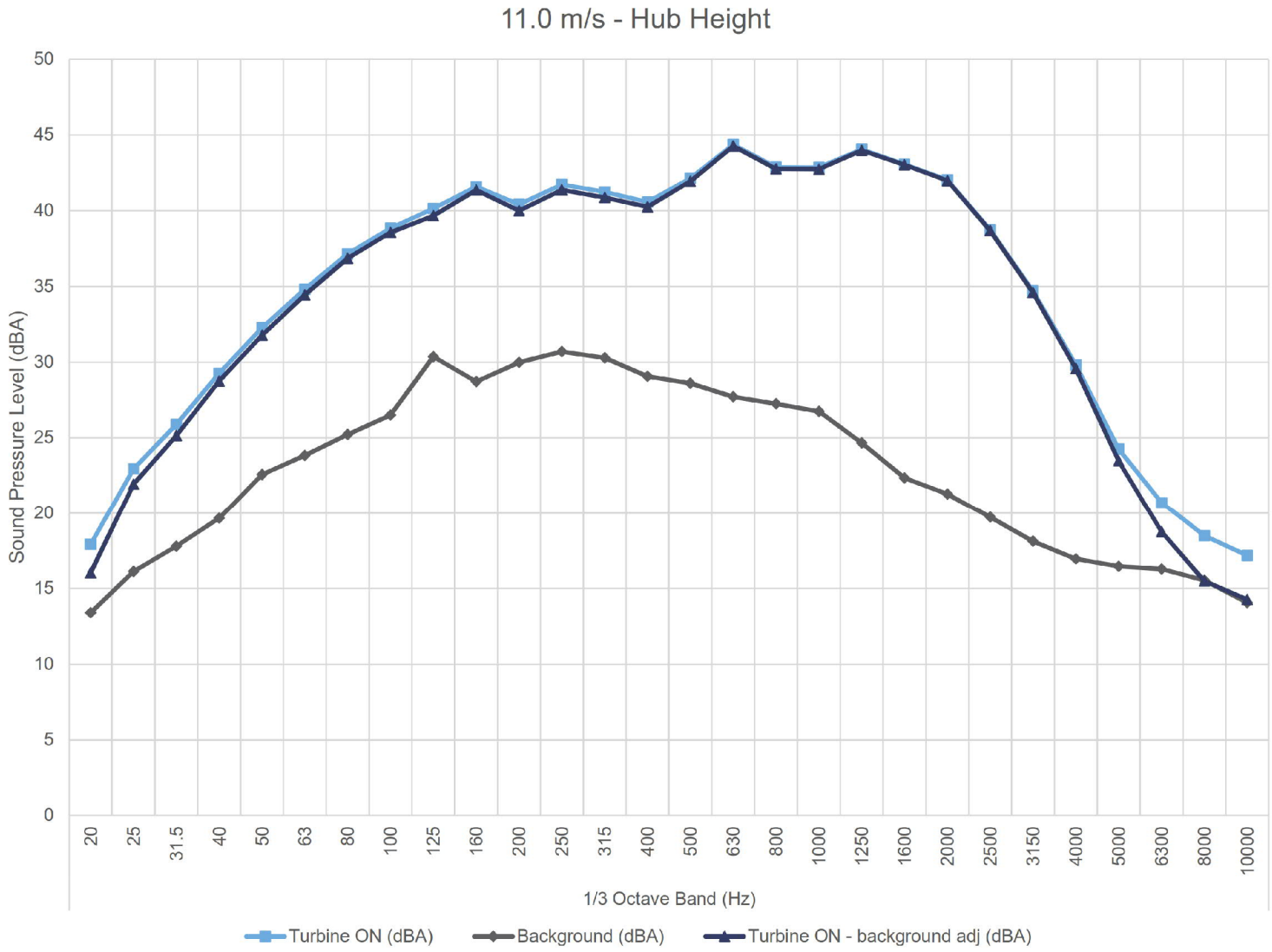
14331.01.T29.RP2	**Project Name**
Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
	Figure Title Plot of sound pressure spectrum in 1/3 Octave at 10 m/s

Figure C.11



aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of sound pressure spectrum in 1/3 Octave at 10.5 m/s

Figure C.12



aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of sound pressure spectrum in 1/3 Octave at 11 m/s

Figure C.13

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14431.01.T29.RP2

Created on: 9/29/2017

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)	12.3	16.0	20.1	23.7	27.2	30.1	32.5	33.9	38.4	35.9	36.1	37.3	37.6	36.8	39.7	37.7	37.9	39.6	39.2	38.9	36.8	33.9	30.5	26.2	21.6	17.8	15.9	14.3		49.7
	Background (dBA)	13.1	16.3	18.2	19.4	25.9	23.9	25.2	27.5	30.9	29.4	30.8	31.4	30.8	29.5	29.0	28.0	26.9	27.4	24.8	21.7	20.5	18.9	17.5	16.5	16.1	16.0	15.3	13.9		40.7
	Turbine ON - background adj (dBA)	[9.3]	[13]	[17.1]	21.7	[24.2]	28.9	31.6	32.7	37.5	34.8	34.6	36.0	36.5	35.9	39.3	37.2	37.5	39.3	39.0	38.8	36.7	33.8	30.3	25.7	20.2	[14.8]	[12.9]	[11.3]		49.1
	Signal to noise (dB)	-0.8	-0.3	1.9	4.3	1.3	6.2	7.3	6.4	7.5	6.5	5.4	5.9	6.7	7.3	10.7	9.7	11.0	12.2	14.4	17.1	16.3	15.0	13.0	9.7	5.5	1.8	0.5	0.4		8.9
	Uncertainty (dB)	2.6	2.6	2.0	1.4	2.0	1.1	1.0	1.0	1.0	1.0	1.0	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.1	1.7	1.7	3.1		0.8
	PWL (dBA)	[58.2]	[61.9]	[66]	70.5	[73.1]	77.8	80.4	81.6	86.4	83.6	83.5	84.9	85.4	84.8	88.1	86.0	86.4	88.2	87.9	87.7	85.5	82.7	79.1	74.6	69.0	[63.7]	[61.8]	[60.2]		97.9
7.5	Turbine ON (dBA)	14.4	18.1	21.8	24.9	29.0	31.4	33.8	35.1	42.6	38.7	37.5	39.1	39.1	38.2	40.1	39.2	39.2	40.1	40.5	40.0	38.4	35.6	32.0	27.6	22.8	18.7	16.4	14.5		51.3
	Background (dBA)	11.9	14.8	17.3	19.2	23.3	24.1	25.1	27.2	30.9	29.4	30.6	31.7	31.6	30.4	29.4	27.7	26.1	27.0	24.5	21.4	20.3	18.9	17.5	16.6	16.3	16.1	15.5	14.0		40.8
	Turbine ON - background adj (dBA)	[11.4]	15.3	20.0	23.6	27.7	30.5	33.1	34.3	42.3	38.1	36.5	38.3	38.2	37.4	39.7	38.9	39.0	39.9	40.4	39.9	38.4	35.5	31.9	27.3	21.7	[15.7]	[13.4]	[11.5]		50.9
	Signal to noise (dB)	2.5	3.3	4.6	5.7	5.7	7.3	8.7	7.9	11.7	9.3	7.0	7.4	7.5	7.8	10.7	11.5	13.1	13.1	16.1	18.6	18.1	16.7	14.6	11.0	6.6	2.6	0.9	0.5		10.5
	Uncertainty (dB)	2.5	2.3	1.4	1.2	1.2	1.0	0.9	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.9	1.0	1.8	1.8	3.2		0.8
	PWL (dBA)	[60.3]	64.2	68.8	72.4	76.5	79.4	82.0	83.2	91.1	87.0	85.4	87.1	87.1	86.3	88.6	87.8	87.8	88.8	89.3	88.8	87.2	84.3	80.7	76.1	70.6	[64.6]	[62.2]	[60.4]		99.7
8.0	Turbine ON (dBA)	14.8	18.8	22.6	25.9	30.2	32.0	34.6	35.8	41.3	40.8	38.3	39.4	39.9	39.1	40.1	41.3	40.3	40.9	42.0	41.1	39.7	37.0	33.4	29.0	24.0	19.6	16.9	14.8		52.1
	Background (dBA)	11.1	13.9	16.4	18.2	24.4	23.5	24.3	26.7	29.9	29.0	29.9	30.6	30.1	28.6	28.3	27.0	26.0	26.3	24.1	21.4	20.5	19.0	17.5	16.5	16.1	15.9	15.3	13.8		39.9
	Turbine ON - background adj (dBA)	12.4	17.0	21.4	25.1	28.9	31.3	34.2	35.3	41.0	40.5	37.6	38.8	39.5	38.7	39.8	41.1	40.1	40.7	41.9	41.0	39.6	36.9	33.3	28.8	23.3	17.2	[13.9]	[11.8]		51.8
	Signal to noise (dB)	3.7	4.8	6.2	7.7	5.8	8.5	10.3	9.1	11.4	11.8	8.4	8.8	9.8	10.5	11.7	14.3	14.3	14.5	17.9	19.7	19.2	18.0	15.9	12.5	7.9	3.7	1.7	0.9		12.2
	Uncertainty (dB)	1.9	1.6	1.0	0.9	1.1	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	0.6	0.6	0.6	0.7	0.7	0.8	0.9	1.4	1.6	2.9		0.7
	PWL (dBA)	61.2	65.9	70.3	73.9	77.8	80.2	83.1	84.1	89.8	89.4	86.4	87.6	88.3	87.6	88.6	90.0	89.0	89.6	90.8	89.9	88.5	85.8	82.2	77.6	72.1	66.1	[62.8]	[60.6]		100.7
8.5	Turbine ON (dBA)	15.9	19.9	23.5	26.7	30.1	32.5	35.2	36.5	39.7	41.5	38.9	40.1	40.9	39.9	40.7	43.2	41.0	41.5	43.1	41.7	40.4	37.7	34.1	29.6	24.6	20.0	17.1	15.0		52.8
	Background (dBA)	11.4	14.0	16.8	17.6	22.2	22.6	24.0	26.7	30.3	28.7	30.5	31.7	30.8	29.3	28.7	27.3	26.7	27.2	24.7	22.0	21.1	19.6	17.9	16.7	16.2	16.0	15.3	13.9		40.4
	Turbine ON - background adj (dBA)	13.9	18.6	22.4	26.1	29.3	32.0	34.8	36.0	39.2	41.3	38.2	39.5	40.4	39.5	40.4	43.1	40.8	41.3	43.0	41.7	40.4	37.6	34.0	29.4	23.9	17.8	[14.1]	[12]		52.5
	Signal to noise (dB)	4.4	5.9	6.7	9.1	7.9	9.8	11.2	9.8	9.4	12.8	8.4	8.5	10.0	10.6	12.0	15.9	14.3	14.3	18.4	19.7	19.3	18.1	16.2	12.9	8.4	4.0	1.8	1.1		12.4
	Uncertainty (dB)	1.8	1.5	1.1	1.0	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	0.9	1.4	1.8	3.2		0.8
	PWL (dBA)	62.8	67.4	71.3	75.0	78.2	80.9	83.7	84.9	88.0	90.2	87.1	88.3	89.3	88.3	89.2	92.0	89.7	90.2	91.9	90.5	89.3	86.4	82.8	78.2	72.7	66.7	[63]	[60.9]		101.4
9.0	Turbine ON (dBA)	16.2	20.4	23.8	27.0	30.4	33.0	35.6	37.1	39.4	41.6	39.3	40.7	41.2	40.2	41.1	44.2	41.6	41.9	43.6	42.1	41.1	38.2	34.6	30.1	24.9	20.1	16.8	14.8		53.3
	Background (dBA)	13.4	16.8	18.4	21.1	24.5	23.5	25.0	27.9	30.3	28.7	30.5	31.2	30.5	29.0	28.9	28.5	27.7	26.9	24.9	22.9	21.8	20.2	18.5	17.1	16.5	16.2	15.6	14.1		40.6
	Turbine ON - background adj (dBA)	[13.2]	17.8	22.3	25.7	29.2	32.5	35.2	36.5	38.8	41.4	38.7	40.2	40.8	39.9	40.8	44.1	41.4	41.7	43.6	42.1	41.0	38.1	34.5	29.9	24.3	17.9	[13.8]	[11.8]		53.0
	Signal to noise (dB)	2.7	3.5	5.4	6.0	6.0	9.5	10.6	9.2	9.1	12.9	8.8	9.4	10.8	11.3	12.1	15.7	13.9	15.0	18.7	19.3	19.2	18.0	16.1	13.0	8.4	3.9	1.3	0.7		12.7
	Uncertainty (dB)	2.4	2.1	1.2	1.1	1.1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.4	1.7	3.1		0.7
	PWL (dBA)	[62.1]	66.7	71.2	74.6	78.0	81.4	84.0	85.4	87.6	90.2	87.6	89.0	89.7	88.7	89.7	92.9	90.3	90.6	92.4	91.0	89.9	87.0	83.3	78.7	73.1	66.7	[62.7]	[60.7]		101.9
9.5	Turbine ON (dBA)	17.5	21.8	25.0	27.8	31.1	33.6	36.1	37.5	38.7	41.1	39.6	40.8	41.2	40.4	41.6	45.2	42.3	42.6	44.3	43.0	42.1	38.9	35.1	30.5	25.0	20.6	17.7	16.0		53.8
	Background (dBA)	11.6	14.7	17.4	18.9	22.5	23.1	25.4	27.4	30.5	29.4	30.6	31.6	31.0	29.4	28.9	27.9	27.0	27.6	25.0	22.0	20.9	19.4	17.9	16.7	16.3	16.1	15.4	13.9		40.6
	Turbine ON - background adj (dBA)	16.2	20.9	24.2	27.3	30.4	33.2	35.7	37.1	38.0	40.8	39.0	40.2	40.8	40.1	41.3	45.1	42.2	42.5	44.3	43.0	42.1	38.9	35.0	30.3	24.4	18.6	[14.7]	[13]		53.6
	Signal to noise (dB)	5.8	7.1	7.6	8.9	8.6	10.5	10.6	10.2	8.2	11.7	9.0	9.2	10.2	11.1	12.7	17.3	15.4	15.0	19.3	21.0	21.2	19.5	17.2	13.7	8.7	4.5	2.3	2.0		13.2
	Uncertainty (dB)	1.5	1.3	1.0	1.0	1.0	0.9	0.9	0.9	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	0.8	0.8	0.8	0.9	1.3	1.8	3.2		0.8
	PWL (dBA)	65.0	69.7	73.1	76.1	79.3	82.1	84.5	86.0	86.9	89.6	87.8	89.1	89.6	88.9	90.2	93.9	91.1	91.3	93.2	91.8	90.9	87.7	83.8	79.1	73.3	67.5	[63.5]	[61.8]		102.4
10.0	Turbine ON (dBA)	17.5	22.0	25.0	28.1	31.2	33.7	36.2	37.8	38.9	41.2	39.7	40.8	41.3	40.5	41.8	45.0	42.5	42.7	44.5	43.1	42.2	38.9	35.0	30.4	24.8	20.6	18.0	16.4		53.9
	Background (dBA)	13.9	16.4	18.7	20.1	23.6	23.6	25.3	27.1	30.8	29.0	30.6	30.9	30.3	29.0	28.7	27.5	26.8	27.2	25.0	22.8	21.9	20.2	18.4	16.9	16.4	16.2	15.5	14.1		40.5
	Turbine ON - background adj (dBA)	15.0	20.6	23.9	27.4	30.3	33.3	35.8	37.4	38.1	40.9	39.1	40.4	40.9	40.1	41.6	45.0	42.4	42.6	44.4	43.0	42.1	38.9	34.9	30.2	24.2	18.6	[15]	[13.4]		53.6
	Signal to noise (dB)	3.6	5.6	6.4	8.0	7.6	10.1	10.9	10.7	8.1	12.2	9.1	9.9	10.9	11.5	13.0	17.5	15.7	15.6	19.5	20.3	20.2	18.7	16.6	13.4	8.4	4.4	2.5	2.3		13.4
	Uncertainty (dB)	2.1	1.5	1.1	1.0	1.0	0.9	0.9	0.9	1.0	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	0.9	1.3	1.8	3.2		0.7
	PWL (dBA)	63.9	69.4	72.8	76.2	79.2	82.1	84.7	86.3	87.0	89.8	88.0	89.2	89.8	89.0	90.4	93.8	91.3	91.5	93.3	91.9	91.0	87.7	83.8	79.0	73.0	67.5	[63.9]	[62.2]		102.5
10.5	Turbine ON (dBA)	18.6	22.7	25.9	28.7	31.9	34.4	36.6	38.2	39.4	41.4	40.1	41.3	41.4	41.0	42.2	45.1	42.8	42.9	44.4	43.2	42.2	38.9	35.0	30.3	24.8	20.7	18.1	16.6		54.1
	Background (dBA)	12.4	15.6	17.5	19.6	22.5	23.2	25.4	27.1	30.9	29.4	30.4	31.2	30.3	28.9	28.8	27.9	27.1	27.2	24.9	22.3	21.2	19.7	18.1	16.8	16.4	16.2	15.5	14.0		40.5
	Turbine ON - background adj (dBA)	17.4	21.8	25.2	28.2	31.3	34.1	36.3	37.9	38.7	41.1	39.6	40.8	41.1	40.7	42.0	45.0	42.7	42.8	44.4	43.1	42.1	38.9	34.9	30.1	24.1	18.8	[15.1]	[13.6]		53.9
	Signal to noise (dB)	6.2	7.1	8.4	9.1	9.4	11.2	11.2	11.1	8.5	12.0	9.7	10.0	11.1	12.1	13.5	17.2	15.7	15.7	19.5	20.9	20.9	19.2	16.9	13.4	8.4	4.5	2.6	2.6		13.6
	Uncertainty (dB)	1.5	1.4	1.0	1.0	1.0	0.9	0.9	0.9	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	0.8	0.8	0.8	1.0	1.3	1.9	3.3		0.8
	PWL (dBA)	66.3	70.7	74.1	77.0	80.2	82.9	85.1	86.8	87.6	89.9	88.4	89.7	89.9	89.6	90.9	93.9	91.5	91.7	93.3	92.0	91.0	87.7	83.7	78.9	73.0	67.7	[64]	[62.4]		102.7

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14431.01.T29.RP2

Created on: 9/29/2017

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)	17.9	22.9	25.9	29.2	32.3	34.8	37.1	38.8	40.1	41.6	40.4	41.7	41.2	40.6	42.1	44.4	42.9	42.8	44.0	43.1	42.0	38.7	34.7	29.8	24.3	20.7	18.5	17.2	54.0
	Background (dBA)	13.4	16.1	17.8	19.6	22.6	23.8	25.2	26.5	30.4	28.7	30.0	30.7	30.3	29.1	28.6	27.7	27.3	26.7	24.7	22.3	21.3	19.7	18.1	16.9	16.5	16.3	15.5	14.1	40.2
	Turbine ON - background adj (dBA)	16.0	21.9	25.1	28.7	31.8	34.4	36.8	38.6	39.7	41.4	40.0	41.4	40.9	40.2	41.9	44.3	42.7	42.7	44.0	43.0	42.0	38.7	34.6	29.6	23.5	18.7	[15.5]	14.3	53.8
	Signal to noise (dB)	4.5	6.8	8.1	9.6	9.7	11.0	11.9	12.3	9.8	12.9	10.4	11.0	10.9	11.5	13.5	16.6	15.6	16.1	19.4	20.7	20.7	19.0	16.6	12.9	7.8	4.4	2.9	3.1	13.7
	Uncertainty (dB)	1.8	1.4	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	1.0	1.3	1.8	3.1	0.7
	PWL (dBA)	64.9	70.8	74.0	77.6	80.6	83.3	85.7	87.4	88.5	90.2	88.9	90.2	89.7	89.1	90.8	93.1	91.6	91.6	92.8	91.9	90.8	87.5	83.5	78.4	72.3	67.6	[64.3]	63.1	102.7

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

Created on: 9/29/2017

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)	12.7	16.5	20.4	23.6	27.7	30.1	32.6	34.0	39.5	36.4	36.4	37.5	37.7	37.7	39.5	37.8	38.1	39.3	39.4	39.1	37.0	34.1	30.6	26.3	21.7	17.9	16.0	14.4	49.9
	Background (dBA)	12.3	15.3	17.4	19.0	24.6	24.0	25.0	27.3	31.0	29.5	30.9	31.8	31.5	30.2	29.2	27.8	26.3	27.1	24.4	21.3	20.0	18.5	17.2	16.4	16.1	16.0	15.4	13.9	40.9
	Turbine ON - background adj (dBA)	[9.7]	[13.5]	17.4	21.8	24.9	28.8	31.8	33.0	38.9	35.5	34.9	36.1	36.4	36.8	39.0	37.3	37.8	39.0	39.3	39.0	36.9	34.0	30.4	25.8	20.2	[14.9]	[13]	[11.4]	49.3
	Signal to noise (dB)	0.3	1.2	3.0	4.6	3.2	6.1	7.6	6.7	8.5	6.9	5.5	5.6	6.1	7.5	10.3	10.0	11.8	12.2	15.0	17.8	17.0	15.6	13.4	9.9	5.5	1.9	0.7	0.4	9.0
	Uncertainty (dB)	2.2	2.2	1.7	1.2	1.8	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.7	0.8	0.8	1.0	1.6	1.6	2.9	0.8
	PWL (dBA)	[58.5]	[62.3]	66.3	70.7	73.7	77.7	80.6	81.8	87.7	84.3	83.8	85.0	85.3	85.7	87.9	86.2	86.7	87.9	88.2	87.9	85.8	82.9	79.3	74.7	69.1	[63.8]	[61.9]	[60.2]	98.2
6.0	Turbine ON (dBA)	15.4	19.4	23.1	26.3	30.1	32.3	35.0	36.3	40.8	41.2	38.7	40.0	40.5	39.6	40.5	42.6	40.8	41.3	42.7	41.5	40.2	37.4	33.9	29.4	24.4	19.8	16.9	14.8	52.6
	Background (dBA)	11.8	14.6	16.9	18.4	23.4	23.2	24.3	27.1	30.1	28.8	30.3	31.2	30.5	29.0	28.7	27.5	26.7	26.8	24.6	22.1	21.2	19.7	18.0	16.8	16.2	16.1	15.4	13.9	40.3
	Turbine ON - background adj (dBA)	12.8	17.6	21.9	25.5	29.1	31.8	34.6	35.8	40.4	40.9	38.0	39.3	40.1	39.2	40.2	42.5	40.6	41.1	42.6	41.5	40.2	37.4	33.8	29.2	23.6	17.5	[13.9]	[11.8]	52.3
	Signal to noise (dB)	3.6	4.8	6.2	7.9	6.7	9.2	10.7	9.3	10.7	12.4	8.4	8.8	10.0	10.6	11.8	15.1	14.1	14.5	18.1	19.4	19.0	17.8	15.9	12.6	8.1	3.8	1.5	0.9	12.3
	Uncertainty (dB)	2.0	1.6	1.1	1.0	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	0.9	1.5	1.8	3.2	0.8
	PWL (dBA)	61.7	66.5	70.7	74.4	78.0	80.6	83.4	84.6	89.2	89.8	86.9	88.2	88.9	88.1	89.1	91.3	89.5	90.0	91.5	90.3	89.0	86.2	82.6	78.0	72.5	66.3	[62.8]	[60.7]	101.2
7.0	Turbine ON (dBA)	17.5	21.9	25.0	27.9	31.1	33.6	36.1	37.6	38.8	41.2	39.6	40.8	41.2	40.5	41.7	45.0	42.4	42.6	44.3	43.0	42.1	38.9	35.0	30.4	24.9	20.6	17.8	16.1	53.8
	Background (dBA)	12.9	15.9	18.2	20.2	23.5	23.5	25.4	27.3	30.8	29.2	30.6	31.4	30.8	29.2	28.9	27.8	26.9	27.3	24.9	22.3	21.3	19.7	18.1	16.8	16.4	16.1	15.5	14.0	40.6
	Turbine ON - background adj (dBA)	15.7	20.6	24.0	27.2	30.3	33.2	35.7	37.2	38.1	40.9	39.0	40.3	40.8	40.1	41.4	45.0	42.3	42.5	44.3	43.0	42.0	38.8	34.9	30.2	24.3	18.6	[14.8]	[13.1]	53.6
	Signal to noise (dB)	4.7	6.0	6.9	7.8	7.6	10.1	10.7	10.3	8.0	11.9	9.0	9.4	10.5	11.2	12.8	17.2	15.4	15.3	19.4	20.7	20.8	19.1	16.9	13.6	8.6	4.4	2.3	2.1	13.2
	Uncertainty (dB)	1.6	1.4	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	1.3	1.7	3.1	0.7
	PWL (dBA)	64.6	69.5	72.9	76.0	79.2	82.1	84.6	86.1	87.0	89.7	87.9	89.1	89.7	89.0	90.3	93.8	91.1	91.4	93.2	91.8	90.9	87.7	83.8	79.1	73.1	67.5	[63.6]	[62]	102.4
8.0	Turbine ON (dBA)	18.6	23.3	26.3	29.4	32.5	35.0	37.3	39.0	40.2	41.7	40.6	42.0	41.6	41.2	42.6	44.9	43.2	43.1	44.3	43.2	42.2	38.9	34.8	30.0	24.5	21.0	18.7	17.3	54.3
	Background (dBA)	13.6	16.5	18.3	20.3	23.1	23.9	25.5	26.9	30.2	29.1	30.5	31.1	30.7	29.5	29.1	28.0	27.5	27.2	25.2	22.9	21.9	20.3	18.5	17.2	16.6	16.3	15.6	14.1	40.6
	Turbine ON - background adj (dBA)	17.0	22.3	25.6	28.8	31.9	34.7	37.0	38.7	39.7	41.4	40.2	41.6	41.3	40.9	42.4	44.8	43.1	43.0	44.3	43.2	42.2	38.8	34.7	29.8	23.7	19.2	15.9	14.5	54.1
	Signal to noise (dB)	5.0	6.7	8.0	9.1	9.4	11.1	11.7	12.1	10.0	12.6	10.2	10.8	10.9	11.7	13.5	16.9	15.7	15.9	19.1	20.4	20.3	18.6	16.3	12.8	7.9	4.7	3.2	3.2	13.7
	Uncertainty (dB)	1.5	1.2	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	1.2	1.6	2.7	0.7
	PWL (dBA)	65.8	71.1	74.4	77.7	80.8	83.5	85.8	87.6	88.6	90.3	89.0	90.5	90.1	89.8	91.2	93.7	91.9	91.9	93.1	92.1	91.0	87.7	83.6	78.6	72.6	68.0	64.8	63.4	102.9

Table C.03 Type B measurement uncertainty summary

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

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

Table C.04 Detailed measurement uncertainty at hub height

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

Created on: 11/6/2017

Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																													Overall
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	
7.0	Turbine ON	7.03	59	Average (dBA)	12.2	16.0	20.1	23.7	27.2	30.1	32.5	33.9	38.5	35.9	36.2	37.4	37.6	36.8	39.6	37.7	37.9	39.7	39.3	38.9	36.9	34.0	30.6	26.3	21.7	17.8	15.9	14.3	49.7
				Uncertainty A (dB)	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.3	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	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	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	7.02	25	Average (dBA)	13.2	16.5	18.3	19.6	26.1	24.0	25.3	27.6	30.9	29.5	30.8	31.5	30.9	29.5	28.9	27.9	26.8	27.4	24.7	21.5	20.1	18.6	17.3	16.5	16.1	16.0	15.3	13.9	40.8
				Uncertainty A (dB)	1.4	1.4	1.1	0.9	1.1	0.7	0.5	0.4	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.5	0.5	0.6	0.5	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.7	1.7	1.3	1.2	1.4	1.0	1.0	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	1.4		
7.5	Turbine ON	7.50	66	Average (dBA)	14.4	18.1	21.8	24.9	29.0	31.4	33.8	35.1	42.6	38.7	37.5	39.1	39.1	38.2	40.1	39.2	39.2	40.1	40.5	40.0	38.4	35.6	32.0	27.6	22.8	18.7	16.4	14.5	51.3
				Uncertainty A (dB)	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.3	0.2	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		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	7.56	27	Average (dBA)	11.6	14.5	17.0	19.1	22.8	24.0	25.0	27.1	30.8	29.4	30.5	31.8	31.7	30.4	29.4	27.7	26.0	26.9	24.3	21.3	20.2	18.8	17.4	16.5	16.3	16.1	15.5	14.0	40.7
				Uncertainty A (dB)	1.0	0.9	0.7	0.8	0.5	0.6	0.4	0.3	0.4	0.3	0.3	0.4	0.5	0.6	0.4	0.3	0.4	0.5	0.5	0.5	0.6	0.5	0.4	0.2	0.2	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.4	1.1	1.1	1.0	1.0	0.9	0.9	0.9	0.8	0.7	0.8	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	1.4		
8.0	Turbine ON	7.94	63	Average (dBA)	14.6	18.6	22.4	25.7	30.2	31.9	34.5	35.7	41.5	40.7	38.2	39.3	39.8	39.0	40.0	41.1	40.2	40.8	41.9	41.0	39.6	36.9	33.3	28.9	23.9	19.5	16.8	14.7	52.0
				Uncertainty A (dB)	0.3	0.3	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	7.96	32	Average (dBA)	11.1	14.0	16.4	18.3	24.6	23.6	24.4	26.7	29.9	29.0	29.8	30.4	30.0	28.6	28.3	26.9	25.9	26.3	24.0	21.4	20.4	19.0	17.5	16.5	16.1	16.0	15.3	13.8	39.9
				Uncertainty A (dB)	1.0	0.9	0.7	0.6	0.6	0.5	0.3	0.4	0.4	0.4	0.2	0.3	0.3	0.3	0.2	0.2	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.4	1.1	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	1.4		
8.5	Turbine ON	8.49	51	Average (dBA)	15.9	19.8	23.4	26.7	30.1	32.5	35.2	36.5	39.7	41.5	38.9	40.1	40.8	39.9	40.7	43.2	41.0	41.5	43.0	41.7	40.4	37.6	34.1	29.6	24.5	20.0	17.1	15.0	52.8
				Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.1	0.2	0.1	0.1	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	0.2		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.1	0.8	0.9	0.8	0.8	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.5		
	Background	8.50	40	Average (dBA)	11.3	13.8	16.6	17.5	22.1	22.6	24.0	26.7	30.3	28.7	30.5	31.6	30.8	29.3	28.7	27.3	26.6	27.2	24.7	22.0	21.1	19.5	17.9	16.7	16.1	16.0	15.3	13.9	40.3
				Uncertainty A (dB)	0.9	0.8	0.6	0.5	0.3	0.4	0.3	0.3	0.4	0.2	0.2	0.4	0.3	0.3	0.2	0.2	0.4	0.4	0.4	0.5	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.3	1.0	1.0	0.8	0.9	0.8	0.8	0.9	0.8	0.7	0.8	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8	0.8	0.8	1.4		
9.0	Turbine ON	8.97	61	Average (dBA)	16.1	20.3	23.7	27.0	30.4	33.0	35.5	37.1	39.4	41.6	39.3	40.7	41.2	40.2	41.0	44.1	41.5	41.8	43.6	42.1	41.0	38.1	34.6	30.1	24.9	20.1	16.8	14.7	53.2
				Uncertainty A (dB)	0.3	0.2	0.3	0.2	0.2	0.3	0.2	0.2	0.3	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	9.00	37	Average (dBA)	13.7	17.1	18.7	21.3	24.7	23.7	25.0	28.0	30.3	28.7	30.5	31.3	30.5	29.0	29.0	28.6	27.9	26.9	25.0	23.0	22.0	20.3	18.6	17.2	16.5	16.3	15.6	14.1	40.7
				Uncertainty A (dB)	1.0	1.0	0.8	0.9	0.4	0.5	0.4	0.5	0.4	0.3	0.2	0.4	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.4	1.4	1.1	1.2	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.8	0.8	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.8	1.4		
9.5	Turbine ON	9.50	140	Average (dBA)	17.5	21.8	25.0	27.8	31.1	33.6	36.1	37.5	38.7	41.1	39.6	40.8	41.2	40.4	41.6	45.2	42.4	42.6	44.4	43.0	42.1	38.9	35.1	30.5	25.0	20.6	17.7	16.0	53.8
				Uncertainty A (dB)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	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	0.1	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
	Background	9.50	48	Average (dBA)	11.6	14.6	17.4	18.9	22.5	23.0	25.5	27.4	30.5	29.4	30.6	31.6	31.0	29.4	28.9	27.8	27.0	27.6	25.0	21.9	20.8	19.4	17.8	16.7	16.3	16.1	15.4	13.9	40.6
				Uncertainty A (dB)	0.8	0.8	0.6	0.6	0.3	0.4	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.4	0.3	0.3	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.3	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.7	0.8	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	1.4		
10.0	Turbine ON	9.99	94	Average (dBA)	17.4	21.9	25.0	28.1	31.2	33.7	36.2	37.8	38.9	41.2	39.7	40.8	41.2	40.4	41.8	45.0	42.5	42.7	44.5	43.1	42.2	38.9	35.0	30.4	24.8	20.6	18.0	16.3	53.8
				Uncertainty A (dB)	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	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	0.1	0.1	0.1	0.2	0.2		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.1	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.5		
	Background	9.99	37	Average (dBA)	13.8	16.3	18.6	20.1	23.5	23.6	25.3	27.1	31.1	29.0	30.6	30.9	30.3	28.9	28.7	27.5	26.7	27.1	24.9	22.7	21.8	20.1	18.3	16.9	16.4	16.2	15.5	14.0	40.5
				Uncertainty A (dB)	1.0	1.0	0.8	0.7	0.4	0.4	0.4	0.3	0.4	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.5	0.4	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.5	1.4	1.1	1.0	0.9	0.9	0.9	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.9	1.0	1.0	0.9	0.8	0.8	0.8	0.8	1.4		

Table C.04 Detailed measurement uncertainty at hub height

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

Created on: 11/6/2017

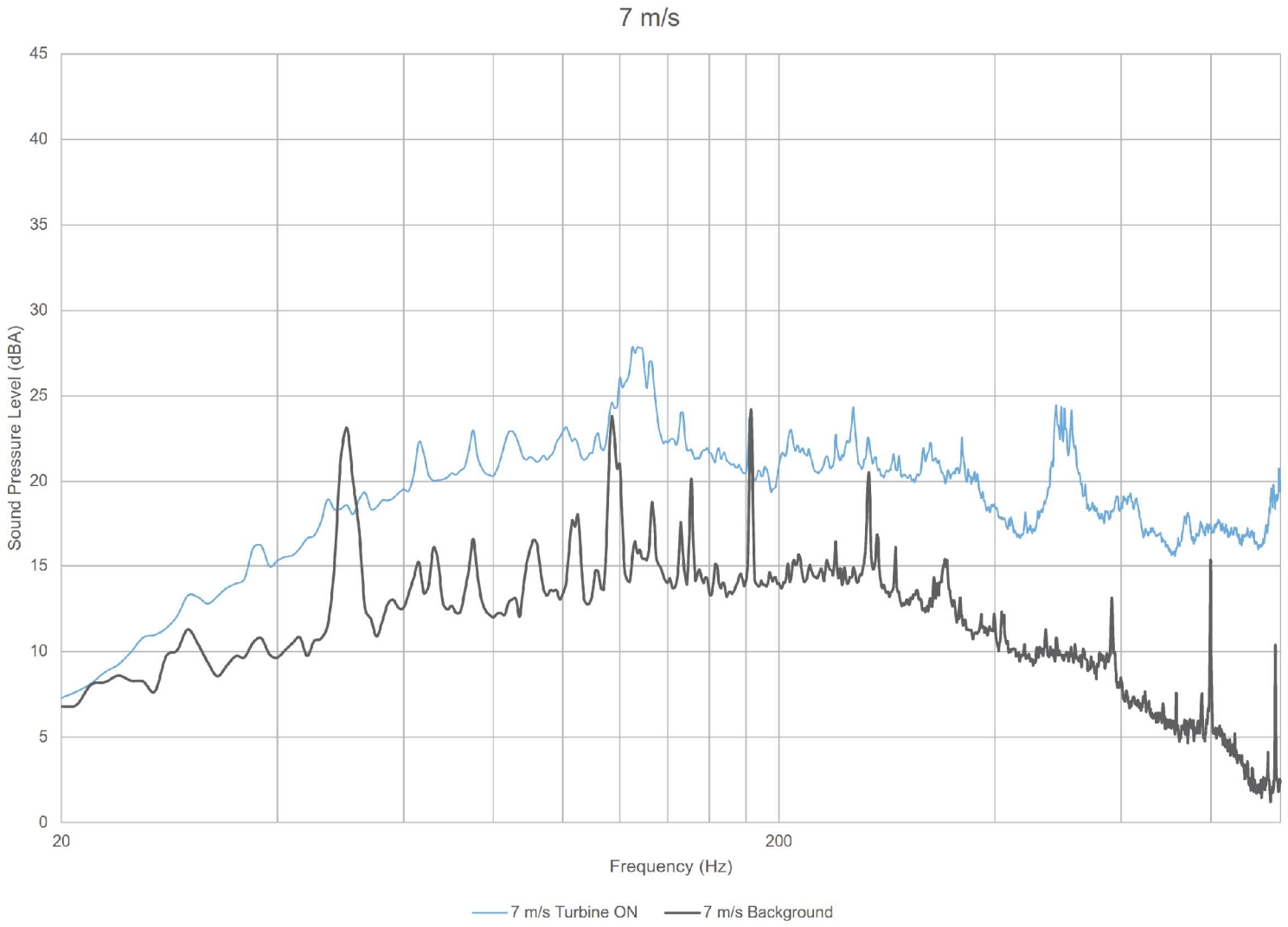
Wind Bin (m/s)	Parameter	Average Wind Speed (m/s)	# of data points	Parameter	1/3 Octave Band (Hz)																												Overall
					20	25	31.5	40	50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000	
10.5	Turbine ON	10.50	51	Average (dBA)	18.6	22.8	25.9	28.7	31.9	34.4	36.6	38.2	39.4	41.3	40.1	41.3	41.4	41.0	42.2	45.1	42.8	42.9	44.5	43.2	42.2	38.9	35.0	30.3	24.8	20.7	18.2	16.6	54.1
				Uncertainty A (dB)	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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	0.8	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	0.9	0.8	0.8	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.5	
	Background	10.53	43	Average (dBA)	12.3	15.6	17.5	19.6	22.5	23.1	25.4	27.1	30.7	29.4	30.4	31.3	30.3	28.9	28.8	28.0	27.2	27.2	25.0	22.3	21.3	19.8	18.1	16.9	16.4	16.2	15.5	14.0	40.5
				Uncertainty A (dB)	0.8	0.8	0.6	0.5	0.4	0.3	0.3	0.3	0.4	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.3	1.3	1.0	1.0	0.9	0.9	0.9	0.8	0.9	0.9	0.7	0.8	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.8	0.8	1.4		
11.0	Turbine ON	10.99	40	Average (dBA)	17.9	22.9	25.9	29.2	32.2	34.8	37.1	38.8	40.1	41.6	40.4	41.7	41.2	40.6	42.1	44.4	42.8	42.8	44.0	43.1	42.0	38.7	34.7	29.8	24.3	20.7	18.4	17.1	54.0
				Uncertainty A (dB)	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.3	0.2	0.2	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	0.2	0.3	0.4		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	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	0.9	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.9	1.5		
	Background	11.02	36	Average (dBA)	13.5	16.2	17.9	19.7	22.7	23.9	25.2	26.4	30.3	28.6	29.9	30.6	30.3	29.1	28.6	27.7	27.3	26.7	24.7	22.4	21.4	19.8	18.2	17.0	16.5	16.3	15.5	14.1	40.2
				Uncertainty A (dB)	1.1	0.9	0.7	0.7	0.4	0.5	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.5	0.4	0.4	0.5	0.5	0.4	0.3	0.2	0.1	0.1	0.1	0.1		
				Uncertainty B (dB)	1.0	1.0	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	1.4		
				Combined Uncertainty (dB)	1.5	1.4	1.1	1.0	0.9	0.9	0.9	0.8	0.9	0.8	0.7	0.8	0.7	0.7	0.7	0.8	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.8	0.8	0.8	1.4		

aercoustics

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

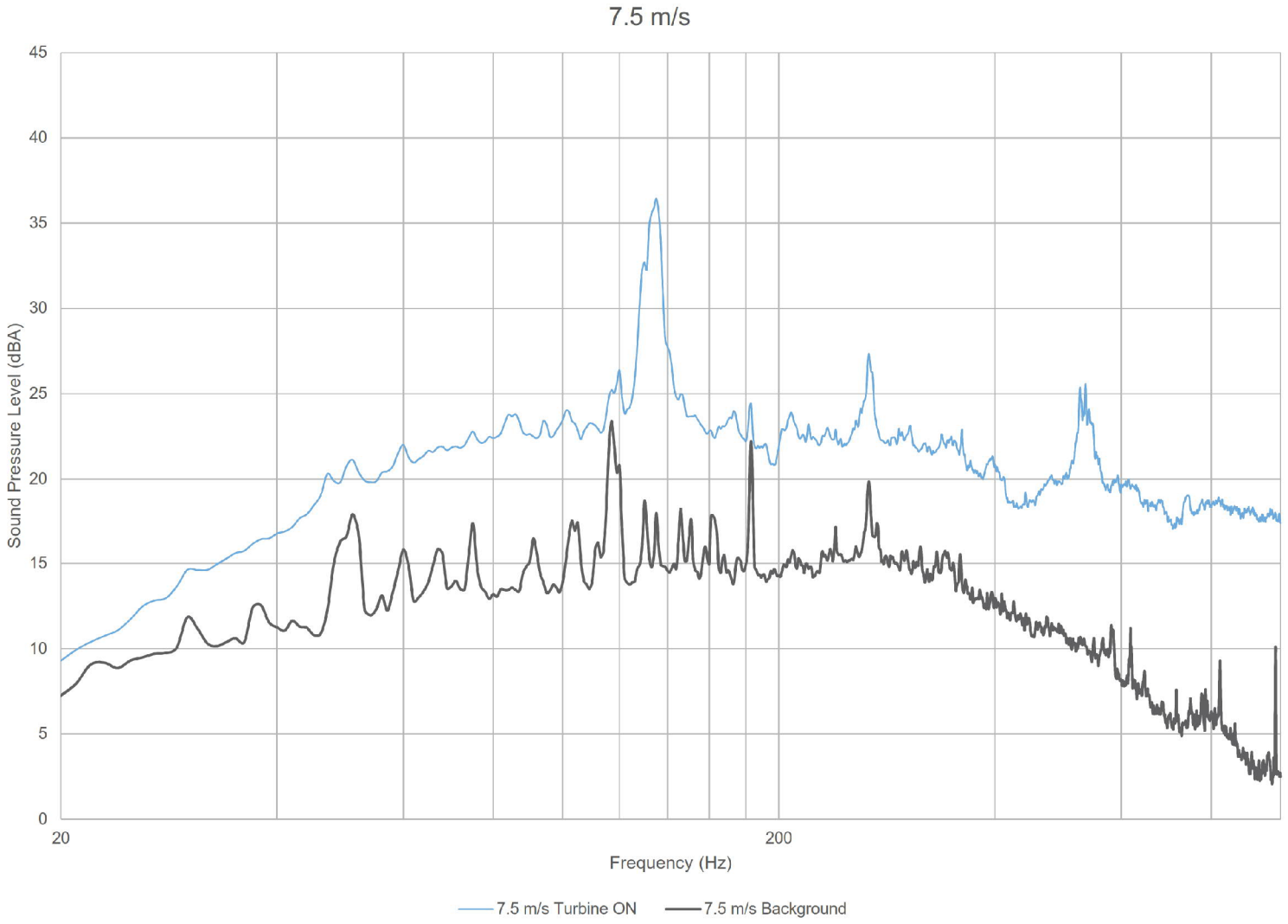
Tel: 416-249-3361
Fax 416-249-3613
aercoustics.com

Appendix D
Tonality Assessment



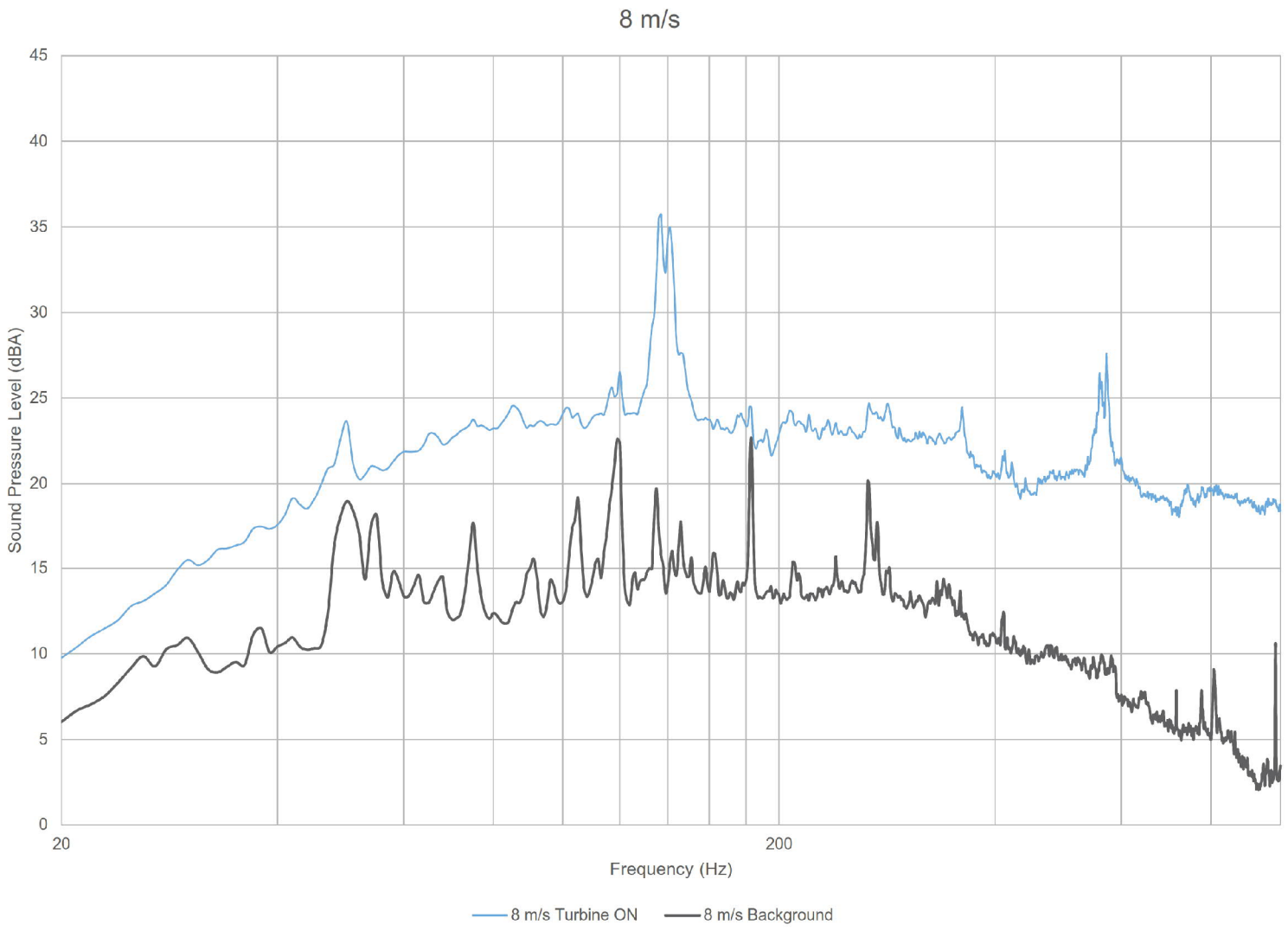
aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of narrow band spectra – Turbine ON vs. Background at 7 m/s

Figure D.01



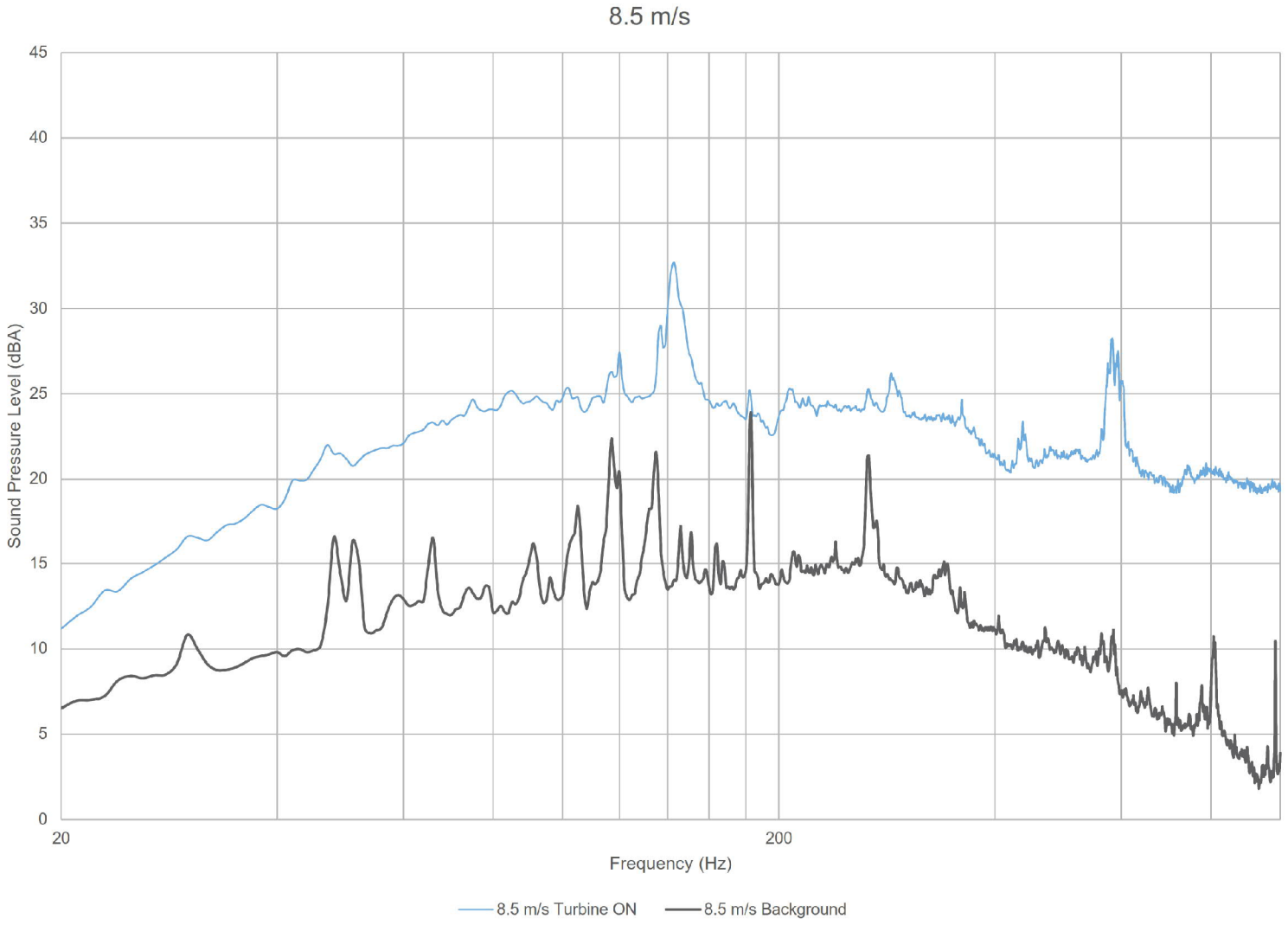
aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of narrow band spectra – Turbine ON vs. Background at 7.5 m/s

Figure D.02

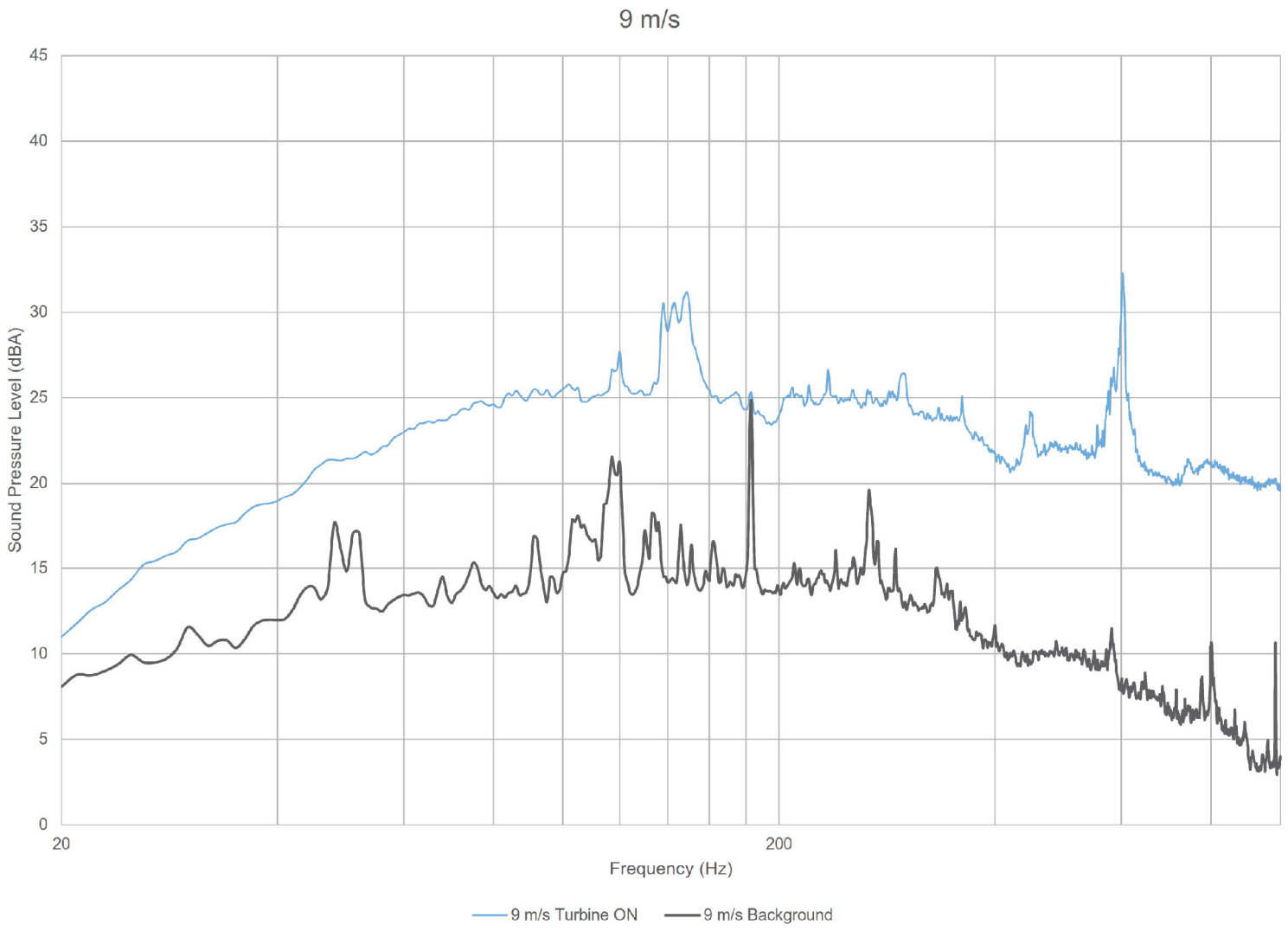


aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of narrow band spectra – Turbine ON vs. Background at 8 m/s

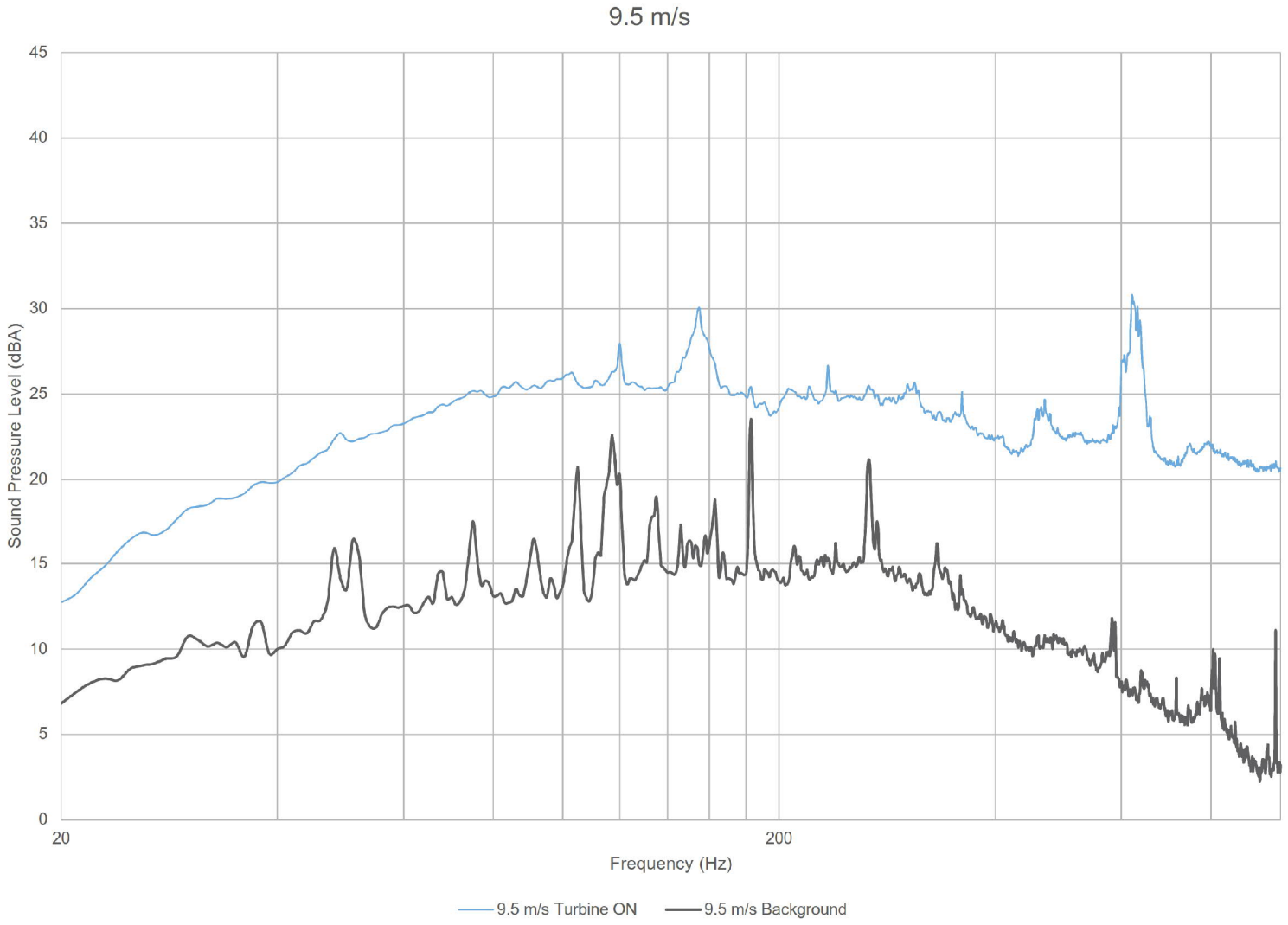
Figure D.03



aercoustics	14331.01.T29.RP2	**Project Name**
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 8.5 m/s
		Figure D.04

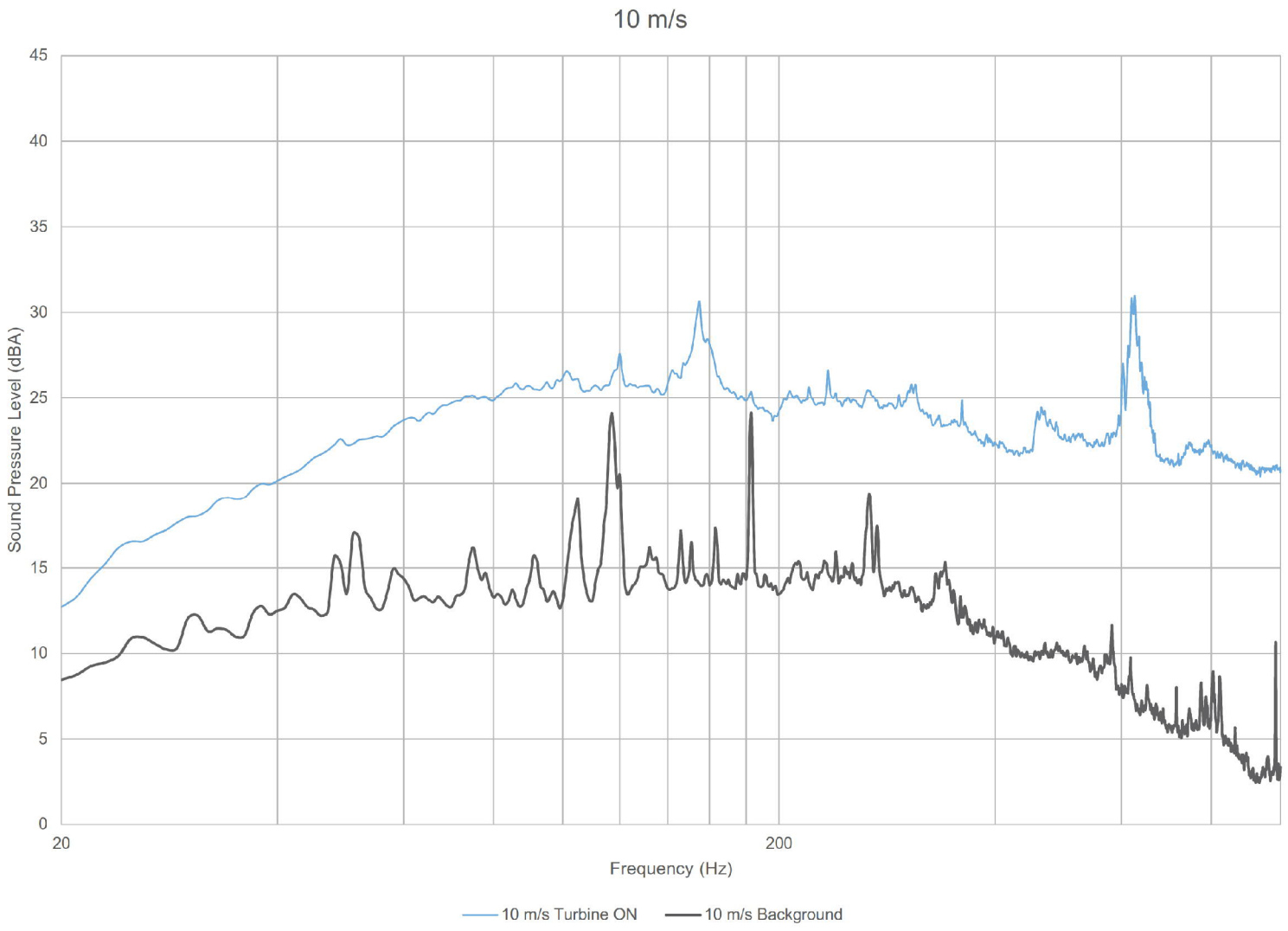


aercoustics	14331.01.T29.RP2	**Project Name**
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 9 m/s
		Figure D.05

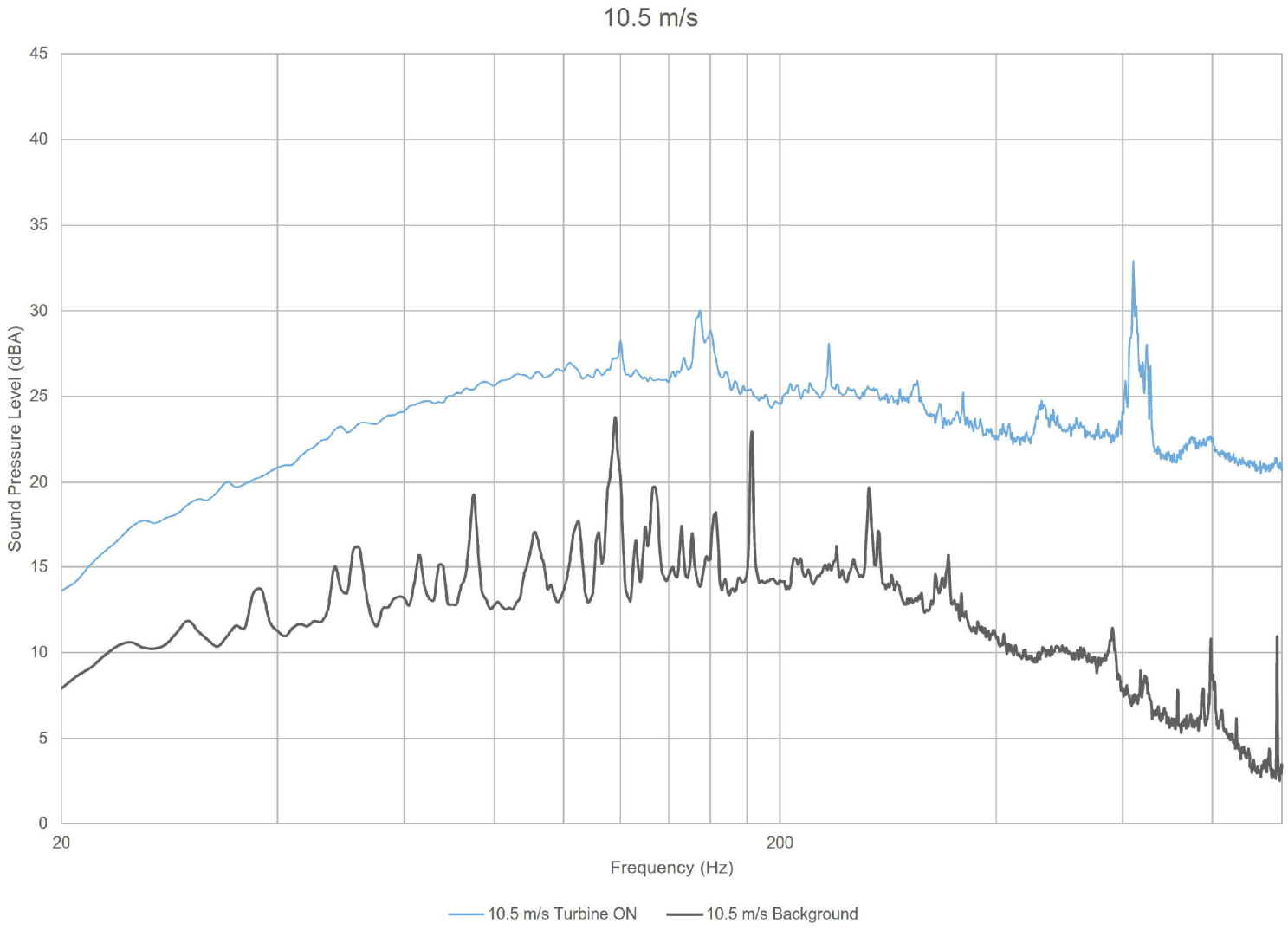


aercoustics	14331.01.T29.RP2 Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	**Project Name** Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0 **Figure Title** Plot of narrow band spectra – Turbine ON vs. Background at 9.5 m/s

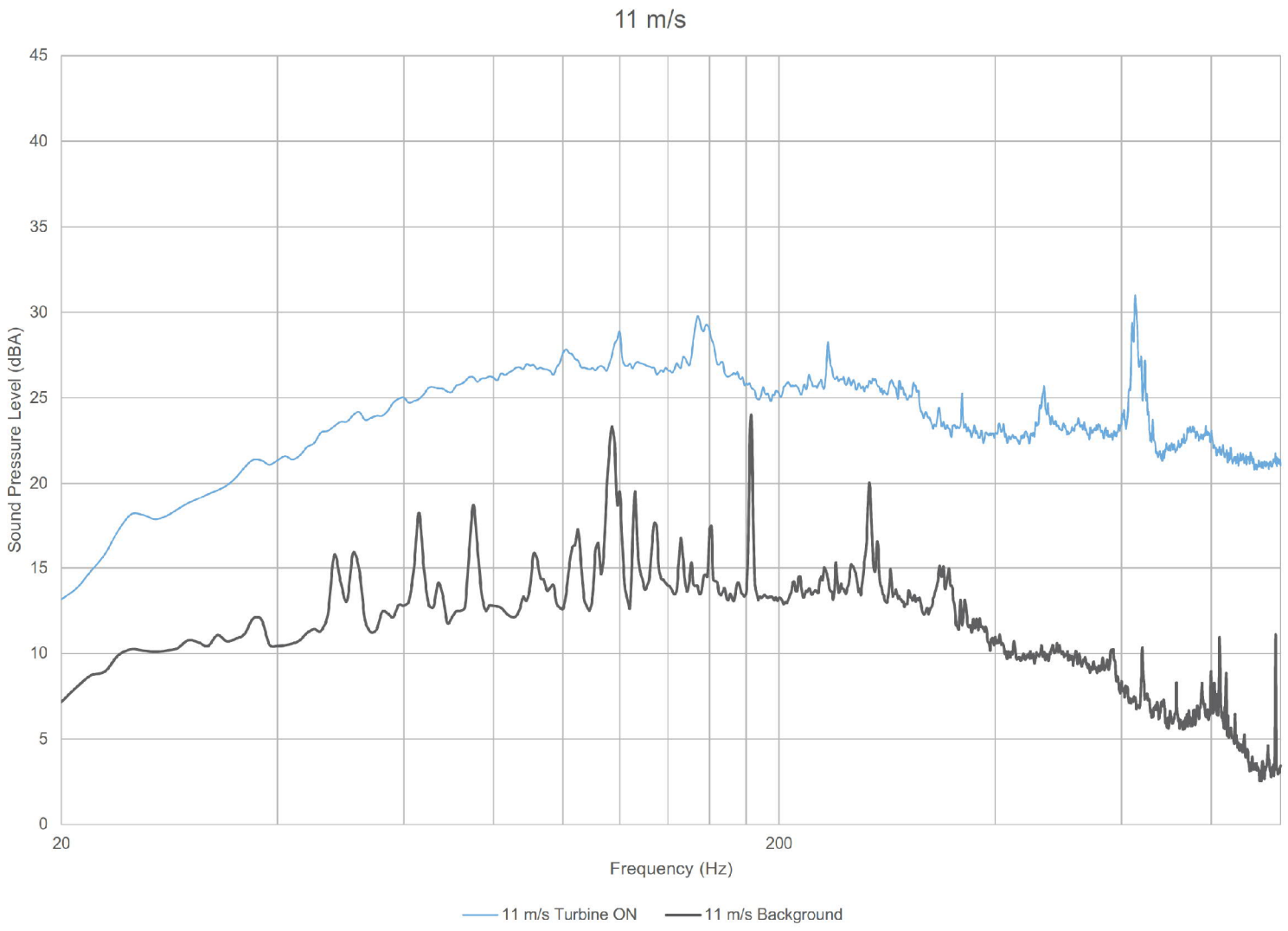
Figure D.06



aercoustics	14331.01.T29.RP2	**Project Name**
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 10 m/s
		Figure D.07



aercoustics	14331.01.T29.RP2	**Project Name**
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 10.5 m/s
		Figure D.08



aercoustics	14331.01.T29.RP2	**Project Name**
	Scale: NTS Drawn by: AM Reviewed by: PA Date: Sept 29, 2017 Revision: 1	Bluewater Wind Energy Centre - Turbine T29 - IEC61400-11 Edition 3.0
		Figure Title Plot of narrow band spectra – Turbine ON vs. Background at 11 m/s
		Figure D.09

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
367	480			17.1	36.0	33.5	-2.5	-2.3	-0.2
192	481			20.4	39.2	31.0	-8.2	-2.3	-5.9
435	481			16.8	35.6	34.3	-1.4	-2.3	0.9
437	484			16.7	35.6	34.5	-1.1	-2.3	1.2
171	485			18.9	37.8	39.2	1.4	-2.3	3.6
112	485			18.4	37.3	36.2	-1.1	-2.3	1.2
179	485			19.5	38.4	37.2	-1.2	-2.3	1.1
182	486			19.3	38.2	37.8	-0.4	-2.3	1.9
189	487			20.4	39.3	34.8	-4.6	-2.3	-2.3
110	488			19.0	37.9	40.5	2.5	-2.3	4.8
175	490			20.4	39.3	39.8	0.5	-2.3	2.8
376	493			17.5	36.4	28.8	-7.6	-2.3	-5.3
436	494			16.8	35.7	32.8	-2.8	-2.3	-0.5
180	494			19.6	38.5	31.7	-6.8	-2.3	-4.5
195	494			19.4	38.3	34.7	-3.6	-2.3	-1.3
111	495			19.1	38.0	40.0	2.0	-2.3	4.3
187	495			19.7	38.6	37.7	-0.9	-2.3	1.4
181	495			19.0	37.9	32.7	-5.2	-2.3	-2.9
194	497			19.7	38.6	36.0	-2.6	-2.3	-0.3
159	498			19.5	38.4	36.4	-2.0	-2.3	0.3
108	498			20.0	39.0	33.2	-5.7	-2.3	-3.4
154	500			19.9	38.9	35.3	-3.6	-2.3	-1.3
115	500			20.2	39.1	32.2	-6.8	-2.3	-4.6
160	500			19.5	38.4	36.4	-2.0	-2.3	0.3
431	501			17.0	35.9	33.3	-2.6	-2.3	-0.3
188	501			20.0	39.0	33.8	-5.1	-2.3	-2.8
361	502			16.8	35.7	31.7	-4.1	-2.3	-1.8
166	503			19.4	38.4	34.0	-4.4	-2.3	-2.1
375	503			17.3	36.3	24.8	-11.5	-2.3	-9.2
1	503			20.3	39.3	31.5	-7.7	-2.3	-5.4
161	504			20.0	38.9	33.2	-5.7	-2.3	-3.4
24	505			20.5	39.4	33.1	-6.4	-2.3	-4.0
360	505			17.3	36.3	27.5	-8.8	-2.3	-6.5
Average	494						-2.5	-2.3	-0.2

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
152	128			22.6	40.9	35.1	-5.8	-2.0	-3.8
382	128			22.0	40.3	37.2	-3.1	-2.0	-1.1
335	129			22.2	40.5	41.1	0.6	-2.0	2.6
153	129			22.7	41.0	36.0	-5.0	-2.0	-3.0
163	129			22.6	40.9	36.9	-4.0	-2.0	-2.0
383	129			22.9	41.2	40.4	-0.8	-2.0	1.2
79	129			24.6	42.9	35.4	-7.5	-2.0	-5.5
384	130			22.6	40.9	41.7	0.8	-2.0	2.8
580	130			23.3	41.6	39.4	-2.2	-2.0	-0.2
334	130			23.3	41.6	41.2	-0.4	-2.0	1.6
162	130			23.3	41.6	36.3	-5.3	-2.0	-3.3
126	131			23.5	41.8	38.9	-2.9	-2.0	-0.9
105	131			23.7	42.0	36.5	-5.5	-2.0	-3.5
117	132			22.9	41.2	39.5	-1.7	-2.0	0.3
634	132			21.9	40.2	42.5	2.3	-2.0	4.3
1190	132			26.2	44.5	45.5	1.0	-2.0	3.0
106	132			23.3	41.6	40.5	-1.1	-2.0	0.9
423	132			22.9	41.2	42.5	1.3	-2.0	3.3
101	132			23.3	41.6	40.1	-1.5	-2.0	0.6
80	132			25.5	43.8	40.2	-3.5	-2.0	-1.5
78	132			24.8	43.1	40.5	-2.6	-2.0	-0.6
90	132			24.6	42.9	42.6	-0.3	-2.0	1.7
428	132			21.5	39.8	43.2	3.4	-2.0	5.4
578	132			23.7	42.0	43.6	1.5	-2.0	3.6
127	132			24.7	43.0	41.2	-1.8	-2.0	0.2
107	132			23.5	41.8	36.6	-5.2	-2.0	-3.2
365	133			24.4	42.6	44.4	1.8	-2.0	3.8
381	133			23.1	41.4	42.0	0.5	-2.0	2.5
151	133			22.9	41.2	40.4	-0.8	-2.0	1.2
134	133			23.9	42.2	39.2	-3.0	-2.0	-1.0
424	133			22.5	40.8	43.6	2.7	-2.0	4.7
363	133			24.1	42.4	42.9	0.5	-2.0	2.5
635	133			22.5	40.8	45.5	4.7	-2.0	6.7
385	133			22.9	41.2	45.7	4.5	-2.0	6.5
1377	133			25.5	43.8	43.0	-0.8	-2.0	1.2
374	133			22.3	40.5	42.4	1.9	-2.0	3.9
359	133			22.4	40.7	43.8	3.2	-2.0	5.2
118	133			23.2	41.5	41.4	-0.1	-2.0	1.9
104	134			24.2	42.5	42.0	-0.5	-2.0	1.5
100	134			24.8	43.1	43.1	0.0	-2.0	2.0
150	134			23.3	41.6	38.2	-3.4	-2.0	-1.4
417	134			22.5	40.8	42.5	1.7	-2.0	3.7
47	134			24.4	42.7	39.7	-2.9	-2.0	-0.9
337	135			23.6	41.9	38.9	-3.0	-2.0	-1.0
135	135			23.1	41.4	43.9	2.5	-2.0	4.5
23	135			24.8	43.1	35.9	-7.2	-2.0	-5.2
123	135			23.3	41.6	44.6	3.0	-2.0	5.0
48	135			25.2	43.5	41.9	-1.6	-2.0	0.4
137	135			24.3	42.6	43.9	1.3	-2.0	3.3
81	135			24.2	42.5	42.3	-0.2	-2.0	1.8
25	135			25.0	43.3	41.3	-2.0	-2.0	0.0
77	135			24.8	43.1	44.5	1.3	-2.0	3.4
2	135			24.3	42.6	40.8	-1.8	-2.0	0.3
197	135			23.8	42.1	45.3	3.2	-2.0	5.3
149	135			23.4	41.7	43.2	1.5	-2.0	3.6
99	135			25.6	43.8	45.9	2.0	-2.0	4.0
17	136			24.1	42.4	44.4	1.9	-2.0	4.0
102	136			24.3	42.6	44.5	1.9	-2.0	3.9
96	136			24.4	42.7	45.9	3.2	-2.0	5.2
89	136			25.8	44.1	43.0	-1.1	-2.0	0.9
418	136			22.2	40.5	46.2	5.7	-2.0	7.7
378	137			23.7	42.0	44.8	2.8	-2.0	4.8
636	137			23.2	41.5	41.6	0.1	-2.0	2.1

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

Measurement #	Centre frequency (Hz)	Energy average of all masking lines (dB)	Background (dB)	Background adjusted criterion level (dB)	Masking level (dB)	Tone level (dB)	Determination of tonality (dB)	Frequency dependent audibility criterion (dB)	Tonal Audibility (dB)
136	137			23.5	41.8	43.7	1.9	-2.0	3.9
103	137			25.1	43.4	41.7	-1.6	-2.0	0.4
370	137			24.1	42.4	41.3	-1.0	-2.0	1.0
Average	133						0.5	-2.0	2.5

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
152	517			19.8	38.7	31.6	-7.1	-2.3	-4.8
382	518			18.0	36.9	33.9	-3.0	-2.3	-0.7
383	523			18.6	37.6	30.2	-7.3	-2.3	-5.0
335	524			18.5	37.5	30.6	-6.9	-2.3	-4.6
153	524			20.3	39.3	30.5	-8.9	-2.3	-6.5
162	524			20.2	39.2	34.4	-4.8	-2.3	-2.5
580	524			19.4	38.4	34.6	-3.7	-2.3	-1.4
1377	525			21.5	40.5	40.0	-0.5	-2.3	1.8
163	526			20.7	39.7	35.5	-4.2	-2.3	-1.8
384	526			17.9	36.9	35.9	-1.0	-2.3	1.3
90	526			21.5	40.5	35.2	-5.3	-2.3	-3.0
101	527			21.2	40.2	28.7	-11.5	-2.3	-9.1
79	527			21.1	40.1	34.8	-5.4	-2.3	-3.0
374	527			19.7	38.7	25.8	-12.8	-2.3	-10.5
107	527			20.2	39.2	31.7	-7.4	-2.3	-5.1
105	528			20.2	39.2	33.8	-5.4	-2.3	-3.0
117	528			20.3	39.3	32.9	-6.4	-2.3	-4.1
127	528			21.4	40.4	32.3	-8.1	-2.3	-5.8
126	528			20.7	39.7	34.4	-5.3	-2.3	-3.0
106	529			20.0	39.0	33.3	-5.8	-2.3	-3.5
1190	532			21.6	40.6	34.0	-6.6	-2.3	-4.3
78	533			21.2	40.2	35.1	-5.1	-2.3	-2.8
151	533			20.7	39.7	31.9	-7.8	-2.3	-5.5
80	534			21.2	40.2	35.3	-4.9	-2.3	-2.6
123	534			21.5	40.5	31.8	-8.7	-2.3	-6.4
118	534			21.0	40.0	36.8	-3.2	-2.3	-0.9
634	534			18.3	37.3	37.8	0.5	-2.3	2.8
81	535			21.7	40.7	29.7	-11.1	-2.3	-8.7
423	535			19.2	38.2	34.6	-3.6	-2.3	-1.3
381	535			19.3	38.3	30.3	-8.1	-2.3	-5.7
365	536			20.5	39.6	37.1	-2.5	-2.3	-0.2
424	536			19.3	38.3	33.8	-4.5	-2.3	-2.2
359	536			19.4	38.5	31.7	-6.8	-2.3	-4.4
635	536			19.0	38.0	37.1	-0.9	-2.3	1.4
134	539			20.9	39.9	34.7	-5.2	-2.3	-2.9
150	539			20.7	39.8	33.6	-6.2	-2.3	-3.8
149	540			21.0	40.0	32.6	-7.4	-2.3	-5.1
334	540			19.2	38.2	30.5	-7.7	-2.3	-5.4
428	541			19.0	38.0	29.2	-8.8	-2.3	-6.4
100	541			21.1	40.2	34.1	-6.1	-2.3	-3.7
385	541			19.3	38.4	30.4	-7.9	-2.3	-5.6
135	541			21.1	40.2	32.3	-7.9	-2.3	-5.5
417	542			19.5	38.5	36.2	-2.3	-2.3	0.0
418	544			19.7	38.7	34.2	-4.6	-2.3	-2.2
99	545			21.6	40.6	35.4	-5.2	-2.3	-2.9
77	546			21.4	40.5	27.5	-13.0	-2.3	-10.6
Average	532						-5.1	-2.3	-2.7

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
1376	132			26.4	44.7	42.3	-2.4	-2.0	-0.4
581	133			25.7	44.0	42.3	-1.7	-2.0	0.3
16	133			24.9	43.2	44.8	1.6	-2.0	3.6
420	134			22.8	41.1	42.4	1.3	-2.0	3.3
119	134			24.9	43.2	42.8	-0.4	-2.0	1.6
133	135			24.1	42.4	40.8	-1.6	-2.0	0.4
355	136			23.3	41.6	42.9	1.3	-2.0	3.3
91	136			25.9	44.2	43.6	-0.6	-2.0	1.4
143	136			23.9	42.2	39.0	-3.2	-2.0	-1.2
141	136			24.0	42.3	42.5	0.1	-2.0	2.2
427	136			21.9	40.2	41.5	1.4	-2.0	3.4
416	136			22.8	41.1	43.7	2.6	-2.0	4.6
199	136			23.0	41.3	46.2	4.9	-2.0	6.9
142	136			23.7	42.0	41.5	-0.5	-2.0	1.5
356	136			24.5	42.8	43.9	1.1	-2.0	3.1
98	136			24.9	43.2	40.6	-2.6	-2.0	-0.6
122	136			24.2	42.5	44.2	1.6	-2.0	3.6
364	136			24.5	42.8	38.7	-4.1	-2.0	-2.1
97	137			25.2	43.5	39.5	-4.1	-2.0	-2.0
76	137			25.2	43.5	39.6	-3.9	-2.0	-1.9
419	137			23.0	41.3	41.7	0.4	-2.0	2.5
128	137			25.2	43.5	43.4	-0.1	-2.0	1.9
333	137			24.0	42.3	39.1	-3.2	-2.0	-1.2
200	137			24.3	42.6	45.7	3.2	-2.0	5.2
386	137			24.0	42.3	40.0	-2.3	-2.0	-0.3
414	137			23.4	41.7	39.9	-1.8	-2.0	0.2
413	137			22.4	40.7	44.0	3.3	-2.0	5.4
1473	137			25.9	44.2	41.2	-3.0	-2.0	-1.0
425	137			23.8	42.1	39.3	-2.8	-2.0	-0.8
1401	138			27.0	45.3	34.7	-10.6	-2.0	-8.6
371	138			24.0	42.3	38.5	-3.8	-2.0	-1.8
46	139			25.2	43.5	42.8	-0.7	-2.0	1.3
198	139			24.3	42.6	41.5	-1.1	-2.0	0.9
637	140			23.2	41.5	37.7	-3.7	-2.0	-1.7
148	140			23.4	41.7	42.9	1.2	-2.0	3.2
358	140			23.1	41.4	41.9	0.5	-2.0	2.5
144	140			22.9	41.2	43.4	2.2	-2.0	4.2
387	140			25.2	43.5	38.4	-5.1	-2.0	-3.0
357	140			23.2	41.5	41.4	-0.1	-2.0	2.0
354	140			23.4	41.7	37.8	-3.9	-2.0	-1.9
426	140			24.0	42.3	36.1	-6.2	-2.0	-4.2
140	141			23.9	42.2	44.4	2.2	-2.0	4.2
3	141			25.3	43.6	40.1	-3.6	-2.0	-1.6
95	141			25.2	43.5	41.0	-2.5	-2.0	-0.5
642	141			23.5	41.8	41.3	-0.5	-2.0	1.5
88	141			25.0	43.3	38.7	-4.6	-2.0	-2.6
638	141			23.5	41.8	39.2	-2.6	-2.0	-0.6
26	141			24.8	43.1	40.7	-2.4	-2.0	-0.4
641	141			23.8	42.1	38.0	-4.1	-2.0	-2.1
138	141			24.8	43.1	43.2	0.1	-2.0	2.1
640	141			24.2	42.5	38.5	-4.0	-2.0	-2.0
412	141			21.8	40.2	39.6	-0.6	-2.0	1.4
379	141			23.7	42.0	37.5	-4.5	-2.0	-2.5
45	141			25.7	44.0	42.4	-1.6	-2.0	0.4
380	141			23.7	42.0	38.8	-3.2	-2.0	-1.2
1189	141			26.2	44.5	39.7	-4.9	-2.0	-2.9
129	142			25.6	43.9	43.1	-0.9	-2.0	1.2
648	142			23.5	41.8	39.5	-2.3	-2.0	-0.3
649	142			23.4	41.7	37.6	-4.1	-2.0	-2.1
4	142			24.6	42.9	41.3	-1.6	-2.0	0.4
639	142			24.4	42.7	38.5	-4.2	-2.0	-2.2
147	142			23.9	42.2	41.6	-0.6	-2.0	1.4
439	143			24.2	42.5	39.1	-3.5	-2.0	-1.4
Average	138						-0.8	-2.0	1.2

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
379	570			19.9	39.0	35.8	-3.2	-2.4	-0.8
416	570			21.0	40.1	27.8	-12.3	-2.4	-9.9
642	571			20.7	39.9	40.2	0.4	-2.4	2.7
414	571			20.4	39.5	32.8	-6.6	-2.4	-4.2
638	572			20.3	39.4	36.2	-3.2	-2.4	-0.8
649	572			20.5	39.6	41.2	1.6	-2.4	3.9
147	572			21.7	40.8	36.5	-4.2	-2.4	-1.8
354	572			20.8	39.9	36.9	-3.0	-2.4	-0.6
1189	572			21.5	40.6	31.3	-9.3	-2.4	-6.9
641	572			20.3	39.4	39.9	0.5	-2.4	2.9
4	573			21.5	40.6	35.1	-5.6	-2.4	-3.2
387	574			21.0	40.1	40.0	-0.2	-2.4	2.2
26	574			22.0	41.1	29.2	-11.9	-2.4	-9.5
648	574			20.9	40.0	40.3	0.3	-2.4	2.7
439	574			20.7	39.8	36.2	-3.6	-2.4	-1.2
3	574			22.1	41.2	34.0	-7.2	-2.4	-4.8
639	576			20.7	39.8	38.2	-1.7	-2.4	0.7
581	600			21.8	41.0	38.5	-2.5	-2.4	-0.1
Average	574						-2.5	-2.4	-0.1

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
87	117			25.5	43.8	32.0	-11.8	-2.0	-9.8
82	137			24.2	42.5	41.6	-0.9	-2.0	1.1
665	137			24.6	42.9	44.6	1.7	-2.0	3.7
1270	140			27.1	45.4	39.9	-5.5	-2.0	-3.5
1483	140			27.3	45.6	40.0	-5.5	-2.0	-3.5
49	141			26.8	45.1	34.8	-10.3	-2.0	-8.3
27	141			24.7	43.0	41.5	-1.5	-2.0	0.5
372	141			23.9	42.2	35.1	-7.2	-2.0	-5.2
402	142			23.1	41.4	38.7	-2.7	-2.0	-0.7
292	142			24.4	42.7	41.6	-1.2	-2.0	0.9
94	142			24.9	43.2	37.6	-5.6	-2.0	-3.6
120	142			26.1	44.4	40.1	-4.3	-2.0	-2.3
121	142			25.8	44.1	38.5	-5.6	-2.0	-3.5
18	142			24.8	43.1	38.3	-4.9	-2.0	-2.8
1432	142			27.4	45.7	38.7	-7.0	-2.0	-5.0
Average	139						-3.5	-2.0	-1.5

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
1270	563			24.0	43.1	32.1	-11.0	-2.4	-8.6
665	571			20.9	40.0	37.6	-2.4	-2.4	0.0
402	572			21.2	40.3	40.9	0.6	-2.4	3.0
401	573			20.3	39.4	41.3	1.9	-2.4	4.3
146	575			22.6	41.7	32.2	-9.5	-2.4	-7.1
1432	575			22.6	41.7	39.5	-2.2	-2.4	0.2
1188	576			22.2	41.4	37.4	-4.0	-2.4	-1.6
395	577			21.3	40.5	39.0	-1.5	-2.4	0.9
650	578			21.6	40.8	37.1	-3.6	-2.4	-1.3
75	579			22.2	41.3	33.2	-8.1	-2.4	-5.7
577	580			20.5	39.6	41.4	1.7	-2.4	4.1
130	581			22.9	42.1	38.7	-3.4	-2.4	-1.0
407	581			20.9	40.0	39.1	-0.9	-2.4	1.5
406	581			20.8	39.9	40.4	0.5	-2.4	2.9
139	582			21.9	41.0	34.9	-6.1	-2.4	-3.7
15	582			22.7	41.8	36.3	-5.5	-2.4	-3.1
408	582			20.5	39.7	38.8	-0.9	-2.4	1.5
415	583			20.9	40.1	37.4	-2.7	-2.4	-0.3
87	583			22.9	42.0	40.0	-2.0	-2.4	0.4
647	583			20.6	39.8	39.9	0.1	-2.4	2.5
207	583			22.0	41.1	33.6	-7.5	-2.4	-5.1
44	584			22.6	41.7	32.3	-9.4	-2.4	-7.0
611	585			20.8	39.9	41.5	1.5	-2.4	3.9
643	585			20.5	39.7	40.0	0.4	-2.4	2.7
208	587			22.3	41.4	35.1	-6.4	-2.4	-4.0
94	588			22.6	41.8	34.0	-7.8	-2.4	-5.4
121	591			22.5	41.7	32.0	-9.8	-2.4	-7.4
396	592			21.2	40.4	39.4	-1.0	-2.4	1.4
372	592			20.4	39.6	39.3	-0.3	-2.4	2.1
1267	593			21.5	40.7	38.4	-2.3	-2.4	0.1
373	593			21.1	40.2	36.5	-3.8	-2.4	-1.4
404	593			21.4	40.5	39.1	-1.4	-2.4	1.0
405	594			21.0	40.2	40.3	0.1	-2.4	2.5
397	595			21.4	40.6	38.5	-2.1	-2.4	0.3
644	595			20.6	39.8	39.8	0.0	-2.4	2.4
82	596			23.0	42.2	30.3	-12.0	-2.4	-9.6
22	597			22.9	42.0	32.4	-9.6	-2.4	-7.2
1474	601			22.5	41.7	32.2	-9.5	-2.4	-7.1
1497	601			21.9	41.1	39.1	-2.0	-2.4	0.4
675	603			20.6	39.8	41.3	1.5	-2.4	3.9
Average	585						-2.1	-2.4	0.3

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
674	576			20.6	39.7	42.6	2.9	-2.4	5.3
394	577			20.6	39.7	42.2	2.5	-2.4	4.8
14	580			23.6	42.7	42.4	-0.3	-2.4	2.1
305	581			22.5	41.6	36.0	-5.7	-2.4	-3.3
70	584			22.1	41.2	40.2	-1.0	-2.4	1.3
550	584			21.4	40.6	42.6	2.0	-2.4	4.4
7	586			23.0	42.1	40.2	-1.9	-2.4	0.5
1200	587			21.2	40.3	40.1	-0.2	-2.4	2.2
679	593			21.2	40.4	38.8	-1.5	-2.4	0.9
93	594			23.6	42.7	37.0	-5.7	-2.4	-3.3
221	595			22.1	41.3	37.2	-4.2	-2.4	-1.8
1421	595			22.7	41.9	35.8	-6.1	-2.4	-3.7
353	596			20.9	40.1	40.3	0.2	-2.4	2.6
71	596			22.9	42.1	38.4	-3.7	-2.4	-1.3
398	598			21.2	40.4	38.1	-2.3	-2.4	0.1
21	598			22.7	41.9	38.7	-3.2	-2.4	-0.8
298	598			22.7	41.9	37.3	-4.6	-2.4	-2.2
400	599			21.0	40.1	40.4	0.3	-2.4	2.7
552	599			21.8	41.0	43.0	2.0	-2.4	4.4
206	599			22.6	41.8	34.9	-6.9	-2.4	-4.5
1268	599			21.7	40.9	41.0	0.0	-2.4	2.4
610	600			21.9	41.1	40.3	-0.8	-2.4	1.6
72	600			22.7	41.8	40.5	-1.4	-2.4	1.0
222	601			22.8	42.0	40.7	-1.3	-2.4	1.1
551	601			21.4	40.6	44.4	3.8	-2.4	6.2
666	601			23.4	42.6	39.2	-3.4	-2.4	-1.0
1284	601			22.2	41.4	44.5	3.1	-2.4	5.5
92	602			23.3	42.5	34.2	-8.3	-2.4	-5.9
1279	602			23.1	42.3	32.9	-9.3	-2.4	-6.9
73	602			23.3	42.5	39.9	-2.5	-2.4	-0.1
86	603			23.4	42.6	41.6	-1.0	-2.4	1.4
399	603			21.3	40.5	37.9	-2.6	-2.4	-0.2
612	603			21.9	41.1	40.6	-0.5	-2.4	1.9
410	603			21.3	40.5	40.0	-0.5	-2.4	1.9
204	603			22.7	41.9	41.9	0.0	-2.4	2.4
1285	603			21.7	40.9	42.9	2.0	-2.4	4.4
409	603			21.0	40.2	40.7	0.5	-2.4	2.9
309	603			23.0	42.2	41.0	-1.2	-2.4	1.2
411	603			21.6	40.8	38.1	-2.7	-2.4	-0.2
293	603			22.4	41.6	41.1	-0.5	-2.4	1.9
403	603			21.4	40.6	40.4	-0.2	-2.4	2.2
1138	604			22.2	41.4	37.1	-4.3	-2.4	-1.9
1201	604			21.9	41.1	42.7	1.6	-2.4	4.0
213	604			23.2	42.4	43.5	1.1	-2.4	3.5
294	604			22.6	41.8	43.2	1.4	-2.4	3.8
1335	605			22.6	41.8	39.9	-1.9	-2.4	0.5
1375	605			22.4	41.6	39.4	-2.2	-2.4	0.2
1374	605			22.7	41.9	35.6	-6.3	-2.4	-3.9
215	606			22.8	42.0	44.4	2.3	-2.4	4.7
209	606			23.0	42.2	44.4	2.1	-2.4	4.5
131	607			23.6	42.8	43.8	1.0	-2.4	3.4
28	607			23.2	42.4	43.0	0.6	-2.4	3.0
569	610			21.5	40.8	37.9	-2.9	-2.4	-0.4
388	615			22.3	41.5	39.6	-1.9	-2.4	0.6
308	617			23.2	42.5	37.4	-5.1	-2.4	-2.6
Average	599						-0.6	-2.4	1.8

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
1388	581			23.0	42.1	37.9	-4.2	-2.4	-1.8
1495	584			21.6	40.7	38.8	-1.9	-2.4	0.5
8	596			24.3	43.5	41.7	-1.7	-2.4	0.7
505	600			21.2	40.4	46.6	6.2	-2.4	8.6
1257	601			22.3	41.5	40.7	-0.8	-2.4	1.6
1453	601			22.0	41.1	44.7	3.6	-2.4	6.0
1260	602			23.2	42.4	42.0	-0.5	-2.4	1.9
514	603			23.0	42.2	36.1	-6.0	-2.4	-3.6
1452	604			22.6	41.8	43.2	1.4	-2.4	3.8
1282	604			22.4	41.6	38.7	-2.9	-2.4	-0.5
1158	605			22.1	41.3	40.5	-0.9	-2.4	1.5
1491	605			24.0	43.2	39.8	-3.4	-2.4	-1.0
1361	606			22.1	41.3	35.6	-5.7	-2.4	-3.2
216	606			23.4	42.6	42.0	-0.6	-2.4	1.8
1346	606			22.5	41.7	43.1	1.3	-2.4	3.7
1387	607			21.4	40.6	39.5	-1.1	-2.4	1.3
1149	607			21.4	40.6	45.3	4.7	-2.4	7.1
214	607			22.8	42.0	41.5	-0.5	-2.4	1.9
1479	608			27.6	46.8	34.3	-12.5	-2.4	-10.1
289	609			22.7	41.9	41.8	-0.2	-2.4	2.2
1416	609			22.3	41.5	38.1	-3.4	-2.4	-1.0
1415	609			22.4	41.6	41.2	-0.4	-2.4	2.0
62	611			23.1	42.3	39.3	-3.0	-2.4	-0.6
1391	611			22.5	41.8	40.2	-1.5	-2.4	0.9
558	611			22.1	41.3	43.7	2.4	-2.4	4.8
651	612			21.5	40.7	40.4	-0.4	-2.4	2.0
1441	613			22.2	41.4	39.4	-2.0	-2.4	0.4
1469	613			23.6	42.8	39.6	-3.3	-2.4	-0.9
1400	614			21.8	41.0	41.4	0.4	-2.4	2.8
1348	614			22.0	41.2	40.8	-0.4	-2.4	2.0
557	614			21.5	40.7	41.8	1.1	-2.4	3.5
685	615			21.0	40.3	37.7	-2.5	-2.4	-0.1
1454	615			21.8	41.0	41.6	0.7	-2.4	3.1
692	615			21.4	40.6	39.0	-1.6	-2.4	0.8
1316	617			23.0	42.2	40.2	-2.0	-2.4	0.4
223	617			23.3	42.6	40.9	-1.6	-2.4	0.8
532	618			21.8	41.1	39.1	-2.0	-2.4	0.4
559	618			21.9	41.2	41.6	0.4	-2.4	2.9
340	618			22.2	41.4	40.5	-0.9	-2.4	1.5
1171	618			21.9	41.1	39.8	-1.3	-2.4	1.2
1259	618			21.5	40.7	43.0	2.4	-2.4	4.8
538	619			22.1	41.3	42.6	1.3	-2.4	3.7
350	619			21.1	40.4	41.4	1.1	-2.4	3.5
697	619			21.8	41.1	43.6	2.5	-2.4	5.0
511	619			21.3	40.6	41.2	0.6	-2.4	3.1
543	619			22.3	41.6	38.8	-2.8	-2.4	-0.4
527	620			21.3	40.5	39.4	-1.1	-2.4	1.3
646	620			21.9	41.1	39.6	-1.5	-2.4	0.9
297	620			23.3	42.5	44.1	1.6	-2.4	4.0
1248	621			22.0	41.3	38.3	-3.0	-2.4	-0.5
1462	621			22.3	41.6	40.6	-1.0	-2.4	1.4
307	621			23.4	42.6	44.5	1.9	-2.4	4.3
1156	621			22.0	41.3	41.4	0.2	-2.4	2.6
84	621			23.6	42.9	45.0	2.2	-2.4	4.6
64	622			24.1	43.4	48.3	4.9	-2.4	7.3
282	622			22.9	42.1	44.4	2.3	-2.4	4.7
589	622			21.2	40.5	40.8	0.3	-2.4	2.7
1283	622			22.0	41.2	41.5	0.3	-2.4	2.7
519	622			22.1	41.3	39.6	-1.7	-2.4	0.7
271	623			22.6	41.9	45.8	3.9	-2.4	6.4
83	623			24.0	43.3	47.7	4.4	-2.4	6.8
604	624			21.1	40.3	40.9	0.6	-2.4	3.0
1139	624			24.3	43.5	34.5	-9.0	-2.4	-6.5
537	624			22.8	42.0	44.3	2.2	-2.4	4.7
602	625			21.7	41.0	42.0	1.1	-2.4	3.5
525	625			21.7	40.9	41.7	0.7	-2.4	3.2
659	625			21.8	41.1	39.4	-1.7	-2.4	0.7
523	625			22.3	41.6	40.2	-1.4	-2.4	1.0
603	625			21.3	40.6	40.2	-0.4	-2.4	2.1
534	625			22.4	41.6	45.6	4.0	-2.4	6.4
522	626			21.8	41.1	40.1	-1.0	-2.4	1.4
39	626			23.9	43.2	44.5	1.3	-2.4	3.8
1307	626			23.0	42.3	42.3	0.0	-2.4	2.5
498	626			21.7	41.0	39.1	-1.9	-2.4	0.6

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
506	626			22.0	41.2	39.5	-1.7	-2.4	0.7
614	626			22.2	41.5	41.7	0.2	-2.4	2.7
687	626			22.2	41.5	41.1	-0.5	-2.4	2.0
1380	627			22.1	41.4	40.6	-0.8	-2.4	1.7
1338	627			23.7	43.0	37.9	-5.1	-2.4	-2.7
5	627			25.0	44.3	41.4	-2.9	-2.4	-0.5
Average	616						0.3	-2.4	2.7

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
272	630			23.2	42.5	46.3	3.8	-2.4	6.2
541	630			22.4	41.7	39.8	-1.9	-2.4	0.6
285	630			25.2	44.4	45.0	0.5	-2.4	3.0
1153	630			22.3	41.5	38.3	-3.2	-2.4	-0.8
661	631			21.6	40.9	41.4	0.5	-2.4	3.0
535	632			22.7	42.0	41.4	-0.6	-2.4	1.8
31	632			23.6	42.9	44.4	1.6	-2.4	4.0
30	632			23.8	43.1	45.6	2.5	-2.4	5.0
50	632			24.0	43.3	45.6	2.3	-2.4	4.7
620	633			22.1	41.4	38.1	-3.3	-2.4	-0.9
657	633			22.1	41.4	41.6	0.2	-2.4	2.6
515	633			22.8	42.1	41.7	-0.4	-2.4	2.0
672	634			21.6	40.8	41.3	0.4	-2.4	2.9
1280	635			22.4	41.6	42.1	0.4	-2.4	2.9
1461	635			22.6	41.9	39.7	-2.2	-2.4	0.2
671	635			22.0	41.2	41.1	-0.2	-2.4	2.3
1244	635			22.6	41.9	41.4	-0.4	-2.4	2.0
598	635			22.0	41.2	40.9	-0.4	-2.4	2.1
266	637			23.9	43.2	45.5	2.3	-2.4	4.8
1460	637			23.2	42.5	40.6	-1.9	-2.4	0.5
229	637			23.6	42.9	45.2	2.3	-2.4	4.7
265	637			24.7	44.0	43.7	-0.3	-2.4	2.1
682	637			22.0	41.3	40.3	-1.0	-2.4	1.5
1233	638			23.2	42.5	36.3	-6.2	-2.5	-3.7
670	638			21.9	41.2	42.2	0.9	-2.5	3.4
311	638			23.7	43.0	44.4	1.4	-2.5	3.8
66	639			23.6	42.9	45.9	3.1	-2.5	5.5
33	639			24.0	43.3	44.0	0.7	-2.5	3.1
1159	639			23.3	42.6	39.7	-2.9	-2.5	-0.4
1274	640			22.6	41.8	38.7	-3.1	-2.5	-0.7
1186	640			23.3	42.6	39.4	-3.2	-2.5	-0.7
618	641			21.9	41.2	41.9	0.7	-2.5	3.2
6	642			24.3	43.6	41.9	-1.8	-2.5	0.7
67	643			23.9	43.2	46.3	3.1	-2.5	5.5
227	644			24.5	43.8	45.3	1.5	-2.5	4.0
338	644			23.6	42.9	36.9	-5.9	-2.5	-3.5
553	644			23.2	42.5	41.6	-1.0	-2.5	1.5
32	646			25.1	44.4	44.5	0.0	-2.5	2.5
653	647			22.8	42.1	37.8	-4.3	-2.5	-1.9
615	648			23.2	42.5	43.5	1.0	-2.5	3.5
391	648			22.1	41.4	40.8	-0.6	-2.5	1.8
1314	649			24.2	43.5	42.0	-1.6	-2.5	0.9
593	649			22.6	41.9	38.1	-3.8	-2.5	-1.4
1154	649			22.6	41.9	38.7	-3.2	-2.5	-0.7
1365	650			23.0	42.4	37.0	-5.4	-2.5	-2.9
1389	657			23.6	43.0	41.1	-1.8	-2.5	0.6
616	659			22.2	41.6	40.0	-1.6	-2.5	0.9
1455	659			23.5	42.9	41.9	-1.0	-2.5	1.5
1422	661			24.2	43.6	39.2	-4.4	-2.5	-1.9
1456	662			22.9	42.3	34.8	-7.5	-2.5	-5.0
Average	641						-0.2	-2.5	2.2

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
532	1224			21.7	42.7	37.7	-4.9	-3.0	-1.9
62	1224			21.6	42.5	29.2	-13.4	-3.0	-10.4
289	1224			20.6	41.6	38.8	-2.8	-3.0	0.2
651	1225			21.4	42.4	38.6	-3.9	-3.0	-0.8
685	1225			21.6	42.6	30.0	-12.7	-3.0	-9.6
511	1225			21.6	42.6	37.0	-5.7	-3.0	-2.7
558	1226			21.6	42.6	38.1	-4.6	-3.0	-1.6
282	1226			21.4	42.4	33.1	-9.3	-3.0	-6.3
1348	1227			20.3	41.3	26.5	-14.9	-3.0	-11.8
214	1227			21.1	42.1	36.6	-5.5	-3.0	-2.5
1469	1228			20.3	41.3	28.1	-13.2	-3.0	-10.2
1441	1228			20.9	41.9	27.2	-14.6	-3.0	-11.6
692	1230			20.7	41.7	32.5	-9.2	-3.0	-6.2
64	1233			22.3	43.4	29.2	-14.1	-3.0	-11.1
646	1234			21.5	42.5	37.6	-4.9	-3.0	-1.9
270	1234			21.1	42.2	40.0	-2.1	-3.0	0.9
223	1235			21.4	42.4	37.8	-4.7	-3.0	-1.6
559	1235			21.5	42.5	37.5	-5.1	-3.0	-2.0
1283	1236			20.3	41.4	30.9	-10.5	-3.0	-7.5
1171	1236			20.6	41.6	29.8	-11.9	-3.0	-8.8
1259	1236			20.9	42.0	32.1	-9.8	-3.0	-6.8
1316	1236			21.5	42.5	30.2	-12.4	-3.0	-9.4
604	1238			21.6	42.7	32.9	-9.8	-3.0	-6.8
620	1239			21.7	42.7	35.2	-7.5	-3.0	-4.5
84	1240			21.8	42.9	37.0	-5.9	-3.0	-2.9
543	1240			21.2	42.2	38.0	-4.2	-3.0	-1.2
557	1240			21.5	42.5	31.4	-11.1	-3.0	-8.1
527	1241			21.3	42.3	30.8	-11.5	-3.0	-8.5
297	1241			21.4	42.4	42.3	-0.1	-3.0	2.9
307	1244			21.1	42.2	42.8	0.6	-3.0	3.6
1248	1244			20.4	41.5	31.6	-9.9	-3.0	-6.8
538	1244			21.9	42.9	35.7	-7.2	-3.0	-4.1
506	1245			21.4	42.5	29.2	-13.3	-3.0	-10.3
271	1246			21.1	42.2	39.3	-2.8	-3.0	0.2
534	1248			21.5	42.6	38.6	-4.0	-3.0	-0.9
83	1248			22.4	43.5	41.2	-2.2	-3.0	0.8
603	1250			21.8	42.9	32.0	-10.9	-3.0	-7.8
659	1251			21.3	42.4	36.1	-6.3	-3.0	-3.3
602	1251			21.4	42.5	40.1	-2.4	-3.0	0.6
522	1253			21.6	42.7	37.4	-5.2	-3.0	-2.2
542	1253			21.6	42.6	40.8	-1.9	-3.0	1.2
1225	1253			21.4	42.5	29.4	-13.1	-3.0	-10.0
498	1253			21.6	42.7	37.8	-4.9	-3.0	-1.9
537	1253			21.7	42.8	41.5	-1.3	-3.0	1.7
523	1253			21.5	42.6	39.3	-3.3	-3.0	-0.3
697	1254			22.2	43.3	38.0	-5.3	-3.0	-2.3
525	1254			21.4	42.4	37.8	-4.6	-3.0	-1.6
39	1254			21.2	42.3	37.7	-4.6	-3.0	-1.5
311	1254			21.6	42.7	32.1	-10.6	-3.0	-7.5
50	1254			22.2	43.2	34.1	-9.2	-3.0	-6.1
340	1255			21.4	42.5	41.1	-1.4	-3.0	1.6
272	1255			21.5	42.6	37.5	-5.1	-3.0	-2.0
667	1255			21.5	42.6	40.7	-1.9	-3.0	1.1
553	1255			21.9	43.0	33.5	-9.5	-3.0	-6.5
661	1255			21.6	42.7	40.6	-2.1	-3.0	1.0
535	1255			22.2	43.2	32.9	-10.4	-3.0	-7.3
687	1255			22.3	43.4	42.3	-1.0	-3.0	2.0
519	1255			21.6	42.6	40.4	-2.3	-3.0	0.8
594	1256			22.4	43.5	38.1	-5.4	-3.0	-2.4
227	1256			22.4	43.5	31.9	-11.6	-3.0	-8.6
6	1256			21.9	43.0	33.3	-9.7	-3.0	-6.7
339	1257			22.3	43.3	32.4	-11.0	-3.0	-7.9
618	1257			22.5	43.6	32.5	-11.2	-3.0	-8.1
614	1258			21.9	43.0	33.7	-9.4	-3.0	-6.3
670	1259			22.2	43.3	30.5	-12.8	-3.0	-9.7
285	1260			22.6	43.7	29.9	-13.7	-3.0	-10.7
541	1261			21.7	42.8	35.0	-7.8	-3.0	-4.7
657	1266			21.9	43.0	35.6	-7.4	-3.0	-4.3
672	1267			21.3	42.5	35.7	-6.8	-3.0	-3.8
671	1268			21.8	42.9	31.4	-11.4	-3.0	-8.4
682	1272			22.0	43.1	28.0	-15.0	-3.0	-12.0
616	1319			22.8	44.1	29.0	-15.1	-3.1	-12.0
615	1320			23.3	44.6	36.4	-8.2	-3.1	-5.1
Average	1247						-5.7	-3.0	-2.6

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14431.01.T29.RP2

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)
1494	601			21.1	40.3	41.2	0.9	-2.4	3.3
676	603			23.4	42.6	40.3	-2.3	-2.4	0.1
1362	603			22.0	41.2	45.0	3.8	-2.4	6.2
1419	604			21.7	40.9	44.7	3.8	-2.4	6.2
299	606			23.7	42.9	45.0	2.1	-2.4	4.6
1254	610			24.8	44.0	32.6	-11.5	-2.4	-9.0
690	610			21.0	40.2	37.9	-2.4	-2.4	0.1
1399	612			22.9	42.1	42.6	0.5	-2.4	2.9
1330	612			22.0	41.2	31.4	-9.9	-2.4	-7.5
1208	613			22.8	42.0	42.0	0.0	-2.4	2.4
590	613			21.1	40.4	38.7	-1.6	-2.4	0.8
1295	613			21.9	41.2	40.6	-0.5	-2.4	1.9
1289	613			22.8	42.1	36.0	-6.1	-2.4	-3.7
570	613			21.8	41.0	42.9	1.9	-2.4	4.3
37	613			23.3	42.6	41.4	-1.1	-2.4	1.3
586	615			21.1	40.3	40.8	0.5	-2.4	2.9
1240	615			21.6	40.8	41.7	0.9	-2.4	3.3
1447	617			22.2	41.4	39.1	-2.4	-2.4	0.1
1429	617			22.0	41.2	38.7	-2.6	-2.4	-0.1
1294	618			21.9	41.2	41.5	0.3	-2.4	2.7
1329	618			22.9	42.1	40.1	-2.0	-2.4	0.4
277	618			26.2	45.4	45.0	-0.4	-2.4	2.0
539	619			21.6	40.8	40.6	-0.2	-2.4	2.2
202	619			22.9	42.1	37.7	-4.4	-2.4	-2.0
1180	619			21.4	40.7	40.7	0.0	-2.4	2.4
645	619			21.3	40.5	39.7	-0.8	-2.4	1.6
1450	619			22.0	41.3	40.7	-0.6	-2.4	1.8
520	619			22.2	41.5	40.5	-0.9	-2.4	1.5
233	620			23.4	42.6	45.7	3.1	-2.4	5.5
1342	620			22.3	41.5	41.5	0.0	-2.4	2.4
40	620			23.2	42.5	42.3	-0.2	-2.4	2.3
521	620			22.3	41.6	38.5	-3.1	-2.4	-0.7
273	620			22.7	42.0	44.8	2.8	-2.4	5.3
592	620			22.6	41.8	38.8	-3.0	-2.4	-0.6
1384	621			22.1	41.4	40.1	-1.3	-2.4	1.1
306	621			22.7	42.0	42.7	0.7	-2.4	3.2
9	622			23.4	42.6	43.5	0.9	-2.4	3.3
591	622			21.7	41.0	43.1	2.1	-2.4	4.5
619	622			22.2	41.4	41.4	-0.1	-2.4	2.4
605	622			20.8	40.0	40.1	0.0	-2.4	2.5
546	622			21.2	40.5	44.2	3.7	-2.4	6.1
528	623			22.2	41.5	40.8	-0.7	-2.4	1.8
524	624			22.5	41.7	39.1	-2.6	-2.4	-0.2
688	624			21.8	41.0	40.4	-0.7	-2.4	1.8
1480	624			23.2	42.5	41.8	-0.6	-2.4	1.8
1209	625			22.0	41.2	39.7	-1.5	-2.4	0.9
1321	625			24.5	43.8	43.4	-0.3	-2.4	2.1
1234	625			24.0	43.3	39.4	-3.8	-2.4	-1.4
1445	625			23.7	42.9	37.5	-5.5	-2.4	-3.0
533	625			23.2	42.4	46.1	3.7	-2.4	6.1
496	626			22.6	41.9	40.8	-1.1	-2.4	1.3
1443	626			22.7	42.0	41.5	-0.4	-2.4	2.0
1489	626			22.3	41.6	42.1	0.6	-2.4	3.0
35	626			23.8	43.1	45.3	2.2	-2.4	4.6
530	627			21.8	41.1	41.4	0.3	-2.4	2.7
588	627			22.4	41.6	40.0	-1.6	-2.4	0.8
1170	627			21.5	40.8	43.2	2.4	-2.4	4.9
1371	628			22.2	41.4	43.0	1.6	-2.4	4.0
500	628			21.4	40.7	39.6	-1.1	-2.4	1.3
1486	628			21.3	40.6	39.5	-1.1	-2.4	1.3
269	628			24.5	43.8	46.7	2.9	-2.4	5.4
1467	628			22.4	41.6	44.6	3.0	-2.4	5.4
280	628			23.0	42.2	45.9	3.7	-2.4	6.1
1173	629			23.3	42.6	36.4	-6.2	-2.4	-3.7
684	629			22.1	41.3	38.4	-2.9	-2.4	-0.5
540	630			21.7	40.9	41.0	0.0	-2.4	2.5
1319	631			22.4	41.7	44.5	2.8	-2.4	5.3
536	632			22.4	41.7	42.7	1.0	-2.4	3.4
341	632			22.3	41.5	40.7	-0.9	-2.4	1.6
Average	620						0.2	-2.4	2.7

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14431.01.T29.RP2

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)
279	638			24.6	43.9	41.2	-2.7	-2.5	-0.2
681	639			22.3	41.5	38.3	-3.3	-2.5	-0.8
1195	639			22.7	42.0	36.0	-6.0	-2.5	-3.5
1340	640			23.3	42.6	35.2	-7.4	-2.5	-5.0
695	640			22.3	41.6	39.4	-2.2	-2.5	0.3
1194	641			23.1	42.4	39.0	-3.4	-2.5	-1.0
573	642			22.2	41.5	37.3	-4.2	-2.5	-1.7
1339	646			22.7	42.1	43.2	1.1	-2.5	3.6
571	649			22.3	41.6	39.5	-2.1	-2.5	0.4
677	649			22.5	41.9	39.1	-2.8	-2.5	-0.3
1288	649			25.4	44.8	37.4	-7.3	-2.5	-4.8
1305	650			23.4	42.8	39.6	-3.1	-2.5	-0.7
1315	653			23.9	43.2	39.7	-3.6	-2.5	-1.1
51	653			24.4	43.7	39.3	-4.4	-2.5	-2.0
29	653			25.3	44.6	44.3	-0.4	-2.5	2.1
278	655			24.3	43.6	40.8	-2.8	-2.5	-0.3
1436	655			23.5	42.8	39.6	-3.2	-2.5	-0.7
1205	657			23.5	42.9	37.4	-5.5	-2.5	-3.0
52	657			24.3	43.6	40.8	-2.8	-2.5	-0.3
1485	668			23.9	43.3	40.8	-2.5	-2.5	0.0
Average	649						-3.0	-2.5	-0.5

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
582	600			24.0	43.2	38.0	-5.2	-2.4	-2.8
1183	604			23.0	42.2	36.8	-5.4	-2.4	-3.0
1383	605			22.5	41.7	42.6	0.9	-2.4	3.3
1359	607			24.3	43.6	34.0	-9.5	-2.4	-7.1
1301	611			21.7	41.0	39.3	-1.6	-2.4	0.8
1216	613			22.0	41.3	43.8	2.6	-2.4	5.0
1327	614			21.8	41.0	41.1	0.1	-2.4	2.5
1169	615			21.5	40.7	40.3	-0.4	-2.4	2.0
597	615			21.5	40.7	42.4	1.7	-2.4	4.1
1144	617			22.7	42.0	41.4	-0.5	-2.4	1.9
1449	618			21.4	40.6	40.5	-0.2	-2.4	2.3
1427	618			22.5	41.8	41.6	-0.2	-2.4	2.3
1218	619			22.3	41.5	40.9	-0.7	-2.4	1.8
1448	619			23.1	42.3	41.2	-1.1	-2.4	1.4
1296	620			21.5	40.7	40.5	-0.2	-2.4	2.2
1318	620			22.0	41.3	41.8	0.5	-2.4	3.0
1179	620			21.5	40.7	43.2	2.5	-2.4	4.9
288	621			23.9	43.1	47.5	4.4	-2.4	6.8
36	621			23.9	43.2	46.7	3.5	-2.4	6.0
295	621			23.7	42.9	45.4	2.5	-2.4	4.9
287	623			24.1	43.4	44.1	0.8	-2.4	3.2
575	623			21.3	40.5	40.7	0.2	-2.4	2.6
526	625			22.3	41.6	39.1	-2.4	-2.4	0.0
497	626			21.6	40.9	38.7	-2.2	-2.4	0.3
1442	626			21.8	41.1	40.4	-0.7	-2.4	1.7
1428	626			21.6	40.8	40.8	-0.1	-2.4	2.4
1317	626			22.3	41.5	41.9	0.4	-2.4	2.8
1237	627			25.4	44.7	39.4	-5.3	-2.4	-2.9
499	627			21.8	41.1	40.4	-0.7	-2.4	1.8
1464	627			25.5	44.7	40.1	-4.7	-2.4	-2.2
613	628			21.9	41.1	42.3	1.2	-2.4	3.6
1458	628			22.0	41.3	39.6	-1.7	-2.4	0.7
529	628			23.4	42.7	41.2	-1.5	-2.4	0.9
286	630			25.3	44.6	44.4	-0.2	-2.4	2.3
345	631			22.2	41.4	39.5	-2.0	-2.4	0.5
Average	620						0.0	-2.4	2.4

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

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
1383	1210			21.1	42.1	29.3	-12.8	-3.0	-9.8
1216	1225			20.4	41.4	35.6	-5.8	-3.0	-2.8
36	1230			21.5	42.5	36.6	-5.9	-3.0	-2.8
1327	1233			20.5	41.5	34.3	-7.2	-3.0	-4.2
1169	1233			20.4	41.4	29.5	-11.9	-3.0	-8.8
1449	1235			20.3	41.4	34.1	-7.2	-3.0	-4.2
1296	1237			20.7	41.7	31.4	-10.3	-3.0	-7.3
1318	1239			20.5	41.5	32.5	-9.0	-3.0	-5.9
1448	1239			20.7	41.8	34.1	-7.7	-3.0	-4.6
597	1239			22.0	43.0	33.1	-9.9	-3.0	-6.9
288	1240			21.9	42.9	40.4	-2.6	-3.0	0.5
1179	1244			20.3	41.4	29.9	-11.5	-3.0	-8.4
287	1247			21.6	42.7	41.4	-1.3	-3.0	1.7
497	1252			21.8	42.8	37.0	-5.8	-3.0	-2.8
295	1253			21.4	42.4	42.1	-0.4	-3.0	2.6
575	1253			21.3	42.4	37.2	-5.2	-3.0	-2.2
1464	1253			21.6	42.7	35.5	-7.2	-3.0	-4.1
1428	1253			20.6	41.7	30.6	-11.1	-3.0	-8.1
1427	1253			21.4	42.5	28.2	-14.3	-3.0	-11.3
1442	1254			20.9	42.0	28.6	-13.4	-3.0	-10.4
1458	1254			20.7	41.8	28.3	-13.5	-3.0	-10.5
499	1255			21.6	42.7	36.6	-6.1	-3.0	-3.1
613	1255			21.9	43.0	41.5	-1.6	-3.0	1.5
529	1255			22.5	43.6	36.1	-7.4	-3.0	-4.4
217	1256			21.7	42.8	32.6	-10.2	-3.0	-7.2
286	1256			21.9	43.0	40.4	-2.6	-3.0	0.4
526	1256			21.6	42.7	39.6	-3.1	-3.0	-0.1
Average	1245						-5.9	-3.0	-2.8

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

Project: Bluewater Wind Energy Centre- Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

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)
1168	605			20.8	40.0	41.7	1.6	-2.4	4.1
1385	614			22.5	41.7	39.6	-2.1	-2.4	0.3
1147	615			22.9	42.1	40.5	-1.7	-2.4	0.8
1215	621			23.4	42.7	39.8	-2.9	-2.4	-0.4
1444	621			21.9	41.1	40.9	-0.2	-2.4	2.2
1328	621			22.1	41.4	41.0	-0.3	-2.4	2.1
1175	621			21.7	41.0	40.8	-0.2	-2.4	2.3
1345	622			22.7	42.0	40.2	-1.8	-2.4	0.7
1211	622			22.2	41.4	39.8	-1.6	-2.4	0.8
1176	623			21.6	40.8	38.9	-1.9	-2.4	0.5
1219	626			22.3	41.5	38.6	-2.9	-2.4	-0.5
1191	626			24.2	43.4	30.4	-13.1	-2.4	-10.6
1293	626			22.8	42.1	41.7	-0.3	-2.4	2.1
1212	626			22.2	41.4	41.2	-0.2	-2.4	2.2
1213	627			23.2	42.5	43.7	1.2	-2.4	3.6
1292	627			22.3	41.6	41.5	-0.1	-2.4	2.3
1386	627			22.3	41.5	38.4	-3.2	-2.4	-0.7
1299	628			22.5	41.8	40.1	-1.7	-2.4	0.7
1143	628			23.8	43.1	40.3	-2.8	-2.4	-0.4
1382	628			22.6	41.9	39.2	-2.7	-2.4	-0.3
1142	628			22.4	41.7	41.4	-0.3	-2.4	2.1
1273	629			22.4	41.6	39.2	-2.5	-2.4	0.0
1426	632			24.4	43.7	38.9	-4.8	-2.4	-2.3
495	632			22.5	41.7	40.1	-1.6	-2.4	0.8
1174	632			22.4	41.6	41.5	-0.2	-2.4	2.3
1210	636			22.3	41.6	41.9	0.3	-2.4	2.7
Average	625						-1.2	-2.4	1.2

aercoustics

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

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

Appendix E
Measurement Data

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
1	7.1	50.6	892	121.5	121.7	0.3	12.3	5.3	3.2	-3	99.6	58
2	7.3	50.4	961	121.5	121.7	0.3	12.6	7.8	2.9	-3	99.6	58
3	8.0	52.1	1200	121.5	121.7	0.5	13.7	8.1	3.3	-3	99.6	58
4	8.2	52.2	1258	121.5	121.7	1.0	13.8	7.3	4.3	-3	99.6	58
5	9.6	52.7	1539	121.5	121.7	0.9	14.6	9.0	6.8	-2	99.5	58
6	9.4	55.1	1627	121.5	121.7	2.8	15.3	8.7	6.4	-2	99.5	58
7	9.0	53.6	1481	121.5	121.7	2.2	14.3	7.6	4.9	-2	99.5	58
8	9.6	53.8	1618	121.5	121.7	0.4	14.5	8.9	2.8	-2	99.5	58
9	10.0	54.1	1656	121.5	121.7	1.5	15.0	9.3	3.6	-2	99.5	58
10	9.9	54.7	1662	121.5	121.7	3.2	15.4	9.2	4.6	-2	99.5	58
11			1639	121.5	121.7	4.3	15.5	8.3	5.4	-2	99.5	57
12			1583	121.5	121.7	3.5	14.9	8.3	6.7	-2	99.5	57
13			1600	121.5	121.7	2.0	14.7	8.4	6.0	-2	99.5	57
14	9.2	53.7	1501	121.5	121.7	1.1	14.2	7.8	5.9	-2	99.5	57
15	8.5	53.4	1349	121.5	121.7	0.7	14.2	8.2	5.8	-2	99.5	57
16	7.8	52.3	1152	121.5	121.7	1.2	13.4	6.2	6.7	-2	99.5	57
17	7.7	52.0	1112	121.5	121.7	0.3	13.2	7.6	4.9	-2	99.5	56
18	8.5	52.7	1340	121.5	121.7	0.1	14.1	7.5	5.2	-2	99.5	56
19			1539	121.5	121.7	0.2	14.8	8.4	6.3	-2	99.5	56
20			1526	121.5	123.3	0.8	14.7	8.4	5.4	-2	99.5	56
21	8.9	53.3	1445	121.5	129.8	0.6	14.4	8.3	5.7	-2	99.5	56
22	8.4	53.3	1328	121.5	133.4	0.3	14.1	8.7	6.0	-2	99.5	56
23	7.4	52.3	1001	121.5	133.4	1.4	12.7	6.0	6.5	-2	99.5	56
24	7.1	50.3	872	121.5	133.4	0.5	12.2	7.1	4.4	-2	99.5	56
25	7.6	51.1	1057	121.5	133.4	0.4	13.1	7.8	5.4	-2	99.5	56
26	8.1	52.6	1234	121.5	133.4	0.5	13.8	7.8	5.2	-2	99.5	56
27	8.3	51.8	1283	121.5	133.4	0.9	13.9	7.6	5.2	-2	99.5	56
28	9.1	53.2	1487	121.5	133.4	0.2	14.5	9.6	5.7	-2	99.5	56
29	9.9	54.5	1670	121.5	133.4	2.7	15.6	9.2	6.8	-2	99.5	56
30	9.3	54.4	1622	121.5	133.4	3.9	15.4	8.7	6.1	-2	99.5	56
31	9.7	54.3	1622	121.5	133.4	3.7	15.3	9.1	5.0	-2	99.5	56
32	9.5	54.1	1636	121.5	133.4	5.1	15.5	8.8	5.3	-2	99.5	56
33	9.7	54.3	1618	121.5	133.4	5.8	15.3	9.0	6.8	-2	99.5	56
34			1617	121.5	133.4	5.7	15.2	8.1	6.0	-2	99.5	56
35	9.9	54.0	1624	121.5	133.4	5.9	15.2	9.2	5.6	-2	99.5	56
36	10.3	54.7	1608	121.5	133.4	5.5	14.9	9.6	4.9	-2	99.5	56
37	9.9	53.6	1612	121.5	133.4	4.3	14.8	9.2	6.0	-2	99.5	56
38			1637	121.5	133.4	4.4	15.0	8.2	6.6	-2	99.5	56
39	9.5	53.7	1634	121.5	133.4	4.7	15.1	8.9	6.3	-2	99.5	56
40	9.9	53.8	1611	121.5	133.4	3.8	14.8	9.3	5.3	-2	99.5	56
41			1609	121.5	133.4	2.2	14.6	8.2	5.4	-2	99.5	56
42			1635	121.5	133.4	1.8	14.8	8.2	5.0	-2	99.5	56
43			1601	121.5	133.4	1.9	14.7	8.1	6.2	-2	99.5	56
44	8.7	52.8	1405	121.5	133.4	0.5	14.1	7.6	6.7	-2	99.5	56
45	8.2	52.9	1276	121.5	133.4	0.4	13.9	7.0	6.1	-2	99.5	56
46	7.8	52.7	1156	121.5	133.4	0.3	13.5	6.7	5.5	-2	99.5	56
47	7.4	51.8	997	121.5	133.4	0.5	12.7	5.9	5.5	-2	99.5	56
48	7.6	51.3	1057	121.5	133.4	0.3	13.0	7.3	6.2	-2	99.5	56
49	8.5	52.9	1358	121.5	133.4	0.4	14.2	8.5	5.2	-2	99.5	56
50	9.3	53.9	1595	121.5	133.4	1.1	14.9	8.7	4.8	-2	99.5	56
51	9.9	55.1	1675	121.5	133.4	3.7	15.8	9.2	6.3	-2	99.5	56
52	10.0	54.2	1631	121.5	133.4	5.7	15.7	9.3	5.4	-2	99.5	56
53			1604	121.5	133.4	5.3	15.3	7.5	3.0	-2	99.5	56
54			1583	121.5	133.4	3.8	14.8	8.2	2.7	-2	99.5	56
55			1613	121.5	133.4	2.9	14.7	8.6	4.9	-2	99.5	56
56			1623	121.5	133.4	3.2	14.9	8.2	6.8	-2	99.5	56
57			1637	121.5	133.4	3.0	14.9	8.6	7.8	-2	99.5	56
58			1632	121.5	133.4	3.2	15.1	8.6	7.4	-2	99.5	56
59			1629	121.5	133.4	3.0	15.0	8.2	5.9	-2	99.5	55
60			1582	121.5	133.4	2.2	14.7	7.8	6.2	-2	99.5	55
61			1558	121.5	133.4	0.9	14.3	8.3	5.6	-2	99.5	55
62	9.6	53.0	1508	121.5	133.4	0.1	14.6	9.0	5.7	-2	99.5	55
63			1518	121.5	133.4	0.6	14.7	8.3	5.8	-2	99.5	55
64	9.3	54.7	1635	121.5	133.4	0.6	15.1	8.7	4.5	-2	99.5	55
65			1643	121.5	133.4	2.1	15.4	8.3	4.3	-2	99.5	56
66	9.5	54.2	1638	121.5	133.4	2.7	15.4	8.9	3.3	-2	99.5	56
67	9.4	54.6	1628	121.5	133.4	3.7	15.4	8.8	2.2	-2	99.5	56
68			1582	121.5	132.3	2.9	14.9	7.6	3.6	-2	99.5	56
69			1520	121.5	127.7	1.6	14.3	6.8	3.2	-2	99.5	56
70	8.9	52.4	1445	121.5	127.5	0.0	14.2	7.9	4.8	-2	99.5	57
71	8.8	52.7	1417	121.5	127.5	0.4	14.4	8.7	5.6	-2	99.5	57
72	8.9	53.1	1443	121.5	127.5	0.4	14.4	8.2	6.7	-2	99.5	57
73	8.9	53.4	1455	121.5	127.5	0.3	14.5	7.6	8.0	-2	99.5	57
74	8.6	53.7	1369	121.5	127.5	0.5	14.2	7.3	6.2	-2	99.5	57
75	8.3	52.4	1284	121.5	127.5	0.3	13.9	7.7	4.6	-2	99.5	57
76	8.0	52.4	1197	121.5	127.5	0.1	13.6	6.8	5.1	-2	99.5	57
77	7.6	52.3	1079	121.5	127.5	0.4	13.1	6.5	4.9	-2	99.5	57
78	7.4	51.7	1001	121.5	127.5	0.4	12.8	6.0	5.8	-2	99.5	57
79	7.3	51.2	966	121.5	127.5	0.4	12.8	5.4	5.4	-2	99.5	57
80	7.4	51.6	997	121.5	127.5	0.4	12.9	5.8	5.4	-2	99.5	57
81	7.6	51.6	1051	121.5	127.5	0.4	13.0	7.8	4.4	-2	99.5	57
82	8.3	51.8	1290	121.5	127.5	0.3	13.9	8.4	3.7	-2	99.5	57
83	9.4	54.0	1629	121.5	127.5	0.3	14.9	8.7	3.3	-2	99.5	57
84	9.7	55.3	1599	121.5	127.5	0.5	15.0	9.1	4.3	-2	99.5	57
85			1529	121.5	127.5	0.6	14.7	8.2	4.1	-2	99.5	57
86	9.0	53.8	1470	121.5	127.5	0.0	14.5	8.6	5.7	-2	99.5	57
87	8.6	53.5	1379	121.5	127.5	0.1	14.2	7.7	4.0	-2	99.5	57
88	8.1	52.8	1241	121.5	127.5	0.5	13.8	7.2	3.5	-2	99.5	57

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
89	7.7	51.7	1084	121.5	127.5	0.3	13.2	6.3	4.9	-2	99.5	58
90	7.5	51.7	1020	121.5	127.5	0.4	12.8	6.9	4.3	-2	99.5	58
91	8.0	52.3	1199	121.5	127.5	0.1	13.6	7.3	4.2	-2	99.5	58
92	8.8	53.4	1428	121.5	127.5	0.2	14.4	8.7	3.4	-2	99.5	58
93	8.9	53.9	1441	121.5	127.5	0.3	14.5	7.5	3.6	-2	99.5	58
94	8.5	53.2	1335	121.5	127.5	0.8	14.1	8.2	4.2	-2	99.5	58
95	7.9	52.7	1188	121.5	127.5	0.4	13.5	6.7	4.1	-2	99.5	58
96	7.7	52.0	1118	121.5	126.7	0.4	13.3	6.9	1.9	-2	99.5	58
97	7.9	52.5	1191	121.5	127.3	0.2	13.6	8.6	4.1	-2	99.5	58
98	7.9	52.0	1170	121.5	127.5	0.3	13.5	7.9	4.9	-2	99.5	58
99	7.7	52.8	1087	121.5	127.1	0.4	13.1	7.4	4.8	-2	99.5	58
100	7.5	52.2	1041	121.5	127.5	0.4	13.0	7.0	5.5	-2	99.5	58
101	7.4	51.2	992	121.5	127.5	0.4	12.7	6.9	6.0	-2	99.5	58
102	7.6	51.1	1075	121.5	127.5	0.4	13.2	6.9	5.1	-2	99.5	58
103	7.7	52.0	1118	121.5	127.5	0.4	13.3	7.1	5.3	-2	99.5	58
104	7.5	51.7	1020	121.5	127.5	0.4	12.9	7.5	4.0	-2	99.5	58
105	7.4	50.8	974	121.5	127.5	0.4	12.7	7.5	3.8	-2	99.5	58
106	7.4	50.5	991	121.5	127.5	0.4	12.8	8.0	4.2	-2	99.5	58
107	7.3	50.4	949	121.5	127.5	0.4	12.6	7.8	5.5	-2	99.5	58
108	7.0	50.1	827	121.5	127.5	0.5	12.0	7.3	4.3	-2	99.5	58
109	6.7	49.4	749	121.5	127.5	0.4	11.6	6.6	5.2	-2	99.5	58
110	6.8	49.6	772	121.5	127.5	0.4	11.8	6.6	5.4	-2	99.5	58
111	6.8	49.5	781	121.5	127.5	0.4	11.9	6.0	6.0	-2	99.5	58
112	6.8	49.0	760	121.5	127.5	0.4	11.7	6.6	4.5	-2	99.5	58
113	6.7	49.5	752	121.5	127.5	0.4	11.7	6.1	4.1	-2	99.5	57
114	6.7	49.5	740	121.5	127.5	0.4	11.6	5.6	3.8	-2	99.5	57
115	7.0	49.6	820	121.5	127.5	0.4	12.0	7.8	5.0	-2	99.5	57
116	7.2	50.4	927	121.5	127.5	0.4	12.6	7.7	5.0	-2	99.5	57
117	7.4	50.0	986	121.5	127.5	0.4	12.8	6.7	6.1	-2	99.5	57
118	7.5	51.0	1018	121.5	127.5	0.4	12.9	6.7	5.1	-2	99.5	57
119	7.8	51.4	1129	121.5	127.5	0.3	13.3	7.5	5.4	-2	99.5	56
120	8.4	52.5	1310	121.5	127.5	0.1	14.0	9.1	4.7	-2	99.5	56
121	8.4	53.3	1325	121.5	127.5	0.6	14.1	8.1	6.3	-2	99.5	56
122	7.9	52.3	1170	121.5	127.5	0.3	13.5	6.8	4.9	-2	99.5	56
123	7.5	52.2	1034	121.5	126.3	0.4	13.0	7.4	4.1	-2	99.5	56
124	7.2	50.9	922	121.5	126.9	0.4	12.4	6.2	3.9	-2	99.5	57
125	7.2	50.1	927	121.5	127.5	0.4	12.5	6.6	2.6	-2	99.5	57
126	7.4	50.6	972	121.5	127.5	0.4	12.7	6.5	3.6	-2	99.5	57
127	7.5	50.9	1026	121.5	127.5	0.4	12.9	7.1	4.7	-2	99.5	57
128	7.9	51.9	1163	121.5	127.5	0.4	13.5	8.1	5.8	-2	99.5	57
129	8.1	52.7	1252	121.5	127.5	0.3	13.8	8.6	7.2	-2	99.5	57
130	8.5	53.1	1341	121.5	127.5	0.2	14.1	8.9	5.8	-2	99.5	57
131	9.0	53.6	1473	121.5	130.7	0.2	14.6	8.9	5.7	-2	99.5	56
132	8.7	54.2	1411	121.5	135.9	0.5	14.4	8.2	4.7	-2	99.5	56
133	7.9	52.3	1161	121.5	136.3	1.0	13.4	6.7	3.7	-2	99.5	56
134	7.6	51.2	1049	121.5	136.3	0.3	13.0	7.2	4.6	-2	99.5	56
135	7.6	51.2	1082	121.5	136.3	0.3	13.1	7.9	4.0	-2	99.5	56
136	7.7	51.9	1114	121.5	136.3	0.3	13.3	7.5	4.2	-2	99.5	56
137	7.7	52.0	1105	121.5	136.3	0.3	13.2	7.4	5.6	-2	99.5	57
138	8.0	52.1	1208	121.5	136.3	0.2	13.6	8.0	6.5	-2	99.5	57
139	8.3	52.7	1296	121.5	136.3	0.3	14.0	8.4	6.5	-2	99.5	57
140	8.1	52.3	1252	121.5	136.3	0.5	13.8	7.8	5.6	-2	99.5	57
141	7.8	52.3	1152	121.5	136.3	0.3	13.4	8.0	5.5	-2	99.5	57
142	7.8	51.5	1129	121.5	136.3	0.3	13.3	8.3	4.6	-2	99.5	57
143	7.8	51.4	1148	121.5	136.3	0.3	13.4	7.4	5.6	-2	99.5	57
144	8.0	51.6	1212	121.5	136.3	0.2	13.6	8.0	5.3	-2	99.5	57
145	8.4	52.6	1332	121.5	136.3	0.1	14.1	8.4	5.3	-2	99.5	57
146	8.4	52.8	1324	121.5	136.3	0.4	14.1	8.0	4.8	-2	99.5	57
147	8.2	52.4	1262	121.5	136.3	0.5	13.8	7.6	4.5	-2	99.5	57
148	7.9	51.9	1180	121.5	136.3	0.3	13.5	7.2	4.5	-2	99.5	57
149	7.6	51.9	1078	121.5	136.3	0.3	13.1	7.2	4.1	-2	99.5	57
150	7.5	51.2	1043	121.5	136.3	0.3	13.0	7.2	4.0	-2	99.5	57
151	7.4	51.2	989	121.5	136.3	0.3	12.8	7.0	4.6	-2	99.5	57
152	7.3	50.2	933	121.5	136.3	0.3	12.5	7.4	5.1	-2	99.5	57
153	7.3	50.3	939	121.5	136.3	0.3	12.6	7.3	5.4	-2	99.5	57
154	7.1	50.0	873	121.5	136.3	0.3	12.3	6.4	5.2	-2	99.5	57
155	6.7	49.5	739	121.5	136.3	0.7	11.6	6.0	4.7	-2	99.5	57
156	6.3	48.2	623	121.5	136.3	0.6	10.9	5.6	4.5	-2	99.5	57
157	6.3	47.8	612	121.5	136.3	0.3	11.0	6.1	4.7	-2	99.5	57
158	6.5	48.5	688	121.5	136.3	0.3	11.3	6.5	5.2	-2	99.5	57
159	6.9	49.4	804	121.5	136.3	0.4	12.1	7.0	4.3	-2	99.5	57
160	7.0	49.7	835	121.5	136.3	0.3	12.1	6.9	3.7	-2	99.5	57
161	7.1	50.0	865	121.5	136.3	0.3	12.2	7.1	3.5	-2	99.5	58
162	7.3	49.9	931	121.5	136.3	0.3	12.6	6.7	4.5	-2	99.5	58
163	7.3	50.7	952	121.5	135.4	0.3	12.7	7.3	4.6	-2	99.5	58
164	7.2	50.6	923	121.5	129.7	0.3	12.5	7.1	3.6	-2	99.5	58
165	7.1	50.3	887	121.5	127.5	0.3	12.3	7.0	4.1	-2	99.5	58
166	7.1	49.9	860	121.5	127.5	0.3	12.2	6.5	4.3	-2	99.5	58
167	7.2	50.1	913	121.5	127.5	0.3	12.5	7.0	5.4	-2	99.5	58
168	7.2	50.5	921	121.5	127.5	0.3	12.5	6.9	4.2	-2	99.5	58
169	7.2	50.1	902	121.5	127.5	0.3	12.4	6.7	3.4	-2	99.5	58
170	7.1	49.8	879	121.5	127.5	0.3	12.4	7.2	4.8	-2	99.5	58
171	6.8	49.7	772	121.5	127.5	0.5	11.7	6.2	4.4	-2	99.5	58
172	6.5	48.9	692	121.5	127.5	0.4	11.3	6.5	5.1	-2	99.5	58
173	6.6	48.9	720	121.5	127.5	0.4	11.6	6.6	4.3	-2	99.5	58
174	6.7	49.3	755	121.5	127.5	0.4	11.7	6.4	4.7	-2	99.5	58
175	6.8	49.8	761	121.5	127.5	0.4	11.8	6.0	6.4	-2	99.5	58
176	6.6	50.0	716	121.5	127.5	0.4	11.4	6.2	6.4	-2	99.5	58

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
177	6.6	49.3	714	121.5	127.5	0.4	11.5	7.1	5.4	-2	99.5	58
178	6.7	50.2	746	121.5	127.5	0.4	11.7	6.5	5.4	-2	99.5	58
179	6.8	49.5	774	121.5	127.5	0.4	11.8	7.0	5.7	-2	99.5	57
180	6.9	49.5	793	121.5	127.5	0.4	11.9	7.0	5.4	-2	99.5	57
181	6.9	49.2	797	121.5	127.5	0.4	11.9	6.7	5.6	-2	99.5	57
182	6.8	49.0	766	121.5	127.5	0.4	11.8	6.4	5.1	-2	99.5	57
183	6.5	49.4	676	121.5	127.5	0.4	11.2	6.1	4.4	-2	99.5	57
184	6.4	48.2	647	121.5	127.5	0.4	11.1	5.7	4.4	-2	99.5	57
185	6.5	49.2	669	121.5	127.5	0.4	11.3	5.7	3.7	-2	99.5	57
186	6.7	48.9	727	121.5	127.5	0.4	11.6	7.0	4.4	-2	99.5	57
187	6.9	50.1	809	121.5	127.5	0.4	12.0	7.2	3.5	-2	99.5	57
188	7.0	49.6	852	121.5	127.5	0.4	12.2	6.5	3.8	-2	99.5	57
189	7.0	50.3	822	121.5	127.5	0.5	12.1	6.3	5.5	-2	99.5	57
190	6.5	49.0	678	121.5	127.5	1.0	11.2	5.1	4.3	-2	99.5	57
191	6.4	47.7	634	121.5	127.5	0.4	11.0	6.7	4.2	-2	99.5	58
192	6.9	49.2	807	121.5	127.5	0.4	12.0	7.7	4.7	-2	99.5	58
193	7.2	50.2	905	121.5	127.5	0.4	12.5	7.1	4.4	-2	99.5	58
194	7.0	49.6	837	121.5	127.5	0.5	12.1	6.6	4.1	-2	99.5	58
195	6.9	49.6	808	121.5	127.5	0.5	11.9	6.4	4.1	-2	99.5	58
196	7.2	49.9	918	121.5	127.5	0.5	12.5	7.8	4.9	-2	99.5	58
197	7.6	51.2	1071	121.5	127.5	0.5	13.1	7.6	3.8	-2	99.5	58
198	7.9	52.3	1162	121.5	127.5	0.5	13.5	8.4	3.1	-2	99.5	58
199	7.8	51.9	1132	121.5	127.5	0.3	13.3	7.9	4.3	-2	99.5	58
200	7.9	52.5	1166	121.5	127.5	0.2	13.5	7.6	4.9	-2	99.5	58
201	8.5	52.5	1348	121.5	127.5	0.2	14.1	7.5	4.9	-2	99.5	58
202	10.2	53.2	1567	121.5	127.5	0.2	14.8	9.5	4.8	-2	99.5	58
203			1536	121.5	127.5	0.8	14.7	8.6	3.2	-2	99.5	57
204	9.2	53.4	1499	121.5	127.5	0.5	14.6	7.1	4.8	-2	99.5	57
205			1518	121.5	127.5	0.1	14.7	8.1	5.2	-2	99.5	57
206	8.8	53.5	1416	121.5	127.5	0.5	14.4	6.8	5.7	-2	99.5	57
207	8.5	52.6	1342	121.5	127.5	0.1	14.1	6.3	5.1	-2	99.5	57
208	8.5	52.4	1352	121.5	127.5	0.2	14.2	7.6	3.9	-2	99.5	57
209	8.8	53.0	1434	121.5	127.5	0.1	14.4	7.9	5.2	-2	99.5	57
210			1592	121.5	127.5	0.2	14.9	8.1	6.7	-2	99.5	57
211			1629	121.5	127.5	1.3	15.2	8.5	6.2	-2	99.5	57
212			1524	121.5	127.5	0.8	14.7	7.9	6.0	-2	99.5	57
213	9.2	53.4	1496	121.5	129.2	0.1	14.6	9.1	4.7	-2	99.5	57
214	9.6	53.5	1520	121.5	130.5	0.3	14.7	8.9	4.6	-2	99.5	57
215	9.2	53.5	1500	121.5	130.5	0.3	14.6	8.4	6.4	-2	99.5	57
216	9.4	53.2	1535	121.5	130.5	0.3	14.7	8.7	6.1	-2	99.5	57
217	10.5	54.2	1664	121.5	130.5	1.5	15.4	9.8	6.1	-2	99.5	57
218			1604	121.5	130.5	3.0	15.3	7.8	6.0	-2	99.5	57
219			1591	121.5	130.5	2.0	14.9	8.4	6.6	-2	99.5	57
220			1598	121.5	130.5	1.2	14.7	8.1	7.1	-2	99.5	57
221	9.0	52.8	1483	121.5	130.5	0.6	14.3	8.4	6.2	-2	99.4	56
222	9.0	53.1	1477	121.5	130.5	0.2	14.6	8.4	7.3	-2	99.4	56
223	9.6	53.6	1572	121.5	130.5	0.3	14.9	9.0	5.9	-2	99.4	56
224			1572	121.5	130.5	0.4	14.9	8.5	5.0	-2	99.4	56
225			1568	121.5	130.5	0.4	14.9	8.3	5.8	-2	99.4	56
226			1588	121.5	130.5	0.3	14.9	8.2	6.8	-2	99.4	56
227	9.5	54.5	1658	121.5	130.5	1.7	15.4	8.8	6.2	-2	99.4	56
228			1622	121.5	130.5	2.8	15.3	8.4	6.2	-2	99.4	56
229	9.4	53.6	1630	121.5	130.5	3.0	15.3	8.8	5.7	-2	99.4	56
230			1597	121.5	130.5	2.9	15.1	7.5	5.9	-2	99.4	56
231			1586	121.5	130.5	2.1	14.7	8.1	5.0	-2	99.4	56
232			1620	121.5	130.5	1.2	14.7	8.3	5.0	-2	99.4	56
233	9.8	54.0	1636	121.5	134.8	1.4	14.9	9.1	5.2	-2	99.4	57
234			1591	121.5	140.2	1.2	14.7	8.3	4.8	-2	99.4	57
235			1438	121.5	140.2	0.2	14.5	8.8	4.9	-2	99.4	57
236			1386	121.5	140.2	0.5	14.2	8.1	5.2	-2	99.4	57
237			1512	121.5	140.2	0.2	14.6	7.7	5.8	-2	99.4	57
238			1674	121.5	140.2	2.4	15.6	9.4	6.3	-2	99.4	57
239			1613	121.5	140.2	4.1	15.4	8.2	5.5	-2	99.4	57
240			1591	121.5	140.2	2.8	15.0	8.3	6.5	-2	99.4	57
241			1596	121.5	140.2	2.8	15.0	8.3	7.7	-2	99.4	57
242			1537	121.5	140.2	2.0	14.3	7.5	7.6	-2	99.4	57
243			1412	121.5	140.2	0.4	14.2	6.8	6.5	-2	99.4	57
244			1447	121.5	140.2	0.3	14.5	8.0	6.4	-2	99.4	57
245			1649	121.5	140.2	1.5	15.3	9.0	5.6	-2	99.4	57
246			1616	121.5	140.2	3.9	15.5	7.6	6.5	-2	99.4	57
247			1567	121.5	140.2	2.9	14.9	8.1	7.0	-2	99.4	57
248			1610	121.5	140.2	1.9	14.8	7.8	6.3	-2	99.4	57
249			1562	121.5	140.2	1.4	14.5	7.5	5.1	-2	99.4	57
250			1644	121.5	140.2	1.2	14.8	9.8	5.2	-2	99.4	57
251			1667	121.5	140.2	3.9	15.5	8.8	6.1	-2	99.4	57
252			1635	121.5	140.2	4.1	15.3	8.5	6.9	-2	99.4	57
253			1637	121.5	140.2	5.3	15.5	8.9	6.9	-2	99.4	57
254			1615	121.5	140.2	5.4	15.3	8.8	6.7	-2	99.4	57
255			1624	121.5	140.2	5.7	15.2	9.0	6.6	-2	99.4	57
256			1626	121.5	140.2	6.5	15.3	8.9	6.8	-2	99.4	57
257			1634	121.5	140.2	7.3	15.4	9.6	6.5	-2	99.4	57
258			1609	121.5	140.2	7.1	15.1	9.0	7.3	-2	99.4	57
259			1621	121.5	140.2	6.6	15.0	8.8	6.9	-2	99.4	57
260			1613	121.5	140.2	5.9	14.9	8.5	6.2	-2	99.4	57
261			1620	121.5	140.2	4.9	14.8	8.8	5.4	-2	99.4	57
262			1609	121.5	140.2	3.9	14.6	8.9	4.4	-2	99.4	57
263			1611	121.5	140.2	2.0	14.4	8.2	5.9	-2	99.4	58
264			1679	121.5	137.3	3.7	15.2	9.2	6.4	-2	99.4	58

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
265	9.4	54.1	1649	121.5	136.3	5.7	15.4	8.8	5.5	-2	99.4	58
266	9.4	53.7	1627	121.5	136.3	5.7	15.3	8.8	5.2	-2	99.4	58
267			1619	121.5	136.3	5.4	15.2	8.1	6.3	-2	99.4	58
268			1629	121.5	136.3	6.2	15.2	8.3	7.1	-2	99.4	58
269	10.1	53.9	1623	121.5	136.3	6.7	15.2	9.4	5.0	-2	99.4	57
270	9.4	54.4	1611	121.5	136.3	6.2	15.0	8.8	5.2	-2	99.4	57
271	9.7	53.4	1628	121.5	136.3	5.8	15.0	9.0	7.2	-2	99.4	57
272	9.6	53.7	1636	121.5	136.3	6.8	15.2	8.9	6.7	-2	99.4	57
273	9.8	53.9	1610	121.5	136.3	6.0	14.9	9.2	6.7	-2	99.4	57
274			1600	121.5	136.3	4.4	14.6	8.3	6.2	-2	99.4	57
275			1556	121.5	136.3	2.0	14.1	7.8	6.7	-2	99.4	57
276			1541	121.5	136.3	0.7	14.4	7.8	7.2	-2	99.4	57
277	10.0	55.2	1676	121.5	136.3	3.0	15.6	9.3	6.5	-2	99.4	57
278	9.8	54.5	1640	121.5	136.3	6.9	15.9	9.1	6.1	-2	99.4	57
279	10.1	54.3	1612	121.5	136.3	7.3	15.6	9.4	7.1	-2	99.4	57
280	9.9	53.9	1590	121.5	136.3	6.3	15.1	9.2	7.4	-2	99.4	57
281			1597	121.5	136.3	4.7	14.7	8.1	7.4	-2	99.4	57
282	9.7	53.0	1629	121.5	136.3	4.8	14.9	9.0	7.3	-2	99.4	57
283			1639	121.5	136.3	5.3	15.1	8.3	6.3	-2	99.4	57
284	10.1	54.1	1654	121.5	136.3	6.5	15.4	9.4	6.4	-2	99.4	57
285	9.7	54.1	1627	121.5	136.3	7.3	15.3	9.1	6.0	-2	99.4	57
286	10.3	54.3	1618	121.5	136.3	6.9	15.2	9.6	6.4	-2	99.4	57
287	10.7	54.0	1617	121.5	136.3	6.6	15.0	9.9	7.0	-2	99.4	57
288	10.5	54.4	1618	121.5	136.3	6.2	14.9	9.8	6.0	-2	99.4	57
289	9.6	53.9	1611	121.5	136.3	5.0	14.7	8.9	5.4	-2	99.4	57
290			1603	121.5	136.3	3.6	14.5	8.2	5.0	-2	99.4	57
291			1547	121.5	136.3	1.4	14.0	7.1	5.2	-2	99.4	57
292	8.5	53.4	1349	121.5	136.3	0.4	14.1	7.6	5.0	-2	99.4	57
293	8.9	52.9	1453	121.5	136.3	0.3	14.5	8.6	3.7	-2	99.4	58
294	9.2	53.6	1506	121.5	136.3	0.5	14.6	9.3	3.4	-2	99.4	58
295	10.5	54.3	1624	121.5	136.3	0.1	15.0	9.7	5.1	-2	99.4	58
296			1605	121.5	136.3	0.4	15.0	8.3	3.9	-2	99.4	58
297	9.3	54.7	1571	121.5	136.3	0.4	14.9	8.7	4.5	-2	99.4	58
298	8.9	53.9	1460	121.5	136.3	0.3	14.5	7.0	7.2	-2	99.4	58
299	9.8	53.7	1596	121.5	136.3	0.1	14.9	9.1	6.9	-2	99.4	57
300			1646	121.5	136.3	1.6	15.3	8.0	6.0	-2	99.4	57
301			1624	121.5	136.3	2.5	15.2	8.3	6.6	-2	99.4	57
302			1636	121.5	136.3	3.5	15.5	8.6	6.4	-2	99.4	57
303			1584	121.5	136.3	3.0	14.9	8.5	6.2	-2	99.4	57
304			1599	121.5	136.3	2.0	14.8	8.1	6.1	-2	99.4	57
305	9.2	53.1	1503	121.5	136.3	1.1	14.2	7.8	5.8	-2	99.4	57
306	9.9	53.0	1529	121.5	136.3	0.1	14.6	9.2	5.9	-2	99.4	57
307	9.4	54.3	1611	121.5	136.3	0.5	15.0	8.8	4.0	-2	99.4	57
308	9.1	54.2	1491	121.5	136.3	0.6	14.6	8.0	4.5	-2	99.4	57
309	8.9	53.0	1448	121.5	136.3	0.3	14.5	8.1	7.0	-2	99.4	57
310			1570	121.5	136.3	0.1	14.8	8.5	7.3	-2	99.4	57
311	9.4	54.6	1639	121.5	136.3	0.9	15.3	8.8	6.9	-2	99.4	57
312			1482	121.5	138.3	1.2	14.6	7.5	6.1	-2	99.4	57
313			1240	121.5	140.2	0.4	13.7	6.8	5.6	-2	99.4	57
314			1162	121.5	140.2	0.4	13.4	7.9	5.1	-2	99.4	57
315			1282	121.5	140.2	0.1	13.9	8.2	5.5	-2	99.4	57
316			1372	121.5	140.2	0.1	14.3	7.9	5.6	-2	99.4	57
317			1221	121.5	140.2	0.9	13.7	7.5	5.4	-2	99.4	57
318			1178	121.5	140.2	0.4	13.5	6.7	5.6	-2	99.4	57
319			1179	121.5	140.2	0.3	13.5	7.3	5.2	-2	99.4	57
320			1220	121.5	140.2	0.2	13.6	8.9	4.4	-2	99.4	57
321			1361	121.5	140.2	0.1	14.3	8.3	5.2	-2	99.4	57
322			1295	121.5	140.2	1.0	14.0	7.7	6.5	-2	99.4	57
323			1173	121.5	140.2	0.5	13.4	8.0	6.7	-2	99.4	58
324			1278	121.5	140.2	0.1	13.9	8.3	6.8	-2	99.4	58
325			1309	121.5	140.2	0.7	14.0	8.6	6.0	-2	99.4	58
326			1308	121.5	140.2	0.8	14.0	8.6	6.8	-2	99.4	58
327			1438	121.5	140.2	0.1	14.5	8.4	6.6	-2	99.4	58
328			1565	121.5	140.2	0.5	14.9	8.4	6.9	-2	99.4	58
329			1624	121.5	140.2	0.4	15.1	8.5	8.3	-2	99.4	56
330			1542	121.5	140.2	0.8	14.8	8.8	7.7	-2	99.4	56
331			1372	121.5	140.2	0.5	14.2	7.5	7.0	-2	99.4	56
332			1407	121.5	140.2	0.0	14.4	8.0	6.0	-2	99.4	56
333	7.9	51.5	1161	146.5	146.1	0.3	13.5	7.2	7.5	-1	99.4	55
334	7.5	51.1	1020	146.5	146.1	0.4	12.9	7.1	6.9	-1	99.4	55
335	7.3	50.3	939	146.5	146.1	0.4	12.6	7.3	6.5	-1	99.4	55
336	7.1	49.9	855	146.5	146.1	0.4	12.2	6.6	6.1	-1	99.4	55
337	7.6	49.4	1048	146.5	146.1	0.5	12.8	7.5	6.0	-1	99.4	55
338	9.5	53.0	1658	146.5	146.1	1.2	15.1	8.8	5.4	-1	99.4	55
339	9.5	53.8	1628	146.5	146.1	4.1	15.2	8.8	5.0	-1	99.4	55
340	9.3	53.7	1623	146.5	146.1	3.2	15.0	8.7	5.9	-1	99.4	55
341	10.1	53.8	1637	146.5	146.1	3.8	15.2	9.4	6.6	-1	99.4	55
342			1622	146.5	146.1	4.0	15.1	8.5	4.4	-1	99.4	55
343			1617	146.5	146.4	3.3	15.0	8.3	4.4	-1	99.4	55
344			1649	146.5	151.0	4.5	15.3	8.6	7.4	-1	99.4	55
345	10.4	52.9	1628	146.5	151.9	5.5	15.3	9.7	7.8	-1	99.4	55
346			1622	146.5	151.9	5.1	15.2	8.5	7.0	-1	99.4	55
347			1622	146.5	151.9	5.3	15.1	8.3	6.7	-1	99.4	55
348			1605	146.5	151.9	4.3	14.8	8.0	7.3	-1	99.4	55
349			1627	146.5	151.9	3.7	14.9	8.2	6.1	-1	99.4	55
350	9.3	52.9	1619	146.5	151.9	3.5	14.9	8.7	6.5	-1	99.4	55
351			1617	146.5	151.9	2.2	14.7	8.3	4.2	-1	99.4	55
352			1609	146.5	151.9	1.4	14.6	8.2	7.3	-1	99.4	55

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
353	8.9	52.9	1442	146.5	151.9	0.6	14.4	7.5	7.9	-1	99.4	55
354	8.2	52.2	1264	146.5	151.9	0.4	13.8	6.9	7.2	-1	99.4	55
355	7.8	51.2	1135	146.5	151.9	0.4	13.4	6.8	5.8	-1	99.4	55
356	7.8	51.5	1126	146.5	151.9	0.3	13.3	7.3	6.2	-1	99.4	55
357	8.0	51.7	1199	146.5	151.9	0.2	13.7	7.5	6.0	-1	99.4	55
358	7.9	51.7	1180	146.5	151.9	0.4	13.6	8.0	5.4	-1	99.4	55
359	7.4	51.3	1002	146.5	151.9	0.7	12.8	6.8	4.8	-1	99.4	55
360	7.1	49.4	867	146.5	151.9	0.4	12.2	6.5	4.3	-1	99.4	55
361	7.0	48.9	843	146.5	151.9	0.4	12.1	7.0	3.5	-1	99.4	55
362	7.2	49.1	897	146.5	151.9	0.4	12.4	7.2	3.7	-1	99.4	55
363	7.7	50.7	1092	146.5	151.9	0.4	13.2	9.0	5.0	-1	99.4	55
364	7.8	51.5	1155	146.5	151.9	0.4	13.5	8.9	5.2	-1	99.4	55
365	7.5	51.9	1032	146.5	151.9	0.4	13.0	6.9	5.6	-1	99.4	55
366	7.1	51.3	891	146.5	151.9	0.4	12.3	7.7	5.2	-1	99.4	56
367	6.8	49.2	778	146.5	151.9	0.4	11.8	6.8	6.6	-1	99.4	56
368	6.7	48.7	741	146.5	151.9	0.4	11.6	6.7	5.9	-1	99.4	56
369	7.2	49.1	909	146.5	151.9	0.5	12.5	7.2	6.7	-1	99.4	56
370	7.7	50.9	1089	146.5	151.9	0.4	13.2	6.7	5.1	-1	99.4	56
371	7.9	51.6	1164	146.5	151.9	0.4	13.5	6.8	5.0	-1	99.4	56
372	8.3	51.7	1306	146.5	151.9	0.3	14.0	8.6	5.8	-1	99.4	56
373	8.4	52.1	1312	146.5	151.9	0.7	14.1	7.7	6.0	-1	99.4	56
374	7.5	51.3	1039	146.5	151.9	1.1	12.9	5.7	7.3	-1	99.4	56
375	7.1	49.3	865	146.5	151.9	0.4	12.2	6.1	7.1	-1	99.4	56
376	6.9	49.1	813	146.5	151.9	0.3	12.0	5.9	6.1	-1	99.4	56
377	7.2	49.2	903	146.5	151.9	0.3	12.4	6.9	5.2	-1	99.4	56
378	7.7	51.6	1089	146.5	151.9	0.3	13.2	7.9	4.6	-1	99.4	56
379	8.0	51.2	1201	146.5	151.9	0.4	13.7	7.5	5.1	-1	99.4	56
380	7.9	51.5	1161	146.5	151.9	0.4	13.5	7.8	4.4	-1	99.4	56
381	7.5	50.9	1034	146.5	151.9	0.3	13.0	6.7	5.2	-1	99.4	56
382	7.3	50.6	934	146.5	151.9	0.3	12.5	6.6	5.0	-1	99.4	56
383	7.3	49.5	933	146.5	151.9	0.3	12.6	7.4	5.4	-1	99.4	56
384	7.3	50.8	958	146.5	151.9	0.3	12.7	6.9	5.3	-1	99.4	56
385	7.5	50.7	1027	146.5	151.9	0.3	12.9	7.2	5.2	-1	99.4	56
386	7.8	51.7	1123	146.5	151.9	0.4	13.4	7.4	4.8	-1	99.4	56
387	8.0	52.1	1210	146.5	151.9	0.4	13.7	7.9	6.0	-1	99.4	56
388	9.0	52.8	1479	146.5	151.9	0.2	14.4	9.2	4.9	-1	99.4	56
389			1650	146.5	151.9	1.2	15.2	8.4	4.7	-1	99.4	56
390			1652	146.5	151.9	3.1	15.5	8.6	4.9	-1	99.4	56
391	9.3	53.7	1633	146.5	151.9	4.1	15.5	8.7	4.9	-1	99.4	56
392			1613	146.5	151.9	3.9	15.3	7.8	6.8	-1	99.4	56
393			1555	146.5	151.9	2.9	14.7	8.3	5.5	-1	99.4	56
394	9.2	52.4	1507	146.5	151.9	1.3	14.1	8.1	5.3	-1	99.4	56
395	8.5	52.5	1345	146.5	151.9	0.4	14.1	7.8	5.1	-1	99.4	56
396	8.6	52.4	1375	146.5	151.9	0.8	14.2	7.3	5.1	-1	99.4	56
397	8.7	52.8	1408	146.5	151.9	0.2	14.4	7.9	6.3	-1	99.4	56
398	8.8	52.9	1424	146.5	151.9	0.5	14.4	8.5	7.6	-1	99.4	56
399	9.0	52.8	1481	146.5	151.9	0.4	14.6	8.9	7.8	-1	99.4	56
400	8.9	52.8	1459	146.5	151.9	0.4	14.5	8.3	7.3	-1	99.4	56
401	8.4	52.4	1314	146.5	151.9	0.8	14.0	7.6	7.1	-1	99.4	55
402	8.4	51.7	1326	146.5	151.9	0.0	14.0	7.9	7.1	-1	99.4	54
403	8.9	52.5	1454	146.5	151.9	0.1	14.6	8.2	6.2	-1	99.4	54
404	8.7	52.9	1395	146.5	151.9	1.0	14.3	8.0	5.7	-1	99.4	54
405	8.7	52.2	1387	146.5	151.9	0.2	14.3	8.3	5.5	-1	99.4	54
406	8.4	52.5	1332	146.5	151.9	0.4	14.1	7.6	6.8	-1	99.4	54
407	8.3	51.9	1305	146.5	151.9	0.4	14.0	7.6	5.6	-1	99.4	54
408	8.6	52.0	1381	146.5	151.9	0.0	14.2	8.6	4.8	-1	99.4	55
409	8.9	52.4	1458	146.5	151.9	0.4	14.5	8.5	5.5	-1	99.4	55
410	9.0	52.6	1475	146.5	151.9	0.6	14.6	8.5	6.8	-1	99.4	55
411	8.8	52.3	1438	146.5	151.9	0.2	14.5	8.2	7.2	-1	99.4	55
412	8.1	52.0	1250	146.5	151.9	0.7	13.8	7.0	7.0	-1	99.4	55
413	7.8	51.2	1142	146.5	151.9	0.3	13.4	6.8	7.2	-1	99.4	55
414	8.0	51.5	1209	146.5	151.9	0.1	13.6	7.9	6.4	-1	99.4	55
415	8.3	52.0	1295	146.5	151.9	0.1	14.0	7.7	5.6	-1	99.4	55
416	7.9	51.8	1165	146.5	151.9	0.5	13.5	7.2	5.3	-1	99.4	55
417	7.6	51.6	1067	146.5	151.9	0.3	13.1	7.2	5.4	-1	99.4	55
418	7.7	51.4	1090	146.5	151.9	0.3	13.2	7.3	5.2	-1	99.4	55
419	7.9	51.9	1162	146.5	151.9	0.3	13.5	7.4	4.8	-1	99.4	55
420	7.8	51.3	1121	146.5	151.9	0.4	13.4	6.4	4.1	-1	99.4	55
421	7.2	51.1	927	146.5	151.9	0.8	12.4	6.3	5.9	-1	99.4	55
422	7.1	49.1	856	146.5	151.9	0.5	12.2	6.2	5.8	-1	99.4	55
423	7.3	50.4	964	146.5	151.9	0.4	12.7	7.7	5.9	-1	99.4	55
424	7.5	51.2	1028	146.5	151.9	0.4	13.0	7.5	6.7	-1	99.4	55
425	7.8	51.2	1123	146.5	151.9	0.4	13.4	6.8	5.8	-1	99.4	55
426	7.9	51.4	1192	146.5	151.9	0.5	13.6	6.9	5.8	-1	99.4	55
427	7.8	51.1	1134	146.5	151.9	0.5	13.4	7.2	5.8	-1	99.4	55
428	7.4	51.0	975	146.5	151.9	0.5	12.7	6.0	5.1	-1	99.4	55
429	7.1	49.0	874	146.5	151.9	0.4	12.2	6.7	5.5	-1	99.4	55
430	7.1	49.0	858	146.5	151.9	0.4	12.3	6.5	6.1	-1	99.4	55
431	7.0	48.6	835	146.5	151.9	0.4	12.1	6.2	6.2	-1	99.4	55
432	7.1	49.1	861	146.5	151.9	0.4	12.3	6.4	6.3	-1	99.4	55
433	7.2	49.5	896	146.5	151.9	0.4	12.4	7.3	5.7	-1	99.4	55
434	7.1	49.0	859	146.5	151.9	0.4	12.3	6.8	4.5	-1	99.4	55
435	6.8	48.6	763	146.5	151.9	0.6	11.6	6.3	4.1	-1	99.4	55
436	6.8	48.5	765	146.5	151.9	0.4	11.9	6.5	4.4	-1	99.4	55
437	6.8	48.8	766	146.5	151.9	0.4	11.7	6.5	5.2	-1	99.4	55
438	7.2	48.7	904	146.5	151.9	0.5	12.4	7.7	5.0	-1	99.4	56
439	8.0	51.5	1201	146.5	151.9	0.4	13.8	8.1	4.7	-1	99.4	56
440			1224	146.5	151.9	0.8	13.7	8.2	5.0	-1	99.4	56

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
441			1352	146.5	151.9	0.4	14.2	8.7	4.0	-1	99.4	56
442			1577	146.5	151.9	0.2	14.9	8.3	3.6	-1	99.4	56
443			1633	146.5	151.9	0.9	15.2	8.6	5.7	-1	99.4	56
444			1612	146.5	151.9	1.5	15.2	8.0	7.2	-1	99.4	55
445			1559	146.5	151.9	0.4	14.7	7.0	6.0	-1	99.4	55
446			1562	146.5	151.9	0.0	14.9	8.3	4.3	-1	99.4	55
447			1277	146.5	151.9	1.4	13.9	7.1	6.1	-1	99.4	55
448			1166	146.5	151.9	0.4	13.4	7.4	4.6	-1	99.4	55
449			1384	146.5	151.9	0.6	14.3	9.7	4.6	-1	99.4	55
450			1652	146.5	151.9	1.2	15.3	9.4	5.2	-1	99.4	55
451			1629	146.5	151.9	3.0	15.4	8.5	4.5	-1	99.4	55
452			1629	146.5	151.9	2.9	15.3	8.7	3.8	-1	99.4	55
453			1612	146.5	151.9	2.9	15.2	7.6	6.2	-1	99.4	55
454			1603	146.5	151.9	2.4	14.9	7.5	7.3	-1	99.4	55
455			1640	146.5	151.9	3.5	15.3	8.9	6.0	-1	99.4	54
456			1615	146.5	151.9	3.2	15.0	7.9	4.4	-1	99.4	53
457			1619	146.5	152.3	2.5	14.9	8.8	5.0	-1	99.4	53
458			1638	146.5	157.6	2.9	15.1	9.4	5.7	-1	99.4	53
459			1613	146.5	164.1	2.9	14.9	7.9	5.6	-1	99.4	53
460			1644	146.5	166.6	2.9	15.1	7.5	4.0	-1	99.4	53
461			1643	146.5	166.6	5.0	15.5	8.2	3.7	-1	99.4	53
462			1530	146.5	166.6	3.5	14.6	7.7	3.6	-1	99.4	54
463			1614	146.5	166.6	2.1	14.6	8.2	5.2	-1	99.4	54
464			1631	146.5	166.6	2.7	14.8	8.2	5.3	-1	99.4	54
465			1543	146.5	166.6	1.5	14.4	7.9	6.1	-1	99.4	54
466			1511	146.5	166.6	0.4	14.5	8.2	5.7	-1	99.4	54
467			1654	146.5	166.6	1.8	15.2	8.0	7.1	-1	99.4	53
468			1627	146.5	166.6	1.8	15.1	8.3	6.5	-1	99.4	52
469			1625	146.5	166.6	2.1	15.1	7.9	6.4	-1	99.4	52
470			1623	146.5	166.6	1.6	15.0	8.5	5.0	-1	99.4	52
471			1634	146.5	166.6	2.5	15.1	10.2	4.8	-1	99.4	52
472			1643	146.5	166.6	3.2	15.4	9.4	4.5	-1	99.4	52
473			1630	146.5	166.6	4.2	15.3	8.5	6.1	-1	99.4	52
474			1625	146.5	166.6	4.0	15.2	8.6	6.9	-1	99.4	52
475			1625	146.5	166.6	4.9	15.3	8.2	4.4	-1	99.4	52
476			1635	146.5	166.6	5.8	15.4	8.3	4.9	-1	99.4	52
477			1629	146.5	166.6	6.7	15.4	10.1	5.4	-1	99.4	52
478			1616	146.5	166.6	6.8	15.2	9.2	5.1	-1	99.4	52
479			1623	146.5	166.5	7.2	15.2	9.8	5.3	-1	99.4	53
480			1618	146.5	161.6	6.9	15.1	9.0	7.7	-1	99.4	53
481			1629	146.5	155.8	7.4	15.2	9.1	7.1	-1	99.4	53
482			1621	146.5	154.9	7.4	15.1	8.7	7.4	-1	99.4	53
483			1617	146.5	154.9	6.4	14.9	9.0	6.3	-1	99.4	53
484			1629	146.5	154.9	6.2	15.0	9.0	5.2	-1	99.4	53
485			1631	146.5	154.9	6.3	15.1	9.0	6.4	-1	99.4	53
486			1628	146.5	154.9	6.2	15.0	9.3	8.8	-1	99.4	53
487			1628	146.5	154.6	6.0	15.0	9.3	8.8	-1	99.4	53
488			1634	146.5	149.4	6.2	15.1	9.8	8.2	-1	99.4	53
489			1640	146.5	146.1	7.2	15.3	9.2	8.0	-1	99.4	53
490			1630	146.5	146.1	7.9	15.3	9.3	8.2	-1	99.4	53
491			1626	146.5	146.1	8.9	15.3	9.8	7.3	-1	99.3	53
492			1619	146.5	146.1	8.5	15.1	9.2	6.1	-1	99.3	52
493			1619	146.5	146.1	8.0	15.0	10.2	6.0	-1	99.3	52
494			1626	146.5	146.1	7.7	15.0	9.7	5.5	-1	99.3	52
495	10.9	52.8	1639	146.5	154.8	6.7	15.2	10.2	7.0	-1	99.3	54
496	10.0	53.3	1625	146.5	154.8	6.9	15.1	9.3	6.3	-1	99.3	54
497	10.3	53.3	1621	146.5	154.8	6.5	15.1	9.6	6.2	-1	99.3	54
498	9.7	53.4	1628	146.5	154.8	6.6	15.1	9.0	7.4	-1	99.3	54
499	10.4	52.9	1630	146.5	154.8	6.8	15.1	9.7	7.1	-1	99.3	54
500	10.1	53.1	1627	146.5	154.8	6.9	15.1	9.4	5.8	-1	99.3	54
501			1624	146.5	154.8	6.6	15.1	8.5	6.4	-1	99.3	54
502			1617	146.5	154.8	6.3	14.9	8.6	6.8	-1	99.3	54
503			1615	146.5	154.8	5.1	14.8	7.9	6.5	-1	99.3	54
504			1621	146.5	154.8	4.4	14.8	7.7	7.3	-1	99.3	54
505	9.3	52.9	1614	146.5	154.8	3.1	14.5	8.6	6.3	-1	99.3	54
506	9.7	53.7	1653	146.5	154.9	3.4	15.0	9.1	5.4	-1	99.3	54
507			1640	146.5	154.9	3.8	15.0	8.3	3.5	-1	99.3	54
508			1654	146.5	154.9	5.3	15.5	7.9	5.5	-1	99.3	54
509			1612	146.5	154.9	5.1	15.1	7.4	4.2	-1	99.3	54
510			1624	146.5	154.9	5.1	15.2	7.7	3.9	-1	99.3	55
511	9.5	53.6	1608	146.5	154.9	4.3	14.9	8.9	4.2	-1	99.3	55
512			1637	146.5	154.9	5.0	15.2	8.2	5.4	-1	99.3	55
513			1587	146.5	154.9	3.7	14.6	8.1	4.9	-1	99.3	55
514	9.7	53.2	1651	146.5	154.9	4.1	15.1	9.0	4.6	-1	99.3	55
515	9.7	53.6	1640	146.5	154.9	5.8	15.3	9.1	6.3	-1	99.3	55
516			1637	146.5	154.9	6.2	15.4	8.5	5.0	-1	99.3	54
517	10.7	52.9	1631	146.5	154.9	7.2	15.4	10.0	6.3	-1	99.3	54
518	10.3	53.5	1624	146.5	154.9	7.8	15.3	9.6	7.5	-1	99.3	54
519	9.6	53.3	1611	146.5	154.9	7.3	15.1	9.0	6.9	-1	99.3	54
520	10.1	53.1	1618	146.5	154.9	6.8	14.9	9.4	7.3	-1	99.3	54
521	10.0	52.7	1623	146.5	154.9	6.2	14.9	9.3	6.5	-1	99.3	54
522	9.7	52.3	1632	146.5	154.9	6.2	15.0	9.0	6.8	-1	99.3	54
523	9.6	52.8	1632	146.5	154.9	6.3	15.1	8.9	6.7	-1	99.3	53
524	9.9	53.1	1625	146.5	154.9	6.2	15.0	9.3	7.0	-1	99.3	53
525	9.4	52.4	1631	146.5	154.9	5.9	15.0	8.8	6.6	-1	99.3	53
526	10.3	53.4	1627	146.5	154.9	6.3	15.1	9.6	6.5	-1	99.3	53
527	9.6	52.4	1620	146.5	154.9	5.6	15.0	8.9	8.1	-1	99.3	53
528	9.8	52.5	1632	146.5	154.9	5.3	15.0	9.1	7.5	-1	99.3	54

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
529	10.6	53.6	1637	146.5	154.9	7.7	15.4	9.9	7.8	-1	99.3	53
530	9.8	53.4	1614	146.5	154.9	6.9	15.1	9.1	7.2	-1	99.3	53
531			1611	146.5	154.9	5.9	14.9	8.6	6.3	-1	99.3	53
532	9.6	52.6	1618	146.5	154.9	5.1	14.8	8.9	6.2	-1	99.3	53
533	10.0	53.4	1639	146.5	154.9	5.3	15.0	9.3	6.0	-1	99.3	53
534	9.5	54.0	1628	146.5	154.9	5.4	15.0	8.8	6.5	-1	99.3	54
535	9.4	53.0	1642	146.5	154.9	5.5	15.2	8.7	5.2	-1	99.3	54
536	9.9	53.6	1630	146.5	154.9	6.0	15.2	9.2	5.5	-1	99.3	54
537	9.6	53.2	1623	146.5	154.9	5.8	15.1	9.0	7.3	-1	99.3	54
538	9.6	53.6	1616	146.5	154.9	5.3	15.0	9.0	6.2	-1	99.3	54
539	10.1	52.9	1623	146.5	154.9	4.7	14.9	9.4	6.7	-1	99.3	54
540	10.0	53.0	1645	146.5	154.9	5.5	15.2	9.3	6.8	-1	99.3	54
541	9.3	52.9	1633	146.5	154.9	6.2	15.2	8.6	6.0	-1	99.3	54
542	9.7	53.3	1621	146.5	154.9	5.8	15.1	9.0	5.5	-1	99.3	54
543	9.3	52.9	1618	146.5	154.9	5.4	15.0	8.7	5.8	-1	99.3	54
544			1615	146.5	154.9	4.5	14.8	8.1	5.1	-1	99.3	54
545			1641	146.5	154.9	4.9	15.1	8.6	6.0	-1	99.3	54
546	9.8	52.7	1627	146.5	154.9	4.9	15.0	9.1	6.7	-1	99.3	55
547			1630	146.5	154.9	4.8	15.1	8.2	6.7	-1	99.3	55
548			1600	146.5	154.9	3.6	14.7	8.5	7.4	-1	99.3	55
549			1595	146.5	154.9	1.8	14.5	8.2	6.2	-1	99.3	55
550	8.9	52.8	1440	146.5	154.9	0.9	14.1	7.7	5.9	-1	99.3	55
551	8.8	53.1	1423	146.5	154.9	0.2	14.5	8.3	4.4	-1	99.3	55
552	8.9	53.8	1458	146.5	154.9	0.6	14.5	7.5	3.6	-1	99.3	55
553	9.6	53.6	1649	146.5	154.9	1.0	15.2	8.9	4.8	-1	99.3	55
554			1621	146.5	154.9	2.8	15.3	7.6	4.9	-1	99.3	55
555			1574	146.5	154.9	2.3	14.8	7.6	4.8	-1	99.3	55
556			1627	146.5	154.9	1.3	14.9	8.2	5.1	-1	99.3	55
557	9.6	53.5	1617	146.5	154.9	1.9	14.9	9.0	5.3	-1	99.3	55
558	9.3	53.2	1615	146.5	154.9	1.1	14.7	8.6	5.9	-1	99.3	56
559	9.3	53.6	1633	146.5	154.9	0.8	14.9	8.7	6.8	-1	99.3	56
560			1633	146.5	154.9	0.8	14.9	8.5	6.4	-1	99.3	56
561			1636	146.5	154.9	0.7	15.0	8.1	6.5	-1	99.3	56
562			1642	146.5	154.9	1.5	15.2	8.4	6.7	-1	99.3	56
563			1615	146.5	154.9	1.7	15.1	8.2	6.6	-1	99.3	56
564			1563	146.5	154.9	0.9	14.7	7.8	5.5	-1	99.3	55
565			1522	146.5	154.9	0.2	14.7	7.7	6.7	-1	99.3	55
566			1640	146.5	154.9	1.0	15.2	8.3	6.0	-1	99.3	55
567			1557	146.5	152.3	1.0	14.9	8.1	6.2	-1	99.3	55
568			1508	146.5	151.9	0.5	14.7	8.0	5.2	-1	99.3	55
569	9.2	53.9	1507	146.5	151.9	0.3	14.6	8.2	6.8	-1	99.3	55
570	9.8	53.2	1606	146.5	151.9	0.9	15.0	9.1	5.6	-1	99.3	55
571	10.1	53.4	1662	146.5	151.9	2.5	15.6	9.4	5.2	-1	99.3	55
572			1638	146.5	151.9	4.7	15.6	8.3	4.9	-1	99.3	55
573	9.8	54.2	1622	146.5	151.9	4.9	15.5	9.1	4.5	-1	99.3	55
574			1606	146.5	151.9	4.5	15.2	8.4	5.0	-1	99.3	55
575	10.6	53.8	1609	146.5	151.9	4.1	15.0	9.9	5.5	-1	99.3	55
576			1547	146.5	151.9	2.9	14.5	8.5	5.2	-1	99.3	56
577	8.6	53.1	1382	146.5	151.9	0.8	13.8	7.0	4.3	-1	99.3	56
578	7.6	51.7	1082	146.5	151.9	0.8	13.2	5.9	5.5	-1	99.3	56
579	7.2	50.9	927	146.5	151.9	0.6	12.4	5.2	4.9	-1	99.3	56
580	7.3	50.4	954	146.5	151.9	0.4	12.7	6.7	3.9	-1	99.3	56
581	8.0	51.5	1200	146.5	151.9	0.4	13.5	8.6	2.9	-1	99.3	56
582	10.7	53.7	1675	146.5	151.9	2.2	15.3	9.9	3.4	-1	99.3	57
583			1645	146.5	151.9	5.2	15.5	7.9	4.0	-1	99.3	57
584			1633	146.5	151.9	5.0	15.4	8.4	4.3	-1	99.3	57
585			1616	146.5	151.9	5.5	15.4	8.0	6.3	-1	99.3	57
586	10.0	53.5	1602	146.5	151.9	4.6	14.9	9.3	5.1	-1	99.3	57
587			1626	146.5	151.9	4.7	15.1	8.4	4.8	-1	99.3	57
588	10.2	53.6	1632	146.5	151.9	5.3	15.2	9.5	6.6	-1	99.3	57
589	9.7	52.9	1613	146.5	151.9	4.9	15.0	9.0	7.6	-1	99.3	56
590	10.2	52.7	1621	146.5	151.9	3.5	14.9	9.5	7.1	-1	99.3	56
591	9.8	53.2	1632	146.5	151.9	4.2	15.0	9.1	7.8	-1	99.3	56
592	10.2	53.7	1642	146.5	151.9	4.3	15.1	9.5	6.8	-1	99.3	56
593	9.7	53.7	1648	146.5	151.9	6.4	15.5	9.0	5.4	-1	99.3	56
594	9.5	54.1	1599	146.5	151.9	5.3	15.0	8.8	4.5	-1	99.3	56
595			1598	146.5	151.9	3.4	14.7	8.3	5.3	-1	99.3	56
596			1621	146.5	151.9	2.6	14.7	8.6	5.7	-1	99.3	56
597	10.3	53.0	1652	146.5	151.9	3.2	15.1	9.6	4.4	-1	99.3	56
598	9.4	53.5	1649	146.5	151.9	4.7	15.3	8.7	4.9	-1	99.3	56
599			1634	146.5	151.9	4.4	15.3	8.6	5.2	-1	99.3	56
600	10.8	53.1	1640	146.5	151.9	5.6	15.4	10.1	4.6	-1	99.3	57
601	10.8	54.0	1628	146.5	151.9	7.0	15.5	10.1	6.1	-1	99.3	57
602	9.6	53.4	1608	146.5	151.9	6.1	15.1	9.0	5.6	-1	99.3	57
603	9.4	52.9	1614	146.5	151.9	6.0	15.0	8.8	6.9	-1	99.3	57
604	9.3	52.7	1624	146.5	151.9	5.6	15.0	8.7	5.5	-1	99.3	57
605	9.9	52.9	1617	146.5	151.9	5.4	14.9	9.2	6.6	-1	99.3	57
606			1611	146.5	151.9	3.9	14.7	8.5	5.6	-1	99.3	56
607			1612	146.5	151.9	2.5	14.6	8.2	6.9	-1	99.3	56
608			1584	146.5	151.9	1.0	14.3	8.3	6.2	-1	99.3	56
609			1528	146.5	151.9	0.4	14.8	8.5	7.5	-1	99.3	56
610	8.9	53.5	1451	146.5	151.9	0.8	14.5	8.2	8.3	-1	99.3	56
611	8.5	52.6	1336	146.5	151.9	0.4	14.0	8.1	6.0	-1	99.3	56
612	9.0	52.6	1475	146.5	151.9	0.2	14.5	7.8	7.0	-1	99.3	56
613	10.3	54.1	1636	146.5	151.9	0.2	15.1	9.6	7.1	-1	99.3	56
614	9.7	53.8	1641	146.5	151.9	1.6	15.3	9.0	7.8	-1	99.3	56
615	9.4	54.1	1666	146.5	151.9	3.7	15.8	8.8	7.2	-1	99.3	56
616	9.3	54.3	1627	146.5	151.9	5.6	15.7	8.7	7.3	-1	99.3	56

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
617			1619	146.5	151.9	5.7	15.5	8.0	6.8	-1	99.3	56
618	9.5	53.5	1610	146.5	151.9	6.5	15.3	8.9	6.9	-1	99.3	56
619	10.0	53.2	1608	146.5	151.9	6.0	15.1	9.4	6.4	-1	99.3	56
620	9.6	53.3	1620	146.5	151.9	6.4	15.1	8.9	5.7	-1	99.3	56
621	5.3	46.9	347	146.5	151.9	3.1	11.8	5.5	4.7	-1	99.2	59
622	5.2	48.2	338	146.5	151.9	6.6	11.8	4.2	4.9	-1	99.2	59
623	5.3	47.8	365	146.5	151.9	7.9	11.0	5.0	4.2	-1	99.2	59
624	6.1	47.3	543	146.5	151.9	3.9	9.9	5.9	4.7	-1	99.2	59
625	5.7	46.8	448	146.5	151.9	0.4	10.1	5.9	4.7	-1	99.2	59
626	5.8	47.7	476	146.5	151.9	0.3	10.1	5.5	4.3	-1	99.2	59
627	5.8	47.6	472	146.5	151.9	0.3	10.1	5.8	5.4	-1	99.2	59
628	5.8	46.9	485	146.5	151.9	0.3	10.2	5.2	4.8	-1	99.2	59
629	5.7	47.5	461	146.5	151.9	0.3	9.9	5.3	4.3	-1	99.2	59
630	5.6	47.3	437	146.5	151.9	0.3	9.8	5.8	4.4	-1	99.2	59
631	6.0	47.6	514	146.5	151.9	0.4	10.4	6.9	5.1	-1	99.2	59
632	6.5	48.0	674	146.5	151.9	0.4	11.4	7.4	6.9	-1	99.2	59
633	7.0	49.3	840	146.5	151.9	0.3	12.2	7.7	6.7	-1	99.2	59
634	7.3	50.4	968	146.5	151.9	0.3	12.8	7.2	5.9	-1	99.2	59
635	7.5	51.4	1041	146.5	151.9	0.3	13.0	7.3	5.0	-1	99.2	59
636	7.7	51.6	1118	146.5	151.9	0.3	13.3	7.6	4.0	-1	99.2	59
637	7.9	51.3	1187	146.5	151.9	0.3	13.6	6.9	4.6	-1	99.2	59
638	8.1	51.8	1241	146.5	151.9	0.2	13.8	8.2	5.4	-1	99.2	59
639	8.2	52.1	1262	146.5	151.9	0.2	13.9	8.7	4.9	-1	99.2	59
640	8.0	52.1	1203	146.5	151.9	0.5	13.6	7.3	3.9	-1	99.2	59
641	8.0	51.9	1227	146.5	151.9	0.1	13.8	7.1	5.5	-1	99.2	59
642	8.1	52.0	1248	146.5	151.9	0.1	13.8	8.2	5.2	-1	99.2	59
643	8.4	52.4	1330	146.5	151.9	0.2	14.1	8.1	4.6	-1	99.2	60
644	8.7	52.2	1400	146.5	151.9	0.6	14.3	8.6	5.4	-1	99.2	60
645	10.2	52.9	1526	146.5	151.9	0.2	14.7	9.5	5.1	-1	99.2	60
646	9.5	53.3	1547	146.5	151.9	0.4	14.8	8.9	5.1	-1	99.2	60
647	8.7	53.2	1387	146.5	151.9	0.7	14.3	8.2	5.3	-1	99.2	60
648	8.2	52.0	1275	146.5	151.9	0.2	13.9	7.7	4.9	-1	99.2	60
649	8.1	52.3	1254	146.5	151.9	0.1	13.8	7.7	4.7	-1	99.2	60
650	8.6	52.3	1384	146.5	151.9	0.2	14.3	8.1	4.6	-1	99.2	60
651	9.5	53.1	1510	146.5	151.9	0.1	14.7	8.9	5.3	-1	99.2	60
652			1619	146.5	151.9	0.9	15.1	8.0	5.3	-1	99.2	60
653	9.3	54.0	1658	146.5	151.9	2.7	15.6	8.6	5.8	-1	99.2	60
654			1629	146.5	151.9	3.6	15.5	8.4	5.4	-1	99.2	59
655			1620	146.5	151.9	3.5	15.3	8.3	6.0	-1	99.2	59
656			1630	146.5	151.9	4.3	15.4	8.6	6.2	-1	99.2	59
657	9.7	53.4	1621	146.5	151.9	5.1	15.3	9.0	4.4	-1	99.2	59
658			1614	146.5	151.9	5.0	15.2	8.4	4.0	-1	99.2	59
659	9.3	53.2	1619	146.5	151.9	4.6	15.1	8.7	5.8	-1	99.2	59
660			1626	146.5	151.9	4.9	15.1	8.0	5.0	-1	99.2	59
661	9.6	53.8	1636	146.5	151.9	5.3	15.2	9.0	4.3	-1	99.2	59
662			1631	146.5	151.9	6.0	15.3	7.8	4.9	-1	99.2	59
663			1604	146.5	151.9	5.0	14.9	8.1	6.9	-1	99.2	59
664			1539	146.5	151.9	2.5	14.2	7.4	6.5	-1	99.2	59
665	8.3	52.6	1283	146.5	151.9	0.5	13.5	7.6	6.1	-1	99.2	59
666	9.2	52.6	1507	146.5	151.9	0.5	14.5	8.7	7.3	-1	99.2	59
667	9.5	53.9	1637	146.5	151.9	1.9	15.1	8.9	5.7	-1	99.2	59
668			1640	146.5	151.9	2.0	15.1	8.5	5.1	-1	99.2	59
669			1635	146.5	151.9	2.6	15.3	8.4	5.4	-1	99.2	59
670	9.4	53.6	1637	146.5	151.9	3.2	15.3	8.7	3.9	-1	99.2	59
671	9.4	53.2	1627	146.5	151.9	3.9	15.3	8.8	6.0	-1	99.2	59
672	9.3	53.1	1616	146.5	151.9	4.0	15.2	8.7	7.0	-1	99.2	59
673			1538	146.5	151.9	2.9	14.5	7.9	6.6	-1	99.2	59
674	8.8	53.2	1427	146.5	151.9	0.9	13.9	7.1	6.8	-1	99.2	59
675	8.6	52.4	1370	146.5	151.9	0.5	14.2	7.3	5.5	-1	99.2	59
676	10.2	53.4	1603	146.5	151.9	1.0	15.0	9.6	5.0	-1	99.2	59
677	9.8	54.2	1654	146.5	151.9	3.3	15.6	9.2	4.5	-1	99.2	59
678			1550	146.5	151.9	3.0	15.0	6.8	4.8	-1	99.2	59
679	9.2	53.0	1499	146.5	151.9	1.3	14.2	7.4	3.7	-1	99.2	59
680	10.7	53.4	1670	146.5	151.9	2.7	15.2	10.0	3.4	-1	99.2	59
681	9.9	53.9	1651	146.5	151.9	5.7	15.5	9.2	3.7	-1	99.2	59
682	9.4	53.1	1625	146.5	151.9	5.7	15.4	8.8	4.4	-1	99.2	59
683			1623	146.5	151.9	5.9	15.3	8.2	5.4	-1	99.2	59
684	9.9	53.1	1615	146.5	151.9	6.0	15.1	9.2	7.2	-1	99.2	59
685	9.5	53.0	1606	146.5	151.9	5.0	14.8	8.9	7.3	-1	99.2	59
686	11.2	52.9	1643	146.5	151.9	5.3	15.2	10.4	6.4	-1	99.2	59
687	9.6	53.5	1629	146.5	151.9	6.6	15.2	9.0	6.7	-1	99.2	59
688	10.1	53.4	1620	146.5	151.9	6.0	15.1	9.4	6.4	-1	99.2	59
689			1609	146.5	151.9	5.1	14.8	8.4	5.8	-1	99.2	59
690	9.9	52.7	1616	146.5	151.9	4.0	14.7	9.2	4.2	-1	99.2	59
691			1617	146.5	151.9	2.9	14.6	8.4	5.2	-1	99.2	59
692	9.6	52.6	1637	146.5	151.9	2.6	14.8	8.9	4.2	-1	99.2	59
693			1654	146.5	151.9	3.1	15.1	8.6	6.1	-1	99.2	59
694	10.3	53.6	1648	146.5	151.9	4.7	15.4	9.6	4.7	-1	99.2	59
695	10.2	53.5	1636	146.5	151.9	4.8	15.4	9.5	3.6	-1	99.2	59
696	10.4	53.6	1630	146.5	151.9	5.9	15.4	9.7	2.8	-1	99.2	59
697	9.5	54.0	1604	146.5	151.9	5.3	15.0	8.9	4.1	-1	99.2	59
698			1607	146.5	151.9	4.3	14.9	8.5	4.4	-1	99.2	59
699			1616	146.5	151.9	3.5	14.7	8.8	4.7	-1	99.2	59
700			1619	146.5	151.9	2.6	14.7	9.0	5.8	-1	99.2	59
701			1586	146.5	151.9	1.7	14.5	8.8	4.9	-1	99.2	59
702			1414	146.5	151.9	0.7	14.3	8.2	4.1	-1	99.2	59
703			1453	146.5	151.9	0.6	14.6	9.0	4.8	-1	99.2	59
704			1248	146.5	151.9	1.1	13.7	6.9	5.1	-1	99.2	59

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
705			1330	146.5	151.9	0.1	14.0	9.0	5.3	-1	99.2	59
706			1639	146.5	151.9	0.2	15.0	9.2	4.2	-1	99.2	59
707			1646	146.5	151.9	2.3	15.3	9.4	5.0	-1	99.2	59
708			1659	146.5	151.9	3.8	15.7	9.1	4.3	-1	99.2	59
709			1633	146.5	151.9	5.3	15.6	8.9	3.5	-1	99.2	59
710			1595	146.5	151.9	4.6	15.2	8.1	5.0	-1	99.2	59
711			1568	146.5	151.9	2.9	14.6	7.0	5.8	-1	99.2	59
712			1585	146.5	151.9	1.3	14.4	8.5	6.5	-1	99.2	59
713			1466	146.5	151.9	0.6	14.5	7.6	5.6	-1	99.2	59
714			1572	146.5	151.9	0.8	14.9	7.5	4.7	-1	99.2	59
715			1508	146.5	151.9	0.5	14.6	9.2	5.8	-1	99.2	59
716			1657	146.5	151.9	1.3	15.3	10.3	4.8	-1	99.2	59
717			1644	146.5	151.9	3.7	15.6	9.4	5.8	-1	99.2	59
718			1607	146.5	151.9	3.3	15.2	8.7	6.7	-1	99.2	59
719			1606	146.5	151.9	2.6	15.0	8.9	5.8	-1	99.2	59
720			1595	146.5	151.9	2.1	14.7	8.7	4.1	-1	99.2	59
721			1578	146.5	151.9	0.7	14.5	8.7	5.6	-1	99.2	59
722			1489	146.5	151.9	0.3	14.6	8.4	4.7	-1	99.2	59
723			1557	146.5	151.9	0.5	14.9	8.6	3.7	-1	99.2	59
724			1475	146.5	151.9	0.7	14.6	7.7	4.1	-1	99.2	59
725			1327	146.5	151.9	0.5	14.1	8.0	4.1	-1	99.2	59
726			1188	146.5	151.9	0.3	13.6	8.2	6.0	-1	99.2	59
727			1068	146.5	151.9	0.4	13.1	7.7	6.9	-1	99.2	59
728			1159	146.5	151.9	0.3	13.5	8.5	5.2	-1	99.2	59
729			1349	146.5	151.9	0.1	14.2	8.0	5.5	-1	99.2	59
730			1465	146.5	151.9	0.5	14.6	8.4	4.4	-1	99.2	59
731			1481	146.5	151.9	0.6	14.6	9.0	5.4	-1	99.2	59
732			1376	146.5	151.9	0.6	14.2	8.2	4.0	-1	99.2	59
733			1311	146.5	151.9	0.3	14.0	8.2	3.4	-1	99.2	59
734			1269	146.5	151.9	0.2	13.9	7.7	3.1	-1	99.2	59
735			1259	146.5	151.9	0.3	13.8	8.4	5.9	-1	99.2	59
736			1288	146.5	151.9	0.2	14.0	8.3	5.4	-1	99.2	59
737			1397	146.5	151.9	0.2	14.3	8.6	5.1	-1	99.2	59
738			1475	146.5	151.9	0.3	14.6	8.3	3.6	-1	99.2	59
739			1523	146.5	151.9	0.5	14.7	9.0	4.0	-1	99.2	59
740			1620	146.5	151.9	0.1	15.0	8.7	5.0	-1	99.2	59
741			1537	146.5	151.9	0.6	14.8	7.7	3.9	-1	99.2	59
742			1254	146.5	151.9	0.9	13.8	7.1	3.0	-1	99.2	59
743			1013	146.5	151.9	0.6	12.8	5.9	4.4	-1	99.2	59
744			959	146.5	151.9	0.4	12.6	7.6	5.0	-1	99.2	60
745			1049	146.5	151.9	0.4	13.1	7.9	5.9	-1	99.2	60
746			1065	146.5	151.9	0.4	13.2	7.2	5.4	-1	99.2	60
747			1019	146.5	151.9	0.4	12.9	6.9	4.1	-1	99.2	60
748			1176	146.5	151.9	0.2	13.5	7.6	3.5	-1	99.2	60
749			1365	146.5	151.9	0.2	14.3	8.1	5.4	-1	99.2	60
750			1328	146.5	151.9	0.7	14.1	8.1	5.2	-1	99.2	60
751			1360	146.5	151.9	0.2	14.2	8.2	4.5	-1	99.2	60
752			1311	146.5	151.9	0.3	14.1	7.4	3.6	-1	99.2	60
753			1259	146.5	151.9	0.4	13.8	7.7	3.4	-1	99.2	60
754			1466	146.5	151.9	0.0	14.5	9.2	4.0	-1	99.2	60
755			1637	146.5	151.9	0.7	15.1	9.1	4.5	-1	99.2	60
756			1564	146.5	151.9	0.9	14.8	8.2	4.5	-1	99.2	60
757			1469	146.5	151.9	0.6	14.6	7.6	4.6	-1	99.2	60
758			1444	146.5	151.9	0.1	14.5	8.4	4.0	-1	99.2	60
759			1270	146.5	151.9	0.9	13.9	6.8	3.4	-1	99.2	60
760			1020	146.5	151.9	0.9	12.8	6.0	3.2	-1	99.2	60
761			975	146.5	151.9	0.4	12.8	8.4	3.1	-1	99.2	60
762			959	146.5	151.9	0.3	12.6	7.1	4.4	-1	99.2	60
763			1189	146.5	151.9	0.2	13.6	8.6	3.3	-1	99.2	60
764			1552	146.5	151.9	0.1	14.8	8.6	4.4	-1	99.2	60
765			1466	146.5	151.9	1.2	14.6	8.6	6.5	-1	99.2	60
766			1376	146.5	151.9	0.7	14.2	8.4	4.5	-1	99.2	60
767			1359	146.5	151.9	0.0	14.2	8.4	3.5	-1	99.2	60
768			1256	146.5	151.9	0.5	13.8	7.1	4.4	-1	99.2	60
769			1199	146.5	151.9	0.4	13.6	7.7	4.1	-1	99.2	60
770			1126	146.5	151.9	0.3	13.4	7.5	4.8	-1	99.2	60
771			992	146.5	151.9	0.3	12.8	6.1	4.5	-1	99.2	60
772			880	146.5	151.9	0.3	12.3	6.5	4.3	-1	99.2	60
773			768	146.5	151.9	0.5	11.8	6.0	4.8	-1	99.2	60
774			690	146.5	151.9	0.4	11.3	6.2	4.0	-1	99.2	60
775			725	146.5	151.9	0.3	11.6	7.2	4.0	-1	99.2	60
776			832	146.5	151.9	0.3	12.1	7.2	3.7	-1	99.2	60
777			1011	146.5	151.9	0.3	12.9	7.4	2.5	-1	99.2	60
778			1238	146.5	151.9	0.2	13.8	8.7	4.5	-1	99.2	60
779			1320	146.5	151.9	0.6	14.1	8.0	4.9	-1	99.2	60
780			1240	146.5	151.9	0.6	13.7	7.4	4.6	-1	99.2	60
781			1184	146.5	151.9	0.3	13.6	7.7	3.1	-1	99.2	60
782			1106	146.5	151.9	0.3	13.3	7.1	2.7	-1	99.2	60
783			958	146.5	151.9	0.5	12.6	6.5	5.2	-1	99.2	60
784			955	146.5	151.9	0.3	12.6	7.0	4.9	-1	99.2	60
785			1102	146.5	151.9	0.3	13.3	7.1	5.3	-1	99.2	60
786			1227	146.5	151.9	0.4	13.7	7.9	5.3	-1	99.2	60
787			1329	146.5	151.9	0.5	14.2	8.6	4.3	-1	99.2	60
788			1325	146.5	151.9	0.5	14.1	8.1	4.8	-1	99.2	60
789			1305	146.5	151.9	0.3	14.0	8.2	5.0	-1	99.2	60
790			1331	146.5	151.9	0.1	14.1	7.8	4.0	-1	99.2	60
791			1328	146.5	151.9	0.2	14.1	8.3	4.9	-1	99.2	60
792			1209	146.5	151.9	0.4	13.6	7.8	6.4	-1	99.2	60

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (°C)	Pressure (kPa)	Relative Humidity (%)
793			1159	146.5	151.9	0.2	13.5	7.6	5.3	-1	99.2	60
794			1184	146.5	151.9	0.2	13.6	8.3	4.4	-1	99.2	60
795			1199	146.5	151.9	0.2	13.6	7.8	4.0	-1	99.2	60
796			1219	146.5	151.9	0.3	13.7	7.2	4.0	-1	99.2	60
797			1148	146.5	151.9	0.4	13.5	7.1	5.1	-1	99.2	60
798			980	146.5	151.9	0.4	12.7	7.1	4.5	-1	99.2	60
799			947	146.5	151.9	0.3	12.5	6.5	4.9	-1	99.2	60
800			1208	146.5	151.9	0.2	13.7	8.3	6.6	-1	99.2	60
801			1563	146.5	151.9	0.1	14.8	9.2	7.1	-1	99.2	60
802			1633	146.5	151.9	0.9	15.1	8.8	7.4	-1	99.2	60
803			1635	146.5	151.9	1.1	15.2	8.7	6.3	-1	99.2	60
804			1610	146.5	151.9	1.2	15.1	8.1	5.7	-1	99.2	60
805			1581	146.5	151.9	0.7	14.7	8.1	5.3	-1	99.2	59
806			1552	146.5	151.9	0.1	14.8	7.9	5.0	-1	99.2	59
807			1469	146.5	151.9	0.5	14.6	7.5	6.3	-1	99.2	59
808			1427	146.5	151.9	0.2	14.4	7.9	5.4	-1	99.2	59
809			1525	146.5	151.9	0.1	14.8	9.1	4.5	-1	99.2	59
810			1600	146.5	151.9	0.2	15.0	9.2	6.7	-1	99.2	59
811			1498	146.5	151.9	0.7	14.7	8.2	6.4	-1	99.2	60
812			1297	146.5	151.9	0.8	13.9	7.8	6.7	-1	99.2	60
813			1341	146.5	151.9	0.1	14.1	7.7	5.9	-1	99.2	60
814			1413	146.5	151.9	0.1	14.4	8.3	4.4	-1	99.2	60
815			1541	146.5	151.9	0.7	14.7	7.8	5.6	-1	99.2	60
816			1635	146.5	151.9	0.7	15.2	8.5	6.2	-1	99.2	60
817			1631	146.5	151.9	1.5	15.2	8.4	4.9	-1	99.2	59
818			1610	146.5	151.9	1.5	15.1	8.1	7.0	-1	99.2	59
819			1538	146.5	151.9	0.7	14.6	8.2	6.0	-1	99.2	59
820			1368	146.5	151.9	0.4	14.3	8.1	5.6	-1	99.2	59
821			1191	146.5	151.9	0.7	13.5	7.3	5.2	-1	99.2	59
822			1380	146.5	151.9	0.2	14.0	8.6	5.2	-1	99.2	59
823			1666	146.5	151.9	5.4	15.6	10.1	5.1	-2	99.2	59
824			1595	146.5	151.9	5.9	15.1	9.0	7.5	-2	99.2	59
825			1624	146.5	151.9	5.6	15.2	8.9	6.2	-2	99.2	59
826			1611	146.5	151.9	5.6	15.0	8.4	5.8	-2	99.2	59
827			1617	146.5	151.9	5.0	14.9	8.5	5.4	-2	99.2	59
828			1645	146.5	151.9	5.2	15.1	9.0	6.4	-2	99.2	59
829			1630	146.5	151.9	6.3	15.2	9.0	6.4	-2	99.2	59
830			1625	146.5	151.9	5.8	15.1	8.9	8.2	-2	99.2	59
831			1626	146.5	151.9	6.1	15.1	8.5	5.9	-2	99.2	59
832			1624	146.5	151.9	6.2	15.1	8.6	5.6	-2	99.2	59
833			1624	146.5	151.9	5.9	15.0	8.7	7.3	-2	99.2	59
834			1619	146.5	151.9	5.6	15.0	9.3	6.6	-2	99.2	59
835			1603	146.5	151.9	4.0	14.6	8.7	6.1	-2	99.2	59
836			1615	146.5	151.9	2.8	14.5	8.2	6.0	-2	99.2	59
837			1631	146.5	151.9	1.8	14.6	9.2	5.7	-2	99.2	59
838			1629	146.5	151.9	1.5	14.7	8.6	4.6	-2	99.2	59
839			1489	146.5	151.9	0.7	14.6	7.9	5.2	-2	99.2	59
840			1453	146.5	151.9	0.5	14.5	8.5	4.9	-2	99.2	59
841			1351	146.5	151.9	0.8	14.1	8.4	5.4	-2	99.2	60
842			1281	146.5	151.9	0.6	13.9	7.9	6.7	-2	99.2	60
843			1334	146.5	151.9	0.4	14.1	7.6	6.0	-2	99.2	60
844			1277	146.5	151.9	0.6	13.9	6.7	6.2	-2	99.2	60
845			1111	146.5	151.9	0.4	13.3	6.8	7.2	-2	99.2	60
846			985	146.5	151.9	0.4	12.8	7.3	6.8	-2	99.2	59
847			1089	146.5	151.9	0.3	13.1	7.2	6.4	-2	99.2	59
848			1573	146.5	151.9	0.2	14.7	9.1	6.3	-2	99.2	59
849			1638	146.5	151.9	1.6	15.1	9.0	5.8	-2	99.2	59
850			1536	146.5	151.9	1.2	14.7	8.0	5.2	-2	99.2	59
851			1498	146.5	151.9	0.4	14.5	8.2	6.5	-2	99.2	59
852			1666	146.5	151.9	1.6	15.4	8.7	7.1	-2	99.2	59
853			1630	146.5	151.9	3.4	15.3	9.2	6.8	-2	99.2	59
854			1578	146.5	151.9	2.3	14.9	8.1	5.2	-2	99.2	59
855			1410	146.5	151.9	0.9	14.0	6.5	5.2	-2	99.2	59
856			1417	146.5	151.9	0.1	14.3	8.1	5.5	-2	99.2	59
857			1604	146.5	151.9	0.2	14.9	9.4	5.8	-2	99.2	59
858			1557	146.5	151.9	0.9	14.8	8.0	4.5	-2	99.2	59
859			1460	146.5	151.9	0.5	14.6	7.6	5.0	-2	99.2	60
860			1281	146.5	151.9	0.4	13.9	7.7	6.3	-2	99.2	60
861			1632	268.0	277.7	5.0	15.1	12.2	5.5	1	98.5	64
862			1627	268.0	277.7	5.0	15.1	11.2	7.0	1	98.5	64
863			1629	268.0	277.7	5.0	15.1	12.9	6.8	1	98.5	64
864			1624	268.0	277.7	5.0	15.1	12.5	5.1	1	98.5	64
865			1621	268.0	277.7	5.0	15.0	11.8	5.2	1	98.5	64
866			1627	268.0	277.7	5.0	15.0	11.5	6.1	1	98.5	64
867			1625	268.0	277.7	5.0	15.0	10.4	5.1	1	98.5	64
868			1629	268.0	277.7	5.0	15.0	10.5	4.9	1	98.5	64
869			1628	268.0	277.7	5.0	15.1	9.4	5.1	1	98.5	64
870			1625	268.0	277.7	5.0	15.0	10.4	3.6	1	98.5	64
871			1628	268.0	277.7	5.0	15.0	9.2	3.9	1	98.5	64
872			1629	268.0	277.7	5.0	15.1	10.6	4.4	1	98.5	64
873			1616	268.0	277.7	5.0	14.9	9.1	4.4	1	98.5	64
874			1614	268.0	277.7	5.0	14.7	7.3	4.0	1	98.5	64
875			1650	268.0	277.7	5.0	15.1	8.3	5.6	1	98.5	64
876			1647	268.0	277.7	5.0	15.4	10.3	4.0	1	98.5	64
877			1626	268.0	277.7	5.0	15.3	10.9	5.0	1	98.5	64
878			1621	268.0	277.7	5.0	15.1	9.9	5.0	1	98.5	64
879			1628	268.0	277.7	5.0	15.2	11.1	5.9	1	98.5	64
880			1625	268.0	277.7	5.0	15.2	12.9	7.7	1	98.5	64

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
881			1620	268.0	277.7	5.0	15.0	11.7	6.7	1	98.5	64
882			1624	268.0	277.7	5.0	15.0	12.0	8.1	1	98.5	64
883			1634	268.0	277.7	5.0	15.0	11.4	8.9	1	98.5	64
884			1634	268.0	277.7	5.0	15.2	12.3	4.3	1	98.5	64
885			1617	268.0	277.7	5.0	15.0	13.0	2.9	1	98.5	64
886			1609	268.0	277.7	5.0	14.7	9.7	2.9	1	98.5	64
887			1647	268.0	277.7	5.0	15.0	11.0	3.2	1	98.5	64
888			1640	268.0	277.7	5.0	15.3	13.2	5.0	1	98.5	63
889			1616	268.0	277.7	5.0	15.1	13.6	4.3	1	98.5	63
890			1621	268.0	277.7	5.0	14.9	10.9	6.0	1	98.5	63
891			1622	268.0	277.7	5.0	14.8	10.0	4.1	1	98.5	63
892			1629	268.0	277.7	5.0	14.9	9.6	4.0	1	98.4	63
893			1635	268.0	277.7	5.0	15.0	8.6	5.4	1	98.4	63
894			1645	268.0	277.7	5.0	15.4	10.8	4.6	1	98.5	63
895			1610	268.0	277.7	5.0	15.0	9.9	4.6	1	98.5	62
896			1631	268.0	277.7	5.0	15.1	10.6	7.0	1	98.5	62
897			1616	268.0	277.7	5.0	15.0	10.5	4.9	1	98.5	62
898			1632	268.0	277.7	5.0	15.1	11.2	3.5	1	98.5	62
899			1631	268.0	277.7	5.0	15.2	11.9	1.3	1	98.5	62
900			1616	268.0	277.7	5.0	14.9	10.8	0.9	1	98.5	62
901			1602	268.0	277.7	5.0	14.7	10.1	2.5	1	98.5	62
902			1621	268.0	277.7	5.0	14.6	9.0	3.7	1	98.5	62
903			1626	268.0	277.7	5.0	14.6	8.6	3.2	1	98.5	62
904			1661	268.0	277.7	5.0	15.1	9.4	3.2	1	98.5	62
905			1662	268.0	277.7	5.0	15.4	9.4	3.6	1	98.5	62
906			1641	268.0	277.7	5.0	15.6	9.9	3.4	1	98.5	63
907			1623	268.0	277.7	5.0	15.4	11.8	4.0	1	98.5	63
908			1610	268.0	277.7	5.0	15.0	11.9	3.7	1	98.5	63
909			1622	268.0	277.7	5.0	14.9	9.6	3.3	1	98.5	63
910			1628	268.0	277.7	5.0	15.0	10.0	3.4	1	98.5	63
911			1615	268.0	277.7	5.0	14.8	9.3	4.5	1	98.5	63
912			1632	268.0	277.7	5.0	15.0	8.9	4.2	1	98.5	63
913			1605	268.0	277.7	5.0	14.7	7.1	7.9	1	98.5	63
914			1647	268.0	277.7	5.0	15.1	9.4	6.5	1	98.5	63
915			1633	268.0	277.7	5.0	15.2	9.8	5.9	1	98.5	63
916			1635	268.0	277.7	5.0	15.3	9.7	2.7	1	98.5	63
917			1602	268.0	277.7	5.0	14.9	10.5	1.7	1	98.5	63
918			1627	268.0	277.7	5.0	15.0	11.1	1.6	1	98.5	63
919			1624	268.0	277.7	5.0	15.0	9.7	2.2	1	98.5	64
920			1643	268.0	277.7	5.0	15.3	10.0	3.0	1	98.5	64
921			1618	268.0	277.7	5.0	15.2	10.9	5.1	1	98.5	64
922			1611	268.0	277.7	5.0	14.9	10.2	4.8	1	98.5	64
923			1619	268.0	277.7	5.0	14.8	10.2	5.2	1	98.5	64
924			1634	268.0	277.7	5.0	14.9	8.8	4.3	1	98.5	64
925			1652	268.0	277.7	5.0	15.3	10.4	5.1	1	98.5	63
926			1615	268.0	277.7	5.0	15.1	9.1	5.2	1	98.5	63
927			1610	268.0	277.7	5.0	14.8	7.8	6.6	1	98.5	63
928			1634	268.0	277.7	5.0	15.0	9.3	5.8	1	98.5	63
929			1631	268.0	277.7	5.0	15.1	8.9	4.9	1	98.5	63
930			1606	268.0	277.7	5.0	14.8	8.9	4.2	1	98.5	64
931			1651	268.0	277.7	5.0	15.2	9.2	4.3	1	98.5	64
932			1654	268.0	277.7	5.0	15.7	13.3	5.8	1	98.5	64
933			1618	268.0	277.7	5.0	15.3	12.2	3.5	1	98.5	64
934			1616	268.0	277.7	5.0	15.1	12.3	3.0	1	98.5	64
935			1632	268.0	277.7	5.0	15.2	11.6	5.1	1	98.5	64
936			1621	268.0	277.7	5.0	15.1	13.9	5.7	1	98.5	64
937			1627	268.0	277.7	5.0	15.1	14.4	4.8	1	98.5	64
938			1624	268.0	277.7	5.0	15.0	13.7	2.5	1	98.5	64
939			1628	268.0	277.7	5.0	15.0	12.3	3.6	1	98.5	64
940			1626	268.0	277.7	5.0	15.0	12.6	4.9	1	98.5	64
941			1620	268.0	277.7	5.0	14.9	11.5	5.3	1	98.5	64
942			1623	268.0	277.7	5.0	14.8	10.4	4.6	1	98.5	63
943			1650	268.0	277.7	5.0	15.1	12.2	3.6	1	98.5	63
944			1631	268.0	277.7	5.0	15.3	12.5	4.2	1	98.5	63
945			1630	268.0	277.7	5.0	15.3	13.3	4.5	1	98.5	63
946			1625	268.0	277.7	5.0	15.3	15.2	3.7	1	98.5	63
947			1619	268.0	277.7	5.0	15.0	15.3	4.8	1	98.5	63
948			1624	268.0	277.7	5.0	14.9	13.3	5.2	1	98.5	63
949			1629	268.0	277.7	5.0	15.0	13.3	4.6	1	98.5	63
950			1629	268.0	277.7	5.0	15.1	13.1	4.1	1	98.5	63
951			1625	268.0	277.7	5.0	15.0	12.5	2.7	1	98.5	63
952			1626	268.0	277.7	5.0	14.9	11.0	5.3	1	98.5	63
953			1628	268.0	277.7	5.0	15.1	12.1	4.5	1	98.5	63
954			1620	268.0	277.7	5.0	15.0	10.6	5.2	1	98.5	64
955			1631	268.0	277.7	5.0	15.0	10.8	4.0	1	98.5	64
956			1640	268.0	277.7	5.0	15.2	10.7	3.9	1	98.5	64
957			1631	268.0	277.7	5.0	15.3	12.3	4.0	1	98.5	64
958			1623	268.0	277.7	5.0	15.2	14.2	3.2	1	98.5	64
959			1616	268.0	277.7	5.0	14.9	13.1	4.3	1	98.5	64
960			1628	268.0	277.7	5.0	14.9	10.6	3.4	1	98.5	64
961			1614	268.0	277.7	5.0	14.7	10.9	1.4	1	98.5	64
962			1646	268.0	277.7	5.0	15.0	9.6	3.6	1	98.5	64
963			1611	268.0	277.7	5.0	14.9	9.6	2.7	1	98.5	64
964			1628	268.0	277.7	5.0	14.9	7.0	4.4	1	98.5	64
965			1640	268.0	277.7	5.0	15.2	8.5	7.2	1	98.5	64
966			1638	268.0	277.7	5.0	15.3	8.6	4.2	1	98.5	64
967			1626	268.0	277.7	5.0	15.3	11.4	3.3	1	98.5	64
968			1622	268.0	277.7	5.0	15.2	13.5	3.1	1	98.5	64

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
969			1628	268.0	277.7	5.0	15.1	13.0	2.9	1	98.5	64
970			1620	268.0	277.7	5.0	15.0	12.9	3.0	1	98.5	64
971			1624	268.0	277.7	5.0	15.0	12.4	2.5	1	98.5	64
972			1624	268.0	277.7	5.0	14.9	10.3	4.1	1	98.5	64
973			1631	268.0	277.7	5.0	15.0	10.4	5.0	1	98.5	64
974			1627	268.0	277.7	5.0	15.0	9.5	4.1	1	98.5	64
975			1625	268.0	277.7	5.0	15.0	10.3	5.4	1	98.5	64
976			1622	268.0	277.7	5.0	14.9	9.5	4.7	1	98.5	64
977			1627	268.0	277.7	5.0	14.9	8.7	5.6	1	98.5	64
978			1646	268.0	277.7	5.0	15.2	9.2	4.9	1	98.5	64
979			1635	268.0	277.7	5.0	15.3	10.7	3.0	1	98.5	64
980			1619	268.0	277.7	5.0	15.1	11.2	2.0	1	98.5	64
981			1618	268.0	277.7	5.0	15.0	9.6	3.1	1	98.5	64
982			1621	268.0	277.7	5.0	14.9	9.9	4.0	1	98.5	64
983			1625	268.0	277.7	5.0	14.9	11.5	4.9	1	98.5	64
984			1638	268.0	277.7	5.0	15.0	10.0	5.8	1	98.5	64
985			1631	268.0	277.7	5.0	15.2	10.6	4.9	1	98.5	64
986			1614	268.0	277.7	5.0	14.9	10.2	4.6	1	98.5	64
987			1615	268.0	277.7	5.0	14.8	8.6	3.6	1	98.5	64
988			1656	268.0	277.7	5.0	15.4	11.0	5.5	1	98.5	64
989			1597	268.0	277.7	5.0	14.9	10.1	4.5	1	98.5	64
990			1573	268.0	277.7	5.0	14.2	8.2	4.2	1	98.5	65
991			1607	268.0	277.7	5.0	14.1	8.8	3.2	1	98.5	65
992			1693	268.0	277.7	5.0	15.5	10.0	4.6	1	98.5	65
993			1622	268.0	277.7	5.0	15.4	9.4	4.5	1	98.5	65
994			1613	268.0	277.7	5.0	15.1	8.2	4.7	1	98.5	65
995			1621	268.0	277.7	5.0	15.2	9.0	4.1	1	98.5	65
996			1635	268.0	277.7	5.0	15.3	10.0	3.6	1	98.5	65
997			1620	268.0	277.7	5.0	15.2	12.9	3.1	1	98.5	65
998			1631	268.0	277.7	5.0	15.3	12.5	5.5	1	98.5	65
999			1615	268.0	277.7	5.0	15.0	13.9	5.8	1	98.5	65
1000			1629	268.0	277.7	5.0	15.0	11.3	4.3	1	98.5	65
1001			1624	268.0	277.7	5.0	15.0	11.7	4.9	1	98.5	65
1002			1619	268.0	277.7	5.0	14.9	11.4	2.7	1	98.5	64
1003			1632	268.0	277.7	5.0	14.9	9.5	2.0	1	98.5	64
1004			1648	268.0	277.7	5.0	15.3	9.4	4.9	1	98.5	64
1005			1619	268.0	277.7	5.0	15.1	10.2	5.6	1	98.5	64
1006			1613	268.0	277.7	5.0	14.9	9.4	5.5	1	98.5	64
1007			1644	268.0	277.7	5.0	15.2	8.2	5.9	1	98.5	64
1008			1630	268.0	277.7	5.0	15.3	12.5	7.0	1	98.5	63
1009			1624	268.0	277.7	5.0	15.2	13.0	5.1	1	98.5	63
1010			1609	268.0	277.7	5.0	14.8	11.9	6.0	1	98.5	63
1011			1642	268.0	277.7	5.0	15.1	10.8	8.4	1	98.5	63
1012			1627	268.0	277.7	5.0	15.1	13.3	6.8	1	98.5	63
1013			1628	268.0	277.7	5.0	15.2	13.6	5.8	1	98.5	63
1014			1619	268.0	277.7	5.0	15.0	13.2	4.6	1	98.5	62
1015			1628	268.0	277.7	5.0	15.0	12.4	5.3	1	98.5	62
1016			1629	268.0	277.7	5.0	15.0	12.0	4.9	1	98.5	62
1017			1625	268.0	277.7	5.0	15.0	11.8	5.5	1	98.5	62
1018			1627	268.0	277.7	5.0	15.0	11.9	6.1	1	98.5	62
1019			1631	268.0	277.7	5.0	15.1	11.0	5.3	1	98.5	62
1020			1622	268.0	277.7	5.0	15.1	12.3	5.0	1	98.5	62
1021			1627	268.0	277.7	5.0	15.0	9.9	5.3	1	98.5	62
1022			1624	268.0	277.7	5.0	15.0	10.3	5.6	1	98.5	62
1023			1636	268.0	277.7	5.0	15.2	11.5	5.8	1	98.5	62
1024			1614	268.0	277.7	5.0	14.9	11.6	5.7	1	98.5	62
1025			1629	268.0	277.7	5.0	15.1	9.6	5.9	1	98.5	62
1026			1630	268.0	277.7	5.0	15.0	9.3	7.7	1	98.5	61
1027			1627	268.0	277.7	5.0	15.1	10.5	5.5	1	98.5	61
1028			1617	268.0	277.7	5.0	14.9	10.8	3.5	1	98.5	61
1029			1647	268.0	277.7	5.0	15.3	12.6	6.1	1	98.5	61
1030			1623	268.0	277.7	5.0	15.2	14.2	5.8	1	98.5	61
1031			1615	268.0	277.7	5.0	15.0	13.3	3.9	1	98.5	61
1032			1623	268.0	277.7	5.0	14.8	12.0	3.9	1	98.5	61
1033			1637	268.0	281.2	5.0	15.1	12.7	3.4	1	98.5	62
1034			1634	268.0	286.3	5.0	15.2	10.4	2.6	1	98.5	62
1035			1620	268.0	286.5	5.0	15.1	12.2	1.4	1	98.5	62
1036			1623	268.0	286.5	5.0	15.0	12.0	1.2	1	98.5	62
1037			1612	268.0	286.5	5.0	14.7	9.0	2.9	1	98.5	62
1038			1636	268.0	286.5	5.0	14.9	7.8	2.4	1	98.5	62
1039			1648	268.0	286.5	5.0	15.2	9.2	4.7	1	98.5	62
1040			1626	268.0	286.5	5.0	15.2	11.7	6.6	1	98.5	62
1041			1622	268.0	286.5	5.0	15.1	11.9	6.1	1	98.5	62
1042			1628	268.0	286.5	5.0	15.1	9.0	3.7	1	98.5	62
1043			1623	268.0	286.5	5.0	15.1	10.8	3.0	1	98.5	62
1044			1632	268.0	286.5	5.0	15.2	10.6	4.1	1	98.5	62
1045			1622	268.0	286.5	5.0	15.1	11.9	3.0	1	98.5	62
1046			1620	268.0	286.5	5.0	14.9	10.7	2.9	1	98.5	62
1047			1625	268.0	286.5	5.0	14.9	10.2	3.5	1	98.5	62
1048			1614	268.0	286.5	5.0	14.7	8.8	5.1	1	98.5	62
1049			1627	268.0	286.5	5.0	14.7	8.4	5.0	1	98.5	62
1050			1666	268.0	286.5	5.0	15.3	8.8	5.1	1	98.5	62
1051			1635	268.0	286.5	5.0	15.4	11.7	5.1	1	98.5	62
1052			1616	268.0	286.5	5.0	15.1	11.5	4.2	1	98.5	62
1053			1613	268.0	286.5	5.0	14.9	10.3	3.6	1	98.5	62
1054			1615	268.0	286.5	5.0	14.7	9.6	4.6	1	98.5	62
1055			1653	268.0	286.5	5.0	15.2	9.7	2.5	1	98.5	62
1056			1627	268.0	286.5	5.0	15.2	10.1	4.2	1	98.5	62

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1057			1615	268.0	286.5	5.0	14.9	9.3	5.3	1	98.5	62
1058			1622	268.0	286.5	5.0	14.9	9.9	5.2	1	98.5	62
1059			1607	268.0	286.5	5.0	14.6	9.7	4.3	1	98.5	62
1060			1637	268.0	286.5	5.0	14.8	9.0	4.8	1	98.5	62
1061			1636	268.0	286.5	5.0	15.0	7.5	4.4	1	98.5	62
1062			1653	268.0	286.5	5.0	15.3	8.2	2.5	1	98.5	62
1063			1614	268.0	286.5	5.0	15.2	10.5	1.7	1	98.5	62
1064			1613	268.0	286.5	5.0	15.0	8.7	4.7	1	98.5	62
1065			1617	268.0	286.5	5.0	15.0	8.2	4.2	1	98.5	62
1066			1602	268.0	284.3	5.0	14.6	7.9	4.3	1	98.5	62
1067			1630	268.0	280.7	5.0	14.7	7.2	3.1	1	98.5	62
1068			1661	268.0	280.7	5.0	15.2	8.7	0.9	1	98.5	63
1069			1619	268.0	280.7	5.0	15.1	9.4	1.3	1	98.5	63
1070			1643	268.0	280.7	5.0	15.3	8.4	1.6	1	98.5	63
1071			1641	268.0	280.7	5.0	15.6	10.8	3.2	1	98.5	63
1072			1615	268.0	280.7	5.0	15.3	11.7	4.4	1	98.5	63
1073			1619	268.0	280.7	5.0	15.1	10.9	6.8	1	98.5	63
1074			1613	268.0	280.7	5.0	14.9	11.7	4.9	1	98.5	62
1075			1627	268.0	280.7	5.0	15.0	10.2	4.4	1	98.5	62
1076			1628	268.0	280.7	5.0	14.9	10.6	3.5	1	98.5	62
1077			1627	268.0	280.7	5.0	15.0	9.5	4.9	1	98.5	62
1078			1618	268.0	280.7	5.0	14.9	9.7	5.1	1	98.5	62
1079			1618	268.0	280.7	5.0	14.7	8.2	3.5	1	98.5	62
1080			1617	268.0	280.7	5.0	15.0	10.5	3.8	1	98.5	62
1081			1605	268.0	280.7	5.0	14.6	8.2	3.3	1	98.5	62
1082			1645	268.0	280.7	5.0	15.1	9.0	3.5	1	98.5	62
1083			1619	268.0	280.7	5.0	14.9	8.3	2.9	1	98.5	62
1084			1631	268.0	280.7	5.0	14.9	8.0	4.1	1	98.5	62
1085			1635	268.0	280.7	5.0	15.0	9.4	2.8	1	98.5	62
1086			1653	268.0	280.7	5.0	15.4	8.9	3.2	1	98.5	63
1087			1636	268.0	280.7	5.0	15.5	9.4	5.4	1	98.5	63
1088			1634	268.0	280.7	5.0	15.5	10.8	5.8	1	98.5	63
1089			1610	268.0	280.7	5.0	15.2	10.9	4.0	1	98.5	63
1090			1627	268.0	280.7	5.0	15.2	10.8	3.9	1	98.5	63
1091			1618	268.0	280.7	5.0	15.1	9.9	4.4	1	98.5	63
1092			1628	268.0	280.7	5.0	15.2	13.0	4.7	1	98.5	62
1093			1626	268.0	280.7	5.0	15.1	14.0	7.0	1	98.5	62
1094			1622	268.0	280.7	5.0	15.0	11.5	7.3	1	98.5	62
1095			1625	268.0	280.7	5.0	15.0	10.0	3.8	1	98.5	62
1096			1622	268.0	280.7	5.0	14.9	10.9	6.1	1	98.5	62
1097			1632	268.0	280.7	5.0	15.0	9.1	6.1	1	98.5	62
1098			1632	268.0	280.7	5.0	15.1	11.4	4.6	1	98.5	62
1099			1625	268.0	280.7	5.0	15.0	9.5	4.0	1	98.5	62
1100			1621	268.0	280.7	5.0	15.0	10.7	3.7	1	98.5	62
1101			1624	268.0	280.7	5.0	14.9	10.4	5.4	1	98.5	62
1102			1635	268.0	280.7	5.0	15.1	12.4	4.1	1	98.5	62
1103			1631	268.0	280.7	5.0	15.2	12.0	4.4	1	98.5	62
1104			1615	268.0	280.7	5.0	15.0	11.1	3.5	2	98.5	62
1105			1635	268.0	280.7	5.0	15.2	11.4	4.1	2	98.5	62
1106			1615	268.0	280.7	5.0	15.0	11.2	4.9	2	98.5	62
1107			1618	268.0	280.7	5.0	14.8	7.4	4.7	2	98.5	62
1108			1659	268.0	280.7	5.0	15.5	11.4	4.8	2	98.5	62
1109			1613	268.0	280.7	5.0	15.1	13.5	4.3	2	98.5	62
1110			1619	268.0	280.7	5.0	14.9	12.4	2.1	2	98.5	61
1111			1633	268.0	280.7	5.0	15.0	9.2	3.5	2	98.5	61
1112			1624	268.0	280.7	5.0	15.0	10.6	4.0	2	98.5	61
1113			1629	268.0	280.7	5.0	15.1	10.3	4.2	2	98.5	61
1114			1623	268.0	280.7	5.0	15.0	10.8	4.8	2	98.5	61
1115			1641	268.0	280.7	5.0	15.4	12.0	5.0	2	98.5	61
1116			1618	268.0	280.7	5.0	15.1	12.6	4.9	2	98.5	61
1117			1631	268.0	280.7	5.0	15.2	14.0	7.0	1	98.5	61
1118			1625	268.0	280.7	5.0	15.1	14.8	7.1	1	98.5	61
1119			1626	268.0	280.7	5.0	15.1	14.3	7.2	1	98.5	61
1120			1628	268.0	280.7	5.0	15.1	14.8	6.2	1	98.5	61
1121			1618	268.0	280.7	5.0	14.9	15.5	7.4	1	98.5	61
1122			1630	268.0	280.7	5.0	15.0	13.6	4.5	2	98.5	59
1123			1620	268.0	280.7	5.0	14.9	12.8	4.7	2	98.5	58
1124			1641	268.0	280.7	5.0	15.1	10.4	3.8	2	98.5	58
1125			1627	268.0	280.7	5.0	15.1	10.5	5.2	2	98.5	58
1126			1633	268.0	280.7	5.0	15.3	13.5	5.7	2	98.5	58
1127			1623	268.0	280.7	5.0	15.2	15.2	1.9	2	98.5	58
1128			1621	268.0	280.7	5.0	15.0	14.6	3.1	2	98.5	58
1129			1626	268.0	280.7	5.0	14.9	12.2	2.3	2	98.5	59
1130			1630	268.0	280.7	5.0	15.0	12.9	2.5	2	98.5	59
1131			1633	268.0	285.1	5.0	15.2	12.5	2.5	2	98.5	59
1132			1054	268.0	293.2	5.0	12.6	10.8	2.4	2	98.5	59
1133			100	268.0	296.3	5.0	4.3	9.0	1.8	2	98.5	59
1134			100	268.0	296.3	5.0	0.8	10.0	0.7	2	98.5	58
1135			100	268.0	296.3	5.0	0.0	11.7	1.2	2	98.5	58
1136			100	268.0	296.3	5.0	0.0	12.4	1.9	2	98.5	58
1137			100	268.0	296.3	5.0	0.0	9.8	2.0	2	98.5	58
1138	8.8	54.3	1419	163.6	163.6	1.2	14.4	7.3	6.0	2	99.4	46
1139	9.7	54.0	1665	163.6	163.6	1.6	15.3	9.0	6.6	2	99.4	46
1140	11.0	54.4	1665	163.6	163.6	7.0	15.9	10.2	6.2	2	99.4	45
1141	12.3	54.8	1602	163.6	163.6	8.9	15.5	11.5	6.6	2	99.4	45
1142	11.0	54.3	1605	163.6	163.6	7.7	15.2	10.2	6.4	2	99.4	45
1143	11.0	54.0	1625	163.6	163.6	9.2	15.3	10.2	5.2	2	99.4	45
1144	10.6	55.2	1602	163.6	163.6	8.1	14.8	9.9	4.9	2	99.4	45

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1145	11.5	53.9	1630	163.6	163.6	7.9	15.0	10.7	3.9	2	99.4	45
1146	12.0	55.3	1640	163.6	163.6	9.1	15.2	11.2	5.3	2	99.4	45
1147	11.1	54.7	1609	163.6	163.6	8.6	14.9	10.4	4.5	2	99.4	45
1148			1613	163.6	163.6	6.6	14.7	8.1	4.9	2	99.4	45
1149	9.4	53.4	1616	163.6	163.6	4.9	14.6	8.8	7.8	2	99.4	45
1150			1614	163.6	163.6	3.4	14.4	8.0	8.3	2	99.4	45
1151			1639	163.6	163.6	2.3	14.6	7.4	6.2	2	99.4	45
1152	10.8	54.0	1680	163.6	163.6	4.7	15.4	10.0	4.6	2	99.4	45
1153	9.6	54.0	1635	163.6	163.6	5.3	15.3	8.9	5.6	2	99.4	45
1154	9.6	54.1	1645	163.6	163.6	7.1	15.6	9.0	6.9	2	99.4	45
1155			1613	163.6	163.6	6.8	15.3	8.3	7.8	2	99.4	45
1156	9.3	53.6	1611	163.6	163.6	7.2	15.1	8.6	5.5	2	99.4	45
1157			1604	163.6	163.6	5.6	14.8	8.6	6.5	2	99.4	45
1158	9.3	53.4	1620	163.6	163.6	4.7	14.7	8.7	7.2	2	99.4	45
1159	9.5	53.7	1646	163.6	163.6	6.3	15.3	8.9	6.6	2	99.4	45
1160			1599	163.6	163.6	5.4	14.7	6.8	6.1	2	99.4	45
1161	10.6	54.0	1659	163.6	163.6	8.4	15.6	9.8	6.5	2	99.4	45
1162			1616	163.6	163.6	10.4	15.3	10.7	3.5	2	99.4	45
1163			1623	163.6	163.6	10.4	15.2	11.0	3.5	2	99.4	45
1164			1619	163.6	163.6	10.4	15.1	10.9	4.5	2	99.4	46
1165			1624	163.6	163.6	9.6	15.0	11.2	7.5	2	99.4	46
1166			1626	163.6	163.6	9.3	15.0	11.2	5.1	2	99.4	46
1167			1616	163.6	163.6	8.1	14.8	10.8	4.8	2	99.4	46
1168	10.8	52.8	1607	163.6	163.6	5.4	14.5	10.0	4.8	2	99.4	46
1169	10.4	52.7	1644	163.6	163.6	5.5	14.9	9.7	4.3	2	99.4	46
1170	9.9	53.2	1641	163.6	163.6	6.1	15.1	9.2	5.5	2	99.4	46
1171	9.6	53.3	1630	163.6	163.6	5.6	15.0	8.9	6.5	2	99.4	46
1172			1654	163.6	163.6	6.8	15.4	8.3	6.2	2	99.4	46
1173	10.2	54.4	1627	163.6	163.6	8.5	15.4	9.5	6.0	2	99.4	46
1174	11.1	53.9	1626	163.6	163.6	9.1	15.3	10.3	5.5	2	99.4	46
1175	10.9	53.8	1610	163.6	163.6	8.1	15.0	10.2	3.2	2	99.4	46
1176	10.8	53.0	1626	163.6	163.6	8.0	15.0	10.1	4.0	2	99.4	46
1177			1603	163.6	163.6	6.2	14.7	8.3	6.2	2	99.4	46
1178			1637	163.6	163.6	5.7	14.8	7.5	4.3	2	99.4	46
1179	10.6	53.6	1634	163.6	163.6	5.9	15.0	9.9	3.6	2	99.4	46
1180	10.2	53.2	1626	163.6	163.6	5.4	14.9	9.5	2.2	2	99.4	46
1181			1636	163.6	163.6	5.4	15.0	8.0	6.4	2	99.4	46
1182			1648	163.6	163.6	6.6	15.4	8.0	5.7	2	99.3	45
1183	10.4	53.5	1590	163.6	163.6	6.0	14.8	9.7	5.2	2	99.3	45
1184			1544	163.6	163.6	2.0	14.0	7.7	5.2	2	99.3	45
1185	8.8	53.7	1427	163.6	163.6	0.6	14.2	8.6	7.0	2	99.3	45
1186	9.6	53.8	1661	163.6	163.6	1.7	15.3	9.0	5.8	2	99.3	45
1187			1586	163.6	163.6	2.8	15.0	8.5	6.5	2	99.3	45
1188	8.7	53.4	1394	163.6	163.6	0.7	14.1	7.8	5.4	2	99.3	45
1189	7.8	52.5	1133	163.6	163.6	0.3	13.5	7.1	6.1	2	99.3	45
1190	7.6	52.0	1070	163.6	163.6	0.6	13.0	6.7	6.0	2	99.3	45
1191	11.1	53.8	1553	163.6	163.6	0.8	14.8	10.4	4.5	2	99.3	45
1192	10.8	55.2	1642	163.6	163.6	5.2	15.5	10.1	5.2	2	99.3	45
1193			1636	163.6	163.6	6.4	15.5	7.5	3.5	2	99.3	45
1194	10.1	55.1	1626	163.6	163.6	7.2	15.5	9.4	5.0	2	99.3	45
1195	10.2	54.7	1622	163.6	163.6	8.0	15.4	9.5	7.7	2	99.3	45
1196	10.9	54.6	1617	163.6	163.6	8.8	15.3	10.2	7.6	2	99.3	45
1197			1596	163.6	163.6	7.3	14.7	8.2	7.2	2	99.3	45
1198			1607	163.6	163.6	4.4	14.4	8.6	6.4	2	99.3	45
1199			1615	163.6	163.6	3.4	14.5	7.4	7.3	2	99.3	45
1200	9.1	52.7	1489	163.6	163.6	1.4	14.1	8.2	7.0	2	99.3	44
1201	8.8	53.2	1419	163.6	163.6	0.3	14.5	8.1	6.7	2	99.3	44
1202			1591	163.6	163.6	1.2	14.9	8.4	6.0	2	99.3	44
1203			1656	163.6	163.6	1.9	15.4	7.5	6.2	2	99.3	44
1204			1645	163.6	163.6	6.3	15.8	7.8	6.3	2	99.3	44
1205	10.0	54.5	1628	163.6	163.6	8.5	15.7	9.4	6.8	2	99.3	44
1206	9.6	53.9	1595	163.6	163.6	7.7	15.2	8.9	5.7	2	99.3	44
1207	9.7	53.3	1617	163.6	163.6	7.8	15.2	9.0	3.9	2	99.3	44
1208	10.2	54.2	1605	163.6	163.6	7.8	14.9	9.5	3.6	2	99.3	44
1209	10.0	53.6	1628	163.6	163.6	7.6	15.0	9.3	3.4	2	99.3	44
1210	11.0	53.6	1641	163.6	163.6	8.5	15.2	10.3	4.1	2	99.3	44
1211	11.2	53.7	1619	163.6	163.6	8.9	15.1	10.4	6.0	2	99.3	44
1212	11.1	53.4	1626	163.6	163.6	8.4	15.1	10.4	3.7	2	99.3	44
1213	11.1	54.0	1629	163.6	163.6	9.4	15.2	10.3	5.1	2	99.3	44
1214	11.5	54.8	1624	163.6	163.6	8.9	15.1	10.7	5.0	2	99.3	44
1215	10.9	54.0	1625	163.6	163.6	9.4	15.1	10.1	6.0	2	99.3	44
1216	10.7	54.1	1613	163.6	163.6	7.5	14.8	10.0	5.0	2	99.3	44
1217			1643	163.6	163.6	7.9	15.1	8.4	3.8	2	99.3	44
1218	10.7	54.4	1621	163.6	163.6	8.2	15.0	10.0	5.9	2	99.3	45
1219	10.9	53.9	1629	163.6	163.6	7.5	15.0	10.2	7.7	2	99.3	45
1220	11.6	54.6	1641	163.6	163.6	8.7	15.3	10.8	5.1	2	99.3	45
1221	12.5	55.4	1630	163.6	163.6	11.0	15.3	11.6	5.1	2	99.3	45
1222			1612	163.6	163.6	10.0	15.0	10.7	5.6	2	99.3	45
1223			1606	163.6	163.6	7.4	14.6	7.8	4.4	2	99.3	45
1224			1629	163.6	163.6	5.6	14.7	8.3	5.0	2	99.3	45
1225	9.4	53.5	1648	163.6	163.6	6.7	15.0	8.7	4.1	2	99.3	45
1226			1627	163.6	163.6	6.2	15.0	8.6	3.5	2	99.3	45
1227			1620	163.6	163.6	6.0	14.9	8.0	2.7	2	99.3	45
1228			1615	163.6	163.6	4.1	14.7	7.5	3.9	2	99.3	45
1229			1637	163.6	163.6	4.8	15.0	7.5	4.3	2	99.3	45
1230			1608	163.6	163.6	3.8	14.6	6.5	8.3	2	99.3	45
1231			1664	163.6	163.6	4.5	15.3	8.1	8.2	2	99.3	45
1232			1647	163.6	163.6	6.8	15.5	7.6	8.1	2	99.3	45

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1233	9.3	54.8	1626	163.6	163.6	8.2	15.4	8.6	8.8	2	99.3	45
1234	10.1	54.6	1612	163.6	163.6	9.2	15.3	9.4	7.4	2	99.3	45
1235			1595	163.6	163.6	6.1	14.7	8.4	6.9	2	99.3	45
1236			1624	163.6	163.6	6.0	14.8	8.0	6.1	2	99.3	44
1237	10.3	55.9	1644	163.6	163.6	5.8	15.0	9.6	5.2	2	99.3	44
1238	11.4	54.2	1655	163.6	163.6	7.7	15.3	10.6	4.0	2	99.3	44
1239			1620	163.6	163.6	8.3	15.2	10.7	3.6	2	99.3	44
1240	9.9	54.9	1599	163.6	163.6	6.3	14.8	9.3	5.2	2	99.3	44
1241			1589	163.6	163.6	3.8	14.3	7.7	7.0	2	99.3	44
1242			1671	163.6	163.6	5.2	15.1	8.2	6.3	2	99.3	44
1243	11.0	54.6	1654	163.6	163.6	8.9	15.6	10.2	5.4	2	99.3	44
1244	9.3	54.4	1612	163.6	163.6	8.7	15.2	8.7	6.1	2	99.3	44
1245	12.5	54.1	1623	163.6	163.6	8.6	15.2	11.6	7.5	2	99.3	44
1246	11.6	54.5	1624	163.6	163.6	9.2	15.1	10.8	5.5	2	99.3	44
1247	11.3	54.2	1616	163.6	163.6	8.5	15.0	10.6	4.5	2	99.3	44
1248	9.5	53.3	1623	163.6	163.6	7.8	14.9	8.8	2.9	2	99.3	44
1249			1629	163.6	163.6	7.1	14.9	7.8	5.1	2	99.3	44
1250			1621	163.6	163.6	7.6	15.0	8.0	5.3	2	99.3	44
1251			1613	163.6	163.6	5.8	14.7	7.9	8.1	2	99.3	44
1252			1641	163.6	163.6	6.6	15.1	8.1	8.1	2	99.3	44
1253			1605	163.6	163.6	5.4	14.7	6.6	6.7	2	99.3	44
1254	10.0	53.8	1650	163.6	163.6	5.5	15.1	9.3	5.9	2	99.3	43
1255			1628	163.6	163.6	8.8	15.4	10.6	8.3	2	99.3	43
1256			1618	163.6	163.6	9.3	15.2	10.9	8.2	2	99.3	43
1257	9.5	55.0	1599	163.6	163.6	7.1	14.8	8.9	7.5	2	99.3	43
1258			1628	163.6	163.6	5.8	14.8	8.6	6.0	2	99.3	43
1259	9.4	53.6	1614	163.6	163.6	5.9	14.7	8.8	5.3	2	99.3	43
1260	9.7	53.0	1631	163.6	163.6	4.4	14.7	9.1	4.5	2	99.3	44
1261			1634	163.6	163.6	5.2	15.0	8.3	4.8	2	99.3	44
1262			1597	163.6	163.6	4.0	14.7	7.4	3.9	2	99.3	44
1263			1593	163.6	163.6	3.0	14.5	7.3	4.3	2	99.3	44
1264			1613	163.6	163.6	3.4	14.8	8.4	4.5	2	99.3	44
1265			1607	163.6	163.6	1.8	14.4	7.7	5.0	2	99.3	44
1266			1537	163.6	163.6	0.6	14.5	8.0	3.6	2	99.3	44
1267	8.6	53.0	1369	163.6	163.6	0.6	14.3	7.0	3.3	2	99.3	44
1268	8.8	53.3	1416	163.6	163.6	0.1	14.4	7.5	5.0	2	99.3	44
1269			1529	163.6	163.6	0.1	14.9	8.0	7.6	2	99.3	44
1270	8.4	54.2	1315	163.6	163.6	1.4	14.0	6.0	6.5	2	99.3	44
1271			1546	163.6	163.6	0.7	14.5	8.1	6.5	2	99.3	44
1272	9.4	54.8	1644	163.6	163.6	5.9	15.5	8.7	6.2	2	99.3	43
1273	11.2	53.8	1611	163.6	163.6	5.9	15.2	10.5	4.5	2	99.3	43
1274	9.5	54.3	1635	163.6	163.6	7.0	15.4	8.8	4.9	2	99.3	43
1275			1612	163.6	163.6	7.0	15.1	7.7	3.1	2	99.3	43
1276			1604	163.6	163.6	6.3	14.9	8.2	3.9	2	99.3	43
1277			1598	163.6	163.6	4.6	14.6	8.2	3.4	2	99.3	43
1278	8.9	52.5	1458	163.6	163.6	1.8	13.6	7.4	5.6	2	99.3	45
1279	8.9	53.8	1452	163.6	163.6	0.1	14.4	9.2	6.5	2	99.3	45
1280	9.6	54.2	1655	163.6	163.6	2.0	15.3	9.0	7.1	2	99.3	45
1281			1583	163.6	163.6	2.5	14.9	8.4	5.9	2	99.3	45
1282	9.6	53.4	1593	163.6	163.6	0.8	14.7	8.9	6.5	2	99.3	45
1283	9.7	53.9	1634	163.6	163.6	1.0	15.0	9.0	3.2	2	99.3	45
1284	9.2	53.6	1503	163.6	163.6	1.0	14.6	8.1	2.0	2	99.3	44
1285	9.0	53.8	1466	163.6	163.6	0.1	14.6	9.1	4.3	2	99.3	44
1286	10.9	54.0	1638	163.6	163.6	0.7	15.1	10.2	3.7	2	99.3	44
1287	11.1	54.9	1681	163.6	163.6	3.8	15.8	10.4	1.5	2	99.3	44
1288	10.0	56.0	1561	163.6	163.6	8.3	15.4	9.3	2.6	2	99.3	44
1289	10.0	53.9	1569	163.6	163.6	4.7	14.7	9.3	5.8	2	99.3	44
1290	11.4	54.4	1636	163.6	163.6	8.3	15.6	10.6	6.0	2	99.3	45
1291	12.5	55.8	1601	163.6	163.6	9.6	15.2	11.6	4.5	2	99.3	45
1292	11.2	54.3	1617	163.6	163.6	8.6	15.1	10.4	3.7	2	99.3	45
1293	11.0	54.0	1630	163.6	163.6	9.0	15.1	10.3	7.5	2	99.3	45
1294	9.8	53.7	1614	163.6	163.6	8.5	14.9	9.2	7.5	2	99.3	45
1295	10.1	53.7	1622	163.6	163.6	6.7	14.8	9.4	6.2	2	99.3	45
1296	10.6	53.4	1628	163.6	163.6	6.6	14.9	9.9	5.7	2	99.3	43
1297			1630	163.6	163.6	6.8	15.0	8.4	3.9	2	99.3	43
1298			1641	163.6	163.6	6.5	15.1	8.5	4.6	2	99.3	43
1299	11.0	53.5	1637	163.6	163.6	8.2	15.3	10.3	5.0	2	99.3	43
1300	12.4	54.2	1625	163.6	163.6	8.8	15.3	11.6	5.2	2	99.3	43
1301	10.4	53.9	1586	163.6	163.6	6.1	14.6	9.7	6.1	2	99.3	43
1302			1615	163.6	163.6	4.2	14.6	8.3	5.1	2	99.3	43
1303			1583	163.6	163.6	2.8	14.1	6.9	6.5	2	99.3	43
1304			1625	163.6	163.6	1.3	14.5	7.8	5.1	2	99.3	43
1305	10.1	54.2	1673	163.6	163.6	3.6	15.6	9.4	4.9	2	99.3	43
1306			1568	163.6	163.6	4.1	14.9	8.0	7.3	2	99.3	43
1307	9.7	53.9	1628	163.6	163.6	2.5	15.0	9.0	8.5	2	99.3	43
1308			1642	163.6	163.6	5.0	15.3	7.5	7.3	2	99.3	43
1309			1623	163.6	163.6	4.6	15.2	7.5	4.7	2	99.3	43
1310			1629	163.6	163.6	5.7	15.3	8.1	6.4	2	99.3	43
1311			1605	163.6	163.6	4.3	14.9	8.3	6.3	2	99.3	43
1312			1625	163.6	163.6	5.0	15.0	7.7	5.2	2	99.3	43
1313			1615	163.6	163.6	4.6	15.0	7.6	6.3	2	99.3	43
1314	9.6	54.2	1651	163.6	163.6	5.8	15.2	9.0	5.8	2	99.3	43
1315	10.1	55.2	1628	163.6	163.6	7.8	15.4	9.4	5.2	2	99.3	43
1316	9.6	54.3	1608	163.6	163.6	6.6	15.0	9.0	2.5	2	99.3	43
1317	10.6	54.1	1615	163.6	163.6	7.1	15.1	9.9	4.8	2	99.3	43
1318	10.4	53.2	1617	163.6	163.6	6.6	14.9	9.7	6.1	2	99.3	43
1319	10.2	53.8	1646	163.6	163.6	7.6	15.3	9.5	5.6	2	99.3	43
1320	11.3	54.8	1623	163.6	163.6	9.6	15.3	10.5	6.8	2	99.3	43

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1321	10.2	54.6	1632	163.6	163.6	9.9	15.3	9.5	4.6	2	99.3	43
1322			1617	163.6	163.6	12.1	15.2	12.5	6.4	2	99.3	43
1323			1622	163.6	163.6	10.7	15.0	11.2	4.8	2	99.3	43
1324			1621	163.6	163.6	9.7	14.9	11.6	3.8	2	99.3	43
1325			1620	163.6	163.6	8.2	14.8	10.4	5.4	2	99.3	43
1326			1637	163.6	163.6	8.0	15.0	10.8	4.9	2	99.3	43
1327	10.5	53.8	1620	163.6	163.6	7.3	14.9	9.8	4.7	2	99.3	43
1328	10.9	53.8	1631	163.6	163.6	7.1	15.0	10.1	7.1	2	99.3	43
1329	10.0	54.1	1621	163.6	163.6	6.3	14.9	9.3	7.2	2	99.3	43
1330	10.2	54.8	1574	163.6	163.6	4.0	14.4	9.5	6.2	2	99.3	43
1331	8.8	52.8	1421	163.6	163.6	1.3	13.7	8.3	4.5	2	99.3	43
1332	11.2	54.0	1643	163.6	163.6	4.8	15.3	10.5	4.8	2	99.3	42
1333			1516	163.6	163.6	7.1	14.4	8.1	5.4	2	99.3	42
1334			1555	163.6	163.6	3.1	14.2	6.7	6.9	2	99.3	42
1335	9.2	53.6	1498	163.6	163.6	0.4	13.7	7.6	5.7	2	99.3	42
1336	9.6	54.6	1654	163.6	163.6	5.0	15.3	9.0	7.7	2	99.3	42
1337			1589	163.6	163.6	5.0	14.8	8.2	4.6	2	99.3	42
1338	9.7	53.6	1646	163.6	163.6	4.5	15.2	9.0	5.3	2	99.3	42
1339	10.1	54.2	1645	163.6	163.6	8.1	15.6	9.4	4.9	2	99.3	42
1340	9.8	53.8	1617	163.6	163.6	9.1	15.4	9.1	4.6	2	99.3	42
1341			1607	163.6	163.6	7.8	15.0	8.6	4.8	2	99.3	42
1342	10.2	53.8	1617	163.6	163.6	6.9	14.9	9.5	4.6	2	99.3	42
1343	11.4	54.2	1647	163.6	163.6	7.9	15.2	10.7	6.6	2	99.3	42
1344	13.4	55.2	1625	163.6	163.6	10.3	15.3	12.5	6.4	2	99.3	42
1345	11.0	54.1	1620	163.6	163.6	8.4	15.0	10.2	5.8	2	99.3	42
1346	9.4	54.5	1614	163.6	163.6	8.1	14.9	8.7	5.7	2	99.3	42
1347			1588	163.6	163.6	4.7	14.3	7.7	7.0	2	99.3	42
1348	9.3	54.0	1640	163.6	163.6	4.0	14.6	8.6	5.0	2	99.3	42
1349			1560	163.6	163.6	3.3	14.3	7.4	6.2	2	99.3	42
1350	8.8	52.6	1418	163.6	163.6	0.2	14.0	8.6	5.5	2	99.3	43
1351			1633	163.6	163.6	0.8	15.2	8.6	6.8	2	99.3	43
1352	10.7	54.3	1658	163.6	163.6	5.2	15.8	10.0	9.0	2	99.3	43
1353	10.6	54.4	1628	163.6	163.6	6.7	15.7	9.9	7.2	2	99.3	43
1354	10.6	56.3	1624	163.6	163.6	7.4	15.6	9.9	4.9	2	99.3	43
1355			1583	163.6	163.6	7.1	15.0	8.0	4.5	2	99.3	43
1356			1587	163.6	163.6	4.2	14.5	6.8	3.5	2	99.3	43
1357			1645	163.6	163.6	5.4	15.1	7.9	4.3	2	99.3	43
1358			1533	163.6	163.6	4.1	14.4	7.3	6.0	2	99.3	43
1359	10.4	53.2	1616	163.6	163.6	3.3	14.6	9.7	4.1	2	99.3	43
1360	11.1	54.3	1651	163.6	163.6	7.5	15.5	10.4	3.5	2	99.3	43
1361	9.5	53.9	1588	163.6	163.6	6.0	14.8	8.9	3.3	2	99.3	43
1362	9.8	53.6	1604	163.6	163.6	3.3	14.5	9.1	3.9	2	99.3	43
1363			1572	163.6	163.6	2.0	14.2	8.3	3.3	2	99.3	43
1364	9.2	53.4	1502	163.6	163.6	0.6	14.3	8.2	4.7	2	99.3	43
1365	9.5	54.2	1677	163.6	163.6	2.9	15.5	8.8	6.5	2	99.3	43
1366			1625	163.6	163.6	4.6	15.4	7.5	4.3	2	99.3	43
1367			1617	163.6	163.6	3.2	15.1	8.1	3.0	2	99.3	43
1368	10.5	54.5	1639	163.6	163.6	5.8	15.6	9.8	3.9	2	99.3	44
1369			1613	163.6	163.6	6.0	15.2	8.4	4.8	2	99.3	44
1370			1614	163.6	163.6	6.0	15.2	8.2	3.8	2	99.3	44
1371	9.9	54.4	1619	163.6	163.6	6.2	15.1	9.2	4.4	2	99.3	44
1372			1576	163.6	163.6	4.2	14.6	7.9	5.0	2	99.3	44
1373	9.2	52.5	1503	163.6	163.6	1.5	13.9	9.0	5.3	2	99.3	44
1374	8.9	53.6	1462	163.6	163.6	0.5	14.6	9.1	5.0	2	99.3	43
1375	8.9	53.6	1443	163.6	163.6	1.0	14.6	7.0	5.1	2	99.3	43
1376	7.8	52.9	1141	163.6	163.6	1.5	13.4	5.9	5.3	2	99.3	43
1377	7.4	52.3	992	163.6	163.6	0.5	12.7	7.1	5.8	2	99.3	43
1378	8.4	52.7	1312	163.6	163.6	0.3	13.9	7.8	5.4	2	99.3	43
1379	11.8	54.5	1649	163.6	163.6	6.6	15.6	11.0	3.0	2	99.3	43
1380	9.3	54.3	1597	163.6	163.6	8.6	15.2	8.7	2.8	2	99.3	43
1381	10.2	53.7	1618	163.6	163.6	8.5	15.2	9.5	4.0	2	99.3	43
1382	10.8	54.1	1621	163.6	163.6	9.1	15.2	10.1	5.9	2	99.3	43
1383	10.7	53.8	1601	163.6	163.6	7.6	14.8	9.9	3.5	2	99.3	43
1384	10.0	53.5	1633	163.6	163.6	6.9	14.9	9.3	5.2	2	99.3	43
1385	10.9	53.5	1624	163.6	163.6	6.5	14.9	10.1	5.1	2	99.3	43
1386	11.2	53.2	1636	163.6	163.6	7.0	15.1	10.4	7.1	2	99.3	43
1387	9.6	53.6	1580	163.6	163.6	4.4	14.4	8.9	3.7	2	99.3	43
1388	9.6	52.6	1613	163.6	163.6	2.0	14.3	9.0	3.5	2	99.3	43
1389	9.3	53.6	1694	163.6	163.6	6.0	15.6	8.6	3.9	2	99.3	43
1390	9.9	54.6	1628	163.6	163.6	8.1	15.4	9.2	5.0	2	99.3	43
1391	9.5	54.3	1586	163.6	163.6	5.4	14.8	8.9	5.0	2	99.3	43
1392			1613	163.6	163.6	4.8	14.8	7.4	8.1	2	99.3	43
1393			1638	163.6	163.6	4.8	14.9	8.2	6.7	2	99.3	43
1394	10.4	54.6	1620	163.6	163.6	8.4	15.3	9.7	6.9	2	99.3	43
1395			1617	163.6	163.6	7.7	15.1	8.6	7.8	2	99.3	43
1396			1621	163.6	163.6	7.6	15.1	8.4	6.3	2	99.3	43
1397			1608	163.6	163.6	6.9	14.8	8.3	7.8	2	99.3	43
1398			1536	163.6	163.6	3.3	13.9	7.3	7.4	2	99.3	42
1399	10.1	53.7	1562	163.6	163.6	0.8	14.2	9.4	5.5	2	99.3	42
1400	9.7	54.3	1513	163.6	163.6	0.7	14.7	9.0	4.4	2	99.3	42
1401	8.1	53.4	1248	163.6	163.6	1.9	13.8	7.3	4.9	2	99.3	42
1402			1189	163.6	163.6	0.3	13.6	8.0	4.6	2	99.3	42
1403			1247	163.6	163.6	0.1	13.9	6.8	2.8	2	99.3	42
1404			1108	163.6	163.6	0.6	13.3	5.7	3.5	2	99.3	44
1405			1007	163.6	163.6	0.5	12.8	6.9	7.2	2	99.3	44
1406			977	163.6	163.6	0.7	12.9	6.2	7.2	2	99.3	44
1407			1035	163.6	163.6	0.6	12.9	6.5	6.6	2	99.3	44
1408			1538	163.6	163.6	0.4	14.7	8.2	7.3	2	99.3	44

Table E.01 Measurement data - Turbine ON

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP1

Created on: 9/29/2017

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1409			1481	163.6	163.6	1.9	14.6	8.0	5.3	2	99.3	44
1410			1496	163.6	163.6	1.5	14.3	7.7	7.5	2	99.3	43
1411			1669	163.6	163.6	7.8	15.8	10.5	7.5	2	99.3	43
1412			1593	163.6	163.6	8.5	15.2	10.6	5.2	2	99.3	43
1413			1616	163.6	163.6	7.9	15.1	9.2	4.3	2	99.3	43
1414			1619	163.6	163.6	7.7	15.0	9.5	6.8	2	99.3	43
1415	9.5	53.7	1610	163.6	163.6	6.4	14.8	8.8	6.1	2	99.3	43
1416	9.3	54.0	1621	163.6	163.6	5.1	14.7	8.7	6.8	2	99.3	43
1417			1636	163.6	163.6	4.7	14.8	7.9	6.7	2	99.3	43
1418			1600	163.6	163.6	3.8	14.6	8.2	5.5	2	99.3	43
1419	9.9	53.2	1618	163.6	163.6	1.7	14.5	9.3	3.9	2	99.3	43
1420			1536	163.6	163.6	1.0	14.4	7.8	3.4	2	99.3	43
1421	8.9	53.6	1443	163.6	163.6	0.7	14.4	7.4	2.5	2	99.3	43
1422	9.4	54.2	1677	163.6	163.6	2.9	15.6	8.8	5.2	2	99.3	44
1423	10.5	54.6	1614	163.6	163.6	6.5	15.5	9.8	5.8	2	99.3	44
1424	10.5	54.1	1621	163.6	163.6	6.2	15.4	9.8	7.1	2	99.3	44
1425	11.0	54.7	1623	163.6	163.6	7.5	15.5	10.3	6.0	2	99.3	44
1426	10.8	54.3	1625	163.6	163.6	9.9	15.5	10.1	5.1	2	99.3	44
1427	10.5	55.4	1600	163.6	163.6	8.6	15.0	9.8	8.3	2	99.3	44
1428	10.4	53.0	1621	163.6	163.6	8.2	15.0	9.7	8.6	2	99.3	42
1429	9.8	52.9	1618	163.6	163.6	7.3	14.9	9.2	6.8	2	99.3	42
1430			1578	163.6	163.6	4.3	14.2	7.8	5.2	2	99.3	42
1431			1602	163.6	163.6	2.1	14.2	7.0	5.5	2	99.3	42
1432	8.6	53.5	1377	163.6	163.6	0.7	14.1	6.6	7.2	2	99.3	42
1433			1649	163.6	163.6	2.4	15.4	8.3	6.4	2	99.3	42
1434			1589	163.6	163.6	4.7	15.3	8.5	6.2	2	99.3	43
1435			1599	163.6	163.6	3.5	14.9	7.7	4.0	2	99.3	43
1436	10.0	53.9	1655	163.6	163.6	4.8	15.5	9.3	2.7	2	99.3	43
1437	10.5	54.8	1632	163.6	163.6	8.0	15.6	9.8	3.1	2	99.3	43
1438	10.4	53.9	1625	163.6	163.6	8.1	15.5	9.7	6.6	2	99.3	43
1439	11.8	55.8	1614	163.6	163.6	10.1	15.4	11.0	8.6	2	99.3	43
1440	12.1	54.7	1616	163.6	163.6	10.3	15.2	11.3	6.9	2	99.3	42
1441	9.7	54.2	1610	163.6	163.6	8.6	14.8	9.1	5.7	2	99.3	42
1442	10.7	52.8	1635	163.6	163.6	7.8	15.0	9.9	5.0	2	99.3	42
1443	10.1	53.7	1632	163.6	163.6	8.3	15.1	9.4	3.9	2	99.3	42
1444	10.9	53.5	1626	163.6	163.6	7.9	15.0	10.1	5.0	2	99.3	42
1445	10.0	53.0	1635	163.6	163.6	7.9	15.1	9.4	7.7	2	99.3	42
1446	12.8	55.4	1632	163.6	163.6	9.9	15.3	12.0	5.9	2	99.3	43
1447	10.1	54.8	1610	163.6	163.6	8.1	14.9	9.4	6.6	2	99.3	43
1448	10.4	54.6	1626	163.6	163.6	7.4	14.9	9.7	5.5	2	99.3	43
1449	10.6	54.1	1623	163.6	163.6	7.1	14.9	9.9	5.3	2	99.3	43
1450	9.9	53.5	1625	163.6	163.6	6.2	14.9	9.2	3.6	2	99.3	43
1451			1589	163.6	163.6	4.3	14.4	7.7	3.9	2	99.3	43
1452	9.4	53.3	1614	163.6	163.6	2.0	14.3	8.7	2.8	2	99.3	43
1453	9.5	53.9	1634	163.6	163.6	1.6	14.5	8.8	4.2	2	99.3	43
1454	9.7	53.6	1657	163.6	163.6	1.7	14.9	9.1	5.8	2	99.3	43
1455	9.7	53.6	1681	163.6	163.6	3.4	15.5	9.0	3.9	2	99.3	43
1456	9.7	54.7	1630	163.6	163.6	6.4	15.6	9.0	4.2	2	99.3	43
1457			1607	163.6	163.6	5.4	15.2	7.8	3.7	2	99.3	43
1458	10.5	53.8	1615	163.6	163.6	5.3	15.2	9.8	4.7	2	99.3	43
1459	11.7	53.4	1628	163.6	163.6	5.7	15.1	10.9	5.3	2	99.3	43
1460	9.4	54.2	1634	163.6	163.6	7.5	15.4	8.7	7.3	2	99.3	43
1461	9.3	54.9	1619	163.6	163.6	7.5	15.2	8.7	6.1	2	99.3	43
1462	9.4	53.7	1614	163.6	163.6	7.0	15.0	8.8	7.4	2	99.3	43
1463	11.2	54.7	1645	163.6	163.6	8.5	15.4	10.4	8.0	2	99.3	43
1464	10.7	56.1	1613	163.6	163.6	9.2	15.1	10.0	7.8	2	99.3	42
1465			1605	163.6	163.6	7.5	14.8	8.6	8.5	2	99.3	42
1466			1591	163.6	163.6	4.5	14.3	7.8	8.8	2	99.3	42
1467	9.8	53.8	1656	163.6	163.6	7.5	15.3	9.1	7.8	2	99.3	42
1468	11.3	54.1	1615	163.6	163.6	7.7	15.0	10.6	7.6	2	99.3	42
1469	9.5	54.2	1611	163.6	163.6	5.4	14.8	8.9	7.9	2	99.3	42
1470			1613	163.6	163.6	4.9	14.6	6.5	6.1	2	99.3	42
1471			1628	163.6	163.6	3.5	14.7	8.6	5.1	2	99.3	42
1472			1514	163.6	163.6	2.4	14.1	7.7	4.2	2	99.3	42
1473	7.8	52.2	1132	163.6	163.6	0.3	13.3	7.1	4.4	2	99.3	42
1474	8.4	51.8	1316	163.6	163.6	0.3	14.0	8.8	4.7	2	99.3	42
1475	11.6	54.2	1641	163.6	163.6	7.5	15.5	10.8	3.9	2	99.3	42
1476			1599	163.6	163.6	10.6	15.3	10.6	6.3	2	99.3	43
1477			1597	163.6	163.6	8.3	14.8	9.5	7.9	2	99.3	43
1478			1624	163.6	163.6	6.9	14.8	8.9	8.6	2	99.3	43
1479	9.5	56.5	1618	163.6	163.6	6.0	14.7	8.8	8.4	2	99.3	43
1480	10.2	54.4	1639	163.6	163.6	6.6	15.0	9.5	6.2	2	99.3	43
1481			1597	163.6	163.6	4.8	14.5	8.4	7.1	2	99.3	43
1482			1547	163.6	163.6	1.7	14.0	6.7	7.7	2	99.3	42
1483	8.3	53.0	1287	163.6	163.6	0.4	13.9	8.4	7.2	2	99.3	42
1484			1634	163.6	163.6	1.2	15.1	8.0	6.4	2	99.3	42
1485	10.0	55.1	1625	163.6	163.6	7.0	15.7	9.3	4.7	2	99.3	42
1486	9.8	53.4	1598	163.6	163.6	5.8	15.2	9.1	4.5	2	99.3	42
1487			1599	163.6	163.6	5.1	15.0	8.4	3.9	2	99.3	42
1488			1583	163.6	163.6	3.0	14.4	7.7	4.4	2	99.3	43
1489	9.8	52.9	1643	163.6	163.6	3.3	14.9	9.1	4.2	2	99.3	43
1490			1625	163.6	163.6	4.1	14.9	7.5	5.2	2	99.3	43
1491	9.3	53.9	1635	163.6	163.6	4.0	15.0	8.6	6.5	2	99.3	43
1492			1652	163.6	163.6	6.5	15.6	8.4	6.4	2	99.3	43
1493	9.9	53.8	1605	163.6	163.6	6.0	15.1	9.2	4.4	2	99.3	43
1494	9.8	53.0	1570	163.6	163.6	3.1	14.4	9.1	4.3	2	99.3	43
1495	9.5	52.7	1589	163.6	163.6	1.1	14.1	8.8	5.0	2	99.3	43
1496			1635	163.6	163.6	1.3	14.7	7.8	3.8	2	99.3	43

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

Data Point #	Standardized Wind Speed	LAeq	Turbine Power Output (kW)	Reference Yaw Angle (°)	Yaw Angle (°)	Pitch Angle (°)	Rotor RPM	Nacelle Anemometer Wind Speed (m/s)	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
1497	8.5	53.7	1342	163.6	163.6	1.3	14.2	6.3	3.4	2	99.3	43
1498			1265	163.6	163.6	0.5	13.8	8.7	3.9	2	99.3	43
1499												
1500												
1501												
1502												
1503												
1504												
1505												
1506												
1507												
1508												
1509												
1510												
1511												
1512												
1513												
1514												
1515												
1516												
1517												
1518												
1519												
1520												
1521												
1522												
1523												
1524												
1525												
1526												
1527												
1528												
1529												
1530												
1531												
1532												
1533												
1534												
1535												
1536												
1537												
1538												
1539												
1540												
1541												
1542												
1543												
1544												
1545												
1546												
1547												
1548												
1549												
1550												
1551												
1552												
1553												
1554												
1555												
1556												
1557												
1558												
1559												
1560												
1561												
1562												
1563												
1564												
1565												
1566												
1567												
1568												
1569												
1570												
1571												
1572												
1573												
1574												
1575												
1576												
1577												
1578												
1579												
1580												
1581												
1582												
1583												
1584												

Table E.02 Measurement data - Background

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

Created on: 9/29/2017

***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	7.2	44.1	0.0	4.6	-4	99.8	62
2	7.7	41.9	0.0	4.9	-4	99.8	62
3	10.0	41.4	0.0	6.4	-4	99.8	63
4	8.8	43.8	0.0	5.6	-4	99.8	63
5	10.1	41.1	0.0	6.5	-4	99.8	63
6	10.3	39.9	0.0	6.6	-4	99.8	63
7	9.1	40.3	0.0	5.8	-4	99.8	63
8	7.8	38.6	0.0	5.0	-4	99.8	63
9	9.7	38.7	0.0	6.2	-4	99.8	63
10	11.4	39.5	0.0	7.3	-4	99.8	63
11	11.5	40.9	0.0	7.4	-4	99.8	63
12	9.2	41.3	0.0	5.9	-4	99.8	63
13	9.1	41.3	0.0	5.8	-4	99.8	63
14	12.7	41.7	0.0	8.1	-4	99.8	63
15	11.8	40.3	0.0	7.6	-4	99.8	63
16	14.5	40.8	0.0	9.3	-4	99.8	63
17	11.3	40.2	0.0	7.2	-4	99.8	63
18	10.6	39.6	0.0	6.8	-4	99.8	63
19	11.4	40.1	0.0	7.3	-4	99.8	63
20	11.6	42.1	0.0	7.4	-4	99.8	62
21	9.4	40.0	0.0	6.0	-4	99.8	62
22	12.0	40.9	0.0	7.7	-4	99.8	62
23	11.8	39.2	0.0	7.6	-4	99.8	62
24	12.0	40.8	0.0	7.7	-4	99.8	62
25	9.9	43.0	0.0	6.3	-4	99.8	62
26	8.6	41.2	0.0	5.5	-4	99.8	62
27	8.6	38.9	0.0	5.5	-4	99.8	62
28	7.7	39.0	0.0	4.9	-4	99.8	62
29	6.8	40.3	0.0	4.3	-4	99.8	62
30	10.1	39.2	0.0	6.4	-4	99.8	62
31	9.1	39.8	0.0	5.8	-4	99.8	62
32	10.2	39.9	0.0	6.5	-4	99.8	62
33	9.9	39.2	0.0	6.3	-4	99.8	63
34	11.1	39.3	0.0	7.1	-4	99.8	63
35	11.4	39.6	0.0	7.3	-4	99.8	63
36	11.8	39.9	0.0	7.6	-4	99.8	63
37	10.7	39.5	0.0	6.9	-4	99.8	63
38	11.6	39.3	0.0	7.4	-4	99.8	62
39	9.4	39.6	0.0	6.0	-4	99.8	62
40	10.0	39.8	0.0	6.4	-4	99.8	62
41	11.7	39.7	0.0	7.5	-4	99.8	62
42	10.2	39.6	0.0	6.5	-4	99.8	62
43	10.6	40.1	0.0	6.8	-4	99.8	62
44	9.1	42.7	0.0	5.8	-4	99.8	62
45	10.6	40.1	0.0	6.8	-4	99.8	63
46	10.6	40.5	0.0	6.8	-4	99.8	63
47	9.6	39.5	0.0	6.2	-4	99.8	63
48	8.2	38.9	0.0	5.3	-4	99.8	63
49	6.3	39.6	0.0	4.0	-4	99.8	63
50	6.1	40.2	0.0	3.9	-4	99.8	63
51	8.6	39.9	0.0	5.5	-4	99.8	63
52	8.7	39.0	0.0	5.6	-4	99.8	63
53	7.1	39.4	0.0	4.6	-4	99.8	63
54	7.0	38.9	0.0	4.5	-4	99.8	63
55	6.9	40.5	0.0	4.4	-4	99.8	63
56	6.0	38.7	0.0	3.9	-4	99.8	64
57	5.3	38.7	0.0	3.4	-4	99.8	64
58	7.8	38.8	0.0	5.0	-4	99.8	64
59	9.8	39.1	0.0	6.2	-4	99.8	64
60	9.4	38.6	0.0	6.0	-4	99.8	64
61	7.4	39.0	0.0	4.8	-4	99.8	64
62	9.3	38.4	0.0	5.9	-4	99.8	64
63	11.2	40.5	0.0	7.2	-4	99.8	63
64	8.5	38.5	0.0	5.4	-4	99.8	63
65	10.5	38.9	0.0	6.7	-4	99.8	63
66	10.1	39.3	0.0	6.4	-4	99.8	63
67	11.2	39.0	0.0	7.2	-4	99.8	63
68	10.7	39.9	0.0	6.8	-4	99.8	62
69	10.4	41.0	0.0	6.7	-4	99.8	60
70	7.6	38.4	0.0	4.9	-4	99.8	60
71	10.7	38.5	0.0	6.9	-4	99.8	60
72	12.7	40.0	0.0	8.2	-4	99.8	60
73	11.8	38.5	0.0	7.5	-4	99.8	60
74	7.5	39.0	0.0	4.8	-4	99.8	61
75	7.0	38.9	0.0	4.5	-4	99.8	61
76	8.5	38.0	0.0	5.4	-4	99.8	61
77	9.9	37.3	0.0	6.4	-4	99.8	61
78	8.3	37.7	0.0	5.3	-4	99.8	61
79	9.6	37.7	0.0	6.2	-4	99.8	61
80	8.9	38.2	0.0	5.7	-4	99.8	61
81	7.9	38.1	0.0	5.1	-4	99.8	61
82	6.8	38.4	0.0	4.4	-4	99.8	61
83	9.5	38.0	0.0	6.1	-4	99.8	61

***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	10.9	39.6	0.0	7.0	-4	99.8	61
85	8.7	38.6	0.0	5.6	-4	99.8	61
86	6.4	39.2	0.0	4.1	-4	99.8	61
87	7.9	39.3	0.0	5.1	-4	99.8	62
88	7.5	38.6	0.0	4.8	-4	99.8	62
89	7.6	39.2	0.0	4.9	-4	99.8	62
90	9.3	39.8	0.0	6.0	-4	99.8	62
91	9.2	39.6	0.0	5.9	-4	99.8	62
92	8.8	40.1	0.0	5.6	-4	99.8	62
93	8.2	38.7	0.0	5.2	-4	99.7	62
94	10.5	38.3	0.0	6.7	-4	99.7	62
95	8.3	38.0	0.0	5.3	-4	99.7	62
96	8.5	39.0	0.0	5.4	-4	99.7	62
97	9.3	38.8	0.0	5.9	-4	99.7	62
98	12.7	38.8	0.0	8.1	-4	99.7	62
99	11.5	38.6	0.0	7.3	-4	99.7	61
100	10.9	38.5	0.0	7.0	-4	99.7	61
101	11.4	39.3	0.0	7.3	-4	99.7	61
102	12.1	39.6	0.0	7.7	-4	99.7	61
103	11.3	39.4	0.0	7.2	-4	99.7	61
104	10.2	38.9	0.0	6.5	-4	99.7	61
105	11.0	39.4	0.0	7.0	-4	99.7	61
106	7.6	40.3	0.0	4.9	-4	99.7	61
107	8.8	39.1	0.0	5.6	-4	99.7	61
108	8.4	40.0	0.0	5.4	-4	99.7	61
109	9.8	40.7	0.0	6.3	-4	99.7	61
110	11.0	39.1	0.0	7.0	-4	99.7	61
111	8.8	39.6	0.0	5.6	-4	99.7	61
112	10.4	39.1	0.0	6.7	-4	99.7	61
113	13.1	38.6	0.0	8.4	-4	99.7	61
114	11.4	39.6	0.0	7.3	-4	99.7	61
115	8.7	39.4	0.0	5.6	-4	99.7	61
116	7.8	40.6	0.0	5.0	-4	99.7	61
117	7.0	42.5	0.0	4.5	-4	99.7	61
118	8.2	40.2	0.0	5.3	-4	99.7	61
119	7.5	37.9	0.0	4.8	-4	99.7	61
120	8.0	38.6	0.0	5.1	-4	99.7	61
121	7.1	38.1	0.0	4.5	-4	99.7	61
122	7.0	39.5	0.0	4.5	-4	99.7	61
123	8.6	40.3	0.0	5.5	-4	99.7	61
124	8.5	40.3	0.0	5.4	-4	99.7	61
125	7.7	39.0	0.0	5.0	-4	99.7	61
126	7.2	39.3	0.0	4.6	-4	99.7	61
127	7.6	39.3	0.0	4.9	-4	99.7	61
128	9.6	40.4	0.0	6.2	-4	99.7	62
129	8.8	41.8	0.0	5.6	-4	99.7	62
130	10.6	39.1	0.0	6.8	-4	99.7	62
131	9.8	38.8	0.0	6.2	-4	99.7	62
132	10.9	38.8	0.0	7.0	-4	99.7	62
133	11.0	39.5	0.0	7.0	-4	99.7	62
134	10.1	39.1	0.0	6.5	-4	99.7	62
135	11.2	40.0	0.0	7.2	-4	99.7	60
136	10.1	39.6	0.0	6.5	-4	99.7	60
137	12.1	39.5	0.0	7.8	-4	99.7	60
138	13.1	37.5	0.0	8.4	-4	99.7	60
139	10.6	39.0	0.0	6.8	-4	99.7	60
140	7.9	38.8	0.0	5.0	-4	99.7	60
141	9.1	39.2	0.0	5.8	-4	99.7	61
142	7.9	38.3	0.0	5.0	-4	99.7	61
143	5.8	40.6	0.0	3.7	-4	99.7	61
144	6.4	40.7	0.0	4.1	-4	99.7	61
145	7.1	41.0	0.0	4.5	-4	99.7	61
146	6.0	41.4	0.0	3.9	-4	99.7	61
147	7.0	40.5	0.0	4.5	-4	99.7	62
148	7.8	40.2	0.0	5.0	-4	99.7	62
149	7.3	40.0	0.0	4.7	-4	99.7	62
150	8.2	40.9	0.0	5.3	-4	99.7	62
151	9.2	39.9	0.0	5.9	-4	99.7	62
152	7.6	40.7	0.0	4.9	-3	99.7	62
153	10.6	41.0	0.0	6.8	-3	99.7	61
154	13.0	41.7	0.0	8.3	-3	99.7	61
155	15.3	40.8	0.0	9.8	-3	99.7	61
156	13.4	41.2	0.0	8.6	-3	99.7	61
157	12.4	41.4	0.0	7.9	-3	99.7	61
158	9.3	41.7	0.0	6.0	-3	99.7	61
159	10.5	43.2	0.0	6.7	-3	99.7	60
160	11.2	42.2	0.0	7.2	-3	99.7	60
161	10.6	40.7	0.0	6.8	-3	99.7	60
162	11.0	40.7	0.0	7.1	-3	99.7	60
163	11.9	41.1	0.0	7.6	-3	99.7	60
164	10.9	40.6	0.0	7.0	-3	99.7	60
165	10.2	41.0	0.0	6.6	-3	99.7	59
166	9.5	40.8	0.0	6.1	-3	99.7	59

***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	9.7	40.7	0.0	6.2	-3	99.7	59
168	7.4	40.1	0.0	4.7	-3	99.7	59
169	6.5	39.8	0.0	4.1	-3	99.7	59
170	7.3	40.6	0.0	4.7	-3	99.7	60
171	10.3	41.3	0.0	6.6	-3	99.7	61
172	11.6	40.3	0.0	7.5	-3	99.7	61
173	12.2	40.9	0.0	7.8	-3	99.7	61
174	10.7	41.0	0.0	6.8	-3	99.7	61
175	9.1	40.9	0.0	5.8	-3	99.7	61
176	8.1	41.0	0.0	5.2	-3	99.7	61
177	9.7	40.6	0.0	6.2	-3	99.7	61
178	12.1	40.4	0.0	7.7	-3	99.7	61
179	10.7	41.4	0.0	6.8	-3	99.7	61
180	10.4	40.0	0.0	6.6	-3	99.7	61
181	10.1	40.9	0.0	6.5	-3	99.7	61
182	8.0	40.6	0.0	5.1	-3	99.7	61
183	3.7	40.5	0.0	2.4	-3	99.7	61
184	7.0	39.1	0.0	4.5	-3	99.7	61
185	8.0	39.7	0.0	5.1	-3	99.7	61
186	7.2	40.4	0.0	4.6	-3	99.7	61
187	7.6	40.4	0.0	4.9	-3	99.7	61
188	11.4	41.9	0.0	7.3	-3	99.7	61
189	9.8	40.7	0.0	6.3	-3	99.7	61
190	9.3	40.4	0.0	6.0	-3	99.7	61
191	9.0	40.1	0.0	5.8	-3	99.7	61
192	10.8	40.2	0.0	6.9	-3	99.7	61
193	11.5	39.1	0.0	7.3	-3	99.7	61
194	9.8	40.4	0.0	6.3	-3	99.7	61
195	10.5	39.6	0.0	6.7	-3	99.7	60
196	9.7	39.1	0.0	6.2	-3	99.7	60
197	11.4	39.7	0.0	7.3	-3	99.7	60
198	12.2	39.6	0.0	7.8	-3	99.7	60
199	10.2	39.7	0.0	6.6	-3	99.7	60
200	9.6	40.0	0.0	6.2	-3	99.7	60
201	10.2	40.5	0.0	6.5	-3	99.7	60
202	9.3	39.8	0.0	6.0	-3	99.7	60
203	10.6	40.3	0.0	6.8	-3	99.7	60
204	11.5	39.9	0.0	7.3	-3	99.7	60
205	11.0	39.8	0.0	7.0	-3	99.7	60
206	9.4	40.9	0.0	6.0	-3	99.7	59
207	9.3	40.3	0.0	5.9	-3	99.7	59
208	7.7	40.5	0.0	4.9	-3	99.7	59
209	9.0	40.6	0.0	5.7	-3	99.7	59
210	9.7	42.3	0.0	6.2	-3	99.7	59
211	11.0	40.7	0.0	7.1	-3	99.7	59
212	10.4	41.2	0.0	6.7	-3	99.7	59
213	13.5	42.2	0.0	8.6	-3	99.7	58
214	13.1	41.5	0.0	8.4	-3	99.7	58
215	12.7	40.9	0.0	8.1	-3	99.7	58
216	10.2	41.2	0.0	6.5	-3	99.7	58
217	9.3	42.2	0.0	6.0	-3	99.7	58
218	10.5	42.0	0.0	6.7	-3	99.7	58
219	7.8	41.8	0.0	5.0	-3	99.7	59
220	5.5	40.4	0.0	3.5	-3	99.7	59
221	7.0	40.0	0.0	4.5	-3	99.7	59
222	6.0	40.6	0.0	3.9	-3	99.7	59
223	8.0	40.5	0.0	5.1	-3	99.7	59
224	7.6	40.5	0.0	4.9	-3	99.7	59
225	4.6	39.2	0.0	2.9	-3	99.7	61
226	4.7	40.7	0.0	3.0	-3	99.7	61
227	7.7	40.1	0.0	4.9	-3	99.7	61
228	4.8	40.6	0.0	3.1	-3	99.7	61
229	6.1	40.4	0.0	3.9	-3	99.7	61
230	7.9	41.0	0.0	5.0	-3	99.7	61
231	8.4	41.0	0.0	5.4	-3	99.7	61
232	8.3	40.7	0.0	5.3	-3	99.7	61
233	8.3	40.5	0.0	5.3	-3	99.7	61
234	9.6	40.6	0.0	6.1	-3	99.7	61
235	8.3	40.2	0.0	5.3	-3	99.7	61
236	10.3	41.6	0.0	6.6	-3	99.7	60
237	9.8	41.3	0.0	6.3	-3	99.7	59
238	9.7	41.2	0.0	6.2	-3	99.7	59
239	9.8	41.8	0.0	6.3	-3	99.7	59
240	9.5	41.8	0.0	6.1	-3	99.7	59
241	8.5	40.8	0.0	5.4	-3	99.7	59
242	6.2	40.4	0.0	4.0	-3	99.7	59
243	7.2	40.6	0.0	4.6	-3	99.7	60
244	8.7	40.5	0.0	5.6	-3	99.7	60
245	11.0	40.2	0.0	7.1	-3	99.7	60
246	9.8	41.2	0.0	6.3	-3	99.7	60
247	8.2	40.6	0.0	5.2	-3	99.7	60
248	9.0	41.9	0.0	5.8	-3	99.7	60
249	11.3	40.6	0.0	7.3	-3	99.7	59

Table E.02 Measurement data - Background

Project: Bluewater Wind Energy Centre - Turbine T29 - IEC 61400-11 Measurement

Report ID: 14331.01.T29.RP2

Created on: 9/29/2017

***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	9.6	39.3	0.0	6.2	-3	99.7	59
251	9.2	40.9	0.0	5.9	-3	99.7	59
252	9.3	44.4	0.0	6.0	-3	99.7	59
253	9.6	41.8	0.0	6.2	-3	99.7	59
254	8.0	42.2	0.0	5.1	-3	99.7	59
255	6.9	43.3	0.0	4.4	-3	99.7	59
256	6.6	41.4	0.0	4.2	-3	99.7	59
257	8.3	41.8	0.0	5.3	-3	99.7	59
258	9.6	40.4	0.0	6.1	-3	99.7	59
259	8.7	40.1	0.0	5.6	-3	99.7	59
260	7.6	40.4	0.0	4.9	-3	99.7	59
261	6.8	40.9	0.0	4.4	-3	99.7	59
262	10.5	41.0	0.0	6.7	-3	99.7	59
263	8.7	40.9	0.0	5.6	-3	99.7	59
264	6.5	41.1	0.0	4.2	-3	99.7	59
265	7.4	43.3	0.0	4.7	-3	99.7	59
266	6.3	45.0	0.0	4.0	-3	99.7	59
267	7.4	45.6	0.0	4.7	-3	99.7	59
268	8.6	44.0	0.0	5.5	-3	99.7	59
269	9.5	42.0	0.0	6.1	-3	99.7	59
270	9.5	41.6	0.0	6.1	-3	99.7	59
271	13.0	41.6	0.0	8.3	-3	99.7	59
272	8.7	41.7	0.0	5.5	-3	99.7	59
273	6.9	42.2	0.0	4.4	-3	99.7	59
274	7.1	40.9	0.0	4.5	-3	99.7	59
275	11.2	40.7	0.0	7.2	-3	99.7	59
276	11.8	42.6	0.0	7.6	-3	99.7	59
277	11.3	44.4	0.0	7.2	-3	99.7	59
278	13.1	43.7	0.0	8.4	-3	99.7	59
279	11.5	43.5	0.0	7.3	-3	99.7	58
280	11.1	42.0	0.0	7.1	-3	99.7	58
281	10.4	42.3	0.0	6.7	-3	99.7	58
282	10.5	42.8	0.0	6.7	-3	99.7	58
283	11.9	41.4	0.0	7.6	-3	99.7	58
284	12.5	42.4	0.0	8.0	-3	99.7	58
285	10.6	40.6	0.0	6.8	-3	99.7	57
286	11.9	40.8	0.0	7.6	-3	99.7	57
287	11.7	41.5	0.0	7.5	-3	99.7	57
288	6.9	39.6	0.0	4.4	-1	99.2	59
289	9.0	38.9	0.0	5.1	-1	99.2	59
290	10.5	40.1	0.0	6.7	-1	99.2	59
291	13.2	40.5	0.0	8.5	-1	99.2	59
292	11.2	40.4	0.0	7.1	-1	99.2	59
293	10.8	39.7	0.0	6.9	-1	99.2	59
294	11.0	39.3	0.0	7.0	-1	99.2	59
295	11.6	40.6	0.0	7.4	-1	99.2	59
296	10.5	40.0	0.0	6.7	-1	99.2	58
297	13.8	40.5	0.0	8.8	-1	99.2	57
298	13.3	40.7	0.0	8.5	-1	99.2	57
299	12.6	41.6	0.0	8.0	-1	99.2	57
300	11.5	46.2	0.0	7.3	-1	99.2	57
301	10.9	40.8	0.0	7.0	-1	99.2	57
302	12.1	39.8	0.0	7.8	-1	99.2	57
303	13.8	39.3	0.0	8.8	-1	99.2	57
304	14.0	39.5	0.0	9.0	-1	99.2	57
305	11.4	40.8	0.0	7.3	-1	99.2	57
306	9.7	39.8	0.0	6.2	-1	99.2	57
307	12.0	41.0	0.0	7.7	-1	99.2	57
308	11.0	42.7	0.0	7.0	-1	99.2	57
309	9.5	40.6	0.0	6.1	-1	99.2	57
310	9.8	41.5	0.0	6.3	-1	99.2	57
311	10.6	40.3	0.0	6.8	-1	99.2	57
312	10.6	39.2	0.0	6.8	-1	99.2	57
313	11.7	40.6	0.0	7.5	-1	99.2	57
314	11.6	40.9	0.0	7.4	-1	99.2	57
315	10.2	43.0	0.0	6.5	-1	99.2	57
316	8.4	42.8	0.0	5.4	-1	99.2	57
317	8.0	41.8	0.0	5.1	-1	99.2	57
318	7.1	41.8	0.0	4.5	-1	99.2	57
319	8.5	41.2	0.0	5.4	-1	99.2	57
320	6.5	41.2	0.0	4.2	-1	99.2	58
321	7.7	39.9	0.0	4.9	-1	99.2	59
322	7.7	41.9	0.0	4.9	-1	99.2	59
323	8.9	40.2	0.0	5.7	-1	99.2	59
324	9.9	38.8	0.0	6.3	-1	99.2	59
325	9.8	39.4	0.0	6.3	-1	99.2	59
326	9.8	40.4	0.0	6.3	-1	99.2	58
327	9.0	40.7	0.0	5.8	-1	99.2	58
328	8.5	38.8	0.0	5.5	-1	99.2	58
329	8.9	41.2	0.0	5.7	-1	99.2	58
330	6.4	44.0	0.0	4.1	-1	99.2	58
331	9.6	45.8	0.0	6.1	-1	99.2	58
332	11.2	43.5	0.0	7.2	-1	99.2	58

***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	9.2	42.2	0.0	5.9	-1	99.2	57
334	7.3	39.9	0.0	4.7	-1	99.2	57
335	8.1	38.7	0.0	5.2	-1	99.2	57
336	6.5	39.3	0.0	4.1	-1	99.2	57
337	7.8	39.7	0.0	5.0	-1	99.2	57
338	10.8	38.1	0.0	6.9	-1	99.2	58
339	12.2	38.2	0.0	7.8	-1	99.2	58
340	11.4	37.9	0.0	7.3	-1	99.2	58
341	9.7	37.7	0.0	6.2	-1	99.2	58
342	7.9	37.4	0.0	5.1	-1	99.2	58
343	9.2	42.7	0.0	5.9	-1	99.2	58
344	11.1	41.0	0.0	7.1	-1	99.2	58
345	10.1	41.2	0.0	6.4	-1	99.2	58
346	11.3	39.7	0.0	7.2	-1	99.2	58
347	10.5	39.7	0.0	6.7	-1	99.2	58
348	10.9	38.8	0.0	7.0	-1	99.2	58
349	10.8	39.0	0.0	6.9	-1	99.2	58
350	11.2	38.4	0.0	7.2	-1	99.2	58
351	9.0	38.7	0.0	5.8	-1	99.2	58
352	8.7	39.5	0.0	5.6	-1	99.2	58
353	9.3	41.0	0.0	6.0	-1	99.2	58
354	9.5	42.8	0.0	6.1	-1	99.2	58
355	7.7	43.3	0.0	5.0	-1	99.2	58
356	11.3	44.6	0.0	7.2	-1	99.2	58
357	11.3	42.7	0.0	7.2	-1	99.2	58
358	11.6	39.9	0.0	7.4	-1	99.2	58
359	11.0	39.4	0.0	7.0	-1	99.2	58
360	8.7	39.6	0.0	5.5	-1	99.2	58
361	7.1	39.4	0.0	4.6	-1	99.2	58
362	10.5	39.5	0.0	6.7	-1	99.2	58
363	10.9	39.4	0.0	7.0	-1	99.2	58
364	9.1	39.1	0.0	5.8	-1	99.2	58
365	11.7	39.9	0.0	7.5	-1	99.2	58
366	11.4	39.4	0.0	7.3	-1	99.2	58
367	9.3	39.0	0.0	5.9	-1	99.2	58
368	8.3	38.9	0.0	5.3	-1	99.2	58
369	9.8	39.4	0.0	6.3	-1	99.2	58
370	9.5	40.9	0.0	6.0	-1	99.2	58
371	11.5	39.2	0.0	7.3	-1	99.2	58
372	9.7	39.0	0.0	6.2	-1	99.2	58
373	8.2	39.6	0.0	5.3	-1	99.2	58
374	8.9	40.2	0.0	5.7	-1	99.2	58
375	9.2	41.4	0.0	5.9	-1	99.2	58
376	8.3	39.7	0.0	5.3	-1	99.2	58
377	9.5	38.7	0.0	6.1	-1	99.2	58
378	8.0	38.8	0.0	5.1	-1	99.2	58
379	9.5	39.6	0.0	6.1	-1	99.2	58
380	12.0	40.6	0.0	7.7	-1	99.2	58
381	10.6	40.5	0.0	6.8	-1	99.2	58
382	11.1	40.8	0.0	7.1	-1	99.2	58
383	10.2	40.0	0.0	6.5	-1	99.2	58
384	13.2	39.4	0.0	8.5	-1	99.2	58
385	12.9	39.9	0.0	8.2	-1	99.2	58
386	11.1	39.4	0.0	7.1	-1	99.2	57
387	9.2	42.0	0.0	5.9	-1	99.2	57
388	11.7	40.6	0.0	7.5	-1	99.2	57
389	11.4	40.6	0.0	7.3	-1	99.2	57
390	10.6	41.0	0.0	6.8	-1	99.2	57
391	9.5	41.1	0.0	6.1	-1	99.2	57
392	8.0	40.7	0.0	5.1	-1	99.2	57
393	8.4	41.6	0.0	5.4	-1	99.2	58
394	8.4	41.9	0.0	5.4	-1	99.2	58
395	8.9	41.7	0.0	5.7	-1	99.2	58
396	10.0	41.2	0.0	6.4	-1	99.2	58
397	10.7	41.9	0.0	6.8	-1	99.2	58
398	8.5	39.0	0.0	5.4	-1	99.2	58
399	10.5	41.3	0.0	6.7	-1	99.2	58
400	11.2	39.6	0.0	7.2	-1	99.2	58
401	8.8	41.5	0.0	5.7	-1	99.2	58
402	7.0	42.2	0.0	4.5	-1	99.2	58
403	9.4	40.1	0.0	6.0	-1	99.2	58
404	12.5	40.0	0.0	8.0	-1	99.2	58
405	11.2	40.6	0.0	7.2	-1	99.2	58
406	11.5	40.8	0.0	7.3	-1	99.2	58
407	11.9	40.0	0.0	7.6	-1	99.2	58
408	8.9	39.3	0.0	5.7	-1	99.2	58
409	10.1	40.0	0.0	6.5	-1	99.2	58
410	10.4	40.1	0.0	6.6	-1	99.2	58
411	8.5	39.9	0.0	5.4	-1	99.2	58
412	8.9	39.1	0.0	5.7	-1	99.2	58
413	8.8	38.4	0.0	5.6	-1	99.2	58
414	10.3	39.7	0.0	6.6	-1	99.2	58
415	8.9	39.7	0.0	5.7	-1	99.2	58

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

Data Point #	Standardized Wind Speed	LAeq	Rotor RPM	10m Anemometer Wind Speed (m/s)	Air Temperature (-C)	Pressure (kPa)	Relative Humidity (%)
416	12.9	39.1	0.0	8.3	-1	99.2	58
417	12.0	38.8	0.0	7.7	-1	99.2	58
418	10.6	37.5	0.0	6.8	-1	99.2	58
419	9.5	37.4	0.0	6.1	-1	99.2	58
420	9.0	37.4	0.0	5.8	-1	99.2	58
421	8.7	41.7	0.0	5.6	-1	99.2	58
422	9.4	38.8	0.0	6.0	-1	99.2	58
423	9.5	39.3	0.0	6.1	-1	99.2	58
424	8.3	39.4	0.0	5.3	-1	99.2	58
425	8.7	40.7	0.0	5.5	-1	99.2	58
426	7.9	40.9	0.0	5.1	-1	99.2	58
427	6.7	39.9	0.0	4.3	-1	99.2	58
428	7.7	41.3	0.0	4.9	-1	99.2	59
429	6.7	40.3	0.0	4.3	-1	99.2	59
430	8.4	38.4	0.0	5.4	-1	99.2	59
431	9.8	41.8	0.0	6.3	-1	99.2	59
432	8.9	39.8	0.0	5.7	-1	99.2	59
433	7.8	38.5	0.0	5.0	-1	99.2	59
434	7.8	38.9	0.0	5.0	-1	99.2	59
435							
436							
437							
438							
439							
440							
441							
442							
443							
444							
445							
446							
447							
448							
449							
450							
451							
452							
453							
454							
455							
456							
457							
458							
459							
460							
461							
462							
463							
464							
465							
466							
467							
468							
469							
470							
471							
472							
473							
474							
475							
476							
477							
478							
479							
480							
481							
482							
483							
484							
485							
486							
487							
488							
489							
490							
491							
492							
493							
494							
495							
496							
497							
498							

aercoustics

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

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

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

Note N6.040.17

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

Author: Bo Søndergaard

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

To : Aercoustics Engineering Limited
Att.: Payam Ashtiani

From : Bo Søndergaard

1. Purpose

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

2. Comment

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

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

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

Sweco
Dusager 12
DK-8200 Aarhus
Danmark

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

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

Bo Søndergaard

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

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

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

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

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

SWECO Danmark A/S

Bo Søndergaard

Bo Søndergaard

Acoustica

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

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

End of Report