

## Acoustic Assessment Report Wainfleet Wind Energy Project Township of Wainfleet, Ontario

Prepared for:

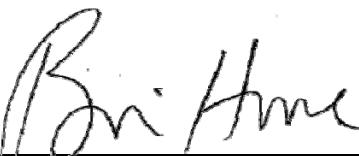
**Wainfleet Wind Energy Inc.**  
222 Martindale Road  
St. Catharines, Ontario  
L2R 7A3

Prepared by:

  
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And

  
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March 25, 2013

## **VERSION CONTROL**

Wainfleet Wind Energy Project, Township of Wainfleet, Ontario

<b>Ver.</b>	<b>Date</b>	<b>Version Description</b>	<b>Prepared By</b>
1	December 10, 2010	Original Acoustic Assessment Report supporting an application for a Renewable Energy Approval.	M. Munro
2	February 1, 2013	Acoustic Assessment Report updated to add additional receptors and to reflect comments from the MOE.	I. Bonsma
3	March 25, 2013	Updated Acoustic Assessment Report to reflect comments from the MOE.	I. Bonsma

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## **EXECUTIVE SUMMARY**

Howe Gastmeier Chapnik Limited (“HGC Engineering”) was retained by IPC Energy on behalf of Wainfleet Wind Energy Inc. to assess the acoustic impact of the proposed Wainfleet Wind Energy Project to be located in the Township of Wainfleet, Ontario. The project will consist of five Vestas V100 wind turbine generators, each rated at 1.8 MW. HGC Engineering has assessed the acoustic impact against the acoustic criteria of the Ontario Ministry of Environment (“MOE”). This report comprises a summary of our assessment and is intended as supporting documentation for an application for a Renewable Energy Approval.

The wind project site is within the Township of Wainfleet, on the shores of Lake Erie. There are a number of residences located in the vicinity of the project. From an acoustic perspective, the area is a rural environment, with relatively low ambient sound levels. The criteria of MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* are thus relevant. Supplementary guidance is also provided by MOE publication *Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities*.

The sound power data for the Vestas wind turbine generators has been obtained through IPC Energy. This data has been used in a computer model to predict the sound level impact at the closest residential receptors. The results of the modelling demonstrate compliance with the MOE guidelines when all five turbines are operating over their entire speed range.

Details of our assessment are provided in the main body of this report. The report is structured around the report format suggested by the MOE for Renewable Energy Approval applications for wind projects, with the required summary tables included as Appendix A.

### ACOUSTIC ASSESSMENT REPORT CHECK-LIST

Company Name: Wainfleet Wind Energy Inc.

Company Address: 222 Martindale Road  
St. Catharines, Ontario, L2R 7A3

Location of Facility: Township of Wainfleet, Ontario

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document "Information to be Submitted for Approval of Stationary Source of Sound" (NPC 233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:	
Name:	Jordan Beekhuis
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Signature:	
Date:	March 25, 2013

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Representing:	HGC Engineering
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Signature:	
Date:	March 25, 2013

## ACOUSTIC ASSESSMENT REPORT CHECK-LIST

	<b>Required Information</b>		
		Submitted	Explanation/Reference
<b>1.0</b>	<b>Introduction (Project Background and Overview)</b>	<input checked="" type="checkbox"/> Yes	<b>Section 1</b>
<b>2.0</b>	<b>Facility Description</b>		
	2.1 Operating hours of facility and significant Noise Sources	<input checked="" type="checkbox"/> Yes	
	2.2 Site Plan identifying all significant Noise Sources	<input checked="" type="checkbox"/> Yes	<b>Figure 2</b>
<b>3.0</b>	<b>Noise Source Summary</b>		
	3.1 <b>Noise Source Summary Table</b>	<input checked="" type="checkbox"/> Yes	<b>Appendix A</b>
	3.2 Source noise emissions specifications	<input checked="" type="checkbox"/> Yes	<b>Appendix D</b>
	3.3 Source power/capacity ratings	<input checked="" type="checkbox"/> Yes	<b>Appendix D</b>
	3.4 Noise control equipment description and acoustical specifications	<input type="checkbox"/> No	N/A
<b>4.0</b>	<b>Point of Reception Noise Impact Calculations</b>		
	4.1 <b>Point of Reception Noise Impact Table</b>	<input checked="" type="checkbox"/> Yes	<b>Appendix A</b>
	4.2 Point(s) of Reception (POR) list and description	<input checked="" type="checkbox"/> Yes	<b>Table A3, A4</b>
	4.3 Land-use Zoning Plan	<input checked="" type="checkbox"/> Yes	<b>Appendix B</b>
	4.4 Scaled Area Location Plan	<input checked="" type="checkbox"/> Yes	<b>Figure 1</b>
	4.5 Procedure used to assess noise impacts at each POR	<input checked="" type="checkbox"/> Yes	<b>Section 7, Appendix E</b>
	4.6 List of parameters/assumptions used in calculations	<input checked="" type="checkbox"/> Yes	<b>Section 7, Appendix E</b>
<b>5.0</b>	<b>Acoustic Assessment Summary</b>		
	5.1 <b>Acoustic Assessment Summary Table</b>	<input checked="" type="checkbox"/> Yes	<b>Appendix A</b>
	5.2 Rationale for selecting applicable noise guideline limits	<input checked="" type="checkbox"/> Yes	<b>Section 6</b>
	5.3 Predictable Worst Case Impacts Operating Scenario	<input checked="" type="checkbox"/> Yes	<b>Figure 3, Table A5 &amp; A6</b>
<b>6.0</b>	<b>Conclusions</b>		
	6.1 Statement of compliance with selected noise performance limits	<input checked="" type="checkbox"/> Yes	
<b>7.0</b>	<b>Appendices (provide details such as)</b>	<input checked="" type="checkbox"/> Yes	
	Listing of Insignificant Noise Sources	<input checked="" type="checkbox"/> Yes	
	Manufacturer's Noise Specifications	<input checked="" type="checkbox"/> Yes	<b>Appendix D</b>
	Calculations	<input checked="" type="checkbox"/> Yes	<b>Appendix E</b>
	Instrumentation	<input checked="" type="checkbox"/> Yes	
	Meteorology during Sound Level Measurements	<input checked="" type="checkbox"/> Yes	
	Raw Data from Measurements	<input checked="" type="checkbox"/> Yes	N/A
	Drawings (Facility / Equipment)	<input checked="" type="checkbox"/> Yes	<b>Appendix C</b>

## **1 INTRODUCTION**

Howe Gastmeier Chapnik Limited (“HGC Engineering”) was retained by IPC Energy on behalf of Wainfleet Wind Energy Inc. to assess the acoustic impact of the proposed Wainfleet Wind Energy Project. The purpose of this report is to determine the acceptability of the predicted sound levels at the nearby residential receptors resulting from the operation of five, 95 metre hub height, Vestas V100 wind turbine generators, each rated at 1.8 MW, in relation to the guidelines of the Ontario Ministry of the Environment (“MOE”) including Ontario Regulation 359/09. Based on Ontario Regulation 359/09, the project is considered a Class 4 wind facility.

HGC Engineering conducted background sound level monitoring at a number of representative residences within the influence area of the proposed Wainfleet Wind Energy Project. Unattended sound level monitoring was conducted between August 13 and August 26, 2010. Attended sound level measurements were also conducted during this period.

This report is intended as supporting documentation for an application for a Renewable Energy Approval for the facility.

### **UPDATES ADDRESSED IN THIS ASSESSMENT REPORT**

This report replaces the *Acoustic Assessment Report Wainfleet Wind Energy Project*, Version 2 dated February 1, 2013 [1]. This update has been prepared to address minor comments from the MOE. Version 2 of the Acoustic Assessment Report included modifications to and the addition of a number of receptor locations. Table 1, attached shows the receptor locations and ID's which have been modified as part of Version 2.

## **2 GENERAL DESCRIPTION OF WIND TURBINE INSTALLATION SITE AND SURROUNDING ENVIRONMENT**

The wind project consists of five wind turbine generators to be located in the Township of Wainfleet, on the shores of Lake Erie, near Morgan's Point.

Two of the wind turbine generators will be sited east of Station Road, south of Concession Road 1 and three of the wind turbine generators are situated southwest of the intersection of Abbey Road and Sideroad 20. Figure 1a, a wind turbine generator siting drawing prepared by IPC Energy, illustrates the location of the five wind turbine generators, and the location of the nearest residential receptors. Figure 1b, is a scaled location map of the surrounding area.

The area is rural in nature, both acoustically and in general character, with agricultural land uses widely in evidence, including scattered dwellings near the major roadways. Zoning maps obtained from the Township of Wainfleet are included as Appendix B, which illustrate that the project site areas are zoned for Agricultural use, and that small residential and commercial parcels exist, generally near Lake Erie and the Town of Wainfleet (Kings Highway 3 and Feeder Street).

### **3 DESCRIPTION OF SOUND SOURCES**

Five 1.8 MW Vestas V100 wind turbine generators are proposed for the site. They are three bladed, upwind, horizontal axis wind turbines with a rotor diameter of 100 m. The turbine rotor and nacelle are mounted on top of a 95 m high tubular tower. The turbines are anticipated to operate continuously whenever wind conditions allow. Additional details are contained in Appendix C, with acoustic information contained in Appendix D. Electronic topology mapping for the area suggests that the turbines will generally be based at an elevation of between about 175 to 180 metres above sea level. Table 2 provides the UTM coordinates (Zone 17) of the five wind turbine generators.

**Table 2: Locations of Wind Turbine Generators (WTG) [m]**

<b>Source</b>	<b>Easting</b>	<b>Northing</b>
WTG 1	631359	4751252
WTG 2	631758	4750750
WTG 3	631911	4750551
WTG 4	632750	4748389
WTG 5	632706	4748817

Please note that the Vestas V100 wind turbines have nacelle mounted transformers and therefore there will be no ground level transformers part of this project. The sound power level of the wind turbines includes the sound power of the nacelle mounted transformer. This project does not include a larger step-up transformer. The electrical connection for this project will be at a switching station with UTM coordinates presented in Table 3.

**Table 3: Location of Switching Station [m]**

Source	Easting	Northing
Switching Station	631602	4751644

#### **4 WIND TURBINE NOISE EMISSION RATINGS**

Overall sound power data for the Vestas V100 wind turbines as determined in accordance with IEC 61400-11:2002 [2], are provided by Vestas in the document *Sound Power Level Data for the V100-1.8 MW* [3] and in the form of a letter issued to IPC Energy [4]. CAN/CSA-C61400-11-07 standard, referenced by the MOE, is an adoption without modification of the identically titled IEC Standard IEC 61400-11 (edition 2:2002 consolidated with amendment 1:2006). Additionally, a test report completed by DNV Renewables (USA) Inc., *Acoustic Noise Test Report for a Vestas V100 1.8 MW Turbine at Pueblo, Colorado* [5], is also included under Appendix D. The overall A-weighted sound power levels as a function of 10 meter height wind speed are shown in Table 4.

**Table 4: 10 Metre Height Wind Speed vs Turbine Sound Power Level, Based on IEC Sound Power Determination Methodology and Wind Shear of 0.2**

Wind Speed [m/s] at 10m Height	6	7	8	9	10 – cutout
Wind Turbine Sound Power Level [dBA]	103.3	105.0	105.0	105.0	105.0

Sound power level data determined under IEC 61400-11 is normalized to a standard “roughness length” value of 0.05 m. The roughness length concept is used to take into account the effect of

friction at the ground, which results in lower wind speeds near the ground than at higher elevations. The wind shear exponent quantifies the same concept by describing the rate of change of windspeed with elevation. A roughness length of 0.05 m is generally held to be equivalent to a wind shear value of about 0.2. Meteorological data near the proposed wind project provided by IPC Energy indicates that the average summer nighttime wind shear was found to be on the order of 0.53 (see Appendix F). This means that a 10 m height wind speed of 2.1 m/s can occur simultaneously with a 7 m/s wind speed at the hub height of 95 m, indicating that maximum sound power output may occur during relatively low 10 m level wind speeds. Consequently the maximum sound power level for the wind turbine (corresponding to a hub height wind speed of 7 m/s) has been used in this analysis.

Table 5 presents the typical octave band spectrum for various 10 m height wind speeds received from Vestas, also included in Appendix D. The spectral shape shown for the 10 m height 7 m/s wind speed has been used in the analysis.

**Table 5: Wind Turbine Acoustic Emissions Summary**

<b>Make and Model:</b>	Vestas V100									
<b>Electrical Rating:</b>	1800 kW									
<b>Hub Height (m):</b>	95m									
<b>Wind Shear Coefficient:</b>	Maximum sound power level utilized to account for average summer nighttime wind shear value of 0.53									
<b>Octave Band Sound Power Level [dB]</b>										
	<b>Manufacturer's Emission Levels</b>					<b>Adjusted Emission Level</b>				
<b>Wind Speed [m/s]</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Frequency [Hz]</b>										
<b>63</b>	111.4	113.6	113.3	112.9	112.8	113.6	113.6	113.6	113.6	113.6
<b>125</b>	105.7	108.1	107.8	107.4	107.5	108.1	108.1	108.1	108.1	108.1
<b>250</b>	101.6	103.3	102.8	102.2	102.1	103.3	103.3	103.3	103.3	103.3
<b>500</b>	98.6	100.3	99.9	99.3	99.3	100.3	100.3	100.3	100.3	100.3
<b>1000</b>	98.2	99.7	99.5	99.0	99.1	99.7	99.7	99.7	99.7	99.7
<b>2000</b>	95.4	97.0	97.2	97.0	97.0	97.0	97.0	97.0	97.0	97.0
<b>4000</b>	93.6	95.6	96.2	97.7	97.6	95.6	95.6	95.6	95.6	95.6
<b>8000</b>	86.5	90.9	91.4	92.5	93.4	90.9	90.9	90.9	90.9	90.9
<b>Overall A-Weighted</b>	103.3	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0

Vestas has indicated that the tonal audibility value for these wind turbines, as per IEC 61400-11-ed2:2002, will be less than 2 dBA. A tonal penalty has not been applied in this assessment.

Additionally, Vestas has also indicated that the sound power levels provided have an uncertainty of +/- 2 dBA. The sound level predictions herein are subject to the degree of uncertainty related to the sound power of the turbine, in addition to the uncertainty related to the fluctuations of atmospheric conditions and the accuracy and limitations inherent in the modelling methodology.

## **5 POINT OF RECEPTION SUMMARY**

As shown in Figure 2, there are several residences in the vicinity of the project, generally sited along the major roadways. The closest noise sensitive receptors have been identified on Figure 2.

A table of UTM co-ordinates for 954 receptors, including vacant lots, located near the proposed wind turbine generators was received from Wainfleet Wind Energy. The existing receptors and vacant lots, together with their coordinates are listed in Tables A3 and A4. For the purposes of this report, each of the 954 receptors were represented by a discrete sound prediction location at the dwelling coordinate, with an assumed height of 4.5 metres above the local grade to represent existing or potential future second-storey windows. Where vacant lots were identified, the assumed future location of the dwelling was selected to be consistent with the typical building pattern in the area. Wainfleet Wind Energy has indicated all receptors within the study area are two storey's or less.

A number of the receptors identified have agreements with the developer. These receptors are identified as participating receptors by the MOE. According to the publication *Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities*, October 2008 (“*Interpretation*”) [6], a participating receptor “means a property that is associated with the Wind Farm by means of a legal agreement with the property owner for the installation and operation of wind turbines or related equipment located on that property.”

Table A3 includes non-participating receptors while Table A4 includes the details of the participating receptors.

## **6 ASSESSMENT CRITERIA**

The MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* [7], indicates that the applicable sound level limit for a stationary source of sound is the background sound level. However, where background sound levels are low, exclusionary minimum criteria apply, with an exclusionary limit of 40 dBA specified for quiet night time periods, and 45 dBA specified for quiet daytime periods. To determine if the minimum criteria should apply, an ambient baseline sound study was conducted from August 13 to 26, 2010. Typical L<sub>EQ</sub> sound levels on the order of 45 dBA were recorded with ninetieth percentile sound levels (L<sub>90</sub>) falling as low as 32 dBA during nighttime hours. The L<sub>90</sub> sound levels indicate that the area is acoustically rural, and that the minimum limits apply.

Because wind turbines generate more sound as the wind speeds increase, and because increasing wind speeds tend to cause greater background sound levels, wind turbine generators have been identified by the MOE as a unique case, and the MOE has provided supplementary guidance for the assessment of wind turbine noise in *Interpretation*. This publication provides criteria for the combined impact of all turbines in an area as a function of 10 metre height wind speed. The criteria are presented in A-weighted decibels, as shown in Table 6.

**Table 6: Wind Turbine Noise Criteria [dBA]**

Wind Speed [m/s] at 10 m Height	4	5	6	7	8	9	10
Wind Turbine Sound Level Limits Class 3 Area, [dBA]	40.0	40.0	40.0	43.0	45.0	49.0	51.0

It should be noted that the MOE guidelines, including NPC-232 and *Interpretation* do not require or imply that a noise source should be inaudible at a point of reception, and inaudibility should not be expected. In fact, even when the sound levels from a source are less than the numeric guideline

limits, spectral and temporal characteristics of a sound regularly result in audibility at points of reception. To be clear, wind turbines may be audible at residences even when sound levels are below MOE guidelines noise criteria.

In the case of this assessment, the sound power output is assumed to be constant at the maximum value of 105.0 dBA over the full range of hub height wind speeds due to the summer nighttime wind shear exponent, which means that strong hub height winds and the maximum sound power level can occur at the same time as low 10 meter height winds and low background sound. Thus, this assessment is based on the minimum criteria of 40 dBA and the maximum wind turbine sound power level.

## **7 IMPACT ASSESSMENT**

An acoustic model of the site was created on a computer using Cadna/A (version 4.3.143), a commercial acoustic modeling system. Cadna/A uses the computational procedures of ISO 9613-2, *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation* [8], which accounts for reduction in sound level with distance due to geometrical spreading, air absorption, ground attenuation and acoustical shielding by intervening structures (or by topography and foliage where applicable). This is the standard that is specified by *Interpretation* to be used in the assessment of wind project noise.

Topographical data for the site and surrounding area was provided by IPC Energy. Ground attenuation was assumed to be spectral for all sources, with the ground factor (G) assumed to be 0.7 globally. The temperature and relative humidity were assumed to be 10° C and 70%, respectively. Stands of foliage were not modelled. There are no known wind projects, outside of the proposed within 5 km.

All wind turbine generators were modeled as point sources at a height of 95 metres above grade. Figure 2 presents the acoustic model, with the source and receptor locations shown. Figure 3 is a noise contour map of the area surrounding the facility produced by Cadna/A based on the octave

band sound power levels corresponding to the overall 105.0 dBA sound power, at a 10 m height wind speed of 7 m/s. The required summary tables are contained in Appendix A of this report.

Tables A5 and A6 list the sound pressure levels calculated at each of the identified receptor locations. The sound level predictions indicate that the proposed wind turbine generators will be at or below the 40.0 dBA minimum criterion. Details of the calculations are provided in Appendix E. The Cadna/A computer model can be provided upon request.

When conducting an acoustic audit of a conventional stationary industrial sound source, the MOE guidelines direct that periods of high wind be excluded. Typically, the noise output of industrial sound sources is independent of wind speed. However, this is not the case for wind projects and there is an intrinsic relationship between wind speed (and therefore ambient noise) and increased sound power levels associated with the wind turbine generators. Complicating matters, there is a large degree of variability related to environmental factors within the wind project area including, among others, local ground level wind speeds, wind speeds affecting the wind turbine generator blades, the associated wind shear, and the sound power of the wind turbine generators, all of which affect the measured sound levels. Thus, it is not realistic to expect that in practice a single repeatable sound level can or will be measured for a given wind speed at a given setback distance; a simple comparison of single numbers is not sufficient or possible.

## **8 CONCLUSIONS AND RECOMMENDATIONS**

The analysis, performed in accordance with the methods prescribed by the Ontario Ministry of the Environment in publication *Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities*, October 2008, indicates that the operation of the proposed wind project will comply with the requirements of the MOE publication NPC-232 *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)* for all identified non-participating receptor locations.

## **REFERENCES**

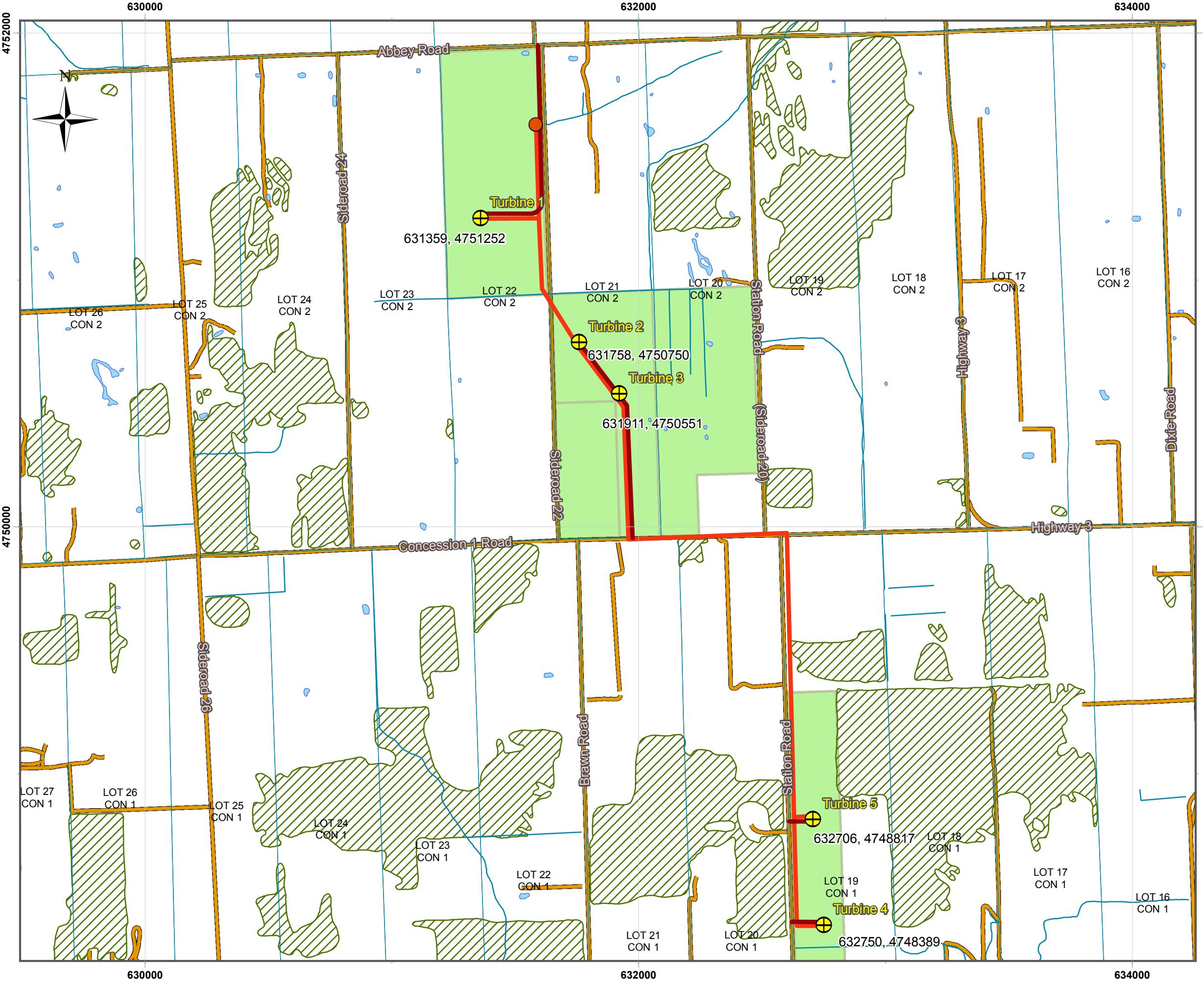
1. Howe Gastmeier Chapnik Limited, *Acoustic Assessment Report, Wainfleet Wind Energy Project*, Version 2, February 1, 2013.
2. CAN/CSA-C61400-11-07, *Wind Turbine Generator Systems – Part 11: Acoustic noise measurement techniques*, Edition 2.1, 2006-11.
3. Vestas, *Sound Power Level Data for the V100-1.8MW*
4. Vestas, *Warranted Sound Power Level and Tonality for the Vestas V100-1.8MW for the Vineland Power Inc. and Wainfleet Wind Energy Inc. Projects*, dated December 1, 2010.
5. DNV Renewables (USA) Inc., *Acoustic Noise Test Report for a Vestas V100 1.8MW Turbine at Pueblo, Colorado*, May 11, 2011.
6. Ontario Ministry of the Environment Publication *Noise Guidelines for Wind Farms, Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities*, October, 2008.
7. Ontario Ministry of the Environment Publication NPC-232, *Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)*, October, 1995.
8. International Organization for Standardization, “Acoustics – Attenuation of Sound during Propagation Outdoors – Part 2: General Method of Calculation,” ISO-9613-2, Switzerland, 1996.
9. Google Maps Aerial Imagery, Internet Application: *maps.google.com*

**Table 1: Receptor Modifications**

Old Point of Reception ID	UTM Coordinates		New Point of Reception ID	UTM Coordinates		Difference between UTM Coordinates (m)
	Easting	Northing		Easting	Northing	
R001	630854	4750619	R001	630845	4750617	9
R003	633292	4747473	R003	633294	4747464	9
R010	632590	4747750	R010	632590	4747743	7
R012	633420	4747588	R012	633418	4747577	11
R014	633333	4747497	R014	633321	4747468	31
R016	632632	4749455	R016	632629	4749446	9
R019	633411	4747932	R019	633411	4747917	15
R020	633502	4747813	R020	633501	4747822	9
R021	631729	4748470	R021	631702	4748487	32
R023	632601	4747722	R023	632611	4747717	11
R025	634241	4747879	R025	634225	4747874	17
R026	634211	4748453	R026	634211	4748412	41
R030	634028	4749277	R030	634000	4749277	28
R031	630495	4749992	R031	630492	4749978	14
R032	631851	4749038	R032	631826	4749049	27
R036	631890	4748807	R036	631854	4748838	48
R042	633520	4747945	R042	633521	4747932	13
R055	633764	4747587	R055	633756	4747574	15
R086	633215	4751980	R086	633201	4751971	17
R088	633221	4751541	R088	633222	4751503	38
R089	633258	4751399	R089	633255	4751391	9
R090	633212	4751188	R090	633236	4751158	38
R091	632407	4751310	R091	632401	4751298	13
R092	633207	4751250	R092	633259	4751231	55
R094	633262	4750714	R094	633279	4750654	62
R095	631711	4749343	R095	631699	4749337	13
R096	631685	4749592	R096	631677	4749589	9
R097	633385	4751006	R097	633358	4751013	28
R098	633259	4751030	R098	633242	4751012	25
R117	632361	4750168	R117	632350	4750168	11
R119	631752	4749452	R119	631734	4749449	18
R135	632833	4751951	R135	632815	4751955	18
R137	632824	4750023	R137	632834	4750015	13
R142	632548	4750507	R142	632525	4750520	26
R144	632538	4750688	R144	632515	4750690	23
R145	632631	4749996	R145	632620	4749997	11
R147	632668	4749998	R147	632656	4749997	12
R155	632384	4749900	R155	632399	4749934	37
R156	630192	4749928	R156	630185	4749919	11
R157	631748	4749247	R157	631737	4749231	19

Old Point of Reception ID	UTM Coordinates		New Point of Reception ID	UTM Coordinates		Difference between UTM Coordinates (m)
	Easting	Northing		Easting	Northing	
R159	630745	4751881	R159	630731	4751880	14
R162	630498	4752839	R162	630485	4752810	32
R164	630930	4749968	R164	630876	4749932	65
R166	630263	4749847	R166	630236	4749851	27
R171	630423	4752767	R171	630419	4752788	21
R172	630948	4751898	R172	630935	4751897	13
R175	630136	4752448	R175	630106	4752484	47
R177	631562	4749869	R177	631545	4749861	19
R178	631729	4749674	R178	631713	4749673	16
R187	633495	4747856	R187	633495	4747845	11
R193	633378	4747498	R193	633399	4747471	34
R215	634489	4749939	R215	634476	4749946	15
R217	634635	4749944	R217	634627	4749949	9
R266	630020	4749901	R266	630017	4749891	10
R267	630648	4749949	R267	630644	4749938	12
R268	630243	4750565	R268	630235	4750602	38
R276	630216	4750761	R276	630228	4750773	17
R303	632547	4750109	R303	632524	4750108	23
R309	633437	4747557	R309	633432	4747541	17
R319	632354	4747301	R319	632358	4747287	15
R333	633285	4750178	R333	633300	4750162	22
R121	632856	4750719	V131	632524	4750821	347
V044	630032	4751848	V044	630028	4751821	27
V007	632094	4747113	V007	632089	4747100	14
V016	633599	4747662	V016	633593	4747654	10
V028	631722	4749013	R825	631699	4749015	23
V034	633597	4749936	R826	633592	4749955	20
V035	633815	4749966	R827	633814	4749968	2
V040	631092	4752872	R828	631089	4752846	26
V041	629992	4752369	R829	630009	4752444	77
V042	629712	4752289	R830	629667	4752320	55
V043	630237	4751830	R831	630224	4751057	773
V045	629680	4749917	R832	629689	4750079	162
V051	634214	4749694	R833	634204	4749689	11
V052	634214	4749658	R834	634205	4749649	13
V053	634214	4749589	R835	634192	4749579	25
V056	634209	4749429	R836	634209	4749428	1
V058	634229	4749160	R837	634222	4749178	19
V059	634229	4749098	R838	634216	4749098	13
V060	634306	4747774	R839	634282	4747767	25
V061	634310	4747710	R840	634286	4747708	24
V062	634312	4747659	R841	634293	4747659	19
V063	634319	4747618	R842	634291	4747619	28

Old Point of Reception ID	UTM Coordinates		New Point of Reception ID	UTM Coordinates		Difference between UTM Coordinates (m)
	Easting	Northing		Easting	Northing	
V064	634230	4747613	R843	634228	4747628	15
V065	634088	4747650	R844	634046	4747595	69
V066	633888	4747568	R845	633894	4747558	11
V067	633508	4747740	R846	633505	4747742	3
V069	633538	4747480	R847	633534	4747473	8
V071	633590	4747488	R848	633585	4747485	6
V072	633642	4747498	R849	633636	4747508	11
V073	633503	4747552	R850	633498	4747538	15
V074	633457	4747483	R851	633436	4747472	24
V076	632625	4747352	R852	632620	4747378	27
V077	632206	4747283	R853	632195	4747356	74
V079	631874	4747232	R854	631879	4747224	9
V080	631843	4747233	R855	631845	4747249	16
V083	632094	4747268	R856	632142	4747295	55
V084	631844	4747325	R857	631848	4747332	8
V085	631870	4747314	R858	631881	4747312	11
V086	631632	4747407	R859	631634	4747401	7
V087	631468	4747553	R860	631481	4747545	15
V088	631380	4747603	R861	631371	4747619	18
V089	631319	4747633	R862	631326	4747655	23
V091	631116	4747777	R863	631107	4747771	11
V096	630938	4747811	R864	630946	4747816	9
V097	631036	4747778	R865	631024	4747787	15



### Legend

- Turbines
- Switching Station
- Access Roads
- Tap Lines
- Optioned Properties
- Streams
- Lots
- Roads
- Lakes
- Forests



Project Name:

**Wainfleet Wind Power**

Project Title:

**Alternative Site Plan A**

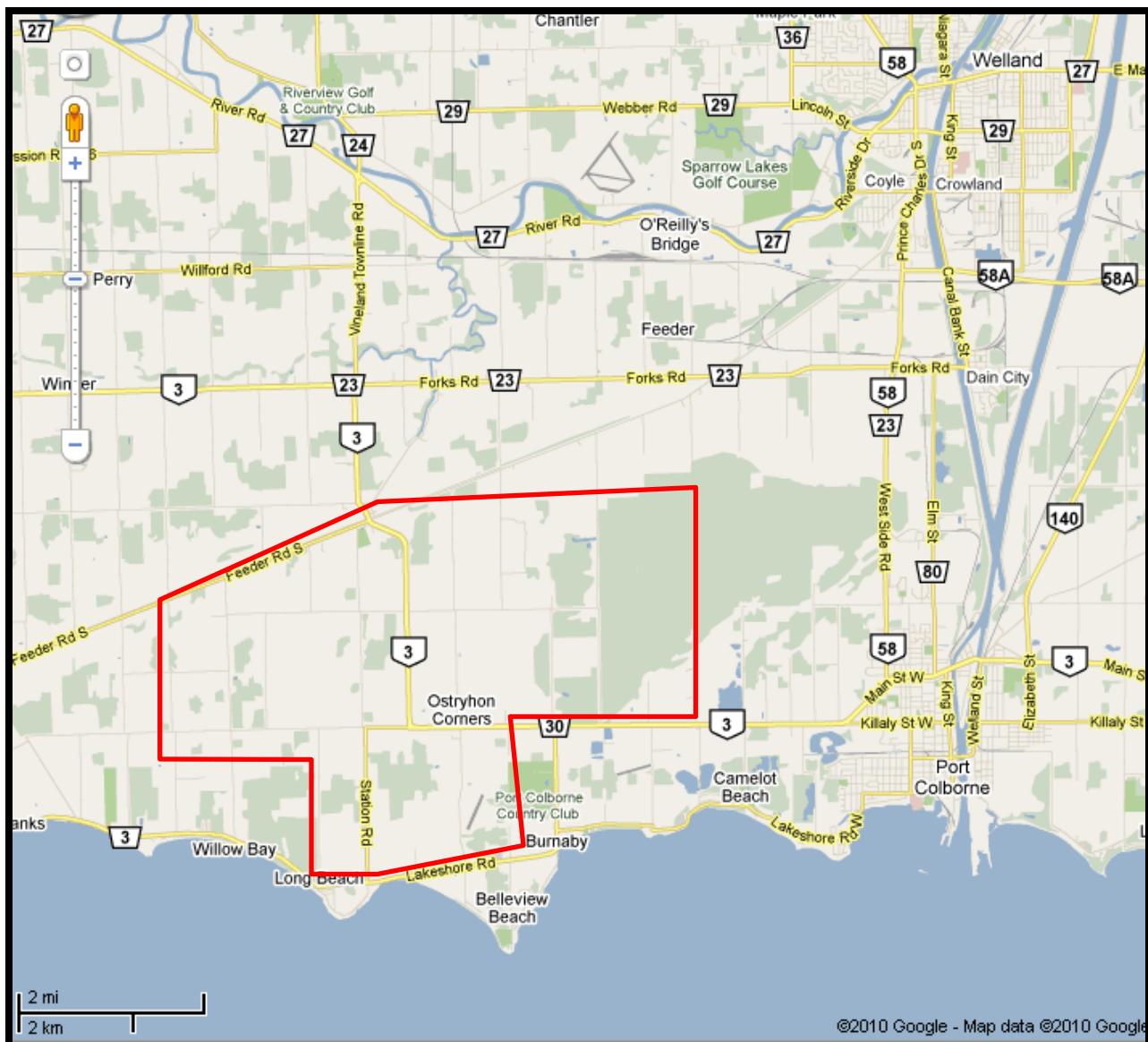
Map Scale:

**1:15,000**

0 125 250 500 750 1,000 Meters




Version 7 dated February 23, 2012  
Created by Geoff Bell, IPC Energy  
All coordinates are expressed in UTM 17N NAD83



**Figure 1b: Key Location Plan**







**APPENDIX A:  
ASSESSMENT SUMMARY TABLES**

## **ACOUSTIC ASSESSMENT SUMMARY TABLES**

### **VERSION CONTROL**

Wainfleet Wind Energy Project, Township of Wainfleet, Ontario

<b>Ver.</b>	<b>Date</b>	<b>Issued as Part of AAR?</b>	<b>Version Description</b>	<b>Prepared By</b>
1	December 10, 2010	Y	Original version of tables as part of Ver. 1.0 of Acoustic Assessment Report	M. Munro
2	February 1, 2013	Y	Updated tables as part of Ver. 2 of the Acoustic Assessment Report	I. Bonsma
3	March 25, 2013	Y	Updated tables as part of Ver. 3 of the Acoustic Assessment Report	I. Bonsma

**Table A1: Vestas V100 Wind Turbine Acoustic Emissions Summary  
Wainfleet Wind Energy Project**

<b>Make and Model:</b>	Vestas V100									
<b>Electrical Rating:</b>	1800 kW									
<b>Hub Height (m):</b>	95m									
<b>Wind Shear Coefficient:</b>	Maximum sound power level utilized to account for average summer nighttime wind shear value of 0.53									
	<b>Octave Band Sound Power Level [dB]</b>									
	<b>Manufacturer's Emission Levels</b>					<b>Adjusted Emission Level</b>				
<b>Wind Speed [m/s]</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>Frequency [Hz]</b>										
<b>63</b>	111.4	113.6	113.3	112.9	112.8	113.6	113.6	113.6	113.6	113.6
<b>125</b>	105.7	108.1	107.8	107.4	107.5	108.1	108.1	108.1	108.1	108.1
<b>250</b>	101.6	103.3	102.8	102.2	102.1	103.3	103.3	103.3	103.3	103.3
<b>500</b>	98.6	100.3	99.9	99.3	99.3	100.3	100.3	100.3	100.3	100.3
<b>1000</b>	98.2	99.7	99.5	99.0	99.1	99.7	99.7	99.7	99.7	99.7
<b>2000</b>	95.4	97.0	97.2	97.0	97.0	97.0	97.0	97.0	97.0	97.0
<b>4000</b>	93.6	95.6	96.2	97.7	97.6	95.6	95.6	95.6	95.6	95.6
<b>8000</b>	86.5	90.9	91.4	92.5	93.4	90.9	90.9	90.9	90.9	90.9
<b>Overall A-Weighted</b>	103.3	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0

**Table A2: Wind Turbine Locations**  
**Wainfleet Wind Energy Project**

<b>Identifier</b>	<b>Equipment Make &amp; Model</b>	<b>UTM Coordinates</b>	
		<b>Easting</b>	<b>Northing</b>
WTG 1	Vestas V100, 95 m Hub Height	631359	4751252
WTG 2	Vestas V100, 95 m Hub Height	631758	4750750
WTG 3	Vestas V100, 95 m Hub Height	631911	4750551
WTG 4	Vestas V100, 95 m Hub Height	632750	4748389
WTG 5	Vestas V100, 95 m Hub Height	632706	4748817

**Table A3: Non-Participating Receptor Locations  
Wainfleet Wind Energy Project**

Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing
R001	Non-Participating Receptor	630845	4750617
R002	Non-Participating Receptor	633228	4747431
R003	Non-Participating Receptor	633294	4747464
R004	Non-Participating Receptor	633097	4747415
R005	Non-Participating Receptor	633059	4747394
R006	Non-Participating Receptor	632963	4747390
R007	Non-Participating Receptor	632908	4747348
R008	Non-Participating Receptor	632619	4747398
R009	Non-Participating Receptor	632682	4747516
R010	Non-Participating Receptor	632590	4747743
R011	Non-Participating Receptor	633504	4747595
R012	Non-Participating Receptor	633418	4747577
R013	Non-Participating Receptor	632789	4747351
R014	Non-Participating Receptor	633321	4747468
R015	Non-Participating Receptor	631643	4749973
R016	Non-Participating Receptor	632629	4749446
R017	Non-Participating Receptor	630038	4750856
R018	Non-Participating Receptor	632534	4749646
R019	Non-Participating Receptor	633411	4747917
R020	Non-Participating Receptor	633501	4747822
R021	Non-Participating Receptor	631702	4748487
R022	Non-Participating Receptor	632667	4747544
R023	Non-Participating Receptor	632611	4747717
R024	Non-Participating Receptor	631847	4747381
R025	Non-Participating Receptor	634225	4747874
R026	Non-Participating Receptor	634211	4748412
R027	Non-Participating Receptor	634205	4748592
R028	Non-Participating Receptor	634186	4748938
R029	Non-Participating Receptor	633550	4747719
R030	Non-Participating Receptor	634000	4749277
R031	Non-Participating Receptor	630492	4749978
R032	Non-Participating Receptor	631826	4749049
R033	Non-Participating Receptor	631780	4747312
R034	Non-Participating Receptor	632148	4747326
R035	Non-Participating Receptor	631531	4747533
R036	Non-Participating Receptor	631854	4748838
R037	Non-Participating Receptor	633305	4752032
R038	Non-Participating Receptor	633364	4752033
R039	Non-Participating Receptor	633471	4750075
R040	Non-Participating Receptor	633531	4749956
R041	Non-Participating Receptor	633561	4749960
R042	Non-Participating Receptor	633521	4747932
R043	Non-Participating Receptor	633634	4749948
R044	Non-Participating Receptor	633700	4749963
R045	Non-Participating Receptor	633743	4749966
R046	Non-Participating Receptor	633653	4750034
R047	Non-Participating Receptor	633728	4750276
R048	Non-Participating Receptor	633673	4750210
R049	Non-Participating Receptor	633678	4750250
R050	Non-Participating Receptor	633674	4752056
R051	Non-Participating Receptor	633691	4752148
R052	Non-Participating Receptor	633782	4749973
R053	Non-Participating Receptor	633853	4749945
R054	Non-Participating Receptor	633769	4750057
R055	Non-Participating Receptor	633756	4747574
R056	Non-Participating Receptor	633680	4747607
R057	Non-Participating Receptor	633971	4750158
R058	Non-Participating Receptor	633984	4749869
R059	Non-Participating Receptor	633983	4749938
R060	Non-Participating Receptor	634065	4749812
R061	Non-Participating Receptor	634205	4749786
R062	Non-Participating Receptor	634118	4749835
R063	Non-Participating Receptor	634207	4749836

Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing
R064	Non-Participating Receptor	634208	4749864
R065	Non-Participating Receptor	634042	4749909
R066	Non-Participating Receptor	633498	4747755
R067	Non-Participating Receptor	634204	4749932
R068	Non-Participating Receptor	633111	4752041
R069	Non-Participating Receptor	632170	4753526
R070	Non-Participating Receptor	633288	4752258
R071	Non-Participating Receptor	633158	4752368
R072	Non-Participating Receptor	632339	4753117
R073	Non-Participating Receptor	634799	4753655
R074	Non-Participating Receptor	633184	4752549
R075	Non-Participating Receptor	632342	4753023
R076	Non-Participating Receptor	632338	4752918
R077	Non-Participating Receptor	632339	4753179
R078	Non-Participating Receptor	633262	4752646
R079	Non-Participating Receptor	633180	4752652
R080	Non-Participating Receptor	633171	4752874
R081	Non-Participating Receptor	633173	4752940
R082	Non-Participating Receptor	632836	4753494
R083	Non-Participating Receptor	633170	4753016
R084	Non-Participating Receptor	633166	4753060
R085	Non-Participating Receptor	633080	4753293
R086	Non-Participating Receptor	633201	4751971
R087	Non-Participating Receptor	633193	4751514
R088	Non-Participating Receptor	633222	4751503
R089	Non-Participating Receptor	633255	4751391
R090	Non-Participating Receptor	633236	4751158
R091	Non-Participating Receptor	632401	4751298
R092	Non-Participating Receptor	633259	4751231
R093	Non-Participating Receptor	633187	4751059
R094	Non-Participating Receptor	633279	4750654
R095	Non-Participating Receptor	631699	4749337
R096	Non-Participating Receptor	631677	4749589
R097	Non-Participating Receptor	633358	4751013
R098	Non-Participating Receptor	633242	4751012
R099	Non-Participating Receptor	633309	4750019
R100	Non-Participating Receptor	633200	4750238
R101	Non-Participating Receptor	633236	4750225
R102	Non-Participating Receptor	633179	4749957
R103	Non-Participating Receptor	633418	4754035
R104	Non-Participating Receptor	634775	4753933
R105	Non-Participating Receptor	634792	4753719
R106	Non-Participating Receptor	633025	4753303
R107	Non-Participating Receptor	632969	4753323
R108	Non-Participating Receptor	632928	4753341
R109	Non-Participating Receptor	633960	4753771
R110	Non-Participating Receptor	631935	4749920
R111	Non-Participating Receptor	631683	4749888
R112	Non-Participating Receptor	632275	4753836
R113	Non-Participating Receptor	632110	4749884
R114	Non-Participating Receptor	632257	4749911
R115	Non-Participating Receptor	631684	4749687
R117	Non-Participating Receptor	632350	4750168
R118	Non-Participating Receptor	632324	4750985
R119	Non-Participating Receptor	631734	4749449
R120	Non-Participating Receptor	632358	4750984
R122	Non-Participating Receptor	632067	4753188
R123	Non-Participating Receptor	632047	4753755
R124	Non-Participating Receptor	632141	4753816
R125	Non-Participating Receptor	634784	4753794
R126	Non-Participating Receptor	632895	4753355
R127	Non-Participating Receptor	632839	4753379
R128	Non-Participating Receptor	632812	4753388

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R129	Non-Participating Receptor	634907	4754010	R190	Non-Participating Receptor	633583	4747551
R130	Non-Participating Receptor	632781	4753415	R191	Non-Participating Receptor	633638	4747576
R131	Non-Participating Receptor	632736	4753440	R192	Non-Participating Receptor	634190	4750053
R132	Non-Participating Receptor	632692	4753454	R193	Non-Participating Receptor	633399	4747471
R133	Non-Participating Receptor	632889	4753642	R194	Non-Participating Receptor	635128	4749988
R134	Non-Participating Receptor	632697	4753600	R195	Non-Participating Receptor	634187	4750801
R135	Non-Participating Receptor	632815	4751955	R196	Non-Participating Receptor	633189	4752041
R136	Non-Participating Receptor	633114	4749956	R197	Non-Participating Receptor	634102	4751052
R137	Non-Participating Receptor	632834	4750015	R198	Non-Participating Receptor	634194	4751389
R138	Non-Participating Receptor	632740	4750067	R199	Non-Participating Receptor	634148	4751884
R139	Non-Participating Receptor	632481	4753207	R200	Non-Participating Receptor	633175	4752408
R140	Non-Participating Receptor	632617	4753391	R201	Non-Participating Receptor	636010	4752202
R141	Non-Participating Receptor	632497	4753453	R202	Non-Participating Receptor	634097	4751191
R142	Non-Participating Receptor	632525	4750520	R203	Non-Participating Receptor	633960	4750265
R143	Non-Participating Receptor	632540	4750610	R204	Non-Participating Receptor	633850	4750359
R144	Non-Participating Receptor	632515	4750690	R205	Non-Participating Receptor	633819	4750449
R145	Non-Participating Receptor	632620	4749997	R206	Non-Participating Receptor	634852	4752454
R146	Non-Participating Receptor	632566	4750013	R207	Non-Participating Receptor	634091	4752898
R147	Non-Participating Receptor	632656	4749997	R208	Non-Participating Receptor	634089	4752509
R148	Non-Participating Receptor	632417	4753459	R209	Non-Participating Receptor	634115	4752492
R149	Non-Participating Receptor	632416	4753461	R210	Non-Participating Receptor	634287	4749789
R150	Non-Participating Receptor	632306	4753457	R211	Non-Participating Receptor	634285	4749818
R151	Non-Participating Receptor	632329	4753272	R212	Non-Participating Receptor	634285	4749869
R152	Non-Participating Receptor	635069	4754533	R213	Non-Participating Receptor	634306	4749949
R153	Non-Participating Receptor	632332	4753415	R214	Non-Participating Receptor	634368	4749946
R154	Non-Participating Receptor	632334	4753351	R215	Non-Participating Receptor	634476	4749946
R155	Non-Participating Receptor	632399	4749934	R216	Non-Participating Receptor	633697	4747523
R156	Non-Participating Receptor	630185	4749919	R217	Non-Participating Receptor	634627	4749949
R157	Non-Participating Receptor	631737	4749231	R218	Non-Participating Receptor	634273	4750062
R158	Non-Participating Receptor	630040	4751914	R219	Non-Participating Receptor	634323	4750060
R159	Non-Participating Receptor	630731	4751880	R220	Non-Participating Receptor	633755	4747540
R160	Non-Participating Receptor	633722	4750109	R221	Non-Participating Receptor	634424	4749950
R161	Non-Participating Receptor	633384	4750427	R222	Non-Participating Receptor	634270	4750914
R162	Non-Participating Receptor	630485	4752810	R223	Non-Participating Receptor	635678	4751559
R163	Non-Participating Receptor	630687	4752888	R224	Non-Participating Receptor	634396	4750064
R164	Non-Participating Receptor	630876	4749932	R225	Non-Participating Receptor	634451	4750063
R165	Non-Participating Receptor	631872	4749804	R226	Non-Participating Receptor	634392	4750257
R166	Non-Participating Receptor	630236	4749851	R227	Non-Participating Receptor	634523	4750057
R167	Non-Participating Receptor	630496	4751880	R228	Non-Participating Receptor	634602	4750062
R168	Non-Participating Receptor	630539	4752617	R229	Non-Participating Receptor	634559	4749934
R169	Non-Participating Receptor	631131	4751914	R230	Non-Participating Receptor	634660	4750062
R170	Non-Participating Receptor	629875	4751800	R231	Non-Participating Receptor	634900	4749915
R171	Non-Participating Receptor	630419	4752788	R232	Non-Participating Receptor	635919	4751935
R172	Non-Participating Receptor	630935	4751897	R233	Non-Participating Receptor	634456	4752096
R173	Non-Participating Receptor	630922	4752815	R234	Non-Participating Receptor	635006	4749797
R174	Non-Participating Receptor	630342	4752548	R235	Non-Participating Receptor	635011	4749994
R175	Non-Participating Receptor	630106	4752484	R236	Non-Participating Receptor	634716	4750058
R176	Non-Participating Receptor	631692	4749469	R237	Non-Participating Receptor	634759	4750086
R177	Non-Participating Receptor	631545	4749861	R238	Non-Participating Receptor	635002	4751998
R178	Non-Participating Receptor	631713	4749673	R239	Non-Participating Receptor	634864	4752484
R179	Non-Participating Receptor	629772	4749924	R240	Non-Participating Receptor	634938	4752567
R180	Non-Participating Receptor	631376	4749862	R241	Non-Participating Receptor	634924	4752786
R181	Non-Participating Receptor	629823	4752565	R242	Non-Participating Receptor	634901	4752862
R182	Non-Participating Receptor	631700	4751927	R243	Non-Participating Receptor	634387	4752095
R183	Non-Participating Receptor	629986	4751905	R244	Non-Participating Receptor	635019	4749994
R185	Non-Participating Receptor	631727	4753145	R245	Non-Participating Receptor	635227	4750204
R186	Non-Participating Receptor	634190	4749979	R246	Non-Participating Receptor	635255	4750147
R187	Non-Participating Receptor	633495	4747845	R247	Non-Participating Receptor	635442	4750012
R188	Non-Participating Receptor	634070	4749972	R248	Non-Participating Receptor	635441	4749987
R189	Non-Participating Receptor	633520	4747515	R249	Non-Participating Receptor	635503	4749983

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R250	Non-Participating Receptor	635863	4750186	R310	Non-Participating Receptor	633618	4747435
R251	Non-Participating Receptor	635935	4750129	R311	Non-Participating Receptor	633432	4747362
R252	Non-Participating Receptor	635813	4750116	R312	Non-Participating Receptor	633863	4747488
R253	Non-Participating Receptor	635813	4750093	R313	Non-Participating Receptor	632596	4747310
R254	Non-Participating Receptor	635826	4749958	R314	Non-Participating Receptor	632525	4747347
R255	Non-Participating Receptor	635833	4750007	R315	Non-Participating Receptor	632483	4747326
R256	Non-Participating Receptor	635760	4750012	R316	Non-Participating Receptor	632177	4747363
R257	Non-Participating Receptor	635833	4749868	R317	Non-Participating Receptor	632419	4747397
R258	Non-Participating Receptor	635856	4750268	R318	Non-Participating Receptor	632415	4747332
R259	Non-Participating Receptor	635037	4750313	R319	Non-Participating Receptor	632358	4747287
R260	Non-Participating Receptor	635856	4750400	R320	Non-Participating Receptor	632169	4747279
R261	Non-Participating Receptor	635853	4750481	R321	Non-Participating Receptor	632324	4747298
R262	Non-Participating Receptor	635854	4750531	R322	Non-Participating Receptor	633925	4750068
R263	Non-Participating Receptor	635957	4750408	R323	Non-Participating Receptor	633874	4750082
R264	Non-Participating Receptor	635859	4750624	R324	Non-Participating Receptor	633816	4750060
R265	Non-Participating Receptor	635837	4750993	R325	Non-Participating Receptor	634128	4749975
R266	Non-Participating Receptor	630017	4749891	R326	Non-Participating Receptor	634203	4749912
R267	Non-Participating Receptor	630644	4749938	R327	Non-Participating Receptor	634125	4749882
R268	Non-Participating Receptor	630235	4750602	R328	Non-Participating Receptor	634154	4749771
R269	Non-Participating Receptor	628451	4749504	R329	Non-Participating Receptor	633981	4749810
R270	Non-Participating Receptor	629257	4749878	R330	Non-Participating Receptor	634287	4749741
R271	Non-Participating Receptor	628310	4750015	R331	Non-Participating Receptor	634202	4749761
R272	Non-Participating Receptor	630170	4749054	R332	Non-Participating Receptor	633261	4750005
R273	Non-Participating Receptor	630221	4749017	R333	Non-Participating Receptor	633300	4750162
R274	Non-Participating Receptor	628571	4749254	R336	Non-Participating Receptor	635097	4753657
R275	Non-Participating Receptor	629806	4749041	R337	Non-Participating Receptor	630829	4747778
R276	Non-Participating Receptor	630228	4750773	R338	Non-Participating Receptor	630830	4747729
R277	Non-Participating Receptor	628565	4751785	R339	Non-Participating Receptor	630851	4747723
R278	Non-Participating Receptor	629494	4749913	R340	Non-Participating Receptor	630876	4747710
R279	Non-Participating Receptor	628255	4750689	R341	Non-Participating Receptor	630895	4747712
R280	Non-Participating Receptor	628797	4751917	R342	Non-Participating Receptor	630922	4747694
R281	Non-Participating Receptor	629707	4751780	R343	Non-Participating Receptor	630937	4747688
R282	Non-Participating Receptor	629664	4750855	R344	Non-Participating Receptor	630959	4747685
R283	Non-Participating Receptor	634254	4753915	R345	Non-Participating Receptor	630993	4747715
R284	Non-Participating Receptor	634407	4754222	R346	Non-Participating Receptor	630993	4747704
R285	Non-Participating Receptor	633982	4754071	R347	Non-Participating Receptor	630995	4747696
R286	Non-Participating Receptor	634486	4754441	R348	Non-Participating Receptor	630995	4747687
R287	Non-Participating Receptor	634463	4753971	R349	Non-Participating Receptor	630996	4747679
R288	Non-Participating Receptor	632881	4753463	R350	Non-Participating Receptor	630999	4747668
R289	Non-Participating Receptor	634278	4754397	R351	Non-Participating Receptor	631005	4747637
R290	Non-Participating Receptor	634796	4754585	R352	Non-Participating Receptor	631009	4747660
R291	Non-Participating Receptor	634891	4754434	R353	Non-Participating Receptor	631016	4747639
R292	Non-Participating Receptor	629255	4752075	R354	Non-Participating Receptor	631020	4747644
R293	Non-Participating Receptor	628985	4751983	R355	Non-Participating Receptor	631024	4747650
R294	Non-Participating Receptor	629062	4752053	R356	Non-Participating Receptor	631027	4747655
R295	Non-Participating Receptor	629421	4752158	R357	Non-Participating Receptor	631032	4747663
R296	Non-Participating Receptor	628246	4751164	R358	Non-Participating Receptor	631036	4747669
R297	Non-Participating Receptor	627679	4751455	R359	Non-Participating Receptor	631037	4747627
R298	Non-Participating Receptor	629336	4752142	R360	Non-Participating Receptor	631039	4747635
R299	Non-Participating Receptor	628167	4751668	R361	Non-Participating Receptor	631042	4747640
R300	Non-Participating Receptor	628311	4751725	R362	Non-Participating Receptor	631045	4747645
R301	Non-Participating Receptor	627507	4751395	R363	Non-Participating Receptor	631048	4747650
R302	Non-Participating Receptor	627962	4751576	R364	Non-Participating Receptor	631049	4747630
R303	Non-Participating Receptor	632524	4750108	R365	Non-Participating Receptor	631051	4747655
R304	Non-Participating Receptor	632986	4747418	R366	Non-Participating Receptor	631058	4747627
R305	Non-Participating Receptor	632847	4747346	R367	Non-Participating Receptor	631064	4747672
R306	Non-Participating Receptor	632881	4747348	R368	Non-Participating Receptor	631066	4747623
R307	Non-Participating Receptor	633299	4747401	R369	Non-Participating Receptor	631068	4747680
R308	Non-Participating Receptor	633600	4747510	R370	Non-Participating Receptor	631072	4747618
R309	Non-Participating Receptor	633432	4747541	R371	Non-Participating Receptor	631079	4747613

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R372	Non-Participating Receptor	631085	4747686	R432	Non-Participating Receptor	631419	4747424
R373	Non-Participating Receptor	631086	4747609	R433	Non-Participating Receptor	631422	4747388
R374	Non-Participating Receptor	631093	4747602	R434	Non-Participating Receptor	631425	4747458
R375	Non-Participating Receptor	631098	4747656	R435	Non-Participating Receptor	631439	4747450
R376	Non-Participating Receptor	631101	4747597	R436	Non-Participating Receptor	631452	4747366
R377	Non-Participating Receptor	631105	4747650	R437	Non-Participating Receptor	631458	4747347
R378	Non-Participating Receptor	631108	4747591	R438	Non-Participating Receptor	631465	4747340
R379	Non-Participating Receptor	631117	4747642	R439	Non-Participating Receptor	631471	4747373
R380	Non-Participating Receptor	631121	4747587	R440	Non-Participating Receptor	631474	4747338
R381	Non-Participating Receptor	631124	4747637	R441	Non-Participating Receptor	631480	4747368
R382	Non-Participating Receptor	631127	4747659	R442	Non-Participating Receptor	631481	4747390
R383	Non-Participating Receptor	631129	4747583	R443	Non-Participating Receptor	631482	4747330
R384	Non-Participating Receptor	631136	4747628	R444	Non-Participating Receptor	631484	4747377
R385	Non-Participating Receptor	631137	4747578	R445	Non-Participating Receptor	631489	4747323
R386	Non-Participating Receptor	631151	4747619	R446	Non-Participating Receptor	631492	4747369
R387	Non-Participating Receptor	631153	4747573	R447	Non-Participating Receptor	631493	4747410
R388	Non-Participating Receptor	631168	4747564	R448	Non-Participating Receptor	631496	4747353
R389	Non-Participating Receptor	631188	4747556	R449	Non-Participating Receptor	631502	4747405
R390	Non-Participating Receptor	631202	4747548	R450	Non-Participating Receptor	631504	4747362
R391	Non-Participating Receptor	631213	4747539	R451	Non-Participating Receptor	631509	4747312
R392	Non-Participating Receptor	631221	4747592	R452	Non-Participating Receptor	631512	4747355
R393	Non-Participating Receptor	631225	4747525	R453	Non-Participating Receptor	631512	4747399
R394	Non-Participating Receptor	631237	4747515	R454	Non-Participating Receptor	631520	4747394
R395	Non-Participating Receptor	631239	4747591	R455	Non-Participating Receptor	631521	4747304
R396	Non-Participating Receptor	631241	4747543	R456	Non-Participating Receptor	631522	4747348
R397	Non-Participating Receptor	631249	4747584	R457	Non-Participating Receptor	631526	4747392
R398	Non-Participating Receptor	631255	4747520	R458	Non-Participating Receptor	631528	4747338
R399	Non-Participating Receptor	631261	4747528	R459	Non-Participating Receptor	631533	4747298
R400	Non-Participating Receptor	631265	4747501	R460	Non-Participating Receptor	631534	4747387
R401	Non-Participating Receptor	631267	4747537	R461	Non-Participating Receptor	631541	4747383
R402	Non-Participating Receptor	631270	4747484	R462	Non-Participating Receptor	631547	4747376
R403	Non-Participating Receptor	631272	4747544	R463	Non-Participating Receptor	631551	4747313
R404	Non-Participating Receptor	631277	4747567	R464	Non-Participating Receptor	631552	4747325
R405	Non-Participating Receptor	631278	4747552	R465	Non-Participating Receptor	631554	4747373
R406	Non-Participating Receptor	631282	4747476	R466	Non-Participating Receptor	631557	4747338
R407	Non-Participating Receptor	631284	4747559	R467	Non-Participating Receptor	631561	4747366
R408	Non-Participating Receptor	631290	4747568	R468	Non-Participating Receptor	631562	4747318
R409	Non-Participating Receptor	631291	4747465	R469	Non-Participating Receptor	631568	4747272
R410	Non-Participating Receptor	631299	4747526	R470	Non-Participating Receptor	631568	4747329
R411	Non-Participating Receptor	631304	4747498	R471	Non-Participating Receptor	631571	4747359
R412	Non-Participating Receptor	631317	4747552	R472	Non-Participating Receptor	631581	4747351
R413	Non-Participating Receptor	631322	4747464	R473	Non-Participating Receptor	631589	4747345
R414	Non-Participating Receptor	631333	4747539	R474	Non-Participating Receptor	631598	4747343
R415	Non-Participating Receptor	631338	4747451	R475	Non-Participating Receptor	631598	4747305
R416	Non-Participating Receptor	631340	4747501	R476	Non-Participating Receptor	631603	4747252
R417	Non-Participating Receptor	631345	4747431	R477	Non-Participating Receptor	631604	4747338
R418	Non-Participating Receptor	631346	4747480	R478	Non-Participating Receptor	631611	4747297
R419	Non-Participating Receptor	631357	4747423	R479	Non-Participating Receptor	631611	4747248
R420	Non-Participating Receptor	631366	4747480	R480	Non-Participating Receptor	631612	4747332
R421	Non-Participating Receptor	631367	4747413	R481	Non-Participating Receptor	631618	4747245
R422	Non-Participating Receptor	631379	4747432	R482	Non-Participating Receptor	631621	4747322
R423	Non-Participating Receptor	631382	4747401	R483	Non-Participating Receptor	631628	4747267
R424	Non-Participating Receptor	631385	4747441	R484	Non-Participating Receptor	631629	4747234
R425	Non-Participating Receptor	631392	4747449	R485	Non-Participating Receptor	631635	4747290
R426	Non-Participating Receptor	631392	4747393	R486	Non-Participating Receptor	631641	4747222
R427	Non-Participating Receptor	631399	4747458	R487	Non-Participating Receptor	631644	4747286
R428	Non-Participating Receptor	631407	4747469	R488	Non-Participating Receptor	631648	4747253
R429	Non-Participating Receptor	631410	4747394	R489	Non-Participating Receptor	631650	4747303
R430	Non-Participating Receptor	631414	4747438	R490	Non-Participating Receptor	631661	4747215
R431	Non-Participating Receptor	631415	4747479	R491	Non-Participating Receptor	631670	4747208

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R492	Non-Participating Receptor	631675	4747272	R552	Non-Participating Receptor	631914	4747005
R493	Non-Participating Receptor	631678	4747189	R553	Non-Participating Receptor	631917	4746992
R494	Non-Participating Receptor	631692	4747263	R554	Non-Participating Receptor	631920	4747187
R495	Non-Participating Receptor	631692	4747184	R555	Non-Participating Receptor	631921	4746983
R496	Non-Participating Receptor	631698	4747244	R556	Non-Participating Receptor	631922	4747049
R497	Non-Participating Receptor	631702	4747220	R557	Non-Participating Receptor	631923	4747083
R498	Non-Participating Receptor	631704	4747205	R558	Non-Participating Receptor	631926	4746973
R499	Non-Participating Receptor	631705	4747176	R559	Non-Participating Receptor	631929	4746961
R500	Non-Participating Receptor	631716	4747163	R560	Non-Participating Receptor	631930	4746948
R501	Non-Participating Receptor	631717	4747220	R561	Non-Participating Receptor	631932	4746939
R502	Non-Participating Receptor	631728	4747188	R562	Non-Participating Receptor	631934	4747084
R503	Non-Participating Receptor	631728	4747155	R563	Non-Participating Receptor	631934	4746933
R504	Non-Participating Receptor	631730	4747242	R564	Non-Participating Receptor	631935	4747121
R505	Non-Participating Receptor	631737	4747145	R565	Non-Participating Receptor	631935	4746922
R506	Non-Participating Receptor	631741	4747227	R566	Non-Participating Receptor	631935	4746909
R507	Non-Participating Receptor	631745	4747178	R567	Non-Participating Receptor	631936	4747191
R508	Non-Participating Receptor	631750	4747135	R568	Non-Participating Receptor	631938	4746896
R509	Non-Participating Receptor	631753	4747169	R569	Non-Participating Receptor	631939	4747155
R510	Non-Participating Receptor	631754	4747195	R570	Non-Participating Receptor	631939	4747045
R511	Non-Participating Receptor	631756	4747224	R571	Non-Participating Receptor	631943	4746886
R512	Non-Participating Receptor	631761	4747128	R572	Non-Participating Receptor	631947	4747084
R513	Non-Participating Receptor	631767	4747210	R573	Non-Participating Receptor	631949	4746875
R514	Non-Participating Receptor	631770	4747190	R574	Non-Participating Receptor	631951	4747023
R515	Non-Participating Receptor	631771	4747121	R575	Non-Participating Receptor	631951	4746931
R516	Non-Participating Receptor	631779	4747111	R576	Non-Participating Receptor	631956	4746865
R517	Non-Participating Receptor	631780	4747205	R577	Non-Participating Receptor	631959	4747126
R518	Non-Participating Receptor	631787	4747149	R578	Non-Participating Receptor	631959	4747162
R519	Non-Participating Receptor	631788	4747102	R579	Non-Participating Receptor	631960	4747090
R520	Non-Participating Receptor	631795	4747171	R580	Non-Participating Receptor	631960	4747000
R521	Non-Participating Receptor	631802	4747103	R581	Non-Participating Receptor	631960	4746849
R522	Non-Participating Receptor	631806	4747135	R582	Non-Participating Receptor	631966	4746988
R523	Non-Participating Receptor	631809	4747096	R583	Non-Participating Receptor	631970	4746835
R524	Non-Participating Receptor	631848	4747054	R584	Non-Participating Receptor	631971	4747128
R525	Non-Participating Receptor	631849	4747349	R585	Non-Participating Receptor	631972	4746966
R526	Non-Participating Receptor	631850	4747160	R586	Non-Participating Receptor	631972	4747014
R527	Non-Participating Receptor	631851	4747173	R587	Non-Participating Receptor	631978	4746954
R528	Non-Participating Receptor	631851	4747146	R588	Non-Participating Receptor	631980	4747094
R529	Non-Participating Receptor	631851	4747136	R589	Non-Participating Receptor	631982	4747128
R530	Non-Participating Receptor	631851	4747122	R590	Non-Participating Receptor	631982	4747195
R531	Non-Participating Receptor	631851	4747110	R591	Non-Participating Receptor	631983	4746943
R532	Non-Participating Receptor	631855	4747047	R592	Non-Participating Receptor	631987	4746932
R533	Non-Participating Receptor	631863	4747040	R593	Non-Participating Receptor	631987	4746824
R534	Non-Participating Receptor	631874	4747147	R594	Non-Participating Receptor	631989	4746918
R535	Non-Participating Receptor	631875	4747182	R595	Non-Participating Receptor	631997	4747127
R536	Non-Participating Receptor	631878	4747040	R596	Non-Participating Receptor	631998	4746908
R537	Non-Participating Receptor	631881	4747086	R597	Non-Participating Receptor	631999	4747096
R538	Non-Participating Receptor	631882	4747020	R598	Non-Participating Receptor	632000	4746897
R539	Non-Participating Receptor	631887	4747146	R599	Non-Participating Receptor	632002	4746885
R540	Non-Participating Receptor	631887	4747114	R600	Non-Participating Receptor	632003	4746802
R541	Non-Participating Receptor	631888	4747183	R601	Non-Participating Receptor	632007	4746790
R542	Non-Participating Receptor	631896	4747027	R602	Non-Participating Receptor	632010	4747132
R543	Non-Participating Receptor	631898	4747185	R603	Non-Participating Receptor	632010	4746875
R544	Non-Participating Receptor	631898	4747107	R604	Non-Participating Receptor	632011	4747058
R545	Non-Participating Receptor	631899	4747081	R605	Non-Participating Receptor	632021	4747100
R546	Non-Participating Receptor	631899	4747149	R606	Non-Participating Receptor	632022	4747201
R547	Non-Participating Receptor	631908	4747017	R607	Non-Participating Receptor	632022	4746786
R548	Non-Participating Receptor	631909	4747185	R608	Non-Participating Receptor	632028	4746856
R549	Non-Participating Receptor	631910	4747080	R609	Non-Participating Receptor	632031	4746775
R550	Non-Participating Receptor	631911	4747118	R610	Non-Participating Receptor	632033	4747135
R551	Non-Participating Receptor	631914	4747058	R611	Non-Participating Receptor	632033	4747201

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R612	Non-Participating Receptor	632043	4746830	R672	Non-Participating Receptor	632452	4746775
R613	Non-Participating Receptor	632045	4746745	R673	Non-Participating Receptor	632460	4746784
R614	Non-Participating Receptor	632046	4747098	R674	Non-Participating Receptor	632468	4746793
R615	Non-Participating Receptor	632053	4747165	R675	Non-Participating Receptor	632477	4746803
R616	Non-Participating Receptor	632054	4747204	R676	Non-Participating Receptor	632485	4746812
R617	Non-Participating Receptor	632054	4747052	R677	Non-Participating Receptor	632494	4747240
R618	Non-Participating Receptor	632055	4747073	R678	Non-Participating Receptor	632495	4746920
R619	Non-Participating Receptor	632056	4747008	R679	Non-Participating Receptor	632503	4746831
R620	Non-Participating Receptor	632056	4746985	R680	Non-Participating Receptor	632526	4746855
R621	Non-Participating Receptor	632056	4746953	R681	Non-Participating Receptor	632534	4749684
R622	Non-Participating Receptor	632056	4746878	R682	Non-Participating Receptor	632535	4746864
R623	Non-Participating Receptor	632057	4746895	R683	Non-Participating Receptor	632543	4746875
R624	Non-Participating Receptor	632059	4746814	R684	Non-Participating Receptor	632550	4746988
R625	Non-Participating Receptor	632068	4746740	R685	Non-Participating Receptor	632560	4746886
R626	Non-Participating Receptor	632079	4746724	R686	Non-Participating Receptor	632570	4746898
R627	Non-Participating Receptor	632084	4747156	R687	Non-Participating Receptor	632579	4746908
R628	Non-Participating Receptor	632087	4747172	R688	Non-Participating Receptor	632584	4747037
R629	Non-Participating Receptor	632087	4747135	R689	Non-Participating Receptor	632589	4746913
R630	Non-Participating Receptor	632088	4747056	R690	Non-Participating Receptor	632597	4746923
R631	Non-Participating Receptor	632090	4746889	R691	Non-Participating Receptor	632604	4746935
R632	Non-Participating Receptor	632091	4746953	R692	Non-Participating Receptor	632616	4747238
R633	Non-Participating Receptor	632091	4746923	R693	Non-Participating Receptor	632617	4747091
R634	Non-Participating Receptor	632091	4746912	R694	Non-Participating Receptor	632619	4746947
R635	Non-Participating Receptor	632092	4747072	R695	Non-Participating Receptor	632622	4747160
R636	Non-Participating Receptor	632092	4746987	R696	Non-Participating Receptor	632637	4746973
R637	Non-Participating Receptor	632092	4746900	R697	Non-Participating Receptor	632644	4747008
R638	Non-Participating Receptor	632093	4746865	R698	Non-Participating Receptor	632690	4747030
R639	Non-Participating Receptor	632094	4746786	R699	Non-Participating Receptor	632691	4747176
R640	Non-Participating Receptor	632094	4746832	R700	Non-Participating Receptor	632710	4747055
R641	Non-Participating Receptor	632097	4746714	R701	Non-Participating Receptor	632722	4747082
R642	Non-Participating Receptor	632109	4746710	R702	Non-Participating Receptor	632744	4747114
R643	Non-Participating Receptor	632127	4746696	R703	Non-Participating Receptor	632764	4747244
R644	Non-Participating Receptor	632138	4746691	R704	Non-Participating Receptor	632774	4747148
R645	Non-Participating Receptor	632164	4746685	R705	Non-Participating Receptor	632793	4747164
R646	Non-Participating Receptor	632175	4746679	R706	Non-Participating Receptor	632836	4747228
R647	Non-Participating Receptor	632186	4746674	R707	Non-Participating Receptor	633093	4747355
R648	Non-Participating Receptor	632199	4746670	R708	Non-Participating Receptor	633106	4747356
R649	Non-Participating Receptor	632219	4746671	R709	Non-Participating Receptor	633115	4747357
R650	Non-Participating Receptor	632221	4747227	R710	Non-Participating Receptor	633129	4747358
R651	Non-Participating Receptor	632259	4746676	R711	Non-Participating Receptor	633142	4747360
R652	Non-Participating Receptor	632273	4747236	R712	Non-Participating Receptor	633163	4747360
R653	Non-Participating Receptor	632275	4746680	R713	Non-Participating Receptor	633176	4747366
R654	Non-Participating Receptor	632294	4746740	R714	Non-Participating Receptor	633196	4747358
R655	Non-Participating Receptor	632295	4746687	R715	Non-Participating Receptor	633222	4747360
R656	Non-Participating Receptor	632329	4752969	R716	Non-Participating Receptor	633259	4747378
R657	Non-Participating Receptor	632338	4746699	R717	Non-Participating Receptor	633293	4747348
R658	Non-Participating Receptor	632340	4747287	R718	Non-Participating Receptor	633298	4747392
R659	Non-Participating Receptor	632344	4747234	R719	Non-Participating Receptor	633308	4747372
R660	Non-Participating Receptor	632365	4746712	R720	Non-Participating Receptor	633316	4747350
R661	Non-Participating Receptor	632368	4747239	R721	Non-Participating Receptor	633345	4747346
R662	Non-Participating Receptor	632386	4746723	R722	Non-Participating Receptor	633371	4747347
R663	Non-Participating Receptor	632390	4746807	R723	Non-Participating Receptor	633403	4747347
R664	Non-Participating Receptor	632397	4746726	R724	Non-Participating Receptor	633430	4747352
R665	Non-Participating Receptor	632410	4746736	R725	Non-Participating Receptor	633458	4747356
R666	Non-Participating Receptor	632413	4746827	R726	Non-Participating Receptor	633502	4747801
R667	Non-Participating Receptor	632423	4746749	R727	Non-Participating Receptor	633518	4750086
R668	Non-Participating Receptor	632433	4746760	R728	Non-Participating Receptor	633518	4747503
R669	Non-Participating Receptor	632434	4746848	R729	Non-Participating Receptor	633553	4747517
R670	Non-Participating Receptor	632444	4746766	R730	Non-Participating Receptor	633623	4747430
R671	Non-Participating Receptor	632451	4746876	R731	Non-Participating Receptor	633632	4747532

Point of Reception ID	Description	UTM Coordinates		Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing			Easting	Westing
R732	Non-Participating Receptor	633634	4747543	R792	Non-Participating Receptor	634346	4747148
R733	Non-Participating Receptor	633653	4747292	R793	Non-Participating Receptor	634351	4750056
R734	Non-Participating Receptor	633673	4747279	R794	Non-Participating Receptor	634367	4747617
R735	Non-Participating Receptor	633682	4747293	R795	Non-Participating Receptor	634367	4747914
R736	Non-Participating Receptor	633692	4747265	R796	Non-Participating Receptor	634379	4747548
R737	Non-Participating Receptor	633762	4747293	R797	Non-Participating Receptor	634379	4747513
R738	Non-Participating Receptor	633763	4747274	R798	Non-Participating Receptor	634379	4747445
R739	Non-Participating Receptor	633764	4747313	R799	Non-Participating Receptor	634380	4747421
R740	Non-Participating Receptor	633795	4747348	R800	Non-Participating Receptor	634381	4747306
R741	Non-Participating Receptor	633798	4747297	R801	Non-Participating Receptor	634382	4747382
R742	Non-Participating Receptor	633814	4747349	R802	Non-Participating Receptor	634382	4747258
R743	Non-Participating Receptor	633834	4747344	R803	Non-Participating Receptor	634385	4747363
R744	Non-Participating Receptor	633842	4747227	R804	Non-Participating Receptor	634385	4747235
R745	Non-Participating Receptor	633854	4747479	R805	Non-Participating Receptor	634385	4747198
R746	Non-Participating Receptor	633876	4747218	R806	Non-Participating Receptor	634386	4747156
R747	Non-Participating Receptor	633899	4747253	R807	Non-Participating Receptor	634386	4747137
R748	Non-Participating Receptor	633901	4747268	R808	Non-Participating Receptor	634386	4747826
R749	Non-Participating Receptor	633903	4747232	R809	Non-Participating Receptor	634386	4747860
R750	Non-Participating Receptor	634041	4749969	R810	Non-Participating Receptor	634387	4747216
R751	Non-Participating Receptor	634048	4749859	R811	Non-Participating Receptor	634387	4747185
R752	Non-Participating Receptor	634099	4749972	R812	Non-Participating Receptor	634387	4747125
R753	Non-Participating Receptor	634113	4749927	R813	Non-Participating Receptor	634387	4747740
R754	Non-Participating Receptor	634131	4747532	R814	Non-Participating Receptor	634387	4747768
R755	Non-Participating Receptor	634141	4749973	R815	Non-Participating Receptor	634392	4747802
R756	Non-Participating Receptor	634165	4747031	R816	Non-Participating Receptor	634394	4747704
R757	Non-Participating Receptor	634183	4747006	R817	Non-Participating Receptor	634399	4747338
R758	Non-Participating Receptor	634190	4747025	R818	Non-Participating Receptor	634466	4748073
R759	Non-Participating Receptor	634209	4746993	R819	Non-Participating Receptor	634487	4747645
R760	Non-Participating Receptor	634218	4747012	R820	Non-Participating Receptor	634489	4749772
R761	Non-Participating Receptor	634219	4746987	R821	Non-Participating Receptor	634497	4748226
R762	Non-Participating Receptor	634219	4750047	R822	Non-Participating Receptor	634513	4747649
R763	Non-Participating Receptor	634230	4746980	R823	Non-Participating Receptor	634549	4747655
R764	Non-Participating Receptor	634234	4747006	R824	Non-Participating Receptor	634661	4747675
R765	Non-Participating Receptor	634238	4747001	R825	Non-Participating Receptor	631699	4749015
R766	Non-Participating Receptor	634247	4750046	R826	Non-Participating Receptor	633592	4749955
R767	Non-Participating Receptor	634261	4748732	R827	Non-Participating Receptor	633814	4749968
R768	Non-Participating Receptor	634280	4749895	R828	Non-Participating Receptor	631089	4752846
R769	Non-Participating Receptor	634282	4749838	R829	Non-Participating Receptor	630009	4752444
R770	Non-Participating Receptor	634288	4749699	R830	Non-Participating Receptor	629667	4752320
R771	Non-Participating Receptor	634290	4749438	R831	Non-Participating Receptor	630224	4751057
R772	Non-Participating Receptor	634292	4749306	R832	Non-Participating Receptor	629689	4750079
R773	Non-Participating Receptor	634296	4748840	R833	Non-Participating Receptor	634204	4749689
R774	Non-Participating Receptor	634296	4749252	R834	Non-Participating Receptor	634205	4749649
R775	Non-Participating Receptor	634297	4748698	R835	Non-Participating Receptor	634192	4749579
R776	Non-Participating Receptor	634297	4748877	R836	Non-Participating Receptor	634209	4749428
R777	Non-Participating Receptor	634300	4748660	R837	Non-Participating Receptor	634222	4749178
R778	Non-Participating Receptor	634302	4747495	R838	Non-Participating Receptor	634216	4749098
R779	Non-Participating Receptor	634305	4749044	R839	Non-Participating Receptor	634282	4747767
R780	Non-Participating Receptor	634307	4748798	R840	Non-Participating Receptor	634286	4747708
R781	Non-Participating Receptor	634314	4747361	R841	Non-Participating Receptor	634293	4747659
R782	Non-Participating Receptor	634316	4747450	R842	Non-Participating Receptor	634291	4747619
R783	Non-Participating Receptor	634316	4747320	R843	Non-Participating Receptor	634228	4747628
R784	Non-Participating Receptor	634317	4747265	R844	Non-Participating Receptor	634046	4747595
R785	Non-Participating Receptor	634321	4747406	R845	Non-Participating Receptor	633894	4747558
R786	Non-Participating Receptor	634323	4747561	R846	Non-Participating Receptor	633505	4747742
R787	Non-Participating Receptor	634339	4747204	R847	Non-Participating Receptor	633534	4747473
R788	Non-Participating Receptor	634340	4747073	R848	Non-Participating Receptor	633585	4747485
R789	Non-Participating Receptor	634343	4747228	R849	Non-Participating Receptor	633636	4747508
R790	Non-Participating Receptor	634345	4747104	R850	Non-Participating Receptor	633498	4747538
R791	Non-Participating Receptor	634346	4747178	R851	Non-Participating Receptor	633436	4747472

Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing
R852	Non-Participating Receptor	632620	4747378
R853	Non-Participating Receptor	632195	4747356
R854	Non-Participating Receptor	631879	4747224
R855	Non-Participating Receptor	631845	4747249
R856	Non-Participating Receptor	632142	4747295
R857	Non-Participating Receptor	631848	4747332
R858	Non-Participating Receptor	631881	4747312
R859	Non-Participating Receptor	631634	4747401
R860	Non-Participating Receptor	631481	4747545
R861	Non-Participating Receptor	631371	4747619
R862	Non-Participating Receptor	631326	4747655
R863	Non-Participating Receptor	631107	4747771
R864	Non-Participating Receptor	630946	4747816
R865	Non-Participating Receptor	631024	4747787
V001	Non-Participating Vacant Lot	632041	4747337
V002	Non-Participating Vacant Lot	632094	4747345
V003	Non-Participating Vacant Lot	631966	4747243
V004	Non-Participating Vacant Lot	632014	4747250
V005	Non-Participating Vacant Lot	632018	4747171
V006	Non-Participating Vacant Lot	632095	4747228
V007	Non-Participating Vacant Lot	632089	4747100
V008	Non-Participating Vacant Lot	632069	4746941
V009	Non-Participating Vacant Lot	632265	4747283
V010	Non-Participating Vacant Lot	632838	4747326
V011	Non-Participating Vacant Lot	633006	4747376
V012	Non-Participating Vacant Lot	632353	4746778
V013	Non-Participating Vacant Lot	633507	4747651
V014	Non-Participating Vacant Lot	633508	4747787
V015	Non-Participating Vacant Lot	633604	4747857
V016	Non-Participating Vacant Lot	633593	4747654
V017	Non-Participating Vacant Lot	633596	4747607
V018	Non-Participating Vacant Lot	633631	4747607
V019	Non-Participating Vacant Lot	633675	4747681
V020	Non-Participating Vacant Lot	634246	4749043
V021	Non-Participating Vacant Lot	632452	4750010
V022	Non-Participating Vacant Lot	631050	4751866
V023	Non-Participating Vacant Lot	631916	4751890
V024	Non-Participating Vacant Lot	630744	4749974
V025	Non-Participating Vacant Lot	631447	4750029
V026	Non-Participating Vacant Lot	631715	4749988
V027	Non-Participating Vacant Lot	632174	4750016
V029	Non-Participating Vacant Lot	631112	4749846
V030	Non-Participating Vacant Lot	632627	4749876
V031	Non-Participating Vacant Lot	633036	4749938
V032	Non-Participating Vacant Lot	633475	4749941
V033	Non-Participating Vacant Lot	633074	4750033
V036	Non-Participating Vacant Lot	633919	4749948
V037	Non-Participating Vacant Lot	632211	4751913
V038	Non-Participating Vacant Lot	631364	4752004
V039	Non-Participating Vacant Lot	631319	4752961
V044	Non-Participating Vacant Lot	630028	4751821
V046	Non-Participating Vacant Lot	630312	4749946
V047	Non-Participating Vacant Lot	631118	4749967
V048	Non-Participating Vacant Lot	630756	4749836
V049	Non-Participating Vacant Lot	630386	4749836
V050	Non-Participating Vacant Lot	634070	4749780
V054	Non-Participating Vacant Lot	634213	4749522
V055	Non-Participating Vacant Lot	634214	4749473
V057	Non-Participating Vacant Lot	634216	4749296

Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing
V068	Non-Participating Vacant Lot	633509	4747476
V070	Non-Participating Vacant Lot	633552	4747481
V075	Non-Participating Vacant Lot	633355	4749228
V078	Non-Participating Vacant Lot	631920	4747240
V081	Non-Participating Vacant Lot	632040	4747259
V082	Non-Participating Vacant Lot	632063	4747265
V090	Non-Participating Vacant Lot	631268	4747669
V092	Non-Participating Vacant Lot	631220	4747734
V093	Non-Participating Vacant Lot	631750	4747706
V094	Non-Participating Vacant Lot	631729	4748681
V095	Non-Participating Vacant Lot	630840	4747836
V098	Non-Participating Vacant Lot	630913	4748268
V099	Non-Participating Vacant Lot	630891	4749079
V100	Non-Participating Vacant Lot	630904	4748798
V101	Non-Participating Vacant Lot	629885	4750837
V102	Non-Participating Vacant Lot	630256	4750476
V103	Non-Participating Vacant Lot	631755	4753045
V104	Non-Participating Vacant Lot	631975	4747056
V105	Non-Participating Vacant Lot	632010	4747014
V106	Non-Participating Vacant Lot	632044	4747136
V107	Non-Participating Vacant Lot	632053	4746922
V108	Non-Participating Vacant Lot	632054	4746968
V109	Non-Participating Vacant Lot	632057	4747137
V110	Non-Participating Vacant Lot	632087	4747211
V111	Non-Participating Vacant Lot	632090	4747020
V112	Non-Participating Vacant Lot	632192	4746746
V113	Non-Participating Vacant Lot	632284	4746676
V114	Non-Participating Vacant Lot	632405	4751387
V115	Non-Participating Vacant Lot	632475	4746897
V116	Non-Participating Vacant Lot	632688	4747249
V117	Non-Participating Vacant Lot	633081	4747353
V118	Non-Participating Vacant Lot	633453	4751972
V119	Non-Participating Vacant Lot	633501	4747626
V120	Non-Participating Vacant Lot	633502	4747577
V121	Non-Participating Vacant Lot	633504	4747614
V122	Non-Participating Vacant Lot	633552	4747531
V123	Non-Participating Vacant Lot	633553	4747545
V124	Non-Participating Vacant Lot	633564	4747824
V125	Non-Participating Vacant Lot	633681	4747583
V126	Non-Participating Vacant Lot	633682	4747571
V127	Non-Participating Vacant Lot	634300	4749176
V128	Non-Participating Vacant Lot	634376	4747660
V129	Non-Participating Vacant Lot	634385	4747482
V130	Non-Participating Vacant Lot	634580	4747673
V131	Non-Participating Vacant Lot	632524	4750821

**Table A4: Non-Participating Receptor Locations  
Wainfleet Wind Energy Project**

Point of Reception ID	Description	UTM Coordinates	
		Easting	Westing
PR01	Participating Receptor	631331	4751909
PR02	Participating Receptor	632675	4747582
PR03	Participating Receptor	632684	4747618
PV01	Participating Vacant Lot	631965	4750002

**Table A5: Wind Turbine Noise Impact Summary - Points of Reception**  
**Wainfleet Wind Energy Project**

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R001	Non-Participating Receptor	4.5	923	WTG2	36.3	36.3	36.3	36.3	36.3	40.0	43.0	45.0	49.0	51.0
R002	Non-Participating Receptor	4.5	1071	WTG4	31.5	31.5	31.5	31.5	31.5	40.0	43.0	45.0	49.0	51.0
R003	Non-Participating Receptor	4.5	1073	WTG4	31.5	31.5	31.5	31.5	31.5	40.0	43.0	45.0	49.0	51.0
R004	Non-Participating Receptor	4.5	1034	WTG4	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
R005	Non-Participating Receptor	4.5	1042	WTG4	31.7	31.7	31.7	31.7	31.7	40.0	43.0	45.0	49.0	51.0
R006	Non-Participating Receptor	4.5	1021	WTG4	31.9	31.9	31.9	31.9	31.9	40.0	43.0	45.0	49.0	51.0
R007	Non-Participating Receptor	4.5	1053	WTG4	31.6	31.6	31.6	31.6	31.6	40.0	43.0	45.0	49.0	51.0
R008	Non-Participating Receptor	4.5	1000	WTG4	32.2	32.2	32.2	32.2	32.2	40.0	43.0	45.0	49.0	51.0
R009	Non-Participating Receptor	4.5	876	WTG4	33.5	33.5	33.5	33.5	33.5	40.0	43.0	45.0	49.0	51.0
R010	Non-Participating Receptor	4.5	666	WTG4	36.2	36.2	36.2	36.2	36.2	40.0	43.0	45.0	49.0	51.0
R011	Non-Participating Receptor	4.5	1095	WTG4	31.4	31.4	31.4	31.4	31.4	40.0	43.0	45.0	49.0	51.0
R012	Non-Participating Receptor	4.5	1051	WTG4	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
R013	Non-Participating Receptor	4.5	1039	WTG4	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
R014	Non-Participating Receptor	4.5	1084	WTG4	31.4	31.4	31.4	31.4	31.4	40.0	43.0	45.0	49.0	51.0
R015	Non-Participating Receptor	4.5	637	WTG3	38.2	38.2	38.2	38.2	38.2	40.0	43.0	45.0	49.0	51.0
R016	Non-Participating Receptor	4.5	634	WTG5	37.4	37.4	37.4	37.4	37.4	40.0	43.0	45.0	49.0	51.0
R017	Non-Participating Receptor	4.5	1723	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R018	Non-Participating Receptor	4.5	847	WTG5	35.8	35.8	35.8	35.8	35.8	40.0	43.0	45.0	49.0	51.0
R019	Non-Participating Receptor	4.5	812	WTG4	34.5	34.5	34.5	34.5	34.5	40.0	43.0	45.0	49.0	51.0
R020	Non-Participating Receptor	4.5	941	WTG4	33.0	33.0	33.0	33.0	33.0	40.0	43.0	45.0	49.0	51.0
R021	Non-Participating Receptor	4.5	1053	WTG4	33.6	33.6	33.6	33.6	33.6	40.0	43.0	45.0	49.0	51.0
R022	Non-Participating Receptor	4.5	849	WTG4	33.8	33.8	33.8	33.8	33.8	40.0	43.0	45.0	49.0	51.0
R023	Non-Participating Receptor	4.5	686	WTG4	35.9	35.9	35.9	35.9	35.9	40.0	43.0	45.0	49.0	51.0
R024	Non-Participating Receptor	4.5	1353	WTG4	29.5	29.5	29.5	29.5	29.5	40.0	43.0	45.0	49.0	51.0
R025	Non-Participating Receptor	4.5	1562	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R026	Non-Participating Receptor	4.5	1461	WTG4	29.3	29.3	29.3	29.3	29.3	40.0	43.0	45.0	49.0	51.0
R027	Non-Participating Receptor	4.5	1469	WTG4	29.5	29.5	29.5	29.5	29.5	40.0	43.0	45.0	49.0	51.0
R028	Non-Participating Receptor	4.5	1485	WTG5	29.5	29.5	29.5	29.5	29.5	40.0	43.0	45.0	49.0	51.0
R029	Non-Participating Receptor	4.5	1044	WTG4	31.9	31.9	31.9	31.9	31.9	40.0	43.0	45.0	49.0	51.0
R030	Non-Participating Receptor	4.5	1373	WTG5	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R031	Non-Participating Receptor	4.5	1483	WTG2	31.0	31.0	31.0	31.0	31.0	40.0	43.0	45.0	49.0	51.0
R032	Non-Participating Receptor	4.5	910	WTG5	34.7	34.7	34.7	34.7	34.7	40.0	43.0	45.0	49.0	51.0
R033	Non-Participating Receptor	4.5	1449	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
R034	Non-Participating Receptor	4.5	1222	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
R035	Non-Participating Receptor	4.5	1490	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
R036	Non-Participating Receptor	4.5	852	WTG5	35.2	35.2	35.2	35.2	35.2	40.0	43.0	45.0	49.0	51.0
R037	Non-Participating Receptor	4.5	2009	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R038	Non-Participating Receptor	4.5	2056	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R039	Non-Participating Receptor	4.5	1472	WTG5	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R040	Non-Participating Receptor	4.5	1406	WTG5	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R041	Non-Participating Receptor	4.5	1427	WTG5	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R042	Non-Participating Receptor	4.5	896	WTG4	33.6	33.6	33.6	33.6	33.6	40.0	43.0	45.0	49.0	51.0
R043	Non-Participating Receptor	4.5	1463	WTG5	30.4	30.4	30.4	30.4	30.4	40.0	43.0	45.0	49.0	51.0
R044	Non-Participating Receptor	4.5	1517	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R045	Non-Participating Receptor	4.5	1548	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R046	Non-Participating Receptor	4.5	1542	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R047	Non-Participating Receptor	4.5	1781	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R048	Non-Participating Receptor	4.5	1696	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R049	Non-Participating Receptor	4.5	1732	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R050	Non-Participating Receptor	4.5	2318	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R051	Non-Participating Receptor	4.5	2386	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R052	Non-Participating Receptor	4.5	1579	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R053	Non-Participating Receptor	4.5	1609	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R054	Non-Participating Receptor	4.5	1633	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R055	Non-Participating Receptor	4.5	1295	WTG4	29.8	29.8	29.8	29.8	29.8	40.0	43.0	45.0	49.0	51.0
R056	Non-Participating Receptor	4.5	1215	WTG4	30.4	30.4	30.4	30.4	30.4	40.0	43.0	45.0	49.0	51.0
R057	Non-Participating Receptor	4.5	1844	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R058	Non-Participating Receptor	4.5	1655	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R059	Non-Participating Receptor	4.5	1699	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R060	Non-Participating Receptor	4.5	1684	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R061	Non-Participating Receptor	4.5	1785	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R062	Non-Participating Receptor	4.5	1741	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R063	Non-Participating Receptor	4.5	1814	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R064	Non-Participating Receptor	4.5	1831	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R065	Non-Participating Receptor	4.5	1726	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R066	Non-Participating Receptor	4.5	981	WTG4	32.6	32.6	32.6	32.6	32.6	40.0	43.0	45.0	49.0	51.0
R067	Non-Participating Receptor	4.5	1867	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R068	Non-Participating Receptor	4.5	1870	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R069	Non-Participating Receptor	4.5	2806	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R070	Non-Participating Receptor	4.5	2148	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R071	Non-Participating Receptor	4.5	2140	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R072	Non-Participating Receptor	4.5	2437	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R073	Non-Participating Receptor	4.5	4206	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R074	Non-Participating Receptor	4.5	2296	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R075	Non-Participating Receptor	4.5	2347	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R076	Non-Participating Receptor	4.5	2244	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R077	Non-Participating Receptor	4.5	2498	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R078	Non-Participating Receptor	4.5	2420	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R079	Non-Participating Receptor	4.5	2375	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R080	Non-Participating Receptor	4.5	2551	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R081	Non-Participating Receptor	4.5	2607	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R082	Non-Participating Receptor	4.5	2948	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R083	Non-Participating Receptor	4.5	2670	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R084	Non-Participating Receptor	4.5	2705	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R085	Non-Participating Receptor	4.5	2866	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R086	Non-Participating Receptor	4.5	1890	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R087	Non-Participating Receptor	4.5	1603	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R088	Non-Participating Receptor	4.5	1620	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R089	Non-Participating Receptor	4.5	1585	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R090	Non-Participating Receptor	4.5	1457	WTG3	30.5	30.5	30.5	30.5	30.5	40.0	43.0	45.0	49.0	51.0
R091	Non-Participating Receptor	4.5	845	WTG2	36.4	36.4	36.4	36.4	36.4	40.0	43.0	45.0	49.0	51.0
R092	Non-Participating Receptor	4.5	1510	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R093	Non-Participating Receptor	4.5	1373	WTG3	31.1	31.1	31.1	31.1	31.1	40.0	43.0	45.0	49.0	51.0
R094	Non-Participating Receptor	4.5	1372	WTG3	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
R095	Non-Participating Receptor	4.5	1133	WTG5	34.0	34.0	34.0	34.0	34.0	40.0	43.0	45.0	49.0	51.0
R096	Non-Participating Receptor	4.5	990	WTG3	34.8	34.8	34.8	34.8	34.8	40.0	43.0	45.0	49.0	51.0
R097	Non-Participating Receptor	4.5	1519	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R098	Non-Participating Receptor	4.5	1409	WTG3	30.8	30.8	30.8	30.8	30.8	40.0	43.0	45.0	49.0	51.0
R099	Non-Participating Receptor	4.5	1345	WTG5	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
R100	Non-Participating Receptor	4.5	1326	WTG3	32.0	32.0	32.0	32.0	32.0	40.0	43.0	45.0	49.0	51.0
R101	Non-Participating Receptor	4.5	1365	WTG3	31.9	31.9	31.9	31.9	31.9	40.0	43.0	45.0	49.0	51.0
R102	Non-Participating Receptor	4.5	1234	WTG5	32.6	32.6	32.6	32.6	32.6	40.0	43.0	45.0	49.0	51.0
R103	Non-Participating Receptor	4.5	3681	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R104	Non-Participating Receptor	4.5	4386	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R105	Non-Participating Receptor	4.5	4245	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R106	Non-Participating Receptor	4.5	2850	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R107	Non-Participating Receptor	4.5	2844	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R108	Non-Participating Receptor	4.5	2843	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R109	Non-Participating Receptor	4.5	3738	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R110	Non-Participating Receptor	4.5	631	WTG3	38.1	38.1	38.1	38.1	38.1	40.0	43.0	45.0	49.0	51.0
R111	Non-Participating Receptor	4.5	701	WTG3	37.3	37.3	37.3	37.3	37.3	40.0	43.0	45.0	49.0	51.0
R112	Non-Participating Receptor	4.5	3129	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R113	Non-Participating Receptor	4.5	696	WTG3	37.3	37.3	37.3	37.3	37.3	40.0	43.0	45.0	49.0	51.0
R114	Non-Participating Receptor	4.5	728	WTG3	37.0	37.0	37.0	37.0	37.0	40.0	43.0	45.0	49.0	51.0
R115	Non-Participating Receptor	4.5	893	WTG3	35.5	35.5	35.5	35.5	35.5	40.0	43.0	45.0	49.0	51.0
R117	Non-Participating Receptor	4.5	583	WTG3	38.5	38.5	38.5	38.5	38.5	40.0	43.0	45.0	49.0	51.0
R118	Non-Participating Receptor	4.5	599	WTG3	39.6	39.6	39.6	39.6	39.6	40.0	43.0	45.0	49.0	51.0
R119	Non-Participating Receptor	4.5	1116	WTG3	34.4	34.4	34.4	34.4	34.4	40.0	43.0	45.0	49.0	51.0
R120	Non-Participating Receptor	4.5	622	WTG3	39.2	39.2	39.2	39.2	39.2	40.0	43.0	45.0	49.0	51.0
R122	Non-Participating Receptor	4.5	2458	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R123	Non-Participating Receptor	4.5	3019	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R124	Non-Participating Receptor	4.5	3090	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R125	Non-Participating Receptor	4.5	4292	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R126	Non-Participating Receptor	4.5	2842	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R127	Non-Participating Receptor	4.5	2843	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R128	Non-Participating Receptor	4.5	2841	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R129	Non-Participating Receptor	4.5	4533	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R130	Non-Participating Receptor	4.5	2855	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R131	Non-Participating Receptor	4.5	2862	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R132	Non-Participating Receptor	4.5	2861	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R133	Non-Participating Receptor	4.5	3105	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R134	Non-Participating Receptor	4.5	3001	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R135	Non-Participating Receptor	4.5	1603	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R136	Non-Participating Receptor	4.5	1210	WTG5	32.9	32.9	32.9	32.9	32.9	40.0	43.0	45.0	49.0	51.0
R137	Non-Participating Receptor	4.5	1067	WTG3	34.3	34.3	34.3	34.3	34.3	40.0	43.0	45.0	49.0	51.0
R138	Non-Participating Receptor	4.5	960	WTG3	34.8	34.8	34.8	34.8	34.8	40.0	43.0	45.0	49.0	51.0
R139	Non-Participating Receptor	4.5	2561	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R140	Non-Participating Receptor	4.5	2777	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R141	Non-Participating Receptor	4.5	2802	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R142	Non-Participating Receptor	4.5	615	WTG3	38.2	38.2	38.2	38.2	38.2	40.0	43.0	45.0	49.0	51.0
R143	Non-Participating Receptor	4.5	632	WTG3	38.1	38.1	38.1	38.1	38.1	40.0	43.0	45.0	49.0	51.0
R144	Non-Participating Receptor	4.5	620	WTG3	38.3	38.3	38.3	38.3	38.3	40.0	43.0	45.0	49.0	51.0
R145	Non-Participating Receptor	4.5	900	WTG3	35.5	35.5	35.5	35.5	35.5	40.0	43.0	45.0	49.0	51.0
R146	Non-Participating Receptor	4.5	848	WTG3	35.8	35.8	35.8	35.8	35.8	40.0	43.0	45.0	49.0	51.0
R147	Non-Participating Receptor	4.5	928	WTG3	35.2	35.2	35.2	35.2	35.2	40.0	43.0	45.0	49.0	51.0
R148	Non-Participating Receptor	4.5	2788	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R149	Non-Participating Receptor	4.5	2790	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R150	Non-Participating Receptor	4.5	2762	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R151	Non-Participating Receptor	4.5	2586	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R152	Non-Participating Receptor	4.5	5027	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R153	Non-Participating Receptor	4.5	2726	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R154	Non-Participating Receptor	4.5	2664	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R155	Non-Participating Receptor	4.5	787	WTG3	36.5	36.5	36.5	36.5	36.5	40.0	43.0	45.0	49.0	51.0
R156	Non-Participating Receptor	4.5	1779	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R157	Non-Participating Receptor	4.5	1054	WTG5	34.1	34.1	34.1	34.1	34.1	40.0	43.0	45.0	49.0	51.0
R158	Non-Participating Receptor	4.5	2075	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R159	Non-Participating Receptor	4.5	1527	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R160	Non-Participating Receptor	4.5	1644	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R161	Non-Participating Receptor	4.5	1478	WTG3	30.8	30.8	30.8	30.8	30.8	40.0	43.0	45.0	49.0	51.0
R162	Non-Participating Receptor	4.5	2422	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R163	Non-Participating Receptor	4.5	2391	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R164	Non-Participating Receptor	4.5	1203	WTG2	33.1	33.1	33.1	33.1	33.1	40.0	43.0	45.0	49.0	51.0
R165	Non-Participating Receptor	4.5	748	WTG3	36.8	36.8	36.8	36.8	36.8	40.0	43.0	45.0	49.0	51.0
R166	Non-Participating Receptor	4.5	1768	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R167	Non-Participating Receptor	4.5	1694	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R168	Non-Participating Receptor	4.5	2230	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R169	Non-Participating Receptor	4.5	1322	WTG2	35.6	35.6	35.6	35.6	35.6	40.0	43.0	45.0	49.0	51.0
R170	Non-Participating Receptor	4.5	2156	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R171	Non-Participating Receptor	4.5	2439	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R172	Non-Participating Receptor	4.5	1412	WTG2	34.7	34.7	34.7	34.7	34.7	40.0	43.0	45.0	49.0	51.0
R173	Non-Participating Receptor	4.5	2228	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R174	Non-Participating Receptor	4.5	2289	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R175	Non-Participating Receptor	4.5	2395	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R176	Non-Participating Receptor	4.5	1104	WTG3	34.3	34.3	34.3	34.3	34.3	40.0	43.0	45.0	49.0	51.0
R177	Non-Participating Receptor	4.5	781	WTG3	36.5	36.5	36.5	36.5	36.5	40.0	43.0	45.0	49.0	51.0
R178	Non-Participating Receptor	4.5	900	WTG3	35.5	35.5	35.5	35.5	35.5	40.0	43.0	45.0	49.0	51.0
R179	Non-Participating Receptor	4.5	2151	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R180	Non-Participating Receptor	4.5	872	WTG3	35.7	35.7	35.7	35.7	35.7	40.0	43.0	45.0	49.0	51.0
R181	Non-Participating Receptor	4.5	2653	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R182	Non-Participating Receptor	4.5	1178	WTG2	35.5	35.5	35.5	35.5	35.5	40.0	43.0	45.0	49.0	51.0
R183	Non-Participating Receptor	4.5	2115	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R185	Non-Participating Receptor	4.5	2395	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R186	Non-Participating Receptor	4.5	1885	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R187	Non-Participating Receptor	4.5	922	WTG4	33.2	33.2	33.2	33.2	33.2	40.0	43.0	45.0	49.0	51.0
R188	Non-Participating Receptor	4.5	1787	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R189	Non-Participating Receptor	4.5	1165	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R190	Non-Participating Receptor	4.5	1182	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R191	Non-Participating Receptor	4.5	1204	WTG4	30.5	30.5	30.5	30.5	30.5	40.0	43.0	45.0	49.0	51.0
R192	Non-Participating Receptor	4.5	1931	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R193	Non-Participating Receptor	4.5	1124	WTG4	31.0	31.0	31.0	31.0	31.0	40.0	43.0	45.0	49.0	51.0
R194	Non-Participating Receptor	4.5	2690	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R195	Non-Participating Receptor	4.5	2290	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R196	Non-Participating Receptor	4.5	1927	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R197	Non-Participating Receptor	4.5	2248	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R198	Non-Participating Receptor	4.5	2432	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R199	Non-Participating Receptor	4.5	2604	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R200	Non-Participating Receptor	4.5	2181	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R201	Non-Participating Receptor	4.5	4419	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R202	Non-Participating Receptor	4.5	2278	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R203	Non-Participating Receptor	4.5	1916	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R204	Non-Participating Receptor	4.5	1920	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R205	Non-Participating Receptor	4.5	1911	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R206	Non-Participating Receptor	4.5	3503	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R207	Non-Participating Receptor	4.5	3171	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R208	Non-Participating Receptor	4.5	2920	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R209	Non-Participating Receptor	4.5	2931	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R210	Non-Participating Receptor	4.5	1856	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R211	Non-Participating Receptor	4.5	1870	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R212	Non-Participating Receptor	4.5	1897	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R213	Non-Participating Receptor	4.5	1960	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R214	Non-Participating Receptor	4.5	2009	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R215	Non-Participating Receptor	4.5	2099	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R216	Non-Participating Receptor	4.5	1283	WTG4	29.8	29.8	29.8	29.8	29.8	40.0	43.0	45.0	49.0	51.0
R217	Non-Participating Receptor	4.5	2230	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R218	Non-Participating Receptor	4.5	2001	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R219	Non-Participating Receptor	4.5	2040	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R220	Non-Participating Receptor	4.5	1316	WTG4	29.6	29.6	29.6	29.6	29.6	40.0	43.0	45.0	49.0	51.0
R221	Non-Participating Receptor	4.5	2058	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R222	Non-Participating Receptor	4.5	2387	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R223	Non-Participating Receptor	4.5	3900	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R224	Non-Participating Receptor	4.5	2100	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R225	Non-Participating Receptor	4.5	2144	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R226	Non-Participating Receptor	4.5	2217	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R227	Non-Participating Receptor	4.5	2200	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R228	Non-Participating Receptor	4.5	2268	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R229	Non-Participating Receptor	4.5	2164	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R230	Non-Participating Receptor	4.5	2317	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R231	Non-Participating Receptor	4.5	2453	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R232	Non-Participating Receptor	4.5	4240	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R233	Non-Participating Receptor	4.5	2977	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R234	Non-Participating Receptor	4.5	2500	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R235	Non-Participating Receptor	4.5	2588	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R236	Non-Participating Receptor	4.5	2362	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R237	Non-Participating Receptor	4.5	2414	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R238	Non-Participating Receptor	4.5	3413	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R239	Non-Participating Receptor	4.5	3529	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R240	Non-Participating Receptor	4.5	3637	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R241	Non-Participating Receptor	4.5	3751	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R242	Non-Participating Receptor	4.5	3779	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R243	Non-Participating Receptor	4.5	2918	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R244	Non-Participating Receptor	4.5	2595	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R245	Non-Participating Receptor	4.5	2877	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R246	Non-Participating Receptor	4.5	2875	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R247	Non-Participating Receptor	4.5	2986	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R248	Non-Participating Receptor	4.5	2975	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R249	Non-Participating Receptor	4.5	3030	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R250	Non-Participating Receptor	4.5	3441	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R251	Non-Participating Receptor	4.5	3485	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R252	Non-Participating Receptor	4.5	3368	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R253	Non-Participating Receptor	4.5	3359	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R254	Non-Participating Receptor	4.5	3322	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R255	Non-Participating Receptor	4.5	3346	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R256	Non-Participating Receptor	4.5	3279	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R257	Non-Participating Receptor	4.5	3299	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R258	Non-Participating Receptor	4.5	3468	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R259	Non-Participating Receptor	4.5	2770	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R260	Non-Participating Receptor	4.5	3525	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R261	Non-Participating Receptor	4.5	3560	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R262	Non-Participating Receptor	4.5	3584	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R263	Non-Participating Receptor	4.5	3619	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R264	Non-Participating Receptor	4.5	3634	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R265	Non-Participating Receptor	4.5	3813	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R266	Non-Participating Receptor	4.5	1941	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R267	Non-Participating Receptor	4.5	1379	WTG2	31.7	31.7	31.7	31.7	31.7	40.0	43.0	45.0	49.0	51.0
R268	Non-Participating Receptor	4.5	1530	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R269	Non-Participating Receptor	4.5	3534	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R270	Non-Participating Receptor	4.5	2649	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R271	Non-Participating Receptor	4.5	3525	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R272	Non-Participating Receptor	4.5	2296	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R273	Non-Participating Receptor	4.5	2282	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R274	Non-Participating Receptor	4.5	3521	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R275	Non-Participating Receptor	4.5	2591	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R276	Non-Participating Receptor	4.5	1530	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R277	Non-Participating Receptor	4.5	3357	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R278	Non-Participating Receptor	4.5	2414	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R279	Non-Participating Receptor	4.5	3504	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R280	Non-Participating Receptor	4.5	3183	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R281	Non-Participating Receptor	4.5	2295	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R282	Non-Participating Receptor	4.5	2097	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R283	Non-Participating Receptor	4.5	4031	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R284	Non-Participating Receptor	4.5	4367	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R285	Non-Participating Receptor	4.5	3997	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R286	Non-Participating Receptor	4.5	4590	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R287	Non-Participating Receptor	4.5	4206	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R288	Non-Participating Receptor	4.5	2936	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R289	Non-Participating Receptor	4.5	4433	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R290	Non-Participating Receptor	4.5	4893	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R291	Non-Participating Receptor	4.5	4836	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R292	Non-Participating Receptor	4.5	2832	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R293	Non-Participating Receptor	4.5	3035	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R294	Non-Participating Receptor	4.5	2994	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R295	Non-Participating Receptor	4.5	2728	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R296	Non-Participating Receptor	4.5	3536	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R297	Non-Participating Receptor	4.5	4139	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R298	Non-Participating Receptor	4.5	2794	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R299	Non-Participating Receptor	4.5	3706	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R300	Non-Participating Receptor	4.5	3582	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R301	Non-Participating Receptor	4.5	4300	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R302	Non-Participating Receptor	4.5	3885	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R303	Non-Participating Receptor	4.5	756	WTG3	36.5	36.5	36.5	36.5	36.5	40.0	43.0	45.0	49.0	51.0
R304	Non-Participating Receptor	4.5	999	WTG4	32.2	32.2	32.2	32.2	32.2	40.0	43.0	45.0	49.0	51.0
R305	Non-Participating Receptor	4.5	1048	WTG4	31.7	31.7	31.7	31.7	31.7	40.0	43.0	45.0	49.0	51.0
R306	Non-Participating Receptor	4.5	1049	WTG4	31.7	31.7	31.7	31.7	31.7	40.0	43.0	45.0	49.0	51.0
R307	Non-Participating Receptor	4.5	1130	WTG4	31.0	31.0	31.0	31.0	31.0	40.0	43.0	45.0	49.0	51.0
R308	Non-Participating Receptor	4.5	1223	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
R309	Non-Participating Receptor	4.5	1088	WTG4	31.4	31.4	31.4	31.4	31.4	40.0	43.0	45.0	49.0	51.0
R310	Non-Participating Receptor	4.5	1290	WTG4	29.7	29.7	29.7	29.7	29.7	40.0	43.0	45.0	49.0	51.0
R311	Non-Participating Receptor	4.5	1233	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R312	Non-Participating Receptor	4.5	1432	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R313	Non-Participating Receptor	4.5	1090	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
R314	Non-Participating Receptor	4.5	1066	WTG4	31.6	31.6	31.6	31.6	31.6	40.0	43.0	45.0	49.0	51.0
R315	Non-Participating Receptor	4.5	1096	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
R316	Non-Participating Receptor	4.5	1175	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R317	Non-Participating Receptor	4.5	1046	WTG4	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
R318	Non-Participating Receptor	4.5	1109	WTG4	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
R319	Non-Participating Receptor	4.5	1170	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R320	Non-Participating Receptor	4.5	1253	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R321	Non-Participating Receptor	4.5	1171	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R322	Non-Participating Receptor	4.5	1747	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R323	Non-Participating Receptor	4.5	1722	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R324	Non-Participating Receptor	4.5	1666	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R325	Non-Participating Receptor	4.5	1834	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R326	Non-Participating Receptor	4.5	1855	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R327	Non-Participating Receptor	4.5	1774	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R328	Non-Participating Receptor	4.5	1734	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R329	Non-Participating Receptor	4.5	1616	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R330	Non-Participating Receptor	4.5	1831	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R331	Non-Participating Receptor	4.5	1769	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R332	Non-Participating Receptor	4.5	1311	WTG5	32.1	32.1	32.1	32.1	32.1	40.0	43.0	45.0	49.0	51.0
R333	Non-Participating Receptor	4.5	1442	WTG3	31.6	31.6	31.6	31.6	31.6	40.0	43.0	45.0	49.0	51.0
R336	Non-Participating Receptor	4.5	4427	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R337	Non-Participating Receptor	4.5	2016	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R338	Non-Participating Receptor	4.5	2030	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R339	Non-Participating Receptor	4.5	2012	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R340	Non-Participating Receptor	4.5	1993	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R341	Non-Participating Receptor	4.5	1975	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R342	Non-Participating Receptor	4.5	1956	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R343	Non-Participating Receptor	4.5	1944	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R344	Non-Participating Receptor	4.5	1924	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R345	Non-Participating Receptor	4.5	1882	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R346	Non-Participating Receptor	4.5	1886	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R347	Non-Participating Receptor	4.5	1887	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R348	Non-Participating Receptor	4.5	1890	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R349	Non-Participating Receptor	4.5	1892	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R350	Non-Participating Receptor	4.5	1894	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R351	Non-Participating Receptor	4.5	1900	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R352	Non-Participating Receptor	4.5	1887	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R353	Non-Participating Receptor	4.5	1889	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R354	Non-Participating Receptor	4.5	1884	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R355	Non-Participating Receptor	4.5	1878	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R356	Non-Participating Receptor	4.5	1873	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R357	Non-Participating Receptor	4.5	1865	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R358	Non-Participating Receptor	4.5	1859	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R359	Non-Participating Receptor	4.5	1875	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R360	Non-Participating Receptor	4.5	1870	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R361	Non-Participating Receptor	4.5	1865	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R362	Non-Participating Receptor	4.5	1860	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R363	Non-Participating Receptor	4.5	1856	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R364	Non-Participating Receptor	4.5	1863	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R365	Non-Participating Receptor	4.5	1851	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R366	Non-Participating Receptor	4.5	1856	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R367	Non-Participating Receptor	4.5	1832	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R368	Non-Participating Receptor	4.5	1850	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R369	Non-Participating Receptor	4.5	1825	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R370	Non-Participating Receptor	4.5	1847	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R371	Non-Participating Receptor	4.5	1842	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R372	Non-Participating Receptor	4.5	1807	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R373	Non-Participating Receptor	4.5	1838	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R374	Non-Participating Receptor	4.5	1834	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R375	Non-Participating Receptor	4.5	1807	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R376	Non-Participating Receptor	4.5	1829	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R377	Non-Participating Receptor	4.5	1803	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R378	Non-Participating Receptor	4.5	1826	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R379	Non-Participating Receptor	4.5	1796	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R380	Non-Participating Receptor	4.5	1816	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R381	Non-Participating Receptor	4.5	1791	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R382	Non-Participating Receptor	4.5	1780	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R383	Non-Participating Receptor	4.5	1810	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R384	Non-Participating Receptor	4.5	1784	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R385	Non-Participating Receptor	4.5	1805	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R386	Non-Participating Receptor	4.5	1775	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R387	Non-Participating Receptor	4.5	1793	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R388	Non-Participating Receptor	4.5	1784	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R389	Non-Participating Receptor	4.5	1770	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R390	Non-Participating Receptor	4.5	1762	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R391	Non-Participating Receptor	4.5	1756	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R392	Non-Participating Receptor	4.5	1724	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R393	Non-Participating Receptor	4.5	1753	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R394	Non-Participating Receptor	4.5	1747	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R395	Non-Participating Receptor	4.5	1709	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R396	Non-Participating Receptor	4.5	1730	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R397	Non-Participating Receptor	4.5	1703	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R398	Non-Participating Receptor	4.5	1729	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R399	Non-Participating Receptor	4.5	1720	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R400	Non-Participating Receptor	4.5	1730	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R401	Non-Participating Receptor	4.5	1710	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R402	Non-Participating Receptor	4.5	1735	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R403	Non-Participating Receptor	4.5	1703	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R404	Non-Participating Receptor	4.5	1687	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R405	Non-Participating Receptor	4.5	1693	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R406	Non-Participating Receptor	4.5	1729	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R407	Non-Participating Receptor	4.5	1685	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R408	Non-Participating Receptor	4.5	1675	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R409	Non-Participating Receptor	4.5	1727	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R410	Non-Participating Receptor	4.5	1688	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R411	Non-Participating Receptor	4.5	1698	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R412	Non-Participating Receptor	4.5	1660	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R413	Non-Participating Receptor	4.5	1701	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R414	Non-Participating Receptor	4.5	1652	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R415	Non-Participating Receptor	4.5	1695	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R416	Non-Participating Receptor	4.5	1666	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R417	Non-Participating Receptor	4.5	1701	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R418	Non-Participating Receptor	4.5	1673	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R419	Non-Participating Receptor	4.5	1695	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R420	Non-Participating Receptor	4.5	1656	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R421	Non-Participating Receptor	4.5	1693	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R422	Non-Participating Receptor	4.5	1672	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R423	Non-Participating Receptor	4.5	1687	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R424	Non-Participating Receptor	4.5	1662	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R425	Non-Participating Receptor	4.5	1652	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R426	Non-Participating Receptor	4.5	1684	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R427	Non-Participating Receptor	4.5	1641	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R428	Non-Participating Receptor	4.5	1628	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R429	Non-Participating Receptor	4.5	1669	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R430	Non-Participating Receptor	4.5	1640	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R431	Non-Participating Receptor	4.5	1616	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R432	Non-Participating Receptor	4.5	1644	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R433	Non-Participating Receptor	4.5	1663	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R434	Non-Participating Receptor	4.5	1619	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R435	Non-Participating Receptor	4.5	1613	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R436	Non-Participating Receptor	4.5	1653	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R437	Non-Participating Receptor	4.5	1660	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R438	Non-Participating Receptor	4.5	1659	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R439	Non-Participating Receptor	4.5	1633	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R440	Non-Participating Receptor	4.5	1653	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R441	Non-Participating Receptor	4.5	1630	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R442	Non-Participating Receptor	4.5	1615	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R443	Non-Participating Receptor	4.5	1652	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R444	Non-Participating Receptor	4.5	1621	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R445	Non-Participating Receptor	4.5	1651	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R446	Non-Participating Receptor	4.5	1620	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R447	Non-Participating Receptor	4.5	1593	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R448	Non-Participating Receptor	4.5	1627	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R449	Non-Participating Receptor	4.5	1589	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R450	Non-Participating Receptor	4.5	1615	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R451	Non-Participating Receptor	4.5	1643	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R452	Non-Participating Receptor	4.5	1613	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R453	Non-Participating Receptor	4.5	1585	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R454	Non-Participating Receptor	4.5	1582	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R455	Non-Participating Receptor	4.5	1639	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R456	Non-Participating Receptor	4.5	1610	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R457	Non-Participating Receptor	4.5	1579	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R458	Non-Participating Receptor	4.5	1612	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R459	Non-Participating Receptor	4.5	1634	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R460	Non-Participating Receptor	4.5	1576	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R461	Non-Participating Receptor	4.5	1573	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R462	Non-Participating Receptor	4.5	1573	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R463	Non-Participating Receptor	4.5	1611	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R464	Non-Participating Receptor	4.5	1602	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R465	Non-Participating Receptor	4.5	1569	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R466	Non-Participating Receptor	4.5	1590	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R467	Non-Participating Receptor	4.5	1569	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R468	Non-Participating Receptor	4.5	1599	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R469	Non-Participating Receptor	4.5	1626	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R470	Non-Participating Receptor	4.5	1588	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R471	Non-Participating Receptor	4.5	1566	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R472	Non-Participating Receptor	4.5	1563	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R473	Non-Participating Receptor	4.5	1561	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R474	Non-Participating Receptor	4.5	1556	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R475	Non-Participating Receptor	4.5	1582	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R476	Non-Participating Receptor	4.5	1615	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R477	Non-Participating Receptor	4.5	1555	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R478	Non-Participating Receptor	4.5	1578	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R479	Non-Participating Receptor	4.5	1612	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R480	Non-Participating Receptor	4.5	1553	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R481	Non-Participating Receptor	4.5	1609	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R482	Non-Participating Receptor	4.5	1553	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R483	Non-Participating Receptor	4.5	1587	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R484	Non-Participating Receptor	4.5	1610	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R485	Non-Participating Receptor	4.5	1566	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R486	Non-Participating Receptor	4.5	1610	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R487	Non-Participating Receptor	4.5	1562	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R488	Non-Participating Receptor	4.5	1583	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R489	Non-Participating Receptor	4.5	1546	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R490	Non-Participating Receptor	4.5	1601	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R491	Non-Participating Receptor	4.5	1600	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R492	Non-Participating Receptor	4.5	1550	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R493	Non-Participating Receptor	4.5	1609	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R494	Non-Participating Receptor	4.5	1545	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R495	Non-Participating Receptor	4.5	1604	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R496	Non-Participating Receptor	4.5	1555	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R497	Non-Participating Receptor	4.5	1570	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R498	Non-Participating Receptor	4.5	1580	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R499	Non-Participating Receptor	4.5	1601	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R500	Non-Participating Receptor	4.5	1604	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R501	Non-Participating Receptor	4.5	1560	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R502	Non-Participating Receptor	4.5	1577	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R503	Non-Participating Receptor	4.5	1602	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R504	Non-Participating Receptor	4.5	1535	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R505	Non-Participating Receptor	4.5	1604	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R506	Non-Participating Receptor	4.5	1539	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R507	Non-Participating Receptor	4.5	1574	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R508	Non-Participating Receptor	4.5	1604	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R509	Non-Participating Receptor	4.5	1576	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R510	Non-Participating Receptor	4.5	1555	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R511	Non-Participating Receptor	4.5	1531	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R512	Non-Participating Receptor	4.5	1603	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R513	Non-Participating Receptor	4.5	1535	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R514	Non-Participating Receptor	4.5	1549	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R515	Non-Participating Receptor	4.5	1602	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R516	Non-Participating Receptor	4.5	1605	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R517	Non-Participating Receptor	4.5	1531	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R518	Non-Participating Receptor	4.5	1570	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R519	Non-Participating Receptor	4.5	1607	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R520	Non-Participating Receptor	4.5	1548	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R521	Non-Participating Receptor	4.5	1598	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R522	Non-Participating Receptor	4.5	1570	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R523	Non-Participating Receptor	4.5	1599	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R524	Non-Participating Receptor	4.5	1611	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R525	Non-Participating Receptor	4.5	1376	WTG4	29.3	29.3	29.3	29.3	29.3	40.0	43.0	45.0	49.0	51.0
R526	Non-Participating Receptor	4.5	1523	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R527	Non-Participating Receptor	4.5	1512	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R528	Non-Participating Receptor	4.5	1534	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R529	Non-Participating Receptor	4.5	1542	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R530	Non-Participating Receptor	4.5	1554	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R531	Non-Participating Receptor	4.5	1563	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R532	Non-Participating Receptor	4.5	1613	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R533	Non-Participating Receptor	4.5	1614	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R534	Non-Participating Receptor	4.5	1520	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R535	Non-Participating Receptor	4.5	1491	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R536	Non-Participating Receptor	4.5	1606	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R537	Non-Participating Receptor	4.5	1566	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R538	Non-Participating Receptor	4.5	1621	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R539	Non-Participating Receptor	4.5	1513	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R540	Non-Participating Receptor	4.5	1540	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R541	Non-Participating Receptor	4.5	1482	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R542	Non-Participating Receptor	4.5	1608	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R543	Non-Participating Receptor	4.5	1475	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R544	Non-Participating Receptor	4.5	1539	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R545	Non-Participating Receptor	4.5	1560	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R546	Non-Participating Receptor	4.5	1504	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R547	Non-Participating Receptor	4.5	1610	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R548	Non-Participating Receptor	4.5	1469	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R549	Non-Participating Receptor	4.5	1555	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R550	Non-Participating Receptor	4.5	1523	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R551	Non-Participating Receptor	4.5	1572	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R552	Non-Participating Receptor	4.5	1617	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R553	Non-Participating Receptor	4.5	1626	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R554	Non-Participating Receptor	4.5	1461	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R555	Non-Participating Receptor	4.5	1632	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R556	Non-Participating Receptor	4.5	1575	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R557	Non-Participating Receptor	4.5	1546	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R558	Non-Participating Receptor	4.5	1638	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R559	Non-Participating Receptor	4.5	1647	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R560	Non-Participating Receptor	4.5	1658	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R561	Non-Participating Receptor	4.5	1665	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R562	Non-Participating Receptor	4.5	1539	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R563	Non-Participating Receptor	4.5	1669	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R564	Non-Participating Receptor	4.5	1507	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R565	Non-Participating Receptor	4.5	1678	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R566	Non-Participating Receptor	4.5	1690	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R567	Non-Participating Receptor	4.5	1448	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R568	Non-Participating Receptor	4.5	1700	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R569	Non-Participating Receptor	4.5	1477	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R570	Non-Participating Receptor	4.5	1570	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R571	Non-Participating Receptor	4.5	1706	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R572	Non-Participating Receptor	4.5	1532	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R573	Non-Participating Receptor	4.5	1713	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R574	Non-Participating Receptor	4.5	1583	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R575	Non-Participating Receptor	4.5	1663	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R576	Non-Participating Receptor	4.5	1718	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R577	Non-Participating Receptor	4.5	1490	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R578	Non-Participating Receptor	4.5	1460	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R579	Non-Participating Receptor	4.5	1520	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R580	Non-Participating Receptor	4.5	1598	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R581	Non-Participating Receptor	4.5	1731	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R582	Non-Participating Receptor	4.5	1605	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R583	Non-Participating Receptor	4.5	1739	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R584	Non-Participating Receptor	4.5	1482	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R585	Non-Participating Receptor	4.5	1622	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R586	Non-Participating Receptor	4.5	1580	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R587	Non-Participating Receptor	4.5	1629	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R588	Non-Participating Receptor	4.5	1507	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R589	Non-Participating Receptor	4.5	1476	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R590	Non-Participating Receptor	4.5	1420	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
R591	Non-Participating Receptor	4.5	1637	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R592	Non-Participating Receptor	4.5	1645	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R593	Non-Participating Receptor	4.5	1741	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R594	Non-Participating Receptor	4.5	1656	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R595	Non-Participating Receptor	4.5	1470	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R596	Non-Participating Receptor	4.5	1661	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R597	Non-Participating Receptor	4.5	1495	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R598	Non-Participating Receptor	4.5	1670	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R599	Non-Participating Receptor	4.5	1680	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R600	Non-Participating Receptor	4.5	1754	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R601	Non-Participating Receptor	4.5	1763	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R602	Non-Participating Receptor	4.5	1459	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R603	Non-Participating Receptor	4.5	1685	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R604	Non-Participating Receptor	4.5	1522	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R605	Non-Participating Receptor	4.5	1481	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R606	Non-Participating Receptor	4.5	1393	WTG4	29.0	29.0	29.0	29.0	29.0	40.0	43.0	45.0	49.0	51.0
R607	Non-Participating Receptor	4.5	1761	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R608	Non-Participating Receptor	4.5	1695	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R609	Non-Participating Receptor	4.5	1767	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R610	Non-Participating Receptor	4.5	1445	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R611	Non-Participating Receptor	4.5	1388	WTG4	29.1	29.1	29.1	29.1	29.1	40.0	43.0	45.0	49.0	51.0
R612	Non-Participating Receptor	4.5	1712	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R613	Non-Participating Receptor	4.5	1789	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R614	Non-Participating Receptor	4.5	1470	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R615	Non-Participating Receptor	4.5	1409	WTG4	28.9	28.9	28.9	28.9	28.9	40.0	43.0	45.0	49.0	51.0
R616	Non-Participating Receptor	4.5	1374	WTG4	29.1	29.1	29.1	29.1	29.1	40.0	43.0	45.0	49.0	51.0
R617	Non-Participating Receptor	4.5	1507	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R618	Non-Participating Receptor	4.5	1488	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R619	Non-Participating Receptor	4.5	1546	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R620	Non-Participating Receptor	4.5	1566	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R621	Non-Participating Receptor	4.5	1595	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R622	Non-Participating Receptor	4.5	1663	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R623	Non-Participating Receptor	4.5	1647	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R624	Non-Participating Receptor	4.5	1720	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R625	Non-Participating Receptor	4.5	1784	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R626	Non-Participating Receptor	4.5	1795	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R627	Non-Participating Receptor	4.5	1401	WTG4	28.9	28.9	28.9	28.9	28.9	40.0	43.0	45.0	49.0	51.0
R628	Non-Participating Receptor	4.5	1386	WTG4	29.0	29.0	29.0	29.0	29.0	40.0	43.0	45.0	49.0	51.0
R629	Non-Participating Receptor	4.5	1418	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
R630	Non-Participating Receptor	4.5	1488	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R631	Non-Participating Receptor	4.5	1639	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R632	Non-Participating Receptor	4.5	1580	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R633	Non-Participating Receptor	4.5	1607	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R634	Non-Participating Receptor	4.5	1617	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R635	Non-Participating Receptor	4.5	1472	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R636	Non-Participating Receptor	4.5	1549	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R637	Non-Participating Receptor	4.5	1628	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R638	Non-Participating Receptor	4.5	1660	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R639	Non-Participating Receptor	4.5	1732	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R640	Non-Participating Receptor	4.5	1690	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R641	Non-Participating Receptor	4.5	1798	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R642	Non-Participating Receptor	4.5	1797	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R643	Non-Participating Receptor	4.5	1804	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R644	Non-Participating Receptor	4.5	1805	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R645	Non-Participating Receptor	4.5	1802	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R646	Non-Participating Receptor	4.5	1804	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R647	Non-Participating Receptor	4.5	1805	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R648	Non-Participating Receptor	4.5	1805	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R649	Non-Participating Receptor	4.5	1798	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R650	Non-Participating Receptor	4.5	1277	WTG4	29.8	29.8	29.8	29.8	29.8	40.0	43.0	45.0	49.0	51.0
R651	Non-Participating Receptor	4.5	1782	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R652	Non-Participating Receptor	4.5	1248	WTG4	30.0	30.0	30.0	30.0	30.0	40.0	43.0	45.0	49.0	51.0
R653	Non-Participating Receptor	4.5	1774	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R654	Non-Participating Receptor	4.5	1711	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R655	Non-Participating Receptor	4.5	1762	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R656	Non-Participating Receptor	4.5	2291	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R657	Non-Participating Receptor	4.5	1739	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R658	Non-Participating Receptor	4.5	1176	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R659	Non-Participating Receptor	4.5	1224	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R660	Non-Participating Receptor	4.5	1721	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R661	Non-Participating Receptor	4.5	1212	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
R662	Non-Participating Receptor	4.5	1705	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R663	Non-Participating Receptor	4.5	1622	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R664	Non-Participating Receptor	4.5	1700	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R665	Non-Participating Receptor	4.5	1688	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R666	Non-Participating Receptor	4.5	1598	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R667	Non-Participating Receptor	4.5	1672	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R668	Non-Participating Receptor	4.5	1660	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R669	Non-Participating Receptor	4.5	1573	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R670	Non-Participating Receptor	4.5	1652	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R671	Non-Participating Receptor	4.5	1542	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R672	Non-Participating Receptor	4.5	1641	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R673	Non-Participating Receptor	4.5	1631	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R674	Non-Participating Receptor	4.5	1621	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R675	Non-Participating Receptor	4.5	1609	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R676	Non-Participating Receptor	4.5	1599	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R677	Non-Participating Receptor	4.5	1177	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R678	Non-Participating Receptor	4.5	1491	WTG4	28.1	28.1	28.1	28.1	28.1	40.0	43.0	45.0	49.0	51.0
R679	Non-Participating Receptor	4.5	1577	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R680	Non-Participating Receptor	4.5	1550	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R681	Non-Participating Receptor	4.5	884	WTG5	35.7	35.7	35.7	35.7	35.7	40.0	43.0	45.0	49.0	51.0
R682	Non-Participating Receptor	4.5	1540	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R683	Non-Participating Receptor	4.5	1528	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R684	Non-Participating Receptor	4.5	1415	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R685	Non-Participating Receptor	4.5	1515	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R686	Non-Participating Receptor	4.5	1502	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R687	Non-Participating Receptor	4.5	1491	WTG4	28.1	28.1	28.1	28.1	28.1	40.0	43.0	45.0	49.0	51.0
R688	Non-Participating Receptor	4.5	1362	WTG4	29.0	29.0	29.0	29.0	29.0	40.0	43.0	45.0	49.0	51.0
R689	Non-Participating Receptor	4.5	1485	WTG4	28.1	28.1	28.1	28.1	28.1	40.0	43.0	45.0	49.0	51.0
R690	Non-Participating Receptor	4.5	1474	WTG4	28.2	28.2	28.2	28.2	28.2	40.0	43.0	45.0	49.0	51.0
R691	Non-Participating Receptor	4.5	1461	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R692	Non-Participating Receptor	4.5	1159	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R693	Non-Participating Receptor	4.5	1305	WTG4	29.5	29.5	29.5	29.5	29.5	40.0	43.0	45.0	49.0	51.0
R694	Non-Participating Receptor	4.5	1448	WTG4	28.4	28.4	28.4	28.4	28.4	40.0	43.0	45.0	49.0	51.0
R695	Non-Participating Receptor	4.5	1236	WTG4	30.0	30.0	30.0	30.0	30.0	40.0	43.0	45.0	49.0	51.0
R696	Non-Participating Receptor	4.5	1421	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R697	Non-Participating Receptor	4.5	1385	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
R698	Non-Participating Receptor	4.5	1360	WTG4	29.0	29.0	29.0	29.0	29.0	40.0	43.0	45.0	49.0	51.0
R699	Non-Participating Receptor	4.5	1214	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R700	Non-Participating Receptor	4.5	1335	WTG4	29.2	29.2	29.2	29.2	29.2	40.0	43.0	45.0	49.0	51.0
R701	Non-Participating Receptor	4.5	1307	WTG4	29.4	29.4	29.4	29.4	29.4	40.0	43.0	45.0	49.0	51.0
R702	Non-Participating Receptor	4.5	1275	WTG4	29.7	29.7	29.7	29.7	29.7	40.0	43.0	45.0	49.0	51.0
R703	Non-Participating Receptor	4.5	1145	WTG4	30.8	30.8	30.8	30.8	30.8	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R704	Non-Participating Receptor	4.5	1241	WTG4	30.0	30.0	30.0	30.0	30.0	40.0	43.0	45.0	49.0	51.0
R705	Non-Participating Receptor	4.5	1226	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R706	Non-Participating Receptor	4.5	1164	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R707	Non-Participating Receptor	4.5	1089	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
R708	Non-Participating Receptor	4.5	1093	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
R709	Non-Participating Receptor	4.5	1095	WTG4	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
R710	Non-Participating Receptor	4.5	1098	WTG4	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
R711	Non-Participating Receptor	4.5	1101	WTG4	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
R712	Non-Participating Receptor	4.5	1109	WTG4	31.1	31.1	31.1	31.1	31.1	40.0	43.0	45.0	49.0	51.0
R713	Non-Participating Receptor	4.5	1108	WTG4	31.1	31.1	31.1	31.1	31.1	40.0	43.0	45.0	49.0	51.0
R714	Non-Participating Receptor	4.5	1123	WTG4	31.0	31.0	31.0	31.0	31.0	40.0	43.0	45.0	49.0	51.0
R715	Non-Participating Receptor	4.5	1132	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R716	Non-Participating Receptor	4.5	1132	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R717	Non-Participating Receptor	4.5	1174	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R718	Non-Participating Receptor	4.5	1138	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R719	Non-Participating Receptor	4.5	1160	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R720	Non-Participating Receptor	4.5	1183	WTG4	30.5	30.5	30.5	30.5	30.5	40.0	43.0	45.0	49.0	51.0
R721	Non-Participating Receptor	4.5	1201	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
R722	Non-Participating Receptor	4.5	1213	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R723	Non-Participating Receptor	4.5	1230	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R724	Non-Participating Receptor	4.5	1240	WTG4	30.0	30.0	30.0	30.0	30.0	40.0	43.0	45.0	49.0	51.0
R725	Non-Participating Receptor	4.5	1252	WTG4	29.9	29.9	29.9	29.9	29.9	40.0	43.0	45.0	49.0	51.0
R726	Non-Participating Receptor	4.5	955	WTG4	32.8	32.8	32.8	32.8	32.8	40.0	43.0	45.0	49.0	51.0
R727	Non-Participating Receptor	4.5	1507	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R728	Non-Participating Receptor	4.5	1173	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R729	Non-Participating Receptor	4.5	1185	WTG4	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R730	Non-Participating Receptor	4.5	1297	WTG4	29.6	29.6	29.6	29.6	29.6	40.0	43.0	45.0	49.0	51.0
R731	Non-Participating Receptor	4.5	1230	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R732	Non-Participating Receptor	4.5	1224	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
R733	Non-Participating Receptor	4.5	1421	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R734	Non-Participating Receptor	4.5	1444	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R735	Non-Participating Receptor	4.5	1439	WTG4	28.5	28.5	28.5	28.5	28.5	40.0	43.0	45.0	49.0	51.0
R736	Non-Participating Receptor	4.5	1467	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R737	Non-Participating Receptor	4.5	1492	WTG4	28.2	28.2	28.2	28.2	28.2	40.0	43.0	45.0	49.0	51.0
R738	Non-Participating Receptor	4.5	1506	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R739	Non-Participating Receptor	4.5	1479	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R740	Non-Participating Receptor	4.5	1475	WTG4	28.3	28.3	28.3	28.3	28.3	40.0	43.0	45.0	49.0	51.0
R741	Non-Participating Receptor	4.5	1514	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R742	Non-Participating Receptor	4.5	1488	WTG4	28.2	28.2	28.2	28.2	28.2	40.0	43.0	45.0	49.0	51.0
R743	Non-Participating Receptor	4.5	1506	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R744	Non-Participating Receptor	4.5	1595	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R745	Non-Participating Receptor	4.5	1431	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R746	Non-Participating Receptor	4.5	1625	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R747	Non-Participating Receptor	4.5	1616	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R748	Non-Participating Receptor	4.5	1607	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R749	Non-Participating Receptor	4.5	1633	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R750	Non-Participating Receptor	4.5	1763	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R751	Non-Participating Receptor	4.5	1699	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R752	Non-Participating Receptor	4.5	1810	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R753	Non-Participating Receptor	4.5	1792	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R754	Non-Participating Receptor	4.5	1625	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R755	Non-Participating Receptor	4.5	1843	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R756	Non-Participating Receptor	4.5	1961	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R757	Non-Participating Receptor	4.5	1992	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R758	Non-Participating Receptor	4.5	1983	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R759	Non-Participating Receptor	4.5	2019	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R760	Non-Participating Receptor	4.5	2013	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R761	Non-Participating Receptor	4.5	2031	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R762	Non-Participating Receptor	4.5	1950	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R763	Non-Participating Receptor	4.5	2043	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R764	Non-Participating Receptor	4.5	2029	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R765	Non-Participating Receptor	4.5	2035	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R766	Non-Participating Receptor	4.5	1971	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R767	Non-Participating Receptor	4.5	1549	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R768	Non-Participating Receptor	4.5	1908	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R769	Non-Participating Receptor	4.5	1878	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R770	Non-Participating Receptor	4.5	1811	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R771	Non-Participating Receptor	4.5	1701	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R772	Non-Participating Receptor	4.5	1660	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R773	Non-Participating Receptor	4.5	1590	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R774	Non-Participating Receptor	4.5	1648	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R775	Non-Participating Receptor	4.5	1578	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R776	Non-Participating Receptor	4.5	1592	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R777	Non-Participating Receptor	4.5	1574	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R778	Non-Participating Receptor	4.5	1791	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R779	Non-Participating Receptor	4.5	1615	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R780	Non-Participating Receptor	4.5	1601	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R781	Non-Participating Receptor	4.5	1872	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R782	Non-Participating Receptor	4.5	1826	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R783	Non-Participating Receptor	4.5	1896	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R784	Non-Participating Receptor	4.5	1928	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R785	Non-Participating Receptor	4.5	1853	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R786	Non-Participating Receptor	4.5	1778	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R787	Non-Participating Receptor	4.5	1982	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R788	Non-Participating Receptor	4.5	2064	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R789	Non-Participating Receptor	4.5	1971	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R790	Non-Participating Receptor	4.5	2048	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R791	Non-Participating Receptor	4.5	2003	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R792	Non-Participating Receptor	4.5	2022	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R793	Non-Participating Receptor	4.5	2059	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R794	Non-Participating Receptor	4.5	1792	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R795	Non-Participating Receptor	4.5	1685	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R796	Non-Participating Receptor	4.5	1833	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R797	Non-Participating Receptor	4.5	1850	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R798	Non-Participating Receptor	4.5	1883	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R799	Non-Participating Receptor	4.5	1896	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R800	Non-Participating Receptor	4.5	1958	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R801	Non-Participating Receptor	4.5	1918	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R802	Non-Participating Receptor	4.5	1986	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R803	Non-Participating Receptor	4.5	1930	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R804	Non-Participating Receptor	4.5	2001	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R805	Non-Participating Receptor	4.5	2023	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R806	Non-Participating Receptor	4.5	2049	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R807	Non-Participating Receptor	4.5	2060	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R808	Non-Participating Receptor	4.5	1730	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R809	Non-Participating Receptor	4.5	1719	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R810	Non-Participating Receptor	4.5	2014	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R811	Non-Participating Receptor	4.5	2032	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R812	Non-Participating Receptor	4.5	2068	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R813	Non-Participating Receptor	4.5	1761	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R814	Non-Participating Receptor	4.5	1751	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R815	Non-Participating Receptor	4.5	1744	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R816	Non-Participating Receptor	4.5	1781	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R817	Non-Participating Receptor	4.5	1955	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R818	Non-Participating Receptor	4.5	1745	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R819	Non-Participating Receptor	4.5	1890	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R820	Non-Participating Receptor	4.5	2023	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R821	Non-Participating Receptor	4.5	1755	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R822	Non-Participating Receptor	4.5	1912	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R823	Non-Participating Receptor	4.5	1943	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R824	Non-Participating Receptor	4.5	2040	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R825	Non-Participating Receptor	4.5	1026	WTG5	33.8	33.8	33.8	33.8	33.8	40.0	43.0	45.0	49.0	51.0
R826	Non-Participating Receptor	4.5	1442	WTG5	30.6	30.6	30.6	30.6	30.6	40.0	43.0	45.0	49.0	51.0
R827	Non-Participating Receptor	4.5	1598	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R828	Non-Participating Receptor	4.5	2200	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R829	Non-Participating Receptor	4.5	2435	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R830	Non-Participating Receptor	4.5	2615	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R831	Non-Participating Receptor	4.5	1564	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R832	Non-Participating Receptor	4.5	2175	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R833	Non-Participating Receptor	4.5	1733	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R834	Non-Participating Receptor	4.5	1714	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R835	Non-Participating Receptor	4.5	1670	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R836	Non-Participating Receptor	4.5	1622	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R837	Non-Participating Receptor	4.5	1558	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R838	Non-Participating Receptor	4.5	1536	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R839	Non-Participating Receptor	4.5	1653	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R840	Non-Participating Receptor	4.5	1680	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R841	Non-Participating Receptor	4.5	1707	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R842	Non-Participating Receptor	4.5	1723	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R843	Non-Participating Receptor	4.5	1662	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0

Table A5: Page 13 of 14  
Noise Impact Summary  
Non Participating Receptors

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
R844	Non-Participating Receptor	4.5	1520	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R845	Non-Participating Receptor	4.5	1414	WTG4	28.9	28.9	28.9	28.9	28.9	40.0	43.0	45.0	49.0	51.0
R846	Non-Participating Receptor	4.5	994	WTG4	32.4	32.4	32.4	32.4	32.4	40.0	43.0	45.0	49.0	51.0
R847	Non-Participating Receptor	4.5	1206	WTG4	30.4	30.4	30.4	30.4	30.4	40.0	43.0	45.0	49.0	51.0
R848	Non-Participating Receptor	4.5	1231	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
R849	Non-Participating Receptor	4.5	1249	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R850	Non-Participating Receptor	4.5	1133	WTG4	31.0	31.0	31.0	31.0	31.0	40.0	43.0	45.0	49.0	51.0
R851	Non-Participating Receptor	4.5	1145	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
R852	Non-Participating Receptor	4.5	1019	WTG4	32.0	32.0	32.0	32.0	32.0	40.0	43.0	45.0	49.0	51.0
R853	Non-Participating Receptor	4.5	1173	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
R854	Non-Participating Receptor	4.5	1455	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R855	Non-Participating Receptor	4.5	1456	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
R856	Non-Participating Receptor	4.5	1252	WTG4	30.1	30.1	30.1	30.1	30.1	40.0	43.0	45.0	49.0	51.0
R857	Non-Participating Receptor	4.5	1390	WTG4	29.2	29.2	29.2	29.2	29.2	40.0	43.0	45.0	49.0	51.0
R858	Non-Participating Receptor	4.5	1384	WTG4	29.2	29.2	29.2	29.2	29.2	40.0	43.0	45.0	49.0	51.0
R859	Non-Participating Receptor	4.5	1491	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
R860	Non-Participating Receptor	4.5	1524	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R861	Non-Participating Receptor	4.5	1579	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R862	Non-Participating Receptor	4.5	1602	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R863	Non-Participating Receptor	4.5	1755	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R864	Non-Participating Receptor	4.5	1893	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
R865	Non-Participating Receptor	4.5	1828	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V001	Non-Participating Vacant Lot	4.5	1269	WTG4	30.0	30.0	30.0	30.0	30.0	40.0	43.0	45.0	49.0	51.0
V002	Non-Participating Vacant Lot	4.5	1233	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
V003	Non-Participating Vacant Lot	4.5	1388	WTG4	29.1	29.1	29.1	29.1	29.1	40.0	43.0	45.0	49.0	51.0
V004	Non-Participating Vacant Lot	4.5	1356	WTG4	29.3	29.3	29.3	29.3	29.3	40.0	43.0	45.0	49.0	51.0
V005	Non-Participating Vacant Lot	4.5	1421	WTG4	28.8	28.8	28.8	28.8	28.8	40.0	43.0	45.0	49.0	51.0
V006	Non-Participating Vacant Lot	4.5	1333	WTG4	29.4	29.4	29.4	29.4	29.4	40.0	43.0	45.0	49.0	51.0
V007	Non-Participating Vacant Lot	4.5	1449	WTG4	28.6	28.6	28.6	28.6	28.6	40.0	43.0	45.0	49.0	51.0
V008	Non-Participating Vacant Lot	4.5	1600	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V009	Non-Participating Vacant Lot	4.5	1207	WTG4	30.4	30.4	30.4	30.4	30.4	40.0	43.0	45.0	49.0	51.0
V010	Non-Participating Vacant Lot	4.5	1067	WTG4	31.5	31.5	31.5	31.5	31.5	40.0	43.0	45.0	49.0	51.0
V011	Non-Participating Vacant Lot	4.5	1045	WTG4	31.7	31.7	31.7	31.7	31.7	40.0	43.0	45.0	49.0	51.0
V012	Non-Participating Vacant Lot	4.5	1659	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V013	Non-Participating Vacant Lot	4.5	1057	WTG4	31.8	31.8	31.8	31.8	31.8	40.0	43.0	45.0	49.0	51.0
V014	Non-Participating Vacant Lot	4.5	968	WTG4	32.7	32.7	32.7	32.7	32.7	40.0	43.0	45.0	49.0	51.0
V015	Non-Participating Vacant Lot	4.5	1006	WTG4	32.4	32.4	32.4	32.4	32.4	40.0	43.0	45.0	49.0	51.0
V016	Non-Participating Vacant Lot	4.5	1118	WTG4	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
V017	Non-Participating Vacant Lot	4.5	1152	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
V018	Non-Participating Vacant Lot	4.5	1178	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
V019	Non-Participating Vacant Lot	4.5	1164	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
V020	Non-Participating Vacant Lot	4.5	1557	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V021	Non-Participating Vacant Lot	4.5	765	WTG3	36.5	36.5	36.5	36.5	36.5	40.0	43.0	45.0	49.0	51.0
V022	Non-Participating Vacant Lot	4.5	1322	WTG2	35.8	35.8	35.8	35.8	35.8	40.0	43.0	45.0	49.0	51.0
V023	Non-Participating Vacant Lot	4.5	1151	WTG2	34.9	34.9	34.9	34.9	34.9	40.0	43.0	45.0	49.0	51.0
V024	Non-Participating Vacant Lot	4.5	1277	WTG2	32.5	32.5	32.5	32.5	32.5	40.0	43.0	45.0	49.0	51.0
V025	Non-Participating Vacant Lot	4.5	699	WTG3	37.7	37.7	37.7	37.7	37.7	40.0	43.0	45.0	49.0	51.0
V026	Non-Participating Vacant Lot	4.5	596	WTG3	38.7	38.7	38.7	38.7	38.7	40.0	43.0	45.0	49.0	51.0
V027	Non-Participating Vacant Lot	4.5	596	WTG3	38.4	38.4	38.4	38.4	38.4	40.0	43.0	45.0	49.0	51.0
V029	Non-Participating Vacant Lot	4.5	1066	WTG3	34.1	34.1	34.1	34.1	34.1	40.0	43.0	45.0	49.0	51.0
V030	Non-Participating Vacant Lot	4.5	984	WTG3	35.2	35.2	35.2	35.2	35.2	40.0	43.0	45.0	49.0	51.0
V031	Non-Participating Vacant Lot	4.5	1168	WTG5	33.3	33.3	33.3	33.3	33.3	40.0	43.0	45.0	49.0	51.0
V032	Non-Participating Vacant Lot	4.5	1362	WTG5	31.2	31.2	31.2	31.2	31.2	40.0	43.0	45.0	49.0	51.0
V033	Non-Participating Vacant Lot	4.5	1271	WTG5	33.0	33.0	33.0	33.0	33.0	40.0	43.0	45.0	49.0	51.0
V036	Non-Participating Vacant Lot	4.5	1659	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V037	Non-Participating Vacant Lot	4.5	1248	WTG2	33.2	33.2	33.2	33.2	33.2	40.0	43.0	45.0	49.0	51.0
V038	Non-Participating Vacant Lot	4.5	1314	WTG2	35.1	35.1	35.1	35.1	35.1	40.0	43.0	45.0	49.0	51.0
V039	Non-Participating Vacant Lot	4.5	2254	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V044	Non-Participating Vacant Lot	4.5	2035	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V046	Non-Participating Vacant Lot	4.5	1654	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V047	Non-Participating Vacant Lot	4.5	985	WTG3	34.9	34.9	34.9	34.9	34.9	40.0	43.0	45.0	49.0	51.0
V048	Non-Participating Vacant Lot	4.5	1356	WTG2	31.9	31.9	31.9	31.9	31.9	40.0	43.0	45.0	49.0	51.0
V049	Non-Participating Vacant Lot	4.5	1649	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V050	Non-Participating Vacant Lot	4.5	1669	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V054	Non-Participating Vacant Lot	4.5	1664	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V055	Non-Participating Vacant Lot	4.5	1645	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V057	Non-Participating Vacant Lot	4.5	1584	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V068	Non-Participating Vacant Lot	4.5	1187	WTG4	30.5	30.5	30.5	30.5	30.5	40.0	43.0	45.0	49.0	51.0
V070	Non-Participating Vacant Lot	4.5	1211	WTG4	30.3	30.3	30.3	30.3	30.3	40.0	43.0	45.0	49.0	51.0
V075	Non-Participating Vacant Lot	4.5	769	WTG5	35.5	35.5	35.5	35.5	35.5	40.0	43.0	45.0	49.0	51.0

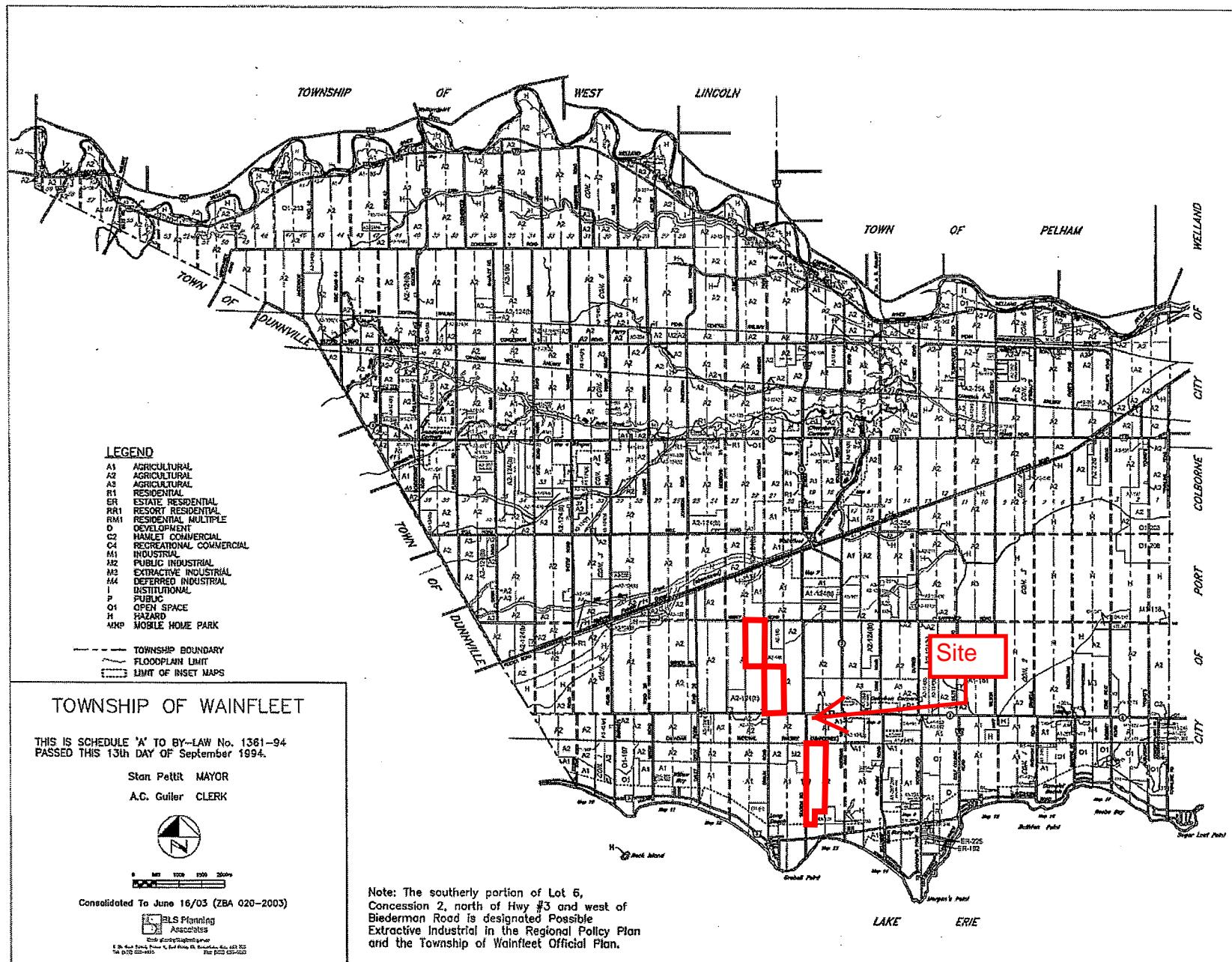
Table A5: Page 14 of 14  
Noise Impact Summary  
Non Participating Receptors

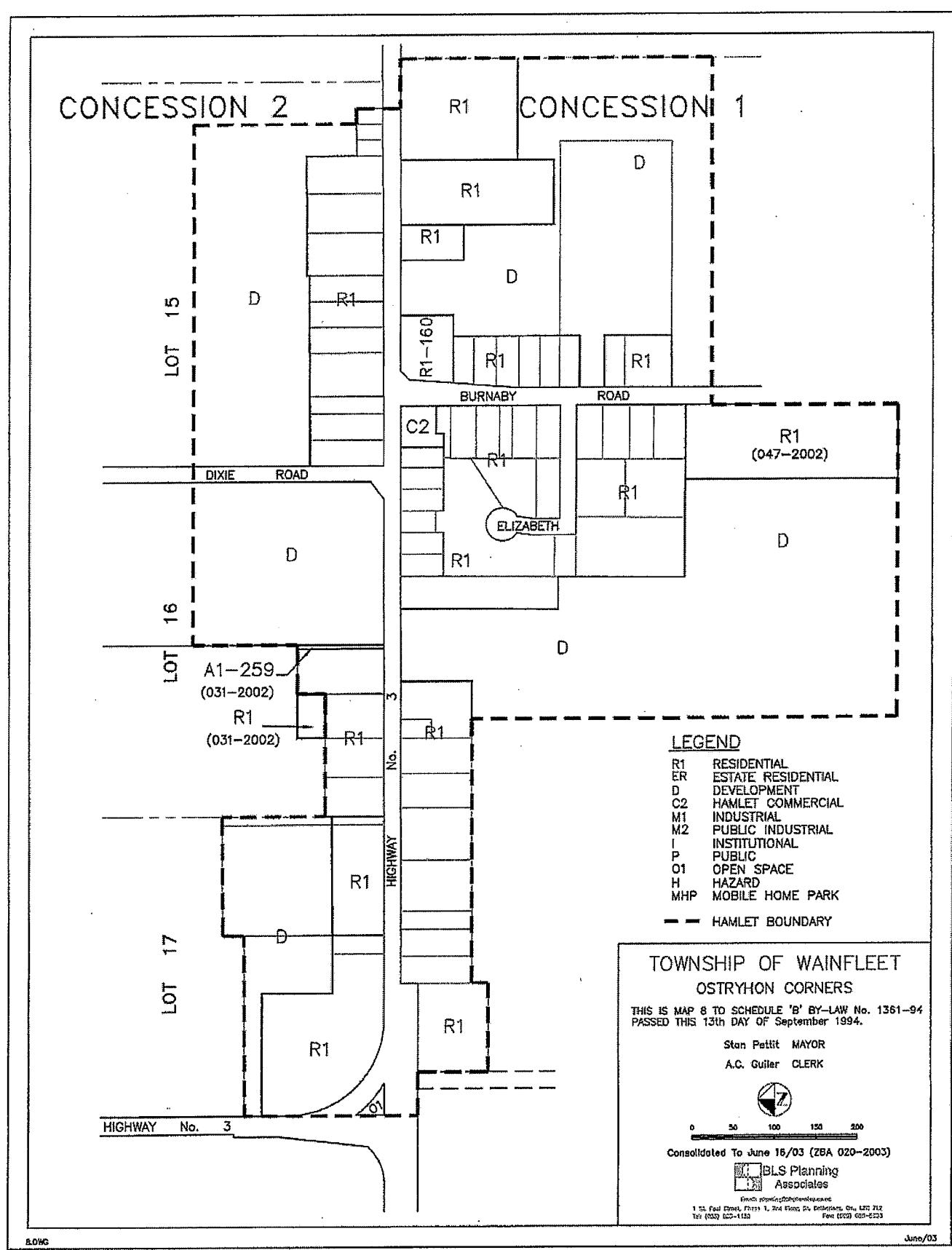
Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)					Sound Level Limit [dBA]				
					6	7	8	9	10	6	7	8	9	10
V078	Non-Participating Vacant Lot	4.5	1418	WTG4	28.9	28.9	28.9	28.9	28.9	40.0	43.0	45.0	49.0	51.0
V081	Non-Participating Vacant Lot	4.5	1335	WTG4	29.5	29.5	29.5	29.5	29.5	40.0	43.0	45.0	49.0	51.0
V082	Non-Participating Vacant Lot	4.5	1317	WTG4	29.6	29.6	29.6	29.6	29.6	40.0	43.0	45.0	49.0	51.0
V090	Non-Participating Vacant Lot	4.5	1648	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V092	Non-Participating Vacant Lot	4.5	1664	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V093	Non-Participating Vacant Lot	4.5	1211	WTG4	30.9	30.9	30.9	30.9	30.9	40.0	43.0	45.0	49.0	51.0
V094	Non-Participating Vacant Lot	4.5	986	WTG5	34.1	34.1	34.1	34.1	34.1	40.0	43.0	45.0	49.0	51.0
V095	Non-Participating Vacant Lot	4.5	1988	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V098	Non-Participating Vacant Lot	4.5	1841	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V099	Non-Participating Vacant Lot	4.5	1791	WTG3	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V100	Non-Participating Vacant Lot	4.5	1802	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V101	Non-Participating Vacant Lot	4.5	1875	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V102	Non-Participating Vacant Lot	4.5	1527	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V103	Non-Participating Vacant Lot	4.5	2295	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V104	Non-Participating Vacant Lot	4.5	1542	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V105	Non-Participating Vacant Lot	4.5	1561	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V106	Non-Participating Vacant Lot	4.5	1438	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
V107	Non-Participating Vacant Lot	4.5	1624	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V108	Non-Participating Vacant Lot	4.5	1582	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V109	Non-Participating Vacant Lot	4.5	1431	WTG4	28.7	28.7	28.7	28.7	28.7	40.0	43.0	45.0	49.0	51.0
V110	Non-Participating Vacant Lot	4.5	1352	WTG4	29.3	29.3	29.3	29.3	29.3	40.0	43.0	45.0	49.0	51.0
V111	Non-Participating Vacant Lot	4.5	1520	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V112	Non-Participating Vacant Lot	4.5	1735	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V113	Non-Participating Vacant Lot	4.5	1775	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V114	Non-Participating Vacant Lot	4.5	908	WTG2	35.7	35.7	35.7	35.7	35.7	40.0	43.0	45.0	49.0	51.0
V115	Non-Participating Vacant Lot	4.5	1517	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V116	Non-Participating Vacant Lot	4.5	1142	WTG4	30.8	30.8	30.8	30.8	30.8	40.0	43.0	45.0	49.0	51.0
V117	Non-Participating Vacant Lot	4.5	1088	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
V118	Non-Participating Vacant Lot	4.5	2090	WTG2	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V119	Non-Participating Vacant Lot	4.5	1071	WTG4	31.6	31.6	31.6	31.6	31.6	40.0	43.0	45.0	49.0	51.0
V120	Non-Participating Vacant Lot	4.5	1107	WTG4	31.3	31.3	31.3	31.3	31.3	40.0	43.0	45.0	49.0	51.0
V121	Non-Participating Vacant Lot	4.5	1081	WTG4	31.5	31.5	31.5	31.5	31.5	40.0	43.0	45.0	49.0	51.0
V122	Non-Participating Vacant Lot	4.5	1174	WTG4	30.7	30.7	30.7	30.7	30.7	40.0	43.0	45.0	49.0	51.0
V123	Non-Participating Vacant Lot	4.5	1165	WTG4	30.8	30.8	30.8	30.8	30.8	40.0	43.0	45.0	49.0	51.0
V124	Non-Participating Vacant Lot	4.5	991	WTG4	32.5	32.5	32.5	32.5	32.5	40.0	43.0	45.0	49.0	51.0
V125	Non-Participating Vacant Lot	4.5	1231	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
V126	Non-Participating Vacant Lot	4.5	1240	WTG4	30.2	30.2	30.2	30.2	30.2	40.0	43.0	45.0	49.0	51.0
V127	Non-Participating Vacant Lot	4.5	1634	WTG5	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V128	Non-Participating Vacant Lot	4.5	1782	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V129	Non-Participating Vacant Lot	4.5	1870	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V130	Non-Participating Vacant Lot	4.5	1965	WTG4	-	-	-	-	-	40.0	43.0	45.0	49.0	51.0
V131	Non-Participating Vacant Lot	4.5	670	WTG3	37.9	37.9	37.9	37.9	37.9	40.0	43.0	45.0	49.0	51.0

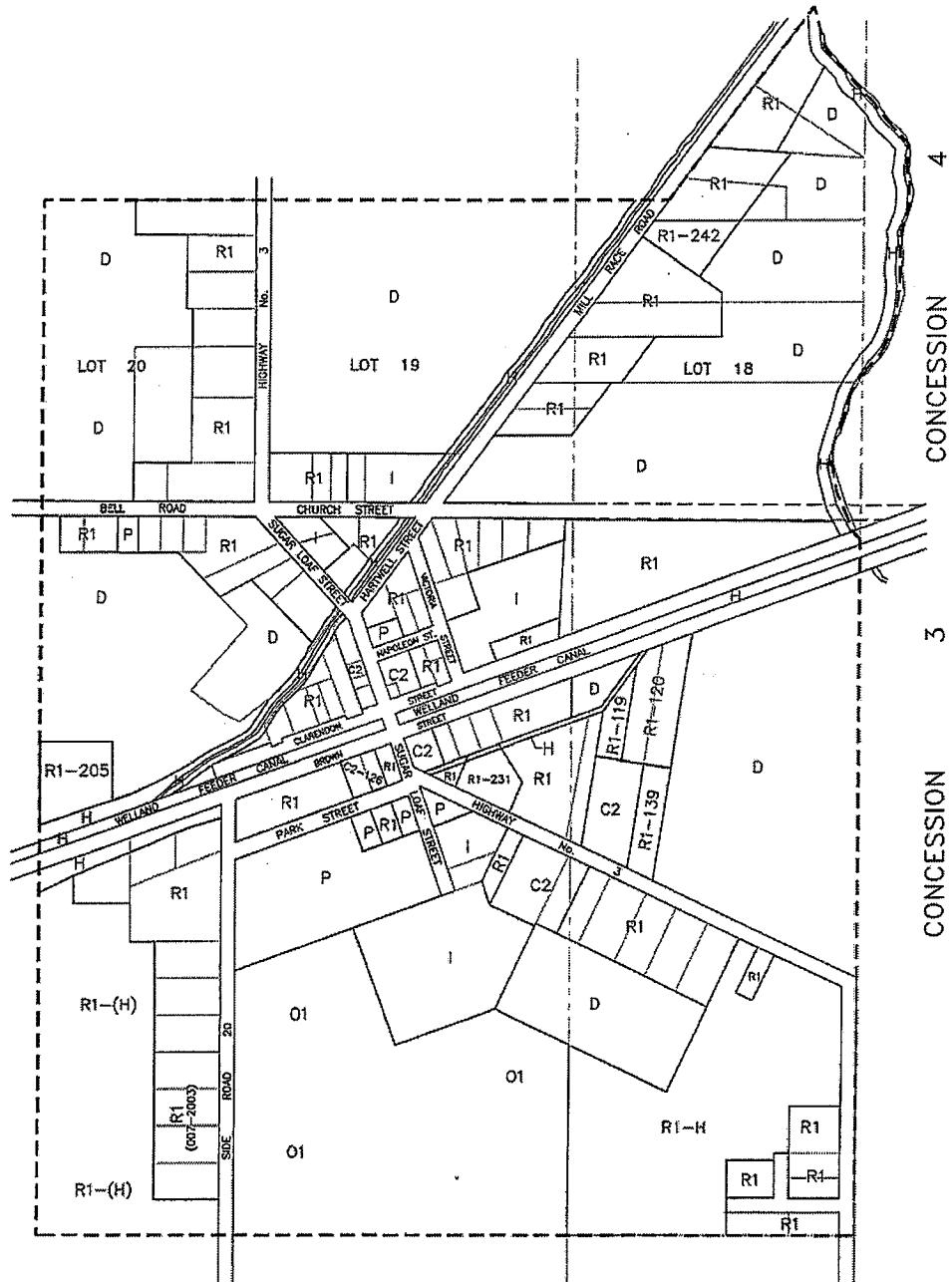
**Table A6: Wind Turbine Noise Impact Summary - Participating Receptor Locations**  
**Wainfleet Wind Energy Project**

Point of Reception ID	Description	Height [m]	Distance to Nearest Wainfleet Turbine [m]	Nearest Turbine ID	Calculated Sound Level [dBA] at Selected Wind Speeds (m/s)				
					6	7	8	9	10
PR01	Participating Receptor	4.5	1235	WTG2	36.3	36.3	36.3	36.3	36.3
PR02	Participating Receptor	4.5	810	WTG4	34.2	34.2	34.2	34.2	34.2
PR03	Participating Receptor	4.5	774	WTG4	34.7	34.7	34.7	34.7	34.7
PV01	Participating Vacant Lot	4.5	552	WTG3	39.1	39.1	39.1	39.1	39.1

**APPENDIX B:**  
**Zoning Map**







LEGEND

- R1 RESIDENTIAL  
 ER ESTATE, RESIDENTIAL  
 D DEVELOPMENT  
 C2 HAMLET COMMERCIAL  
 M1 INDUSTRIAL  
 M2 PUBLIC INDUSTRIAL  
 I INSTITUTIONAL  
 P PUBLIC  
 O1 OPEN SPACE  
 H HAZARD  
 MHP MOBILE HOME PARK  
 —— HAMLET BOUNDARY

**TOWNSHIP OF WAINFLEET**

THIS IS MAP 7 TO SCHEDULE "B" BY-LAW NO. 1361-94  
PASSED THIS 13th DAY OF September 1994.

John Fetter MAYOR  
A.C. Shuler CLERK

Digitized by srujanika@gmail.com



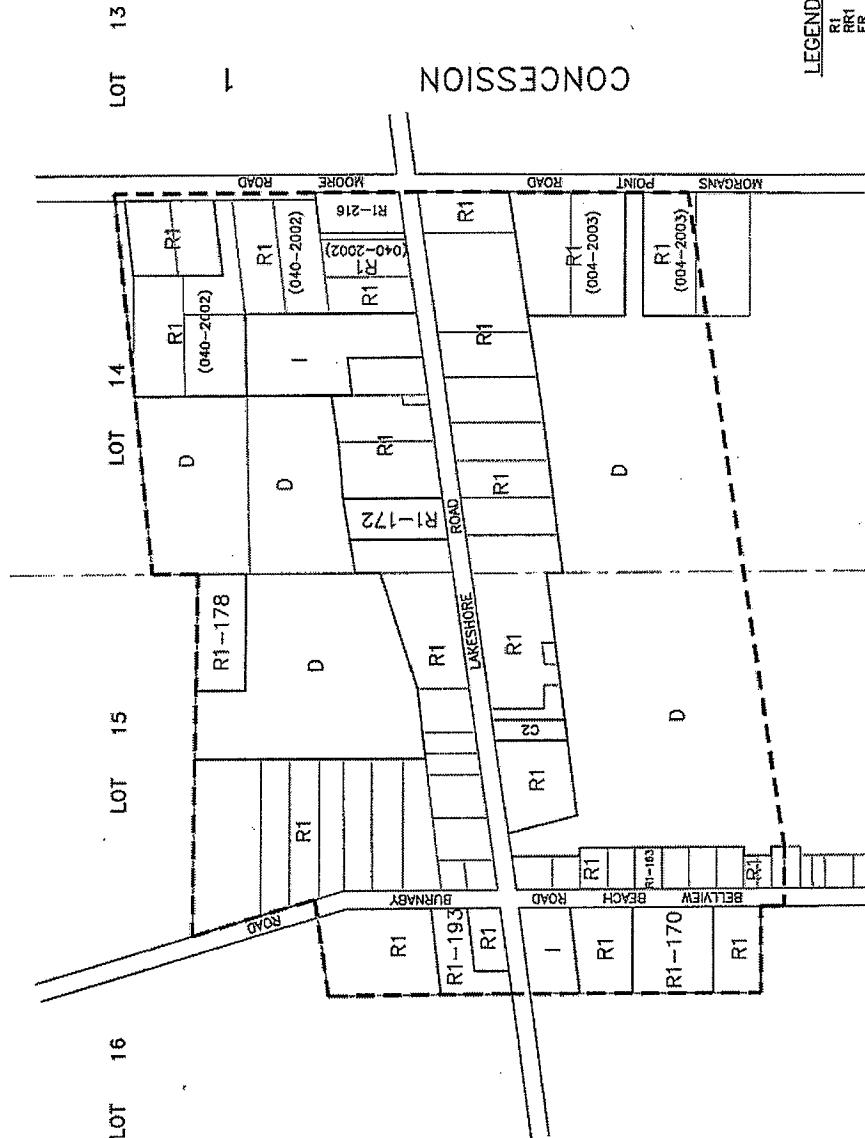
BES Planning  
Associates

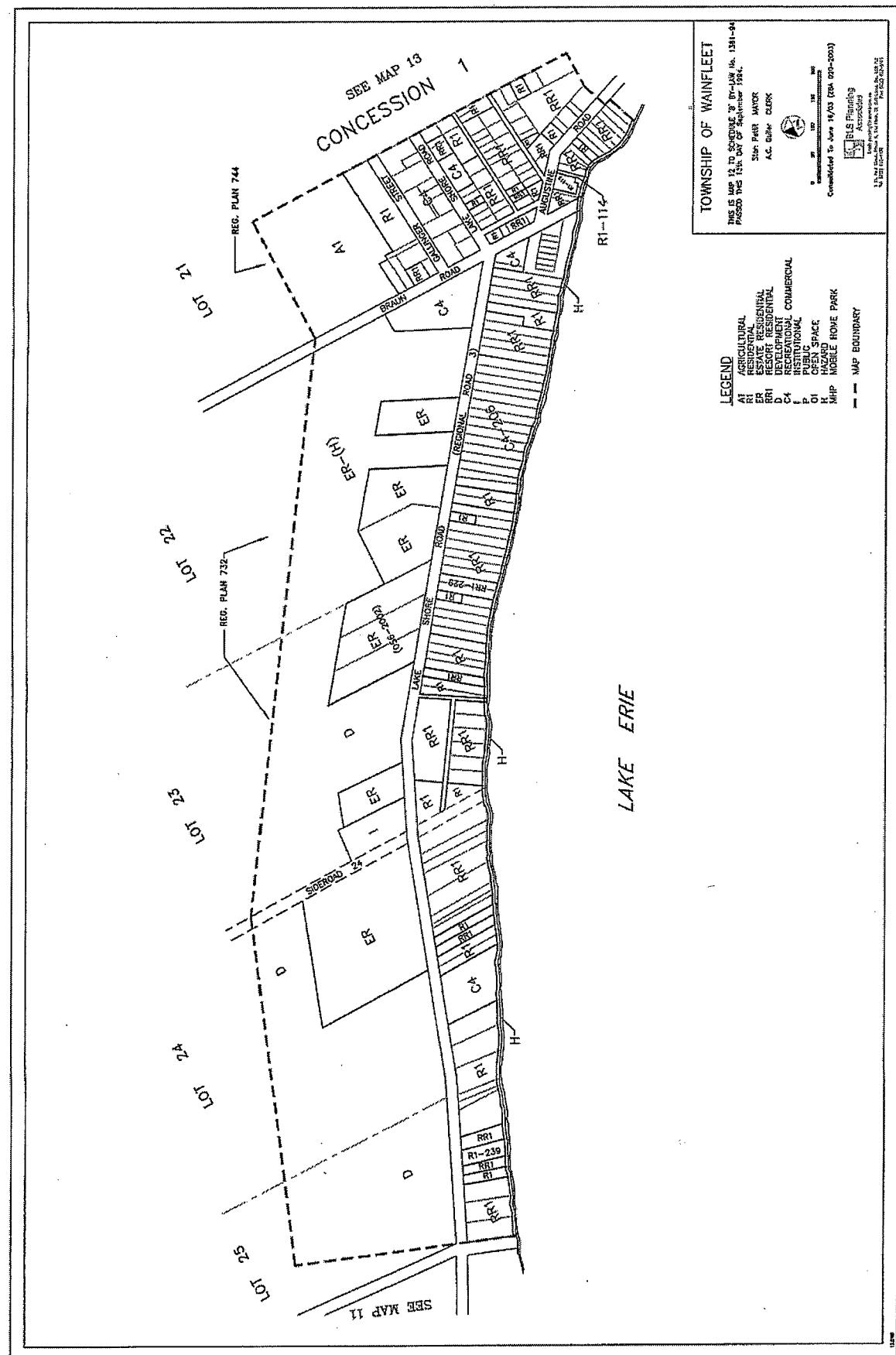
**TOWNSHIP OF WAINFLEET**  
 BURNABY  
 TOWN OF WAINFLEET  
 PLAN NO. 9-20 SURVEY BY MR. J. L. COOPER, NO. 1361-44  
 PLANNED AND APPROVED BY THE  
 TOWNSHIP OF WAINFLEET  
 Stan Peltz, Mayor  
 A.C. Gair, Clerk  
  
 Date: [REDACTED] 2003  
 Time: [REDACTED] AM  
 Surveyor: [REDACTED]  
 Planner: [REDACTED]

**LEGEND**

R1	RESIDENTIAL
RR1	RESORT RESIDENTIAL
ER	ESTATE RESIDENTIAL
D	DEVELOPMENT RESIDENTIAL
G1	HAMLET COMMERCIAL
G2	INDUSTRIAL
M1	PUBLIC INDUSTRIAL
M2	INSTITUTIONAL
P	PUBLIC
O1	OPEN SPACE
H1	HAZARDOUS
H2P	MOBILE HOME PARK
HP	HAMLET BOUNDARY

**SEE MAP 14**





Lot 21  
Lot 20  
Lot 19  
Lot 18

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REG. PLAN 73

REG. PLAN 746

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CONCESSION 1

SEE MAP 12

GRABELL  
POINT

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THIS IS MAP 12 TO SCHEDULE 'B' BY-LAW NO. 1361-84  
PASSED THIS 13TH DAY OF SEPTEMBER 1984.

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CONSIDERATION OF THE 1975-1976

ANS Planning  
Associates  
1000 University Avenue  
Seattle, Washington 98101  
(206) 467-1515

MAP BOUNDARY

— 1 —

AT	AGRICULTURAL
RI	RESIDENTIAL
ER	ESTATE RESIDENTIAL
RRI	RESORT RESIDENTIAL
DR	DEVELOPMENTAL
Ct	COMMERCIAL
I	INSTITUTIONAL
P	PUBLIC
OI	OPEN SPACE

HISTORICAL

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MAP BOUNDARY

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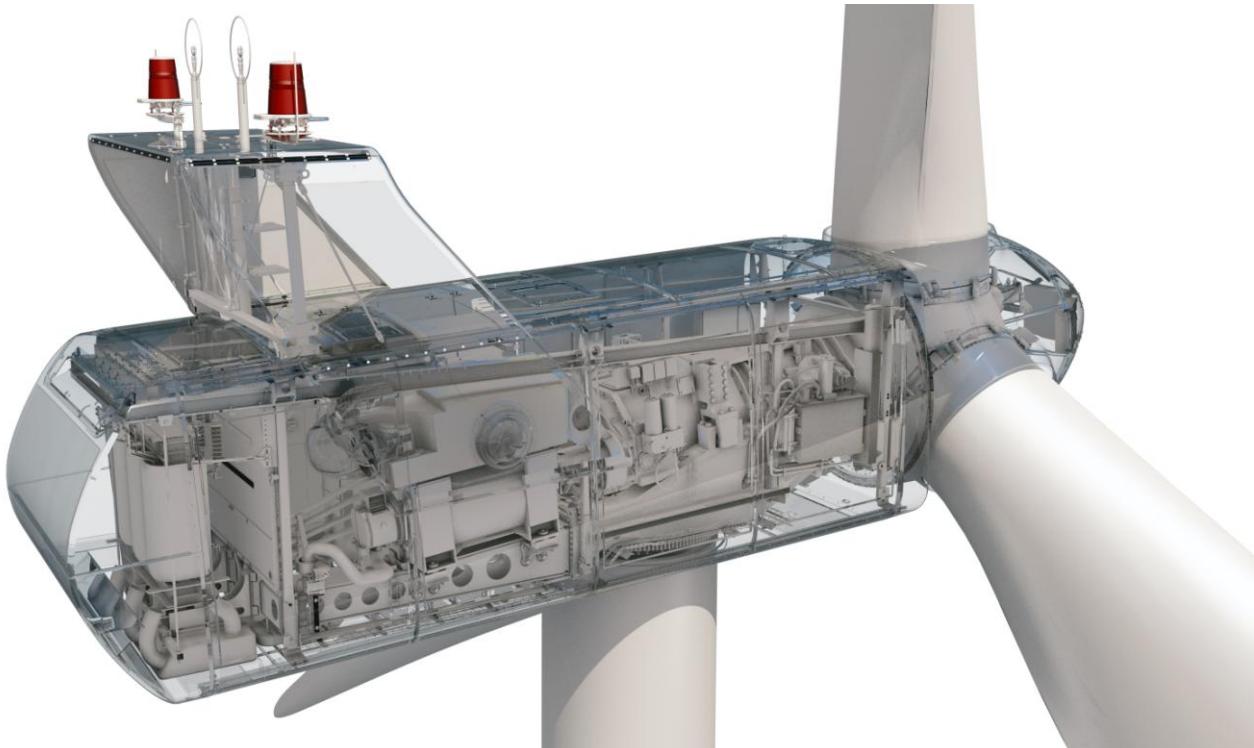
**APPENDIX C:**  
**VESTAS V100-1.8 MW Wind Turbine Generator Information**

**Exhibit D.1.1**  
**General Specification**

Class 1  
Document no.: 0004-3053 V06  
2010-10-06

# General Specification

## V100–1.8 MW VCUS



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**Buyer acknowledges that these general specifications are for Buyer's informational purposes only and do not create or constitute a warranty, guarantee, promise, commitment, or other representation by supplier, all of which are disclaimed by supplier except to the extent expressly provided by supplier in writing elsewhere.**

**See section 11 General Reservations, Notes and Disclaimers, p. 36 for general reservations, notes, and disclaimers applicable to these general specifications.**

## 1 General Description

The Vestas V100-1.8 MW wind turbine is a pitch regulated upwind turbine with active yaw and a three-blade rotor. The Vestas V100-1.8 MW turbine has a rotor diameter of 100 m with a generator rated at 1.8 MW. The turbine utilizes a microprocessor pitch control system called OptiTip® and the Variable Speed concepts (VCUS: Vestas Converter Unity System). With these features the wind turbine is able to operate the rotor at variable speed (RPM), helping to maintain the output at or near rated power.

## 2 Mechanical Design

### 2.1 Rotor

The V100-1.8 MW turbine is equipped with a 100 meter rotor consisting of three blades and the hub. Based on the prevailing wind conditions, the blades are continuously positioned to help optimise the pitch angle.

Rotor	
Diameter	100 m
Swept Area	7850 m <sup>2</sup>
Rotational Speed Static, Rotor	14.9 rpm
Speed, Dynamic Operation Range	9.3-16.6 rpm
Rotational Direction	Clockwise (front view)
Orientation	Upwind
Tilt	6°
Hub Coning	2°
Number of Blades	3
Aerodynamic Brakes	Full feathering

Table 2-1: Rotor data.

### 2.2 Blades

The 49 m Prepreg (PP) blades are made of carbon and fibre glass and consist of two airfoil shells bonded to a supporting beam.

PP Blades	
Type Description	Airfoil shells bonded to supporting beam
Blade Length	49 m
Material	Fibreglass reinforced epoxy and carbon fibres
Blade Connection	Steel roots inserted
Air Foils	RISØ P + FFA -W3
Chord	3.9 m
Blade Root Outer Diameter	1.88 m

<b>PP Blades</b>	
<b>PCD of Steel Root Inserts</b>	1.80 m
<b>R49</b>	0.54 m
<b>Twist (Blade root/blade tip)</b>	24,5°/-0,5°
<b>Approximate Weight</b>	7500 kg

Table 2-2: PP blades data.

## 2.3 Blade Bearing

The blade bearings are double row 4-point contact ball bearings.

<b>Blade Bearing</b>	
<b>Type</b>	2 row 4-point contact ball bearing
<b>Lubrication</b>	Grease lubrication, automatic lubrication pump

Table 2-3: Blade bearing data.

## 2.4 Pitch System

The energy input from the wind to the turbine is adjusted by pitching the blades according to the control strategy. The pitch system also works as the primary brake system by pitching the blades out of the wind. This causes the rotor to idle.

Double row 4-point contact ball bearings are used to connect the blades to the hub. The pitch system relies on hydraulics and uses a cylinder to pitch each blade. Hydraulic power is supplied to the cylinder from the hydraulic power unit in the nacelle through the main gearbox and the main shaft via a rotating transfer.

Hydraulic accumulators inside the rotor hub ensure sufficient power to blades in case of failure.

<b>Pitch System</b>	
<b>Type</b>	Hydraulic
<b>Cylinder</b>	Ø125/80 – 760
<b>Number</b>	1 pcs./ blade
<b>Range</b>	-5° to 90°

Table 2-4: Pitch system data.

<b>Hydraulic System</b>	
<b>Pump Capacity</b>	50 l/min
<b>Working Pressure</b>	200-230 bar
<b>Oil Quantity</b>	260 l
<b>Motor</b>	20 kW

Table 2-5: Hydraulic system data.

## 2.5 Hub

The hub supports the 3 blades and transfers the reaction forces to the main bearing. The hub structure also supports blade bearings and pitch cylinder.

<b>Hub</b>	
<b>Type</b>	Cast ball shell hub
<b>Material</b>	Cast iron EN GJS 400-18U-LT / EN1560

Table 2-6: Hub data.

## 2.6 Main Shaft

<b>Main Shaft</b>	
<b>Type</b>	Forged, trumpet shaft
<b>Material</b>	42 CrMo4 QT / EN 10083

Table 2-7: Main shaft data.

## 2.7 Bearing Housing

<b>Bearing Housing</b>	
<b>Type</b>	Cast foot housing with lowered centre
<b>Material</b>	Cast iron EN GJS 400-18U-LT / EN1560

Table 2-8: Bearing housing data.

## 2.8 Main Bearings

<b>Main Bearings</b>	
<b>Type</b>	Spherical roller bearings
<b>Lubrication</b>	Grease lubrication, manually re-greased

Table 2-9: Main bearings data.

## 2.9 Gearbox

The main gearbox transmits torque and revolutions from the rotor to the generator.

The main gearbox consists of a planetary stage combined with a two-stage parallel gearbox, torque arms and vibration dampers.

Torque is transmitted from the high-speed shaft to the generator via a flexible composite coupling, located behind the disc brake. The disc brake is mounted directly on the high-speed shaft.

Gearbox	
Type	1 planetary stage + 2 helical stages
Ratio	1:92.8 nominal
Cooling	Oil pump with oil cooler
Oil heater	2 kW
Max Gear Oil Temp	80°C
Oil Cleanliness	-/15/12 ISO 4406

Table 2-10: Gearbox data.

## 2.10 Generator Bearings

The bearings are greased and grease is supplied continuously from an automatic lubrication unit when the nacelle temperature is above -10°C. The yearly grease flow is approximately 2400 cm<sup>3</sup>.

## 2.11 High Speed Shaft Coupling

The flexible coupling transmits the torque from the gearbox high speed output shaft to the generator input shaft. The flexible coupling is designed to compensate misalignments between gearbox and generator. The coupling consists of two composite discs and an intermediate tube with two aluminium flanges and a fibre glass tube. The coupling is fitted to 3-armed hubs on the brake disc and the generator hub.

High Speed Shaft Coupling	
Type Description	VK 420

Table 2-11: High speed shaft coupling data.

## 2.12 Yaw System

The yaw system is designed to keep the turbine upwind. The nacelle is mounted on the yaw plate, which is bolted to the turbine tower. The yaw bearing system is a plain bearing system with built-in friction. Asynchronous yaw motors with brakes enable the nacelle to rotate on top of the tower.

The turbine controller receives information of the wind direction from the wind sensor. Automatic yawing is deactivated when the mean wind speed is below 3 m/s.

<b>Yaw System</b>	
<b>Type</b>	Plain bearing system with built-in friction
<b>Material</b>	Forged yaw ring heat-treated Plain bearings PETP
<b>Yawing Speed</b>	< 0.5°/sec.

Table 2-12: Yaw system data.

<b>Yaw Gear</b>	
<b>Type</b>	Non-locking combined worm gear and planetary gearbox Electrical motor brake
<b>Motor</b>	1.5 kW, 6 pole, asynchronous
<b>Number of Yaw Gears</b>	6
<b>Ratio Total (4 Planetary Stages)</b>	1,120: 1
<b>Rotational Speed at Full Load</b>	Approximately 1 rpm at output shaft

Table 2-13: Yaw gear data.

## 2.13 Crane

The nacelle houses the service crane. The crane is a single system chain hoist.

<b>Crane</b>	
<b>Lifting Capacity</b>	Max. 800 kg

Table 2-14: Crane data.

## 2.14 Tower Structure

Tubular towers with flange connections, certified according to relevant type approvals, are available in different standard heights. Magnets provide load support in a horizontal direction for tower internals, such as platforms, ladders, etc. Tower internals are supported vertically (i.e. in the gravitational direction) by a mechanical connection.

The hub heights listed include a distance from the foundation section to the ground level of approximately 0.6 m depending on the thickness of the bottom flange and a distance from the tower top flange to the centre of the hub of 1.70 m.

<b>Tower Structure</b>	
<b>Type Description</b>	Conical tubular
<b>Hub Heights (HH)</b>	80 m/95 m
<b>Material</b>	S355 according to EN 10024 A709 according to ASTM
<b>Weight</b>	80 m IEC S 160 metric tonnes* 95 m IEC S 205 metric tonnes**

*Table 2-15: Tower structure (Onshore) data.*

**NOTE** \*/\*\* Typical values. Dependent on wind class, and can vary with site / project conditions.

## 2.15 Nacelle Bedplate and Cover

The nacelle cover is made of fibre glass. Hatches are positioned in the floor for lowering or hoisting equipment to the nacelle and evacuation of personnel.

The roof is equipped with wind sensors and skylights which can be opened from inside the nacelle to access the roof and from outside to access the nacelle. The nacelle cover is mounted on the girder structure. Access from the tower to the nacelle is through the yaw system.

The nacelle bedplate is in two parts and consists of a cast iron front part and a girder structure rear part. The front of the nacelle bedplate is the foundation for the drive train, which transmits forces from the rotor to the tower, through the yaw system. The bottom surface is machined and connected to the yaw bearing and the yaw-gears are bolted to the front nacelle bedplate.

The nacelle bedplate carries the crane girders through vertical beams positioned along the site of the nacelle. Lower beams of the girder structure are connected at the rear end.

The rear part of the bedplate serves as foundation for controller panels, generator and transformer.

<b>Type Description</b>	<b>Material</b>
<b>Nacelle Cover</b>	GRP
<b>Base Frame Front</b>	Cast iron EN GJS 400-18U-LT / EN1560
<b>Base Frame Rear</b>	Welded grid structure

*Table 2-16: Nacelle base-frame and cover data.*

## 2.16 Cooling

The cooling of the main components (gearbox, hydraulic power pack and VCUS converter) in the turbine is done by a water cooling system. The generator is air cooled by nacelle air and the high voltage (HV) transformer is cooled by mainly ambient air.

Component	Cooling Type	Internal Heating at Low temperature
Nacelle	Forced air	Yes
Hub/spinner	Natural air	No (Yes Low Temperature (LT) turbine)
Gearbox	Water/oil	Yes
Generator	Forced air/air	No (heat source)
Slip rings	Forced air/air	Yes
Transformer	Forced air	No (heat source)
VCUS	Forced water/air	Yes
VMP section	Forced air/air	Yes
Hydraulics	Water/oil	Yes

Table 2-17: Cooling, summary.

All other heat generating systems are also equipped with fans and or coolers but are considered as minor contributors to nacelle thermodynamics.

## 2.17 Water Cooling System

The water cooling system is designed as semi-closed systems (closed system but not under pressure) with a free wind water cooler on the roof of the nacelle. This means that the heat loss from the systems (components) is transferred to the water system and the water system is cooled by ambient air.

The water cooling system has three parallel cooling circuits that cool the gearbox, the hydraulic power unit and the VCUS converter.

The water cooling system is equipped with a 3-way thermostatic valve, which is closed (total water flow is bypassing the water cooler) if the temperature of the cooling water is below 35°C and fully open (total water flow is led to the water cooler) if the temperature is above 43°C.

## 2.18 Gearbox Cooling

The gearbox cooling system consists of two oil circuits that remove the gearbox losses through two plate heat exchangers (oil coolers). The first circuit is equipped with a mechanical driven oil pump and a plate heat exchanger and the second circuit is equipped with an electrical driven oil pump and a plate heat exchanger. The water circuit of the two plate heat exchangers are coupled in serial.

<b>Gearbox Cooling</b>	
<b>Gear Oil Plate Heat Exchanger 1 (Mechanically driven oil pump)</b>	
Nominal oil flow	50 l/min
Oil inlet temperature	80°C
No. of passes	2
Cooling capacity	24.5 kW
<b>Gear Oil Plate Heat Exchanger 2 (Electrically driven oil pump)</b>	
Nominal oil flow	85 l/min
Oil inlet temperature	80°C
No. of passes	2
Cooling capacity	41.5 kW
<b>Water Circuit</b>	
Nominal water flow	App. 150 l/min (50% glycol)
Water inlet temperature	Max. 54°C
No. of passes	1
Heat load	66 kW

Table 2-18: Cooling, gearbox data.

## 2.19 Hydraulic Cooling

The hydraulic cooling system consists of a plate heat exchanger which is mounted on the power pack. In the plate heat exchanger the heat from the hydraulics is transferred to the water cooling system.

<b>Hydraulic Cooling</b>	
<b>Hydraulic Oil Plate Heat Exchanger</b>	
Nominal oil flow	40 l/min
Oil inlet temperature	66°C
Cooling capacity	10.28 kW
<b>Water Circuit</b>	
Nominal water flow	App. 45 l/min (50% glycol)
Water inlet temperature	Max. 54°C
Heat load	10.28 kW

Table 2-19: Cooling, hydraulic data.

## 2.20 VCUS Converter Cooling

The converter cooling system consists of a number of switch modules which is mounted on cooling plates where the cooling water is lead through.

Converter Cooling	
Nominal water flow	Approximately 45 l/min (50% glycol)
Water inlet pressure	Maximum 2.0 bar
Water inlet temperature	Maximum 54°C
Cooling capacity	10 kW

Table 2-20: Cooling, converter data.

## 2.21 Generator Cooling

The generator cooling systems consists of an air to air cooler mounted on the top of the generator and two internal and one external fan. All the fans can run at low or high speed.

Generator Cooling	
Air inlet temperature – external	50°C
Nominal air flow – internal	8000 m <sup>3</sup> /h
Nominal air flow – external	7500 m <sup>3</sup> /h
Cooling capacity	60 kW

Table 2-21: Cooling, generator data.

## 2.22 HV Transformer Cooling

The transformer is equipped with forced air cooling. The cooling system consists of a central fan, which is located under the service floor, an air distribution manifold and six hoses leading to locations beneath and between the HV and LV windings.

Transformer Cooling	
Nominal air flow	1920 m <sup>3</sup> /h
Air inlet temperature	Maximum 40°C

Table 2-22: Cooling, transformer data.

## 2.23 Nacelle Conditioning

The nacelle conditioning system consists of one fan and two air heaters. There are two main circuits of the nacelle conditioning system:

1. Cooling of the HV transformer.
2. Heating and ventilation of the nacelle.

For both systems, the airflow enters the nacelle through louver dampers in the weather shield underneath the nacelle.

The cooling of the HV transformer is described in section 2.22 HV Transformer Cooling, p. 13.

The heating and ventilation of the nacelle is done by means of two air heaters and one fan. To avoid condensation in the nacelle, the two air heaters keep the nacelle temperature +5°C above the ambient temperature. At start-up in cold conditions, the heaters will also heat the air around the gearbox.

The ventilation of the nacelle is done by means of one fan, removing hot air from the nacelle, which is generated by mechanical and electrical equipment.

<b>Nacelle Cooling</b>	
Nominal air flow	1.2 m <sup>3</sup> /s
Air inlet temperature	Maximum 50°C

*Table 2-23: Cooling, nacelle data.*

<b>Nacelle Heating</b>	
Rated power	2 x 6 kW

*Table 2-24: Heating, nacelle data.*

## 3 Electrical Design

### 3.1 Generator

The generator is a 3-phase asynchronous generator with wound rotor, which is connected to the Vestas Converter Unity System (VCUS) via a slip ring system. The generator is an air-to-air cooled generator with an internal and external cooling circuit. The external circuit uses air from the nacelle and exhausts it out through the rear end of the nacelle.

The generator has six poles. The generator is wound with form windings in both rotor and stator. The stator is connected in star at low power and delta at high power. The rotor is connected in star and is insulated from the shaft. A slip ring is mounted to the rotor for the purpose of the VCUS control.

Generator	
<b>Type Description</b>	Asynchronous with wound rotor, slip rings and VCUS
<b>Rated Power (PN)</b>	1.8 MW
<b>Rated Apparent Power</b>	1.8 MVA ( $\text{Cos}\phi = 1.00$ )
<b>Frequency</b>	60 Hz
<b>Voltage, Generator</b>	690 Vac
<b>Voltage, Converter</b>	480 Vac
<b>Number of Poles</b>	6
<b>Winding Type (Stator/Rotor)</b>	Form/Form
<b>Winding Connection, Stator</b>	Star/Delta
<b>Rated Efficiency (Generator only)</b>	> 96.5%
<b>Power Factor (cos)</b>	1.0
<b>Over Speed Limit acc. to IEC (2 min.)</b>	2400 rpm
<b>Vibration Level</b>	$\leq 1.8 \text{ mm/s}$
<b>Weight</b>	Approx. 8,100 kg
<b>Generator Bearing - Temperature</b>	2 PT100 sensors
<b>Generator Stator Windings - Temperature</b>	3 PT100 sensors placed at hot spots and 3 as back-up

Table 3-1: Generator data.

### 3.2 HV Cables

The high voltage cable runs from the transformer in the nacelle down the tower to the switchgear located in the bottom of the tower (switchgear is not included). The high voltage cable is a 4-core rubber insulated halogen free high voltage cable.

<b>HV Cables</b>	
<b>High Voltage Cable Insulation Compound</b>	Improved ethylene-propylene (EP) based material – EPR or high modulus or hard grade ethylene-propylene rubber – HEPR
<b>Conductor Cross Section</b>	3x70/70 mm <sup>2</sup>
<b>Rated Voltage</b>	12/20 kV (24 kV) or 20/35 kV (42 kV) depending on the transformer voltage

Table 3-2: HV cables data.

### 3.3 Transformer

The transformer is located in a separate locked room in the nacelle with surge arresters mounted on the high voltage side of the transformer. The transformer is a two winding, three-phase dry-type transformer. The windings are delta-connected on the high voltage side unless otherwise specified.

The low voltage windings have a voltage of 690 V and a tapping at 480 V and are star-connected. The 690 V and 480 V systems in the nacelle are a TN-system, which means the star point is connected to earth.

<b>Transformer</b>	
<b>Type Description</b>	Dry-type cast resin
<b>Primary Voltage</b>	6-34.5 kV
<b>Rated Apparent Power</b>	2100 kVA
<b>Secondary Voltage 1</b>	690 V
<b>Rated Power 1 at 690 V</b>	1,900 kVA
<b>Secondary Voltage 2</b>	480 V
<b>Rated Power 2 at 480 V</b>	200 kVA
<b>Vector Group</b>	Dyn5 (option YNyn0)
<b>Frequency</b>	60 Hz
<b>HV-tappings</b>	±2 x 2.5% offload
<b>Insulation Class</b>	F
<b>Climate Class</b>	C2
<b>Environmental Class</b>	E2
<b>Fire Behaviour Class</b>	F1

Table 3-3: Transformer data.

### 3.4 Converter

The converter controls the energy conversion in the generator. The VCUS converter feeds power from the grid into the generator rotor at sub sync speed and feeds power from the generator rotor to the grid at super sync speed.

Converter	
<b>Rated Slip</b>	12%
<b>Rated RPM</b>	1344 RPM
<b>Rated Rotor Power (@rated slip)</b>	193 kW
<b>Rated Grid Current (@ rated slip, PF = 1 &amp; 480V)</b>	232 A
<b>Rated Rotor Current (@ rated slip &amp; PF = 1)</b>	573 A

Table 3-4: Converter data.

### 3.5 AUX System

The AUX System is supplied from the 690/480 V socket from the HV transformer. All motors, pumps, fans and heaters are supplied from this system.

All 110 V power sockets are supplied from a 690/110 V transformer.

Power Sockets	
<b>Single Phase</b>	110 V (20 A)
<b>Three Phase</b>	690 V Crane (16 A)

Table 3-5: AUX system data.

### 3.6 Wind Sensors

The turbine is equipped with two ultrasonic wind sensors with built-in heaters.

Wind Sensors	
<b>Type</b>	FT702LT
<b>Principle</b>	Acoustic Resonance
<b>Built-in Heat</b>	99 W

Table 3-6: Wind sensor data.

### 3.7 Turbine Controller

The turbine is controlled and monitored by the System 3500 controller hardware and Vestas controller software.

The turbine controller is based on four main processors (Ground, Nacelle, Hub and Converter) which are interconnected by an optical-based 2.5 Mbit ArcNet network.

I/O modules are connected either as rack modules in the System 3500 rack or by CAN.

**The turbine control system serves the following main functions:**

- Monitoring and supervision of overall operation.
- Synchronizing of the generator to the grid during connection sequence in order to limit the inrush current.
- Operating the wind turbine during various fault situations.
- Automatic yawing of the nacelle.
- OptiTip® - blade pitch control.
- Noise emission control.
- Monitoring of ambient conditions.
- Monitoring of the grid.

The turbine controller hardware is built from the following main modules:

Module	Function	Network
<b>CT3603</b>	Main processor. Control and monitoring (nacelle and hub).	ArcNet, CAN, Ethernet, seriell
<b>CT396</b>	Main processor. Control, monitoring, external communication (ground).	ArcNet, CAN, Ethernet, seriell
<b>CT360</b>	Main processor. Converter control and monitoring.	ArcNet, CAN, Ethernet
<b>CT3218</b>	Counter/encoder module. RPM, Azimuth and wind measurement.	Rack module
<b>CT3133</b>	24 VDC digital input module. 16 channels.	Rack module
<b>CT3153</b>	24 VDC digital output module. 16 channels.	Rack module
<b>CT3320</b>	4 channel analogue input (0-10V, 4-20mA, PT100).	Rack module
<b>CT6061</b>	CAN I/O controller	CAN node
<b>CT6221</b>	3 channel PT100 module	CAN I/O module
<b>CT6050</b>	Blade controller.	CAN node
<b>Balluff</b>	Position transducer	CAN node
<b>Rexroth</b>	Proportional valve	CAN node

Table 3-7: *Turbine controller hardware.*

### 3.8 Uninterruptible Power Supply (UPS)

The UPS supplies power to critical wind turbine components.

The actual back up time for the UPS system is proportional to the power consumption. Actual back-up time may vary.

UPS		
<b>Battery Type</b>	Valve-Regulated Lead Acid (VRLA)	
<b>Rated Battery Voltage</b>	2 x 8 x 12 V (192 V)	
<b>Converter Type</b>	Double conversion online	
<b>Rated Output Voltage</b>	230 V AC	
<b>Rated Output Voltage</b>	230 V AC	
<b>Converter Input</b>	230 V ±20%	
<b>Back-up Time*</b>	Controller system	30 seconds
	Safety systems	35 minutes
<b>Re-charging Time</b>	Typical	Approx. 2.5 hours

Table 3-8: UPS data.

**NOTE** \* For alternative back-up times, consult Vestas!

## 4 Turbine Protection Systems

### 4.1 Braking Concept

The main brake on the turbine is aerodynamic. Braking the turbine is done by feathering the three blades. During emergency stop all three blades will feather simultaneously to full end stop and thereby slowing the rotor speed.

In addition there is a mechanical disc brake on the high speed shaft of the gearbox. The mechanical brake is only used as a parking brake, and when activating the emergency stop push buttons.

### 4.2 Short Circuit Protections

<b>Breakers</b>	<b>Generator / Q8</b> ABB E2B 2000 <b>690 V</b>	<b>Controller / Q15</b> ABB S3X <b>690 V</b>	<b>VCS-VCUS / Q7</b> ABB S5H 400 <b>480 V</b>
<b>Breaking Capacity</b> $I_{cu}, I_{cs}$	42, 42 kA	75, 75 kA	40, 40 kA
<b>Making Capacity</b> $I_{cm}$ (415V Data)	88 kA	440 kA	143 kA
<b>Thermo Release</b> $I_{th}$	2000 A	100 A	400 A

Table 4-1: Short circuit protection data.

### 4.3 Overspeed Protection

The generator RPM and the main shaft RPM are registered by inductive sensors and calculated by the wind turbine controller in order to protect against overspeed and rotating errors.

The turbine is also equipped with a VOG (Vestas Overspeed Guard), which is an independent computer module measuring the rotor RPM, and in case of an overspeed situation the VOG activates the emergency feathered position (full feathering) of the three blades.

Overspeed Protection	
<b>VOG Sensors Type</b>	Inductive
<b>Trip Levels</b>	17.3 (Rotor RPM) / 1597 (Generator RPM)

Table 4-2: Overspeed protection data.

### 4.4 EMC System

The turbine and related equipment must fulfil the EU EMC-Directive with later amendments:

- Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of the Member States relating to Electromagnetic Compatibility.
- The (Electromagnetic Compatibility) EMC-Directive with later amendments.

### 4.5 Lightning System

The Lightning Protection System (LPS) consists of three main parts.

- Lightning receptors.
- Down conducting system.
- Earthing System.

Lightning Protection Design Parameters			Protection Level I
<b>Current Peak Value</b>	$i_{\max}$	[kA]	200
<b>Total Charge</b>	$Q_{\text{total}}$	[C]	300
<b>Specific Energy</b>	W/R	[MJ/Ω]	10
<b>Average Steepness</b>	$di/dt$	[kA/μs]	200

Table 4-3: Lightning design parameters.

**NOTE** The Lightning Protection System is designed according to IEC standards (see section 7.7 Design Codes – Lightning Protection, p. 27). Lightning strikes are considered force majeure, i.e. damage caused by lightning strikes is not warranted by Vestas.

## 4.6 Earthing (also known as grounding)

The Vestas Earthing System is based on foundation earthing.

Vestas document no. 0000-3388 contains the list of documents regarding Vestas Earthing System.

Requirements in the Vestas Earthing System specifications and work descriptions are minimum requirements from Vestas and IEC. Local and national requirements may require additional measures.

## 4.7 Corrosion Protection

Classification of corrosion categories for atmospheric corrosion is according to ISO 9223:1992.

Corrosion Protection	External Areas	Internal Areas
Nacelle	C5	C3 and C4 Climate strategy: Heating the air inside the nacelle compared to the outside air temperature lowers the relative humidity and helps ensure a controlled corrosion level.
Hub	C5	C3
Tower	C5-I	C3

Table 4-4: Corrosion protection data for nacelle, hub and tower.

## 5 Safety

The safety specifications in this safety section provide limited general information about the safety features of the turbine and are not a substitute for Buyer and its agents taking all appropriate safety precautions, including but not limited to (a) complying with all applicable safety, operation, maintenance, and service agreements, instructions, and requirements, (b) complying with all safety-related laws, regulations, and ordinances, (c) conducting all appropriate safety training and education and (d) reading and understanding all safety-related manuals and instructions. See section 5.13 Manuals and Warnings, p. 23 for additional guidance.

### 5.1 Access

Access to the turbine from the outside is through the bottom of the tower. The door is equipped with a lock. Access to the top platform in the tower is by a ladder or service lift. Access to the nacelle from the top platform is by ladder. Access to the transformer room in the nacelle is equipped with a lock. Unauthorised access to electrical switch boards and power panels in the turbine is prohibited according to IEC 60204-1 2006.

## 5.2 Escape

In addition to the normal access routes, alternative escape routes from the nacelle are through the crane hatch.

The hatch in the roof can be opened from both the inside and outside.

Escape from the service lift is by ladder.

## 5.3 Rooms/Working Areas

The tower and nacelle are equipped with connection points for electrical tools for service and maintenance of the turbine.

## 5.4 Platforms, Standing and Working Places

The bottom tower section has three platforms. There is one platform at the entrance level (door level), one safety platform approximately three metres above the entrance platform and finally a platform in the top of the tower section.

Each middle tower section has one platform in the top of the tower section.

The top tower section has two platforms. A top platform and a service lift platform - where the service lift stops - below the top platform.

There are places to stand at various locations along the ladder.

The platforms have anti-slip surfaces.

Foot supports are placed in the turbine for maintenance and service purposes.

## 5.5 Climbing Facilities

A ladder with a fall arrest system (rigid rail or wire system) is mounted through the tower.

Rest platforms are provided at maximum intervals of 9 metres along the tower ladder between platforms.

There are anchorage points in the tower, nacelle, hub and on the roof for attaching a fall arrest equipment (full body harness).

Over the crane hatch there is an anchorage point for the emergency descent equipment. The anchorage point is tested to 22.2 kN.

Anchorage points are coloured yellow and are calculated and tested to 22.2 kN.

## 5.6 Moving Parts, Guards and Blocking Devices

Moving parts in the nacelle are shielded.

The turbine is equipped with a rotor lock to block the rotor and drive train.

It is possible to block the pitch of the cylinder with mechanical tools in the hub.

## 5.7 Lighting

The turbine is equipped with light in the tower, nacelle and in the hub.

There is emergency light in case of loss of electrical power.

## 5.8 Noise

When the turbine is out of operation for maintenance, the sound level in the nacelle is below 80 dB(A). In operation mode ear protection is required.

## 5.9 Emergency Stop

There are emergency stops in the nacelle and in the bottom of the tower.

## 5.10 Power Disconnection

The turbine is designed to allow for disconnection from all its power sources during inspection or maintenance. The switches are marked with signs and are located in the nacelle and in the bottom of the tower.

## 5.11 Fire Protection/First Aid

A 5 kg CO<sub>2</sub> fire extinguisher must be located in the nacelle at the left yaw gear. The location of the fire extinguisher, and how to use it, must be confirmed before operating the turbine.

A first aid kit must be placed by the wall at the back end of the nacelle. The location of the first aid kit, and how to use it, must be confirmed before operating the turbine.

Above the generator there must be a fire blanket which can be used to put out small fires.

## 5.12 Warning Signs

Additional warning signs inside or on the turbine must be reviewed before operating or servicing of the turbine.

## 5.13 Manuals and Warnings

Vestas OH&S manual and manuals for operation, maintenance and service of the turbine provide additional safety rules and information for operating, servicing or maintaining the turbine.

# 6 Environment

## 6.1 Chemicals

Chemicals used in the turbine are evaluated according to Vestas Wind Systems A/S Environmental system certified according to ISO 14001:2004.

- Anti-freeze liquid to help prevent the cooling system from freezing.
- Gear oil for lubricating the gearbox.
- Hydraulic oil to pitch the blades and operate the brake.
- Grease to lubricate bearings.
- Various cleaning agents and chemicals for maintenance of the turbine.

**7****Approvals, Certificates and Design Codes****7.1****Type Approvals**

The turbine is type certified according to the certification standards listed below:

Certification	Wind Class	Hub Height
<b>Type Certificate after IEC WT01 and IEC 61400-1:2005</b>	IEC S*	80 m
	IEC S*	95 m

\*Refer to section 9.1 Climate and Site Conditions, p. 28 for details.

Table 7-1: Type approvals.

**7.2****Design Codes – Structural Design**

The structural design has been developed and tested with regard to, but not limited to, the following main standards.

Design Codes – Structural Design	
<b>Nacelle and Hub</b>	IEC 61400-1:2005 EN 50308 ANSI/ASSE Z359.1-2007
<b>Bedframe</b>	IEC 61400-1:2005
<b>Tower</b>	IEC 61400-1:2005 Eurocode 3 DIBt: Richtlinie für Windenergieanlagen, Einwirkungen und Standsicherheitsnachweise für Turm und Gründung, 4th edition.

Table 7-2: Structural design codes.

## 7.3 Design Codes – Mechanical Equipment

The mechanical equipment has been developed and tested with regard to, but not limited to, the following main standards:

Design Codes – Mechanical Equipment	
Gear	Designed in accordance to rules in ISO 81400-4
Blades	DNV-OS-J102 IEC 1024-1 IEC 60721-2-4 IEC 61400 (Part 1, 12 and 23) IEC WT 01 IEC DEFU R25 ISO 2813 DS/EN ISO 12944-2

Table 7-3: Mechanical equipment design codes.

## 7.4 Design Codes – Electrical Equipment

The electrical equipment has been developed and tested with regard to, but not limited to, the following main standards:

Design Codes – Electrical Equipment	
<b>High Voltage AC Circuit Breakers</b>	IEC 60056
<b>High Voltage Testing Techniques</b>	IEC 60060
<b>Power Capacitors</b>	IEC 60831
<b>Insulating Bushings for AC Voltage above 1kV</b>	IEC 60137
<b>Insulation Co-ordination</b>	BS EN 60071
<b>AC Disconnectors and Earth Switches</b>	BS EN 60129
<b>Current Transformers</b>	IEC 60185
<b>Voltage Transformers</b>	IEC 60186
<b>High Voltage Switches</b>	IEC 60265
<b>Disconnectors and Fuses</b>	IEC 60269
<b>Flame Retardant Standard for MV Cables</b>	IEC 60332
<b>Transformer</b>	IEC 60076-11
<b>Generator</b>	IEC 60034
<b>Specification for Sulphur Hexafluoride for Electrical Equipment</b>	IEC 60376
<b>Rotating Electrical Machines</b>	IEC 34

<b>Design Codes – Electrical Equipment</b>	
<b>Dimensions and Output Ratings for Rotating Electrical Machines</b>	IEC 72 & IEC 72A
<b>Classification of Insulation, Materials for Electrical Machinery</b>	IEC 85
<b>Safety of Machinery – Electrical Equipment of Machines</b>	IEC 60204-1

Table 7-4: *Electrical equipment design codes.*

## 7.5 Design Codes – I/O Network System

The distributed I/O network system has been developed and tested with regard to, but not limited to, the following main standards:

<b>Design Codes – I/O Network System</b>	
<b>Salt Mist Test</b>	IEC 60068-2-52
<b>Damp Head, Cyclic</b>	IEC 60068-2-30
<b>Vibration Sinus</b>	IEC 60068-2-6
<b>Cold</b>	IEC 60068-2-1
<b>Enclosure</b>	IEC 60529
<b>Damp Head, Steady State</b>	IEC 60068-2-56
<b>Vibration Random</b>	IEC 60068-2-64
<b>Dry Heat</b>	IEC 60068-2-2
<b>Temperature Shock</b>	IEC 60068-2-14
<b>Free Fall</b>	IEC 60068-2-32

Table 7-5: *I/O Network system design codes.*

## 7.6 Design Codes – EMC System

To fulfil EMC requirements the design must be as recommended for lightning protection, see section 7.7 Design Codes – Lightning Protection, p. 27.

<b>Design Codes – EMC System</b>	
<b>Designed according to</b>	IEC 61400-1: 2005
<b>Further robustness requirements according to</b>	TPS 901785

Table 7-6: *EMC system design codes.*

## 7.7 Design Codes – Lightning Protection

The LPS is designed according to Lightning Protection Level (LPL) I:

<b>Design Codes – Lightning Protection</b>	
<b>Designed according to</b>	IEC 62305-1: 2006 IEC 62305-3: 2006 IEC 62305-4: 2006
<b>Non Harmonized Standard and Technically Normative Documents</b>	IEC/TR 61400-24:2002

Table 7-7: *Lightning protection design codes.*

## 7.8 Design Codes – Earthing

The Vestas Earthing System design is based on and complies with the following international standards and guidelines:

- IEC 62305-1 Ed. 1.0: Protection against lightning – Part 1: General principles.
- IEC 62305-3 Ed. 1.0: Protection against lightning – Part 3: Physical damage to structures and life hazard.
- IEC 62305-4 Ed. 1.0: Protection against lightning – Part 4: Electrical and electronic systems within structures.
- IEC/TR 61400-24. First edition. 2002-07. Wind turbine generator systems - Part 24: Lightning protection.
- IEC 60364-5-54. Second edition 2002-06. Electrical installations of buildings - Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors.
- IEC 61936-1. First edition. 2002-10. Power installations exceeding 1kV a.c.- Part 1: Common rules.

## 8 Colour and Surface Treatment

### 8.1 Nacelle Colour and Surface Treatment

<b>Surface Treatment of Vestas Nacelles</b>	
<b>Standard Nacelle Colours</b>	RAL 7035 (light grey)
<b>Gloss</b>	According to ISO 2813

Table 8-1: *Surface treatment, nacelle.*

## 8.2 Tower Colour and Surface Treatment

Surface Treatment of Vestas Tower Section		
	External:	Internal:
<b>Tower Colour Variants</b>	RAL 7035 (light grey)	RAL 9001 (cream white)
<b>Gloss</b>	50-75% UV resistant	Maximum 50%

Table 8-2: Surface treatment, tower.

## 8.3 Blades Colour

Blades Colour	
<b>Blade Colour</b>	RAL 7035 (Light Grey)
<b>Tip-End Colour Variants</b>	RAL 2009 (Traffic Orange), RAL 3000 (Flame Red), RAL 3020 (Traffic Red)
<b>Gloss</b>	< 20%

Table 8-3: Colours, blades.

## 9 Operational Envelope and Performance Guidelines

Actual climatic and site conditions have many variables and must be considered in evaluating actual turbine performance. The design and operating parameters set forth in this section do not constitute warranties, guarantees, or representations as to turbine performance at actual sites.

**NOTE**

As evaluation of climate and site conditions is complex, it is needed to consult Vestas for every project.

## 9.1 Climate and Site Conditions

Values refer to hub height:

Extreme Design Parameters	
<b>Wind Climate</b>	<b>IEC S</b>
Ambient Temperature Interval (Normal Temperature Turbine)	-30° to +50°C
Extreme Wind Speed (10 min. average)	42.5 m/s
Survival Wind Speed (3 sec. gust)	59.5 m/s

Table 9-1: Extreme design parameters.

<b>Average Design Parameters</b>	
<b>Wind Climate</b>	<b>IEC S</b>
Wind Speed	7.5 m/s
A-factor	8.45 m/s
Form Factor, c	2.0
Turbulence Intensity acc. to IEC 61400-1, including Wind Farm Turbulence (@15 m/s – 90% quantile)	18%
Wind Shear	0.20
Inflow Angle (vertical)	8°

Table 9-2: Average design parameters.

### 9.1.1 Complex Terrain

Classification of complex terrain acc. to IEC 61400-1:2005 Chapter 11.2.

For sites classified as complex appropriate measures are to be included in site assessment.

### 9.1.2 Altitude

The turbine is designed for use at altitudes up to 1500 m above sea level as standard.

Above 1500 m special considerations must be taken regarding e.g. HV installations and cooling performance. Consult Vestas for further information.

### 9.1.3 Wind Farm Layout

Turbine spacing is to be evaluated site-specifically. Spacing in any case not below three rotor diameters (3D).

## DISCLAIMER

As evaluation of climate and site conditions is complex, consult Vestas for every project. If conditions exceed the above parameters Vestas must be consulted!

## 9.2 Operational Envelope – Temperature and Wind

Values refer to hub height and as determined by the sensors and control system of the turbine.

<b>Operational Envelope – Temperature and Wind</b>	
<b>Ambient Temperature Interval (Normal Temperature Turbine)</b>	-20° to +40° C
<b>Cut-in (10 min. average)</b>	3 m/s
<b>Cut-out (100 sec. exponential average)</b>	20 m/s
<b>Re-cut in (100 sec. exponential average)</b>	18 m/s

Table 9-3: Operational envelope - temperature and wind.

### 9.3 Operational Envelope – Grid Connection \*

Values refer to hub height and as determined by the sensors and control system of the turbine.

Operational Envelope - Grid Connection		
<b>Nominal Phase Voltage</b>	$U_{P, \text{nom}}$	400 V
<b>Nominal Frequency</b>	$f_{\text{nom}}$	60 Hz
<b>Max. Steady State Voltage Jump</b>	$\pm 2\%$	
<b>Max. Frequency Gradient</b>	$\pm 4 \text{ Hz/sec}$	
<b>Max. Negative Sequence Voltage</b>	3%	

Table 9-4: Operational envelope - grid connection.

The generator and the converter will be disconnected if:

	$U_P$	$U_N$
<b>Voltage above 110% of nominal for 60 sec.</b>	440 V	759 V
<b>Voltage above 115% of nominal for 2 sec.</b>	460 V	794 V
<b>Voltage above 120% of nominal for 0.08 sec.</b>	480 V	828 V
<b>Voltage above 125% of nominal for 0.005 sec</b>	500 V	863 V
<b>Voltage below 90% of nominal for 60 sec.</b>	360 V	621 V
<b>Voltage below 85% of nominal for 11 sec.</b>	340 V	586 V
<b>Frequency is above [Hz] for 0.2 sec.</b>	63.6 Hz	
<b>Frequency is below [Hz] for 0.2 sec.</b>	56.4 Hz	

Table 9-5: Generator and converter disconnecting values.

**NOTE**

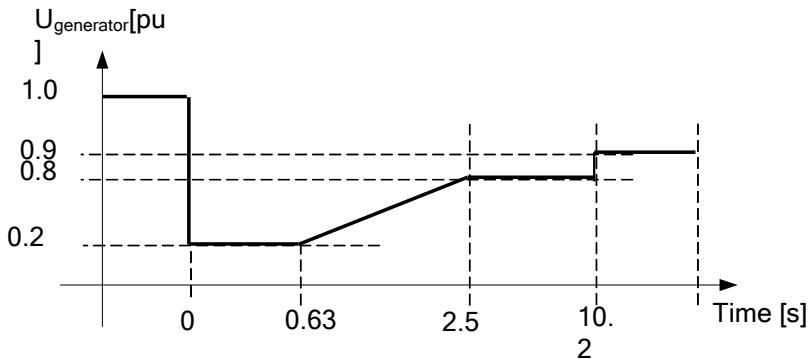
\* Over the turbine lifetime, grid drop-outs are to occur at an average of no more than 50 times a year.

### 9.4 Performance – Fault Ride Through

The turbine is equipped with a reinforced Vestas Converter System in order to gain better control of the generator during grid faults. The controllers and contactors have a UPS backup system in order to keep the turbine control system running during grid faults.

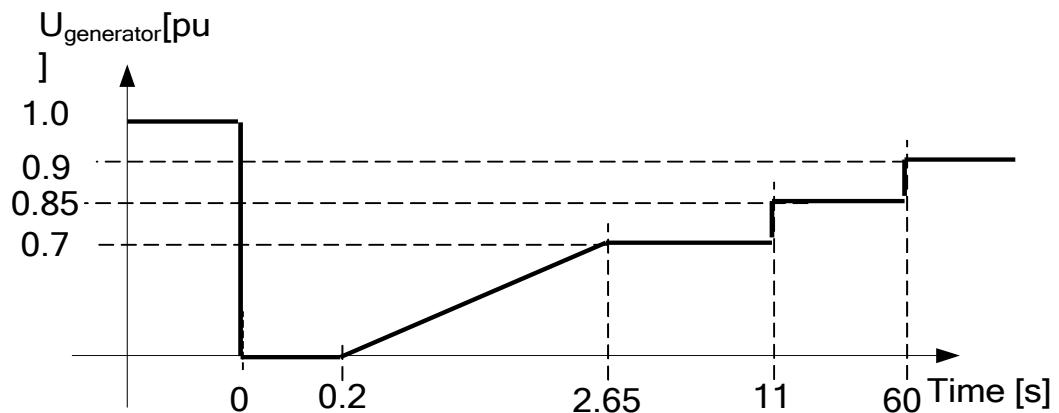
The pitch system is optimised to keep the turbine within normal speed conditions and the generator speed is accelerated in order to store rotational energy and be able to resume normal power production faster after a fault and keep mechanical stress on the turbine at a minimum.

The turbine is designed to stay connected during grid disturbances within the voltage tolerance curve in Figure 9-1, p. 31.



*Figure 9-1: Low voltage tolerance curve for symmetrical and asymmetrical faults.*

For grid disturbances outside the protection curve in Figure 9-2, p. 31, the turbine will be disconnected from the grid.



*Figure 9-2: Default low voltage protection settings for symmetrical and asymmetrical faults.*

<b>Power Recovery Time</b>	
<b>Power recovery to 90% of pre-fault level</b>	Max 1.0 sec

## 9.5 Current Contribution

During the grid dip the generator is typical magnetized from the converter. The controller setpoints are set to keep the reactive current exchange with the grid close to zero and keep as much torque on the generator as possible.

## 9.6 Performance – Multiple Voltage Dips

The turbine is designed to handle re-closure events and multiple voltage dips within a short period of time, due to the fact that voltage dips are not evenly distributed during the year. As an example 6 voltage dips of duration of 200 ms down to 20% voltage within 30 minutes will normally not lead to a problem for the turbine.

## 9.7 Performance – Active Power Control

The turbine is designed for control of active power via the VestasOnline™ SCADA system.

Max. Ramp Rates for External Control	
Active Power	0.1 pu/sec

To protect the turbine active power cannot be controlled to values below the curve in Figure 9-3, p. 32.

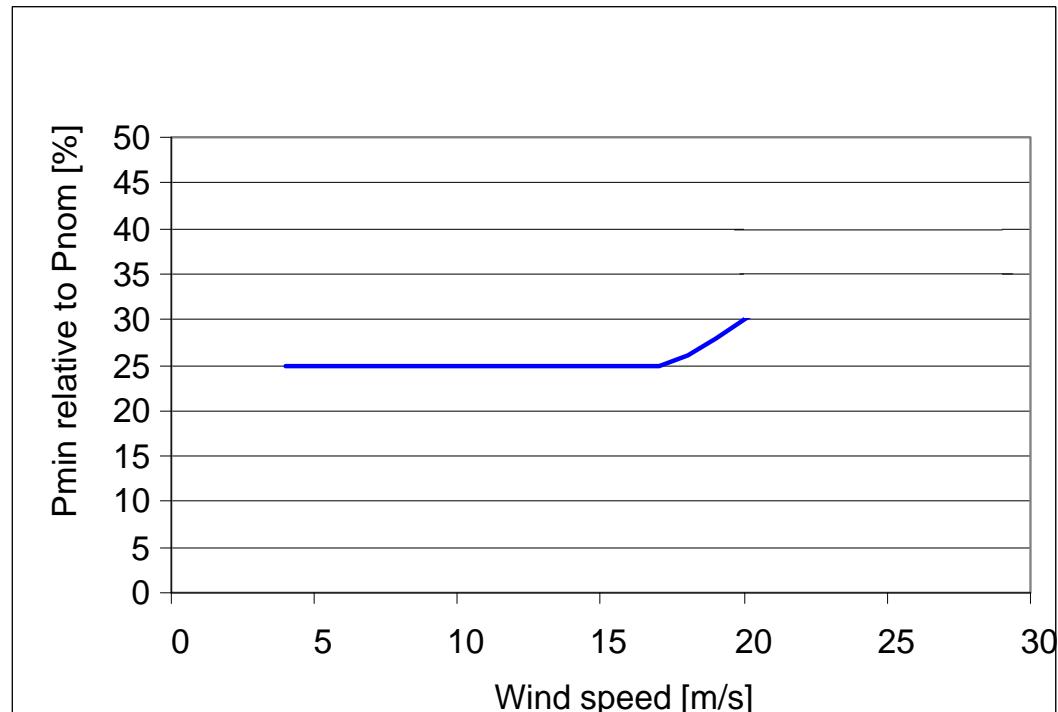


Figure 9-3: Minimum active power output dependant of wind speed.

## 9.8 Performance – Frequency Control

The turbine can be configured to perform frequency control by decreasing the output power as a linear function of the grid frequency (over frequency).

Dead band and slope for the frequency control function are configurable.

## 9.9 Performance – Own Consumption

The consumption of electrical power by the wind turbine is defined as consumption when the wind turbine is not producing energy (generator is not connected to the grid). This is defined in the control system as Production Generator (zero).

The following components have the largest influence on the power consumption of the wind turbine:

Own Consumption	
<b>Hydraulic Motor</b>	20 kW
<b>Yaw Motors 6 x 1.75 kW</b>	10.5 kW
<b>Oil Heating 3 x 0.76 kW</b>	2.3 kW
<b>Air Heaters 2 x 6 kW (std) 3 x 6 kW (LT)</b>	12 kW (Standard) 18 kW (Low Temperature)
<b>Oil Pump for Gearbox Lubrication</b>	3.5 kW
<b>HV Transformer located in the nacelle has a no-load loss of</b>	Max. 3.9 kW

Table 9-6: Own consumption data.

## 9.10 Operational Envelope Conditions for Power Curve, $C_t$ Values (at Hub Height)

See appendix section 12.1 Mode 0, p. 37, 12.2 Mode 1, p. 41 and 12.3 Mode 2, p. 45 for power curve,  $C_t$  values and noise level.

Conditions for Power Curve, $C_t$ Values (at Hub Height)	
<b>Wind Shear</b>	0.10 - 0.16 (10 min. average)
<b>Turbulence Intensity</b>	8 - 12% (10 min. average)
<b>Blades</b>	Clean
<b>Rain</b>	No
<b>Ice/Snow on Blades</b>	No
<b>Leading Edge</b>	No damage
<b>Terrain</b>	IEC 61400-12-1
<b>Inflow Angle (Vertical)</b>	$0 \pm 2^\circ$
<b>Grid Frequency</b>	$60 \pm 0.5$ Hz

Table 9-7: Conditions for power curve,  $C_t$  values.

## 10 Drawings

### 10.1 Structural Design – Illustration of Outer Dimensions

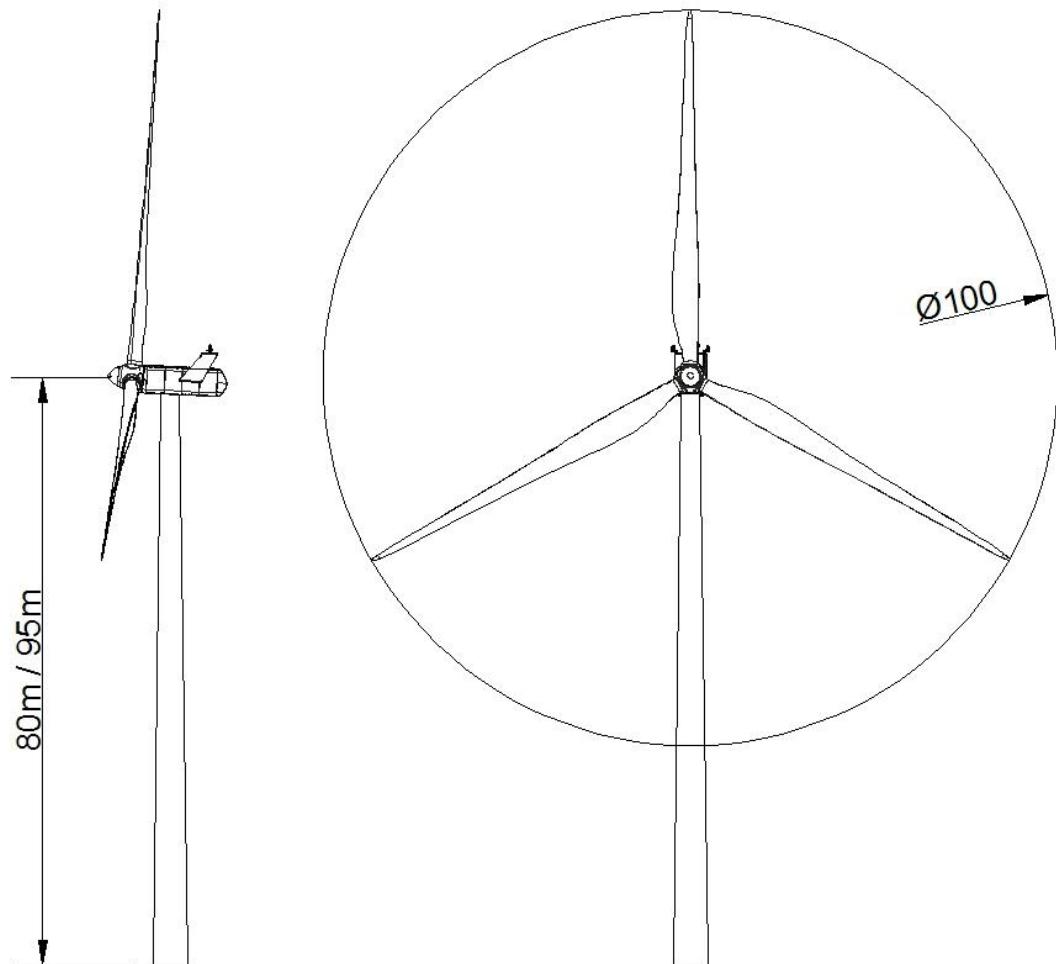


Figure 10-1: Illustration of outer dimensions – structure.

## 10.2 Structural Design – Side View Drawing

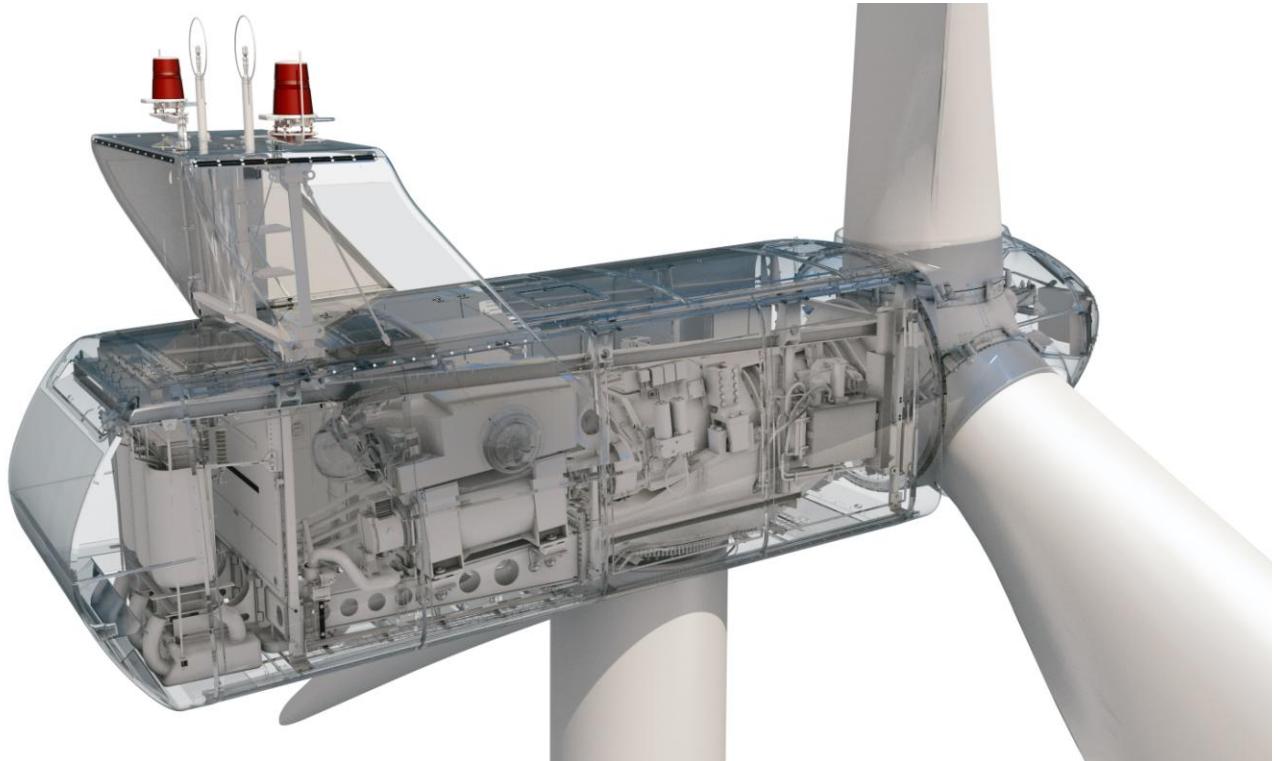


Figure 10-2: Side view drawing.

## 11 General Reservations, Notes and Disclaimers

- These general specifications apply to the current version of the V100 wind turbine. Updated versions of the V100 wind turbine, which may be manufactured in the future, may have general specifications that differ from these general specifications. In the event that Vestas supplies an updated version of the V100 wind turbine, Vestas will provide updated general specifications applicable to the updated version.
- Periodic operational disturbances and generator power de-rating may be caused by combination of high winds, low voltage or high temperature.
- Vestas recommends that the grid be as close to nominal as possible with little variation in frequency.
- A certain time allowance for turbine warm-up must be expected following grid dropout and/or periods of very low ambient temperature.
- The estimated power curve for the different estimated noise levels (sound power levels) is for wind speeds at 10 minute average value at hub height and perpendicular to the rotor plane.
- All listed start/stop parameters (e. g. wind speeds and temperatures) are equipped with hysteresis control. This can, in certain borderline situations, result in turbine stops even though the ambient conditions are within the listed operation parameters.
- The earthing system must comply with the minimum requirements from Vestas, and be in accordance with local and national requirements, and codes of standards.
- Lightning strikes are considered force majeure, i.e. damage caused by lightning strikes is not warranted by Vestas.
- For the avoidance of doubt, this document 'General Specifications' is not, and does not contain, any guarantee, warranty and/or verification of the power curve and noise (including, without limitation, the power curve and noise verification method). Any guarantee, warranty and/or verification of the power curve and noise (including, without limitation, the power curve and noise verification method) must be agreed to separately in writing.

## 12 Appendices

Power Curve,  $C_t$  values and Sound Power Levels for Mode 0 to 2 are defined below.

### 12.1 Mode 0

#### 12.1.1 Mode 0, Power Curve

Wind speed [m/s]	Mode 0, Power curve												
	Air density kg/m <sup>3</sup>												
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
3	13	9	9	10	10	11	11	11	12	12	13	14	15
3.5	53	34	36	38	39	41	43	45	46	48	50	52	55
4	112	80	83	86	89	92	95	98	101	104	106	109	115
4.5	181	136	140	144	148	152	156	160	165	169	173	177	185
5	260	198	203	209	215	220	226	232	237	243	248	254	265
5.5	353	270	278	285	293	300	308	315	323	330	338	345	360
6	462	356	365	375	385	395	404	414	424	433	443	453	472
6.5	581	443	455	468	481	493	506	518	531	544	556	569	594
7	736	563	579	595	611	626	642	658	673	689	705	720	751
7.5	911	700	720	739	758	777	796	816	835	854	873	892	930
8	1108	856	879	902	925	948	971	994	1017	1040	1063	1086	1131
8.5	1321	1028	1055	1082	1110	1137	1163	1190	1216	1243	1269	1295	1347
9	1524	1212	1243	1273	1304	1335	1363	1392	1421	1449	1474	1499	1547
9.5	1679	1397	1429	1460	1491	1522	1547	1572	1597	1622	1641	1660	1695
10	1766	1566	1591	1616	1641	1666	1682	1699	1716	1733	1744	1755	1773
10.5	1800	1689	1705	1721	1737	1753	1762	1770	1779	1788	1792	1796	1802
11	1811	1764	1772	1779	1786	1794	1797	1800	1803	1807	1808	1809	1812
11.5	1815	1796	1799	1802	1805	1808	1809	1811	1812	1813	1814	1814	1815
12	1815	1808	1810	1811	1812	1814	1814	1814	1815	1815	1815	1815	1815
12.5	1815	1813	1814	1814	1815	1815	1815	1815	1815	1815	1815	1815	1815
13	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
13.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
14	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
14.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
15	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
15.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
16	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

Wind speed [m/s]	Mode 0, Power curve													
	Air density kg/m <sup>3</sup>													
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275	
16.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
18	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
18.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
19	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
19.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
20	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

Table 12-1: Mode 0, power curve.

### 12.1.2 Mode 0, $C_t$ values

Wind speed [m/s]	Mode 0, $C_t$ values													
	Air density kg/m <sup>3</sup>													
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275	
3	<b>0.874</b>	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874
3.5	<b>0.891</b>	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
4	<b>0.877</b>	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877
4.5	<b>0.847</b>	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847
5	<b>0.820</b>	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820	0.820
5.5	<b>0.806</b>	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806	0.806
6	<b>0.802</b>	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802	0.802
6.5	<b>0.814</b>	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814	0.814
7	<b>0.807</b>	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807	0.807
7.5	<b>0.804</b>	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804	0.804
8	<b>0.795</b>	0.800	0.800	0.799	0.799	0.799	0.799	0.798	0.798	0.797	0.796	0.796	0.794	0.793
8.5	<b>0.768</b>	0.786	0.784	0.783	0.782	0.780	0.779	0.777	0.776	0.774	0.772	0.770	0.766	0.764
9	<b>0.716</b>	0.756	0.754	0.751	0.749	0.746	0.743	0.739	0.736	0.732	0.727	0.721	0.710	0.704
9.5	<b>0.636</b>	0.713	0.708	0.703	0.698	0.693	0.685	0.678	0.670	0.663	0.654	0.645	0.627	0.617
10	<b>0.545</b>	0.657	0.648	0.639	0.630	0.621	0.610	0.599	0.589	0.578	0.567	0.556	0.535	0.524
10.5	<b>0.459</b>	0.587	0.576	0.564	0.552	0.540	0.528	0.517	0.505	0.493	0.482	0.471	0.449	0.439
11	<b>0.389</b>	0.514	0.501	0.488	0.475	0.462	0.451	0.440	0.428	0.417	0.408	0.398	0.380	0.372
11.5	<b>0.333</b>	0.442	0.430	0.418	0.406	0.395	0.385	0.376	0.366	0.357	0.349	0.341	0.325	0.318
12	<b>0.288</b>	0.381	0.370	0.360	0.350	0.340	0.332	0.324	0.316	0.308	0.301	0.294	0.282	0.276
12.5	<b>0.251</b>	0.330	0.322	0.313	0.305	0.296	0.289	0.282	0.275	0.269	0.263	0.257	0.246	0.241
13	<b>0.222</b>	0.289	0.282	0.275	0.267	0.260	0.254	0.248	0.242	0.236	0.231	0.227	0.217	0.213
13.5	<b>0.197</b>	0.256	0.249	0.243	0.237	0.230	0.225	0.220	0.215	0.210	0.206	0.201	0.193	0.189
14	<b>0.176</b>	0.227	0.222	0.216	0.211	0.205	0.201	0.196	0.192	0.187	0.184	0.180	0.173	0.169
14.5	<b>0.158</b>	0.203	0.199	0.194	0.189	0.184	0.180	0.176	0.172	0.168	0.165	0.161	0.155	0.152
15	<b>0.142</b>	0.183	0.178	0.174	0.170	0.165	0.162	0.158	0.155	0.151	0.148	0.145	0.140	0.137
15.5	<b>0.129</b>	0.165	0.161	0.157	0.153	0.150	0.146	0.143	0.140	0.137	0.134	0.132	0.127	0.124
16	<b>0.117</b>	0.150	0.146	0.143	0.139	0.136	0.133	0.130	0.127	0.125	0.122	0.120	0.115	0.113
16.5	<b>0.107</b>	0.137	0.133	0.130	0.127	0.124	0.121	0.119	0.116	0.114	0.112	0.109	0.105	0.103
17	<b>0.098</b>	0.125	0.122	0.119	0.116	0.114	0.111	0.109	0.107	0.104	0.102	0.100	0.097	0.095
17.5	<b>0.091</b>	0.115	0.112	0.109	0.107	0.104	0.102	0.100	0.098	0.096	0.094	0.092	0.089	0.087
18	<b>0.084</b>	0.105	0.103	0.101	0.098	0.096	0.094	0.092	0.090	0.088	0.087	0.085	0.082	0.081
18.5	<b>0.077</b>	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.079	0.076	0.075
19	<b>0.072</b>	0.090	0.088	0.086	0.084	0.082	0.081	0.079	0.078	0.076	0.075	0.073	0.071	0.069

<b>Mode 0, <math>C_t</math> values</b>														
	<b>Air density kg/m<sup>3</sup></b>													
<b>Wind speed [m/s]</b>	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>19.5</b>	<b>0.067</b>	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.069	0.068	0.066	0.065
<b>20</b>	<b>0.062</b>	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.061	0.060

Table 12-2: Mode 0,  $C_t$  values.

### 12.1.3 Mode 0, Sound Power Levels

<b>Sound Power Level at Hub Height, Mode 0</b>		
<b>Conditions for Sound Power Level</b>		<b>Verification standard: IEC 61400-11 Ed. 2. Wind shear 0.15 Max turbulence at 10 meter height: 16% Inflow angle (vertical): 0 ± 2° Air density: 1.225 kg/m<sup>3</sup></b>
Hub Height	80 m	95 m
LwA @ 3 m/s (10 m above ground) [dBA]	93.8	93.8
Wind speed at hh [m/sec]	4.2	4.3
LwA @ 4 m/s (10 m above ground) [dBA]	96.0	96.4
Wind speed at hh [m/sec]	5.6	5.7
LwA @ 5 m/s (10 m above ground) [dBA]	100.1	100.7
Wind speed at hh [m/sec]	7.0	7.2
LwA @ 6 m/s (10 m above ground) [dBA]	103.9	104.4
Wind speed at hh [m/sec]	8.4	8.6
LwA @ 7 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	9.8	10.0
LwA @ 8 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	11.2	11.5
LwA @ 9 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	12.6	12.9
LwA @ 10 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	13.9	14.3
LwA @ 11 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	15.3	15.8
LwA @ 12 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	16.7	17.2
LwA @ 13 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	18.1	18.6

Table 12-3: Sound power level at hub height: Mode 0.

## 12.2 Mode 1

### 12.2.1 Mode 1, Power Curves

Wind speed [m/s]	Mode 1, Power curves													
	Air density kg/m <sup>3</sup>													
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275	
3	13	9	9	9	10	10	11	11	11	12	12	13	14	15
3.5	53	34	36	38	39	41	43	45	46	48	50	52	55	57
4	112	80	83	86	89	92	95	98	101	104	106	109	115	118
4.5	180	134	139	143	147	151	155	159	163	167	171	175	184	188
5	256	195	200	206	211	217	223	228	234	239	245	250	261	267
5.5	346	265	273	280	287	295	302	310	317	324	332	339	354	361
6	453	349	358	368	377	387	396	406	415	425	434	444	463	472
6.5	576	439	451	464	476	489	501	514	526	539	551	564	588	601
7	728	558	573	589	604	620	635	651	666	682	697	713	744	759
7.5	902	693	712	731	750	769	788	807	826	845	864	883	920	939
8	1098	847	870	893	916	939	961	984	1007	1030	1053	1075	1120	1143
8.5	1312	1019	1046	1073	1100	1127	1154	1180	1207	1234	1260	1286	1338	1364
9	1519	1204	1234	1265	1296	1326	1355	1384	1413	1443	1468	1494	1542	1565
9.5	1678	1392	1423	1455	1486	1518	1543	1569	1594	1619	1639	1658	1693	1709
10	1766	1562	1588	1613	1638	1664	1681	1698	1715	1732	1743	1754	1773	1780
10.5	1799	1687	1703	1720	1736	1753	1761	1770	1779	1788	1791	1795	1801	1803
11	1811	1764	1772	1779	1787	1794	1798	1801	1804	1807	1808	1810	1812	1813
11.5	1814	1796	1799	1802	1805	1809	1810	1811	1812	1813	1813	1814	1815	1815
12	1815	1809	1810	1811	1812	1813	1814	1814	1814	1815	1815	1815	1815	1815
12.5	1815	1813	1814	1814	1814	1815	1815	1815	1815	1815	1815	1815	1815	1815
13	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
13.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
14	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
14.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
15	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
15.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
16	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
16.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
18	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

Mode 1, Power curves														
	Air density kg/m <sup>3</sup>													
Wind speed [m/s]	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>18.5</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>19</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>19.5</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>20</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

Table 12-4: Mode 1, power curve.

### 12.2.2 Mode 1, C<sub>t</sub> values

	Mode 1, C <sub>t</sub> values													
	Air density kg/m <sup>3</sup>													
Wind speed [m/s]	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>3</b>	<b>0.874</b>	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874
<b>3.5</b>	<b>0.890</b>	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890	0.890
<b>4</b>	<b>0.863</b>	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863	0.863
<b>4.5</b>	<b>0.809</b>	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809	0.809
<b>5</b>	<b>0.764</b>	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764	0.764
<b>5.5</b>	<b>0.741</b>	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741	0.741
<b>6</b>	<b>0.733</b>	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733	0.733
<b>6.5</b>	<b>0.766</b>	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766	0.766
<b>7</b>	<b>0.755</b>	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755	0.755
<b>7.5</b>	<b>0.750</b>	0.749	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750	0.750
<b>8</b>	<b>0.748</b>	0.749	0.749	0.749	0.749	0.749	0.749	0.749	0.749	0.749	0.749	0.748	0.748	0.747
<b>8.5</b>	<b>0.735</b>	0.745	0.744	0.744	0.743	0.742	0.741	0.741	0.740	0.739	0.738	0.737	0.734	0.733
<b>9</b>	<b>0.699</b>	0.729	0.727	0.726	0.724	0.722	0.720	0.717	0.715	0.712	0.708	0.703	0.694	0.689
<b>9.5</b>	<b>0.631</b>	0.699	0.695	0.691	0.687	0.683	0.676	0.669	0.663	0.656	0.648	0.639	0.622	0.613
<b>10</b>	<b>0.544</b>	0.652	0.643	0.634	0.626	0.617	0.607	0.597	0.586	0.576	0.565	0.555	0.533	0.522
<b>10.5</b>	<b>0.458</b>	0.585	0.574	0.562	0.551	0.539	0.527	0.516	0.504	0.492	0.481	0.470	0.448	0.438
<b>11</b>	<b>0.388</b>	0.514	0.501	0.488	0.475	0.462	0.451	0.440	0.428	0.417	0.408	0.398	0.380	0.371
<b>11.5</b>	<b>0.333</b>	0.442	0.430	0.418	0.406	0.395	0.385	0.376	0.366	0.356	0.349	0.341	0.325	0.318
<b>12</b>	<b>0.288</b>	0.381	0.370	0.360	0.350	0.340	0.332	0.324	0.316	0.308	0.301	0.294	0.282	0.276
<b>12.5</b>	<b>0.251</b>	0.331	0.322	0.313	0.305	0.296	0.289	0.282	0.275	0.269	0.263	0.257	0.246	0.241
<b>13</b>	<b>0.222</b>	0.289	0.282	0.275	0.267	0.260	0.254	0.248	0.242	0.236	0.231	0.227	0.217	0.213
<b>13.5</b>	<b>0.197</b>	0.256	0.249	0.243	0.237	0.230	0.225	0.220	0.215	0.210	0.206	0.201	0.193	0.189
<b>14</b>	<b>0.176</b>	0.227	0.222	0.216	0.211	0.205	0.201	0.196	0.192	0.187	0.184	0.180	0.173	0.169

<b>Mode 1, <math>C_t</math> values</b>														
	<b>Air density kg/m<sup>3</sup></b>													
<b>Wind speed [m/s]</b>	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>14.5</b>	<b>0.158</b>	0.203	0.199	0.194	0.189	0.184	0.180	0.176	0.172	0.168	0.165	0.161	0.155	0.152
<b>15</b>	<b>0.142</b>	0.183	0.178	0.174	0.170	0.165	0.162	0.158	0.155	0.151	0.148	0.145	0.140	0.137
<b>15.5</b>	<b>0.129</b>	0.165	0.161	0.157	0.153	0.150	0.146	0.143	0.140	0.137	0.134	0.132	0.127	0.124
<b>16</b>	<b>0.117</b>	0.150	0.146	0.143	0.139	0.136	0.133	0.130	0.127	0.125	0.122	0.120	0.115	0.113
<b>16.5</b>	<b>0.107</b>	0.137	0.133	0.130	0.127	0.124	0.121	0.119	0.116	0.114	0.112	0.109	0.105	0.103
<b>17</b>	<b>0.098</b>	0.125	0.122	0.119	0.116	0.114	0.111	0.109	0.107	0.104	0.102	0.100	0.097	0.095
<b>17.5</b>	<b>0.091</b>	0.115	0.112	0.109	0.107	0.104	0.102	0.100	0.098	0.096	0.094	0.092	0.089	0.087
<b>18</b>	<b>0.084</b>	0.105	0.103	0.101	0.098	0.096	0.094	0.092	0.090	0.088	0.087	0.085	0.082	0.081
<b>18.5</b>	<b>0.077</b>	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.079	0.076	0.075
<b>19</b>	<b>0.072</b>	0.090	0.088	0.086	0.084	0.082	0.081	0.079	0.078	0.076	0.075	0.073	0.071	0.069
<b>19.5</b>	<b>0.067</b>	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.069	0.068	0.066	0.065
<b>20</b>	<b>0.062</b>	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.061	0.060

Table 12-5: Mode 1,  $C_t$  values.

### 12.2.3 Mode 1, Sound Power Levels

<b>Sound Power Level at Hub Height, Mode 1</b>		
<b>Conditions for Sound Power Level</b>	<b>Verification standard: IEC 61400-11 Ed. 2.</b>	
	<b>Wind shear 0.15</b>	
	<b>Max turbulence at 10 meter height: 16%</b>	
	<b>Inflow angle (vertical): 0 ± 2°</b>	
	<b>Air density: 1.225 kg/m<sup>3</sup></b>	
Hub Height	80 m	95 m
LwA @ 3 m/s (10 m above ground) [dBA]	93.7	93.7
Wind speed at hh [m/sec]	4.2	4.3
LwA @ 4 m/s (10 m above ground) [dBA]	95.3	95.7
Wind speed at hh [m/sec]	5.6	5.7
LwA @ 5 m/s (10 m above ground) [dBA]	99.1	99.7
Wind speed at hh [m/sec]	7.0	7.2
LwA @ 6 m/s (10 m above ground) [dBA]	102.9	103.4
Wind speed at hh [m/sec]	8.4	8.6
LwA @ 7 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	9.8	10.0
LwA @ 8 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	11.2	11.5
LwA @ 9 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	12.6	12.9
LwA @ 10 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	13.9	14.3
LwA @ 11 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	15.3	15.8
LwA @ 12 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	16.7	17.2
LwA @ 13 m/s (10 m above ground) [dBA]	105.0	105.0
Wind speed at hh [m/sec]	18.1	18.6

Table 12-6: Sound power level at hub height: Mode 1.

## 12.3 Mode 2

### 12.3.1 Mode 2, Power Curves

Wind speed [m/s]	Mode 2, Power curves												
	Air density kg/m <sup>3</sup>												
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
3	13	9	9	10	10	11	11	11	12	12	13	14	15
3.5	53	34	36	38	39	41	43	45	46	48	50	52	55
4	112	80	83	86	89	92	95	98	101	104	106	109	115
4.5	181	136	140	144	148	152	156	160	165	169	173	177	185
5	260	198	203	209	215	220	226	231	237	243	248	254	265
5.5	353	270	278	285	293	300	308	315	323	330	338	345	360
6	462	355	365	375	384	394	404	413	423	433	442	452	471
6.5	581	443	455	468	480	493	506	518	531	543	556	568	594
7	735	563	579	594	610	626	642	657	673	688	704	720	751
7.5	908	697	717	736	755	774	793	812	831	851	870	889	926
8	1090	840	863	886	909	932	954	977	999	1022	1045	1067	1113
8.5	1271	981	1008	1034	1061	1087	1113	1140	1166	1192	1218	1244	1297
9	1437	1112	1142	1172	1201	1231	1261	1290	1320	1349	1379	1408	1465
9.5	1580	1227	1260	1293	1325	1358	1390	1423	1455	1487	1518	1549	1607
10	1689	1331	1367	1402	1437	1473	1506	1540	1573	1607	1634	1661	1709
10.5	1757	1425	1462	1499	1536	1573	1604	1635	1666	1697	1717	1737	1768
11	1792	1512	1549	1585	1622	1659	1683	1708	1732	1757	1768	1780	1797
11.5	1805	1592	1624	1657	1690	1722	1738	1755	1771	1787	1793	1799	1808
12	1811	1666	1691	1715	1740	1764	1774	1783	1792	1802	1805	1808	1812
12.5	1813	1726	1742	1757	1773	1789	1794	1799	1804	1809	1810	1812	1814
13	1814	1765	1774	1784	1793	1802	1805	1807	1810	1812	1813	1814	1815
13.5	1815	1786	1791	1797	1803	1808	1810	1811	1813	1814	1815	1815	1815
14	1815	1802	1805	1808	1811	1813	1814	1814	1814	1815	1815	1815	1815
14.5	1815	1812	1812	1813	1814	1815	1815	1815	1815	1815	1815	1815	1815
15	1815	1813	1813	1814	1814	1815	1815	1815	1815	1815	1815	1815	1815
15.5	1815	1814	1814	1814	1815	1815	1815	1815	1815	1815	1815	1815	1815
16	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
16.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
17.5	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
18	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

	Mode 2, Power curves													
	Air density kg/m <sup>3</sup>													
Wind speed [m/s]	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>18.5</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>19</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>19.5</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815
<b>20</b>	<b>1815</b>	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815	1815

Table 12-7: Mode 2, power curve.

### 12.3.2 Mode 2, C<sub>t</sub> values

	Mode 2, C <sub>t</sub> values													
	Air density kg/m <sup>3</sup>													
Wind speed [m/s]	1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275
<b>3</b>	<b>0.874</b>	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874	0.874
<b>3.5</b>	<b>0.891</b>	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891	0.891
<b>4</b>	<b>0.877</b>	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877	0.877
<b>4.5</b>	<b>0.847</b>	0.847	0.847	0.847	0.847	0.846	0.847	0.847	0.847	0.847	0.847	0.847	0.847	0.847
<b>5</b>	<b>0.818</b>	0.818	0.818	0.818	0.818	0.817	0.818	0.818	0.818	0.818	0.818	0.818	0.818	0.818
<b>5.5</b>	<b>0.801</b>	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801	0.801
<b>6</b>	<b>0.796</b>	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796	0.796
<b>6.5</b>	<b>0.811</b>	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811	0.811
<b>7</b>	<b>0.800</b>	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800	0.800
<b>7.5</b>	<b>0.783</b>	0.783	0.783	0.783	0.783	0.782	0.783	0.783	0.783	0.783	0.783	0.783	0.783	0.783
<b>8</b>	<b>0.747</b>	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747	0.747
<b>8.5</b>	<b>0.695</b>	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695	0.695
<b>9</b>	<b>0.634</b>	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634	0.634
<b>9.5</b>	<b>0.569</b>	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.569	0.567
<b>10</b>	<b>0.505</b>	0.513	0.513	0.513	0.513	0.513	0.513	0.513	0.512	0.512	0.509	0.507	0.500	0.496
<b>10.5</b>	<b>0.441</b>	0.462	0.462	0.462	0.462	0.462	0.460	0.458	0.456	0.454	0.450	0.445	0.435	0.428
<b>11</b>	<b>0.381</b>	0.417	0.416	0.415	0.415	0.414	0.410	0.407	0.403	0.400	0.394	0.388	0.375	0.368
<b>11.5</b>	<b>0.330</b>	0.377	0.375	0.373	0.371	0.369	0.364	0.359	0.354	0.349	0.342	0.336	0.323	0.317
<b>12</b>	<b>0.287</b>	0.342	0.339	0.335	0.331	0.328	0.322	0.316	0.311	0.305	0.299	0.293	0.281	0.275
<b>12.5</b>	<b>0.251</b>	0.310	0.305	0.300	0.295	0.290	0.285	0.279	0.273	0.267	0.262	0.257	0.246	0.241
<b>13</b>	<b>0.222</b>	0.279	0.274	0.268	0.263	0.258	0.252	0.247	0.241	0.236	0.231	0.226	0.217	0.213
<b>13.5</b>	<b>0.197</b>	0.250	0.245	0.240	0.235	0.229	0.224	0.220	0.215	0.210	0.206	0.201	0.193	0.189
<b>14</b>	<b>0.176</b>	0.225	0.220	0.215	0.210	0.205	0.201	0.196	0.192	0.187	0.184	0.180	0.173	0.169

<b>Wind speed [m/s]</b>	<b>Mode 2, <math>C_t</math> values</b>													
	<b>Air density kg/m<sup>3</sup></b>													
1.225	0.95	0.975	1	1.025	1.05	1.075	1.1	1.125	1.15	1.175	1.2	1.25	1.275	
<b>14.5</b>	<b>0.158</b>	0.203	0.198	0.193	0.189	0.184	0.180	0.176	0.172	0.168	0.165	0.161	0.155	0.152
<b>15</b>	<b>0.142</b>	0.182	0.178	0.174	0.169	0.165	0.162	0.158	0.155	0.151	0.148	0.145	0.140	0.137
<b>15.5</b>	<b>0.129</b>	0.165	0.161	0.157	0.153	0.150	0.146	0.143	0.140	0.137	0.134	0.132	0.127	0.124
<b>16</b>	<b>0.117</b>	0.150	0.146	0.143	0.139	0.136	0.133	0.130	0.127	0.125	0.122	0.120	0.115	0.113
<b>16.5</b>	<b>0.107</b>	0.137	0.133	0.130	0.127	0.124	0.121	0.119	0.116	0.114	0.112	0.109	0.105	0.103
<b>17</b>	<b>0.098</b>	0.125	0.122	0.119	0.116	0.114	0.111	0.109	0.107	0.104	0.102	0.100	0.097	0.095
<b>17.5</b>	<b>0.091</b>	0.115	0.112	0.109	0.107	0.104	0.102	0.100	0.098	0.096	0.094	0.092	0.089	0.087
<b>18</b>	<b>0.084</b>	0.105	0.103	0.101	0.098	0.096	0.094	0.092	0.090	0.088	0.087	0.085	0.082	0.081
<b>18.5</b>	<b>0.077</b>	0.097	0.095	0.093	0.091	0.089	0.087	0.085	0.083	0.082	0.080	0.079	0.076	0.075
<b>19</b>	<b>0.072</b>	0.090	0.088	0.086	0.084	0.082	0.081	0.079	0.078	0.076	0.075	0.073	0.071	0.069
<b>19.5</b>	<b>0.067</b>	0.084	0.082	0.080	0.078	0.077	0.075	0.074	0.072	0.071	0.069	0.068	0.066	0.065
<b>20</b>	<b>0.062</b>	0.078	0.076	0.075	0.073	0.071	0.070	0.069	0.067	0.066	0.065	0.063	0.061	0.060

Table 12-8: Mode 2,  $C_t$  values.

### 12.3.3 Mode 2, Sound Power Levels

<b>Sound Power Level at Hub Height, Mode 2</b>		
<b>Conditions for Sound Power Level</b>	<b>Verification standard: IEC 61400-11 Ed. 2.</b>	
		<b>Wind shear 0.15</b>
		<b>Max turbulence at 10 meter height: 16%</b>
		<b>Inflow angle (vertical): 0 ± 2°</b>
		<b>Air density: 1.225 kg/m³</b>
Hub Height	80 m	95 m
LwA @ 3 m/s (10 m above ground) [dBA]	93.8	93.8
Wind speed at hh [m/sec]	4.2	4.3
LwA @ 4 m/s (10 m above ground) [dBA]	96.0	96.4
Wind speed at hh [m/sec]	5.6	5.7
LwA @ 5 m/s (10 m above ground) [dBA]	100.1	100.7
Wind speed at hh [m/sec]	7.0	7.2
LwA @ 6 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	8.4	8.6
LwA @ 7 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	9.8	10.0
LwA @ 8 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	11.2	11.5
LwA @ 9 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	12.6	12.9
LwA @ 10 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	13.9	14.3
LwA @ 11 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	15.3	15.8
LwA @ 12 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	16.7	17.2
LwA @ 13 m/s (10 m above ground) [dBA]	103.0	103.0
Wind speed at hh [m/sec]	18.1	18.6

Table 12-9: Sound power level at hub height: Mode 2.

**APPENDIX D:**  
**VESTAS V100-1.8 MW SOUND POWER DATA**

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Ministry of the Environment.

## Sound Power Level Data for the V100-1.8MW

**These values are valid for the following conditions**

WTG Type	V100-1.8 MW
Max Rated Power	1.8 MW
Hub Height [m]	95 m
Shear factor	0.16
Max turbulence at 10m height	0.16
Inflow angle	0 +/-2 deg
Air Density	1.225 kg/m3
Measurement Standard:	ICE 61400-11:2002, using amendments procedure above 95% RP

Wind Speed@10m [m/s]	3	4	5	6	7	8	9	10	11	12	13	14
16Hz [dB(A)]	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
31.5Hz [dB(A)]	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
63Hz [dB(A)]	NaN	NaN	NaN	85.2	87.4	87.1	86.7	86.6	NaN	NaN	NaN	NaN
125Hz [dB(A)]	NaN	NaN	NaN	89.6	92	91.7	91.3	91.4	NaN	NaN	NaN	NaN
250Hz [dB(A)]	NaN	NaN	NaN	93	94.7	94.2	93.6	93.5	NaN	NaN	NaN	NaN
500Hz [dB(A)]	NaN	NaN	NaN	95.4	97.1	96.7	96.1	96.1	NaN	NaN	NaN	NaN
1000Hz [dB(A)]	NaN	NaN	NaN	98.2	99.7	99.5	99	99.1	NaN	NaN	NaN	NaN
2000Hz [dB(A)]	NaN	NaN	NaN	96.6	98.2	98.4	98.2	98.2	NaN	NaN	NaN	NaN
4000Hz [dB(A)]	NaN	NaN	NaN	94.6	96.6	97.2	98.7	98.6	NaN	NaN	NaN	NaN
8000Hz [dB(A)]	NaN	NaN	NaN	85.4	89.8	90.3	91.4	92.3	NaN	NaN	NaN	NaN

Spectra Value [dB(A)]	NaN	NaN	NaN	103.3	105	105	105	105	NaN	NaN	NaN	0
-----------------------	-----	-----	-----	-------	-----	-----	-----	-----	-----	-----	-----	---

**Notes:**

1. NAN indicates data not available due to insufficient data collection at this wind speed.
2. Disclaimer:  
The values are valid for the A-weighted sound power levels  
Octave band values must be regarded as informative  
Site specific values are not warranted
3. Measurement standard - ICE 61400-11:2002, using amendments procedure above 95% RP



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IPC Energy  
December 01, 2010

**Attention: Sunny Galia / John Andrews / Terry Hawrysh**

IPC Energy  
2550 Argentia Rd. Suite 105  
Mississauga, ON, Canada  
L5N 5R1

**Reference:** Warranted Sound Power Level and Tonality for the Vestas V100-1.8MW for the Vineland Power Inc. and Wainfleet Wind Energy Inc. Projects.

Dear Sunny/John/Terry,

Vestas is pleased to provide the following clarification regarding the sound characteristics of the V100-1.8MW wind turbine. The V100-1.8 wind turbine will be used by Vineland Power Inc and Wainfleet Wind Energy Inc. located respectively in Vineland ON, and Wainfleet ON, Canada to power their projects and supply power to the OPA. This letter provides clarification of the V100-1.8 sound characteristics and is not intended as a warranty, the above projects will be covered by warranties provided to the above contracts as part of the Ontario FIT award and as such constitute a special offer to only these FIT contracts.

**Warranted Sound Power Level and Tonality V100 – 1.8MW WTG IEC Class IIIA**

**Sound Power Level:**

When measured in accordance with the Sound Level Testing Procedures attached as Exhibit N.2 to the Wind Turbine Supply Agreement to which this Exhibit N.1 is attached, the V100 1.8MW WTG IEC Class IIIA warranted sound power level at 8m/s (10m height) is

$$L_{WA} = 105.0 \text{ dB(A).}$$

This warranted sound level is subject to a tolerance for measurement uncertainties of the greater of (i) the actual measurement uncertainty determined in accordance with the Sound Level Test Standard and (ii)  $\pm 2\text{dB(A)}$ . If the measured sound power level is at or below the warranted sound power level plus the uncertainty, the standard has been met.

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IPC Energy  
December 01, 2010

**Tonality:**

The supplier will warrant the tonality of the sound generated by the Wind Turbines as measured by the Sound Level Testing Procedures attached as Exhibit N.2 (IEC 61400-11-ed2:2002 standard), such that the tonal audibilities,  $\Delta L_{a,k}$  are not greater than two (2) DBa.

The above commitments will be captured in the contracts for IPC Energy Wainfleet and Vineland that are in the process of being finalized.

Thank you for the opportunity to clarify our position with respect to the V100 sound characteristics. Vestas prides itself on its excellent working relationships with owners of wind turbines worldwide. Our goal is to provide you with the highest levels of customer service in order to support you in creating a successful project. If you have any questions, please do not hesitate to contact me at your convenience.

Sincerely,

*Timothy Koivu*

Timothy Koivu (MSc)  
Senior Contract and Business Development Manager  
Vestas-American Wind Technology, Inc.  
65 Queen Street, Suite 2000, Box 56  
Toronto, Ontario, Canada  
Direct: 416-254-6238

## **Exhibit N**

### **Sound Level Performance Standard**

#### **Warranted Sound Power Level V100 – 1.8MW WTG IEC Class III**

When measured in accordance with the Sound Level Testing Procedures attached as Exhibit O to the Wind Turbine Supply Agreement to which this Exhibit N is attached, the V100 – 1.8MW WTG IEC Class S warranted sound power level at 8m/s (10m height) is

$$L_{wa} = 105.0 \text{ dB(A).}$$

This warranted sound level is subject to a tolerance for measurement uncertainties of the greater of (i) the actual measurement uncertainty determined in accordance with the Sound Level Test Standard and (ii)  $\pm 2\text{dB(A)}$ . If the measured sound power level is at or below the warranted sound power level plus the uncertainty, the standard has been met.

Supplier also warrants that the sound generated by any Wind Turbine shall not contain any tone greater than +2dB when measured in accordance with the Sound Level Test Standard.



# Acoustic Noise Test Report for a Vestas V100 1.8 MW Turbine at Pueblo, Colorado

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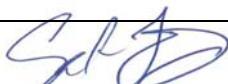
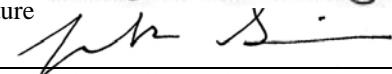
Vestas American Wind Technology, Inc.

1881 SW Naito Parkway #100  
Portland, OR 97201



TESTING CERT #2564.01

DNV Report No.: ANRP0105  
May 12, 2011

Acoustic Noise Test Report for a Vestas V100 1.8 MW Turbine at Pueblo, Colorado		DNV Renewables (USA) Inc. 1809 7th Avenue, Suite 900 Seattle, WA 98101 USA Tel: 1-206-387-4200 Fax: 1-206-387-4201 <a href="http://www.dnv.com/windenergy">http://www.dnv.com/windenergy</a>	
For: Vestas – American Wind Technology, Inc. 1881 SW Naito Parkway #100 Portland, OR 97201			
Customer Name: Galvin Clancy			
Date of First Issue:	May 11, 2011	Project No.:	PP003349
Report No.:	ANRP0105	Organization Unit:	ACGUS364
Version:	B		
Summary:  This report presents the methods, assumptions, and results of acoustic noise testing conducted by DNV on one V100 1.8 MW wind turbine at the Pueblo, Colorado Vestas manufacturing plant grounds.			
Prepared by:	Sarah Taubitz, Test Engineer	Signature 	
Verified by:	Collin Sad, Test Engineer	Signature 	
Approved by:	Luke Simmons, Group Leader, Performance and Acoustic Testing	Signature 	

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## 1 INTRODUCTION

### 1.1 Scope

This report presents the results of an acoustic noise test conducted on one Vestas V100 1.8 MW wind turbine located at Vestas' tower manufacturing facility in Pueblo, Colorado (the Project). The test turbine is a prototype turbine, designated number WTG1, and is the only turbine currently built on the plant property. The test was conducted in accordance with the Test Plan [1] to document acoustic noise emissions from the test turbine in accordance with the IEC acoustic noise measurement standard (the IEC Standard) [2]. The test was conducted during the early hours of February 20, 2011. This report describes the methodology, equipment, assumptions, and the results of the acoustic noise test. This test does not meet all the requirements of the IEC Standard; exceptions are given in Section 3.

A Power Performance Test will be conducted by DNV on the same test turbine. Newly installed met tower instrumentation, planned for use on the Power Performance Test, was therefore utilized for this Acoustic Noise Test.

This test was conducted and the report was prepared by DNV's Seattle-based Technology Group, an organization that is accredited by the American Association for Laboratory Accreditation (A2LA) to perform acoustic noise testing of wind turbines (Certificate number 2564.01).

The results given in this report relate only to this particular wind turbine; the same turbine type installed at a different site or operating with a different control scheme may provide different results.

### 1.2 Background

The power curve used in this report is the theoretical curve provided in the turbine's General Specification, supplied by Vestas [3]. Using a measured power curve is preferable to a theoretical one; however since the turbine is a prototype no measured power curve yet exists. Additional uncertainty was assigned to the sound power levels and third octave sound pressure levels reported herein.

### 1.3 Turbine Description

The V100 wind turbine is an upwind, 3-bladed, active yaw turbine incorporating full-span pitch control and constant-speed operation. Table 1-1 lists general details of the test turbine as noted in the General Specification [3]. Table 1-2 lists the serial numbers of the turbine and significant components.

**Table 1-1. Turbine Description**

Item	Value
IEC Class	S
Grid Frequency	60 Hz
Special Features	-
Rated Power	1815 kW
Rotor Diameter	100 m
Rotor Speed	9.3 – 16.6 RPM, 14.5 RPM nominal
Generator Speed	1345 RPM
Gearbox Ratio	1:92.8 nominal
Power Regulation	Pitch Regulated, Variable Speed
Shaft Tilt	6°
Hub Height	80 m
Distance from Rotor Center to Tower Center Line	4480 mm (per Appendix D)
Tower Type	Tubular steel
Cut-in Wind Speed	3 m/s
Rated Wind Speed	12 m/s
Cut-out Wind Speed	20 m/s
Generator Voltage	6 pole, 690 Vac
Power Factor (cos)	1.0

**Table 1-2. Turbine and Turbine Component Identification (per Vestas)**

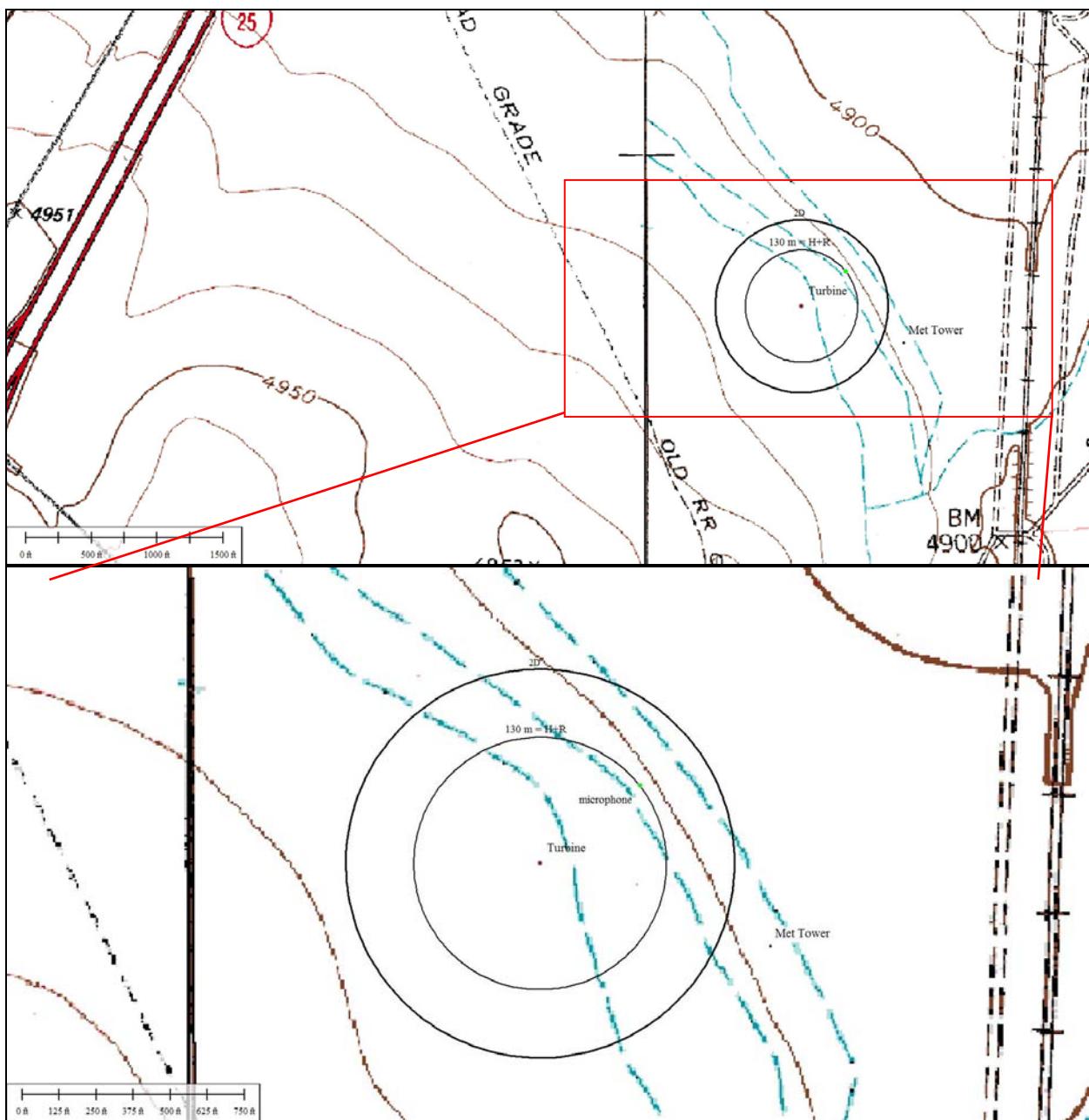
Item	Manufacturer/Model	Serial Number
Turbine	Vestas V100-1.8MW VCUS Mk7	38733
Blades	Vestas 49M	781302WHD90177 781302WHD90179 781302WHD90187
Gearbox	Bosch Rexroth GPV 442	72802018635
Generator	Vestas/Weier DVSG 560/6M	620451
Controller Software Version	VMPGlobal v. 10.05.03	N/A

## 1.4 Site Description

The test turbine is located on arid, bare land approximately 12 km south of Pueblo, Colorado, at an elevation of approximately 1490 m. The latitude and longitude coordinates for the turbine under measurement are 38.16341° N by 104.62135° W. Figure 1-1 shows the site layout and topography of the Project and surrounding areas. The BNSF and UPNW railway is located approximately 0.5 km east of the turbine; Interstate-25 is located approximately 1.5 km northwest of the turbine. The access road to the plant is approximately 130 m from the turbine at its nearest point. Traffic on this access road, Vestas plant noise, along with the railway and

highway noise, necessitate data collection on the weekend and preferably at nighttime; even so, trains and highway traffic noise invalidated a significant amount of data during the test period. The terrain within the Project is very flat with little to no vegetation. As can be seen on Figure 1-1, the microphone is located in the IEC Standard reference downwind position of  $R_0 = 133.9$  m (where the IEC Standard specifies  $130\text{ m} \pm 20\%$ ), the permanent meteorological (met) tower was located alongside the turbine, approximately 250 m to the southeast.

The site bearings were measured using a Garmin Nuvi GPS (accuracy  $\pm 1.5^\circ$ ) validated with a compass at several locations around the turbine, and distances were measured with a TruPulse 200 rangefinder (accuracy  $\pm 0.3$  m).



**Figure 1-1. Test Site Topography and Measurement Locations (zoomed image below)**

## 1.5 Site Conditions

The Project test site had a clear sky and no precipitation during the nighttime test period; the ranges of environmental conditions are displayed in Table 1-3, with a clear sky and no precipitation. The minimum and maximum values are taken from the 1-minute averaged 1 Hz data. There was no precipitation in the data set used for analysis.

**Table 1-3. Meteorological Conditions during the Test Period of 01:52 to 06:12**

Variable	Average	Minimum	Maximum
80 m Height Measured Wind Speed (m/s)	11.5	4.8	21.7
Air Pressure (hPa)	826.8	825.8	828.0
Air Temperature (°C)	9.4	8.0	11.0
Air Density (kg/m <sup>3</sup> )*	1.020	1.014	1.025
Relative Humidity (%)	44.0	43.4	44.4

\* Calculated from temperature and pressure according to the IEC Standard [1].

## 2 TECHNICAL APPROACH

### 2.1 Test Instrumentation

The IEC Standard requires that wind speed is determined for noise measurements when the turbine is operating by measuring the electrical output and determining wind speed, using a representative power curve, or from direct measurement with an anemometer. The former technique is mandatory for certification purposes, and was used for this test.

The 80 m permanent met tower was used for all meteorological data. For background noise measurements, measuring wind speed with an anemometer is required. For the wind direction encountered during this noise test, the 10 m temporary met mast could not be placed in an IEC-compliant location, due to a tall chain-link fence. Instead, DNV measured wind speeds using the primary anemometer mounted on the permanent 80 m height met tower, located 2.5 rotor diameters (250 m) southeast ( $108^\circ$  with respect to true north) of the test turbine. DNV also measured temperature and barometric pressure using DNV-installed instrumentation on the met tower. Figure 2-1 shows the permanent met tower configuration at the site. In Appendix B, Figures B-1 and B-4 display the met tower and anemometers. The met tower instrumentation has been installed in anticipation of a power performance test.

DNV obtained the turbine power signal from IEC-compliant measurement equipment recently installed in the turbine by DNV for the power performance test.

All data were sampled at 1 Hz for the duration of this test, and later averaged in 1-minute periods.

The microphone was located at a distance of 133.9 m from the turbine tower center, and  $47^\circ$  true relative to the turbine (for a downwind location of  $227^\circ$ ), and was mounted on a round 1 m diameter acoustically hard sound board made from 3/4-inch-thick plywood. In Appendix B, Figure B-2 shows the microphone and board relative to the turbine. The microphone power supply and measurement system were located near the microphone on the ground, in mild weather.

It has become industry accepted to utilize the yaw position of the turbine as the wind direction indicator, since the correlation to noise is better than with a wind direction transducer. Using a compass, DNV verified on site that the yaw position of the turbine was set to zero degrees at true North. There was no specified yaw position offset in the turbine controller. DNV utilized a GPS unit to verify compass readings at several locations around the turbine, and all were found to be in compliance within the IEC Standard's requirements.

Table 2-1 summarizes the instrumentation utilized, along with the calibration information. The instrument calibration sheets are attached as Appendix C.

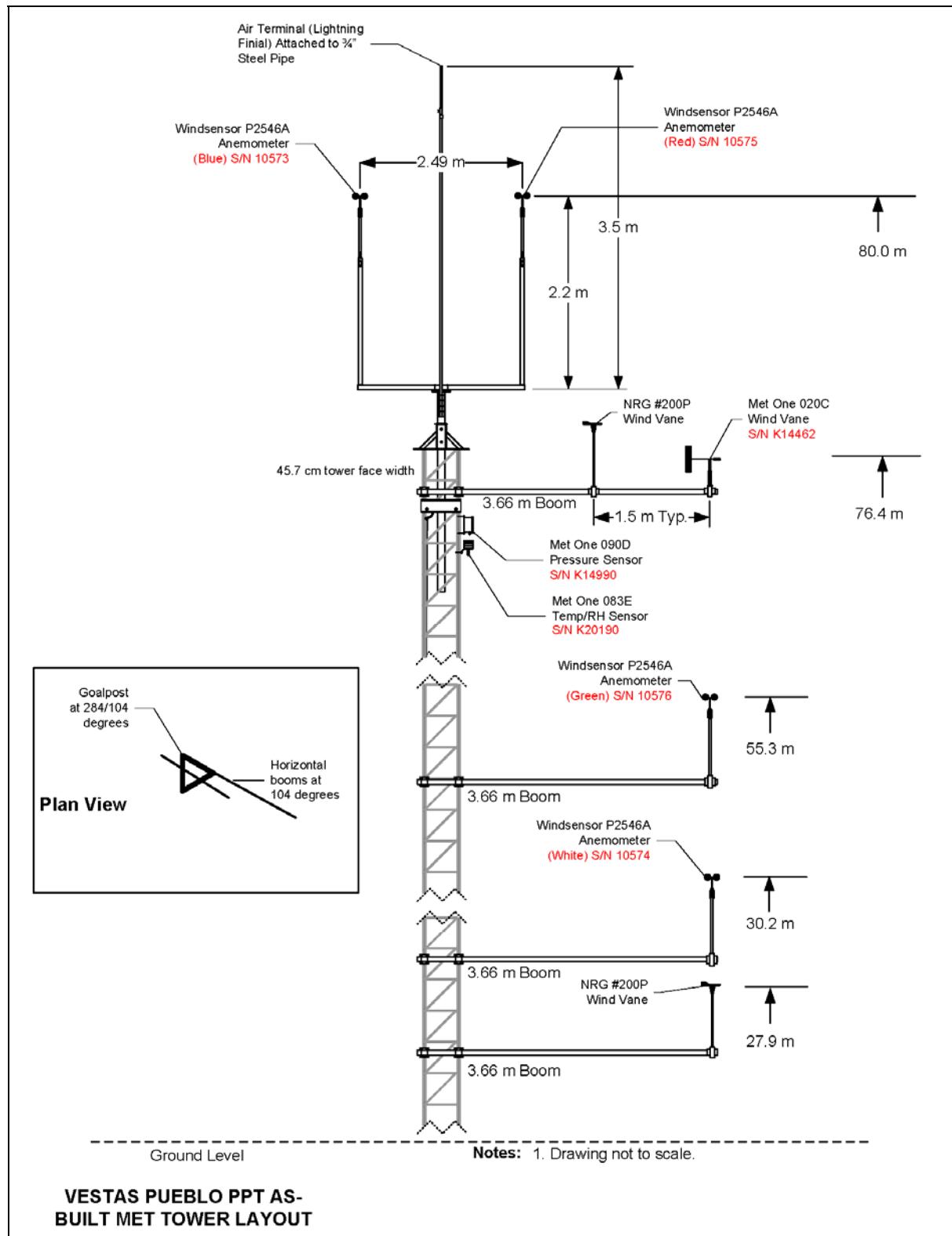


Figure 2-1. Met Tower Top Instrumentation Drawing

**Table 2-1. Test Instrumentation and Calibration**

Item	Manufacturer and Model	Serial Number	Calibration By, Date
Integrated Sound Level Meter, which includes Laptop, Data Acquisition Board, Cabling, Realtime Analyzer and Playback/Recorder, Microphone with Preamplifier	See below	1546B35	Scantek, January 21, 2011
Data Acquisition System	National Instruments NI-9233	1546B35	See Integrated Sound Level Meter line item
Real Time Analyzer, Playback/Recorder	Delta NoiseLab 3.0	N/A	See Integrated Sound Level Meter line item
Microphone and Preamplifier	PCB 378B02	105577	Scantek, January 2, 1011
Laptop	D830	F1PT3H1	N/A
Windscreen	Open cell foam, Brüel & Kjær UA-0237	N/A	N/A
Sound Board	¾"-thick particle board, N/A	N/A	N/A
Acoustic Calibrator	PCB Larson Davis CAL200	8053	Scantek, January 21, 2011
Wind Speed	Windsensor P2546A	10573	Svend Ole Hansen, December 5, 2010
Wind Direction	Turbine Yaw Position	N/A	N/A
Barometric Pressure	Met One 090D	K14990	February 14, 2011
Air Temperature	Met One 083E-1-35	K20290	February 14, 2011
Power Transducers	N/A	N/A	Logged and provided by Vestas
Data Logger	Campbell Scientific CR1000	38384	SIMCO, January 17, 2011

## 2.2 Data Reduction Methodology

The following subsections describe DNV's general method for collecting and processing the test data.

Test data were collected between 01:52 and 06:12 on February 20, 2011. The integrated sound level meter measured and recorded sound pressure levels, sampled at 50 kHz. DNV collected meteorological and turbine signals using Campbell Scientific loggers at a sampling rate of 1 Hz, and were subsequently averaged in 1-minute periods. One-minute averages of overall sound pressure levels were processed in Delta NoiseLab after data collection was complete. One-minute energy averaged one-third octave spectra, from 0 to 20,000 Hz, were also generated in post processing. Data available in the files included the fields described in Table 2-2. After measured wind speed and wind speed derived from turbine power were converted to standardized wind speed (at standard roughness length of 0.05 m and 10 m height, "Vs") for all the data, 1-minute records could be selected for tonality analysis at integer standardized wind speed (Vs) for the test period, after the field measurement was completed.

**Table 2-2. Recorded Data**

<b>Signal</b>	<b>Logged Measurement</b>	<b>Unit</b>
Date and Time	Time at end of sample period	Julian day 24 hour clock
Wind Speed	Average	m/s
Yaw Position	Average	Degrees relative to wind turbine
Air Temperature	Average	°C
Barometric Pressure	Average	hPa
Turbine Output Power	Average	kW
Sound Pressure Level	Scaled signal representing time series sound pressure	dB

## 2.2.1 Data Selection

Data corresponding to the following circumstances were removed from the valid data set:

1. Wind direction was outside the valid measurement sector of 212° to 242° relative to true north.
2. Interrupting noise sources such as a passing vehicle, train, or airplane that showed influence on the acoustic measurement.

The IEC Standard requires that a minimum of three one-minute averaged records be collected for each integer wind speed of  $V_s$  from 6 to 10 m/s; this requirement was not met for background noise during this test period; only a single one-minute record was collected at 8 m/s and none were collected at 9 or 10 m/s. As an alternative, the one-minute record at 8 m/s and the highest wind speed in the 7 m/s bin were utilized to background correct the one-third octave data and narrowband spectra used for tonality analysis. This is noted as a deviation in Section 3. Although this deviates from the IEC Standard, DNV believes that carrying out background correction in this manner on the data in these bins still provides useful information on the turbine's noise characteristics at these wind speeds; it can be expected that the one-third octave and tonality results at 8 through 10 m/s are somewhat more conservative, since background noise levels increase with increasing wind speed.

## 2.2.2 Wind Speed Correction

Consistent with the IEC Standard, for turbine operating acoustic measurements, DNV calculated the  $V_s$  at standard sea-level reference conditions, 10 m height, and 0.05 m roughness length using the 1-minute average measured electrical power and a measured sea-level density power curve.  $V_s$  is corrected for the reference conditions using Equation 1. Table 2-3 defines the variables for Equation 1. The power curve used to determine  $V_s$  is included as Appendix A. This curve is the sea-level-adjusted measured power curve published in the General Specification [3].

$$V_s = V_z \left[ \frac{\ln \frac{z_{ref}}{z_{oref}} \ln \frac{H}{z_o}}{\ln \frac{H}{z_{oref}} \ln \frac{z}{z_o}} \right] \quad \text{Equation 1}$$

**Table 2-3. Variables for Standardizing Wind Speed**

Parameter	Description	Value	Unit
$V_s$	Standardized wind speed	N/A	m/s
$V_z$	Wind speed measured at anemometer height $z$	N/A	m/s
$z_{oref}$	Reference roughness length	0.05	m
$z_o$	Roughness length	0.05	m
$H$	Rotor center height	80	m
$z_{ref}$	Reference height	10	m
$z$	Anemometer height (turbine rotor)	80	m

DNV derived the linear relationship between wind speed derived from power and wind speed measured by the nacelle anemometer for power between 5% and 95% of rated power; the nacelle anemometer method is preferred over the kappa method by the IEC Standard. For background noise measurements, turbine power is unavailable for determining  $V_s$ ; so for background noise wind speeds the kappa method was utilized, which provided a better correlation than the logarithmic Equation 5 from the IEC Standard. For noise measurements when the turbine power is greater than 95% of rated power, calculating wind speed from power output is not accurate; this linear relationship between wind speed derived from power and nacelle anemometer wind speeds, shown in Figure E-1 of Appendix E, was then utilized for these periods to determine  $V_s$ .

### 2.2.3 A-Weighted Sound Power Level

DNV plotted the measured A-weighted sound pressure levels against wind speed data, and utilized the fourth-order polynomials to determine the average sound pressure level,  $L_{Aeq}$ , for both total and background noise at each integer wind speed  $V_s$  (6, 7, 8, 9, and 10 m/s) per the IEC Standard. DNV utilized background noise data at wind speeds up to 13 m/s, since there were insufficient data between 8 and 10 m/s, and the Pearson regression coefficients ( $R^2$ ) for the fourth-order fit had a very high correlation that still provides a high degree of confidence in the resulting “predicted” background noise levels for each  $V_s$ . Noncompliance with the minimum data collection requirements and use of background noise data at wind speeds higher than 10 m/s are both exceptions to the IEC Standard and are listed in Section 3. This analysis yields the background noise level at each integer  $V_s$ , which is used to correct the turbine operating data for background noise at all integer wind speeds 6 to 10 m/s.

As an alternative method of mitigating the risk of the lack of background data for 8 though 10 m/s, the background noise value found using the fourth-order regression analysis at 7 m/s was

utilized to correct the total noise levels determined by regression analysis to determine sound power levels; these are also included in the results in Table 4-2.

#### **2.2.4 A-Weighted One-Third Octave Band Levels**

The one-third octave band sound pressure levels of the noise signal at the microphones were obtained using spectrum analysis software Delta Noiselab, concurrent with the one-minute sound pressure level calculations. As in the  $L_{Aeq}$  analysis, the turbine operating data were background corrected; where insufficient background noise data were collected (at 8 through 10 m/s), DNV utilized background noise at 7 and 8 m/s to provide a background correction, as described in Section 2.2.1.

#### **2.2.5 Tonality Analysis**

To analyze the tonality of the turbine, valid noise data were selected at the wind speeds closest to each integer  $V_s$ , per the IEC Standard. DNV performed the tonality analysis at wind speeds between 4 and 10 m/s. Sufficient operating data were available for all wind speeds between 4 and 10 m/s. Insufficient background noise data were unavailable between 8 and 10 m/s; in these cases, DNV utilized background noise data at 7 and 8 m/s for the corrections. The same was done for one-third octave analysis. DNV analyzed each measurement using a fast Fourier transform (FFT) with a 3-Hz resolution Hanning window from 3 to 20 kHz. Consistent with the IEC Standard, twelve 10-second energy-averaged narrowband spectra from turbine-operational data were analyzed in order to compare any suspected tones with the masking level in the tone's critical band. Two 60-second background-noise spectra closest to the integer wind speed (or at the highest wind speeds available in the case of 8 through 10 m/s, as described in Section 2.2.1) were energy averaged to get one spectra that was analyzed for each integer  $V_s$  and used to correct the operating spectra. Although an exception to the IEC Standard, utilizing background noise data from lower wind speeds for correction is expected to yield conservative results, since background noise levels are typically lower at lower wind speeds.

Each line in the identified tone's critical band was then classified according to the following criteria:

1. Lines are classified as masking if their RMS-averaged levels are less than 6 dB above the  $L_{70\%}$  sound pressure level. The  $L_{70\%}$  sound pressure level is the energy average of the 70% of spectral lines in the critical band with the lowest levels.
2. Lines are classified as tones if their RMS-averaged levels are more than 6 dB above the  $L_{pn,avg}$  sound pressure level. The  $L_{pn,avg}$  sound pressure level is the energy average of the spectral lines classified as masking.
3. Where there are several adjacent lines classified as tones, the line with the greatest level is identified. Adjacent lines are then classified as tones only if their levels are within 10 dB of the highest level.

4. Lines are classified as neither tones nor masking if their RMS-averaged levels:
  - Are greater than 6 dB above the  $L_{70\%}$  sound pressure level and
  - Are less than 6 dB above the  $L_{pn,avg}$  sound pressure level
5. Individual tones from each of the 12 background-corrected operating spectra (or a substitute lower-wind speed spectra in the case of 8 to 10 m/s) were energy averaged to determine their audibility.

The wind turbine noise tonality and tonal audibility are then calculated from the processed and categorized narrow band spectra. The tonal audibility as defined in the IEC Standard is a frequency-dependent criteria that has been determined from listening tests. A summary of these results is provided in Table 2-4.

## 2.2.6 A-Weighted Apparent Sound Power Level

The category A uncertainty for the apparent sound power level,  $L_{WA}$ , is the standard error of the estimated A-weighted sound pressure level,  $L_{Aeq}$ , at each integer  $V_S$  (Equation 2), and is obtained from the linear regression analysis.

$$U_A = \sqrt{\frac{\sum(y - y_{est})^2}{N - 2}} \quad \text{Equation 2}$$

Where:  
 $U_A$  = Category A uncertainty for apparent sound power level,  
 $y$  = measured sound pressure level,  
 $y_{est}$  = estimated sound pressure level using linear regression,  
 $N$  = number of measurements used in the linear regression.

The category A apparent sound power level uncertainty analysis resulted in a calculated uncertainty value,  $U_A$ , of 0.83 dB. DNV calculated this value using 143 data points at integer  $V_S$  values of 4 through 11 m/s. Uncertainty on the nacelle anemometer correlation was found to be 0.83 using Equation 2 above for data between 5% and 95% of rated power.

The category B uncertainty is calculated using Equation 3. The category B components are listed in Table 2-4. Two different values of  $U_{B9}$  were used, a higher value for the 8 to 10 m/s bins.

Total uncertainty values,  $U_C$ , are included in Table 4-4.

**Table 2-4. Category B Uncertainty Components**

Parameter	Description	Value	Unit	Source
U <sub>B</sub>	Category B uncertainty for apparent sound power level	0.9	dB	Calculation
U <sub>B1</sub>	Calibration of the instruments	0.2	dB	Calibrator calibration
U <sub>B2</sub>	Tolerances on the measurement chain	0.3	dB	Estimate
U <sub>B3</sub>	Sound board	0.3	dB	Estimate
U <sub>B4</sub>	Distance from microphone to hub	0.1	dB	Estimate
U <sub>B5</sub>	Acoustic impedance of air	0.1	dB	Estimate
U <sub>B6</sub>	Turbulence	0.5	dB	Estimate
U <sub>B7</sub>	Wind speed, measured Wind speed, derived	0.83 0.2	dB	Calculated using Equation 2 New anemometer install
U <sub>B8</sub>	Wind direction	0.3	dB	Sensor calibration and mounting estimate
U <sub>B9</sub>	Background correction, 4-7 m/s Background correction, 8-10 m/s	0.25 1.3	dB	Applied background correction Maximum correction assuming 3<SNR>6

$$U_B = \sqrt{U_{B1}^2 + U_{B2}^2 + U_{B3}^2 + U_{B4}^2 + U_{B5}^2 + U_{B6}^2 + U_{B7}^2 + U_{B8}^2 + U_{B9}^2} \quad \text{Equation 3}$$

Category A and B uncertainties are combined into one standard uncertainty by Equation 4:

$$U_C = \sqrt{U_A^2 + U_B^2} \quad \text{Equation 4}$$

Where: U<sub>C</sub> = Overall standard uncertainty for apparent sound power level.

## 2.2.7 One-Third Octave Spectra

For the one-third octave band, U<sub>A</sub> for each band is the standard error on the averaged band level, computed as the standard deviation divided by (N-1)<sup>1/2</sup>, where N is the number of measured spectra. The value for U<sub>B3</sub> is considered much larger than for L<sub>WA</sub>, and is estimated to be 1.7 dB for one-third octave bands. Uncertainties on the one-third octaves are included in Table 4-3.

## 2.2.8 Tonality

Per the IEC Standard, U<sub>A</sub> for each tone is the standard error, defined above, on the averaged tone level. The values of U<sub>B1</sub>, U<sub>B4</sub>, and U<sub>B6</sub> can be estimated to be smaller than for L<sub>WA</sub>. The value of U<sub>B3</sub> is estimated to be 1.7 dB. Uncertainties are provided along with the tonality results in Table 4-5. Because 1 minute of background noise at 7 m/s and 8 m/s were utilized to background correct the total noise at 8 through 10 m/s, the background noise portion of uncertainty calculation, U<sub>B9</sub>, was raised to a maximum value of 0.8, which DNV views as very conservative.

### 3 EXCEPTIONS TO THE IEC STANDARD

1. Insufficient background noise was recorded at the standardized wind speeds ( $V_S$ ) of 8 through 10 m/s; only 1 minute of background noise at 8 m/s was recorded, and none at 9 m/s or 10 m/s was recorded. Background noise recorded at lower wind speeds (7 and 8 m/s) were utilized as a substitute for background corrections for overall sound pressure levels. For one-third octave data between 4 and 7 m/s, sufficient background noise data were available to calculate uncertainties per the IEC Standard. For one-third octave data at 8 to 10 m/s, no uncertainties are reported because these values are merely indicative and not to be relied upon.
2. Due to insufficient background noise at 8 through 10 m/s, measured background noise up to 13 m/s was utilized to derive the fourth-order regression equation utilized for background correction of operating noise. Uncertainty on the resulting calculated sound power levels ( $L_{WA}$ ) and one-third octave turbine sound pressure levels have therefore been increased to account for this.
3. The turbine's yaw position data were utilized for determining wind direction instead of a wind vane transducer; yaw position has been shown to provide better correlation to acoustic noise output.

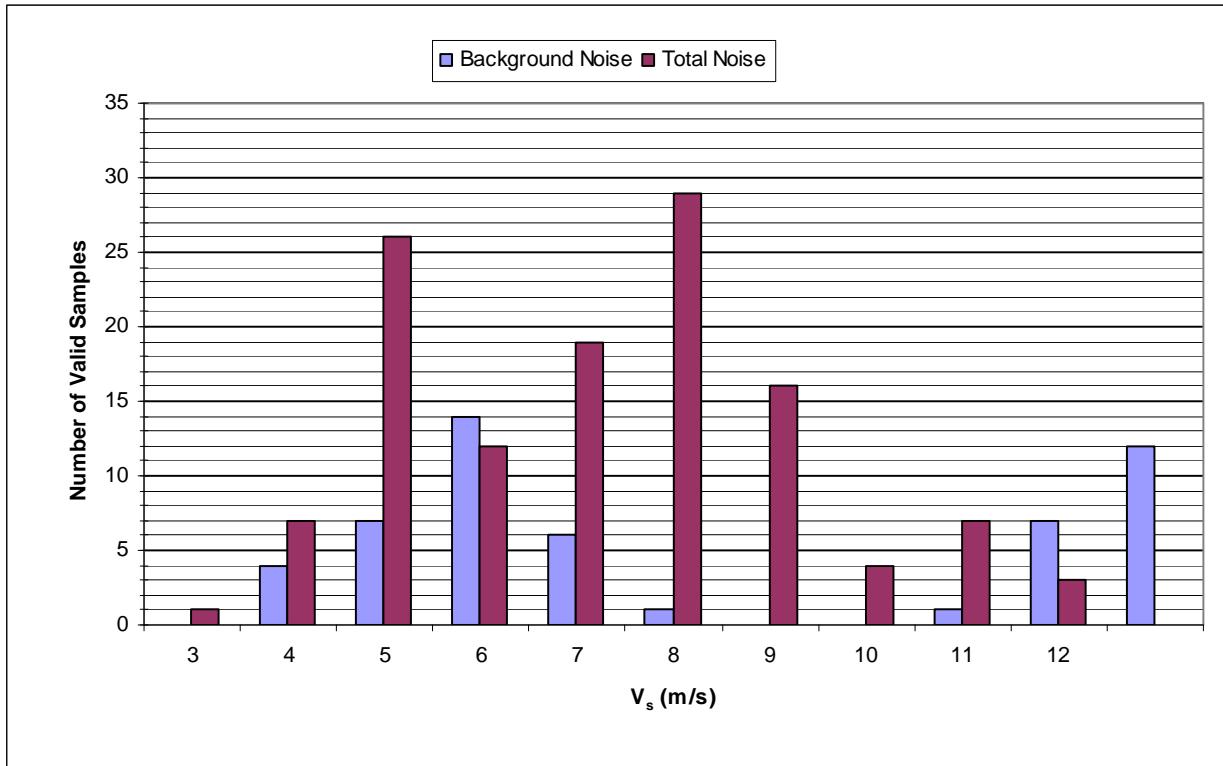
## 4 RESULTS

### 4.1 Collected Data

Data collected from 01:52 to 06:12 on February 20, 2011, were utilized in the subsequent results. Table 4-1 details the amount of data collected and the data removed for the specified reasons. Figure 4-1 displays the distribution of the collected data.

**Table 4-1. Summary of Collected Data**

Item	Number of 1 Minute Data Points
Total collected data, $V_s = 4 - 13 \text{ m/s}$	261
Removed data for invalid wind direction	19
Removed data for turbine operating outside normal parameters	24
Removed for spurious noises, turbine shutdown/startup periods	51
Valid data used, turbine operating	114
Valid data used, background	53



**Figure 4-1. Valid Collected Data**

## 4.2 Results

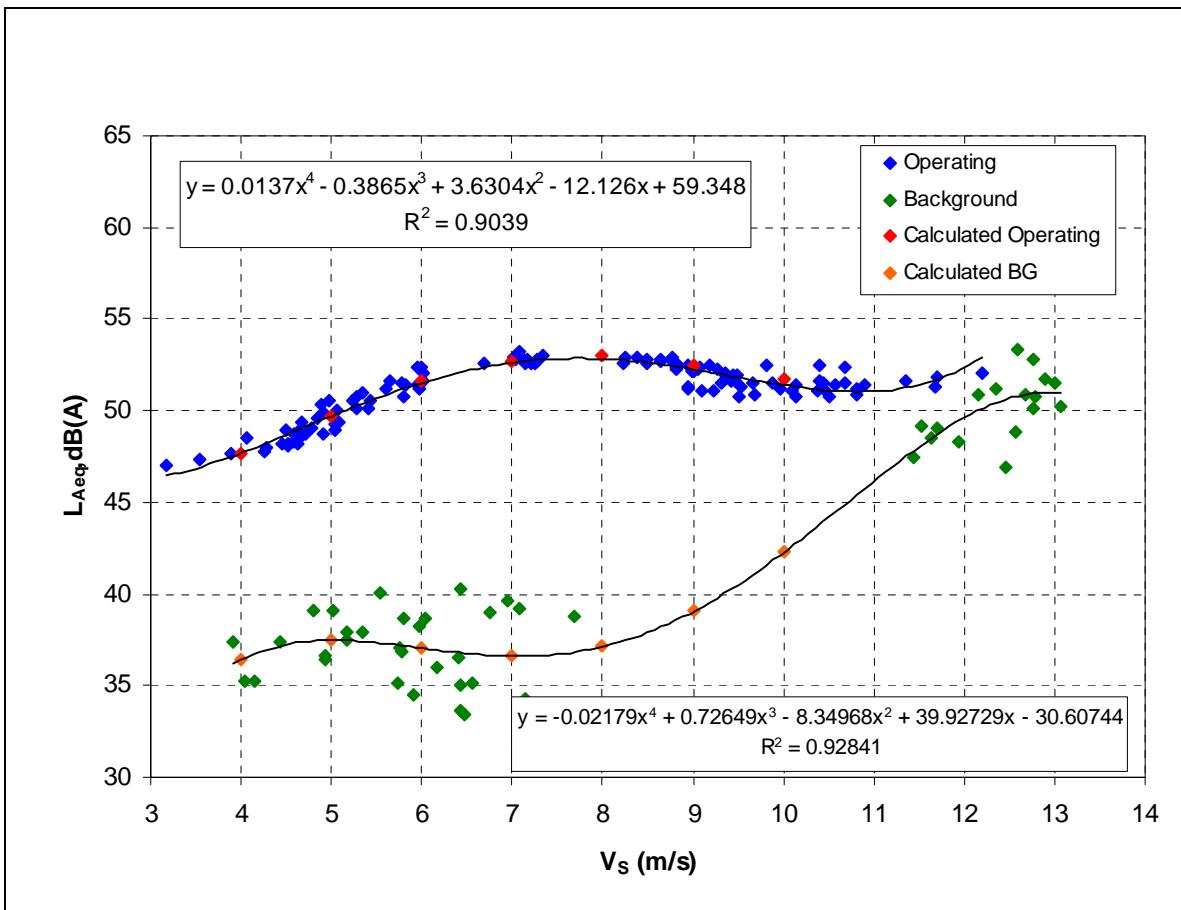
### 4.2.1 Overall Sound Pressure and Power Levels

As described in Section 2, DNV processed data into a set of valid data for use in the final results. The measured valid sound pressure levels for background and total (turbine operating) noise is displayed graphically in Figure 4-2. The fourth-order polynomials of total and background noise were used, since the resulting correlation coefficients were greater than 0.8, according to the IEC Standard. Because only one data point existed in the 8 m/s bin, and none in the 9 and 10 m/s bins, background noise at 11 through 13 m/s was utilized to determine the fourth-order regression. Table 4-2 lists the measured sound pressure levels for background and total noise, the background corrected “turbine-only” noise, and the subsequent sound power level for each standardized wind speed.

Figure 4-2 displays the sound pressure levels for both turbine operating and background noise measurements. Table 4-2 lists the total noise (wind turbine plus background) and background noise levels for each wind speed using fourth-order regression analysis per the IEC Standard, along with the calculated apparent sound power levels and the corresponding total uncertainties for each standardized wind speed. Although there was insufficient background noise measured at 8 m/s and none at 9 m/s and 10 m/s, including background noise at 12 and 13 m/s provides a fourth-order polynomial with a very high correlation factor ( $R^2$ ); therefore, although an exception to the IEC Standard, DNV believes this to be an accurate prediction of the background noise at these wind speeds. DNV also applied additional uncertainty to these  $L_{WA}$  at 8 through 10 m/s to account for this.

Additionally, Figure 4-2 shows sound power levels calculated using the 7 m/s background noise correction, to remove the uncertainty that may exist with the method above (using the fourth-order polynomial prediction without having any measured background data in the bin). Since it is in any case expected that the background noise will be higher at 8 m/s through 10 m/s than at 7 m/s, these calculated sound power levels for 8 m/s through 10 m/s are meant to provide an additional level of confidence in the results.

Figure 4-3 shows the turbine operating sound pressure levels versus the measured wind speed (labeled “ $V_{met}$ ” in the figure) at 10 m height. Figure 4-4 shows the turbine operating sound pressure levels versus turbine electrical power.

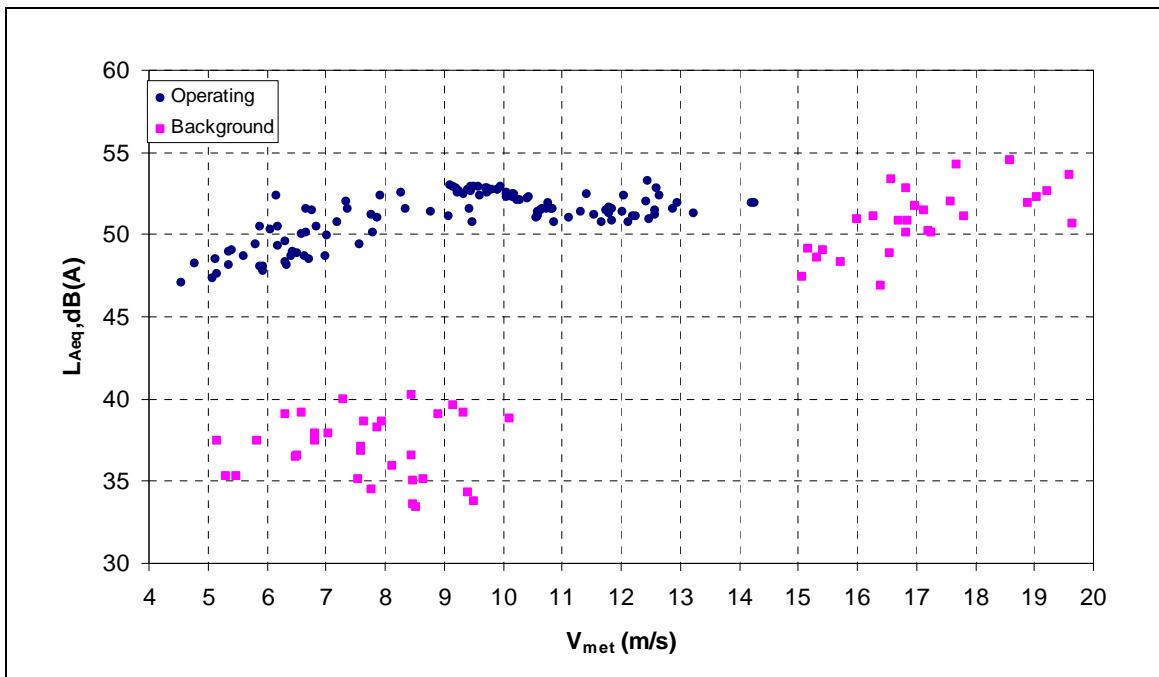


**Figure 4-2. A-Weighted, Valid Measured Sound Pressure Levels versus Standardized Wind Speed, Operating and Background**

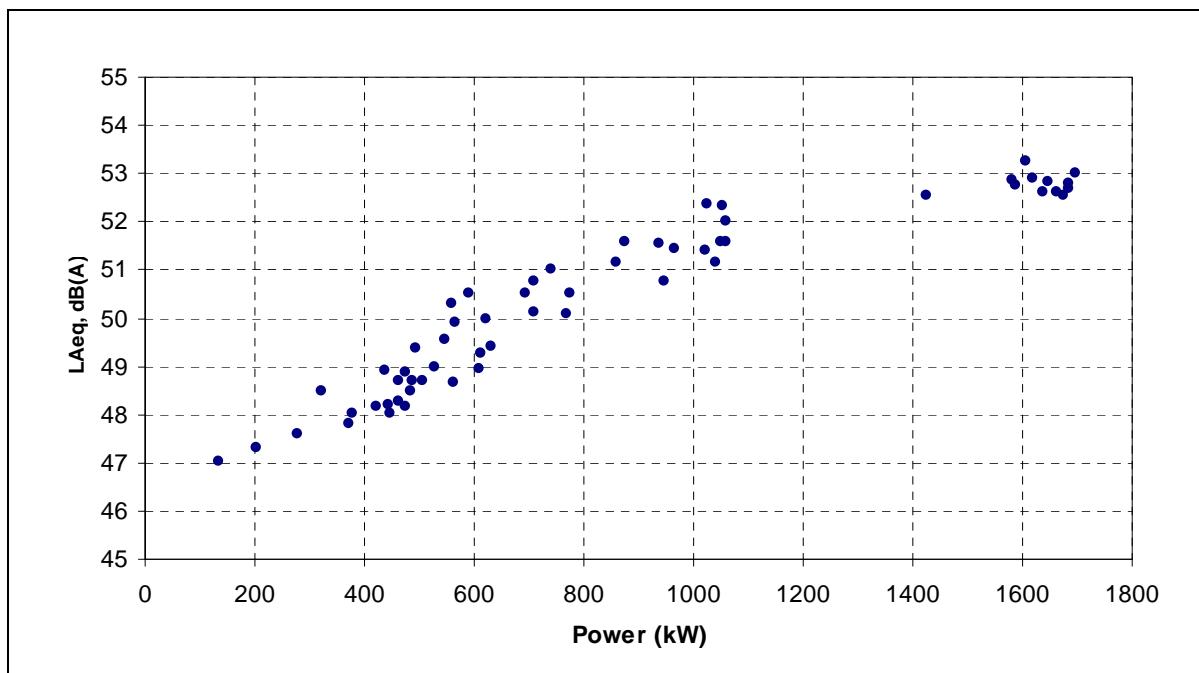
**Table 4-2. A-Weighted Sound Pressure and Power Level ( $L_{WA}$ ) Summary,  $V_s = 4 - 10$  m/s**

Standardized Wind Speed, $V_s$ (m/s)	4	5	6	7	8	9	10
Wind Turbine + Background Noise, $L_{Aeq,k}$ (dB)	47.7	49.7	51.6	52.7	53.0	52.5	51.8
Background Noise, $L_{Aeq,k}$ (dB)	36.4	37.5	37.0	36.6	37.1	39.1	42.3
Wind Turbine Noise, $L_{Aeq,c,k}$ (dB)	47.4	49.5	51.4	52.6	52.9	52.3	51.2
Wind Turbine Apparent Sound Power Level, $L_{WA,k}$ (dB)	96.3	98.4	100.3	101.5	101.8	101.2	100.2
Uncertainty ( $\pm$ dB)	0.9	1.0	0.9	0.9	1.6	1.7	1.7
Wind Turbine Noise using 7m/s Background Noise Correction of 36.6 dB, $L_{Aeq,c,k}$ (dB)					52.9	52.4	51.6
Apparent Sound Level using 7 m/s Background Correction (dB)					101.8	101.4	100.7

Note: For 8 to 10 m/s bins, insufficient background noise exists; LWA were calculated using a fourth-order polynomial for background noise.



**Figure 4-3. A-Weighted Sound Pressure Levels, Turbine Operating and Background Measurements versus Density-Corrected Measured Wind Speed at 80 m Height**



**Figure 4-4. A-Weighted Sound Pressure Levels, Turbine Operating Versus Measured Electrical Power**

#### 4.2.2 A-Weighted One-Third Octave Analysis

Results of A-weighted one-third octave spectra analysis for integer standardized wind speeds of 4 through 10 m/s, with background noise correction, are displayed in Table 4-3 and Table 4-4.

Because only 1 minute of background noise was available at 8 m/s and none was available at 9 or 10 m/s, the lower wind speed background noise available at 8 m/s was utilized for background corrections of the one-third octave data; this is a deviation from the IEC Standard and is listed in Section 3. Since background noise is expected to be lower at lower wind speeds, the one-third octave levels of background-corrected turbine noise can generally be considered a more conservative result. Note that for all integer wind speeds, the background noise influences the wind turbine noise above 6300 Hz.

**Table 4-3. A-Weighted One-Third Octave Sound Pressure Levels,  $V_s = 4 - 10 \text{ m/s}$** 

	Standardized Wind Speed Bin (m/s)						
	4	5	6	7	8	9	10
One-Third Octave Center Frequency (Hz)	<b>20</b>	5.4	6.4*	9.7	11.3	7.6*	11#
	<b>25</b>	9.4*	10.9*	12.4	14.8	11.4*	14#
	<b>31.5</b>	14.3	15.5	17.0	18.5	13.9	17#
	<b>40</b>	18.3	19.5	21.8	22.3	18.8	20.7#
	<b>50</b>	21.4	22.3	24.9	25.5	22.2	23.8#
	<b>63</b>	27.7	28.3	29.6	29.9	28.1	28.4#
	<b>80</b>	26.0	26.6	30.2	31.3	29.5	29.4#
	<b>100</b>	27.3	28.8	32.3	33.2	31.7	31.1#
	<b>125</b>	30.3	31.6	35.2	36.3	35.8	35.3#
	<b>160</b>	30.6	32.5	35.8	36.9	35.9	34.2#
	<b>200</b>	30.9	32.6	36.2	37.2	36.2	34.8#
	<b>250</b>	32.6	34.0	37.5	40.4	40.4	38#
	<b>315</b>	36.7	38.0	39.9	40.6	40.3	39.7#
	<b>400</b>	36.1	38.0	40.3	41.4	41.4	41.1#
	<b>500</b>	35.3	37.0	39.6	40.8	40.6	39.6#
	<b>630</b>	36.9	39.0	41.5	43.4	43.4	42.4#
	<b>800</b>	37.4	39.5	41.4	42.4	42.4	41.4#
	<b>1000</b>	37.5	39.2	41.4	42.5	42.3	41.5#
	<b>1250</b>	37.3	38.7	41.2	42.3	42.3	41.6#
	<b>1600</b>	37.7	39.0	40.7	41.7	41.8	41#
	<b>2000</b>	37.0	37.8	39.7	40.7	40.8	40.2#
	<b>2500</b>	36.7	37.0	38.4	38.9	39.1	38.5#
	<b>3150</b>	31.6	32.8	35.1	36.3	36.6	36#
	<b>4000</b>	27.4	28.8	31.0	32.4	32.7	32.2#
	<b>5000</b>	+	25.1#	26.7#	28.0	28.3	27.8#
	<b>6300</b>	+	+	+	+	+	+
	<b>8000</b>	+	+	+	+	+	+
	<b>10000</b>	+	+	+	+	+	+
	<b>12500</b>	+	+	+	+	+	+
	<b>16000</b>	+	+	+	+	+	+

\* Operating-to-background level less than 6 dB but more than 3 dB

+ Operating-to-background level less than 3 dB

# Corrected with only available one-minute record of 8 m/s data

**Table 4-4. Uncertainties  $U_C (\pm \text{dB})$  for One-Third Octave Results,  $V_s = 4 - 7 \text{ m/s}$** 

		Standardized Wind Speed $V_s$ (m/s)			
		4	5	6	7
One-Third Octave Center Frequency (dB)	20	2.1	3.0	2.1	3.3
	25	2.2	3.9	2.3	3.2
	31.5	2.1	3.4	2.3	3.8
	40	2.1	3.2	2.2	3.5
	50	2.1	2.7	2.3	3.5
	63	1.9	2.1	2.0	2.6
	80	2.2	2.6	2.2	2.9
	100	2.1	2.4	2.1	2.5
	125	2.0	2.2	2.0	2.1
	160	2.0	2.2	2.0	2.1
	200	2.0	2.2	1.9	2.0
	250	2.0	2.1	1.9	2.1
	315	1.9	2.0	1.9	1.9
	400	2.0	2.1	1.9	1.9
	500	2.0	2.1	1.9	1.9
	630	2.0	2.3	1.9	1.9
	800	2.0	2.2	1.9	1.9
	1000	2.0	2.1	1.9	1.9
	1250	1.9	2.1	1.9	1.9
	1600	1.9	2.0	1.9	1.9
	2000	1.9	2.0	1.9	1.9
	2500	1.9	1.9	1.9	1.9
	3150	1.9	2.0	1.9	2.0
	4000	1.9	2.0	1.9	2.1
	5000	1.9	2.0	1.9	2.1
	6300	1.9	1.9	1.9	2.0
	8000	1.9	1.9	1.9	1.9
	10000	1.9	1.9	1.9	1.9
	12500	1.9	1.9	1.9	1.9
	16000	1.9	1.9	1.9	1.9

### 4.2.3 Tonality

A summary of the tonality analysis is provided in Table 4-5. Results of the tonality analysis at each standardized wind speed are provided in Table 4-6 through Table 4-12. Graphs of each tone determined to be reportable per Equation 17 of the IEC Standard are provided in Appendix E, as well as narrowband spectra of the total noise utilized in this analysis for all wind speeds. As per the IEC Standard, the average frequency within the critical bandwidths for the tones at 674 Hz and 2490 Hz were used for determining audibility, since the frequencies of these two tones varied in each spectra analyzed but stayed within 10% of the critical bandwidth. Tones at 300 Hz and 360 Hz, respectively, stayed constant at those frequencies.

**Table 4-5. Tonality Analysis Summary**

<b>Standardized Wind Speed, <math>V_s</math> (10 m height)</b>	<b>Frequency (Hz)</b>	<b><math>\Delta L_k</math> (dB)</b>	<b><math>\Delta L_a</math> (dB)</b>	<b><math>\Delta L_{a,k}</math> (dB)</b>	<b>Uncertainty on Tonality (<math>\pm</math> dB)</b>	<b>Reportable per IEC</b>
4	60	-10.56	-2.00	-8.55	1.85	No
4	300	-4.52	-2.11	-2.41	2.49	Yes
4	360	-11.89	-2.16	-9.73	2.46	No
4	711	-14.74	-2.53	-12.21	2.46	No
4	2490	-3.67	-3.75	0.08	3.42	Yes
4	3300	-12.38	-4.05	-8.33	2.96	No
5	60	-2.14	-2.00	-0.14	2.98	Yes
5	120	-10.67	-2.01	-8.66	2.20	No
5	300	-8.21	-2.06	-1.22	1.87	Yes
5	360	-12.10	-2.16	-9.94	2.10	No
5	474	-5.76	-2.24	-3.52	2.72	No
5	639	-8.75	-2.36	-6.39	2.43	No
5	711	-7.09	-2.53	-4.56	2.31	No
5	1549	-12.67	-3.25	-9.42	2.36	No
5	2553	-5.42	-3.77	-1.64	3.17	Yes
5	3129	-17.91	-3.99	-13.92	2.17	No
5	4518	-18.65	-4.39	-14.26	2.31	No
6	450	-8.60	-2.25	-6.35	2.42	No
6	710	-13.21	-2.53	-10.59	2.09	No
6	2451	-19.35	-3.73	-15.62	1.93	No
7	237	-8.21	-2.06	-6.15	2.48	No
7	357	-11.38	-2.15	-9.22	2.16	No
7	474	-10.08	-2.27	-7.81	2.24	No
7	639	-10.42	-2.45	-7.97	2.34	No
7	711	-13.05	-2.53	-10.52	2.10	No
8	120	-6.82	-2.01	-4.81	2.38	No
8	359	-5.32	-2.16	-3.16	2.34	No
8	474	-14.33	-2.27	-12.06	2.44	No
8	658	-6.46	-2.47	-3.99	3.16	No
9	120	-6.42	-2.01	-4.41	2.24	No
9	237	-15.97	-2.06	-13.91	2.04	No
9	359	-2.97	-2.16	-0.82	2.24	Yes
9	474	-6.70	-2.27	-4.43	3.07	No
9	674	-3.18	-2.49	-0.69	3.00	Yes
10	120	-6.94	-2.01	-4.93	2.49	No
10	237	-14.23	-2.06	-12.17	2.17	No
10	294	-12.38	-2.10	-10.28	2.36	No
10	359	-5.85	-2.16	-3.69	2.87	No
10	470	-12.51	-2.27	-10.24	2.59	No
10	564	-16.72	-2.37	-14.35	2.26	No
10	665	-6.05	-2.48	-3.57	3.34	No

**Table 4-6. Tonality and Tonal Audibility Results,  $V_s = 4 \text{ m/s}$** 

Frequency of Identified Tone (Hz)	Difference between Tone and Masking Noise Level in each 10-second Period $\Delta L_{tn,j,k}$ (dB)				Energy Average $\Delta L_k$ (dB)	Tonal Audibility $\Delta L_{a,k}$ (dB)	Uncertainty $\Delta L_{a,k} (\pm \text{ dB})$
60	-11.25	-11.25	-11.25	-11.25	-10.56	-8.55	1.85
	-11.25	-11.25	-11.25	-11.25			
	-11.25	-11.25	-6.37	-3.96			
300	-5.02	-18.24	-5.82	-3.31	-4.52	-2.41	2.49
	-2.40	-0.93	-4.41	-18.24			
	-4.78	-4.66	-4.60	-3.96			
360	-5.88	-6.91	-7.04	-19.03	-11.89	-9.73	2.46
	-18.86	-17.94	-19.03	-19.03			
	-19.03	-19.03	-19.03	-19.03			
711	-21.99	-21.99	-21.99	-21.99	-14.75	-12.21	2.46
	-21.99	-21.99	-21.99	-21.99			
	-21.99	-7.35	-21.99	-8.10			
2490	-27.43	-1.49	-3.77	-1.25	-3.67	0.08	3.42
	-3.73	-1.27	-3.86	-3.93			
	-17.43	-2.62	-10.50	-1.86			
3300	-28.65	-28.65	-28.65	-28.65	-12.38	-8.33	2.96
	-28.65	-1.68	-28.65	-28.65			
	-28.65	-28.65	-28.65	-28.65			

**Table 4-7. Tonality and Tonal Audibility Results,  $V_s = 5 \text{ m/s}$** 

Frequency of Identified Tone (Hz)	Difference between Tone and Masking Noise Level in each 10-second Period $\Delta L_{tn,j,k}$ (dB)				Energy Average $\Delta L_k$ (dB)	Tonal Audibility $\Delta L_{a,k}$ (dB)	Uncertainty $\Delta L_{a,k} (\pm \text{ dB})$
60	-3.08	-15.24	-15.24	-15.24	-2.14	-0.14	2.98
	-15.24	-15.24	0.68	1.16			
	0.19	0.39	0.446	-0.17			
120	-15.27	-15.27	-15.27	-15.27	-10.67	-8.66	2.20
	-15.27	-15.27	-5.66	-5.99			
	-15.27	-15.27	-6.25	-15.27			
300	-3.36	-6.68	-4.96	-3.85	-3.89	-1.78	1.84
	-5.41	-4.47	-2.82	-2.30			
	-3.66	-4.99	-4.06	-2.25			
360	-15.61	-15.61	-15.61	-15.61	-12.10	-9.94	2.10
	-15.61	-15.61	-15.61	-15.61			
	-15.61	-15.61	-6.53	-6.15			
450	-5.97	-1.36	2.93	-15.80	-5.76	-3.52	2.72
	-15.80	-15.80	-15.80	-15.80			
	-15.80	-15.80	-15.80	-15.80			
555	-6.94	-3.08	-7.05	-16.06	-8.75	-6.39	2.43
	-16.06	-16.06	-5.71	-16.06			
	-5.72	-16.06	-16.06	-16.06			
711	-5.20	-6.85	-16.48	-6.65	-7.09	-4.56	2.31
	-7.06	-6.54	-5.47	-4.80			
	-6.75	-16.48	-16.48	-5.12			
1549	-18.89	-18.89	-18.89	-18.89	-12.67	-9.42	2.36
	-18.89	-18.89	-18.89	-18.89			
	-18.89	-10.45	-7.94	-5.50			
2553	-8.58	-21.20	-21.20	-21.20	-5.42	-1.65	3.17
	-12.89	-21.20	-2.39	-0.38			
	-6.15	-3.46	-2.41	-3.35			
3129	-22.26	-22.26	-22.26	-22.26	-17.91	-13.92	2.17
	-14.24	-22.26	-22.26	-22.26			
	-22.26	-13.63	-22.26	-12.25			
4518	-24.27	-24.27	-24.27	-24.27	-18.65	-14.26	2.31
	-24.27	-24.27	-14.13	-13.11			
	-24.27	-24.27	-24.27	-13.71			

**Table 4-8. Tonality and Tonal Audibility Results,  $V_s = 6 \text{ m/s}$** 

Frequency of Identified Tone (Hz)	Difference between Tone and Masking Noise Level in each 10-second Period $\Delta L_{tn,j,k}$ (dB)				Energy Average $\Delta L_k$ (dB)	Tonal Audibility $\Delta L_{a,k}$ (dB)	Uncertainty $\Delta L_{a,k} (\pm \text{ dB})$
450	-5.26	-3.83	-15.80	-7.32	-8.60	-6.35	2.42
	-3.99	-15.80	-15.80	-15.80			
	-7.54	-15.80	-15.80	-15.80			
711	-16.48	-16.48	-16.48	-16.48	-13.12	-10.59	2.09
	-16.48	-16.48	-16.48	-16.48			
	-16.48	-16.48	-6.91	-8.06			
2450	-21.00	-21.00	-12.85	-21.00	-19.35	-15.62	1.93
	-21.00	-21.00	-21.00	-21.00			
	-21.00	-21.00	-21.00	-21.00			

**Table 4-9. Tonality and Tonal Audibility Results,  $V_s = 7 \text{ m/s}$** 

Frequency of Identified Tone (Hz)	Difference between Tone and Masking Noise Level in each 10-second Period $\Delta L_{tn,j,k}$ (dB)				Energy Average $\Delta L_k$ (dB)	Tonal Audibility $\Delta L_{a,k}$ (dB)	Uncertainty $\Delta L_{a,k} (\pm \text{ dB})$
237	-3.50	-2.77	-15.40	-15.40	-8.21	-6.15	2.48
	-15.40	-15.40	-15.40	-15.40			
	-15.40	-2.39	-15.40	-15.40			
357	-15.60	-15.60	-7.22	-15.60	-11.38	-9.22	2.16
	-15.60	-15.60	-15.60	-15.60			
	-15.60	-15.60	-7.16	-6.13			
474	-15.86	-15.86	-15.86	-15.86	-10.10	-7.81	2.24
	-15.86	-15.86	-15.86	-15.86			
	-15.86	-15.86	-0.49	-15.86			
639	-16.28	-16.28	-16.28	-16.28	-10.42	-7.97	2.34
	-16.28	-16.28	-4.99	-5.65			
	-5.39	-16.28	-16.28	-16.28			
711	-7.30	-7.37	-16.48	-16.48	-13.05	-10.52	2.10
	-16.48	-16.48	-16.48	-16.48			
	-16.48	-16.48	-16.48	-16.48			

**Table 4-10. Tonality and Tonal Audibility Results,  $V_s = 8 \text{ m/s}$** 

<b>Frequency of Identified Tone (Hz)</b>	<b>Difference between Tone and Masking Noise Level in each 10-second Period</b> $\Delta L_{tn,j,k} (\text{dB})$				<b>Energy Average</b> $\Delta L_k (\text{dB})$	<b>Tonal Audibility</b> $\Delta L_{a,k} (\text{dB})$	<b>Uncertainty</b> $\Delta L_{a,k} (\pm \text{dB})$
120	-14.26	-14.26	-14.26	-5.59	-6.82	-4.81	2.38
	-14.26	-6.56	-4.18	-4.01			
	-10.42	-4.88	-4.42	-5.35			
359	-5.68	-4.32	-2.31	-4.34	-5.32	-3.16	2.34
	-19.01	-5.50	-2.89	-6.85			
	-7.42	-7.32	-5.49	-5.79			
474	-20.23	-20.23	-20.23	-20.23	-14.33	-12.06	2.44
	-20.23	-20.23	-20.23	-20.23			
	-20.23	-7.59	-19.43	-7.66			
658	-21.65	-21.65	-21.65	-4.73	-6.46	-3.99	3.16
	-4.37	-21.65	-3.48	-1.66			
	-7.72	-7.59	-5.42	-6.59			

**Table 4-11. Tonality and Tonal Audibility Results,  $V_s = 9 \text{ m/s}$** 

<b>Frequency of Identified Tone (Hz)</b>	<b>Difference between Tone and Masking Noise Level in each 10-second Period</b> $\Delta L_{tn,j,k} (\text{dB})$				<b>Energy Average</b> $\Delta L_k (\text{dB})$	<b>Tonal Audibility</b> $\Delta L_{a,k} (\text{dB})$	<b>Uncertainty</b> $\Delta L_{a,k} (\pm \text{dB})$
120	-9.81	-6.44	-14.26	-5.40	-6.42	-4.41	2.24
	-15.10	-6.91	-5.55	-5.42			
	-6.50	-4.18	-4.59	-17.22			
237	-17.22	-17.22	-17.22	-17.22	-15.97	-13.91	2.04
	-17.22	-10.23	-17.22	-17.22			
	-17.22	-17.22	-17.22	-17.22			
359	-6.75	-2.85	-3.28	0.38	-2.97	-0.82	2.24
	-13.58	-2.45	-0.94	-3.87			
	-6.25	-3.11	-0.97	-4.04			
474	-1.74	-1.42	-20.23	-11.35	-6.70	-4.43	3.07
	-4.28	-6.67	-20.23	-20.23			
	-20.23	-7.45	-18.74	-5.51			
674	-0.86	-21.75	-4.40	-0.57	-3.18	-0.69	3.00
	-3.35	-2.22	-4.52	-1.66			
	-21.75	-1.04	-5.85	-2.58			

**Table 4-12. Tonality and Tonal Audibility Results,  $V_s = 10 \text{ m/s}$** 

Frequency of Identified Tone (Hz)	Difference between Tone and Masking Noise Level in each 10-second Period $\Delta L_{tn,j,k}$ (dB)				Energy Average $\Delta L_k$ (dB)	Tonal Audibility $\Delta L_{a,k}$ (dB)	Uncertainty $\Delta L_{a,k} (\pm \text{ dB})$
120	-7.01	-14.26	-14.26	-14.26	-6.94	-4.93	2.49
	-14.26	-14.26	-14.26	-6.37			
	-1.80	-5.19	-4.10	-3.79			
237	-17.22	-17.22	-17.22	-17.22	-14.23	-12.17	2.17
	-12.83	-17.22	-17.22	-17.22			
	-17.22	-17.22	-6.75	-17.22			
294	-18.15	-18.15	-18.15	-18.15	-12.38	-10.28	2.36
	-18.15	-18.15	-18.15	-2.80			
	-18.15	-18.15	-18.15	-18.15			
359	-19.02	-19.02	-6.40	-2.61	-5.85	-3.69	2.87
	-16.31	-2.41	-6.15	-6.43			
	-19.02	-7.22	-2.20	-3.51			
470	-20.19	-20.19	-20.19	-20.19	-12.51	-2.27	-10.24
	-7.38	-20.19	-20.19	-20.19			
	-20.19	-20.19	-20.19	-4.04			
564	-20.98	-20.98	-20.98	-20.98	-16.72	-14.35	2.26
	-20.98	-20.98	-20.98	-20.98			
	-20.98	-7.76	-20.98	-20.98			
665	-21.70	-21.70	-21.70	-5.83	-6.05	-3.57	3.34
	-21.70	-2.72	-6.85	-21.70			
	-7.32	-6.75	-4.65	-0.81			

## 5 REFERENCES

1. ANTP0102, *Draft Acoustic Noise Test Plan for the V100 1.8MW Wind Turbine in Pueblo, CO*, DNV document, January 21, 2011.
2. *Wind turbine generator systems - Part 11: Acoustic noise measurement techniques*. IEC 61400-11:2002 +A1:2006(E). International Electrotechnical Commission, Geneva, Switzerland.
3. 0004-3053 V07, *General Specification V100-1.8MW*, Vestas document, dated November 22, 2010.

## APPENDIX A

### POWER CURVE USED FOR WIND SPEED CALIBRATION [3]

**Table A-1. Measured Electrical Power Output for “Mode 0” at 1.225 kg/m<sup>3</sup> Air Density**

Normalized Hub-Height Wind Speed (m/s)	Power Output (kW)
3.0	13
3.5	53
4.0	112
4.5	181
5.0	260
5.5	353
6.0	462
6.5	581
7.0	736
7.5	911
8.0	1108
8.5	1321
9.0	1524
9.5	1679
10.0	1766
10.5	1800
11.0	1811
11.5	1815
12.0	1815
12.5	1815
13.0	1815
13.5	1815
14.0	1815
14.5	1815
15.0	1815
15.5	1815
16.5	1815
17.0	1815
17.5	1815
18.0	1815
18.5	1815
19.0	1815
19.5	1815
20.0	1815

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## **APPENDIX B**

### **SITE PHOTOS**

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**Figure B-1. Met Tower**

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**Figure B-2. Wind Turbine Under Measurement and Microphone**

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**Figure B-3. Wind Turbine Under Measurement from Met Tower**



**Figure B-4. Met Tower Hub Height Anemometers**

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## **APPENDIX C**

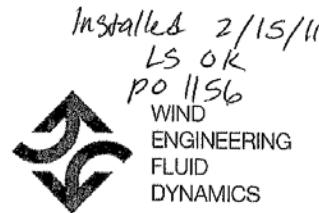
### **INSTRUMENTATION CALIBRATIONS**

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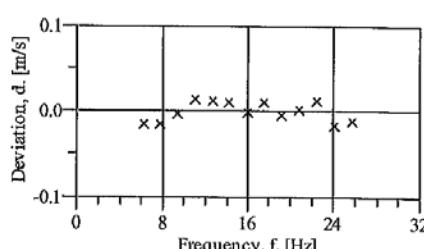
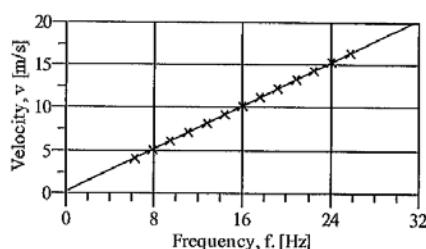
blue - Pueblo

**Svend Ole Hansen ApS**

SCT. JØRGENS ALLÉ 7 · DK-1615 KØBENHAVN V · DENMARK  
 TEL: (+45) 33 25 38 38 · FAX: (+45) 33 25 38 39 · WWW.SOHSANSEN.DK

**CERTIFICATE FOR CALIBRATION OF CUP ANEMOMETER****Certificate number:** 10.02.7183**Date of issue:** December 6, 2010**Type:** WindSensor P2546A Cup Anemometer**Serial number:** 10573**Manufacturer:** WindSensor, Søkrogen 9, 4000 Roskilde, Denmark**Client:** WindSensor, Søkrogen 9, 4000 Roskilde, Denmark**Anemometer received:** November 26, 2010**Anemometer calibrated:** December 5, 2010**Calibrated by:** asj**Calibration procedure:** IEC 61400-12-1, MEASNET**Certificate prepared by:** jsa**Approved by:** Calibration engineer, soh**Calibration equation obtained:**  $v \text{ [m/s]} = 0.63038 \cdot f \text{ [Hz]} + 0.21284$ *Svend Ole Hansen***Standard uncertainty, slope:** 0.00089**Standard uncertainty, offset:** 0.04502**Covariance:** -0.0000050 (m/s)<sup>2</sup>/Hz**Coefficient of correlation:**  $\rho = 0.999996$ **Absolute maximum deviation:** -0.017 m/s at 15.379 m/s**Barometric pressure:** 991.4 hPa**Relative humidity:** 21.0%

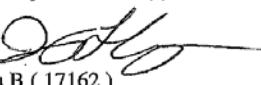
Succession	Velocity pressure, q. [Pa]	Temperature in wind tunnel [°C]	Temperature in control room [°C]	Wind velocity, v. [m/s]	Frequency, f. [Hz]	Deviation, d. [m/s]	Uncertainty $u_c$ (k=2) [m/s]
2	9.89	25.7	20.2	4.141	6.2557	-0.015	0.028
4	15.30	25.5	20.2	5.151	7.8559	-0.014	0.032
6	21.80	25.4	20.2	6.147	9.4188	-0.003	0.037
8	29.90	25.3	20.1	7.197	11.0563	0.015	0.043
10	39.17	25.2	20.1	8.237	12.7085	0.013	0.048
12	49.23	25.1	20.1	9.233	14.2904	0.012	0.054
13-last	60.79	25.1	20.1	10.259	15.9383	-0.001	0.060
11	73.68	25.2	20.1	11.296	17.5645	0.011	0.066
9	87.16	25.3	20.1	12.289	19.1631	-0.004	0.072
7	102.53	25.4	20.2	13.331	20.8054	0.003	0.078
5	118.66	25.5	20.2	14.344	22.3960	0.013	0.084
3	136.36	25.6	20.2	15.379	24.0852	-0.017	0.090
1-first	155.19	25.9	20.2	16.415	25.7202	-0.011	0.096



**DANAK**  
 CAL Reg.nr. 452  
 Accreditation to ISO 17025



Page 1 of 2

 5764 PACIFIC CENTER BLVD. SAN DIEGO, CA 92121		Certificate No. 5090107 <i>LS OK</i> <i>Installed 2/15/11</i> <i>Po 1155</i>											
<b>CERTIFICATE OF CALIBRATION FOR DNV RENEWABLES</b> 1809 7TH AVE. STE. 900 SEATTLE, WA 98101													
Description: MET ONE, 064-1, Temperature Sensor													
Serial No: K20290	Asset No:	Simco ID: 42492-695											
Dept: NONE	PO No: 11154												
Calibration Date: 02/14/11	Calibration Interval: 24 Months	Recall Date: 02/14/13											
Arrival Condition: <b>MEETS MANUFACTURER'S SPEC'S.</b>		Service: <b>CALIBRATED &amp; CLEANED</b>											
Procedure: 635-0030 REV 3 Temperature: 73°F													
			Relative Humidity: 36%										
Standards Used:													
Type	Simco ID	Due Date	Intvl Mos										
TEMPERATURE/HUMIDITY CHAMBER	1016*152	07/31/11	Acc/Unc +/-0.5 deg C										
PRT	1016*121	06/08/11	-200to500 deg C										
PRT	1016*121	06/08/11	+/-0.010 deg C										
THERMOMETER READOUT	1016*120	07/31/11	+/-0.004 deg C										
MULTIMETER	1008*523	06/30/11	RES+/-0.011%										
Trace No. B0902021 B0902021 B0902021 B0A26025 817/277427-09													
<u>Detail Of Work Performed:</u> UPDATED MODEL NUMBER FROM 064-2.													
<u>Calibration Data:</u> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Parameter</th> <th style="width: 25%;">Nominal</th> <th style="width: 25%;">Measured Before</th> <th style="width: 25%;">Measured After</th> <th style="width: 25%;">Tolerance</th> </tr> </thead> <tbody> <tr> <td>SEE</td> <td>ATTACHED</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Parameter	Nominal	Measured Before	Measured After	Tolerance	SEE	ATTACHED			
Parameter	Nominal	Measured Before	Measured After	Tolerance									
SEE	ATTACHED												
There are 1 Supplementary Data Sheet(s) attached.													
Work performed by:  <b>Jeremy Cooper</b> Calibration Technician B (17162)		Reviewed by:  <b>AMC</b>											
SIMCO Electronics' quality management system conforms to ISO 9001:2008, ISO/IEC 17025:2005, and ANSI/NCSL Z540-1-1994. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test uncertainty ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control. This is an A2LA Accredited calibration.													
Dated: 02/14/11													
Page 1 of 1													

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## Acoustic Noise Test Report for a Vestas V100 1.8-MW Turbine at Pueblo, Colorado



MANAGING RISK

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ACCREDITED  
CALIBRATION CERT. 1996.17

**CERTIFICATE OF CALIBRATION**  
FOR  
**DNV RENEWABLES**  
1809 7TH AVE. STE. 900  
SEATTLE, WA 98101

Installed 2/15/11  
LS OK  
Po 11154

Description: **MET ONE, 090D, Barometer**

Serial No: **K14990** Asset No:  Simco ID: **42492-696**

Dept: **NONE** PO No: **11154**

Calibration Date: <b>02/14/11</b>	Calibration Interval: <b>24 Months</b>	Recall Date: <b>02/14/13</b>
Arrival Condition: <b>MEETS MANUFACTURER'S SPEC'S.</b>	Service: <b>CALIBRATED TO MFR SPEC,&amp; CLEAN</b>	

Procedure: **TO33K6-4-1425-1 6/02**  
Temperature: **71°F** Relative Humidity: **40%**

Standards Used:

Type	Simco ID	Due Date	Intvl Mos	Acc/Unc	Trace No.
Pressure Calibrator	<b>35363*93</b>	<b>05/20/11</b>	<b>12</b>	<b>+/-0.012% RNG</b>	<b>REPORT#69683</b>
Precision DMM	<b>35363*35</b>	<b>07/22/11</b>	<b>12</b>	<b>dcV +/-0.004%</b>	<b>817/276744-08</b>

There are 2 Supplementary Data Sheet(s) attached.

Work performed by:   
**John Durr**  
Calibration Technician D (317)

Reviewed by: 

SIMCO Electronics' quality management system conforms to ISO 9001:2008, ISO/IEC 17025:2005, and ANSI/NCSL Z540-1-1994. All calibrations are performed using internationally recognized standards traceable to the International System of Units (SI Units). Traceability is achieved through calibrations by the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constants, intrinsic standards or ratio calibration techniques. Instruments are calibrated with a test uncertainty ratio of 4:1 or greater, otherwise measurement uncertainty analysis and/or guard bands are applied during the measurement process. The information shown on this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from SIMCO Electronics. There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control. This is an A2LA Accredited calibration.

Dated: **02/14/11**

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DNV Report No.: ANRP0105

Version: B

Date: May 12, 2011



MANAGING RISK



## CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC and APLAC  
signatory)



NVLAP Lab Code: 200625-0

## Calibration Certificate No.23173

**Instrument:** Acoustical Calibrator  
**Model:** CAL200  
**Manufacturer:** Larson Davis  
**Serial number:** 8056  
**Class (IEC 60942):** 1  
**Barometer type:**  
**Barometer s/n:**

Date Calibrated: 1/21/2011 Cal Due:  
 Status: Received Sent  
 In tolerance: X X  
 Out of tolerance: \_\_\_\_\_  
 See comments: \_\_\_\_\_  
 Contains non-accredited tests: Yes X No

**Customer:** DNV Renewables (USA) Inc. **Address:** 1809 7th Ave. Suite #500  
**Tel/Fax:** 1-206-387-4240 / -4201 **Seattle, WA 90181**

**Tested in accordance with the following procedures and standards:**  
Calibration of Acoustical Calibrators, Scantek Inc., 06/06/2005

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System.

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence	Cal. Due
				Cal. Lab / Accreditation	
483B-Norsonic	SME Cal Unit	25747	Jan 4, 2011	Scantek, Inc./NVLAP	Jan 4, 2012
DS-360-SRS	Function Generator	81646	Nov 13, 2009	ACR Env. / A2LA	Nov 13, 2011
34401A-Agilent Technologies	Digital Multimeter	MY41022043	Nov 17, 2010	ACR Env. / A2LA	Nov 17, 2011
DPI 141-Druck	Pressure Indicator	790/00-04	Dec 13, 2010	ACR Env. / A2LA	Dec 13, 2012
8903A-HP	Audio Analyzer	2514A05691	Dec 1, 2010	ACR Env./A2LA	Dec 1, 2013
HMP233-Vaisala Oyj	Humidity & Temp. Transmitter	V3820001	Nov 25, 2009	ACR Env./A2LA	May 25, 2011
PC Program 1018 Norsonic	Calibration software	v.5.0	Validated July 2009	-	
1253-Norsonic	Calibrator	28326	Dec 6, 2010	Scantek, Inc./NVLAP	Dec 6, 2011
1203-Norsonic	Preamplifier	14059	Jan 5, 2011	Scantek, Inc./NVLAP	Jan 5, 2012
4180-Brüel&Kjaer	Microphone	2246115	Dec 14, 2009	NPL (UK) / UKAS	Dec 14, 2011

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by	Valentin Buzduga	Checked by	Mariana Buzduga
Signature		Signature	
Date	1/21/2011	Date	1/21/2011

Calibration Certificates or Test Reports shall not be reproduced, except in full, without written approval of the laboratory. This Calibration Certificate or Test Reports shall not be used to claim product certification, approval or endorsement by NVLAP, NIST, or any agency of the federal government.

Document stored as: Z:\Calibration\Lab\Cal 2011\LDCAL200\_8056\_M1.doc

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Page 1 of 2

Document stored as: Z:\Calibration Lab\Cal 2011\LDCAL200\_8056\_M1.doc

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**Scantek, Inc.**  
 CALIBRATION LABORATORY

 ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
 and relevant requirements of ISO 9002:1994  
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 signatory)


NVLAP Lab Code: 200625-0

## Calibration Certificate No.23175

Instrument: Microphone  
 Model: 377B02  
 Manufacturer: PCB Piezotronics  
 Serial number: 119659

Date Calibrated: 1/7/2011 Cal Due:  
 Status: Received Sent  
 In tolerance: X X  
 Out of tolerance: \_\_\_\_\_  
 See comments: \_\_\_\_\_  
 Contains non-accredited tests: Yes  No

Customer: DNV Renewables (USA) Inc.  
 Tel/Fax: 1-206-387-4240/1-206-387-4201

Address: 1809 7th Ave. Suite #500  
 Seattle, WA 98181

**Tested in accordance with the following procedures and standards:**  
 Procedure for Calibration of Measurement Microphones, Scantek Inc., 06/15/2005

**Instrumentation used for calibration:** N-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Sep 10, 2010	Scantek, Inc./NVLAP	Sep 10, 2011
DS-360-SRS	Function Generator	33584	Oct 5, 2009	ACR. Env / A2LA	Oct 5, 2011
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 3, 2010	ACR Env. / A2LA	Sep 3, 2011
HM30-Thommen	Meteo Station	1040170/39633	Jun 26, 2010	ACR Env. / A2LA	Dec 26, 2011
PC Program 1017 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1253-Norsonic	Calibrator	28326	Dec 6, 2010	Scantek, Inc./NVLAP	Dec 6, 2011
1203-Norsonic	Preamplifier	92268	Dec 6, 2010	Scantek, Inc./NVLAP	Dec 6, 2011
4180-Brüel&Kjaer	Microphone	2246115	Dec 14, 2009	NPL (UK) / UKAS	Dec 14, 2011

**Instrumentation and test results are traceable to SI - BIPM through standards maintained by NPL (UK) and NIST (USA)**

Calibrated by	Alex Buzduga	Checked by	Valentina Buzduga
Signature		Signature	
Date	1/7/2011	Date	1/21/2011

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OK  
 Sarah Taubity  
 1/26/11  
 PO 101749

Page 1 of 2

**Scantek, Inc.**  
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1  
ACCREDITED by NVLAP (an ILAC and APLAC signatory)

**NVLAP®**

NVLAP Lab Code: 200625-0

## Calibration Certificate No.23176

<b>Instrument:</b>	Sound Measuring System	<b>Date Calibrated:</b>	1/21/2011	<b>Cal Due:</b>	
<b>Model:</b>	noiseLab3-NI-9233	<b>Status:</b>	Received	<b>Sent</b>	
<b>Manufacturer:</b>	Delta	<b>In tolerance:</b>	X	X	
<b>Serial number:</b>	1546B35	<b>Out of tolerance:</b>			
<b>Tested with:</b>	Mic. 377B02 s/n 119761 & 119659 Preamp. 426E01 s/n 017604 & 017614 150 ft extension cables, Belden type 1C20	<b>See comments:</b>	X		
<b>Type (class):</b>	1	<b>Contains non-accredited tests:</b>	Yes	X	No
<b>Customer:</b>	DNV Renewables (USA) Inc.	<b>Calibration service:</b>	Basic	X	Standard
<b>Tel/Fax:</b>	1-206-387-4240 / 1-206-387-4201	<b>Address:</b>	1809 7th Ave. Suite #500 Seattle, WA 90181		

**Tested in accordance with the following procedures and standards:**

Calibration of Sound Level Meters, Scantek Inc., 06/07/2005  
SLM & Dosimeters – Acoustical Tests, Scantek Inc., 06/15/2005

**Instrumentation used for calibration:** Nor-1504 Norsonic Test System:

<b>Instrument - Manufacturer</b>	<b>Description</b>	<b>S/N</b>	<b>Cal. Date</b>	<b>Traceability evidence</b>		<b>Cal. Due</b>
				<b>Cal. Lab / Accreditation</b>		
483B-Norsonic	SMB Cal Unit	31071	Jul 6, 2010	Scantek, Inc./NVLAP		Jul 6, 2011
DS-360-SRS	Function Generator	88077	Aug 17, 2010	ACR Env./A2LA		Aug 17, 2012
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Aug 17, 2010	ACR Env./A2LA		Aug 17, 2011
HM30-Thommen	Meteo Station	1040170/39633	Jun 26, 2010	ACR Env./A2LA		Dec 26, 2011
PC Program 1019 Norsonic	Calibration software	v.5.0	Validated July 2009	-		-
1251-Norsonic	Calibrator	30878	Dec 7, 2010	Scantek, Inc./NVLAP		Dec 7, 2011

**Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).**

**Environmental conditions:**

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.2 °C	99.38 kPa	48.5 %RH

Calibrated by	Mariana Buzduga	Checked by	Valentin Buzduga
Signature		Signature	
Date	12/1/2011	Date	1/21/2011

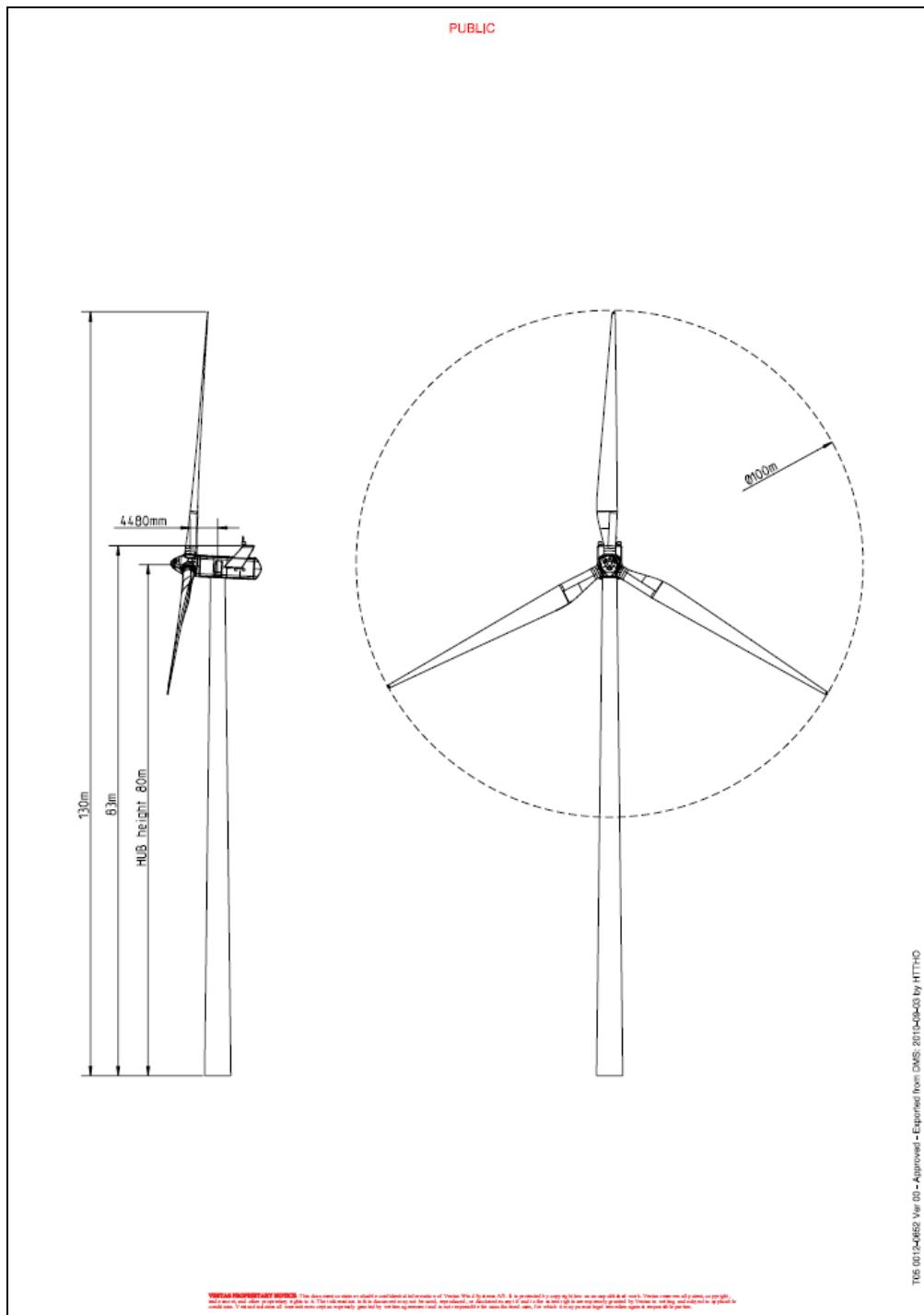
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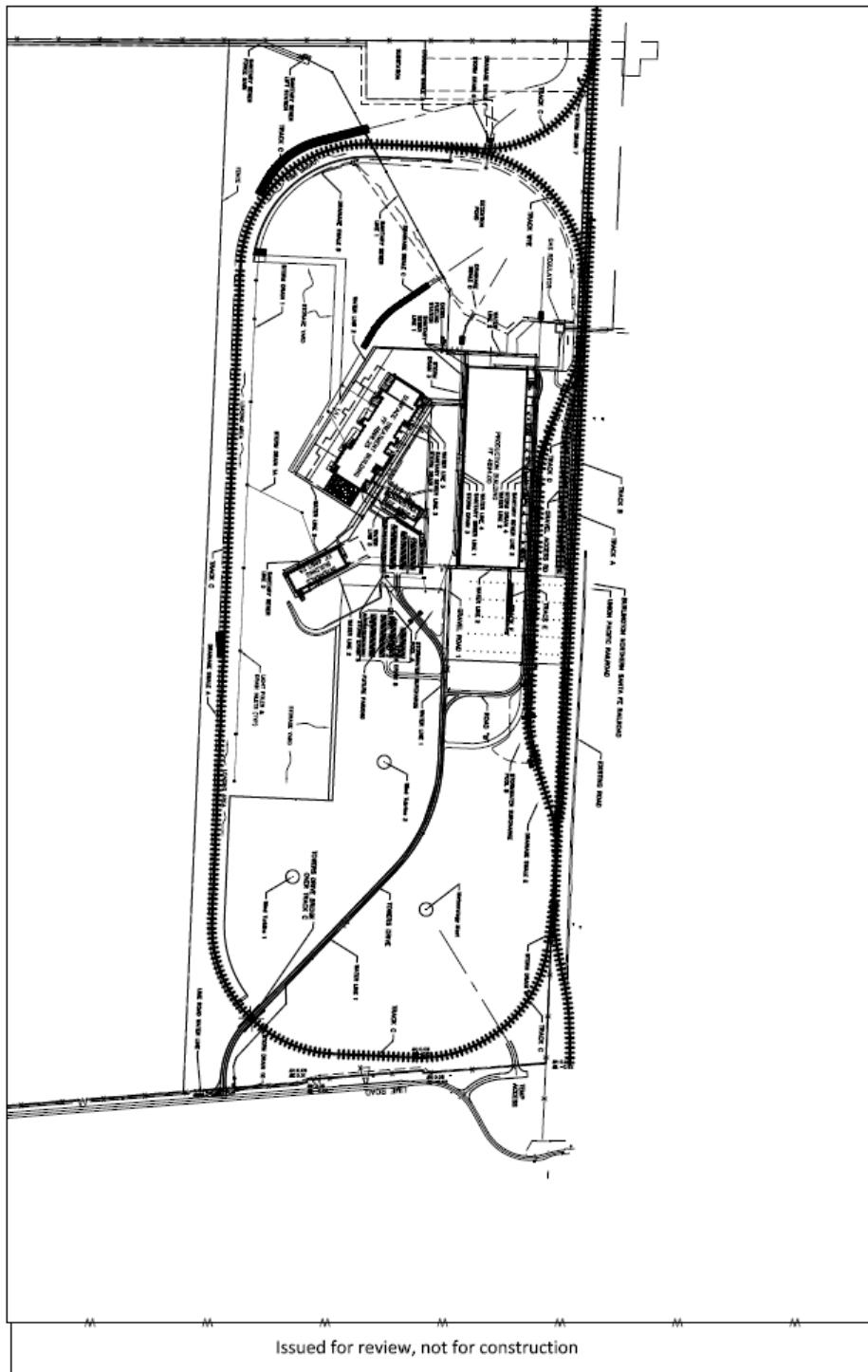
*✓ Saeed Tawbi 1/21/11 10/17/11*

## APPENDIX D

### OTHER TURBINE INFORMATION PROVIDED BY VESTAS



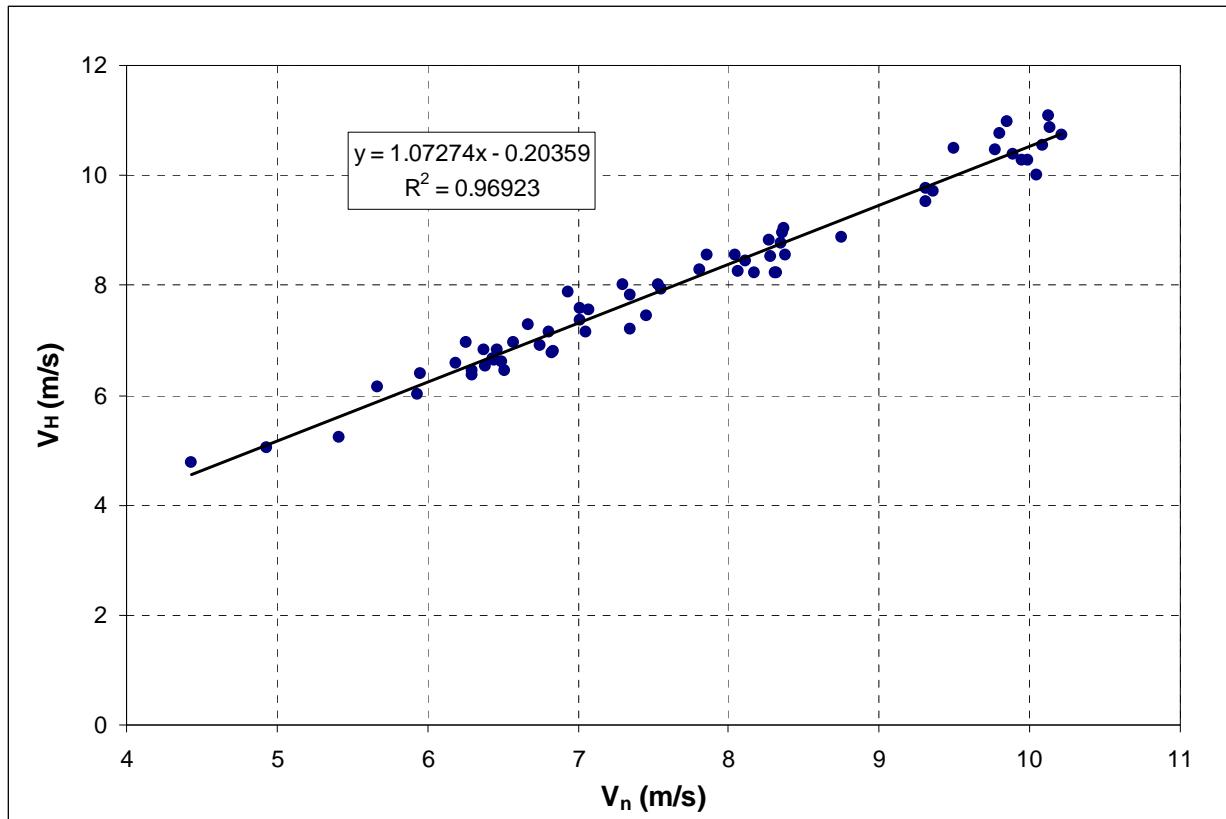
**Figure D-1. Turbine Drawing Showing Rotor Plane Offset**



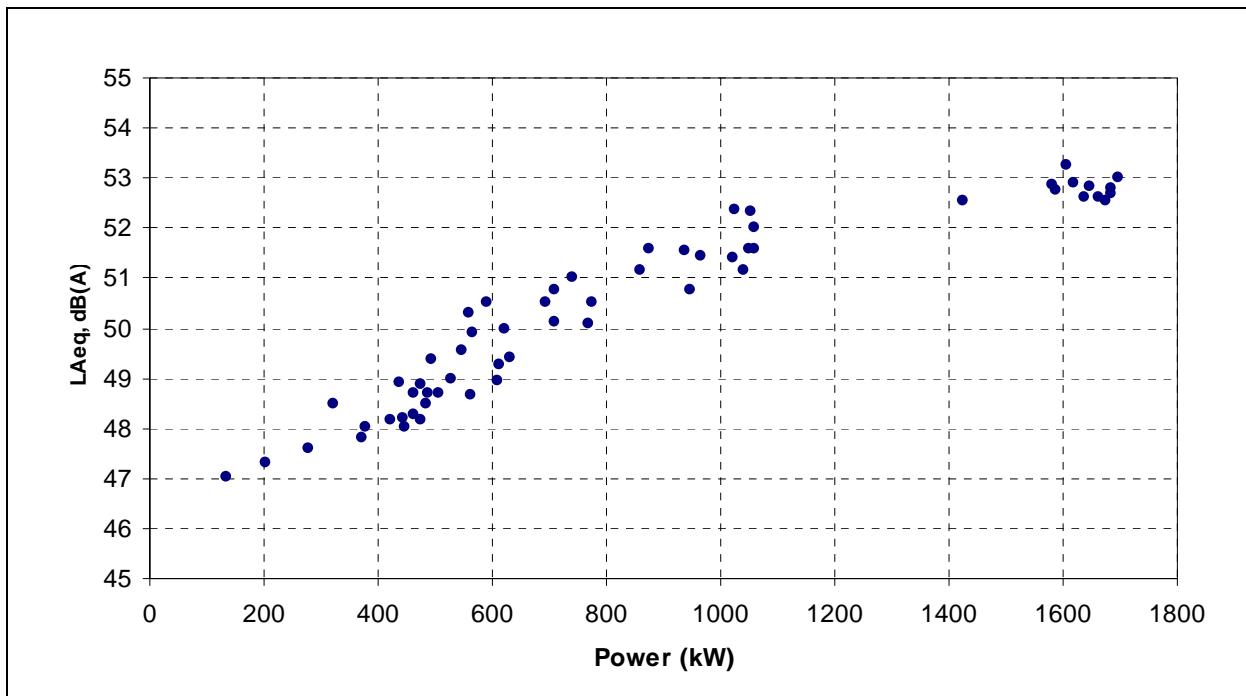
## **Figure D-2. Plant Map**

## APPENDIX E

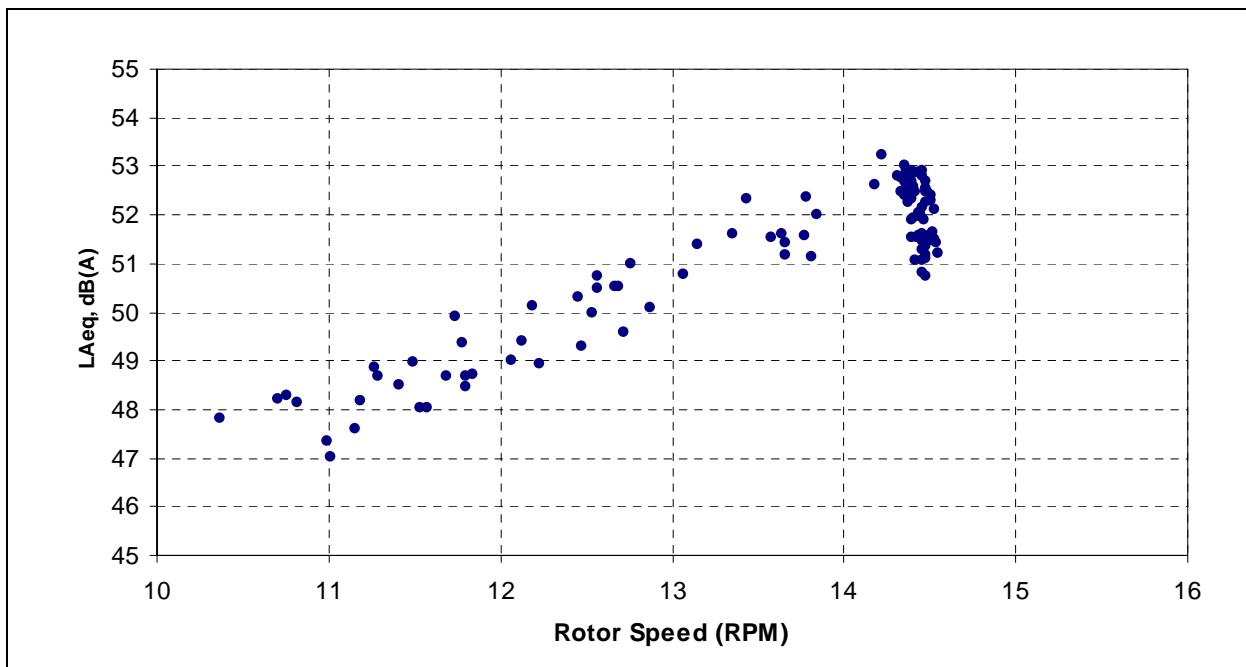
### RESULTS GRAPHS



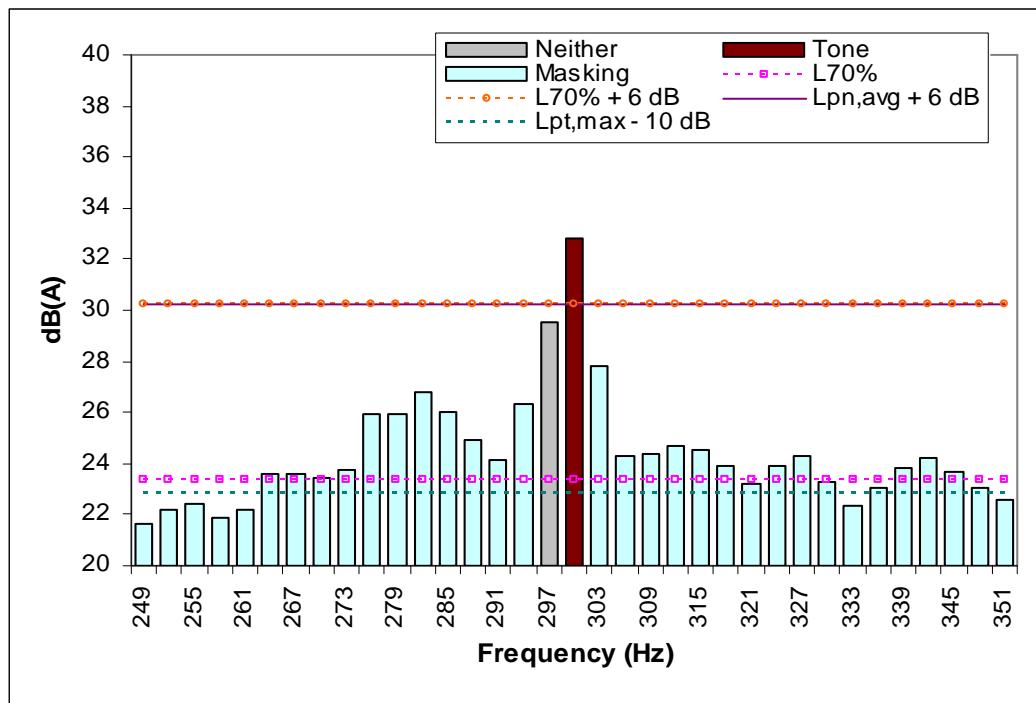
**Figure E-1. Hub-Height Derived Wind Speed vs. Nacelle Wind Speed**



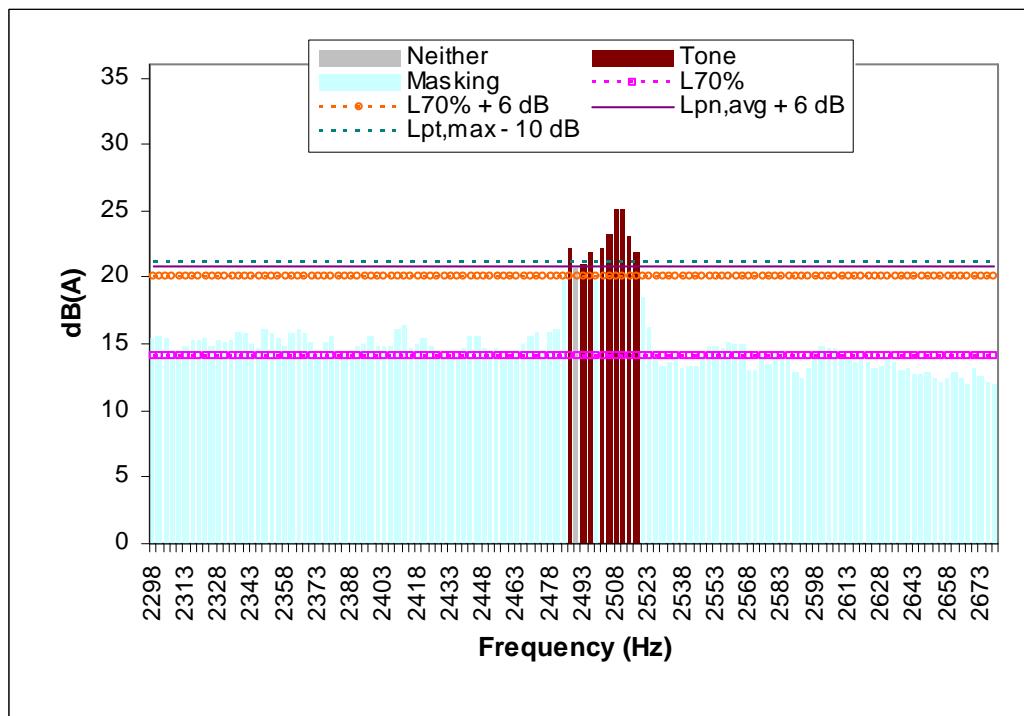
**Figure E-2. Measured Sound Pressure Levels (Operating) vs. Turbine Power, not Background Corrected**



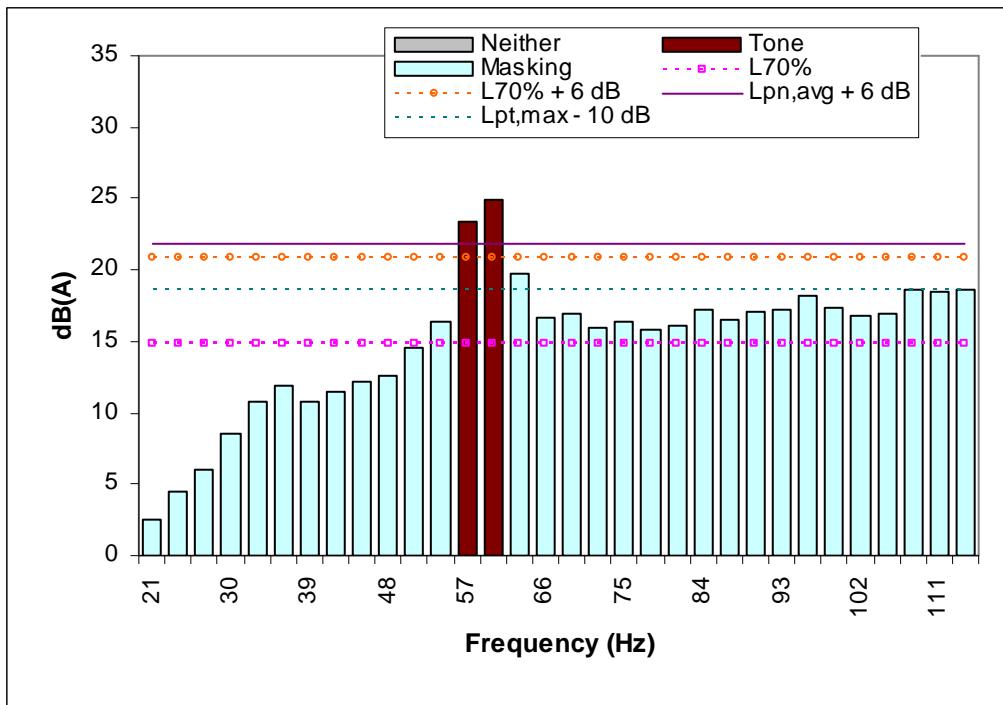
**Figure E-3. Operating Sound Pressure Levels vs. Rotor Speed**



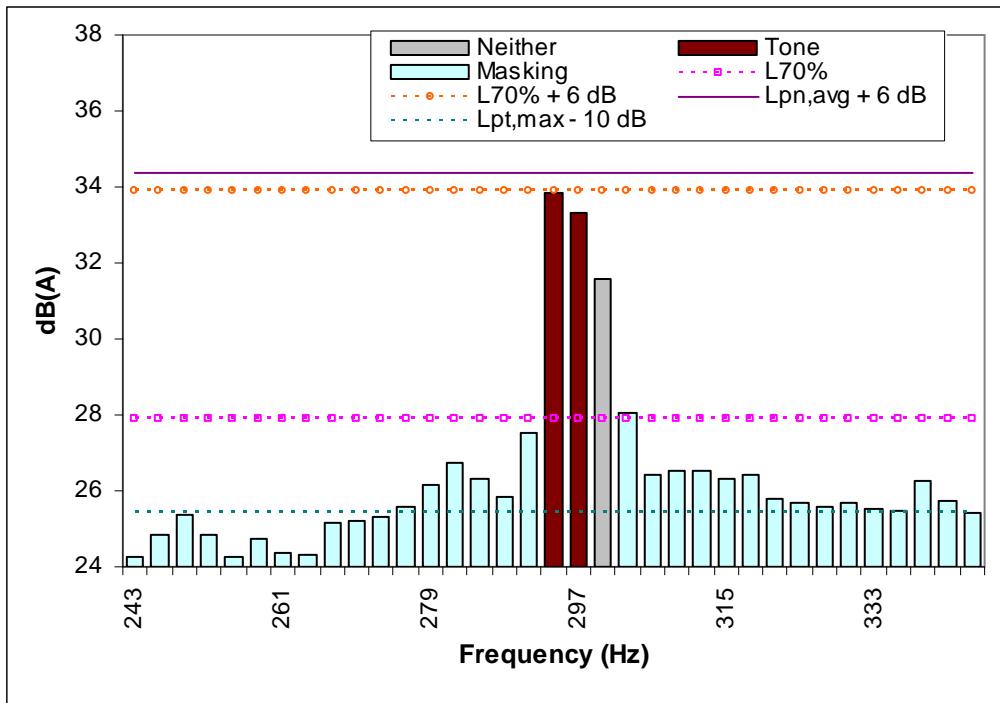
**Figure E-5. Tone at 300 Hz in the 4 m/s Bin (graphed data from 02:30,  $V_s = 4.44 \text{ m/s}$ )**



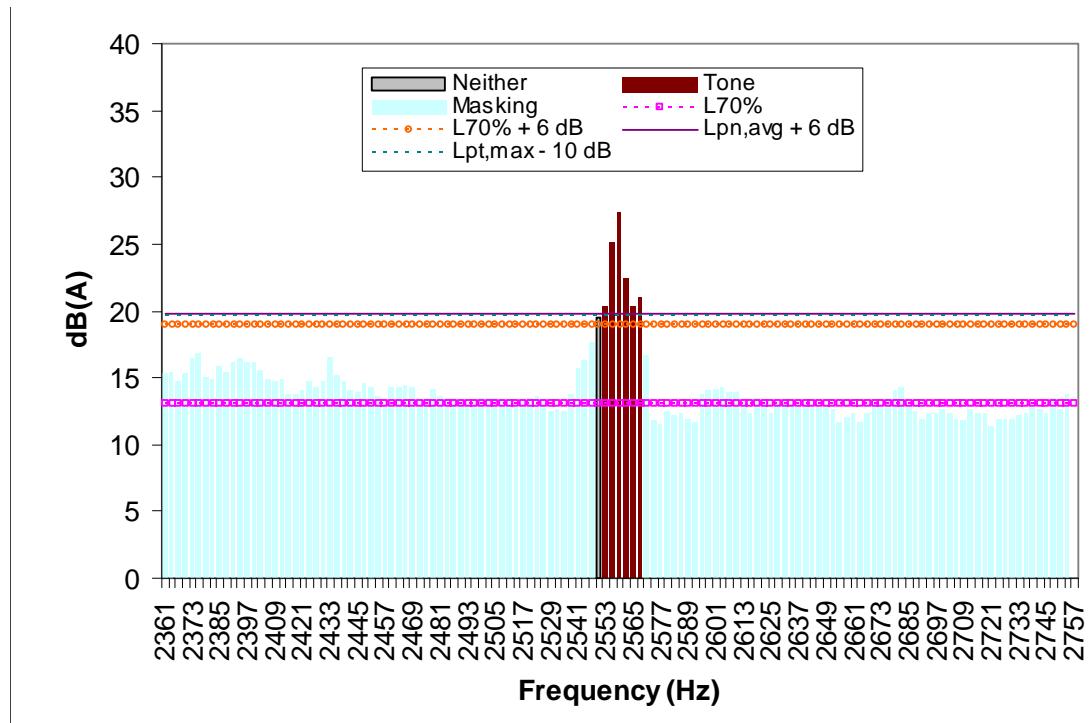
**Figure E-6. Tone at 2490 Hz in the 4 m/s Bin (graphed data from 02:23,  $V_s = 4.07 \text{ m/s}$ )**



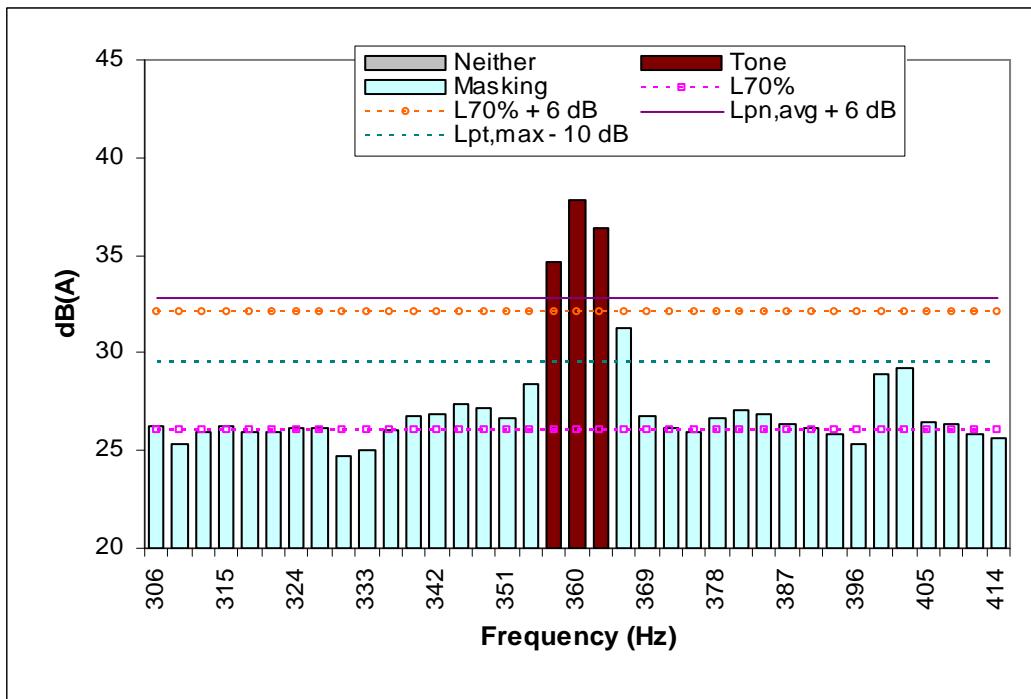
**Figure E-7. Tone at 60 Hz in the 5 m/s Bin (graphed data from 04:06,  $V_s = 5.04 \text{ m/s}$ )**



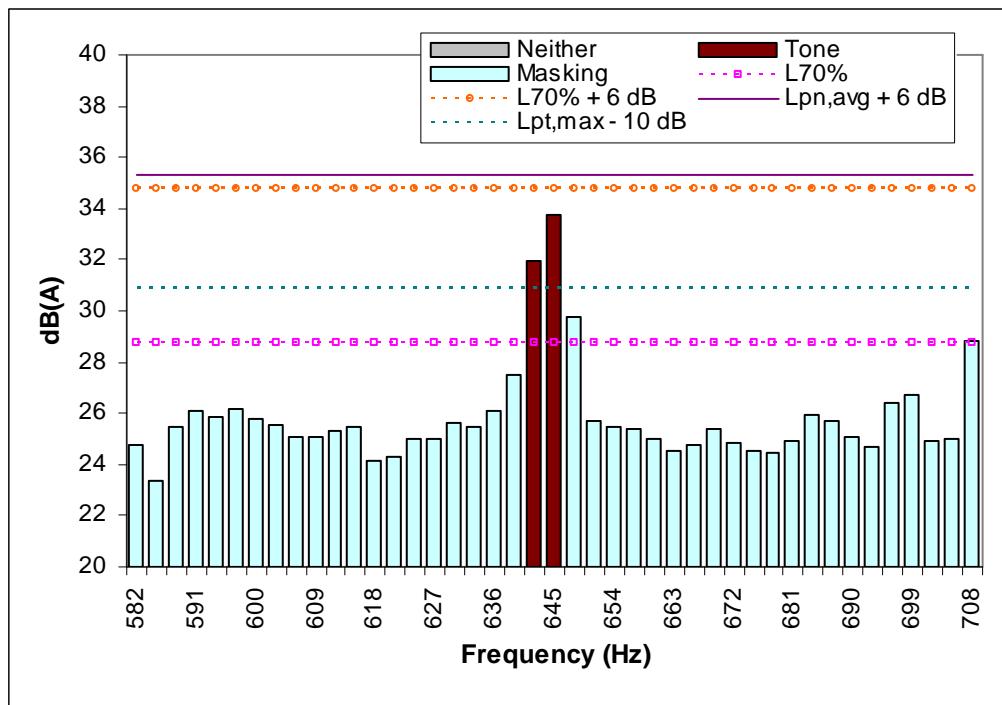
**Figure E-8. Tone at 300 Hz in the 5 m/s Bin (graphed data from 04:06,  $V_s = 5.04 \text{ m/s}$ )**



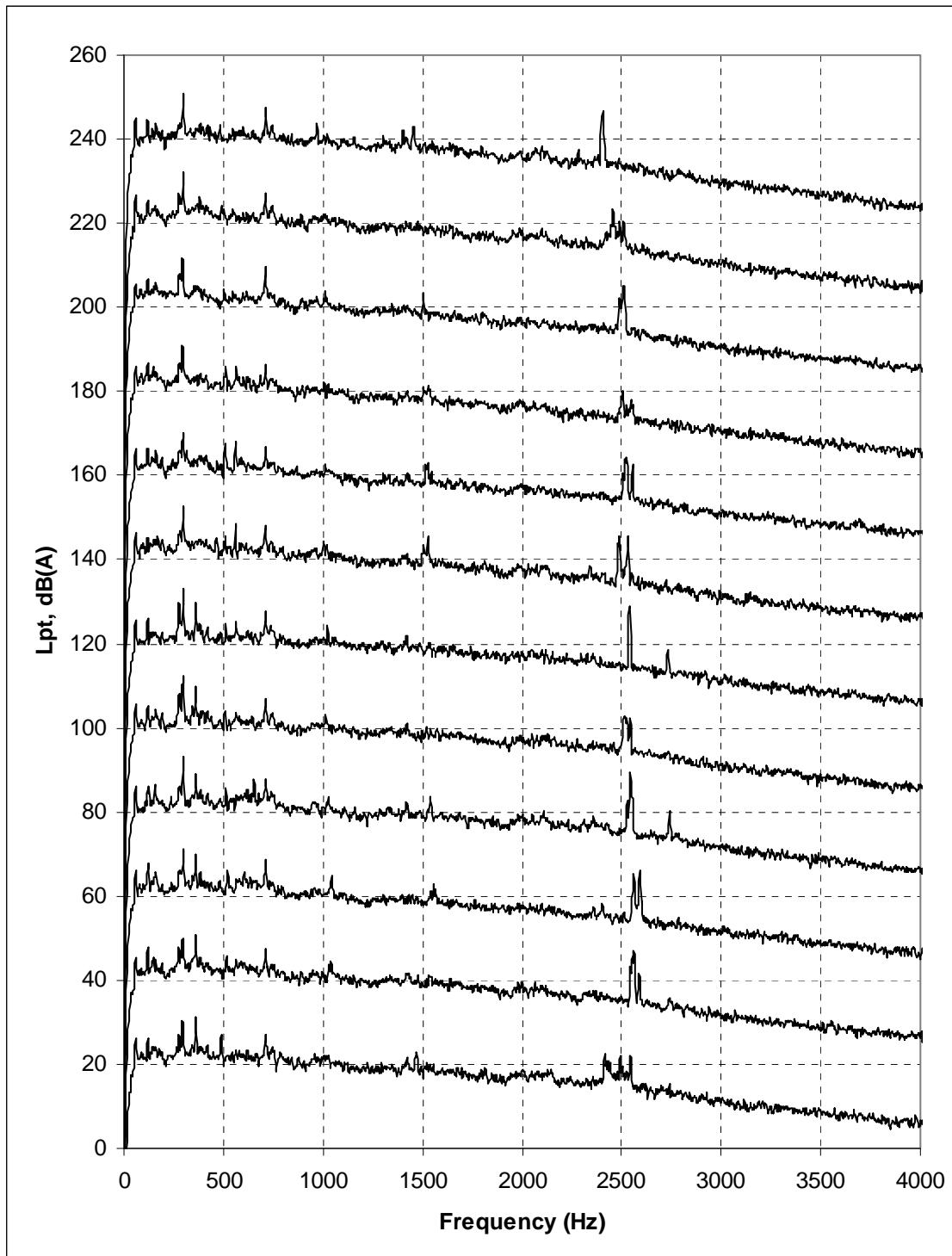
**Figure E-9. Tone at 2553 Hz in the 5 m/s Bin (graphed data from 03:55,  $V_s = 4.98 \text{ m/s}$ )**



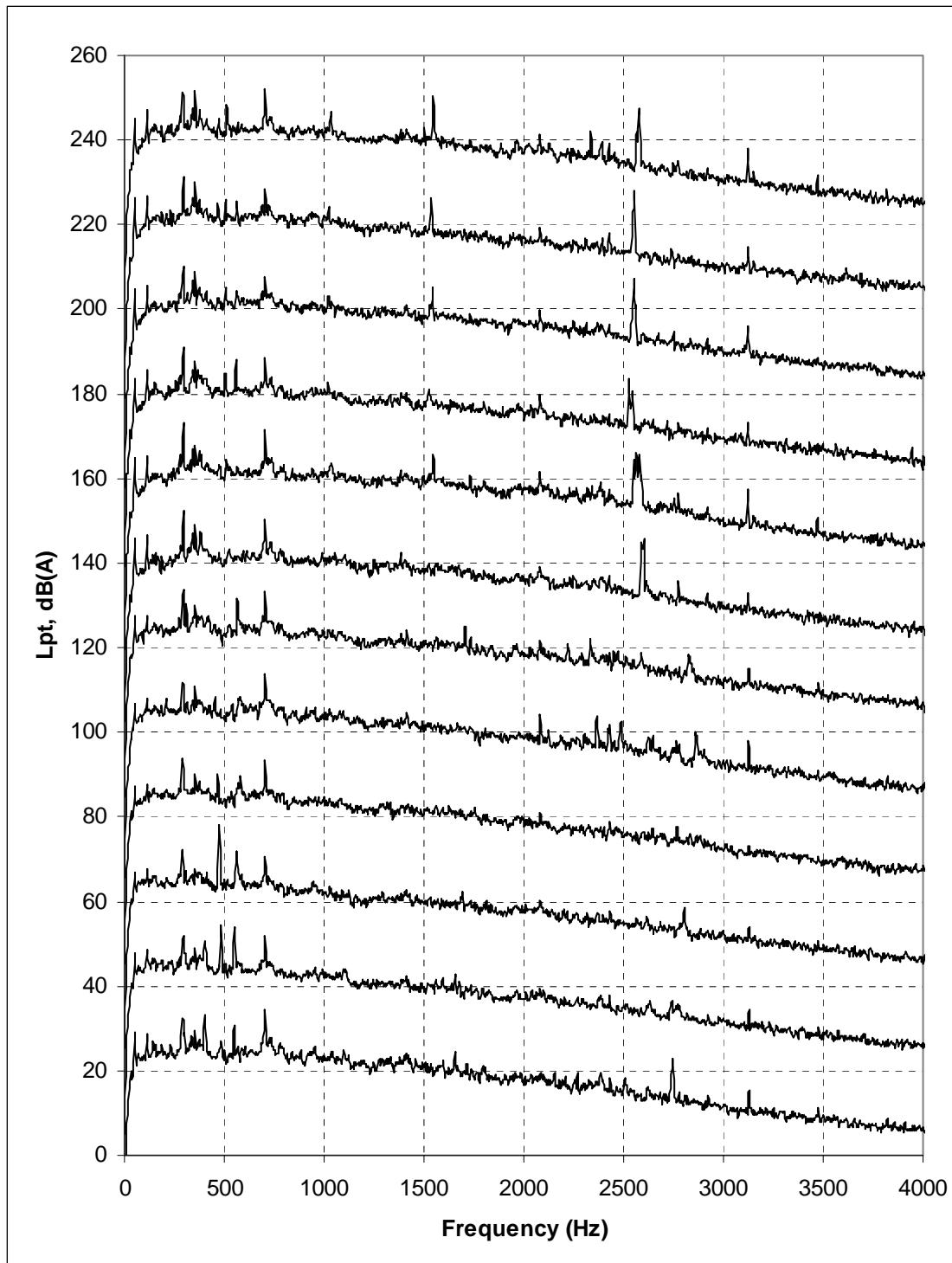
**Figure E-10. Tone at 360 Hz in the 9 m/s Bin (graphed data from 05:59,  $V_s = 8.99 \text{ m/s}$ )**



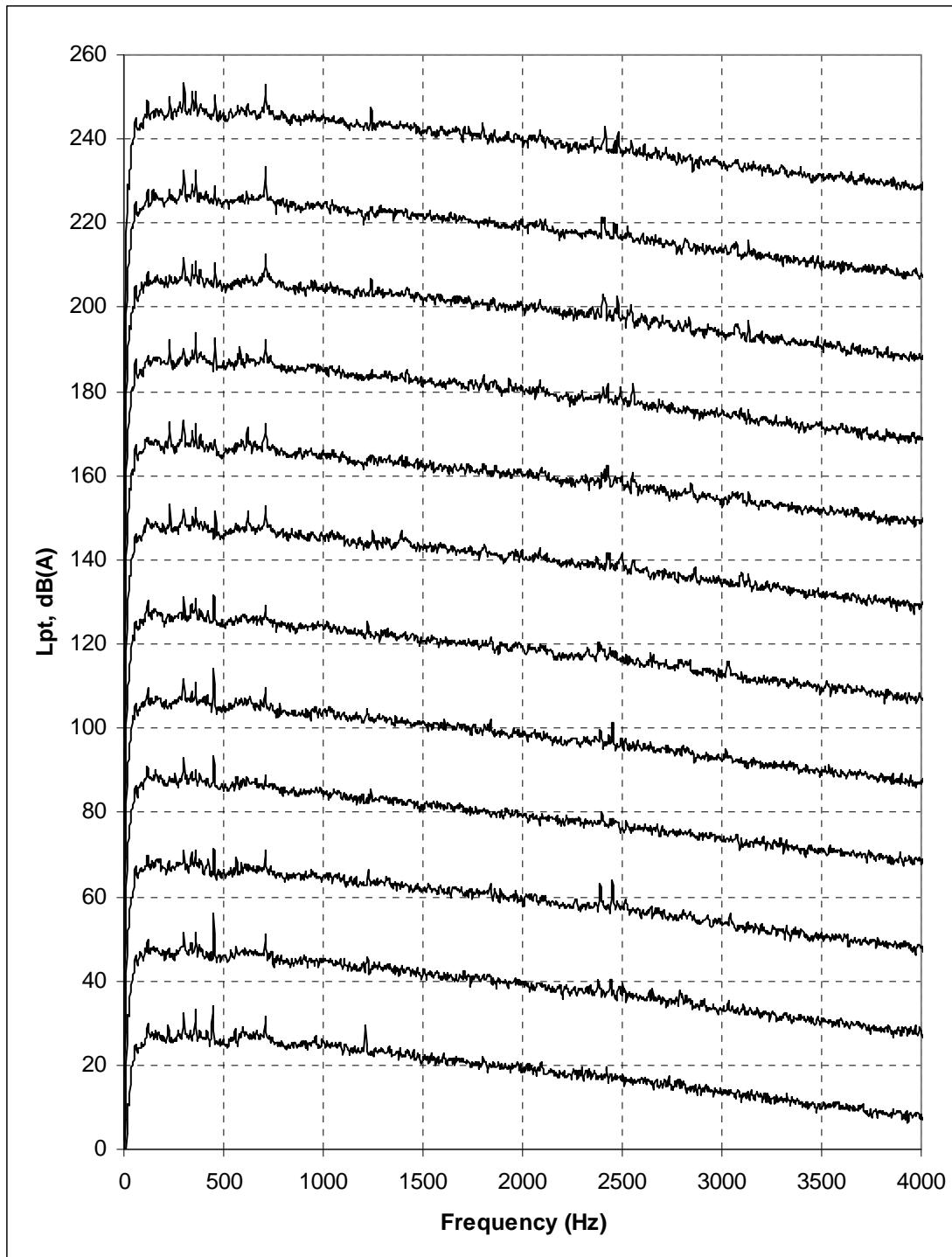
**Figure E-11. Tone at 645 Hz in the 9 m/s Bin (graphed data from 06:02,  $V_s = 8.97 \text{ m/s}$ )**



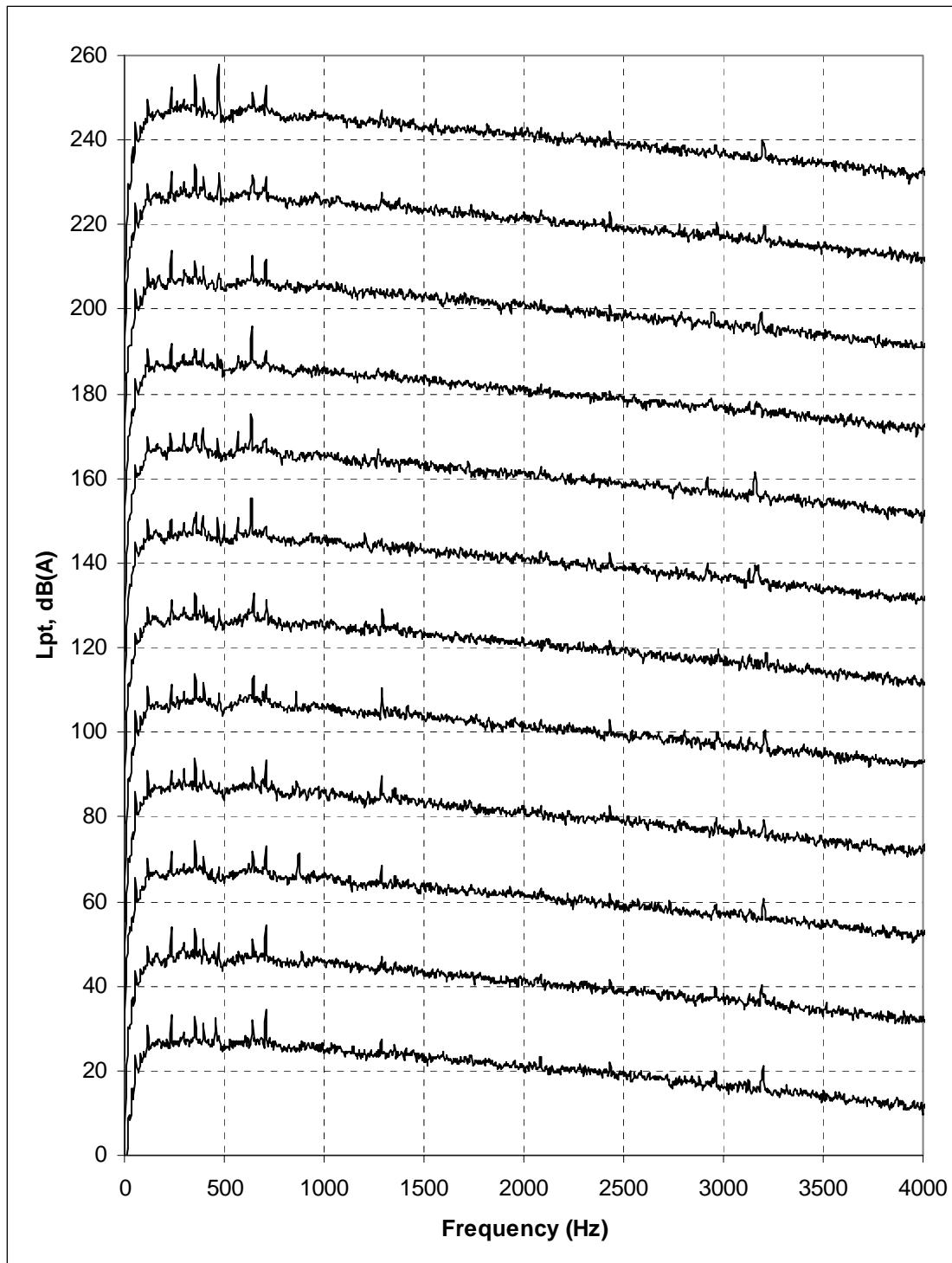
**Figure E-12. Total Noise FFTs used for 4 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 4.06$  and  $4.07$  m/s)**



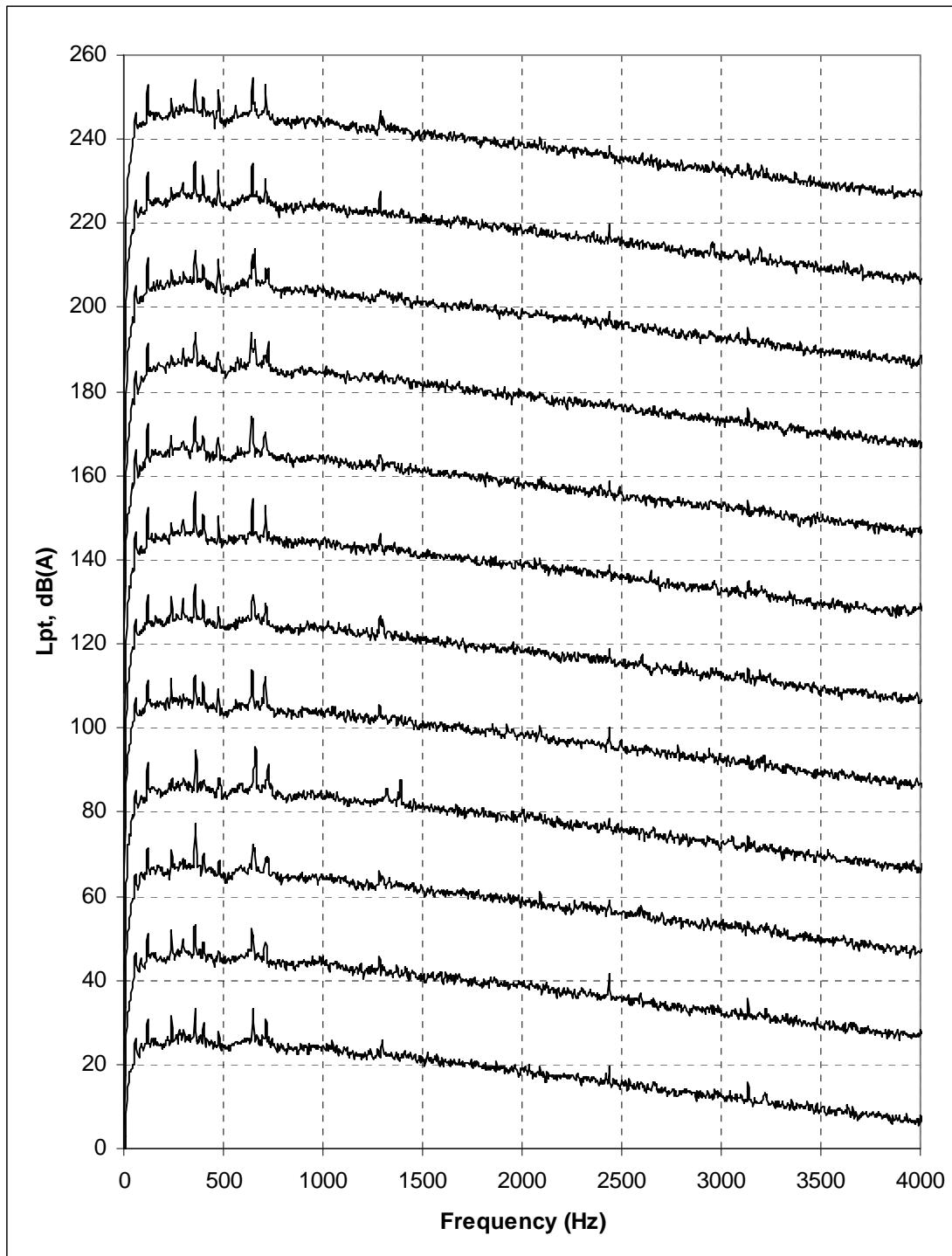
**Figure E-13. Total Noise FFTs used for 5 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 4.98$  and  $5.04$  m/s)**



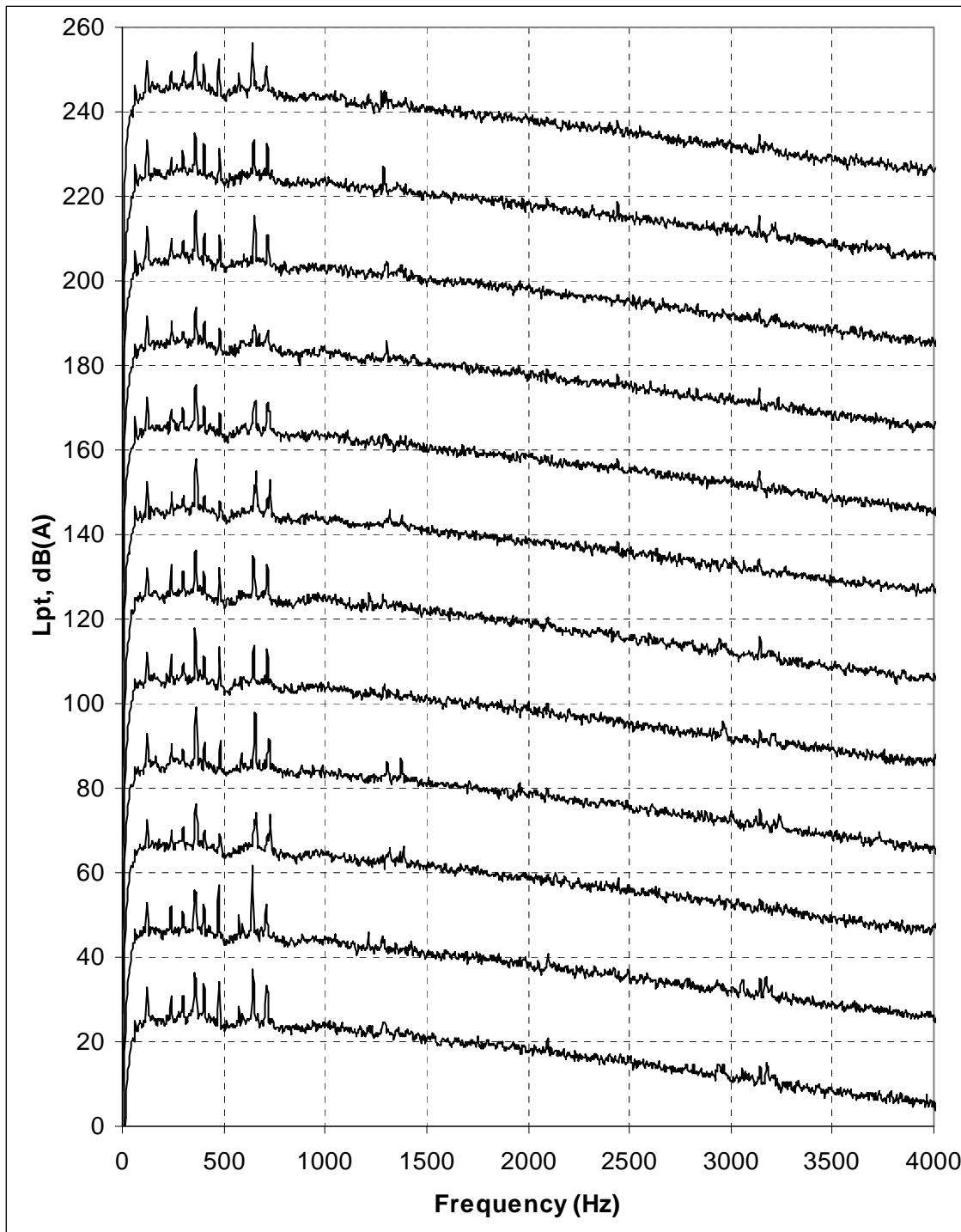
**Figure E-14. Total Noise FFTs used for 6 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 6.00$  and  $6.01$  m/s)**



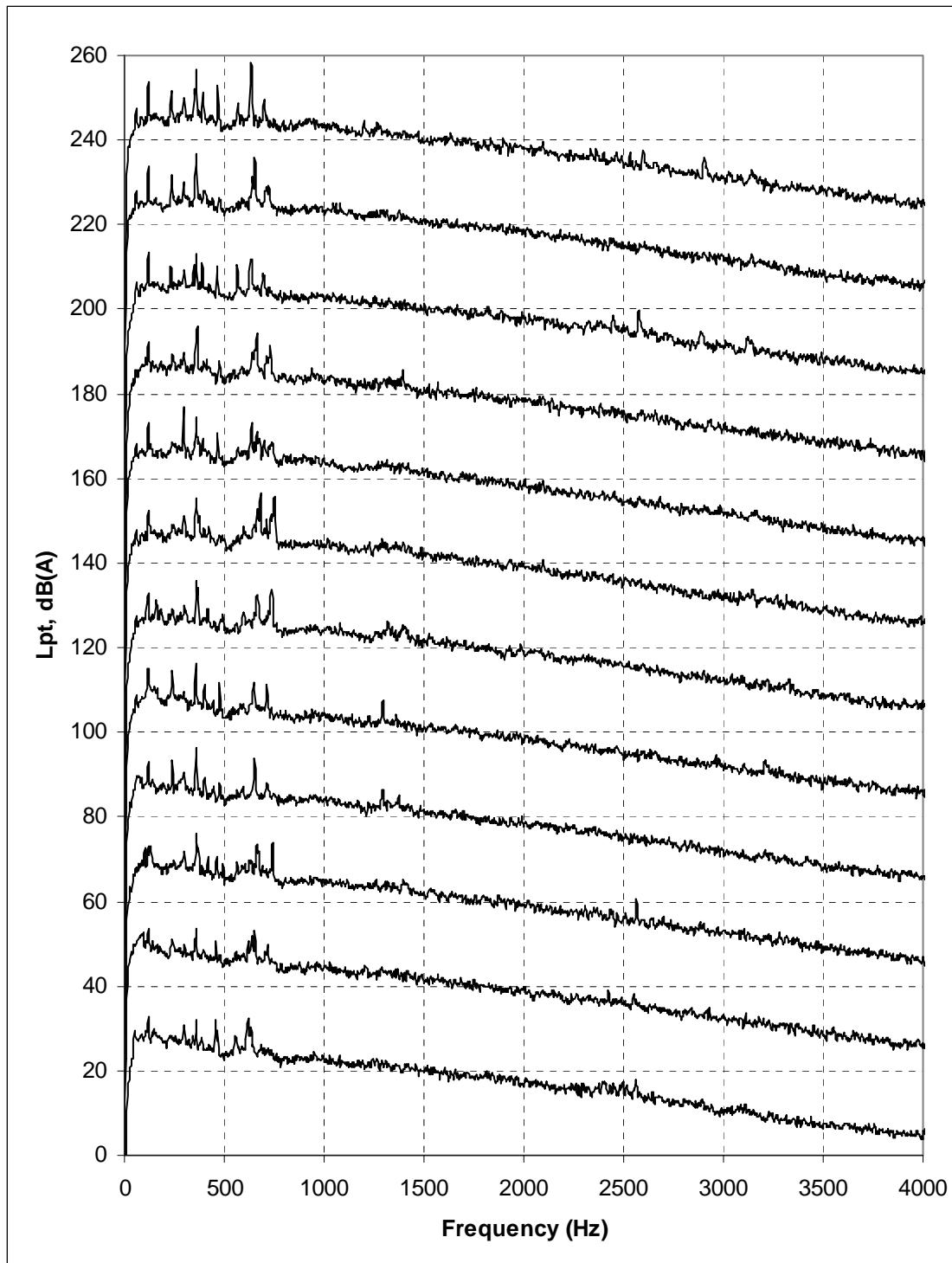
**Figure E-15. Total Noise FFTs used for 7 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 7.02$  and  $7.04$  m/s)**



**Figure E-16. Total Noise FFTs used for 8 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 8.00$  and  $8.02$  m/s)**



**Figure E-17. Total Noise FFTs used for 9 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 8.99$  and  $8.97$  m/s)**



**Figure E-18. Total Noise FFTs used for 10 m/s Tonality Analysis, Upper Spectra Shifted by 20 dB each ( $V_s = 9.82$  and  $10.04$  m/s)**

**APPENDIX E:  
CALCULATION DETAILS**

## Summary of Calculations - Condensed Overall, dBA Format

R001 Non-Participating Receptor		630845	4750617	182.1													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	69.3	0	0.0	-0.6	0.0	3.6	0.0	0.0	0.0	0.0	32.7	
WTG2	Vestas V100	631758	4750750	273.2	105	70.3	0	0.0	-0.6	0.0	3.9	0.0	0.0	0.0	0.0	31.4	
WTG3	Vestas V100	631911	4750552	273.6	105	71.6	0	0.0	-0.6	0.0	4.3	0.0	0.0	0.0	0.0	29.7	
WTG4	Vestas V100	632750	4748389	275.0	105	80.4	0	0.0	-0.5	0.0	7.7	0.0	0.0	0.0	0.0	17.4	
WTG5	Vestas V100	632706	4748817	275.0	105	79.3	0	0.0	-0.5	0.0	7.2	0.0	0.0	0.0	0.0	19.0	

R016 Non-Participating Receptor		632629	4749446	183.8													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	77.9	0	0.0	-0.5	0.0	6.6	0.0	0.0	0.0	0.0	21.0	
WTG2	Vestas V100	631758	4750750	273.2	105	74.9	0	0.0	-0.6	0.0	5.4	0.0	0.0	0.0	0.0	25.3	
WTG3	Vestas V100	631911	4750552	273.6	105	73.4	0	0.0	-0.6	0.0	4.9	0.0	0.0	0.0	0.0	27.3	
WTG4	Vestas V100	632750	4748389	275.0	105	71.6	0	0.0	-0.6	0.0	4.3	0.0	0.0	0.0	0.0	29.8	
WTG5	Vestas V100	632706	4748817	275.0	105	67.1	0	0.0	-0.7	0.0	3.1	0.0	0.0	0.0	0.0	35.4	

R117 Non-Participating Receptor		632350	4750168	184.0													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	74.4	0	0.0	-0.6	0.0	5.2	0.0	0.0	0.0	0.0	26.0	
WTG2	Vestas V100	631758	4750750	273.2	105	69.4	0	0.0	-0.6	0.0	3.7	0.0	0.0	0.0	0.0	32.5	
WTG3	Vestas V100	631911	4750552	273.6	105	66.4	0	0.0	-0.7	0.0	3.0	0.0	0.0	0.0	0.0	36.3	
WTG4	Vestas V100	632750	4748389	275.0	105	76.2	0	0.0	-0.5	0.0	5.9	0.0	0.0	0.0	0.0	23.4	
WTG5	Vestas V100	632706	4748817	275.0	105	73.9	0	0.0	-0.6	0.0	5.0	0.0	0.0	0.0	0.0	26.6	

R118 Non-Participating Receptor		632324	4750985	183.5													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	71.1	0	0.0	-0.6	0.0	4.1	0.0	0.0	0.0	0.0	30.5	
WTG2	Vestas V100	631758	4750750	273.2	105	66.8	0	0.0	-0.7	0.0	3.0	0.0	0.0	0.0	0.0	35.8	
WTG3	Vestas V100	631911	4750552	273.6	105	66.7	0	0.0	-0.7	0.0	3.0	0.0	0.0	0.0	0.0	36.0	
WTG4	Vestas V100	632750	4748389	275.0	105	79.4	0	0.0	-0.5	0.0	7.3	0.0	0.0	0.0	0.0	18.8	
WTG5	Vestas V100	632706	4748817	275.0	105	77.9	0	0.0	-0.5	0.0	6.6	0.0	0.0	0.0	0.0	21.1	

R120 Non-Participating Receptor		632358	4750984	183.5													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	71.3	0	0.0	-0.6	0.0	4.2	0.0	0.0	0.0	0.0	30.1	
WTG2	Vestas V100	631758	4750750	273.2	105	67.3	0	0.0	-0.7	0.0	3.1	0.0	0.0	0.0	0.0	35.3	
WTG3	Vestas V100	631911	4750552	273.6	105	67.0	0	0.0	-0.7	0.0	3.1	0.0	0.0	0.0	0.0	35.6	
WTG4	Vestas V100	632750	4748389	275.0	105	79.4	0	0.0	-0.5	0.0	7.3	0.0	0.0	0.0	0.0	18.8	
WTG5	Vestas V100	632706	4748817	275.0	105	77.8	0	0.0	-0.5	0.0	6.6	0.0	0.0	0.0	0.0	21.1	

R172 Non-Participating Receptor		630935	4751897	180.9													
Src ID	Src Name	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	
WTG1	Vestas V100	631359	4751252	272.6	105	68.8	0	0.0	-0.6	0.0	3.5	0.0	0.0	0.0	0.0	33.3	
WTG2	Vestas V100	631758	4750750	273.2	105	74.0	0	0.0	-0.6	0.0	5.1	0.0	0.0	0.0	0.0	26.5	
WTG3	Vestas V100	631911	4750552	273.6	105	75.4	0	0.0	-0.5	0.0	5.6	0.0	0.0	0.0	0.0	24.5	
WTG4	Vestas V100	632750	4748389	275.0	105	82.9	0	0.0	-0.8	0.0	9.1	0.0	0.0	0.0	0.0	13.8	
WTG5	Vestas V100	632706	4748817	275.0	105	82.0	0	0.0	-0.6	0.0	8.6	0.0	0.0	0.0	0.0	15.1	

## Summary of Calculations - Octave Band Format

R118 Non-Participating Receptor		632324	4750985	183.5															
Src ID	Src Name	Band	X	Y	Z	Lx	Adiv	K0	Dc	Agnd	Abar	Aatm	Afol	Ahous	Cmet	Refl	Lr	Band	
WTG1	Vestas V100	63	631359	4751252	272.6	87	71.1	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	19	63	
WTG1	Vestas V100	125	631359	4751252	272.6	92	71.1	0	0.0	1.7	0.0	0.4	0.0	0.0	0.0	0.0	19	125	
WTG1	Vestas V100	250	631359	4751252	272.6	95	71.1	0	0.0	0.1	0.0	1.1	0.0	0.0	0.0	0.0	23	250	
WTG1	Vestas V100	500	631359	4751252	272.6	97	71.1	0	0.0	-0.9	0.0	1.9	0.0	0.0	0.0	0.0	25	500	
WTG1	Vestas V100	1000	631359	4751252	272.6	100	71.1	0	0.0	-0.9	0.0	3.7	0.0	0.0	0.0	0.0	26	1000	
WTG1	Vestas V100	2000	631359	4751252	272.6	98	71.1	0	0.0	-0.9	0.0	9.7	0.0	0.0	0.0	0.0	18	2000	
WTG1	Vestas V100	4000	631359	4751252	272.6	97	71.1	0	0.0	-0.9	0.0	32.9	0.0	0.0	0.0	0.0	--	4000	
WTG1	Vestas V100	8000	631359	4751252	272.6	90	71.1	0	0.0	-0.9	0.0	117.5	0.0	0.0	0.0	0.0	--	8000	
WTG2	Vestas V100	63	631758	4750750	273.2	87	66.8	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	23	63	
WTG2	Vestas V100	125	631758	4750750	273.2	92	66.8	0	0.0	1.6	0.0	0.3	0.0	0.0	0.0	0.0	23	125	
WTG2	Vestas V100	250	631758	4750750	273.2	95	66.8	0	0.0	0.1	0.0	0.7	0.0	0.0	0.0	0.0	27	250	
WTG2	Vestas V100	500	631758	4750750	273.2	97	66.8	0	0.0	-0.9	0.0	1.2	0.0	0.0	0.0	0.0	30	500	
WTG2	Vestas V100	1000	631758	4750750	273.2	100	66.8	0	0.0	-0.9	0.0	2.3	0.0	0.0	0.0	0.0	32	1000	
WTG2	Vestas V100	2000	631758	4750750	273.2	98	66.8	0	0.0	-0.9	0.0	6.0	0.0	0.0	0.0	0.0	26	2000	
WTG2	Vestas V100	4000	631758	4750750	273.2	97	66.8	0	0.0	-0.9	0.0	20.3	0.0	0.0	0.0	0.0	10	4000	
WTG2	Vestas V100	8000	631758	4750750	273.2	90	66.8	0	0.0	-0.9	0.0	72.4	0.0	0.0	0.0	0.0	--	8000	
WTG3	Vestas V100	63	631911	4750551	273.6	87	66.7	0	0.0	-3.0	0.0	0.1	0.0	0.0	0.0	0.0	24	63	
WTG3	Vestas V100	125	631911	4750551	273.6	92	66.7	0	0.0	1.5	0.0	0.3	0.0	0.0	0.0	0.0	24	125	
WTG3	Vestas V100	250	631911	4750551	273.6	95	66.7	0	0.0	0.1	0.0	0.6	0.0	0.0	0.0	0.0	27	250	
WTG3	Vestas V100	500	631911	4750551	273.6	97	66.7	0	0.0	-0.9	0.0	1.2	0.0	0.0	0.0	0.0	30	500	
WTG3	Vestas V100	1000	631911	4750551	273.6	100	66.7	0	0.0	-0.9	0.0	2.2	0.0	0.0	0.0	0.0	32	1000	
WTG3	Vestas V100	2000	631911	4750551	273.6	98	66.7	0	0.0	-0.9	0.0	5.9	0.0	0.0	0.0	0.0	27	2000	
WTG3	Vestas V100	4000	631911	4750551	273.6	97	66.7	0	0.0	-0.9	0.0	19.9	0.0	0.0	0.0	0.0	11	4000	
WTG3	Vestas V100	8000	631911	4750551	273.6	90	66.7	0	0.0	-0.9	0.0	70.8	0.0	0.0	0.0	0.0	--	8000	
WTG4	Vestas V100	63	632750	4748389	275.0	87	79.4	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	11	63	
WTG4	Vestas V100	125	632750	4748389	275.0	92	79.4	0	0.0	1.8	0.0	1.1	0.0	0.0	0.0	0.0	10	125	
WTG4	Vestas V100	250	632750	4748389	275.0	95	79.4	0	0.0	0.1	0.0	2.8	0.0	0.0	0.0	0.0	12	250	
WTG4	Vestas V100	500	632750	4748389	275.0	97	79.4	0	0.0	-0.9	0.0	5.1	0.0	0.0	0.0	0.0	14	500	
WTG4	Vestas V100	1000	632750	4748389	275.0	100	79.4	0	0.0	-0.9	0.0	9.6	0.0	0.0	0.0	0.0	12	1000	
WTG4	Vestas V100	2000	632750	4748389	275.0	98	79.4	0	0.0	-0.9	0.0	25.4	0.0	0.0	0.0	0.0	--	2000	
WTG4	Vestas V100	4000	632750	4748389	275.0	97	79.4	0	0.0	-0.9	0.0	86.3	0.0	0.0	0.0	0.0	--	4000	
WTG4	Vestas V100	8000	632750	4748389	275.0	90	79.4	0	0.0	-0.9	0.0	307.7	0.0	0.0	0.0	0.0	--	8000	
WTG5	Vestas V100	63	632706	4748817	275.0	87	77.9	0	0.0	-3.0	0.0	0.3	0.0	0.0	0.0	0.0	12	63	
WTG5	Vestas V100	125	632706	4748817	275.0	92	77.9	0	0.0	1.8	0.0	0.9	0.0	0.0	0.0	0.0	11	125	
WTG5	Vestas V100	250	632706	4748817	275.0	95	77.9	0	0.0	0.1	0.0	2.3	0.0	0.0	0.0	0.0	14	250	
WTG5	Vestas V100	500	632706	4748817	275.0	97	77.9	0	0.0	-0.9	0.0	4.3	0.0	0.0	0.0	0.0	16	500	
WTG5	Vestas V100	1000	632706	4748817	275.0	100	77.9	0	0.0	-0.9	0.0	8.1	0.0	0.0	0.0	0.0	15	1000	
WTG5	Vestas V100	2000	632706	4748817	275.0	98	77.9	0	0.0	-0.9	0.0	21.3	0.0	0.0	0.0	0.0	--	2000	
WTG5	Vestas V100	4000	632706	4748817	275.0	97	77.9	0	0.0	-0.9	0.0	72.2	0.0	0.0	0.0	0.0	--	4000	
WTG5	Vestas V100	8000	632706	4748817	275.0	90	77.9	0	0.0	-0.9	0.0	257.5	0.0	0.0	0.0	0.0	--	8000	

**APPENDIX F:  
WIND SHEAR COEFFICIENT SUMMARY**

**Figure F1: Diurnal Wind Shear, Wainfleet Wind Energy**  
Calculations based on Wind Speeds Measured Between August 13 until August 26, 2010  
at 60 m, 50 m and 40 m Heights

