Appendix E

ENIA

NOISE IMPACT ASSESSMENT
Ostrander Point Wind Energy Park

- For the purposes of the Certificate of Approval (Air and Noise) Application

Prepared for
Gilead Power Corporation

by
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Membre GL Group Member

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DISCLAIMER

DEFINITIONS AND SYMBOLS

agl	above ground level
CofA (Air)	Certificate of Approval - Air
dB(A)	decibel A-scale
EPA	Environmental Protection Act
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
kW	kilowatt
m/s	meters per second
m	meter
MOE	Ontario Ministry of the Environment
MW	megawatt
NIA	Noise Impact Assessment
n/a	not applicable
PWL	Sound Power Level
WTG	Wind turbine generator

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 INTRODUCTION

Helimax Energy Inc. ("Helimax") was retained by Gilead Power Corporation ("Gilead" or "Client") to prepare a Noise Impact Assessment ("NIA") for the Ostrander Point Wind Energy Park ("Project") in accordance with the Ontario Ministry of the Environment's ("MOE") revised environmental noise guideline for wind turbines (MOE, October 2008). Noise levels at points of reception are calculated on the basis of an approved methodology (ISO 9613-2). The proposed Wind Farm is located on Crown land, within the municipality of Prince Edward, along the Lake Ontario shoreline, in south-eastern Ontario.

Gilead seeks to supply clean energy to the Ontario energy system using state-of-the-art wind energy technology. The Project is comprised of twelve (12) 2-MW turbines for a nameplate capacity of 24 MW.

The purpose of this NIA is to meet the requirements of Ontario Regulation 116/01 under the *Environmental Assessment Act* and to provide the basis for the Certificate of Approval – Air and Noise (CofA) under the *Environmental Protection Act* ("EPA"). Specifically, to fulfill these requirements, the objective of this assessment is twofold:

1. Confirm the sound level limit requirements for the Project by providing an assessment of the existing baseline environmental noise conditions in the vicinity of the wind farm;

2. Predict the noise levels generated by the Project at all critical Points of Reception within 1.5 km of the turbines.

This NIA was prepared in accordance with the Ministry of Environment (October 2008) revised noise guidelines for wind turbines entitled *Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities* ("MOE Interpretation"). The MOE Interpretation was prepared to assist proponents of wind turbine installations in determining what information should be submitted when applying for a CofA, in accordance with Section 9 of the EPA.

2 GENERAL DESCRIPTION OF PROJECT SITE

2.1 General Characteristics

The Project is located on Crown land, namely Ostrander Point, within the Municipality of Prince Edward in south-eastern Ontario. Its layout consists of twelve (12) 2-MW wind turbine generators (WTG) manufactured by Enercon, for a total capacity of 24 MW. More specifically, the Project is located approximately 15 km south of the municipality of Picton, along the shoreline of Lake Ontario.

The Project has been configured using Enercon E82 wind turbines strategically sited on Ostrander Point Crown land to which the Client is an Applicant of Record for the Ostrander Point Crown Land Block. The turbines are sited on lands that are in rural and undeveloped areas. Electricity generated by the turbines will be fed to an underground and/or overhead collector system terminating at two (2) step-up transformers, within the Project area. Electricity will be fed directly to the local distribution system. The Ostrander site map showing the locations of wind turbines, Points of Reception (PoR) and step-up transformers is presented in Appendix A.

The land inside the Project Area is relatively flat. All turbines are to be placed in grassland type fields, sparsely populated by coniferous trees. There are a number of woodlots close to the Project Area and comprised within the boundaries of the Project Area. The woodlots tend to be isolated stands surrounded by fields.

Figure 2-1 : Land Features of the Project Area

2.2 Land Use Description

The site is publicly-owned Crown land and municipal policy is not technically binding. Similarly, the County's comprehensive Zoning By-Law does not apply. However, considering the local high-level policies in the Region of Prince Edward County's Official Plan is helpful in understanding the social context and municipal direction for the site and the surrounding area.

Ostrander Point is bound by roads designated 'Rural Service' under Prince Edward County's Official Plan in the north, east and west and by the Lake Ontario shoreline in the south. Schedule E, the Land Use plan for the Official Plan, indicates the northern portion of the site is designated in part as 'Outdoor Recreation Land'. Generally, this designation is meant to provide a range of recreational and open space opportunities to residents and tourists. The southern portion of the site in proximity to Lake Ontario is designated as 'Environmental Protection' under the Official Plan. Generally, this designation is meant to provide protection to wetlands identified as provincially or locally significant or other wetland areas identified through air photos or field visits.

There are no provincially significant wetlands on the site. Schedule A indicates there is an Environmentally Sensitive Area designated 'Other Sensitive Site or Area' adjacent to the south eastern corner of the site. This implies the presence of a representative example of the County's biological or geological history and diversity. There are no identified 'Environmental constraints' or 'Tourism or Recreation' features on the site as per Schedules B and D respectively. There is however, a designated 'Tourism Corridor' north of the site, surrounding South Bay. In addition, Highway 13, which is located north of the site, is designated as a 'Scenic Route / Bicycle Trail'

The area is considered as having a very low population density, and no dwellings are found within the project boundaries.

Appendix B presents an excerpt of the land use designation map of Prince Edward County along with the project area (outlined in green).

2.3 Points of Reception

Sensitive receptor locations (i.e. Points of Reception) for the Project were identified using base data from the Ministry of Natural Resources Land Information Warehouse and Directory, recent aerial photos and field reconnaissance to verify locations and building types. The height of each Point of Reception was also noted and was 4.5 m (2-storey houses) in all cases. They are tabulated in Table 7-1.

The MOE guidelines dictate that noise from step-up transformers associated with the project needs to be taken into account. For two-storey dwellings, the worst-case scenario (i.e. either the noise calculated at the location, 4.5 m above grade at the centre of the dwelling, or calculated at 1.5 m above grade, 30 m horizontally from the dwelling in the direction of each wind turbine location) has to be used when siting the turbines. In the present case at Ostrander, noise levels were always higher at 4.5m for all Points of Reception, given that the step-up transformers are not very noisy and that they are located far away from these dwellings. Results for all receptors are presented in Table 7-1.

The MOE Interpretation indicates that any point on the premises of a person within 30 m of a residence or camping area is considered to be part of a Point of Reception. However, a residence located on the same premises as a wind turbine is not a Point of Reception as defined by the MOE noise guidelines. In this instance, all dwellings are considered Point of Reception as they are not part of the premises.

According to base mapping and site visit validation by Gilead and their consultants, a total of 8 points of reception, 7 dwellings and one planned retirement home, are found within 1,500 m of the wind farm. The coordinates of each of these Points of Reception are listed in Appendix C.

3 DESCRIPTION OF RECEPTORS

3.1 Receptor Classes

The MOE categorizes Points of Reception into three classes: 1, 2, and 3. Class 1 refers to an acoustic environment typical of a major population centre where the background noise is dominated by the urban hum. These areas are highly urbanized and have moderate to high noise levels throughout the day and night. Class 2 areas have an acoustic environment characterized by low ambient sound levels between 19:00 and 07:00, whereby the evening and night time levels are defined by natural sounds, infrequent human activity and no clearly audible sounds from stationary sources (e.g. industrial and commercial facilities). Class 3 areas are typical of rural and/or small communities (i.e. with populations of less than 1000) and an acoustic environment that is dominated by natural sounds with little or no road traffic.

Within the study area the main sources of ambient sound that currently exist include:

- Recurrent sounds from the shores of Lake Ontario
- Vehicular traffic on the local rural roads
- Occasional sounds due to agricultural activities
- Occasional sounds due to anthropogenic domestic activities
- Natural sounds.

Based on these conditions, **all Points of Reception are considered as having a Class 3 acoustical environment.**

3.2 Determination of Applicable Noise Limits

As stated in the MOE guideline, the noise limits for a wind farm are set according to the existing MOE noise guidelines in NPC-205/NPC-232 while taking into account the wind-generated background noise.

For a Class 3 area, the sound level limits as defined by the MOE Interpretation are described in the sections below.

3.2.1 Wind Turbine Installations in Class 3 Areas (Rural), Wind Speeds Below 6 m/s

The lowest sound level limit expressed in terms of L_{eq} is: i) 40 dB(A); or ii) the minimum hourly background sound level established in accordance with Publications NPC-232/NPC-233, whichever is higher.

3.2.2 Class 3 Areas, Wind Speeds Above 6 m/s

The lowest sound level limit expressed in terms of L_{eq} is: i) the wind-induced background sound level, expressed in terms of ninetieth percentile sound level (L_{A90}) plus 7 dB; or ii) the minimum hourly background sound level established in accordance with Publications NPC-205/NPC-232/NPC-233, whichever is higher.

The applicable noise limits should be those defined by the MOE as summarized below in Table 3-1.

Table 3-1: Summary of Noise Limits for Points of Reception (Class 3)

		Wind Speed [m/s]				
		6	7	8	9	10
Class 3 Receptors	Wind Turbine Noise Criterion NPC-232 [dB(A)]	40	43	45	49	51

4 DESCRIPTION OF SOURCES

4.1 Wind Turbines

Table 4-1 presents the general specifications of the wind turbine model proposed for the Project.

Table 4-1: Turbine Description – Enercon E82 2-MW

Model	E82
Rated power	2000 kW
Hub height	78 m
Rotor diameter	82 m
Total height	119 m
Rotor swept area	5281 m^2
Rotational speed	6-19.5 rpm
Number of blades	3
Cut-in wind speed	2.5 m/s
Cut-out wind speed	22-28 m/s
Nominal wind speed	12.0 m/s

Each turbine is active yaw and pitch regulated and features variable-speed control with an asynchronous generator. Full technical specifications as provided by the manufacturer can be found in Appendix D. Coordinates of all turbines are listed in Appendix E.

The Project will comprise 12 WTGs. Each turbine is equipped with a small step-up transformer where the voltage will be elevated to 27.6 kV. The requirements of the Noise Guideline do not apply however to small transformer units attached to the turbines as they are considered an insignificant noise source.

4.2 Step-up Transformers

The collector system will terminate at two (2) Pioneer step-up transformers. The voltage will be elevated to 44 kV at these locations to enable connection to the local distribution system. The broadband maximum noise level for the 10 MVA transformers was provided by an engineering representative at Pioneer Transformers[1]. A noise level of 68 dBA was attributed to each transformer, to which 5 dBA was added as per the Noise Guideline, and was included in the calculation of the noise levels at each receptor. The octave band distribution was established as follows based on available information for larger transformers:

Table 4-2: 10 MVA Octave Band Sound Power Levels (with and without 5 dBA adjustment)

Broadband SPL [dB(A)]	Octave Band Sound Power Levels (Centre Frequency) [dB(A)]							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
68.0	48.7	56.2	59.0	62.3	64.0	58.8	50.1	42.1

Broadband SPL [dB(A)]	Octave Band Sound Power Levels (Centre Frequency) + 5 dBA [dB(A)]							
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
73.0	53.7	61.2	64	67.3	69	63.8	55.1	47.1

[1] Pers. comm. Carl Girard, Eng. PIONEER Transformers ltd.

4.3 Cumulative Effects Assessment – Other Wind Farms

As per the MOE Guidelines, all other approved wind farms, or wind farms in the process of being approved located within 5 km of any wind turbine of the proposed wind farm need to be considered in the present analysis.

The Royal Road project, initially developed by Vision Quest and now owned by Canadian Hydro Developers, has filed the Statement of Completion, thus completing the Ministry of the Environment's Environmental Screening Process (ESP). The Royal Road project, with a defined wind turbine layout and Standard Offer Contracts (SOC), is located at a distance beyond 5 km - approximately 7.5 km - from the Ostrander Point Wind Energy Park closest turbine. Thus a cumulative noise effect assessment is not warranted.

The White Pines Project, developed by IPC Energy, is located in the vicinity of the Ostrander Point Wind Energy Park. However, after consulting the Project's published information, it has thus far only filed a Notice of Commencement. IPC Energy has not yet publicly presented a wind turbine layout. Due to the White Pines Project being in the early stages of the Environmental Screening Process, a cumulative noise effects assessment was deemed to be unwarranted.

5 WIND TURBINE NOISE EMISSION RATING

5.1 Noise Emission Rating

Sound power levels ("SPL") of the wind turbine model proposed for the Project are presented in Table 5-1. Broadband and octave band sound power levels at 6 to 10 m/s wind speeds (measured at 10 m agl) are provided by Enercon (see Appendix D). The maximum sound power level of 104 dBA was utilized at every wind speed to take into account site conditions (summer time wind shear, turbulence, etc.). The Octave Band spread was derived from an Extract of Test Report M65 333/2 on the Enercon E82 by Muller-BBM, dated 20 September 2006.

Thus, the octave band sound power levels used for the simulations in this NIA were those stated for each octave band centre frequency in Table 5-1.

Table 5-1: Overall and Octave Band Sound Power Levels for the Enercon E82 - 78 m Hub Height

Wind Speed [m/s]	Broadband SPL [dB(A)]	Octave Band Sound Power Levels (Centre Frequency) [dB(A)]							
		63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
≤ 6	104.0	84.7	92.3	95.0	98.3	100.0	94.8	83.1	78.2
7	104.0	84.7	92.3	95.0	98.3	100.0	94.8	83.1	78.2
8	104.0	84.7	92.3	95.0	98.3	100.0	94.8	83.1	78.2
9	104.0	84.7	92.3	95.0	98.3	100.0	94.8	83.1	78.2
10	104.0	84.7	92.3	95.0	98.3	100.0	94.8	83.1	78.2

6 NOISE IMPACT ASSESSMENT

The sound pressure level at each critical Point of Reception for the aggregate of all wind turbines and the step-up transformers associated with the Project were calculated based on the ISO 9613-2 method. Since the maximum sound power level was utilized at every wind speed, results were identical for every wind speed, from 6 m/s to 10 m/s.

The ISO 9613 standard provides a prediction of the equivalent continuous A-weighted sound pressure level at a distance from one or more point sources under meteorological conditions favourable to propagation from sources of sound emission. These conditions are for downwind propagation or, equivalently, propagation under a well-developed moderate ground-based temperature inversion, such as commonly occurs at night.

The method consists of octave-band algorithms (i.e. with nominal mid-band frequencies from 63 Hz to 8 kHz) for calculating the attenuation of the emitted sound. The algorithm takes into account the following physical effects:

- Geometrical divergence – attenuation due to spherical spreading from the sound source
- Atmospheric absorption – attenuation due to absorption by the atmosphere
- Ground effect – attenuation due to the acoustical properties of the ground

The parameters used in the model are found in the following table.

Table 6-1: Parameters Used in the Propagation Modeling

Parameter	Value used in modeling
Atmospheric absorption coefficients (ambient air temperature and relative humidity)	As per table 2, section 6.4.10 of MOE Guideline (approximates 10ºC and 70% RH conditions)
Ambient barometric pressure	101.32 kPa
Source ground factor	0.7 (soft ground)
Middle ground factor	0.7 (soft ground)
Receptor ground factor	0.7 (soft ground)
Windshear factor	N/A – maximum noise level of turbine was used for all wind speeds
Vegetation screening	Not considered
Number of turbines	12
Maximum Broadband SPL (turbine)	104.0 dBA
Number of step-up transformers/substations	2
Maximum Broadband SPL (step-up transformers) (including additional 5 dBA)	73.0 dBA

Additional calculations concerning propagation through foliage were not performed in this NIA, implying that the values calculated for sound attenuation are likely to be conservative in areas where there is foliage present in the line of sight between any turbine and a critical Point of Reception. The estimated accuracy of the ISO 9613 method, as stated in ISO 9613-2, is ± 3 dB. For sources above 30 m, the accuracy is estimated to be higher (± 5 dB).

The wind turbine noise emission ratings used for each octave band were those specified in Table 5-1. The noise impact was calculated for each Point of Reception located within 1500 m of one or more turbines, and the calculated noise level was then compared with the applicable noise limit for each receptor as stated in Table 3-1.

7 WIND TURBINE NOISE IMPACT ASSESSMENT SUMMARY TABLE

The noise level at each critical Point of Reception within 1500 m of any turbine of the Project, for wind speeds between 6 m/s and 10 m/s, is tabulated in Table 7-1. For each Point of Reception, the following information is provided:

- The distance to the closest wind turbine;
- The height of the Point of Reception
- The sound level limit for each Point of Reception and for each wind speed from 6 m/s to 10 m/s according to the MOE Classification ;
- The applicable background sound level;
- The calculated noise level induced by the wind farm at all Points of Reception.
- Whether or not the calculated noise levels at the receptor comply with the MOE guidelines (for continued reference, compliance is confirmed for all receptors).

The closest distance between a wind turbine and a point of reception for this project is 726 m.

The results show that the Project complies with the applicable MOE environmental noise guidelines at all wind speeds modelled (i.e., 6, 7, 8, 9 and 10 m/s). For illustration purposes, a noise iso-contour map illustrating the acoustical contribution of all wind turbines considered in the simulation is shown in Appendix A for a wind speed of 6 m/s (identical for wind speeds 7 m/s to 10 m/s as stated above).

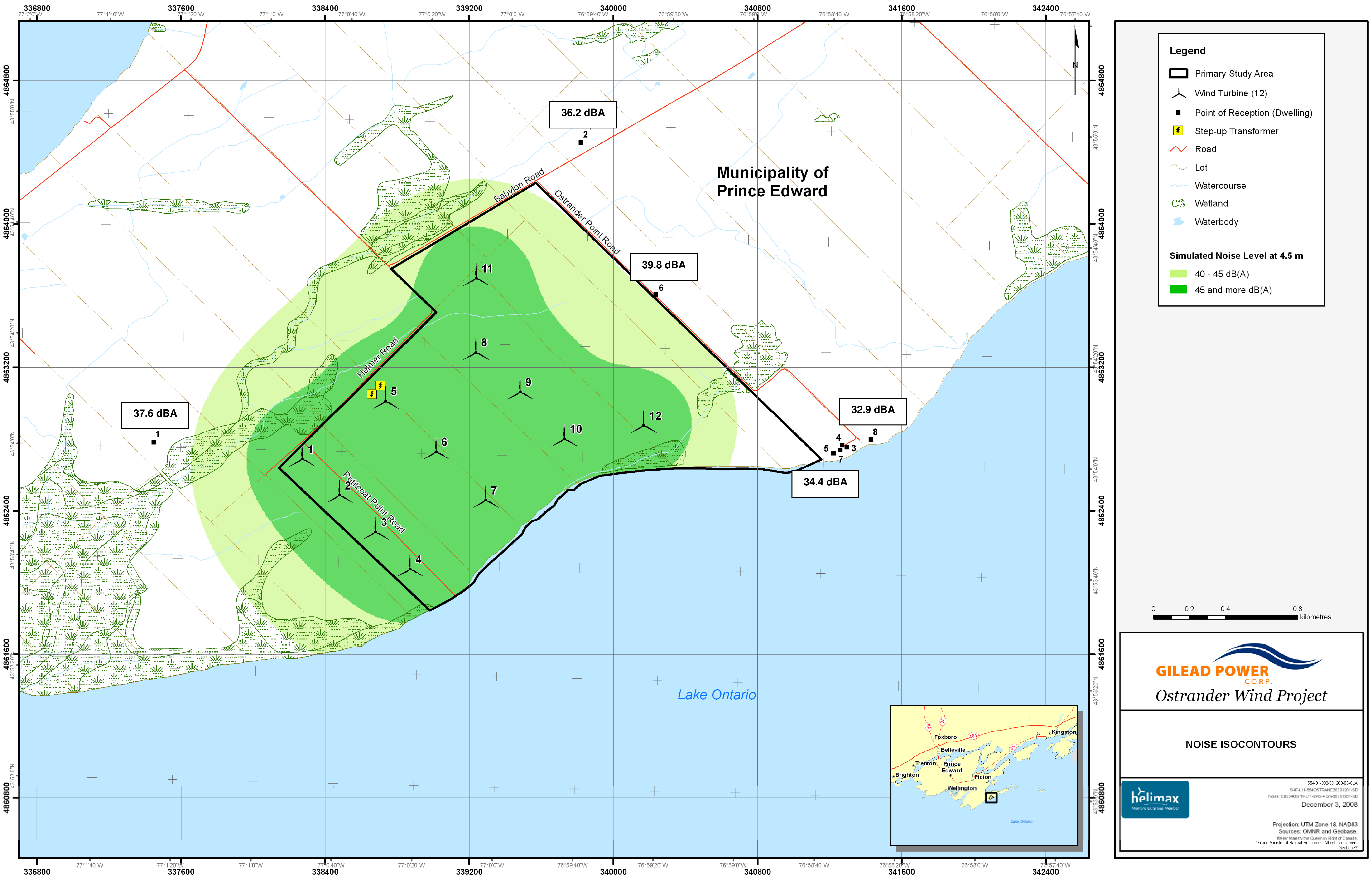
Table 7-1: Wind Turbine Noise Impact Assessment Summary

Point of Reception		Distance to Closest WTG [m]	Calculated Sound Pressure Level at Receptor [dB(A)] at selected Wind Speed in m/s					Compliance With Limit (Yes/No)
ID	Heigth [m agl]		6 or <	7	8	9	10	
		Sound Level Limit	40	43	45	49	51	
Applicable Background Sound Level - NPC 232 (C 3) = 40 dB(A)								
1	4.5	829	37.6	37.6	37.6	37.6	37.6	Yes
2	4.5	938	36.2	36.2	36.2	36.2	36.2	Yes
3	4.5	1135	33.8	33.8	33.8	33.8	33.8	Yes
4	4.5	1108	34.0	34.0	34.0	34.0	34.0	Yes
5	4.5	1065	34.4	34.4	34.4	34.4	34.4	Yes
6	4.5	726	39.8	39.8	39.8	39.8	39.8	Yes
7	4.5	1100	34.1	34.1	34.1	34.1	34.1	Yes
8	4.5	1265	32.9	32.9	32.9	32.9	32.9	Yes

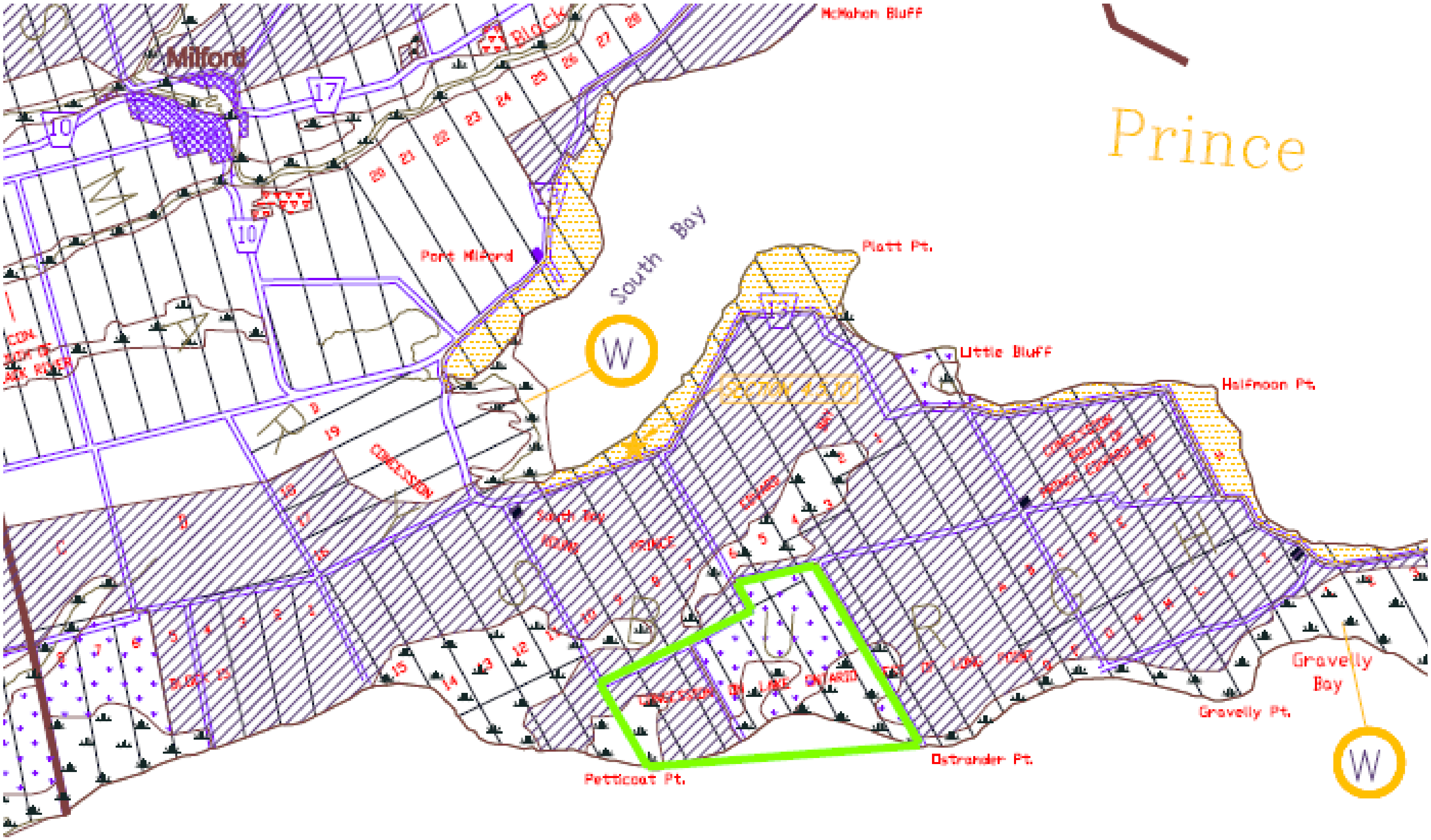
8 CONCLUSION

When modeled according to the ISO 9613 standard and the conditions specified in the MOE Interpretation, the noise produced by the turbines was found to be within the acceptable limits at all critical Points of Reception within 1500 m of one or more turbines for wind speeds of 6, 7, 8, 9 and 10 m/s.

APPENDIX A NOISE ISO-CONTOUR MAP (MAXIMUM SOUND POWER LEVEL)


Legend
Primary Study Area
Wind Turbine (12)
Point of Reception (Dwelling)
Step-up Transformer
Road
Lot
Watercourse
Wetland
Waterbody
Simulated Noise Level at 4.5 m
40 - 45 dB(A)
45 and more dB(A)
0 0.2 0.4 0.8 kilometres
GILEAD POWER CORP.
Ostrander Wind Project
NOISE ISOCONTOURS
helimax
December 3, 2008
Projection: UTM Zone 18, NAD83
Sources: OMNR and Geobase.
Municipality of Prince Edward
Lake Ontario
Babylon Road
Ostrander Point Road
Helmer Road
Petticoat Point Road
36.2 dBA
39.8 dBA
37.6 dBA
32.9 dBA
34.4 dBA
336800
337600
338400
339200
340000
340800
341600
342400
4864800
4864000
4863200
4862400
4861600
4860800
Foxboro
Belleville
Trenton
Brighton
Prince Edward
Picton
Wellington
Kingston

APPENDIX B LAND USE DESIGNATION MAP (EXCERPT FROM SCHEDULE E - PEC)



APPENDIX C COORDINATES OF POINTS OF RECEPTION (POR)

PoR ID	PoR Height	UTM17-NAD83	
		Easting [m]	Northing [m]
1	4.5	337449	4862785
2	4.5	339821	4864457
3	4.5	341297	4862757
4	4.5	341271	4862768
5	4.5	341222	4862724
6	4.5	340236	4863608
7	4.5	341260	4862741
8	4.5	341431	4862798

APPENDIX D TECHNICAL SPECIFICATIONS OF THE E82 WTG

TECHNICAL DATA E-82 2000 kW

Rated power:	2000 kW
Rotor diameter:	82 m
Hub height:	70 m, 78 m, 98 m, 108 m
Prototype:	Autumn 2005
Series production:	From 3rd quarter 2006
Turbine concept:	Gearless, variable speed, variable pitch control

Rotor

Type:	Upwind rotor with active pitch control
Direction of rotation:	Clockwise
Number of blades:	3
Swept area:	5281 m²
Blade material:	Fibreglass (epoxy resin); integrated lightning protection
Rotational speed:	Variable, 6 – 19.5 rpm
Tip speed:	25 – 80 m/s
Pitch control:	ENERCON blade pitch system, one independent pitching system per rotor blade with allocated emergency supply

Drive train with generator

Hub:	Rigid
Main bearings:	Dual-row tapered/single-row cylindrical roller bearings
Generator:	ENERCON direct-drive synchronous annular generator
Grid feeding:	ENERCON inverter
Braking systems:	– 3 independent blade pitch systems with emergency supply – Rotor brake – Rotor lock
Yaw control:	Active via adjustment gears, load-dependent damping
Cut-in wind speed:	2.5 m/s
Rated wind speed:	12.0 m/s
Cut-out wind speed:	22 – 28 m/s
Remote monitoring:	ENERCON SCADA

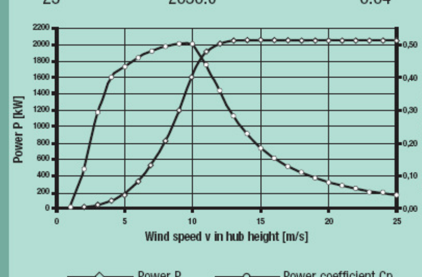
Specifications subject to change/November 2005

1 Main carrier
2 Yaw motors
3 Annular generator
4 Blade adaptor
5 Rotor hub
6 Rotor blade

Calculated power curve

Wind (m/s)	Power P (kW)	Power coefficient Cp (-)
1	0.0	0.00
2	3.0	0.12
3	25.0	0.29
4	82.0	0.40
5	174.0	0.43
6	321.0	0.46
7	532.0	0.48
8	815.0	0.49
9	1180.0	0.50
10	1612.0	0.50
11	1890.0	0.44
12	2000.0	0.36
13	2050.0	0.29
14	2050.0	0.23
15	2050.0	0.19
16	2050.0	0.15
17	2050.0	0.13
18	2050.0	0.11
19	2050.0	0.09
20	2050.0	0.08
21	2050.0	0.07
22	2050.0	0.06
23	2050.0	0.05
24	2050.0	0.05
25	2050.0	0.04

ρ = 1,225 kg/m³



E82

The new ENERCON E-82 sets yet another milestone in the success story of the highly economical use of wind energy. Especially designed for medium wind strengths, the E-82, with its large rotor diameter and the efficient ENERCON rotor blade design, guarantees optimal yield and considerably reduces the costs per kWh of wind energy. Furthermore, the E-82 fulfils the current grid connection stipulations due to its sophisticated grid feed system, which enables it to be integrated in all types of supply and distribution structures.

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Guaranteed Values of the Sound Power Level for the E-82 with 2000 kW rated power

V_{Wind} in 10m height / Hub height	78 m	85 m	98 m	108 m	138 m
4 m/s					
5 m/s	96.3 dB(A)	96.6 dB(A)	97.2 dB(A)	97.5 dB(A)	98.2 dB(A)
6 m/s	100.7 dB(A)	101.0 dB(A)	101.6 dB(A)	101.9 dB(A)	102.6 dB(A)
7 m/s	103.3 dB(A)	103.5 dB(A)	103.6 dB(A)	103.6 dB(A)	103.8 dB(A)
8 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
9 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
10 m/s	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
95% rated power	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)	104.0 dB(A)
Measured value at 95% rated power			103.4 dB(A) MBBM M65 333/1	103.8 dB(A) KCE 207041-01.01	

1. A tonality value K_{TN} of 0-1 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
2. An impulsivity value K_{IN} of 0 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
3. The sound power values given in the table are valid for the **Operational Mode I** (defined through the rotational speed range of 6 – 19 rpm). The respective power curve is the Calculated Power Curve E-82 dated January 2005 (Rev. 1.x).
4. The guarantee is based on official and internal measurements of the sound power level. The official measured values are given in this document as a reference. The extracts of the official measurements are available and are valid in combination with this guarantee document. The measurements are being carried out according to the recommended national and international standards and norms (mentioned on the respective extracts).
5. In order to account for the uncertainties of measurement and sound prediction calculations, to increase the acceptance at the authorities and to avoid eventual verification measurements ENERCON recommends a safety factor of 1 dB(A) on the guaranteed values when carrying out sound propagation calculations. In countries where safety factors are already mandatory due to local regulations, the ENERCON recommendation is not applicable.

   Should this recommendation be neglected for any reasons, it is hereby explicitly referred to 6.
6. Due to the measurement uncertainties of sound measurements the verification of the guaranteed values is successful, if the measurement result of a measurement that has been carried out according to the accepted standards is in the range of +/- 1dB(A) of the guaranteed values [guarantee fulfilled when measurement result = guaranteed value +/- 1dB(A)].
7. For noise-sensitive sites it is possible to operate the E-82 with reduced rotational speed and reduced rated power during the night. The reduced sound power levels are given in a separate document.

Document information:		ENERCON reserves the right to technical modifications	
Author/ date:	MK / 10.03.05		
Department:	SA	Translator / date:	MK / 10.03.05
Approved / date:	MK / 09.05.07	Revisor / date:	-
Revision / date:	1.3 / 09.05.07	Reference:	SA-04-SPL Guarantee E-82-Rev1_3-ger-eng

APPENDIX E COORDINATES OF TURBINES AND STEP-UP TRANSFORMERS

Coordinates of all wind turbines and step-up transformers considered for the noise simulation are listed below in UTM Zone 17, NAD83 projection:

WTG ID	Easting [m]	Northing [m]
Ostrander Project		
1	338274	4862699
2	338480	4862496
3	338681	4862291
4	338873	4862085
5	338736	4863021
6	339017	4862739
7	339293	4862469
8	339238	4863294
9	339483	4863072
10	339729	4862811
11	339240	4863706
12	340169	4862885
Transformer 1*	338660	4863053
Transformer 2*	338707	4863100

* The locations of the transformers are approximated