Kerwood Wind, LP

Adelaide Wind Energy Centre – Project Modifications Report

Report

Kerwood Wind, LP

Adelaide Wind Energy Centre – Project Modifications Report

Prepared by:

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Project Number:

60478107

Date:

December, 2015

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Appendices

1. Introduction

The Adelaide Wind Energy Centre (Adelaide WEC or Project) is a currently operating wind project, located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario. The Project operates under a Renewable Energy Approval (REA), number 8980-95RSLP, dated August 1, 2013. The Project and Approval include a transformer substation for the Project, located on Kerwood Road, and an additional transformer substation as part of the Parkhill Interconnect.

Modifications are sought to the REA to allow for use of a spare transformer, in the event of maintenance or failure of the approved transformer at the substation on Kerwood Road.

1.1 The Proponent

The Project will be owned and operated by Kerwood Wind, LP (Kerwood Wind), a wholly owned subsidiary of NextEra Energy Canada, LP (NextEra). NextEra's indirect parent company is NextEra Energy Resources, LLC. The primary contact for the Project is as follows:

Derek Dudek
NextEra Energy Canada, LP
390 Bay Street, Suite 1720
Toronto, ON M5H 2Y2
Phone: 1-877-257-7330
Website: www.nexteraenergycanada.com
Email: Adelaide.Wind@NextEraEnergy.com

1.2 Project Study Area

The Project is located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario. More specifically, the Project area is located south of Townsend Line, west of Center Road, north of Napperton Drive and east of Sexton Road. The Project area has not changed from the original REA submission.

The site plan from the original REA submission is provided in Appendix A of the appended Substation Spare Transformer Noise Assessment Report. The site plan has not changed since the original REA submission.

2. Proposed Project Modification

Kerwood Wind is proposing to use a spare transformer in the event of failure or maintenance of the approved transformer at the substation on Kerwood Road. The spare transformer will only be used in place of the approved transformer, not simultaneously. The currently approved transformer is an 85 megavolt amperes (MVA) transformer with a maximum sound power level of 102.8 A-weighted decibels (dB(A)). The spare transformer to be used is a 150 MVA transformer, identical to the central transformer used by the Jericho Wind Energy Centre, with a sound power level of 100.8 dB(A) when operating in an ONAN mode of operation. The spare transformer will operate continuously in ONAN cooling mode.

The spare transformer has three modes of operation, each with a different maximum power. The spare transformer when used at the Adelaide WEC will be run in the ONAN mode with a rating of 102 MVA. Under the ONAN mode of

operation, the spare transformer has a lower sound power level than the currently approved transformer. Therefore, use of the spare transformer instead of the currently approved transformer in the Adelaide WEC is predicted to operate in compliance with Ontario Ministry of the Environment and Climate Change (MOECC) noise level limits at all points of reception for 6 metres per second (m/s) to 10 m/s wind speeds.

3. Edits to the REA Reports

As a result of the proposed Project modification, an amendment to the REA Noise Impact Assessment (NIA) was prepared (Appendix A). The amendment assesses the compliance of the Project's substation spare transformer with respect to the applicable MOECC noise level limits. The results of the amended NIA indicate that the use of the spare transformer is predicted to operate in compliance with MOECC noise level limits at all points of reception for 6 m/s to 10 m/s wind speeds.

Edits are not required as a result of this proposed Project modification for the other REA reports that were submitted as part of the REA Application process.

4. Summary and Conclusion

The proposed Project modification described in this report is not anticipated to change the results of the REA reports (August, 2012).

Appendix A

Adelaide Wind Energy Centre – Substation Spare Transformer Noise Assessment Report

Kerwood Wind, LP

Adelaide Wind Energy Centre – Substation Spare Transformer Noise Assessment Report

Prepared by:

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Project Number:

60447266

Date:

22 December 2015

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The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

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- may be based on information provided to Consultant which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
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AECOM: 2012-01-06

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Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	Brian Bulnes	22 December 2015	Original document

AECOM Signatures

Report Prepared By:

Brian Bulnes, EIT
Acoustic Engineering Intern

Report Reviewed By:

Alex Dundon, P.Eng., INCE, MIEAust
Manager, Acoustics and Air Quality Compliance

Executive Summary

AECOM Canada Ltd. was retained by Kerwood Wind, LP (Kerwood Wind) to prepare an amendment to the Renewable Energy Approval – Noise Impact Assessment (NIA) – Adelaide Wind Energy Centre, Ontario prepared by GL Garrad Hassan Canada, Inc. This amendment assesses the compliance of the substation spare transformer at the Adelaide Wind Energy Centre (Adelaide WEC or Project). The Project is an existing wind farm operating under Renewable Energy Approval number 8980-95RSLP, dated August 1, 2013. The Project is located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario.

The spare transformer will be used in the event of failure or maintenance of the previously approved transformer, not simultaneously.

This noise assessment evaluates noise emissions from the Project, under a scenario where the spare transformer is used instead of the previously approved transformer, with respect to the applicable Ontario Ministry of the Environment and Climate Change (MOECC) noise level limits.

The spare transformer has three modes of operation, each with a different maximum power. The spare transformer when used at the Adelaide WEC will be run in the ONAN mode with a rating of 102 MVA. Under the ONAN mode of operation, the spare transformer has a lower sound power level than the currently approved transformer. Therefore, use of the spare transformer instead of the currently approved transformer in the Adelaide Wind Energy Centre is predicted to operate in compliance with MOECC noise level limits at all points of reception for 6 m/s to 10 m/s wind speeds.

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1. Introduction

The Adelaide Wind Energy Centre (Adelaide WEC or Project) is a currently operating wind project, located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario. The Project operates under a Renewable Energy Approval, number 8980-95RSLP, dated August 1, 2013 (REA). The Project and REA include a transformer substation for the Project, located on Kerwood Road, and an additional transformer substation as part of the Parkhill Interconnect.

Modifications are sought to the REA to allow for use of a spare transformer, in the event of maintenance or failure of the approved transformer at the substation on Kerwood Road. The currently approved transformer is an 85 MVA transformer with a maximum sound power level of 102.8 dB(A). The spare transformer to be used is a 150 MVA transformer, identical to the central transformer used by the Jericho Wind Energy Centre, with a sound power level of 100.8 dB(A) when operating in an ONAN mode of operation. The spare transformer will operate continuously in ONAN cooling mode.

As part of the REA Application, a Noise Impact Assessment (NIA) was prepared by GL Garrad Hassan Canada, Inc. This report assesses changes in noise impacts from the NIA, due to the proposed use of the substation spare transformer at the Project. Resultant noise levels have been assessed in accordance with the requirements of the Ontario Ministry of the Environment and Climate Change (MOECC) guideline *Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities* (October 2008).

The substation spare transformer at the Adelaide WEC is identical to the central transformer used in the Jericho Wind Energy Centre; this noise impact assessment has used the substation transformer specifications and information provided in the Jericho Wind Energy Centre – Revised Noise Assessment Report prepared in February 2014. Noise emission data for the transformer was obtained from the Transformer Test Reports, dated March 7, 2015.

2. Project Site Description

The Adelaide WEC is located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario. More specifically, the Project Area is located south of Townsend Line, west of Center Road, north of Napperton Drive and east of Sexton Road. The Project Area has not changed from the original REA submission.

Site plans from the original REA submission are provided in Appendix A.

3. Points of Reception

The points of reception (POR) used in the Noise Impact Assessment (NIA) were also used for this assessment. These points of reception were classified into four different categories, which are outlined in Table 1 below.

Table 1: Receptor classification descriptions

Class	Description	Quantity	Remarks
NP	Non-participating	225	MOE Limits Apply
PR	Participating	33	MOE Limits Do Not Apply
VNP	Vacant Lot Non-participating	246	MOE Limits Apply
VPR	Vacant Lot Participating	15	MOE Limits Do Not Apply

The height of each POR was estimated to be 1.5, 4.5, or 7.5 metres for one storey, two storey, or three storey buildings, respectively. Participating receptors are residences or vacant lots located on the same premises as Adelaide Wind Energy Centre project related infrastructure. A site layout is provided in Appendix A and coordinates are available in Section 9 summary tables.

The project area is best defined as a Class 3 area. The MOECC Publication NPC-300, *Environmental Noise Guideline for Stationary and transportation Sources – Approval and Planning,* defines Class 3 areas as “a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as: a small community, agricultural area, a rural recreational area such as a cottage or a resort area or a wilderness area.”

4. Noise Source Summary

4.1 Wind turbine noise sources

The wind turbine technology used for this Project is the GE 1.6-100 Wind Turbine with Low-Noise Trailing Edges (LNTE). This model has the following features:

- 100 metre rotor diameter, with a swept area of 7,854 m^2
- Hub height of 80 metres
- Maximum generation capacity of 1.62 Megawatts

The REA for the Project approved 38 wind turbine generator locations, of which 37 have been constructed. This assessment includes noise emissions from all approved turbine locations, regardless of whether they have been constructed or not. No changes have been made, or are proposed, to the currently approved turbines.

As part of this assessment, existing and crystalized wind turbines (defined as those that have published Draft Site Plan Reports) within 5,000 metres of the transformer substation have also been considered. At the time of the Draft Site Plan Report for the Project, the only wind turbine to be considered was the Napier Wind Farm:

- Napier Wind Farm
    - Consists of two 2.05 MW REPower MM92 wind turbines with a hub height of 100 metres

Noise levels for both Project turbines and those from the Napier Wind Farm were provided in the approved REA application. No changes are proposed to the approved noise levels for Project wind turbines.

At this time, the following additional projects are located within 5,000 metres of the transformer substation:

- Suncor Energy Adelaide Wind Power Project
    - Consists of 22 Siemens 2.3-113 wind turbine generators, derated to a capacity of 2.221 as outlined in the *Adelaide Wind Power Project Noise Assessment Report*

Manufacturer's noise data for the Siemens turbines for this project have been summarized in Section 9. The noise datasheets provided have been taken from the NIA for the Suncor Energy Adelaide Wind Power Project Noise Assessment Report, by HGC Engineering, dated July 2013.

4.2 Substation noise source

The currently approved transformer for the Project is a Prolec GE 51/68/85 MVA transformer. The proposed spare transformer for the Project is a Prolec GE 102/136/170 MVA transformer, which will be used in the event that the primary transformer requires servicing. The spare transformer has been confirmed to be capable of continuously operating at the 102 MVA ONAN mode for the Adelaide WEC, and will run at this setting when in use.

The test report for the spare transformer in ONAN cooling mode states that the sound pressure level measured in accordance with ANSI C57.12.90 shall not exceed 72 dB over the measurement surface (as defined in the ANSI/IEEE standard C57.12.90). An estimate of noise emissions expected from the spare transformer is provided in Table 5. Appendix C includes the spare transformer test report and a detailed calculation to support the transformer emission estimate. Note that a 5 dB penalty has been added to the transformer emission level in the noise prediction modelling as per the requirements of *Noise Guidelines for Wind Farms*.

The transformer will have a 5.5 metre high noise barrier on the south side of the transformer substation. The noise barrier is absorptive with an Absorptive Coefficient of 0.84. The noise barrier was constructed to a minimum surface density of 20 kg/m^2, and has no gaps or cracks. The co-ordinates of the transformer, as well as end-points and corners of the noise barrier are provided in Table 2.

Table 2: Transformer and Associated Noise Barrier Coordinates (UTM17-NAD83)

Identifier	Equipment Make & Model	UTM Coordinates (NAD83 Zone 17N)		Notes
		Easting	Northing	
Spare Transformer	Prolec GE 102/136/170 MVA Transformer	439495.0	4765334.0	—
Primary Transformer	Prolec GE 51/68/85 MVA Transformer	439495.0	4765334.0	—
Noise Barrier	—	439494.0	4765325.5	West endpoint
Noise Barrier	—	439486.0	4765325.5	East endpoint

5. Assessment Criteria

Part V.0.1 of the Ontario Environmental Protection Act R.S.O. 1990 (EPA) addresses the approvals process required for renewable energy projects and Ontario Regulation 359/09 outlines the specific requirements for obtaining a Renewable Energy Approval (REA) from the MOECC.

As required by O. Reg. 359/09, noise from wind energy projects requiring approval within Ontario is assessed using the MOECC guideline *Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities* (PIBS 4709e, October 2008). This guideline, in conjunction with the regulation, sets the definitions, assessments and noise level limits for noise assessments of wind energy projects.

The MOECC noise level limits, at integer wind speeds, for points of reception in Class 3 areas are summarized in Table 3 below.

Table 3: Noise Level Limits for Wind Turbines

Point of Reception Classifications	1-hr L_{eq} Sound Level Limit (dB(A)) at 10m height Wind Speeds (m/s)				
	Less than or equal to 6 m/s	7 m/s	8 m/s	9 m/s	Greater than or equal to 10 m/s
Class 1 & 2 Areas	45.0	45.0	45.0	49.0	51.0
Class 3 Areas	40.0	43.0	45.0	49.0	51.0

The subject area is best described as Class 3 rural, based on the definition provided in NPC-300. The most stringent noise level limit for a Class 3 Area, 40 dB(A) at a wind speed of 6 m/s, was the Performance Noise Level Limit applied at each Point of Reception.

6. Noise Impact Assessment

Kerwood Wind has confirmed that the spare transformer will run continuously at the ONAN rating of 102 MVA. Per transformer test results (provided in Appendix C), the guaranteed maximum sound pressure level emitted by the spare transformer will be 72 dB over the measurement surface (as defined in the ANSI/IEEE standard C57.12.90). A transformer sound power level calculation using the measurement surface area of the spare transformer is provided in Appendix C. The calculated sound power level of the spare transformer using ONAN cooling will be less than that of the currently approved transformer, and can be found in Section 9 summary tables.

7. Results and Compliance

The spare transformer is capable of running at the ONAN rating of 102 MVA continuously for the Adelaide WEC, and will only operate at this rating. In this mode, the spare transformer has a lower sound power level than the currently approved transformer. As the Adelaide wind farm is currently in compliance per the NIA and REA, the Project is predicted to continue to operate within MOECC noise level limits if the spare transformer is used.

8. References

1. Ontario Ministry of the Environment, Environmental Noise Guideline Publication NPC-300: Stationary and Transportation Sources - Approval and Planning, August 2013.
2. International Organization for Standardization, ISO 9613-2: Acoustics - Attenuation of Sound during Propagation Outdoors Part 2: General Method of Calculation, Geneva, Switzerland, 1996.
3. PIBS 4709e, Noise Guidelines for Wind Farms – Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities, Ontario Ministry of the Environment, Queens Printer for Ontario, October 2008.
4. Adelaide Wind Energy Centre Renewable Energy Approval Application Noise Impact Assessment, GL Garrad Hassan, April 2013.
5. ANSI/IEEE C57.12.90, Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers, Institute of Electrical and Electronics Engineers, Inc.
6. IEC 61400-11, Wind turbine generator systems – Part 11: Acoustic noise measurement techniques, International Electrotechnical Commission, 2006.
7. Parkhill Interconnect – Noise Impact Assessment, GL Garrad Hassan, September 2012

9. Summary Tables

Table 4: Adelaide Primary Transformer Acoustic Emission Summary

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Overall
Transformer Sound Power (dB(A))	74.2	86.3	88.8	94.2	91.4	87.6	82.4	73.3	97.8
Tonal Penalty (dB)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Resultant Transformer Sound Power (dB(A))	**79.2**	**91.3**	**93.8**	**99.2**	**96.4**	**92.6**	**87.4**	**78.3**	**102.8**

Table 5: Adelaide Spare Transformer Acoustic Emission Summary – ONAN cooled rating

Octave Band Centre Frequency (Hz)	63	125	250	500	1000	2000	4000	8000	Overall
Transformer Sound Power (dB(A))	72.2	84.3	86.8	92.2	89.4	85.6	80.4	71.3	95.8
Tonal Penalty (dB)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Resultant Transformer Sound Power (dB(A))	**77.2**	**89.3**	**91.8**	**97.2**	**94.4**	**90.6**	**85.4**	**76.3**	**100.8**

Appendices

Appendix A

Appendix A: Extracted Site Plan (taken from Adelaide Wind Energy Centre REA Application)

Legend

Project Components

- Turbine (38)
- Proposed Transmission 115 kV Line
- Collector System
- Access Road
- Substation
- Laydown Area
- Project Location
- 120m Boundary
- 300m Boundary
- Closest Point to Waterbodies

Significant Natural Features

- Woodland
- Wetland
- Valleyland
- Carey's Sedge
- Yellow Stargrass
- Amphibian Breeding Habitat
- Bat Maternity Area
- Raptor Wintering Area

Cultural Heritage

- Structure Locations A
- Structure Locations B

Other Components

- 1 Storey Receptor
- 2 Storey Receptor
- 3 Storey Receptor
- Vacant Lot Receptor
- Existing 500 kV Line
- Existing Transmission Line
- Railway
- Freeway
- Arterial Road
- Local Road / Street
- Race Track
- Pipeline
- Permanent Watercourse
- Intermittent Watercourse
- Runway
- Transformer Station
- Park / Sports Field
- Residential Area
- Cemetery
- Pit or Quarry
- Waterbody
- Wetland
- Napier Turbine

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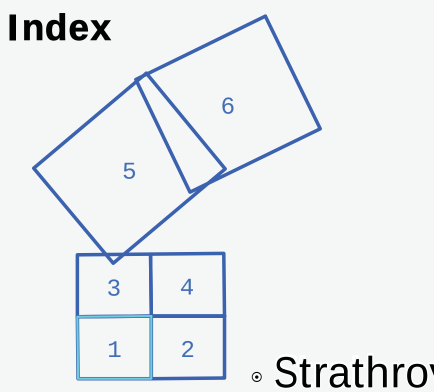

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NEXTera ENERGY

Adelaide Wind Energy Centre

SITE PLAN
MAP 1

GL Garrad Hassan

1009-003-120222--002-JM

April 24, 2012

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.

442000 81°42'0"W 444000 81°40'0"W 446000

4760000 4758000 4756000 42°58'0"N

MULLIFARRY DRIVE

MAPPERTON DRIVE

Legend

Project Components

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Napier Turbine

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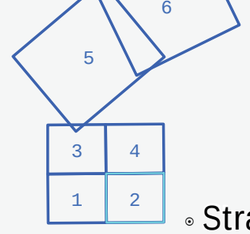

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NEXTera ENERGY

Adelaide Wind Energy Centre

SITE PLAN
MAP 2

GL Garrad Hassan

1009-003-120424--002-JM

April 24, 2012

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.

Legend

Project Components

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Napier Turbine

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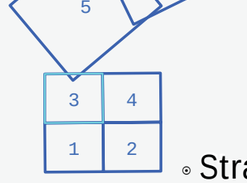

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NEXTera ENERGY

Adelaide Wind Energy Centre

SITE PLAN
MAP 3

GL Garrad Hassan

1009-003-120424--002-JM

April 24, 2012

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.

442000 81°42'0"W 444000 81°41'0"W 446000

43°2'0"N

4764000

4762000

43°1'0"N

N

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Napier Turbine

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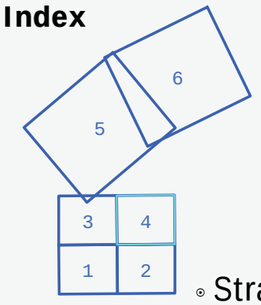

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NEXTera ENERGY

Adelaide Wind Energy Centre

SITE PLAN
MAP 4

GL Garrad Hassan

1009-003-120424--002-JM

April 24, 2012

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.

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- Napier Turbine

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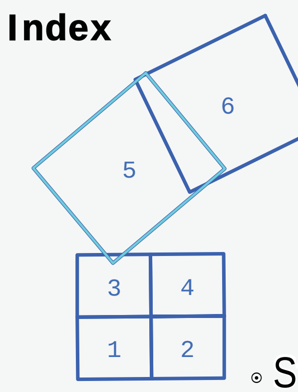


Adelaide Wind Energy Centre

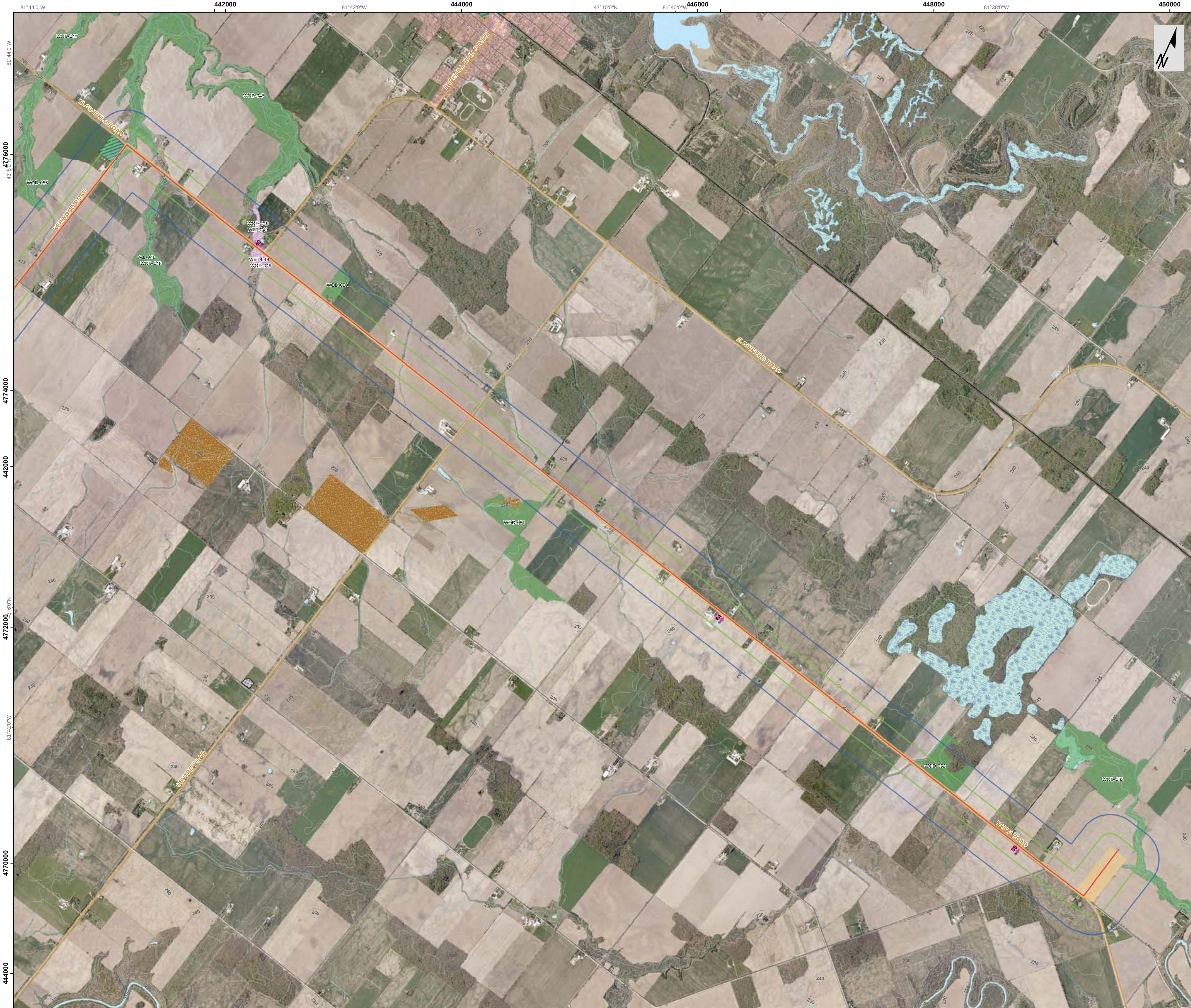
SITE PLAN
MAP 5

1009-003-120424--002-JM

April 24 2012

GL Garrad Hassan

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.



Legend

Project Components
- Turbine (38)
- Proposed Transmission 115 kV Line
- Collector System
- Access Road
- Substation
- Park Hill Substation
- Laydown Area
- Project Location
- 120m Boundary
- 300m Boundary

Significant Natural Features
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Cultural Heritage
- Structure Locations A
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- 1 Storey Receptor
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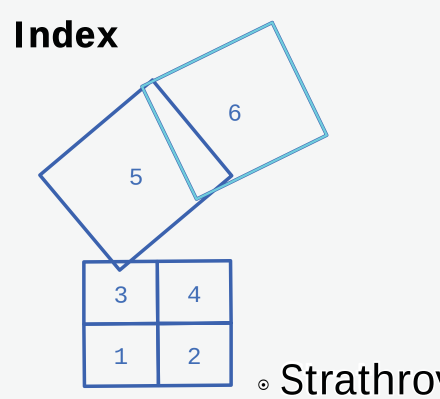
- Permanent Watercourse
- Intermittent Watercourse
- Runway
- Transformer Station
- Park / Sports Field
- Residential Area
- Cemetery
- Pit or Quarry
- Waterbody
- Wetland
- Napier Turbine

Map Index



NEXTera ENERGY

Adelaide Wind Energy Centre

SITE PLAN
MAP 6

1009-003-120424--002-JM

April 24, 2012

GL Garrad Hassan

Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec.

Appendix B

Appendix B: Approved Adelaide Noise Impact Assessment Report (April 2013)

RENEWABLE ENERGY APPROVAL

NOISE IMPACT ASSESSMENT

ADELAIDE WIND ENERGY CENTRE

APRIL 2013

GL Garrad Hassan

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RENEWABLE ENERGY APPROVAL APPLICATION – NOISE IMPACT ASSESSMENT

ADELAIDE WIND ENERGY CENTRE, ONTARIO

Client	NextEra Energy Canada, ULC
Contact	Ben Greenhouse
Document No.	1009-CAMO-R-04
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REVISION HISTORY

Issue	Issue Date	Summary
A	23 December 2011	Original Release (electronic version only)
B	13 January 2012	New octave band spectrum for turbine
C	14 August 2012	Updated receptor list and turbine sound levels
D	12 October 2012	Responses to MOE comments
E	10 April 2013	Responses to additional MOE comments; updated substation sound level and barrier, new sound power level spectrum for GE turbine, and ground factor justification.
F	25 April 2013	Revised transformer source height.

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1 INTRODUCTION

GL Garrad Hassan Canada, Inc., a member of the GL Group and part of the GL Garrad Hassan brand (hereafter "GL GH") was retained by NextEra Energy Canada, ULC ("Client" or "NextEra") to prepare a Noise Impact Assessment (NIA) of the Adelaide Wind Energy Centre ("Project") in accordance with Ontario Regulation 359/09 (Renewable Energy Approvals (REA) under Part V.0.1 of the Ontario Environmental Protection Act (EPA)) [1] and Regulation 521/10. This NIA also follows the Ontario Ministry of the Environment (MOE) 2008 NPC Noise Interpretation Guidelines [2].

The proposed Adelaide Wind Energy Centre is located in south-western Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario.

The Project will comprise 38 GE 1.6-100 (1.62 MW) turbines manufactured by General Electric (GE). The substation transformer location has been determined and it has been included in this assessment.

The objective of this assessment is twofold:

- 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; and
- Predict the noise levels generated by the Project and adjacent projects at all Points of Reception, Participants and Vacant Lot Receptors within 1.5 km of the turbines.

2 GENERAL DESCRIPTION OF PROJECT SITE

2.1 General Characteristics

The proposed Adelaide Wind Energy Centre is located in southwestern Ontario, in the Township of Adelaide-Metcalfe, Middlesex County, Ontario. More specifically, the Project Area is located south of Townsend Line, west of Center Road, north of Napperton Drive and east of Sexton Road.

The Project has been configured using 38 GE 1.6-100 (1.62 MW), though only 37 turbines will be constructed. The wind turbines have been strategically sited on lands that the Client holds under lease option. The total Project Area is approximately 6,515 ha. Project components will be installed on privately-owned agricultural lots within this area. It is anticipated that the Project's collection system may be partially located on public rights-of-way.

Energy generated by the Project will be collected via underground cabling and overhead lines and directed to a substation. A project-owned 115 kV transmission line will then travel north; approximately 11.4 km to a proponent owned switchyard and from there will connect to a Hydro One 500 kV transmission line located approximately 11.5 km west of the project switchyard.

The landscape in the study area is predominantly characterized by agricultural fields and associated farms punctuated with numerous hedgerows, isolated woodlands, and the occasional watercourse. Photographs included in Figure 2-1 show typical views of the land and features of the study area.

Figure 2-1: Land features of the Adelaide wind farm site

2.2 Land Use Description

The site is located within two two-tiered municipal systems. The County of Middlesex makes up the upper tier of the region, while Adelaide Metcalfe, North Middlesex and Strathroy-Caradoc, along with five additional townships and municipalities, have lower tier municipal status. Agriculture is the predominant economic activity and land use throughout the County of Middlesex; however, the

municipalities that comprise the study area each have features creating distinct community character. Surrounding properties and lands are characterized as low density residential while also including a number of agricultural buildings. Other land use within the study area includes rural and urban-rural, providing a foundation for manufacturing, business and tourism development. Access to the Adelaide Project is provided by small paved and unpaved municipal roads that stem from larger municipal roads. A zoning map key of Adelaide is shown in Appendix A.

2.3 Points of Reception

Receptor locations (i.e. Points of Reception) for the Project were identified using base data from recent aerial photos obtained from the Client, and field reconnaissance performed by GL GH to verify locations and building types. The height of each Point of Reception - taken to be 1.5 m, 4.5 m and 7.5 m for one-storey, two-storey and three-storey houses respectively - was also noted. All Points of Reception, as per the definition of the MOE, were considered in this NIA.

The MOE Noise Guidelines [2] generally define a Point of Reception (POR) as a house, campground, church, school or other sensitive building that is not located on the same premises as the wind farm, including its turbines and ancillary structures. Points of Reception can also include locations on vacant lots that have residences as a permitted use; in this case, GL GH and a third party consultant, IBI Group, identified Vacant Lot Receptors (VLR) on such lots in a location consistent with the building pattern in the area, as per the O. Reg. 359/09 and the Ontario MOE Noise Guidelines.

A residence located on the same premises as the wind turbine(s) or other Project infrastructure is not a Point of Reception as defined by the MOE noise guidelines, and considered a “Participating Receptor”, and thus MOE noise limits do not apply.

The coordinates of each of the Points of Reception, Vacant Lot Receptors, and Participants are listed in Appendix C and Appendix D, respectively.

3 DESCRIPTION OF POINTS OF RECEPTION

There are 248 PoRs located within a radius of 1,500 m of a wind turbine or substation, among which 110 are VLRs and 138 are dwellings or other sensitive receptors such as churches, schools and cemeteries. There are 33 dwellings considered as Participants and 15 Vacant Lot Receptors considered as Participants.

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:

- Vehicular traffic noise from Highway 402;
- Vehicular traffic on the local concession and side roads, some of which are gravel roads;
- Occasional sounds due to agricultural activities;
- Occasional sounds due to anthropogenic domestic activities; and
- Natural sounds.

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

3.2 Determination of Applicable Noise Limits

As stated in the MOE guidelines, 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 dBA; 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. A sample calculation of how noise modeling was determined for each Point of Reception appears in Appendix B where intermediate and cumulative A-weighted sound pressure levels from each turbine are provided.

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

Wind Turbine Noise Criterion NPC-232 [dBA]	**Wind Speed [m/s]**				
	6	**7**	**8**	**9**	**10**
	40	43	45	49	51

4 DESCRIPTION OF SOURCES

4.1 Turbine Description

The proposed GE 1.6-100 turbine is a 3-bladed, upwind, horizontal-axis turbine. The total rotor diameter of the turbine is 100 m, resulting in a swept area of 7,854 m^2, and is designed to operate at between 9.75 and 16.18 revolutions per minute (rpm). The turbine rotor and nacelle are mounted on top of an 80 m tubular tower which is manufactured in sections from steel plate. Each turbine is mounted on a steel reinforced concrete foundation and equipped with a transformer, located outside the base of the tower.

Table 4-1 presents the general specifications of the wind turbine.

Table 4-1: Turbine Description – GE 1.6 - 100

Model	**GE 1.6 - 100**
Design	Steel, tubular, white; 3 sections
Rated power	1.62 MW
Hub height	80 m
Rotor diameter	100 m
Rotor swept area	7854 m^2
Operational interval	9.75 – 16.18 rpm
Number of blades	3
Cut-in wind speed	3 m/s
Cut-out wind speed	25 m/s
Nominal wind speed	12 m/s

Full noise specifications as provided by the manufacturer can be found in Appendix E. Coordinates of all turbines are listed in Appendix F.

The Project consists of 38 wind turbines, though only 37 will be constructed. The collector system will connect to the substation, where the voltage will be elevated to 115 kV. The main power transformer has been included in this NIA.

5 WIND TURBINE NOISE EMISSION RATING

5.1 Noise Emission Rating of the Adelaide Wind Farm Turbines

Broadband sound power levels and octave band sound power levels of the GE 1.6-100 wind turbine were provided by the manufacturer and are shown in Appendix E. Measurements were made in accordance with the IEC 61400 – 11 Ed. 2.1[3] method using standardized wind speeds at 10 m height. The worst case octave band and broadband sound power levels of the turbine were retained for the purpose of the noise impact assessment to account for summer night-time shear. These values correspond to a 10 m height wind speed of 10 m/s or more. The proposed version of the GE 1.6-100 wind turbine uses Low Noise Trailing Edge (LNTE) serrated blade technology, which results in a lower broadband sound level than the previous version.

The GE 1.6-100 wind turbine has an expected value for tonal audibility of $\Delta La,k < 2$ dB, irrespective of wind speed, hub height, and grid frequency based on the IEC 61400-11 standard. A letter confirming the current sound power levels and stating the tonality of the turbine is attached in Appendix E.

The octave band sound power levels used for the simulation in this NIA are those stated for each octave band centre frequency in Table 5-1, and are presented in dB linear, as requested by the MOE. The total broadband level is presented in dBA.

Table 5-1: Adelaide Project – GE 1.6-100 Wind Turbine Acoustic Emission Summary

Make and Model : GE 1.6-100										
Electrical Rating : 1.6 MW										
Hub Height (m) : 80 m										
Wind Shear Coefficient : 0.35, typical summer night time shear of the region										
	Octave Band Sound Power Level [dB]									
	Manufacturer's Emission Levels					Adjusted Emission Levels				
Wind Speed [m/s]	6	7	8	9	10	6	7	8	9	10
Frequency [Hz]										
31.5	109.5	112.9	113.1	113.0	112.9	112.9	112.9	112.9	112.9	112.9
63	106.5	110.2	110.3	110.3	110.2	110.2	110.2	110.2	110.2	110.2
125	104.5	107.7	107.9	107.9	107.8	107.8	107.8	107.8	107.8	107.8
250	103.3	104.0	103.9	104.0	104.1	104.1	104.1	104.1	104.1	104.1
500	98.7	100.3	99.8	99.9	100.2	100.2	100.2	100.2	100.2	100.2
1000	91.8	97.1	97.5	97.6	97.8	97.8	97.8	97.8	97.8	97.8
2000	91.2	94.5	94.5	94.3	93.9	93.9	93.9	93.9	93.9	93.9
4000	87.9	88.7	88.1	87.4	86.9	86.9	86.9	86.9	86.9	86.9
8000	71.4	71.5	71.7	70.5	70.2	70.2	70.2	70.2	70.2	70.2
Broadband (dBA)	100.5	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0	103.0

5.2 Noise Emission Rating of the Adjacent Napier Wind Farm Turbines

The Napier Wind Farm, which is under development, is within 5 km of the proposed Adelaide wind farm. The proposed Napier Wind Farm consists of two REPower MM92 2.05 MW turbines at a hub height of 100 m.

GL GH has obtained octave band sound power levels corresponding to 10 m height wind speeds of 6, 7, 8, 9, and 10 m/s from the Napier Wind Farm Noise Impact Assessment [4]. The worst case octave band and broadband sound power levels of the turbine were retained for the purpose of the noise impact assessment.

GL GH has determined that the octave band sound power levels corresponding to a 10 m wind speed of 7 m/s result in the worst case sound pressure levels. GL GH has reported the greatest estimated sound pressure level for each receptor.

The octave band sound power levels used for the simulation in this NIA are those stated for each octave band centre frequency in Table 5-2.

Table 5-2: Napier Project – REpower MM92 2.05MW Wind Turbine Acoustic Emission Summary

Make and Model : REpower										
Electrical Rating : 2.05 MW										
Hub Height (m) : 100 m										
Wind Shear Coefficient : 0.35, typical summer night time shear of the region										
	Octave Band Sound Power Level [dB]									
	Manufacturer's Emission Levels					Adjusted Emission Levels				
Wind Speed [m/s]	6	7	8	9	10	6	7	8	9	10
Frequency [Hz]										
63	109.0	110.5	111.0	110.8	111.8	110.5	110.5	110.5	110.5	110.5
125	107.7	108.4	108.3	107.9	106.6	108.4	108.4	108.4	108.4	108.4
250	106.0	106.5	105.7	105.3	103.4	106.5	106.5	106.5	106.5	106.5
500	102.1	102.9	102.6	102.3	101.5	102.9	102.9	102.9	102.9	102.9
1000	97.1	98.1	98.7	99.0	99.3	98.1	98.1	98.1	98.1	98.1
2000	90.4	91.3	92.2	92.8	95.3	91.3	91.3	91.3	91.3	91.3
4000	82.8	83.8	85.1	86.2	91.7	83.8	83.8	83.8	83.8	83.8
8000	74.2	75.7	78.5	79.5	82.3	75.7	75.7	75.7	75.7	75.7
Broadband (dBA)	103.4	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2

5.3 Noise Emission Rating of the Substation Transformer

The cumulative effect that the substation would have on nearby residents has been considered in this analysis.

Noise emission from the substation mainly originates from one (1) high-voltage 51/68/85 MVA, 121/34.5 kV, Wye/ Delta step-up transformer. The equipment proposed for the substation will be compliant with applicable standards (CAN/CSA-C88-M90, IEEE C57.12.90).

The Broadband Sound Power Level for the noise modelling calculations was calculated to be 102.8 dBA, based on an audible noise level of 75 dBA guaranteed by the transformer manufacturer (shown in Appendix E), in accordance with the application of standard IEEE C57.12.90, for utility scale transformers. The 102.8 dBA includes a 5 dBA tonal penalty, as prescribed in Publication NPC-104.

The substation transformer drawings that were used to calculate the transformer's measurement surface area as defined in standard IEEE C57.12.90 are included in Appendix E. The calculated measurement surface area S was found to be 190.6 m². This calculation is based on an 8 sided polygon perimeter that includes a 2 m offset from both fan cooled surfaces and a 0.3 m offset from the other surfaces, as well as the top area of the transformer, in accordance with standard IEEE C57.12.90.

It excludes the reservoir above the main transformer tank since that height is not considered when determining the height of the IEEE C57.12.90 microphone placement, and therefore not part of the measurement surface area. The substation coordinates, as provided by the Client, are included in Appendix F.

A sound barrier has been proposed to attenuate the noise from the substation transformer. The type of barrier used in this noise study is one that can be described as of absorptive type with an Absorptive Coefficient of 0.84. The acoustic barrier should have a density of at least 20 kg/m^2 and have a closed surface free of gaps and cracks, such as Armtec's Durisol. A 5.5 meter tall one-sided barrier was placed south of the transformer and is illustrated on the noise iso-contour maps in Appendix A. The coordinates of the substation barrier are shown in Table 5-3.

Table 5-3: Substation Barrier Coordinates

ID	Easting[1] [m]	Northing[1] [m]
B1a	439494.0	4765325.5
B1b	439486.0	4765325.5

1. UTM Zone 17, NAD83

Table 5-4 provides the octave band sound power levels of the substation transformer, using a typical transformer octave band sound distribution for a large transformer from the Handbook of Acoustics [5]. Table 5-5 details the octave band calculation.

GL GH has considered modeling the transformer as a set of area sources. In this case, modeling as an area source yields a less conservative sound pressure level at the nearest PoR, compared to modeling the

transformer as a point source at top height. Therefore, the transformer was conservatively modeled as a point source located at the top height of 4.5 m, at the request of the MOE.

Table 5-4: Adelaide Project – Substation Transformer Sound Power Level

Transformer	**Octave Band Sound Power Level* (dBA)**									
Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	Broadband
PWL (dBA)	60.0	79.2	91.3	93.8	99.2	96.4	92.6	87.4	78.3	**102.8**

*Includes 5 dBA penalty to account for tonality

Table 5-5: Transformer Octave Band Calculation Details

31.5	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	
-1	5	7	2	2	-4	-9	-14	-21	**Typical Outdoor Transformer Octave band relative distribution [5] [dB Lin]**
-39.4	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	**dB Lin to dBA Conversion Scale**
-40.4	-21.2	-9.1	-6.6	-1.2	-4	-7.8	-13	-22.1	**Typical Outdoor Transformer Octave band relative distribution [dBA]**
60.0	79.2	91.3	93.8	99.2	96.4	92.6	87.4	78.3	**Scaled to 102.8 dBA Transformer**

6 NOISE IMPACT ASSESSMENT

The sound pressure levels at each Point of Reception, Participant and VLR for the aggregate of all wind turbines and substations associated with the Adelaide Project and adjacent projects were calculated based on the ISO 9613-2 method.

The ISO 9613 standard [6], [7] 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, commonly occurring 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; and
- Ground effect – attenuation due to the acoustical properties of the ground.

ISO-9613-2 parameters were set as follows:

- Ambient air temperature: 10ºC;
- Ambient barometric pressure: 101.32 kPa;
- Humidity: 70%;
- Source ground factor: 0.7;
- Middle ground factor: 0.7; and
- Receptor ground factor: 0.7.
- The effect of topography was considered

Justification for the use of a global ground factor of 0.7 is presented in Section 6.1.

Additional potential attenuation from foliage was not taken into account 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 Point of Reception. The estimated accuracy of the ISO 9613 method, as stated in ISO 9613-2, is ± 3 dB.

The wind turbine noise emission ratings used for each octave band were those specified in Table 5-1 and Table 5-2. The noise impact was calculated for each Point of Reception and Participant located within 1,500 m of one or more turbines or substation, and the calculated noise level was then compared with the applicable noise limit for each Point of Reception as stated in Table 3-1.

Noise levels were calculated at 4.5 m and 7.5 m agl for 2-storey and 3-storey Points of Reception/Participants respectively, and at 1.5 m agl at 16 points along a 30 m radius circle for each 1-storey Point of Reception/Participant. For the latter, the highest of these 16 values was chosen and presented in the table of noise levels.

6.1 Justification of global ground factor G

GL GH has undertaken a refined estimate of the noise propagation around the project substation based on recent comments from the MOE, since this part of the site will have the largest area of hard ground, as well as the shortest source-receiver distance. This section presents a detailed ground factor calculation for the area expected to be most sensitive to ground factor assumptions. For the transformer-to-R408 case, ground factors for the source, middle, and receiver regions have been calculated based on ISO 9613-2. The distance from the transformer to VLR408 is 289 m. Figure 6-1 shows the regions and ground cover, including the gravel area around the substation.

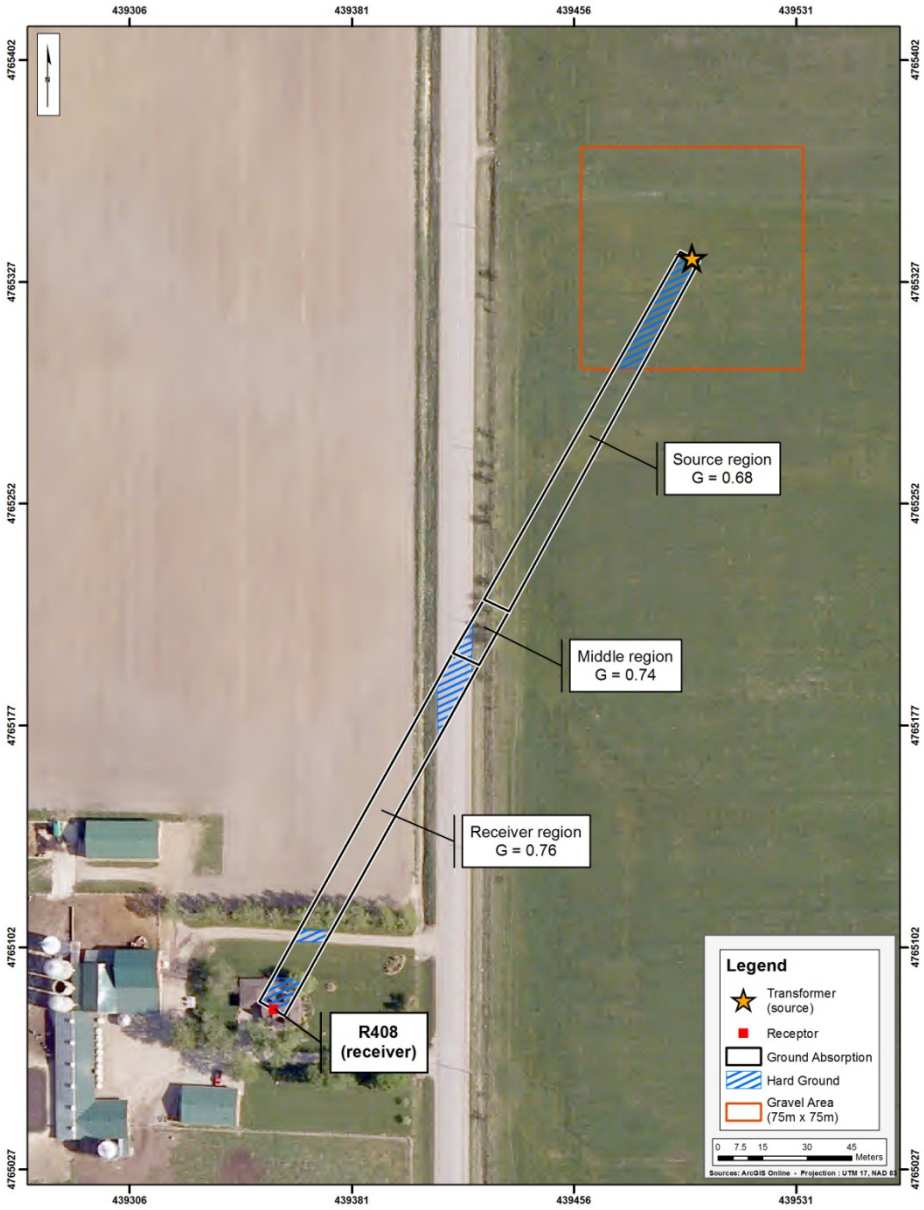

Figure 6-1: Ground factor coverage near Adelaide substation

Source region ground factor G_S
As defined by ISO 9613-2, the source region extends over a distance of $30h_S$ from the source towards the receiver, where h_S is the source height of 4.5 m. The source region length is therefore 135 m. NextEra has supplied site plans indicating that an area of approximately 5660 m^2 will be covered with gravel. A geometric analysis has indicated that 43 m of the source region is covered with gravel. Based on aerial photography, the remaining 92 m is covered with grass. The source region ground factor G_S is then 0.68 (92 m / 135 m), as per ISO 9613-2.

Receiver region ground factor G_R
As defined by ISO 9613-2, the receiver region extends over a distance of $30h_R$ from the receiver towards the source, where h_R is the receiver height of 4.5 m. The receiver region length is 135 m. Based on aerial photography, 32 m of the receiver region is covered by road and other hard ground. The remaining 103 m is covered by soft ground. The receiver region ground factor G_R is then 0.76 (103 m / 135 m), as per ISO 9613-2.

Middle region ground factor G_M
As defined by ISO 9613-2, the middle region stretches over the distance between the source and receiver regions. The middle region length is 19 m. Based on aerial photography, 5 m of the receiver region is covered by road and other hard ground. The remaining 14 m is covered by soft ground. The middle region ground factor G_M is then 0.74 (14 m / 19 m), as per ISO 9613-2.

CadnaA Calculations
Two sets of CadnaA calculations have been carried out. The first uses the following three ground factors calculated as described above:

$G_S = 0.68$
$G_M = 0.74$
$G_R = 0.76$

The second CadnaA calculation uses a global ground factor of 0.7 for all three regions. The estimated sound pressure level at R408 is shown below for each case.

Table 6-1: Adelaide Comparison of ground factor cases

Case	Case 1, Global G = 0.7	Case 2, Specific G values for each region
Sound Pressure Level at R408 [dBA]	38.2	38.2

As seen in Table 6-1, both cases produce a sound pressure level of 38.2 dBA at R408. Because a global value of 0.7 has been shown to be appropriate for the most sensitive source-receiver case in the vicinity of the transformer, GL GH considers this to be further support that this value can be considered appropriate for use across the rest of the Adelaide site, based on ISO 9613-2. Therefore the opinion of GL GH is that based on ISO 9613-2, a global ground factor of 0.7 is suitable for use when modeling noise propagation at the Adelaide site.

7 NOISE IMPACT ASSESSMENT SUMMARY TABLE

7.1 Results

The noise level at each critical Point of Reception within 1,500 m of any turbine or substation of the Adelaide 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;
- For Points of Reception at 1.5 m agl, the sound pressure level presented for wind speeds from 6 m/s to 10 m/s is the maximum noise level on the circumference of a 30 m radius circle centered on the Point of Reception;
- For Points of Reception at 4.5 m or 7.5 m agl, the sound pressure level presented for wind speeds from 6 m/s to 10 m/s is the noise level at the Point of Reception location at its respective height;
- The sound level limit for that Point of Reception according to the MOE noise guidelines at each wind speed from 6 m/s to 10 m/s;
- The applicable background sound level; and
- Whether or not the noise levels at the Point of Reception comply with the MOE guidelines (for continued reference, compliance is confirmed for all Points of Reception).

The closest distance between a wind turbine and a Point of Reception for this project is 555 m found between Turbine 2 and VLR_331.

The closest distance between a Point of Reception and the substation transformer is 289 m, found between Point of Reception R_408 and the transformer.

The highest calculated noise levels were found at VLR_73 and R_119 with sound pressure levels of 39.2 dBA and 38.9 dBA, respectively.

The results show that the Adelaide Project complies with the applicable MOE noise guidelines at all wind speeds modelled (i.e., 6, 7, 8, 9 and 10 m/s). Noise iso-contour maps illustrating the maximum cumulative noise contribution of all noise sources are shown in Appendix A.

The maximum noise level calculated at each Participant within 1,500 m of any turbine or substation of the Adelaide Project is tabulated in Table 7-2.

A concordance table showing all shared PoRs between the Adelaide and Napier wind farms is shown in Table 7-3.

Table 7-1: Wind Turbine Noise Impact Assessment Summary – Adelaide Wind Farm (Including Adjacent Wind Farm)

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_17	4.5	1497	36	36.5	36.5	36.5	36.5	36.5	40	43	45	49	51	40	Yes
R_21	4.5	1491	36	36.1	36.1	36.1	36.1	36.1	40	43	45	49	51	40	Yes
V_23	4.5	1476	36	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	40	Yes
R_36	4.5	1452	35	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	40	Yes
R_38	1.5	1397	36	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	40	Yes
R_42	4.5	1434	33	38.2	38.2	38.2	38.2	38.2	40	43	45	49	51	40	Yes
R_45	7.5	1497	37	33.5	33.5	33.5	33.5	33.5	40	43	45	49	51	40	Yes
R_50	7.5	1399	37	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
V_51	4.5	1338	36	38.9	38.9	38.9	38.9	38.9	40	43	45	49	51	40	Yes
V_52	4.5	1329	36	38.3	38.3	38.3	38.3	38.3	40	43	45	49	51	40	Yes
V_55	4.5	1388	35	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	40	Yes
R_56	4.5	1342	36	37.3	37.3	37.3	37.3	37.3	40	43	45	49	51	40	Yes
V_57	4.5	1321	33	38.3	38.3	38.3	38.3	38.3	40	43	45	49	51	40	Yes
V_58	4.5	1310	33	38.0	38.0	38.0	38.0	38.0	40	43	45	49	51	40	Yes
V_59	4.5	1356	33	38.7	38.7	38.7	38.7	38.7	40	43	45	49	51	40	Yes
R_60	4.5	1333	33	37.7	37.7	37.7	37.7	37.7	40	43	45	49	51	40	Yes
R_62	4.5	1497	33	37.6	37.6	37.6	37.6	37.6	40	43	45	49	51	40	Yes
R_64	4.5	1288	33	37.9	37.9	37.9	37.9	37.9	40	43	45	49	51	40	Yes
V_65	4.5	1458	30	31.7	31.7	31.7	31.7	31.7	40	43	45	49	51	40	Yes
R_69	4.5	1492	30	32.6	32.6	32.6	32.6	32.6	40	43	45	49	51	40	Yes
R_72	4.5	1500	30	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	40	Yes
V_73	4.5	1363	35	39.2	39.2	39.2	39.2	39.2	40	43	45	49	51	40	Yes
R_74	4.5	1392	37	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	40	Yes
V_75	4.5	996	37	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	40	Yes
R_76	1.5	1089	32	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
V_77	4.5	889	37	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
V_78	4.5	1366	38	29.9	29.9	29.9	29.9	29.9	40	43	45	49	51	40	Yes
R_80	1.5	959	32	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
R_81	4.5	894	32	37.6	37.6	37.6	37.6	37.6	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_82	1.5	1000	37	32.7	32.7	32.7	32.7	32.7	40	43	45	49	51	40	Yes
R_83	4.5	756	38	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_84	4.5	871	37	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
R_86	4.5	834	32	37.9	37.9	37.9	37.9	37.9	40	43	45	49	51	40	Yes
V_87	4.5	1011	37	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
R_96	1.5	1174	13	33.7	33.7	33.7	33.7	33.7	40	43	45	49	51	40	Yes
V_97	4.5	1116	29	34.8	34.8	34.8	34.8	34.8	40	43	45	49	51	40	Yes
V_98	4.5	861	26	36.4	36.4	36.4	36.4	36.4	40	43	45	49	51	40	Yes
V_99	4.5	980	38	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
R_100	1.5	1028	29	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	40	Yes
V_101	4.5	1233	25	34.8	34.8	34.8	34.8	34.8	40	43	45	49	51	40	Yes
R_102	1.5	1028	29	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	40	Yes
V_103	4.5	1191	21	37.9	37.9	37.9	37.9	37.9	40	43	45	49	51	40	Yes
V_104	4.5	1207	29	31.6	31.6	31.6	31.6	31.6	40	43	45	49	51	40	Yes
R_106	1.5	1396	13	30.5	30.5	30.5	30.5	30.5	40	43	45	49	51	40	Yes
R_107	1.5	995	26	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
R_108	4.5	987	31	37.7	37.7	37.7	37.7	37.7	40	43	45	49	51	40	Yes
R_109	4.5	1180	21	37.8	37.8	37.8	37.8	37.8	40	43	45	49	51	40	Yes
V_110	4.5	652	38	37.0	37.0	37.0	37.0	37.0	40	43	45	49	51	40	Yes
R_111	4.5	698	38	36.6	36.6	36.6	36.6	36.6	40	43	45	49	51	40	Yes
V_112	4.5	1215	13	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_113	4.5	1130	13	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
R_114	4.5	1014	29	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
V_118	4.5	1109	34	37.6	37.6	37.6	37.6	37.6	40	43	45	49	51	40	Yes
R_119	1.5	695	32	38.9	38.9	38.9	38.9	38.9	40	43	45	49	51	40	Yes
R_126	4.5	857	25	37.3	37.3	37.3	37.3	37.3	40	43	45	49	51	40	Yes
R_127	1.5	1120	24	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
R_128	1.5	1127	21	35.9	35.9	35.9	35.9	35.9	40	43	45	49	51	40	Yes
R_129	4.5	864	25	36.6	36.6	36.6	36.6	36.6	40	43	45	49	51	40	Yes
R_131	1.5	950	29	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	40	Yes
R_135	4.5	986	24	37.5	37.5	37.5	37.5	37.5	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_137	1.5	796	38	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
R_138	1.5	1064	24	35.4	35.4	35.4	35.4	35.4	40	43	45	49	51	40	Yes
R_139	4.5	1048	25	35.1	35.1	35.1	35.1	35.1	40	43	45	49	51	40	Yes
R_140	4.5	1022	24	37.5	37.5	37.5	37.5	37.5	40	43	45	49	51	40	Yes
R_143	1.5	1038	21	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
R_145	4.5	973	29	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
R_146	7.5	1084	23	38.0	38.0	38.0	38.0	38.0	40	43	45	49	51	40	Yes
V_149	4.5	1046	21	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	40	Yes
R_150	1.5	834	24	35.6	35.6	35.6	35.6	35.6	40	43	45	49	51	40	Yes
R_152	4.5	980	13	36.3	36.3	36.3	36.3	36.3	40	43	45	49	51	40	Yes
R_153	1.5	1201	13	31.6	31.6	31.6	31.6	31.6	40	43	45	49	51	40	Yes
R_154	1.5	839	20	37.4	37.4	37.4	37.4	37.4	40	43	45	49	51	40	Yes
V_158	4.5	762	38	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	40	Yes
V_159	4.5	915	38	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
V_160	4.5	1099	38	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
V_162	4.5	924	23	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	40	Yes
R_163	4.5	1248	13	33.0	33.0	33.0	33.0	33.0	40	43	45	49	51	40	Yes
R_164	7.5	1048	13	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
V_165	4.5	1414	13	31.7	31.7	31.7	31.7	31.7	40	43	45	49	51	40	Yes
R_168	4.5	1061	29	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	40	Yes
V_170	4.5	723	29	35.6	35.6	35.6	35.6	35.6	40	43	45	49	51	40	Yes
V_172	4.5	756	25	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
V_174	4.5	624	29	37.1	37.1	37.1	37.1	37.1	40	43	45	49	51	40	Yes
V_176	4.5	663	27	37.6	37.6	37.6	37.6	37.6	40	43	45	49	51	40	Yes
V_177	4.5	763	27	36.8	36.8	36.8	36.8	36.8	40	43	45	49	51	40	Yes
R_179	4.5	1296	21	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
R_180	1.5	1338	21	33.2	33.2	33.2	33.2	33.2	40	43	45	49	51	40	Yes
R_181	4.5	1468	9	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
R_183	4.5	1463	16	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
V_186	4.5	1453	12	31.3	31.3	31.3	31.3	31.3	40	43	45	49	51	40	Yes
V_187	4.5	1225	12	32.8	32.8	32.8	32.8	32.8	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_188	1.5	1411	5	31.9	31.9	31.9	31.9	31.9	40	43	45	49	51	40	Yes
V_189	4.5	930	12	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
V_191	4.5	1038	12	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_193	4.5	874	12	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
V_195	4.5	1097	12	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
V_196	4.5	1299	9	35.4	35.4	35.4	35.4	35.4	40	43	45	49	51	40	Yes
V_197	4.5	1238	9	35.7	35.7	35.7	35.7	35.7	40	43	45	49	51	40	Yes
R_198	4.5	1428	5	33.5	33.5	33.5	33.5	33.5	40	43	45	49	51	40	Yes
R_199	4.5	871	12	35.8	35.8	35.8	35.8	35.8	40	43	45	49	51	40	Yes
V_201	4.5	1416	5	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
R_202	4.5	1402	8	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
R_203	4.5	1394	8	35.0	35.0	35.0	35.0	35.0	40	43	45	49	51	40	Yes
V_207	4.5	1402	3	34.0	34.0	34.0	34.0	34.0	40	43	45	49	51	40	Yes
V_208	4.5	1433	4	33.7	33.7	33.7	33.7	33.7	40	43	45	49	51	40	Yes
R_209	1.5	1195	9	34.0	34.0	34.0	34.0	34.0	40	43	45	49	51	40	Yes
R_210	1.5	1369	5	31.7	31.7	31.7	31.7	31.7	40	43	45	49	51	40	Yes
R_211	4.5	1185	9	36.1	36.1	36.1	36.1	36.1	40	43	45	49	51	40	Yes
R_213	4.5	1447	4	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
R_217	1.5	1376	2	32.0	32.0	32.0	32.0	32.0	40	43	45	49	51	40	Yes
R_218	4.5	908	12	36.6	36.6	36.6	36.6	36.6	40	43	45	49	51	40	Yes
R_222	1.5	1392	4	31.8	31.8	31.8	31.8	31.8	40	43	45	49	51	40	Yes
R_227	4.5	1335	3	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
R_228	1.5	1346	3	32.2	32.2	32.2	32.2	32.2	40	43	45	49	51	40	Yes
R_229	1.5	1334	3	32.2	32.2	32.2	32.2	32.2	40	43	45	49	51	40	Yes
V_230	4.5	1327	3	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_231	4.5	1326	3	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
R_232	4.5	1332	2	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
R_233	1.5	1329	3	32.1	32.1	32.1	32.1	32.1	40	43	45	49	51	40	Yes
V_234	4.5	1356	3	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	40	Yes
R_235	1.5	1362	2	31.9	31.9	31.9	31.9	31.9	40	43	45	49	51	40	Yes
R_236	4.5	1333	2	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_238	4.5	1324	3	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
R_239	4.5	1311	3	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
R_248	1.5	1010	12	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	40	Yes
R_249	4.5	1087	12	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
R_250	4.5	1148	12	33.1	33.1	33.1	33.1	33.1	40	43	45	49	51	40	Yes
V_251	4.5	1268	3	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
R_253	4.5	1276	3	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
R_255	1.5	1261	3	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	40	Yes
R_256	1.5	1271	3	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	40	Yes
R_257	4.5	1269	2	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	40	Yes
R_258	1.5	1257	3	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	40	Yes
R_259	4.5	1248	3	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	40	Yes
R_260	1.5	1133	9	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	40	Yes
R_261	1.5	1270	3	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	40	Yes
V_262	4.5	1262	3	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
R_264	1.5	1251	2	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	40	Yes
R_265	1.5	1242	3	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	40	Yes
R_267	4.5	953	12	34.6	34.6	34.6	34.6	34.6	40	43	45	49	51	40	Yes
R_270	4.5	1241	5	34.8	34.8	34.8	34.8	34.8	40	43	45	49	51	40	Yes
V_272	4.5	1348	12	31.8	31.8	31.8	31.8	31.8	40	43	45	49	51	40	Yes
V_275	4.5	1218	3	34.6	34.6	34.6	34.6	34.6	40	43	45	49	51	40	Yes
V_276	4.5	702	12	37.1	37.1	37.1	37.1	37.1	40	43	45	49	51	40	Yes
V_280	4.5	1219	3	34.6	34.6	34.6	34.6	34.6	40	43	45	49	51	40	Yes
V_281	4.5	1251	4	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
V_282	4.5	1251	4	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	40	Yes
V_284	4.5	1231	8	35.4	35.4	35.4	35.4	35.4	40	43	45	49	51	40	Yes
V_285	4.5	1198	3	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
V_287	4.5	1249	5	33.8	33.8	33.8	33.8	33.8	40	43	45	49	51	40	Yes
R_289	1.5	1223	3	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	40	Yes
R_290	4.5	1206	3	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
V_291	4.5	1377	5	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
V_292	4.5	1434	4	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
R_295	4.5	1478	2	33.4	33.4	33.4	33.4	33.4	40	43	45	49	51	40	Yes
V_296	4.5	1184	3	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
R_304	4.5	1187	3	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
R_309	1.5	1141	3	33.0	33.0	33.0	33.0	33.0	40	43	45	49	51	40	Yes
R_310	4.5	1156	3	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
R_311	4.5	1112	3	35.1	35.1	35.1	35.1	35.1	40	43	45	49	51	40	Yes
V_312	4.5	1092	3	35.1	35.1	35.1	35.1	35.1	40	43	45	49	51	40	Yes
V_313	4.5	1096	3	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
R_314	4.5	1096	3	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	40	Yes
R_315	1.5	1124	3	33.1	33.1	33.1	33.1	33.1	40	43	45	49	51	40	Yes
R_317	1.5	1106	3	33.2	33.2	33.2	33.2	33.2	40	43	45	49	51	40	Yes
R_319	4.5	1064	8	36.4	36.4	36.4	36.4	36.4	40	43	45	49	51	40	Yes
R_320	4.5	1065	3	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
R_322	4.5	1068	3	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
R_323	4.5	1186	2	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	40	Yes
R_324	1.5	1046	3	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
R_325	1.5	1057	3	33.5	33.5	33.5	33.5	33.5	40	43	45	49	51	40	Yes
R_326	1.5	999	3	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
V_327	4.5	1064	4	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
V_328	4.5	897	3	36.5	36.5	36.5	36.5	36.5	40	43	45	49	51	40	Yes
V_329	4.5	670	4	37.5	37.5	37.5	37.5	37.5	40	43	45	49	51	40	Yes
R_330	1.5	678	2	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	40	Yes
V_331	4.5	555	2	38.5	38.5	38.5	38.5	38.5	40	43	45	49	51	40	Yes
R_332	1.5	631	4	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	40	Yes
R_337	1.5	800	4	34.6	34.6	34.6	34.6	34.6	40	43	45	49	51	40	Yes
R_338	4.5	883	11	36.8	36.8	36.8	36.8	36.8	40	43	45	49	51	40	Yes
R_340	1.5	945	4	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	40	Yes
V_341	4.5	1116	4	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
R_342	1.5	814	1	33.8	33.8	33.8	33.8	33.8	40	43	45	49	51	40	Yes
R_345	4.5	762	6	36.6	36.6	36.6	36.6	36.6	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
R_347	4.5	699	6	37.0	37.0	37.0	37.0	37.0	40	43	45	49	51	40	Yes
R_348	4.5	981	6	35.1	35.1	35.1	35.1	35.1	40	43	45	49	51	40	Yes
V_349	4.5	1008	6	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
V_350	4.5	1329	5	33.1	33.1	33.1	33.1	33.1	40	43	45	49	51	40	Yes
V_351	4.5	1362	5	32.6	32.6	32.6	32.6	32.6	40	43	45	49	51	40	Yes
V_355	4.5	1246	1	32.1	32.1	32.1	32.1	32.1	40	43	45	49	51	40	Yes
V_356	4.5	887	1	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
V_357	4.5	1457	sub	30.6	30.6	30.6	30.6	30.6	40	43	45	49	51	40	Yes
R_358	4.5	938	6	35.1	35.1	35.1	35.1	35.1	40	43	45	49	51	40	Yes
V_359	4.5	1193	sub	30.6	30.6	30.6	30.6	30.6	40	43	45	49	51	40	Yes
V_360	4.5	1321	sub	30.5	30.5	30.5	30.5	30.5	40	43	45	49	51	40	Yes
V_361	4.5	1133	sub	30.7	30.7	30.7	30.7	30.7	40	43	45	49	51	40	Yes
R_362	7.5	1460	1	31.6	31.6	31.6	31.6	31.6	40	43	45	49	51	40	Yes
R_363	7.5	1302	6	34.0	34.0	34.0	34.0	34.0	40	43	45	49	51	40	Yes
R_364	4.5	993	1	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
R_365	1.5	1351	1	30.6	30.6	30.6	30.6	30.6	40	43	45	49	51	40	Yes
R_368	1.5	1209	sub	25.8	25.8	25.8	25.8	25.8	40	43	45	49	51	40	Yes
R_371	4.5	1114	6	34.0	34.0	34.0	34.0	34.0	40	43	45	49	51	40	Yes
R_372	4.5	972	6	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	40	Yes
R_373	7.5	1447	6	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	40	Yes
R_374	4.5	1456	1	32.1	32.1	32.1	32.1	32.1	40	43	45	49	51	40	Yes
R_375	1.5	866	6	33.4	33.4	33.4	33.4	33.4	40	43	45	49	51	40	Yes
R_377	4.5	1034	sub	31.3	31.3	31.3	31.3	31.3	40	43	45	49	51	40	Yes
R_378	1.5	1142	sub	28.7	28.7	28.7	28.7	28.7	40	43	45	49	51	40	Yes
R_379	4.5	1330	1	31.5	31.5	31.5	31.5	31.5	40	43	45	49	51	40	Yes
V_382	4.5	1346	6	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	40	Yes
R_384	4.5	1187	sub	30.7	30.7	30.7	30.7	30.7	40	43	45	49	51	40	Yes
V_385	4.5	1168	6	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	40	Yes
R_386	1.5	1393	sub	25.6	25.6	25.6	25.6	25.6	40	43	45	49	51	40	Yes
V_387	4.5	927	6	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes
V_388	4.5	935	6	34.7	34.7	34.7	34.7	34.7	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
V_389	4.5	1245	6	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	40	Yes
V_390	4.5	1011	6	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
R_399	4.5	1176	sub	27.0	27.0	27.0	27.0	27.0	40	43	45	49	51	40	Yes
V_400	4.5	1302	1	31.5	31.5	31.5	31.5	31.5	40	43	45	49	51	40	Yes
R_402	4.5	1114	6	33.7	33.7	33.7	33.7	33.7	40	43	45	49	51	40	Yes
V_403	4.5	1372	sub	30.4	30.4	30.4	30.4	30.4	40	43	45	49	51	40	Yes
R_408	4.5	289	sub	38.2	38.2	38.2	38.2	38.2	40	43	45	49	51	40	Yes
R_414	4.5	521	sub	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	40	Yes
R_416	4.5	773	sub	33.0	33.0	33.0	33.0	33.0	40	43	45	49	51	40	Yes
R_418	4.5	950	sub	31.0	31.0	31.0	31.0	31.0	40	43	45	49	51	40	Yes
V_420	4.5	1184	sub	28.7	28.7	28.7	28.7	28.7	40	43	45	49	51	40	Yes
V_439	4.5	634	38	35.7	35.7	35.7	35.7	35.7	40	43	45	49	51	40	Yes
V_440	4.5	891	25	36.0	36.0	36.0	36.0	36.0	40	43	45	49	51	40	Yes
V_441	4.5	915	4	35.6	35.6	35.6	35.6	35.6	40	43	45	49	51	40	Yes
V_445	4.5	971	3	35.9	35.9	35.9	35.9	35.9	40	43	45	49	51	40	Yes
V_451	4.5	791	25	37.0	37.0	37.0	37.0	37.0	40	43	45	49	51	40	Yes
V_458	4.5	1321	3	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
V_459	4.5	1114	sub	27.8	27.8	27.8	27.8	27.8	40	43	45	49	51	40	Yes
V_460	4.5	1328	1	32.7	32.7	32.7	32.7	32.7	40	43	45	49	51	40	Yes
V_462	4.5	1319	3	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_464	4.5	717	2	36.7	36.7	36.7	36.7	36.7	40	43	45	49	51	40	Yes
V_465	4.5	890	2	35.5	35.5	35.5	35.5	35.5	40	43	45	49	51	40	Yes
V_466	4.5	988	2	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	40	Yes
V_467	4.5	1096	2	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes
V_468	4.5	1181	2	34.2	34.2	34.2	34.2	34.2	40	43	45	49	51	40	Yes
V_469	4.5	1228	2	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	40	Yes
V_470	4.5	1287	2	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
V_471	4.5	1334	2	33.9	33.9	33.9	33.9	33.9	40	43	45	49	51	40	Yes
V_472	4.5	1287	2	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	40	Yes
V_473	4.5	1253	2	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	40	Yes
V_474	4.5	1241	2	34.4	34.4	34.4	34.4	34.4	40	43	45	49	51	40	Yes

Point of Reception ID	Receptor Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Receptor [dBA] at Selected Wind Speed in m/s					Sound Level Limit [dBA] at Selected Wind Speed in m/s					Applicable Background Sound Level	Compliance With Limit (Yes/No)
				6 or <	7	8	9	10	6 or <	7	8	9	10	NPC 232 (C 3)	
V_475	4.5	972	3	35.9	35.9	35.9	35.9	35.9	40	43	45	49	51	40	Yes
V_476	4.5	673	2	38.6	38.6	38.6	38.6	38.6	40	43	45	49	51	40	Yes

Table 7-2: Wind Turbine Noise Impact Assessment Summary – Adelaide Wind Farm – Participants

Participant ID	Height [m]	Distance to Nearest Turbine [m]	Nearest Turbine [ID]	Calculated Sound Pressure Level at Dwelling [dBA]
PR_89	4.5	602	34	40.6
PR_90	7.5	609	34	40.3
PR_92	4.5	819	32	38.5
PR_93	4.5	744	31	38.4
PR_94	7.5	977	34	38.4
PR_122	4.5	691	38	37.9
PR_123	7.5	572	31	42.1
PR_124	4.5	881	24	37.6
PR_125	1.5	813	24	35.7
PR_133	1.5	925	29	33.7
PR_134	4.5	906	26	36.5
PR_136	4.5	757	24	37.9
PR_141	4.5	603	26	38.4
PR_142	4.5	1047	21	38.1
PR_144	1.5	1041	22	36.0
PR_156	4.5	650	20	40.4
PR_157	4.5	521	19	42.0
PR_161	1.5	686	19	38.0
PR_166	4.5	517	26	39.1
PR_167	4.5	533	20	42.4
PR_169	1.5	791	20	37.9
PR_173	4.5	515	23	39.8
PR_200	4.5	1430	8	34.7
PR_254	4.5	780	12	37.3
PR_263	1.5	1248	2	32.3
PR_266	4.5	1064	9	36.5
PR_333	4.5	562	4	38.6
PR_343	4.5	666	1	36.8
PR_354	1.5	792	6	34.3
PR_366	4.5	1086	1	33.5
PR_376	7.5	1189	1	33.3
PR_381	1.5	1085	1	30.8
PR_404	1.5	909	sub	30.1
PV_442	4.5	1016	1	33.5
PV_443	4.5	990	1	33.5
PV_444	4.5	1027	1	33.2
PV_446	4.5	944	13	38.0
PV_447	4.5	487	19	42.0
PV_448	4.5	596	19	41.3
PV_449	4.5	533	23	39.7
PV_450	4.5	710	24	38.1
PV_452	4.5	731	26	37.2
PV_453	4.5	947	29	35.7
PV_454	4.5	1184	9	35.8
PV_455	4.5	720	12	37.3
PV_456	4.5	1252	5	34.1
PV_457	4.5	591	4	38.2
PV_461	4.5	1304	1	32.7

Table 7-3: Concordance table showing sound level contributions for Adelaide and Napier shared receptors

UTM coordinates		Noise receptor ID		Distance to nearest source [m]		Nearest source ID		Level of farm [dBA]		Level [dBA]
Easting [m]	Northing [m]	Adelaide	Napier	Adelaide	Napier	Adelaide	Napier	Adelaide	Napier	Total
441,720	4,756,075	17	R021	1497	750	36	N2	31.6	34.8	36.5
441,842	4,756,093	21	R022	1491	788	36	N2	31.6	34.2	36.1
441,670	4,756,094	23	R127	1476	714	36	N2	31.8	35.2	36.9
441,197	4,756,181	36	R018	1452	635	35	N2	32.7	36.7	38.1
441,366	4,756,200	38	R020	1398	574	36	N2	30.8	35.6	36.9
440,002	4,756,224	42	R003	1433	597	33	N1	31.8	37.0	38.2
442,598	4,756,229	45	R027	1498	1281	37	N2	31.2	29.7	33.5
442,215	4,756,239	50	R025	1399	941	37	N2	32.2	32.8	35.5
441,566	4,756,234	51	R105	1388	550	36	N2	32.8	37.7	38.9
441,714	4,756,243	52	N/A	1329	595	36	N2	32.7	36.9	38.3
440,988	4,756,249	55	R102	1388	688	35	N2	33.1	36.5	38.1
441,882	4,756,250	56	R023	1341	683	36	N2	32.5	35.6	37.3
440,337	4,756,256	57	R101	1321	620	33	N1	32.6	37.0	38.3
440,482	4,756,256	58	N/A	1310	694	33	N1	32.8	36.4	38.0
440,150	4,756,258	59	N/A	1355	564	33	N1	32.3	37.6	38.7
440,765	4,756,258	60	R001	1333	844	33	N2	33.0	35.9	37.7
439,769	4,756,263	62	R004	1497	632	33	N1	31.7	36.4	37.6
440,605	4,756,282	64	R002	1288	754	33	N1	33.1	36.2	37.9
438,195	4,756,284	65	N/A	1458	1953	30	N1	30.7	24.7	31.7
438,603	4,756,336	69	R083	1492	1548	30	N1	31.1	27.3	32.6
438,767	4,756,399	72	N/A	1499	1373	30	N1	31.5	28.5	33.3

441,203	4,756,271	73	N/A	1363	550	35	N2	33.2	37.9	39.2
443,272	4,756,926	74	R090	1392	1842	37	N2	31.4	25.3	32.3
442,958	4,757,175	75	N/A	997	1575	37	N2	33.7	27.1	34.5
439,303	4,757,317	76	R013	1089	919	32	N1	33.5	30.6	35.2
442,928	4,757,390	77	N/A	889	1615	37	N2	34.6	26.8	35.2
439,284	4,757,478	80	R081	959	1030	32	N1	34.2	28.9	35.3
439,309	4,757,608	81	R123	894	1100	32	N1	36.6	30.9	37.6
443,072	4,757,647	82	R089	1000	1855	37	N2	32.2	22.9	32.7
442,939	4,757,713	84	N/A	870	1774	37	N2	35.0	25.8	35.5
439,409	4,757,971	86	R009	834	1332	32	N1	37.3	29.1	37.9
441,145	4,758,265	89	R012	602	1524	34	N2	40.3	28.9	40.6
440,833	4,758,373	90	R011	609	1714	34	N2	39.9	28.8	40.3
439,319	4,758,521	92	R010	818	1864	32	N1	38.3	25.6	38.5
440,444	4,758,669	94	R014	977	1888	34	N1	38.0	27.0	38.4
439,828	4,758,749	103	R128	1191	1948	21	N1	37.6	25.5	37.9
440,037	4,758,770	109	R015	1180	1953	21	N1	37.5	25.7	37.8
442,970	4,757,513	N/A	R125	905	1704	37	N2	34.5	26.2	35.1
442,766	4,757,172	N/A	R126	832	1389	37	N2	34.9	28.4	35.8

8 CONCLUSION

Based on the approach presented in this NIA, the Adelaide Wind Energy Centre is compliant with the MOE noise limits at all Points of Reception and Vacant Lot Receptors within 1,500 m of the Project's noise sources, for wind speeds of 6, 7, 8, 9, and 10 m/s.

9 REFERENCES

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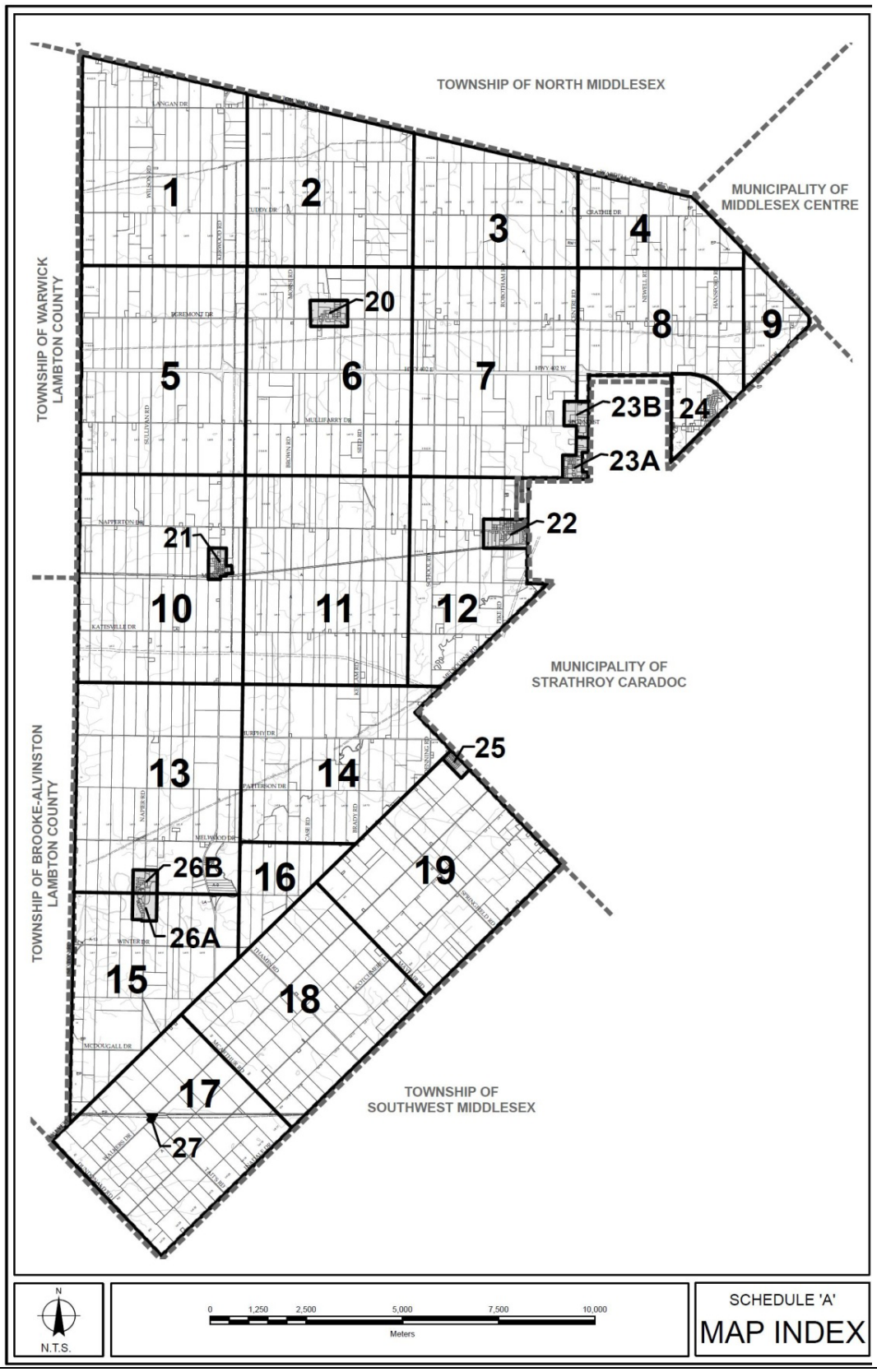
[4] HGC Engineering, Acoustic Assessment Report: Napier Wind Project: Township of Adelaide Metcalfe, Ontario, 28 September 2012.

[5] Handbook of Acoustics – Malcolm J. Crocker, 1998.

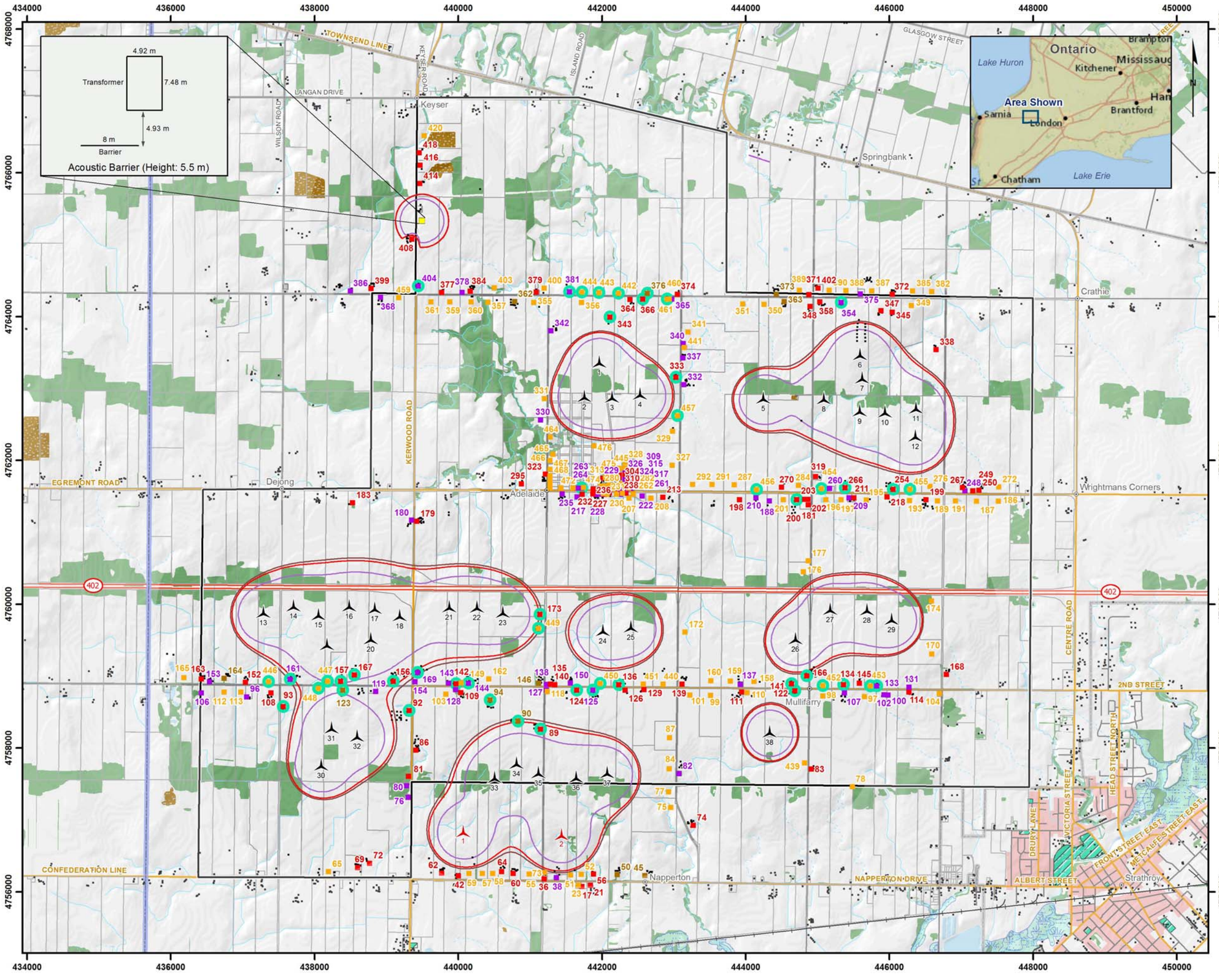
[6] International Organization for Standardization (ISO), 1993. Acoustics - Attenuation of Sound During Propagation Outdoors - Calculation of the Absorption of Sound by the Atmosphere. ISO 9613-1. 33 p.

[7] International Organization for Standardization (ISO), 1996. Acoustics - Attenuation of Sound During Propagation Outdoors - General Method of Calculation. ISO 9613-2. 25 p.

APPENDIX A ZONING AND NOISE ISO-CONTOUR MAPS



GL Garrad Hassan



Legend

Project Components

- Wind Turbine (38)
- Napier Turbine
- Substation
- Participating Receptor
- Project Area

Predicted Sound Level

- 40 dB(A) at 1.5 m agl*
- 40 dB(A) at 4.5 m agl*
- 40 dB(A) at 7.5 m agl*

*agl: Above Ground Level

Other Components

- 1-Storey Receptor
- 2-Storeys Receptor
- 3-Storeys Receptor
- Vacant Lot Receptor
- Other Building
- Railway
- Freeway
- Arterial / Collector
- Local Road / Street
- Permanent Watercourse
- Intermittent Watercourse
- Runway
- Residential Area
- Park / Sports Field
- Campground
- Cemetery
- Pit or Quarry
- Waterbody
- Wetland
- Wooded Area
- Lot Line
- Municipal Boundary
- County Boundary

NEXTera ENERGY

Adelaide Wind Energy Centre

38 TURBINE LAYOUT WITH SIMULATED NOISE ISOCONTOURS (THE WORST CASE WIND SPEED SCENARIO)

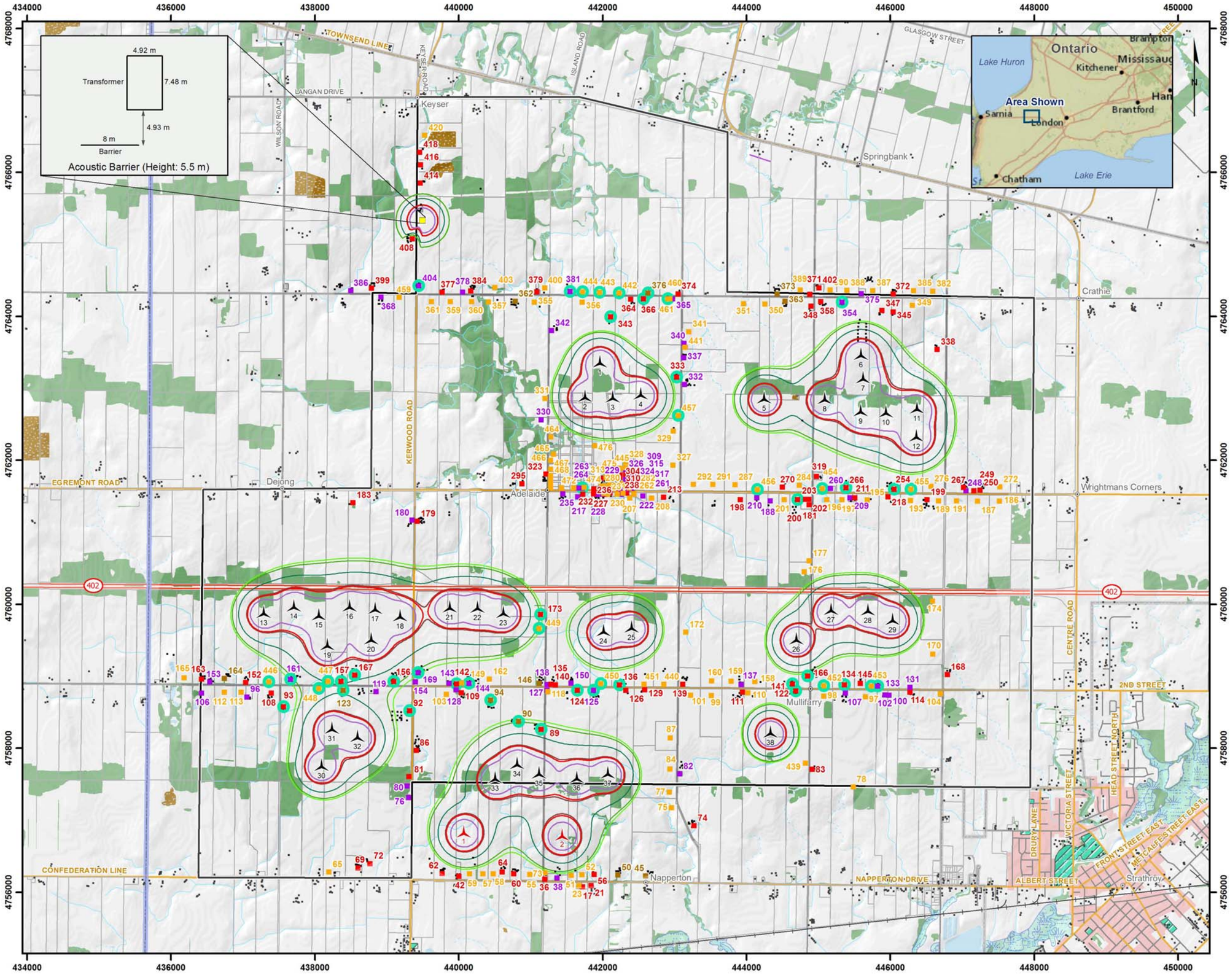
GL Garrad Hassan

1009-015-130423-001-AB

April 23, 2013

Projection: UTM Zone 17, NAD83

Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec, Industry Canada.


4.92 m
Transformer
7.48 m
4.93 m
8 m
Barrier
Acoustic Barrier (Height: 5.5 m)
TOWNSEND LINE
LANGAN DRIVE
WILSON ROAD
KEYSER ROAD
ISLAND ROAD
GLASGOW STREET
Keyser
Springbank
Crathie
Dejong
Adelaide
Wrightmans Corners
Mullifarry
Napperton
Strathroy
EGREMONT ROAD
KERWOOD ROAD
CONFEDERATION LINE
NAPPERTON DRIVE
ALBERT STREET
DRURY LANE
VICTORIA STREET
HEAD STREET NORTH
FRONT STREET EAST
MCCALFES STREET EAST
2ND STREET
CENTRE ROAD
402
Ontario
Lake Huron
Lake Erie
Area Shown
Sarnia
London
Kitchener
Brantford
Chatham
Brampton
N
Legend
Project Components
Wind Turbine (38)
Napier Turbine
Substation
Participating Receptor
Project Area
Predicted Sound Level
40 dB(A) at 1.5 m agl*
40 dB(A) at 4.5 m agl*
40 dB(A) at 7.5 m agl*
45 dB(A) at 1.5 m agl*
45 dB(A) at 4.5 m agl*
45 dB(A) at 7.5 m agl*
*agl: Above Ground Level
Other Components
1-Storey Receptor
2-Storeys Receptor
3-Storeys Receptor
Vacant Lot Receptor
Other Building
Railway
Freeway
Arterial / Collector
Local Road / Street
Permanent Watercourse
Intermittent Watercourse
Runway
Residential Area
Park / Sports Field
Campground
Cemetery
Pit or Quarry
Waterbody
Wetland
Wooded Area
Lot Line
Municipal Boundary
County Boundary
0
0.5
1
2
km
NEXTera ENERGY
Adelaide Wind Energy Centre
38 TURBINE LAYOUT WITH SIMULATED NOISE ISOCONTOURS (THE WORST CASE WIND SPEED SCENARIO)
GL Garrad Hassan
1009-015-130423-001-AB
April 23, 2013
Projection: UTM Zone 17, NAD83
Sources: Ontario Base Mapping, Ontario Road Network, Land Information Ontario, Geobase, CanVec, Industry Canada.
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APPENDIX B SAMPLE CALCULATION FOR NOISE MODELING

Resulting A-weighted Sound Pressure Level at a Points of Reception R_119 and V_73

The calculation of cumulative receptor noise levels from wind turbines uses the methodology of ISO 9613-2, "*Acoustics — Attenuation of sound during propagation outdoors: Part 2: General method of calculation*". These calculations are conducted with CadnaA *(which is an implementation of ISO 9613-1 and ISO 9613-2)*.

As an example, in this appendix, the results are presented at Points of Reception R_119 and V_73. The following conditions were used:

- Turbine locations (Appendix F);
- Receptor locations (Appendix C).

Turbine characteristics and modeling parameters:

- Hub heights: 80 m (GE 1.6 100), and 100 m (MM92);
- Ambient air temperature: 10ºC;
- Ambient barometric pressure: 101.32 kPa;
- Relative humidity: 70%;
- Wind speed (10 m agl): 6 m/s;
- Source ground factor: 0.7
- Middle ground factor: 0.7;
- Receptor ground factor: 0.7;
- Tonality penalty for transformer: 5.0 dBA;
- Broadband and the octave band sound power levels (see Table 5-1 and Table 5-2);
- The effect of topography was included.

The following table presents an example result and intermediate values of the calculations as the A-weighted sound pressure levels at two chosen example receptors, due to each turbine or substation and each octave band. The A-weighted sound pressure levels at the example receptors R_119 and V_73 for all bands and all noise sources are 38.9 dBA and 39.2 dBA respectively.

Sample Calculations

Sound Pressure Levels at R_119

Turbine ID	Distance* [m]	Octave Band Sound Pressure Levels [dBA]									Total A-Weighted Broadband Sound Pressure Level by Turbine [dBA]
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
N1	2347	N/A	8.6	10.1	13.0	14.2	11.5	-7.7	-69.6	N/A	18.9
N2	3312	N/A	5.7	6.8	9.1	9.4	5.1	-19.9	N/A	N/A	14.6
13	1867	0.0	10.4	11.7	13.1	14.4	15.0	1.5	-48.8	N/A	20.3
14	1605	1.3	11.7	13.1	14.7	16.2	17.3	5.4	-38.9	N/A	22.2
15	1288	3.3	13.6	15.2	16.9	18.7	20.3	10.4	-26.6	N/A	24.8
16	1203	3.9	14.2	15.8	17.6	19.5	21.2	11.8	-23.2	N/A	25.6
17	1119	4.5	14.9	16.5	18.3	20.3	22.2	13.2	-19.9	N/A	26.4
18	1083	4.8	15.2	16.8	18.7	20.6	22.6	13.8	-18.4	N/A	26.8
19	894	6.4	16.9	18.8	20.5	22.7	24.9	17.3	-10.5	N/A	29.0
20	702	8.5	19.0	21.5	22.8	25.1	27.7	21.3	-2.1	-80.0	31.7
21	1552	1.6	12.0	13.4	15.0	16.6	17.7	6.2	-36.9	N/A	22.6
22	1834	0.2	10.5	11.8	13.3	14.6	15.3	2.0	-47.6	N/A	20.5
23	2093	-1.0	9.3	10.6	11.9	13.0	13.2	-1.6	-57.2	N/A	18.9
24	3292	-4.2	6.0	6.4	6.9	7.0	5.1	-16.9	N/A	N/A	13.4
25	3684	-4.9	5.2	5.3	5.6	5.3	2.7	-21.6	N/A	N/A	12.0
30	1291	3.2	13.6	15.1	16.9	18.7	20.3	10.3	-26.7	N/A	24.8
31	803	7.4	17.8	20.0	21.5	23.8	26.2	19.1	-6.6	N/A	30.2
32	700	8.6	19.0	21.5	22.9	25.2	27.8	21.3	-2.0	-79.7	31.7
33	2089	-1.0	9.3	10.6	11.9	13.0	13.2	-1.6	-57.1	N/A	18.9
34	2245	-1.6	8.7	9.9	11.1	12.1	12.0	-3.7	-62.8	N/A	18.0
35	2575	-2.6	7.6	8.6	9.6	10.3	9.6	-8.1	-74.8	N/A	16.3
36	3077	-3.7	6.5	7.0	7.7	7.9	6.4	-14.3	N/A	N/A	14.2
37	3455	-4.5	5.7	5.9	6.4	6.3	4.1	-18.9	N/A	N/A	12.8
Total A-Weighted Sound Pressure Level											**38.9**

*Includes the heights of noise sources and receptors and the required 30 meter radius around the 1-storey dwelling
N/A indicates levels below -88.0 dBA or unavailable data at 31.5 Hz

Sound Pressure Levels at V_73

Turbine ID	Distance* [m]	Octave Band Sound Pressure Levels [dBA]									Total A-Weighted Broadband Sound Pressure Level by Turbine [dBA]
		31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
N1	1254	N/A	14.2	17.0	23.5	25.2	21.4	8.2	-28.5	N/A	28.9
N2	550	N/A	21.3	24.6	31.3	33.6	31.0	22.0	1.4	-55.9	37.4
15	4754	-6.8	3.3	3.8	6.3	4.6	-2.8	-34.1	N/A	N/A	11.0
16	4578	-6.5	3.6	4.2	6.8	5.3	-1.9	-32.1	N/A	N/A	11.5
17	4347	-6.2	4.0	4.7	7.5	6.1	-0.6	-29.4	N/A	N/A	12.1
18	4080	-5.7	4.4	5.4	8.3	7.2	0.9	-26.3	N/A	N/A	12.9
19	4365	-6.2	3.9	4.7	7.5	6.1	-0.7	-29.6	N/A	N/A	12.1
20	4034	-5.6	4.5	5.5	8.4	7.3	1.2	-25.8	N/A	N/A	13.1
21	3902	-5.4	4.7	5.8	8.8	7.9	1.9	-24.2	N/A	N/A	13.5
22	3784	-5.2	5.0	6.1	9.2	8.3	2.6	-22.8	N/A	N/A	13.9
23	3641	-4.9	5.2	6.5	9.7	8.9	3.4	-21.1	N/A	N/A	14.4
24	3435	-4.5	5.6	7.0	10.4	9.8	4.7	-18.7	N/A	N/A	15.1
25	3598	-4.8	5.3	6.6	9.8	9.1	3.7	-20.6	N/A	N/A	14.5
26	4753	-6.8	3.3	3.8	6.3	4.6	-2.8	-34.1	N/A	N/A	11.0
30	3440	-4.6	5.6	7.0	10.3	9.8	4.6	-18.7	N/A	N/A	15.1
31	3569	-4.8	5.4	6.7	9.9	9.2	3.9	-20.3	N/A	N/A	14.6
32	3213	-4.1	6.1	7.6	11.1	10.8	6.0	-16.0	N/A	N/A	15.9
33	1473	2.1	12.5	14.9	19.5	20.7	18.9	7.4	-33.9	N/A	25.3
34	1546	1.7	12.0	14.5	19.0	20.1	18.3	6.3	-36.7	N/A	24.8
35	1366	2.7	13.1	15.7	20.3	21.6	20.0	9.1	-29.7	N/A	26.2
36	1374	2.7	13.1	15.6	20.2	21.5	19.9	9.0	-30.0	N/A	26.1
37	1616	1.3	11.6	14.1	18.6	19.6	17.6	5.2	-39.3	N/A	24.2
38	3679	-5.0	5.2	6.4	9.6	8.8	3.2	-21.6	N/A	N/A	14.2
Total A-Weighted Sound Pressure Level											**39.2**

*Includes the heights of noise sources and receptors
N/A indicates levels below -88.0 dBA or unavailable data at 31.5 Hz

APPENDIX C COORDINATES OF POINTS OF RECEPTION

Coordinates of all modeled Points of Reception and Vacant Lot Receptors for the Adelaide Wind Energy Centre (UTM17-NAD83 projection) are given in the tables below:

Point of Reception ID	Easting [m]	Northing [m]
R_17	441720	4756075
R_21	441842	4756093
V_23	441670	4756094
R_36	441197	4756181
R_38	441366	4756200
R_42	440002	4756224
R_45	442598	4756229
R_50	442215	4756239
V_51	441566	4756234
V_52	441714	4756243
V_55	440988	4756249
R_56	441882	4756250
V_57	440337	4756256
V_58	440482	4756256
V_59	440150	4756258
R_60	440765	4756258
R_62	439769	4756263
R_64	440605	4756282
V_65	438195	4756284
R_69	438603	4756336
R_72	438767	4756399
V_73	441203	4756271
R_74	443272	4756926
V_75	442958	4757175
R_76	439303	4757317
V_77	442928	4757390
V_78	445484	4757462
R_80	439284	4757478
R_81	439309	4757608
R_82	443072	4757647
R_83	444912	4757711

Point of Reception ID	Easting [m]	Northing [m]
V_84	442939	4757713
R_86	439409	4757971
V_87	442941	4758147
R_96	437056	4758714
V_97	445653	4758716
V_98	445076	4758724
V_99	443513	4758734
R_100	445980	4758739
V_101	443224	4758740
R_102	445928	4758743
V_103	439828	4758749
V_104	446697	4758759
R_106	436426	4758768
R_107	445375	4758770
R_108	437395	4758770
R_109	440037	4758770
V_110	444023	4758772
R_111	443943	4758778
V_112	436743	4758779
V_113	436976	4758779
R_114	446273	4758781
V_118	441238	4758788
R_119	438850	4758789
R_126	442321	4758808
R_127	441227	4758810
R_128	439964	4758816
R_129	442586	4758816
R_131	446272	4758847
R_135	441344	4758884
R_137	443929	4758885
R_138	441230	4758887

Point of Reception ID	Easting [m]	Northing [m]
R_139	443113	4758889
R_140	441286	4758889
R_143	439869	4758901
R_145	445584	4758902
R_146	441122	4758902
V_149	440040	4758906
R_150	441560	4758908
R_152	437038	4758917
R_153	436541	4758925
R_154	439397	4758925
V_158	444116	4758930
V_159	443788	4758933
V_160	443518	4758935
V_162	440427	4758961
R_163	436426	4758963
R_164	436743	4758970
V_165	436186	4758980
R_168	446792	4759026
V_170	446591	4759309
V_172	443158	4759613
V_174	446588	4760048
V_176	444804	4760454
V_177	444872	4760605
R_179	439423	4761154
R_180	439352	4761171
R_181	444870	4761383
R_183	438531	4761414
V_186	447516	4761433
V_187	447214	4761436
R_188	444329	4761437
V_189	446672	4761438

Point of Reception ID	Easting [m]	Northing [m]
V_191	446921	4761441
V_193	446280	4761444
V_195	445682	4761452
V_196	445116	4761454
V_197	445330	4761454
R_198	443914	4761456
R_199	446510	4761456
V_201	444523	4761457
R_202	444822	4761459
R_203	444866	4761460
V_207	442378	4761475
V_208	442685	4761475
R_209	445440	4761479
R_210	444144	4761480
R_211	445505	4761483
R_213	442850	4761488
R_217	441653	4761493
R_218	445969	4761495
R_222	442560	4761507
R_227	442037	4761526
R_228	441921	4761529
R_229	441995	4761531
V_230	442204	4761531
V_231	442074	4761533
R_232	441725	4761533
R_233	442254	4761533
V_234	442439	4761534
R_235	441449	4761538
R_236	441876	4761538
R_238	442334	4761547
R_239	442101	4761547

Point of Reception ID	Easting [m]	Northing [m]
R_248	447051	4761577
R_249	447161	4761579
R_250	447248	4761586
V_251	442057	4761592
R_253	441959	4761594
R_255	442259	4761601
R_256	442342	4761602
R_257	441877	4761602
R_258	442311	4761611
R_259	442221	4761612
R_260	445167	4761612
R_261	442402	4761614
V_262	442371	4761616
R_264	441647	4761619
R_265	442253	4761620
R_267	447019	4761625
R_270	444500	4761630
V_272	447524	4761634
V_275	442058	4761642
V_276	446563	4761642
V_280	441990	4761648
V_281	442537	4761648
V_282	442480	4761649
V_284	444738	4761655
V_285	442103	4761660
V_287	443841	4761663
R_289	442416	4761665
R_290	442323	4761665
V_291	443534	4761666
V_292	443264	4761668
R_295	440879	4761674

Point of Reception ID	Easting [m]	Northing [m]
V_296	442256	4761678
R_304	442411	4761701
R_309	442324	4761731
R_310	442408	4761732
R_311	441993	4761755
V_312	442117	4761765
V_313	442048	4761765
R_314	442243	4761766
R_315	442428	4761770
R_317	442367	4761774
R_319	444973	4761778
R_320	442242	4761797
R_322	442324	4761805
R_323	441212	4761811
R_324	442371	4761836
R_325	442430	4761840
R_326	442321	4761874
V_327	442981	4761936
V_328	442321	4761978
V_329	442984	4762407
R_330	441146	4762567
V_331	441200	4762863
R_332	443140	4763056
R_337	443128	4763430
R_338	446649	4763542
R_340	443131	4763628
V_341	443201	4763790
R_342	441292	4763805
R_345	446039	4764066
R_347	445882	4764085
R_348	444897	4764144

Point of Reception ID	Easting [m]	Northing [m]
V_349	446307	4764158
V_350	444259	4764174
V_351	443963	4764177
V_355	441055	4764198
V_356	441719	4764198
V_357	440414	4764203
R_358	445034	4764206
V_359	439883	4764206
V_360	440182	4764206
V_361	439621	4764208
R_362	440787	4764211
R_363	444536	4764214
R_364	442391	4764241
R_365	442971	4764244
R_368	438921	4764270
R_371	444879	4764308
R_372	446038	4764313
R_373	444429	4764314
R_374	443049	4764315
R_375	445596	4764316
R_377	439771	4764337
R_378	440056	4764339
R_379	441085	4764344
V_382	446590	4764351
R_384	440169	4764357
V_385	446323	4764359
R_386	438500	4764359
V_387	445756	4764362
V_388	445397	4764365
V_389	444748	4764367
V_390	445164	4764367

Point of Reception ID	Easting [m]	Northing [m]
R_399	438790	4764393
V_400	441195	4764396
R_402	445009	4764400
V_403	440502	4764402
R_408	439355	4765081
R_414	439465	4765854
R_416	439468	4766107
R_418	439458	4766283
V_420	439528	4766518
V_439	444820	4757792
V_440	442851	4758890
V_441	443146	4763574
V_445	442241	4761891
V_451	442579	4758890
V_458	442018	4761542
V_459	439173	4764268
V_460	442939	4764246
V_462	442284	4761546
V_464	441281	4762327
V_465	441321	4762088
V_466	441277	4762000
V_467	441279	4761878
V_468	441276	4761786
V_469	441276	4761734
V_470	441276	4761670
V_471	441277	4761620
V_472	441430	4761620
V_473	441599	4761622
V_474	441745	4761624
V_475	442320	4761901
V_476	441889	4762205

APPENDIX D COORDINATES OF PARTICIPANTS

Coordinates of all modeled participants for the Adelaide Wind Energy Centre (UTM17-NAD83 projection) are given in the table below.

Participant ID	Easting [m]	Northing [m]
PR_89	441145	4758265
PR_90	440833	4758373
PR_92	439319	4758521
PR_93	437566	4758576
PR_94	440444	4758669
PR_122	444685	4758796
PR_123	438394	4758805
PR_124	441649	4758806
PR_125	441873	4758807
PR_133	445824	4758864
PR_134	445361	4758883
PR_136	442235	4758884
PR_141	444639	4758896
PR_142	439969	4758896
PR_144	440144	4758901
PR_156	439096	4758927
PR_157	438364	4758928
PR_161	437664	4758957
PR_166	444852	4759004
PR_167	438554	4759016
PR_169	439437	4759052
PR_173	441138	4759859
PR_200	444711	4761456
PR_254	446051	4761598
PR_263	441719	4761618
PR_266	445382	4761621
PR_333	443029	4763156
PR_343	442111	4763994
PR_354	445329	4764198
PR_366	442570	4764245
PR_376	442634	4764327
PR_381	441549	4764348
PR_404	439445	4764426
PV_442	442228	4764326
PV_443	441958	4764335
PV_444	441723	4764344

Participant ID	Easting [m]	Northing [m]
PV_446	437363	4758923
PV_447	438183	4758927
PV_448	438055	4758830
PV_449	441117	4759664
PV_450	441977	4758899
PV_452	445073	4758871
PV_453	445734	4758867
PV_454	445052	4761608
PV_455	446284	4761598
PV_456	444151	4761597
PV_457	443052	4762624
PV_461	442906	4764245

APPENDIX E TURBINE AND TRANSFORMER TECHNICAL SPECIFICATIONS

GE Energy

Parker D. Powell
Technical Leader

March 19, 2013

Don Karwisch
NextEra Energy Resources
700 Universe Blvd
Juno Beach, FL 33408

RE: Tonality of 1.6-100 Wind Turbine Generator

Mr. Karwisch:

On September 20, 2012, I responded to your request to help respond to the Ministry of Environment's request to "Provide a letter and report from manufacturer indicating that GE1.6-100, 1.62 MW is not tonal based on IEC 61400-11-ed.2.1: 2006. State the tonality of the turbines in the report."

IEC 61400-11 only requires a report of any tonality that exceeds 3dB, but appears not to define the term "tonal".

The 1.6-100 turbine (with or without low-noise trailing edges) has an expected value for tonal audibility of $\Delta L_{a,k} < 2$ dB, irrespective of wind speed, hub height, and grid frequency based on the IEC 61400-11 standard and thuse does not require a report.

Nonetheless, please refer to the attached report on the 1.6-100 with LNTE's, the model NextEra plans to install, for more detailed acoustic information. This is an updated version of what was provided with my September 20, 2012 letter. The following changes were made:

- Tabel 1 was replaced to include lower wind speeds and to update the low frequencies based on measurement data.
- The description for Audible Tonality was updated to conform with IEC 61400-11 standard. It now says, "The tonal audibility ($\Delta L_{a,k}$), when measured in accordance with the IEC 61400-11 standard, for the GE's 1.6-100 with LNTE is less than or equal to 2 dB.".

Best regards,

Parker D. Powell

Attachment: Technical Description of the 1.6-100 Wind Turbine with Low-Noise Trailing Edges (LNTE's) and Major Components Rev 3

GE Energy
Bldg. 53-405B
1 River Road
Schenectady, NY 12345

1

Phone 518-385-5838
Cell 518-867-6298
email parker.powell@ge.com

2 Normal Operation Calculated Apparent Sound Power Level

The apparent sound power levels $L_{WA,k}$ are initially calculated as a function of the hub height wind speed v_{HH}. The corresponding wind speeds v_{10m} at 10 m height above ground level have been evaluated assuming a logarithmic wind profile. In this case a surface roughness of $z_{0ref} = 0.05$ m has been used, which is representative of average terrain conditions.

$$v_{10m} = v_{HH} \frac{\ln\left(10m / z_{0ref}\right)}{\ln\left(hub\ height / z_{0ref}\right)} \quad *$$

The calculated apparent sound power levels $L_{WA,k}$ and the associated octave-band spectra are given in Table 1 and Table 2 for two different hub heights. The values are provided as mean levels as a function of v_{10m} for Normal Operation (NO) over cut-in to cut-out wind speed range. The uncertainties for octave sound power levels are generally higher than for total sound power levels. Guidance is given in IEC 61400-11, Annex D.

1.6-100 with LNTE – Normal Operation Octave Spectra									
Standard wind speed at 10 m [m/s]		3	4	5	6	7	8	9	10-Cutout
Hub height wind speed at 80 m [m/s]		4.2	5.6	7.0	8.4	9.7	11.1	12.5	14-Cutout
Frequency (Hz)	31.5	62.5	62.2	66.1	70.1	73.5	73.7	73.6	73.5
	63	72.1	71.9	75.9	80.3	84.0	84.1	84.1	84.0
	125	79.0	79.2	83.8	88.4	91.6	91.8	91.8	91.7
	250	84.0	84.6	89.4	94.7	95.4	95.3	95.4	95.5
	500	85.5	84.9	89.7	95.5	97.1	96.6	96.7	97.0
	1000	83.4	83.0	86.9	91.8	97.1	97.5	97.6	97.8
	2000	81.7	83.4	87.9	92.4	95.7	95.7	95.5	95.1
	4000	74.9	77.7	83.5	88.9	89.7	89.1	88.4	87.9
	8000	55.5	57.6	63.5	70.3	70.4	70.6	69.4	69.1
	16000	7.9	13.2	18.9	24.7	27.2	26.6	27.5	29.0
Total apparent sound power level $L_{WA,k}$ [dB]		90.4	90.7	95.3	100.5	103.0	103.0	103.0	103.0

Table 1: Normal Operation Calculated Apparent Sound Power Level, 1.6-100 with LNTE with 80 m hub height as a function of 10 m wind speed ($z_{0ref} = 0.05$ m), the octave band spectra are for information only

* Simplified from IEC 61400-11, ed. 2.1: 2006 equation 7

REPower MM92 2.05 MW Turbine

Make and Model:	REpower, MM92									
Electrical Rating:	2050 kW									
Hub Height (m):	100 m									
Wind Shear Coefficient:	0.5									
	Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					**Adjusted Emission Level**				
Wind Speed [m/s]	**6**	**7**	**8**	**9**	**10**	**6**	**7**	**8**	**9**	**10**
Frequency [Hz]										
63	109.0	110.5	111.0	110.8	111.8	110.5	110.5	110.5	110.5	110.5
125	107.7	108.4	108.3	107.9	106.6	108.4	108.4	108.4	108.4	108.4
250	106.0	106.5	105.7	105.3	103.4	106.5	106.5	106.5	106.5	106.5
500	102.1	102.9	102.6	102.3	101.5	102.9	102.9	102.9	102.9	102.9
1000	97.1	98.1	98.7	99.0	99.3	98.1	98.1	98.1	98.1	98.1
2000	90.4	91.3	92.2	92.8	95.3	91.3	91.3	91.3	91.3	91.3
4000	82.8	83.8	85.1	86.2	91.7	83.8	83.8	83.8	83.8	83.8
8000	74.2	75.7	78.5	79.5	82.3	75.7	75.7	75.7	75.7	75.7
Overall A-Weighted	103.4	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2	104.2

NEXTera ENERGY	TRANSFORMER SPECIFICATION ADELAIDE COLLECTION STATION DETAIL REQUIREMENTS	Spec. No. Exhibit 1 Rev. No. 0 Date 7/24/12 Page 1 of 3

TRANSFORMER RATINGS

Application: (Wind Farm / Solar) Generator Step-Up (GSU)

Phase	3	Cooling Class	HV Volts (L-L) 121 kV		XV Volts(L-L) 34.5kV		YV Volts		ZV(TV) Volts		Sound Level dBA
Frequency	60										
Cooling medium	Oil	Connection	Wye		Delta						
Phasor Diagram	YND1	ONAN	51	MVA	51	MVA		MVA		MVA	75@
Oil preservation	Conservator /diaphragm	ONAF	68	MVA	68	MVA		MVA		MVA	Top
		ONAF	85	MVA	85	MVA		MVA		MVA	ONAF

ADDITIONAL TAP VOLTAGES

Terminal	Style	Taps or kV	Capacity
HV	MR	± 10 % HV Line Voltage (33 Taps ULTC)	Full Capacity ULTC
XV	N/A	N/A	N/A

PERCENT IMPEDANCE VOLTS

%	Windings	At MVA
8.0	H - X	51 MVA
	H - Y	
	X - Y	

TEMPERATURE RISES	°C	MVA
Winding	≤65	Top ONAF
Metallic Part	≤100	Top ONAF
Metallic Part in contact with paper	≤80	Top ONAF
Top Oil	≤65	Top ONAF

PD = <300 pC
RIV = < 100 uV

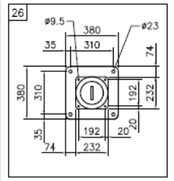
Winding and Bushing Ratings

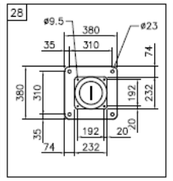
	Winding				Bushing					
Terminal	MVA	Voltage (kV)	BIL (kV)	Ampere (A)	Class (kV)	BIL (kV)	Ampere (A)	Min Strike Dist Ph to Ph	Min Strike Dist Ph to Gnd	Ext. Creep
HV Line	85	121	550		145	650				
HV Neutral			200		36	200				
XV Line	85	34.5	200		36	200				
XV Neutral										
YV Line										
YV Neutral										

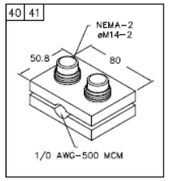
UNUSUAL SERVICE CONDITIONS Yes x No (Check one) – Conform to CSA-C88-M90	
Ambient Temp. in °C (Max, Avg, Min)	38, 20, -30
Elevation/Wind Speed	See Exhibit 2
Seismic Zone Designation (see Appendix H)	See Exhibit 2
Snow/Ice Accumulation (under energized, but no load)	See Exhibit 2
Short-time emergency Overloading (except GSU)	See IEEE C57.91-1995 Table 8
Long-time emergency Overloading (except GSU)	
Abnormal harmonic currents solid-state short circuits	no
Geomagnetically Induced Current (GIC) location	yes
High-current isolated-phase bus duct connection	no
Parallel operation	yes
Neutral grounding resistor	no

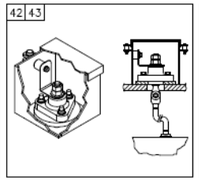
FOUNDATION Specific Details and Measurements	
Foundation Type:	
Distance from Center of Foundation:	
To Segment 1	
To Segment 2	
To Segment 3	
To Segment 4	**LOSS EVALUATION**
No Load losses per kW will be evaluated at	See Appendix F
Load losses per kW will be evaluated at	See Appendix F
Auxiliary losses per kW will be evaluated at	See Appendix F

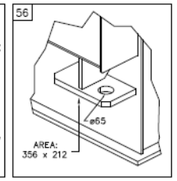
Exhibit 1 **NEXTERA ENERGY Transformer Detailed Requirements**

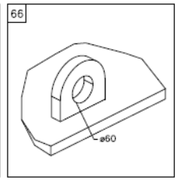


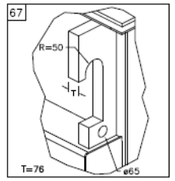


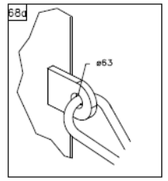


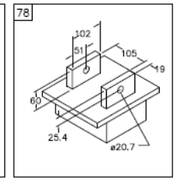


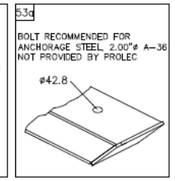












NOTES:

a) ITEMS REMOVED FOR SHIPMENT ARE MARKED WITH (*).

b) NUMBERING IS ACCORDING WITH G.E. PROLEC STD. LIST.

c) THE NUMBER IN COLUMN "GUIDE" CORRESPONDS TO THE "IN-FIELD" ASSEMBLY GUIDE

OPERATION CENTER OF GRAVITY

SHIPPING CENTER OF GRAVITY

TOLERANCES

Centerline distance of cot inclined bushings	±0.25 [±0]
Centerline distance of inclined bushings	±0.50 [±13]
Bushings height (distances to floor)	±0.50 [±13]
Outlet of cabinet support distance	±0.25 [±6]
HV & LV bushings center line	±0.25 [±6]
Bushings & surge arrester center line	±0.50 [±13]
Surge arrester height (distances to floor)	±0.50 [±13]
Center tank distance to short side	±0.50 [±13]
Center tank distance to large side	±0.50 [±13]
Conservator height	±0.50 [±13]
Anchoring central line	±12 [±5]
Bracing base center line	±12 [±5]
Pattern distance	±0.06 [±1.5]
	±10 [±254]
Outline D=118.00 / Dimensions 118.00~197.00 [3000~5002]	±0.50 [±13]
197.00 & Above [5002 & Above]	±2.00 [±51]

GENERAL ELECTRIC CANADA
PO N° 512-03114
GE Req N° TD7-04340
01 BLUEWATER
PROLEC GE Serial N° G2992-01...03

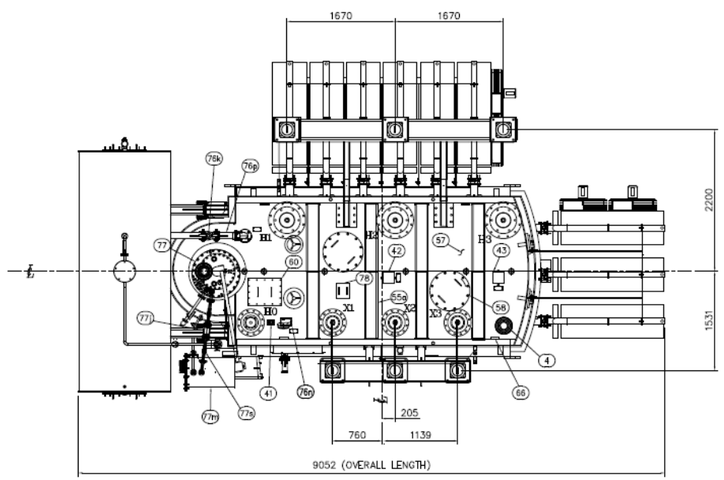
TRANSFORMER
ONAN/ONAF/ONAF, 51/68/85 MVA
60 HZ THREE PHASE, 65°C, 1000 MASL
121/69.86 KV Δ – 34.5 KV ⊲

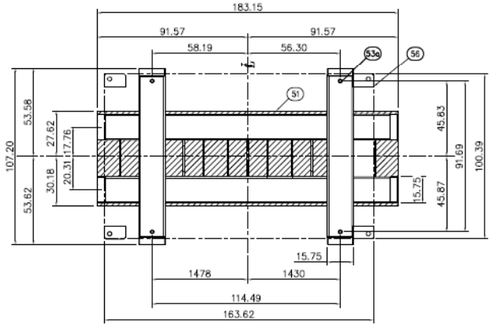
PROLEC

APPROVAL DRAWING
01 / 21 / 2013

DEAR CUSTOMER :
WE WANT TO SERVE YOU BETTER. PLEASE REVIEW THIS DRAWING AND SEND BACK WITH YOUR COMMENTS TO PROLEC-GE IN THE TIMEFRAME OF 10 DAYS AFTER THE DATE MARKED IN THIS STAMP.

APPROXIMATE WEIGHTS (KGS)	
CORE AND COILS	44539
TANK AND FITTINGS	29282
MAIN TANK INSULATING LIQUID (28149 LTS)	25334
COOLING EQUIPMENT INSULATING LIQUID (3011 LTS)	2710
CONSERVATOR TANK INSULATING LIQUID (2003 LTS)	1803
LTC CONSERVATOR TANK INSULATING LIQUID (57 LTS)	51
LTC TANK INSULATING LIQUID (130 LTS)	117
TOTAL WEIGHT	103836
UNTANKING WEIGHT (HEAVIEST PIECE)	29282
SHIPPING WEIGHT (WITHOUT INSULATING LIQUID)	59106

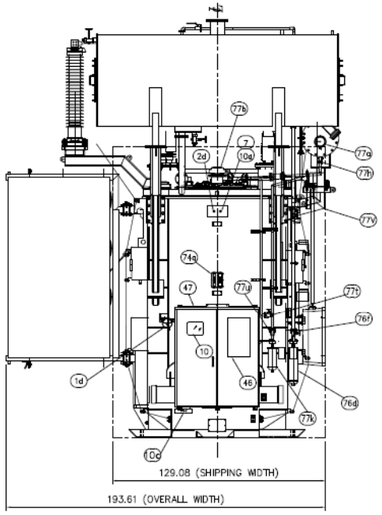


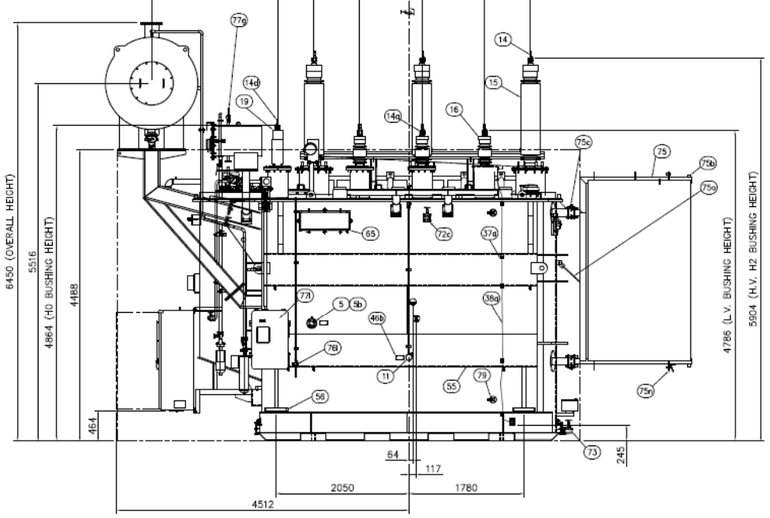


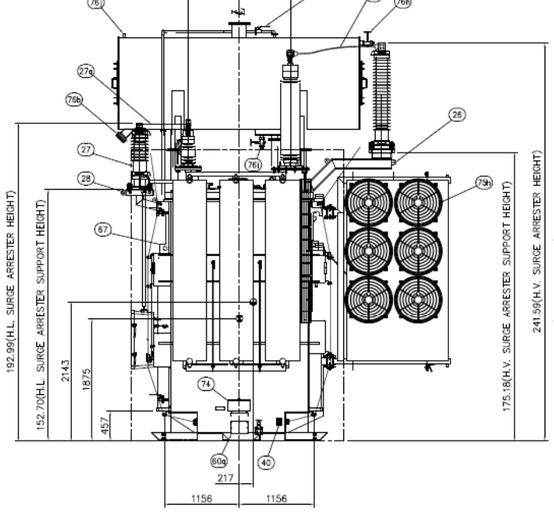
SECTION A – A

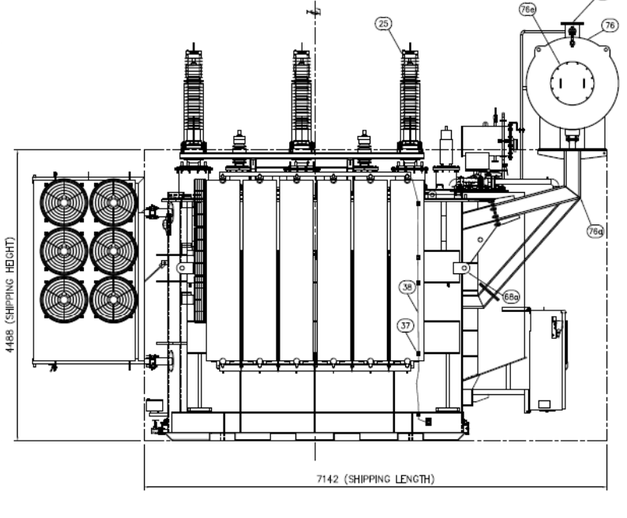
* THE HATCHED AREA REPRESENT THE BOTTOM OF THE TRANSFORMER, THIS AREA IS NOT IN CONTACT WITH FOUNDATION OR PAD

GUIDE		QTY.	ITEM	DESCRIPTION	CAT./MOD.
		1	1d	LIQUID TEMPERATURE INDICATOR (26Ω–1)	QUALITROL, 104–685–03
		1	2d	THERMO–WELL FOR LIQUID TEMPERATURE INDICATOR	
5.4	*	1	4	PRESSURE RELIEF DEVICE WITH SEMAPHORE (63PR–1)	QUALITROL, 208–60F
5.6	*	1	5	RAPID PRESSURE RELAY (OIL) (63PA–1)	QUALITROL, 900–003–02
			5b	RAPID PRESSURE RELAY VALVE (2.00 ø) BALL–TYPE	
		1	7	THERMO–WELL FOR RESISTANCE TEMPERATURE DEVICE FOR ETM (TOP)	
		1	10	ELECTRONIC TEMPERATURE MONITOR (INSIDE CONTROL CABINET)	APT, ECLIPSE–000H
		1	10a	RESISTANCE TEMPERATURE DEVICE FOR ETM (TOP OIL) RTD–1	
		1	10c	RESISTANCE TEMPERATURE DEVICE FOR ETM (AMBIENT) RTD–2	
		1	11	PRESSURE–VACUUM GAUGE FOR SHIPPING	QUALITROL, 050–35E
5.15	*	3	14	H.V. BUSHING EXTERNAL CONNECTOR	BURNDY, FD67C12W
5.15	*	3	14d	LV. BUSHING EXTERNAL CONNECTOR	BURNDY, FD67C12W
5.15	*	1	14d	NEUTRAL BUSHING HO EXTERNAL CONNECTOR	BURNDY, FD67C12W
3.2	*	3	15	H.V. BUSHING	PCORE, P0C850008008S
3.2	*	3	16	L.V. BUSHING	PCORE, B88823–70
3.2	*	1	19	NEUTRAL BUSHING HO	ABB 034Z041ZUT
4.2	*	3	25	H.V. SURGE–ARRESTERS	SIEMENS, 3EQ4 108–2PK31–4NH5
		3	25d	H.V. BUSHING TO SURGE–ARRESTER FLEXIBLE CONNECTOR	
4.1	*	1	26	H.V. SURGE–ARRESTER SUPPORT	
4.2	*	3	27	L.V. SURGE–ARRESTER	SIEMENS 3EQ4 045–2P031–4NH5
		3	27a	L.V. BUSHING TO SURGE–ARRESTER FLEXIBLE CONNECTOR	
4.1	*	1	28	L.V. SURGE–ARRESTER SUPPORT	
	*	1	37	H.V. SURGE–ARRESTERS GROUND CABLE CONNECTOR	
	*	1	37a	L.V. SURGE–ARRESTERS GROUND CABLE CONNECTOR	
	*	1	38	H.V. SURGE–ARRESTERS COPPER GROUND CABLE	
	*	1	38a	L.V. SURGE–ARRESTERS COPPER GROUND CABLE	
		5	40	GROUND PAD	
		1	41	NEUTRAL HO GROUND PAD	
		1	42	CORE GROUND BUSHING TERMINAL BOX (MAIN UNIT)	
		1	43	FRAME GROUND BUSHING BOX	
		1	46	NAMEPLATE	
		1	46b	IDENTIFICATION NAMEPLATE	
		1	47	CONTROL CABINET	
		1	51	REINFORCED BASE WELDED TO TANK	
		4	53a	TRANSFORMER ANCHOR PADS EXTENSIONS	
		5	55	TANK BRACES	
		4	55a	COVER BRACES	
		4	56	JACKING PADS AND PULLING EYES	
		1	57	MAIN COVER	
		2	58	INSPECTION MANHOLE (COVER)	
		1	60	INSPECTION RECTANGULAR MANHOLE (COVER)	
		2	60a	INSPECTION RECTANGULAR MANHOLE (WALL)	
		3	65	CT TERMINAL BOX	
		4	66	LIFTING EYE COVER ONLY	
		4	67	LIFTING HOOK FOR LIFTING COMPLETE UNIT	
		4	68a	SHIPPING LUGS FOR SECURING THE UNIT LONGITUDINALLY (LONG LUGS)	
		1	72c	TOP FILTER PRESS VALVE (50.8 ø) GLOBE–TYPE	
		1	73	MAIN TANK DRAIN VALVE (50.8ø) GLOBE–TYPE WITH SAMPLING DEVICE (9.65) AND PLUG	
		1	74	IMPACT RECORDER FOR SHIPPING	
		1	74a	ELECTRONIC IMPACT RECORDER FOR SHIPPING	
1.3	*	9	75	COOLING RADIATORS	
		18	75b	RADIATOR VENT AND DRAIN PLUG (25.4 ø)	
		18	75c	RADIATOR VALVE BUTTERFLY–TYPE (101.6 ø)	
		12	75h	COOLING FAN	KRENZ, F260–A9712
1.4	*	4	75n	TOP/BOTTOM RADIATOR SUPPORTS	
1.2	*	4	75o	RADIATOR BRACE	
2.3	*	1	76	CONSERVATOR TANK WITH INTERNAL BLADDER	
2.1	*	2	76a	CONSERVATOR TANK SUPPORT	
2.2	*	1	76b	CONSERVATOR MAGNETIC LIQUID LEVEL GAUGE (71Ω–1)	QUALITROL, 042–144–07
		1	76c	HANDHOLE TO INSTALL BLADDER	
5.8	*	1	76d	SILICA–GEL BREATHER WITH PIPE	MESSKO, DB200–RM–T
		2	76e	CONSERVATOR MANHOLE	
5.8	*	1	76f	SILICA–GEL SHUT OFF VALVE (12.7 ø) BALL–TYPE	
		1	76g	CONSERVATOR PRESSURE EQUALIZATION VALVE (25.4 ø) GLOBE–TYPE	
		1	76h	CONSERVATOR FILL VALVE (50.8 ø) GLOBE–TYPE	
		1	76i	CONSERVATOR DRAIN VALVE (50.8 ø) GLOBE–TYPE	
		1	76j	CONSERVATOR TANK NIPPLE FOR VENT WITH CAP	
2.2	*	1	76k	CONSERVATOR TANK TO MAIN TANK VALVE (76.2 ø) BALL–TYPE	
		1	76l	GAS SAMPLING DEVICE	
5.13	*	1	76n	GAS ACCUMULATION DEVICE (63Ω–1)	QUALITROL, 038–002–02
2.4	*	1	76p	EXPANSION JOINT FOR PIPING	
		1	77	ON–LOAD TAP–CHANGER	MR, VMIII550Y–72.5–B183539W
		1	77a	LTC MAGNETIC LIQUID LEVEL GAUGE (71Ω–2)	QUALITROL, 032–088–01 CS32148
5.4	*	1	77b	LTC PRESSURE RELIEF DEVICE (63PR–1)	QUALITROL, 208–60F
		1	77g	LTC TOP FILTER PRESS VALVE (1.00 ø) BALL–TYPE	
		1	77h	LTC DRAIN VALVE (1.00 ø) BALL–TYPE WITH SAMPLING DEVICE (0.38 ø) AND PLUG	
	*	1	77i	LTC PROTECTIVE RELAY (63–2003)	
5.8	*	1	77k	LTC SILICA–GEL BREATHER WITH PIPE (AFDB–1)	MESSKO, DB100RM–HT
		1	77l	LTC MOTOR DRIVE CABINET	
5.7	*	1	77m	LTC CONSERVATOR TANK	
		2	77o	LTC VALVE (1.00 ø) BALL–TYPE	
	*	1	77t	LTC SUCTION VALVE (1.00 ø) GLOBE–TYPE	
5.8	*	1	77u	SILICA–GEL SHUT OFF VALVE (1.00 ø) GLOBE–TYPE	
2.1	*	1	77v	LTC CONSERVATOR TANK SUPPORT	
		1	78	TETHER POLE MOUNTING PLATE	
		2	79	VALVES FOR INSTALLATION OF A KELMAN MINITRANS DGA MONITOR (BALL TYPE)	









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TITLE:
TRANSFORMER'S OUTLINE

DFTM: CTC 01/18/2013
CHKD: CSP 01/18/2013

PROJECTION
SCALE: 1: 45
DIMENSIONS: IN
REVISION: INDICATED
DRAWING NO.: G299201D801
sheet: 1 of 1

REV | DESCRIPTION | DESIGN GROUP | 3

APPENDIX F COORDINATES OF TURBINES

Coordinates of the proposed 38 turbine positions are shown below, though only 37 will be installed in the Adelaide Wind Farm. Coordinates are listed in UTM17-NAD83 projection:

Turbine ID	Easting [m]	Northing [m]
1	441963	4763345
2	441755	4762865
3	442142	4762857
4	442529	4762899
5	444245	4762845
6	445590	4763450
7	445620	4763125
8	445087	4762836
9	445586	4762665
10	445939	4762651
11	446370	4762704
12	446360	4762314
13	437290	4759864
14	437710	4759955
15	438055	4759832
16	438483	4759952
17	438837	4759917
18	439187	4759817
19	438176	4759414
20	438783	4759497
21	439875	4759939
22	440261	4759935
23	440623	4759864
24	442013	4759608
25	442404	4759661
26	444694	4759496
27	445175	4759905
28	445687	4759898
29	446031	4759766
30	438092	4757738
31	438237	4758255
32	438593	4758143
33	440506	4757566
34	440812	4757764
35	441115	4757631
36	441641	4757570
37	442072	4757631
38	444335	4758200
Substation	439495	4765334

Coordinates of turbines used to simulate the Napier Wind Farm Noise Emissions are listed below in UTM17-NAD83 projection, as per the Napier NIA [4]:

Turbine ID	Easting [m]	Northing [m]
N1	440074	4756817
N2	441437	4756769

Appendix C

Appendix C: Spare Transformer Noise Emissions

Purchaser : GENERAL ELECTRIC CANADA
Rating : 102.000/136.000/170.000 MVA

Serial No:G2994-02
Date :03/07/2015

AUDIBLE SOUND LEVEL
MEASUREMENTS (dB)

RATING : **ONAN**
H.V. TAP POSITION : NOM
L. V. TAP POSITION : NOM

TEST VOLTAGE : 34500 V

1. Before test meas.	
Side	**Ambient**
A	65.2
B	66.0
C	65.7
D	66.4

3.- After test meas.	
Side	**Ambient**
A	65.1
B	65.4
C	64.2
D	64.6

4.- Average Ambient
65.0

6.- Average Corrected
68.0

Pos.	2.- Ambient + Transformer meas. 1/3 Height	2/3 Height	5.- Corrected Transformer meas. 1/3 Height	2/3 Height
1	69.2	69.4	67.6	67.8
2	68.3	68.6	66.7	67.0
3	69.4	69.7	67.8	68.1
4	68.6	68.6	67.0	67.0
5	69.4	70.1	67.8	68.5
6	69.2	69.4	67.6	67.8
7	68.1	68.3	66.5	66.7
8	68.6	69.2	67.0	67.6
9	68.9	69.1	67.3	67.5
10	69.7	69.1	68.1	67.5
11	70.1	69.9	68.5	68.3
12	69.2	70.1	67.6	68.5
13	69.1	70.0	67.5	68.4
14	70.2	69.4	68.6	67.8
15	70.1	70.2	68.5	68.6
16	69.4	69.2	67.8	67.6
17	69.3	68.3	67.7	66.7
18	70.1	69.4	68.5	67.8
19	69.4	70.1	67.8	68.5
20	69.2	70.2	67.6	68.6
21	68.7	69.4	67.1	67.8

Guaranteed Level 72 dB

Average transformer sound pressure level at ANSI surface (Lp)	68.0	db(A)
Height of the Transformer tank (H)	4.0	m
Length of the prescribed contour (Pm)	28.5	m
Measurement Surface Area (S)	143	m
Sound Power Level (Lw)	90.0	db(A)

Results : Accepted

COMMENTS :

Test Engineer

Design Engineer

Purchaser : GENERAL ELECTRIC CANADA
Rating : 102.000/136.000/170.000 MVA

Serial No:G2994-02
Date :03/07/2015

AUDIBLE SOUND LEVEL
MEASUREMENTS (dB)

RATING : **ONAN**
H.V. TAP POSITION : NOM
L. V. TAP POSITION : NOM

TEST VOLTAGE : 34500 V

1. Before test meas.	
Side	**Ambient**
A	65.2
B	66.0
C	65.7
D	66.4

3.- After test meas.	
Side	**Ambient**
A	65.1
B	65.4
C	64.2
D	64.6

4.- Average Ambient
65.0

6.- Average Corrected
68.0

Pos.	2.- Ambient + Transformer meas. 1/3 Height	2/3 Height	5.- Corrected Transformer meas. 1/3 Height	2/3 Height
22	68.6	69.1	67.0	67.5
23	70.1	68.1	68.5	66.5
24	69.4	69.2	67.8	67.6
25	70.2	69.3	68.6	67.7
26	69.3	70.1	67.7	68.5
27	69.9	69.2	68.3	67.6
28	70.0	69.4	68.4	67.8
29	70.1	69.2	68.5	67.6

Guaranteed Level 72 dB

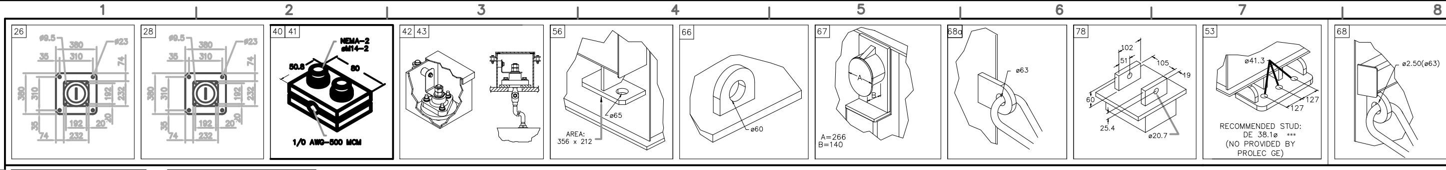
Average transformer sound pressure level at ANSI surface (Lp)	68.0	db(A)
Height of the Transformer tank (H)	4.0	m
Length of the prescribed contour (Pm)	28.5	m
Measurement Surface Area (S)	143	m
Sound Power Level (Lw)	90.0	db(A)

Results : Accepted

COMMENTS :

Test Engineer

Design Engineer



NOTES:

a) ITEMS REMOVED FOR SHIPMENT ARE MARKED WITH (*).

b) NUMBERING IS ACCORDING WITH G.E. PROLEC STD. LIST.

c) THE NUMBER IN COLUMN "GUIDE" CORRESPONDS TO THE "IN-FIELD ASSEMBLY GUIDE".

OPERATION CENTER OF GRAVITY

SHIPPING CENTER OF GRAVITY

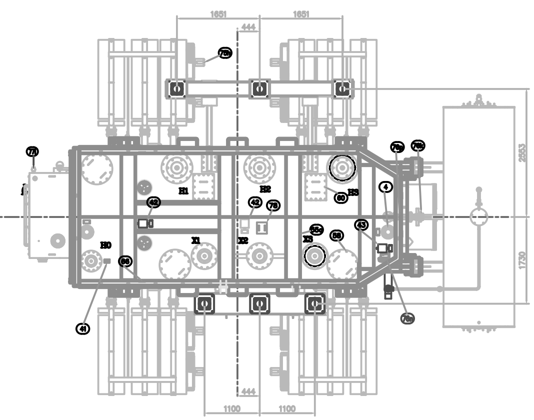
TOLERANCES

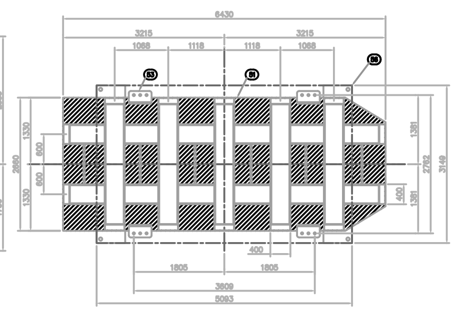
GENERAL ELECTRIC CANADA
P.O. No: 512-03118
GE Req No: TD7-04344
CUSTOMER ID: JERICHO
PROLEC GE Serial No: G2994-01

STEP UP TRANSFORMER
ONAN/ONAF/ONAF
102/136/170 MVA
60 HZ. THREE PHASE, 65°C, 1000 MASL
121/69.86 KV ⅄ – 34.5 KV ◁

PROLEC
APPROVAL DRAWING
FEB/15/2013
DEAR CUSTOMER :
WE WANT TO SERVE YOU BETTER.
PLEASE REVIEW THIS DRAWING AND SEND BACK WITH YOUR COMMENTS TO PROLEC-GE IN THE TIMEFRAME OF 10 DAYS AFTER THE DATE MARKED IN THIS STAMP.

APPROXIMATE WEIGHTS (KGS)	
CORE AND COILS	94780
TANK AND FITTINGS	40330
MAIN TANK INSULATING LIQUID (45730 LTS)	41160
COOLING EQUIPMENT INSULATING LIQUID (4015 LTS)	3615
CONSERVATOR TANK INSULATING LIQUID (2355 LTS)	2120
LTC TANK INSULATING LIQUID (1300 LTS)	1170
TOTAL WEIGHT	183175
UNTANKING WEIGHT (HEAVIEST PIECE)	94780
SHIPPING WEIGHT (WITHOUT INSULATING LIQUID)	116240

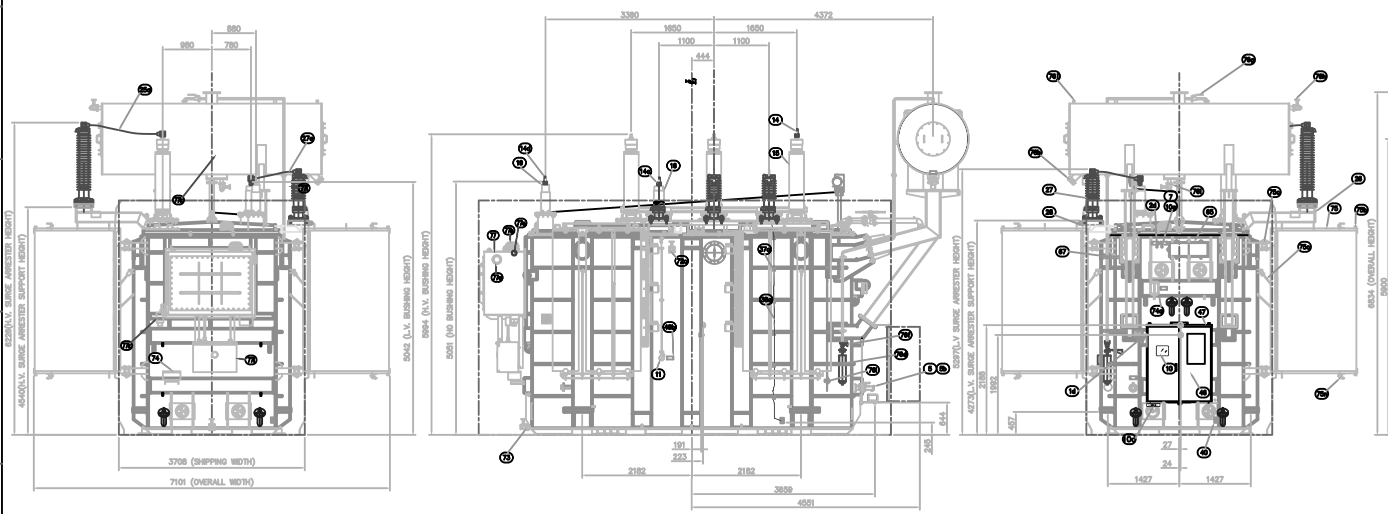




SECTION A - A

* THE HATCHED AREA REPRESENT THE BOTTOM OF THE TRANSFORMER, THIS AREA IS NOT IN CONTACT WITH FOUNDATION OR PAD

GUIDE		QTY.	ITEM	DESCRIPTION	CAT./MOD.
		1	1d	LIQUID TEMPERATURE INDICATOR (26Q-1)	QUALITROL, 104-685-03
		1	2d	THERMO-WELL FOR LIQUID TEMPERATURE INDICATOR	
5.4	*	2	4	PRESSURE RELIEF DEVICE WITH SEMAPHORE (63PR-1,2)	QUALITROL, 208-60F
5.6	*	1	5	RAPID PRESSURE RELAY (OIL) (63FP-1)	QUALITROL, 900-003-02
		1	5b	RAPID PRESSURE RELAY VALVE (2.00 ø) BALL-TYPE	
		1	7	THERMO-WELL FOR RESISTANCE TEMPERATURE DEVICE FOR ETM (TOP)	
		1	10	ELECTRONIC TEMPERATURE MONITOR (INSIDE CONTROL CABINET)	APT, ECLIPSE-000H
		1	10a	RESISTANCE TEMPERATURE DEVICE FOR ETM (TOP OIL) RTD-1	
		1	10c	RESISTANCE TEMPERATURE DEVICE FOR ETM (AMBIENT) RTD-2	
		1	11	PRESSURE-VACUUM GAUGE FOR SHIPPING	QUALITROL, 050-35E
5.15	*	3	14	H.V. BUSHING EXTERNAL CONNECTOR	DELTA, PM60C12-1-4N4-E
5.15	*	3	14a	L.V. BUSHING EXTERNAL CONNECTOR	DELTA, PM60C12-1-422-M1-E
5.15	*	1	14d	NEUTRAL BUSHING H0 EXTERNAL CONNECTOR	BURNDY, FD67C12W
3.2	*	3	15	H.V. BUSHING	PCORE, POC650G1216CMS
3.2	*	3	16	L.V. BUSHING	ABB 034Z3000AS
3.2	*	1	19	NEUTRAL BUSHING H0	ABB 034Z0412UT
4.2	*	3	25	H.V. SURGE-ARRESTERS	SIEMENS, 3EQ4 108-2PK31-4NH5
	*	3	25a	H.V. BUSHING TO SURGE-ARRESTER FLEXIBLE CONNECTOR	
4.1	*	1	26	H.V. SURGE-ARRESTER SUPPORT	
4.2	*	3	27	L.V. SURGE-ARRESTER	SIEMENS 3EQ4 046-2PD31-4NH5
	*	3	27a	L.V. BUSHING TO SURGE-ARRESTER FLEXIBLE CONNECTOR	
4.1	*	1	28	L.V. SURGE-ARRESTER SUPPORT	
	*	5	37	H.V. SURGE-ARRESTERS GROUND CABLE CONNECTOR	
	*	5	37a	L.V. SURGE-ARRESTERS GROUND CABLE CONNECTOR	
	*	1	38	H.V. SURGE-ARRESTERS COPPER GROUND CABLE	
	*	1	38a	L.V. SURGE-ARRESTERS COPPER GROUND CABLE	
		5	40	GROUND PAD	
		1	41	NEUTRAL H0 GROUND PAD	
		1	42	CORE GROUND BUSHING TERMINAL BOX (MAIN UNIT)	
		1	43	FRAME GROUND BUSHING BOX	
		1	46	NAMEPLATE	
		7	46b	IDENTIFICATION NAMEPLATE	
		1	47	CONTROL CABINET	
		1	51	REINFORCED BASE WELDED TO TANK	
		4	53	TRANSFORMER ANCHOR PADS	
		13	55	TANK BRACES	
		4	55a	COVER BRACES	
		4	56	JACKING PADS AND PULLING EYES	
		1	57	MAIN COVER	
		3	58	INSPECTION MANHOLE (COVER)	
		2	60	INSPECTION RECTANGULAR MANHOLE (COVER)	
		3	65	CT TERMINAL BOX	
		4	66	LIFTING EYE COVER ONLY	
		4	67	LIFTING HOOK FOR LIFTING COMPLETE UNIT	
		4	68	SHIPPING LUGS FOR SECURING THE UNIT LONGITUDINALLY (SHORT LUGS)	
		4	68a	SHIPPING LUGS FOR SECURING THE UNIT LONGITUDINALLY (LONG LUGS)	
		1	72c	TOP FILTER PRESS VALVE (50.8 ø) GLOBE-TYPE	
		1	73	MAIN TANK DRAIN VALVE (50.8ø) GLOBE-TYPE WITH SAMPLING DEVICE (9.65) AND PLUG	
		1	74	IMPACT RECORDER FOR SHIPPING	
		1	74a	ELECTRONIC IMPACT RECORDER FOR SHIPPING	
1.3	*	9	75	COOLING RADIATORS	
		18	75b	RADIATOR VENT AND DRAIN PLUG (25.4 ø)	
		18	75c	RADIATOR VALVE BUTTERFLY-TYPE (101.6 ø)	
		24	75h	COOLING FAN	KRENZ, F26-A8678
1.4	*	4	75n	TOP/BOTTOM RADIATOR SUPPORTS	
1.2	*	7	75o	RADIATOR BRACE	
2.3	*	1	76	CONSERVATOR TANK WITH INTERNAL BLADDER	
2.1	*	2	76a	CONSERVATOR TANK SUPPORT	
2.2	*	1	76b	CONSERVATOR MAGNETIC LIQUID LEVEL GAUGE (71Q-1)	QUALITROL, 042-144-07
		1	76c	HANDHOLE TO INSTALL BLADDER	
5.8	*	1	76d	SILICA-GEL BREATHER WITH PIPE	MESSKO, DB200-RM-T
		2	76e	CONSERVATOR MANHOLE	
5.8	*	1	76f	SILICA-GEL SHUT OFF VALVE (12.7 ø) BALL-TYPE	
		1	76g	CONSERVATOR PRESSURE EQUALIZATION VALVE (25.4 ø) GLOBE-TYPE	
		1	76h	CONSERVATOR FILL VALVE (50.8 ø) GLOBE-TYPE	
		1	76i	CONSERVATOR DRAIN VALVE (50.8 ø) GLOBE-TYPE	
		1	76j	CONSERVATOR TANK NIPPLE FOR VENT WITH CAP.	
2.2	*	1	76k	CONSERVATOR TANK TO MAIN TANK VALVE (76.2 ø) BALL-TYPE	
		1	76l	GAS SAMPLING DEVICE	
5.13	*	1	76n	GAS ACCUMULATION DEVICE (63G-1)	QUALITROL, 038-002-02
2.4	*	1	76p	EXPANSION JOINT FOR PIPING	
		1	77	ON-LOAD TAP-CHANGER	MR, RMV-II-1500-72.5
		1	77a	LTC MAGNETIC LIQUID LEVEL GAUGE (71Q-2)	
		1	77b	LTC PRESSURE RELIEF DEVICE (63PR-4)	
		1	77i	LTC DRAIN VALVE (25.4 ø) GATE-TYPE WITH SAMPLING DEVICE (9.65 ø) AND PLUG	
5.8	*	1	77k	LTC SILICA-GEL BREATHER WITH PIPE	
		1	77l	LTC MOTOR DRIVE CABINET	
		1	78	TETHER POLE MOUNTING PLATE	
		2	79	VALVES FOR INSTALLATION OF A KELMAN MINITRANS DGA MONITOR (BALL TYPE)	



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REV | DESCRIPTION | DESIGN GROUP 2

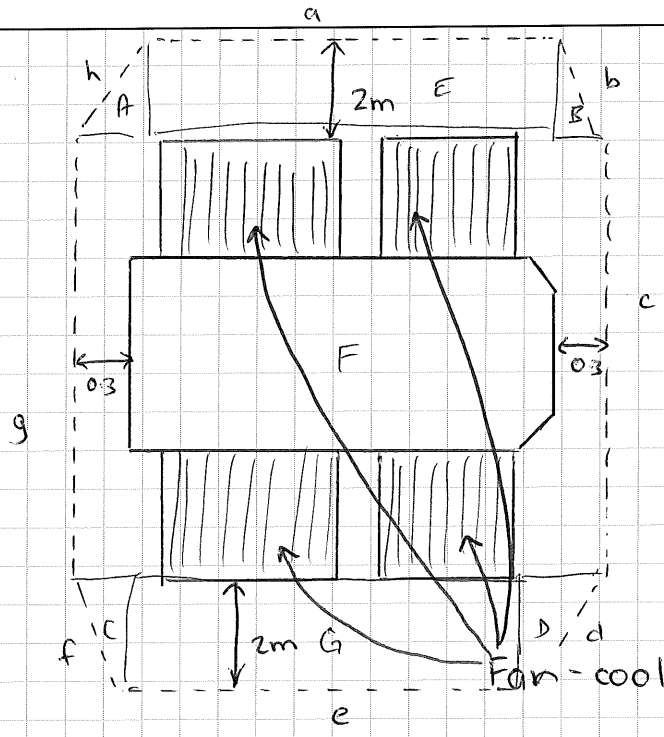
TITLE: TRANSFORMER'S OUTLINE

DFTM: CTC 01/18/2013
CHKD: CSP 01/18/2013

PROJECTION
SCALE: 1:45
DIMENSIONS: MM
REVISION: INDICATED
DRAWING NO.: G299401D801
sheet: 1 of 1

AECOM

JOB TITLE Jericho Wind Energy Centre
JOB NO. 60155032 CALCULATION NO.
ORIGINATOR AD DATE Measurement Area
REVIEWER DATE Genset
SCALE SHEET NO. OF



Perimeter = a + b + c + d + e + f + g + h

e = a = 6.43 m (from drawing)

f = h = d = b = $\sqrt{2^2 + 0.3^2}$ = 2.02m

c = g = 7.10m

∴ Perimeter = 35.14m

Top Area = 4 triangles (A + B + C + D)
+2 Rectangles (E + G)
+1 Rectangle (F)

Area of A = B = C = D = $\frac{1}{2} \times 2 \times 0.3$
= 0.6m²

Area of E = a × 2 = 12.86m² = G
Area of F = [a + (2 × 0.3)] × c
= 49.9m²

∴ Top area = 78.02m²

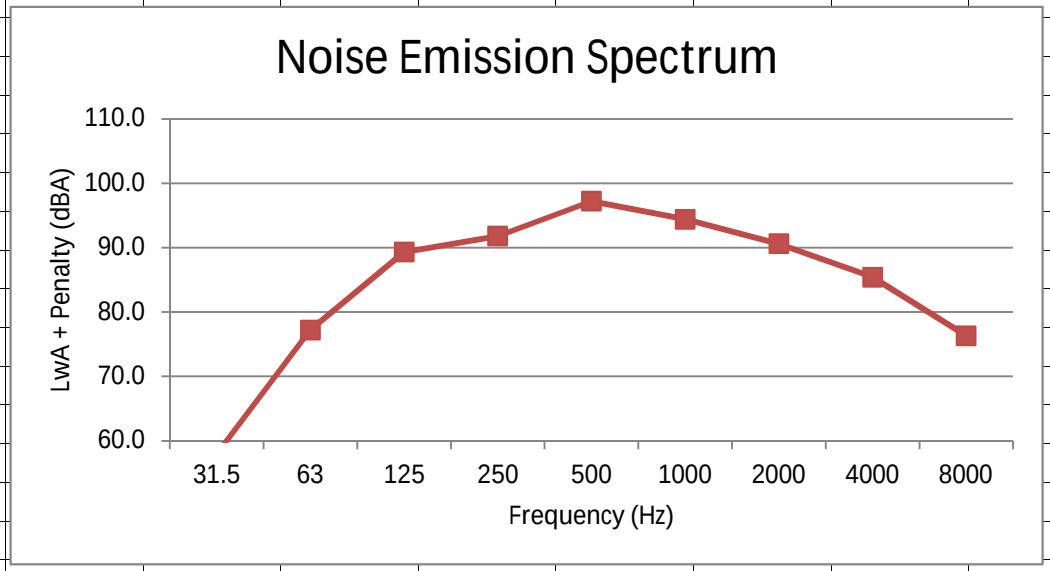
Side area = perimeter × (height + 0.3)
= 35.14 × 4.573 = 160.7m²

∴ Total area = 78.0 + 160.7
Area = 238.7m²

Grid: 5x5 = 1 in

Transformer Noise Emissions

Noise Rating	72.0	dBA
Measurement Dist	0.30	m
Measurement Surface Area	238.7	m^2
Sound Power Level	95.78	dBA
Tonal Penalty	5.0	dB
Sound Power Level	100.8	dBA



Octave Band Emission Estimates

Centre Frequency	Corr[1]	Ncor[2]	Lw	LwA	Tonal Penalty	Lw + Penalty	LwA + Penalty
31.5	-1.0	-2.37	92.4	53.0	5.0	97.4	58.0
63	5.0	-2.37	98.4	72.2	5.0	103.4	77.2
125	7.0	-2.37	100.4	84.3	5.0	105.4	89.3
250	2.0	-2.37	95.4	86.8	5.0	100.4	91.8
500	2.0	-2.37	95.4	92.2	5.0	100.4	97.2
1000	-4.0	-2.37	89.4	89.4	5.0	94.4	94.4
2000	-9.0	-2.37	84.4	85.6	5.0	89.4	90.6
4000	-14.0	-2.37	79.4	80.4	5.0	84.4	85.4
8000	-21.0	-2.37	72.4	71.3	5.0	77.4	76.3
Overall Sound Power Level			104.4	95.78		109.4	100.8

1. Correction from "Engineering Noise Control", David A. Bies and Colin H. Hansen

2. Normalization correction to ensure total sound power after band corrections does not exceed measured overall value