NORTHLAND POWER

McLean's Mountain Wind Farm

October 12, 2017

Mr. Mohsen Keyvani, P.Eng
Director, Renewable Energy Approvals
Ministry of the Environment & Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, ON M4V 1P5

Re: McLean's Mountain Wind Farm - Renewable Energy Approval 7733-8XUNS5 Amendment Application – Condition F1 (3)(c.) Acoustic Audit – Emissions

McLean's Mountain Wind GP Inc. (operating as McLean's Mountain Wind Limited Partnership) owns the McLean's Mountain Wind Farm (MMWF) which is located on Manitoulin Island, near the Town of Little Current. The MMWF is a Class 4 Wind Facility with a total name plate capacity of 60 megawatts and it received its Renewable Energy Approval (REA) permit on October 31, 2012. The REA permit was subsequently amended on May 17, 2013 and on October 25, 2013.

The MMWF consists of a total of 24 GE wind turbines which are de-rated to the following MW ratings: 2 turbines limited to 2.66 MW, 21 turbines limited to 2.49 MW and 1 turbine limited to 2.38 MW.

The REA permit's Condition F1 (3) requires that acoustic emission audits be conducted on each wind turbine type used in the wind farm and the emissions measurements are to be taken in accordance with the IEC 61400-11 standard. Specifically, Condition: F1 (3)(a) requires that one 2.66 MW turbine, F1 (3)(b) requires that two 2.49 MW turbines and F1 (3)(c.) requires that one 2.38 MW turbine be assessed as part of the acoustic audit.

Request: This amendment application is to request the deletion of the Acoustic Audit Condition F1 (3)(c.) requirement from the REA permit.

The rationale for this request is fully detailed in the attached amendment application and can be described as:

- There is only one wind turbine de-rated to 2.38 MW and it is identified as T20
- T20 is located on top of a undulating hill side and is surrounded by trees/forest
- The physical geography of where T20 is situated means that the standard IEC 61400-11 cannot be conformed to, as there is insufficient clearing space to place the sound meters and anemometers. The trees/forest interfere with the collection of the needed acoustic audit data.

It is important to note that we have not received any noise complaints related to the operation of this turbine since the start of the facility.

Should you have any questions about the attached documents or amendment request, please feel free to contact me at 416 662 1437.

Yours truly,

Jim Mulvale
Sr. Director, EH&S
Northland Power

Cc: MOE Sudbury District Manager /Steven Moggy, Sr. Environmental Officer

Attach: Renewable Energy Approval Amendment Application

Ontario Ministry of the Environment and Climate Change

Renewable Energy Approval Application

General Information and Instructions

General Information

Information requested in this form is collected under the authority of the *Environmental Protection Act*, R.S.O. 1990, c. E.19 (EPA) and will be used for the purposes of making decisions in respect of applications for the issue of, or amendment to, a Renewable Energy Approval. The information may also be used in connection with the Ministry's compliance and enforcement activities under the EPA.

For all questions related to preparing or submitting this form or about the Ministry's collection of information related to applying for a Renewable Energy Approval contact: Environmental Approvals Access and Service Integration Branch, 135 St. Clair Ave. W., 1st Floor, Toronto ON M4V 1P5. Telephone outside Toronto 1 800 461-6290 or in Toronto 416 314-8001. E-mail: EAASIBGen@ontario.ca.

Instructions

1. **Applicants are responsible for ensuring that they complete the most recent application form.** Application forms and information about the required supporting documentation and technical requirements are available from the Environmental Approvals Access and Service Integration Branch (the address and phone number are provided in the General Information on this page). As well, you can get this information from your local District Office of the Ministry of the Environment and Climate Change, and in the "Renewable Energy Approvals" section of the Ministry of the Environment and Climate Change website at https://www.ontario.ca/environment-and-energy/renewable-energy-approvals.

2. **Complete Submission**

   In order to be eligible for the issue of a renewable energy approval, a person who proposes to engage in or change a renewable energy project, or alter the terms and conditions of a renewable energy approval shall, before submitting an application to the Director,

   1) prepare the application in a form or format approved by the Director;
   2) obtain or prepare, as the case may be, any documents that,
      a) are required under Part IV of O. Regulation 359/09 (the Regulation) to be submitted as part of the application; or,
      b) are to be submitted as part of the application for the purposes of obtaining an exemption from a provision of Part V of the Regulation; and,
      c) comply with all other requirements of Part IV of the Regulation;
   3) If there is more than one person applying for the issue of a renewable energy approval in respect of a renewable energy project, those persons shall jointly submit one application for the issue of a renewable energy approval;

   New Renewable Energy Approval

   Where a renewable energy approval has not yet been issued, a person who proposes to engage in a renewable energy project shall also
   1) submit, as part of the application, the documents set out in Column 1 of Table 1 of the Regulation, wherever the renewable energy project is described opposite the document in Column 3 of Table 1 of the Regulation; and,
   2) ensure the documents meet the requirements set out opposite the document in Column 2 of Table 1 of the Regulation.

   Amendment to Renewable Energy Approval

   Where a renewable energy approval has been issued, a person making an application in respect of a **proposed change to a renewable energy project or alteration** to the terms and conditions of the renewable energy approval shall, also
   1) obtain or prepare, as the case may be, one or more reports that set out a description of and rationale for the proposed change or alteration, including any proposed change or alteration in respect of the following:
      a) the nameplate capacity of the renewable energy generation facility.
      b) the energy sources to be used to generate electricity at the renewable energy generation facility.
      c) the project location.
      d) the renewable energy generation facility, including any associated or ancillary equipment, systems or technologies.
      e) the activities that will be engaged in as part of the project.
      f) the negative environmental effects that may result from engaging in the project.
      g) the measures to mitigate the negative environmental effects that may result from engaging in the project.

Supporting documents

1) Any document submitted as part of an application for the issue of a new, or amendment of an existing, renewable energy approval shall be in writing, with an electronic copy of the document attached.
2) Any document submitted as part of an application for the issue of a new, or amendment of an existing, renewable energy approval that is a diagram, map or plan shall be drawn to scale and shall include a scale bar and a north arrow.

Payment of the application fee (in Canadian funds) by certified cheque or money order made payable to the Minister of Finance, or credit card payment (for payments up to $10,000) is required with the complete submission of your application.

INCOMPLETE APPLICATIONS WILL BE RETURNED TO THE APPLICANT.

The Ministry may require additional information during the technical review of any application.

3. Two (2) paper copies of the completed application form and the supporting documents required to be submitted as part of the application, one (1) electronic copy and the fee, must be sent to:

Ministry of the Environment and Climate Change
Director, Environmental Approvals Access and Service Integration Branch
135 St. Clair Avenue West, 1st Floor
Toronto ON M4V 1P5

The fee should be mailed or faxed to our office with the application. For the protection of your credit card information, do not submit the fee by email.

4. You must also send one (1) paper copy of the complete application without the fee to any local Ministry District Office having jurisdiction over the project location. To locate the appropriate local Ministry District Office, please visit the Ministry of the Environment and Climate Change Internet site at: https://www.ontario.ca/environment-and-energy/ministry-environment-regional-and-district-offices.

5. Information collected by the Ministry of the Environment and Climate Change is subject to the *Freedom of Information and Protection of Privacy Act* (FIPPA). If you are of the view that any part of your application is confidential on the grounds that such information constitutes a trade secret or scientific, technical, commercial, financial or labour relations information, please make this known now. Otherwise, the Ministry may make the information available to the public without further notice to you.

It is an offence under the EPA to provide false or misleading information in this application and/or accompanying documents.

For Office Use Only			
Reference Number	Payment Received	Date (yyyy/mm/dd)	Initials
	$		

Application Summary

Applicant Name (Legal name of individual or organization as evidenced by legal documents)

McLean's Mountain Wind GP Inc., operating as McLean's Mountain Wind Limited Partnership

Project Name (Project identifier to be used as a reference in correspondence)

McLean's Mountain Wind Farm

Project Description Summary (This summary should reflect the description in the documents upon which consultation has been completed and if it does not, the difference should be highlighted)

The existing REA permit's Condition F1 (3) requires that acoustic emission audits be conducted on each wind turbine type used in the wind farm and that the emissions measurements are to be taken in accordance with the standard IEC 61400-11. Specifically, Condition: F1 (3)(a) requires that one 2.66 MW turbine, F1 (3)(b) requires that two 2.49 MW turbines and F1 (3)(c.) requires that one 2.38 MW turbine be assessed as part of the acoustic audit.

This amendment application is to request the deletion of the Acoustic Audit Condition F1 (3)(c.) requirement from the REA permit, such that an acoustic audit of T20 (2.38 MW wind turbine) is not required.

Supplemental Application Information (Provide any other information that might be relevant to your application)

The MMWF consists of a total of 24 GE wind turbines which are de-rated to the following MW ratings: 2 turbines limited to 2.66 MW, 21 turbines limited to 2.49 MW and 1 turbine limited to 2.38 MW.

The physical geography of where the 2.38 MW wind turbine is situated means that the acoustic audit standard IEC 61400-11 cannot be conformed to, as there is insufficient clearing space to place the sound meters and anemometers. The trees/forest interfere with the collection of the needed acoustic audit data.

Note: This form has been save-enabled; you can save a copy of this form that includes any information you have entered.

Additional instructions and information on how to complete the application form can be found in the accompanying "Guide for Completing the Renewable Energy Approval Application".

Section 1 – Applicant Information

1.1 – Applicant Information (Owner of works/facility)

Applicant Name (Legal name of individual or organization as evidenced by legal documents)	Business Identification Number
McLean's Mountain Wind GP Inc., operating as McLean's Mountain Wind Limited Partr	851176743

Business Name (The name under which the entity is operating or trading, also referred to as trade name) ☑ Same as Applicant Name

Applicant Type

☐ Corporation ☐ Federal Government ☐ Individual ☐ Municipal Government
☑ Partnership ☐ Provincial Government ☐ Sole Proprietor
☐ Other (describe):

North American Industry Classification System (NAICS) Code
221119

Business Activity Description (A description of the business endeavour, this may include products sold, services provided or machinery/equipment used, etc.)
Developer, owner and operator of the McLean's Mountain Wind Farm. Facility is jointly owned by Mnidoo Mnising Power (itself a partnership of 6 local First Nation groups around Manitoulin Island)

1.2 – Applicant Physical Address

Civic Address

Unit Number	Street Number	Street Name (Include type and direction)
12thFl	30	St. Clair Ave. West

City/Town	Province	Postal Code
Toronto	ON – Ontario	M4V 3A1

Survey Address (Not required if the Civic Address is provided)

Lot/Part	Concession/Reference Plan	Municipality/Unorganized Township

County/District	Province/State	Country	Postal Code

Telephone Number (incl. area code) ext.	Fax Number (incl. area code)	Mobile Number (incl. area code)

Email Address

1.3 – Applicant Mailing Address ☑ Same as Applicant Physical Address

Civic Address

Unit Number	Street Number	Street Name (Include type and direction)	PO Box

City/Town/Municipality/Unorganized Township	Province/State

Country	Postal Code

Delivery Designator	Delivery Identifier	Postal Station

1.4 – Statement of Applicant

I, the undersigned hereby declare that, to the best of my knowledge:

- The information contained herein is complete and accurate in every way and I am aware of the penalties against providing false information as per s.184(2) of the *Environmental Protection Act*;
- I understand that by submitting this form, I am guaranteeing the completeness and accuracy of all the information provided on this form and included in the draft reports. Failure to submit the correct information will result in an incomplete application being returned;
- The Project Technical Information Contact identified below is authorized to act on my behalf for the purpose of obtaining approval under section 47.3 of the EPA for the Project identified herein.

Name of Signing Authority (Please print) (Last name, first name)	Title
Mulvale, Jim	Sr. Director EH&S

Telephone Number (incl. area code) ext.	Fax Number (incl. area code)	Mobile Number (incl. area code)
627 288-1273		416 662-1437

Email Address
jim.mulvale@northlandpower.ca

Signature	Date (yyyy/mm/dd)
	2017/10/12

Section 2 – Project Information

2.1 – Application Type

☐ New Renewable Energy Approval

☑ Amendment to existing Renewable Energy Approval
Provide existing Renewable Energy Approval Number
7733-8XUNS5

Application Initiated by

☑ Applicant
☐ Environmental Approvals Branch/Environmental Approvals Access and Service Integration Branch
☐ Provincial Officer Order (attach copy)
☐ Other (describe):

Relevant pre-submission rules subject to/elected (please select one of the following)

Notice of Proposal to Engage **and** if applicable, Notice of First Public Meeting, distributed on or before December 31, 2010.	☐ 2010 Rules ☐ Elect into one or more 2011 Rules ☑ Elect into Current Rules	If "Elect into one or more 2011 Rules", please specify which rules:
Notice of Proposal to Engage **and** Notice of First Public Meeting (or if public meeting not required, drafts of the documents identified in paragraphs 1 and 2 of subsection 18(2) of the Regulation) distributed after December 31, 2010 and on or before July 1, 2012.	☐ 2011 Rules ☑ Elect into Current Rules	
Notice of Proposal to Engage **or** Notice of First Public Meeting distributed after July 1, 2012.	☑ Current Rules	

Current Environmental Compliance Approvals (please attach a separate list if more space is required)

Environmental Compliance Approval Number	Date of Issue (yyyy/mm/dd)
N/A	
Environmental Compliance Approval Number	Date of Issue (yyyy/mm/dd)
Environmental Compliance Approval Number	Date of Issue (yyyy/mm/dd)
Environmental Compliance Approval Number	Date of Issue (yyyy/mm/dd)

Current Permit(s) to Take Water (please attach a separate list if more space is required)

Permit Number	Date of Issue (yyyy/mm/dd)
N/A	
Permit Number	Date of Issue (yyyy/mm/dd)
Permit Number	Date of Issue (yyyy/mm/dd)
Permit Number	Date of Issue (yyyy/mm/dd)

Project Schedule

Estimated date for start of construction/installation (yyyy/mm/dd)	Estimated date for start of operation (yyyy/mm/dd)
ALREADY OPERATING	

2.2 – Statement of Project Technical Information Contact

☑ The Project Technical Information Contact is the same as the Applicant (Identified in Section 1)

I, the undersigned hereby declare that, to the best of my knowledge:

- The information contained herein and the information submitted in support of this application (electronically and in hard copy) is complete and accurate in every way and I am aware of the penalties against providing false information as per s.184(2) of the *Environmental Protection Act.*
- I understand that by submitting this form, I am guaranteeing the completeness and accuracy of this form and the draft documents. Failure to submit the correct information will result in the application being returned as incomplete.
- That the information contained in the electronically submitted application form is the same as the information submitted in the hard copy submission.
- I have used the most recent application form (as obtained from the "Renewable Energy Approvals" section of the Ministry of the Environment and Climate Change website at http://www.ontario.ca/environment-and-energy/renewable-energy-approvals or from the Environmental Approvals Access and Service Integration Branch at 1 800 461-6290).

Name of Project Technical Information Contact (Please print) (Last name, first name)

Jim Mulvale.

Company

Telephone Number (incl. area code) ext.	Fax Number (incl. area code)	Mobile Number (incl. area code)

Email Address

Signature (hard copy submission **MUST** be signed)	Date (yyyy/mm/dd)
Jim Mulvale	2017/10/12.

Address

☑ The Project Technical Information Contact Address is the same as the Applicant (Identified in Section 1)

Unit Number	Street Number	Street Name (Include type and direction)	PO Box

City/Town/Municipality/Unorganized Township	Province/State

Country	Postal Code

Delivery Designator	Delivery Identifier	Postal Station

2.3 – Other Approvals for Facility (Please attach a separate list if more space is required)

☐ A separate list is attached

List all other environmental approvals/permits applied for related to this project or received in relation to this project

Approval Number	Approval Date (yyyy/mm/dd)
N/A	
Approval Number	Approval Date (yyyy/mm/dd)
Approval Number	Approval Date (yyyy/mm/dd)
Approval Number	Approval Date (yyyy/mm/dd)

Ontario Power Authority Reference (i.e. FIT) Number (if applicable)

2.4 – Type of Renewable Energy Generation Facility (Select all that apply)

Wind	☐ Class 2	☐ Class 3	☑ Class 4	☐ Class 5
Other	☐ Biofuel	☐ Biogas	☐ Other (if other please describe):	
Anaerobic Digestion	☐ Class 1	☐ Class 2	☐ Class 3	
Solar Photovoltaic	☐ Class 3			
Thermal Treatment	☐ Class 1	☐ Class 2	☐ Class 3	

2.5 – Generation of Electricity

Total Maximum Name Plate Capacity	Total Expected Generation Capacity
60 MW (1 MW = 1000 kW / 1 kW = 0.001 MW)	60 MW (1 MW = 1000 kW / 1 kW = 0.001 MW)

Days and Hours of Operation

24 / 7 / 365

Section 3 – Site Information

3.1 – Project Location (The site/location where project will be located)

☐ The Project Location is the same as the Applicant's Address (Identified in Section 1)

Civic Address

Unit Number	Street Number	Street Name (Include type and direction)	
	1192	Green Bush Road	
City/Town		Province	Postal Code
Little Current		ON – Ontario	P0P 1K0

Survey Address (Not required if the Civic Address is provided)

Lot/Part	Concession/Reference Plan	Municipality/Unorganized Township	
County/District	Province/State	Country	Postal Code

Non Address Information (where the project spans many locations or a large rural area, specify how the project area relates to the address provided)

The address above is the main local office for the project. The wind turbines are on 24 properties.

Geo Reference (Southwest corner of property)

Map Datum	Zone	Accuracy Estimate
Geo Referencing Method	UTM Easting	UTM Northing

3.2 – Municipal or Local Authority Information (List all municipal or board authorities where the project is located. Attach a separate list if more space is necessary.)

Local Municipality (include each Single Tier or Lower Tier in which the project location is situated) / Unorganized Township

Name of Municipality/Unorganized Township

Northeastern Manitoulin and the Islands

Address

Unit Number	Street Number	Street Name (Include type and direction)	PO Box
	15	Manitowaning Rd	2000
City/Town		Province	Postal Code
Little Current		ON – Ontario	P0P 1K0
Telephone Number (incl. area code) ext.		Fax Number (incl. area code)	Mobile Number (incl. area code)
Email Address			

Clerk

Last Name	First Name	Middle Initial
Moore	Janet	
Telephone Number (incl. area code)	Email Address	
705 368-3500	jmoore@townofnemi.on.ca	

Is the project location situated in one or more Upper Tier Municipality? (i.e., county, regional or district municipality)

☐ Yes ☑ No

Is the project location situated in a Local Roads area?

☐ Yes ☑ No

Is the project location in a Local Service Board area?

☐ Yes ☑ No

3.3 – Site Information (Information about the site/location where project will be located)

Site Name	MOE District Office
McLean's Mountain Wind Farm	Sudbury

Is any portion of the Project location on federally owned land or a reserve?	☐ Yes ☑ No
Is any portion of the Project location on Crown Land?	☐ Yes ☑ No
Is the Project location that is the subject of this application owned by the Applicant? If "no", please attach the owner's name, address and a signed letter granting consent for the installation and operation of the facilities.	☑ Yes ☐ No
Is the Applicant the operating authority of the facility that is the subject of this application? If "no", please attach the operating authority name, address and phone number.	☑ Yes ☐ No
Is the Project location in the area of the Niagara Escarpment Plan?	☐ Yes ☑ No
Is the Project location in the area subject to the Oak Ridges Moraine Conservation Plan?	☐ Yes ☑ No
Is the Project location in the Protected Countryside as shown in Schedule 1 to the Greenbelt Belt Plan?	☐ Yes ☑ No
Is the Project location in the Lake Simcoe Watershed as defined in the *Lake Simcoe Protection Act, 2008*?	☐ Yes ☑ No
Is the Project location in the Central Pickering Development Planning Area as shown in Schedule 1 to the Central Pickering Development Plan?	☐ Yes ☑ No
Has an Archaeological Report (s. 22) been prepared as part of the complete submission?	☐ Yes ☑ No
Has a Heritage Report (s.23) been prepared as part of the complete submission?	☐ Yes ☑ No
Has an Environmental Impact Study Report (s.38, s. 41 or s. 43) been prepared as part of the complete submission?	☐ Yes ☑ No
Has a Water Assessment Report or supplementary reporting on any additional mitigation (s.39, s. 40, s.44 s. 45) been prepared as part of the complete submission?	☐ Yes ☑ No
Does the Project require any authorizations under the *Endangered Species Act, 2007*?	☐ Yes ☑ No
If "yes", have they been obtained from the Ministry of Natural Resources?	☐ Yes ☑ No

Section 4 – Supporting Documents

4.1 – Supporting Documentation and Technical Requirements

This is a list of all supporting information to this application and is subject to the FIPPA and EBR.

Mandatory	Attachment	Attached	Reference	Confidential*
Yes	Proof of Legal Name of Applicant.	☑ Yes ☐ No	Always Mandatory	☐
Yes	A map that identifies the project location.	☑ Yes ☐ No	Always Mandatory	☐
	Name, Address and Phone Number of the Operating Authority.	☑ Yes ☐ No	Mandatory if applicant not operating authority.	☐
	Name, Address and consent of land/site owner for the installation/construction and operation of the facility.	☑ Yes ☐ No	Mandatory if applicant not landowner	☐
Yes	Project Description Report.	☑ Yes ☐ No	Mandatory	☐
Yes	Design and Operations Report.	☑ Yes ☐ No	Mandatory for all but Class 2 Wind Facility.	☐
Yes	Decommissioning Plan Report.	☑ Yes ☐ No	Mandatory for all but Class 2 Wind Facility.	☐
Yes	Construction Plan Report.	☑ Yes ☐ No	Mandatory for all but Class 2 Wind Facility.	☐
Yes	Consultation Report.	☑ Yes ☐ No	Mandatory for all but Class 2 Wind Facility.	☐
	Development Permit under the *Niagara Escarpment Planning and Development Act.*	☐ Yes ☑ No	Mandatory where permit required by NEC.	☐
Yes	A copy of this application has been sent to the Ministry local district office(s).	☑ Yes ☐ No	Always Mandatory	☐
	Report(s) that sets out a description of and rationale for the proposed change or alteration.	☑ Yes ☐ No	Mandatory for Amendment to REA applications.	☐
	Document(s) required under Part IV the Regulation to be submitted as part of the application (list below).	☐ Yes ☑ No		☐
	Document(s) required for the purposes of obtaining an exemption from a provision of Part V of the Regulation (list below).	☐ Yes ☑ No		☐

Other Information Submitted in Support of the Application for the issue of a new, or amendment to an existing, Renewable Energy Approval, including any document that is required under Part IV of the Regulation and/or for the purposes of obtaining an exemption from a provision of Part V of the Regulation.

Title	Reference	Confidential*
All documents submitted with original application		☐
This submission is an administrative change		☐
		☐
		☐
		☐
		☐
		☐
		☐
		☐
		☐
		☐
		☐

Are you attaching an additional list of documents? ☐ Yes ☑ No

If there is not enough space to list all of the attached documents included in this application package, please include an additional listing of these attachments.

***Note:** The collection of personal information in this application is necessary to administer the Ministry's approvals program, which is authorized pursuant to the *Environmental Protection Act*. The personal information collected in this application will be used to administer the program, including for the purposes of the Ministry's compliance and enforcement activities under the aforementioned acts, and for the purposes of making information in respect of the Renewable Energy Approval available to the public with the exception of payment information. Questions about the collection of the information can be directed to a Client Service Representative, Environmental Approvals Access and Service Integration Branch, 135 St. Clair Avenue West, 1st Floor, Toronto Ontario M4V 1P5; Telephone outside Toronto 1 800 461-6290 or in Toronto 416 314-8001 or Fax 416 314-8452.

Ontario

Ministry of the Environment and Climate Change

Renewable Energy Approval Application

Payment Information

For Office Use Only			
Reference Number	Payment Received	Date (yyyy/mm/dd)	Initials
	$		

Note:

1. All fees should be paid in Canadian funds, payable to the Ontario Minister of Finance.
2. Credit card payments are accepted for payments under $10,000 only.
3. This page can only be mailed or faxed to our office with this application. For the protection of your credit card information, do not submit by email.
4. If you are paying by certified cheque or money order, please staple your payment to this page.
5. Do not include this page in the copies of your application that are being provided to the local MOE District Office or the local municipality(s).
6. The information collected in this section of the form is considered confidential and will only be used to process your application fee.

Amount enclosed

$ 300.00

Method of Payment

- ☐ Certified Cheque
- ☐ Money Order
- ☐ Visa
- ☑ MasterCard

Name on Card (please print)

Jim Mulvale - please call 416 662 1437 for billing authorization to credit card

Credit Card Number	Expiry Date (mm/yyyy)

Cardholder Signature	Date (yyyy/mm/dd)
Jim Mulvale	2017/10/12

If paying by certified cheque or money order, please attach it here.

McLean's Mountain Wind Farm - Renewable Energy Approval 7733-8XUNS5
Amendment Application – Condition F1 (3)(c.) Acoustic Audit – Emissions
Support Package – October 12, 2017

Background

McLean's Mountain Wind GP Inc. (operating as McLean's Mountain Wind Limited Partnership) owns the McLean's Mountain Wind Farm (MMWF) which is located on Manitoulin Island, near the Town of Little Current. The MMWF is a Class 4 Wind Facility with a total name plate capacity of 60 megawatts and it received its Renewable Energy Approval (REA) permit on October 31, 2012. The REA permit was subsequently amended on May 17, 2013 and on October 25, 2013.

The MMWF consists of a total of 24 GE wind turbines which are de-rated to the following MW ratings: 2 turbines limited to 2.66 MW, 21 turbines limited to 2.49 MW and 1 turbine limited to 2.38 MW.

The REA permit's Condition F1 (3) requires that acoustic emission audits be conducted on each wind turbine type used in the wind farm and the emissions measurements are to be taken in accordance with the IEC 61400-11 standard. Specifically, Condition: F1 (3)(a) requires that one 2.66 MW turbine, F1 (3)(b) requires that two 2.49 MW turbines and F1 (3)(c.) requires that one 2.38 MW turbine be assessed as part of the acoustic audit.

Amendment Request

This amendment application is to request the deletion of the Acoustic Audit Condition F1 (3)(c.) from the REA permit, such that an acoustic emission audit of T20 (2.38 MW) is not required.

Supporting Information

The rationale for this request is described below and supported by the attachments:

- Tab A – MMWF Site Plan (as built)
- Tab B – Correspondence from Aercoustics (2014, 2017)
- Tab C – Aercoustics' Environmental Noise Impact Assessment Report dated May 3, 2013
- Tab D – MOE&CC Issued REA Permit and Amendments
- Tab E – MOE&CC correspondence related to the MMWF Immission and Emission Audits

As turbine T20 is the only wind turbine de-rated to 2.38 MW, it would need to be assessed to fulfil the requirements of Acoustic Audit Condition F1 (3)(c.). However, T20 is located on top of an undulating hill side and is surrounded by trees/forest and, as such, the physical geography of where T20 is situated means that the standard IEC 61400-11 cannot be conformed to. There is insufficient clearing space to place the sound meters and anemometers and the trees/forest will interfere with the collection of the needed acoustic audit data.

Tab A is the "As built" site plan of the wind farm and T20 is located in the eastern portion of the farm, south of Green Bush Rd, in close proximity to T19. There are few residences near these turbines and it is important to note that we have not received any noise complaints related to the operation of T20 since the start of the facility.

Tab B is correspondence from Aercoustics dated Sept 25, 2017 and May 23, 2014. In their correspondence, Aercoustics notes that the 2.66 MW wind turbine has a noise rating of 104 dBA, the 2.49 MW wind turbine has a noise rating of 103 dBA and the 2.38 MW wind turbine has a noise rating of 102 dBA. Noise emissions audits of the 2.66 and the 2.49 MW wind turbines conducted by Aercoustics confirm that they are in compliance with the design noise specifications. As such, it can be expected that the 2.38 MW wind turbine will likely be in compliance with its design specification, or at the very least, will produce less noise than the 2.49 MW model.

Aercoustics further notes, that as a layer of conservatism, they added 1.5 dBA safety margin (in addition to the 102 dBA for a total of 103.5 dBA) to their calculations during the initial noise impact assessment modelling. Thus, the 2.38 MW wind turbine would meet the initial noise impact assessment modelling design, if it were to be performing acoustically the same as the 2.49 MW wind turbine at 103 dBA.

Tab C is a copy of the initial noise impact assessment report.

Tab D is a copy of the facility's REA permit and the two amendments to it.

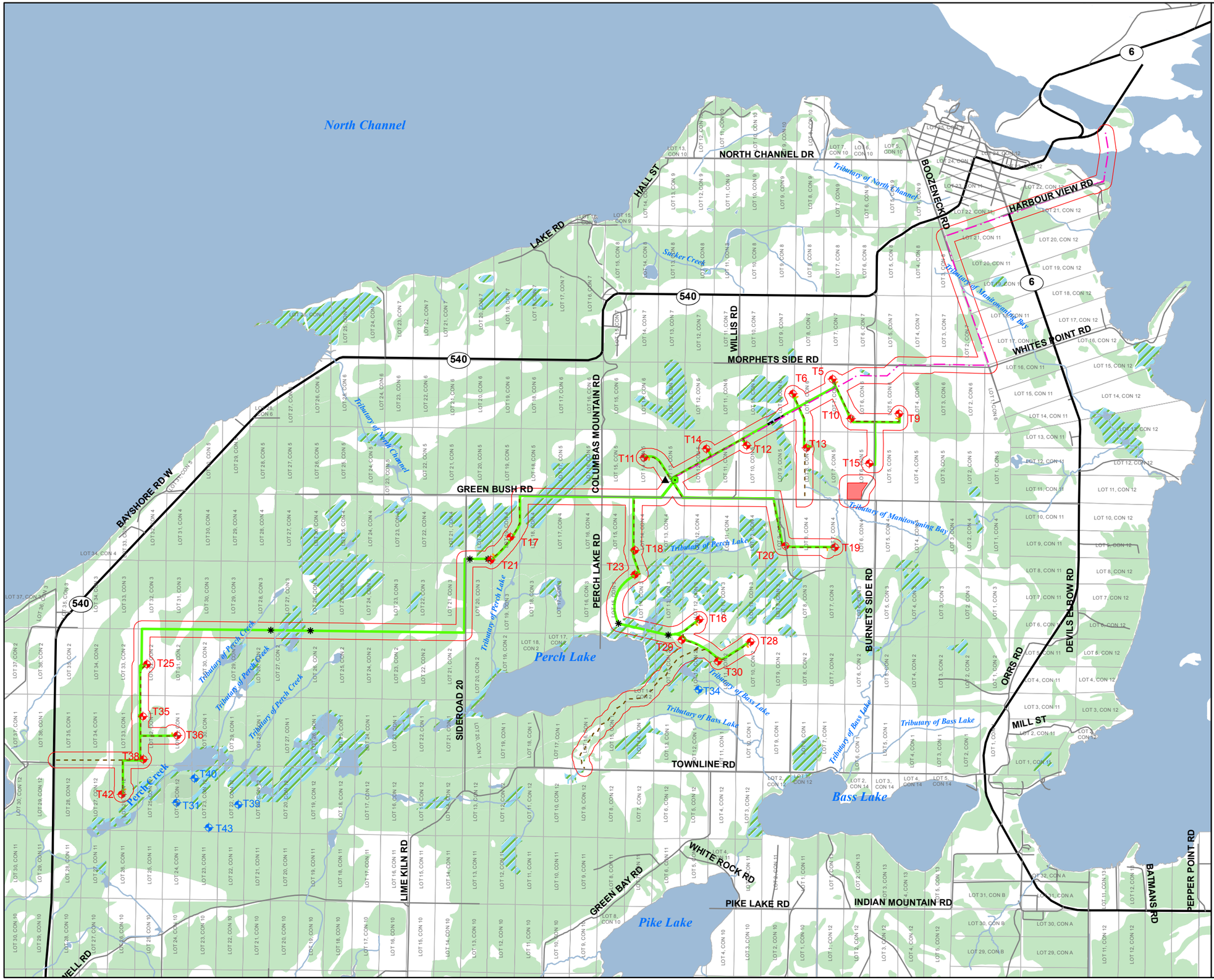
Tab E is correspondence from the MOE&CC dated July 11, 2017 regarding the Immissions and Emissions acoustic audit reports, and follow-up correspondence in September 2017. This amendment application is in response to point 4) in the MOE&CC e-mail dated September 20, 2017.

Summary

Based on the fact that T20 is located on top of an undulating hill side and is surrounded by trees/forest and, as such, the physical geography of where T20 is situated means that the acoustic audit standard IEC 61400-11 cannot be conformed to: this amendment application is to request the deletion of the Acoustic Audit Condition F1 (3)(c.) from the REA permit, such that an acoustic emission audit of T20 (2.38 MW) is not required.

As the Emissions audits for the 2.66 MW and the 2.49 MW wind turbines were favorable and indicate that these two wind turbine models comply with their design specifications, we feel that the testing of the 2.38 MW model can be deleted from the REA permit. There has not been any complaints about this turbine while it has been operating, and there is only one turbine of this model in the entire wind farm.

TAB A



McLean's Mountain Wind Farm
Revised (Proposed) Site Plan

Legend

- Local Roads
- Highway
- Lots/Concessions
- Water Body
- Watercourse
- Woodland
- Unevaluated Wetland

Project Components

- 24 Wind Turbine Locations
- 5 Extra Permitted Sites
- Horizontal Directional Drilling Locations
- Operations Building
- Substation
- Hammerhead
- Access Road
- Feeder Line
- Overhead Feeder Line
- Transmission Line
- Construction Laydown Area
- 120 m Project Location Setback

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DILLON CONSULTING

Created By: SFG
Checked By: DM
Date Created: May 27, 2008
Date Modified: September 4, 2013
File Path: I:\GIS\091983 - Northland Power\2012\Mapping\2013\September 2013 REA Amendments\2013 Project Components.mxd

TAB B

Jim Mulvale

From: Jim Mulvale
Sent: October-06-17 11:34 AM
To: Jim Mulvale
Subject: FW: McLean's Mtn Wind Farm - Follow-up to MOE Noise Audit Letter (E-Audit)
Attachments: 08020.05 - MMWF - IEC Acoustic Audit Measurement Methodology - 2014.05.23.pdf

From: Allan Munro [mailto:AllanM@aercoustics.com]
Sent: September-25-17 1:22 PM
To: Jim Mulvale <jim.mulvale@Northlandpower.ca>
Cc: Payam Ashtiani <PayamA@aercoustics.com>
Subject: RE: McLean's Mtn Wind Farm - Follow-up to MOE Noise Audit Letter (E-Audit)

Hi Jim,

During the kick-off stages of the Mclean's Mountain IEC-61400-11 Acoustic Audit it was identified that conducting the required IEC 61400-11 measurements was going to be an issue and a consultation letter was issued to the MOECC dated May 23, 2014. Please see attached for the consultation letter. As part of the discussion the MOECC indicated that measurements were required to be attempted. We did attempt measurements at T20, please see below for an excerpt from the Emission audit cover letter for language explaining why the IEC methods for conducting the noise assessment at Turbine T20 was not possible.

Numerous and significant challenges were observed while trying to conduct IEC C61400-11 measurements at Turbine 20, due to its location and surroundings:

- *Turbine 20 is located in a heavily forested hilly terrain and the land around the turbine does not have a clearing radius of at least 120m (minimum distance for microphone placement). Aside from the turbine access road, the microphone would have to be placed in the forest.*
- *The only microphone location that would provide some testing feasibility; the turbine access road, is very narrow and limits microphone placement to maintain the required ± 15 degrees of downwind (as per measurement standard)*
- *On the turbine access road, the ambient noise is dominant at a distance of 150m from the turbine. Measurements yielded less than 3 dB difference between Turbine ON and ambient. The standard requires that if the ambient is within 3 dB of the total sound, that the measured interval not be reported.*
- *It was observed that the anemometer height does not clear the tree line (10m height). As such, the ground level wind speed measurements required for ambient noise conditions would be heavily influenced by flow disruptions due to the forest surrounding the sensor.*

Based on Aercoustics measurements it has been determined that it is not feasible to evaluate T20's noise emission.

T20 was de-rated to 2.38MW in order to meet the sound level limits at the closest vacant lot receptors. However, in the original study, there was an allowance for uncertainty in the turbine noise outputs as a safety factor in meeting the limits (1.5dBA) so the worst-case receptor was designed to have a predicted level of <=38.5dBA for nominal sound power of the turbines. This was done to protect Northland in case the turbines were louder than spec but within their guarantee levels.

There is a 1dB difference in the noise emission ratings for the 2.38MW and 2.49MW turbines. The 2.38MW is rated at 102dBA sound power and the 2.49MW turbine is rated at 103dBA sound power. At this juncture, because measurements have been carried out on the 2.49 units, we know that if the noise of the 2.38MW was the same as the 2.49MW turbine the sound level at the closest receptors to Turbine T20 would still be compliant.

Please let me know if you have any further questions.

Regards,
Allan

Allan Munro, B.A.Sc.
AllanM@aercoustics.com
Tel: +1-416-249-3361;300
www.aercoustics.com

aercoustics
engineering limited

Acoustics
Noise
Vibration

23 May 2014

Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

Attn: **Mr. Denton Miller**, Denton.Miller@ontario.ca
Re: McLean's Mountain Wind Farm – IEC-61400-11 Acoustic Audit Methodology Summary

Aercoustics Engineering Limited ("Aercoustics") has been retained by Northland Power Inc. ("Northland") to complete an IEC-61400-11 acoustic audit at McLean's Mountain Wind Farm ("MMWF") as part of condition F "Acoustic Audit – Emission" of the facility's REA. MMWF operates under REA #7744-8XUNS5 (originally issued on October 31, 2012 and as amended on May 17, 2013 and October 25, 2013).

To summarize, Section F1 of the facility REA states that acoustic emission measurements shall be performed on each type of the wind turbine generator used in the Facility, Specifically:

- One (1) wind turbine generator rated at 2.66 MW
- Two (2) wind turbine generators rated at 2.49 MW
- One (1) wind turbine generator rated at 2.38 MW

IEC-61400-11 Measurement Methodology

The site REA lists IEC Standard 61400-11 as the method for conducting noise emissions measurements on all four turbines at MMWF.

At the end of 2012 IEC released a new version of the measurement standard (formally referred to as Edition 3.0) and subsequently in 2013 CAN/CSA directly adopted IEC's version.

As such, Aercoustics intends to conduct noise emission measurements and provide reporting as per the most relevant and applicable standard, IEC-61400-11 Edition 3.0 (directly adopted by CAN/CSA as CAN/CSA-IEC 61400-11:13).

As requested by the MOE in previous correspondence regarding MMWF, Aercoustics will also re-analyze its measurement data as per IEC-61400-11 Edition 2.1 to provide a comparative analysis (to Edition 3.0). This information will be provided as a summary memorandum.

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

Test Turbine Selection

The terrain where MMWF is located is very difficult for IEC-61400-11 compliant measurements, due to the rolling hill topography and the extensive presence of forest. After an extensive review of suitable test locations, the following turbines were selected to be audited:

- Turbine T05 (2.66 MW unit)
- Turbine T15 (2.49 MW unit)
- Turbine T16 (2.49 MW unit)

Although the locations of these 3 turbines (T05, T15, and T16) are considered difficult, Aercoustics believes that the IEC-61400-11 measurements are still feasible and will likely yield acceptable data. That however, is not the case with Turbine T20, the only 2.38 MW unit on site. Aercoustics is requesting that the MMWF noise emission audit be limited to only three (3) units (T05, T15 and T16).

Numerous and significant challenges are anticipated with conducting IEC C61400-11 measurements at Turbine T20, due to its location and surroundings. While data collection is not impossible, the prospect of obtaining good quality data from this site is expected to be poor.

It is our understanding that Turbine T20 is located in a heavily forested hilly terrain, and the land around the turbine will have a clearing radius of approximately 70m. See Figure 1 below. This would mean that for Turbine T20 the measurement location will likely be in the midst of forested areas. This creates a challenge from an instrumentation perspective, as well as a data quality perspective.

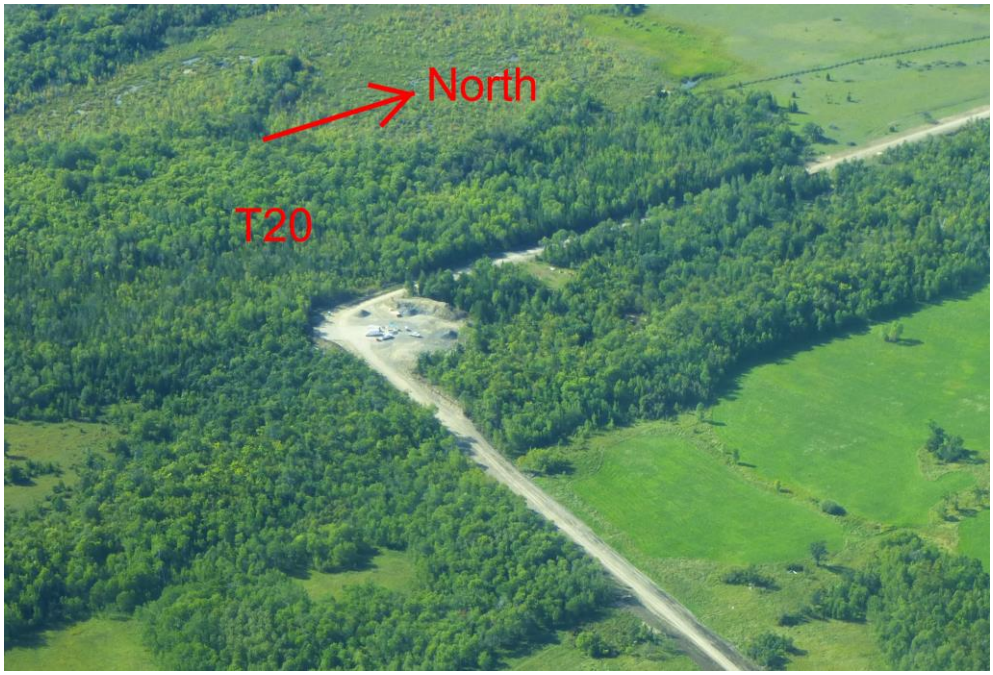


Figure 1 - Turbine 20 Aerial Photo

From an instrumentation perspective, difficulties would be related to setting up the ground board to be flat and level with the ground in a heavily forested area. Additionally the movement of the microphone during the measurements when wind direction may shift could pose similar problems if moving around in a forested area. The added challenge of hilly terrain may also pose safety concerns that would have to be adhered to while setting up or moving equipment.

From a data quality perspective, the ambient noise inside a forested area would be expected to be high during windy periods. The standard requires that if the ambient level is measured to within 6dB of the total sound, that the data be marked in the report indicating lower quality, and that if the ambient is within 3dB of the total sound, that the measured interval not be reported. Thus it may be difficult to ensure that the ambient noise from forested area would be low enough during high wind speeds.

Based on the above discussion, acoustic measurements of wind turbines per the requirements of IEC 61400-11 in a heavily forested hilly terrain are not recommended.

The only exception would be in a situation where the wind direction would allow the microphone to be placed on the access road. Such a situation would have its own set of difficulties:

- Although these locations would provide a lower ambient level compared to within the forested area, it would still not be an ideal location as ambient noise from surrounding trees would still influence the measurements, and could compromise the data quality.
- The limitations on the wind direction would severely limit the amount of time during which valid measurements could be taken. Given that the standard also requires measurements in a multitude of wind speeds to define the entire range of noise emissions, the time required to get the right wind speed conditions and wind direction conditions would likely increase the time required to complete the measurements.
- One also has to keep in mind that the test is only applicable to one turbine at a time – meaning if a measurement campaign has commenced on a candidate turbine while the wind is towards the access road, and the wind direction subsequently shifts out of that range, the only recourse is to wait until the right wind direction happens again. Moving the microphone location would likely be in the forested areas, and succumb to the challenges described earlier.
- A number of the access roads are public. This means that provisions would have to be taken to ensure the equipment is sufficiently out of the main laneways of traffic, and that cables don't get run over by vehicles.

In addition to the placement of the microphone, the placement of the anemometer is also mandated by the standard as being between 1 and 2 rotor diameters away from the turbine center in a crosswind to partially downwind location. This aspect faces the same limitations as the acoustic measurement location in forested and hilly terrain. In addition, if the anemometer height does not clear the tree line (10m height), the ground level wind speed measurements required for ambient noise conditions would be heavily influenced by flow disruptions due to the forest surrounding the sensor. This may further complicate the data integrity.

Closure

We hope this letter provides the MOE a clear indication of our approach and methodology for the selection of the MMWF turbines to be assessed by the IEC-61400-11 acoustic audit. In an effort to ensure a smooth audit process we kindly request the MOE acknowledge acceptance of our approach or provide feedback on any aspect the MOE feels should be addressed differently. We would appreciate a phone call discussion or other feedback from the MOE by Thursday May 29, 2014, in order to allow the audit to be started promptly.

If you have any questions or concerns, please do not hesitate to contact us.

Sincerely,
Aercoustics Engineering Limited

Rob Jozwiak, B.A.Sc., P.Eng.
RobJ@aercoustics.com
416-249-3361 x305

Cc: Paul Kaminski – Northland Power
Jim Mulvale – Northland Power

TAB C

aercoustics
engineering limited

Acoustics
Noise
Vibration

Environmental Noise Impact Assessment

project number: 08020.01

McLean's Mountain Wind Farm

Amendment

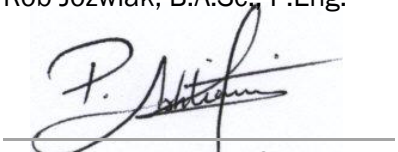
Manitoulin Island, Ontario

Prepared for:

Northland Power Inc.
30 St Clair Ave W,
Toronto, ON M4V 3A1

Prepared by:

Rob Jozwiak, B.A.Sc., P.Eng.



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

3 May 2013

Original report issued: 22 July 2009
Revision issued: 15 August 2012
25 February 2013
9 April 2013

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

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Executive Summary

This updated environmental noise impact assessment for the M1 Wind Project (the "Project), fulfils Northland Power Inc ("NPI") requirements under Ontario Regulation 359/09 of the Renewable Energy Approval (REA) regulation and provides support for an amendment to the facilities REA, number 7733-8XUNS5, issued October 31, 2012.

The purpose of this updated environmental noise impact assessment, prepared for NPI's Project, is to reflect the following changes:

- Revision of turbine models which will be used for the project. Twenty-six (26) turbines are now proposed to be GE 2.49-103 (2.49 MW) units with a maximum sound power level of 103 dBA. Two (2) turbines (T05 and T09) are proposed to be GE 2.66-103 (2.66 MW) units with a maximum sound power level of 104 dBA. Turbine T20 will be a GE-2.38-103 (2.38 MW) unit with a maximum sound power level of 102 dBA. The new models selected generate a lower sound power level then previously used models, providing a reduction in noise impact at the nearest receptors.

- Movement of Turbine T14 to a spot more suitable for construction. The proposed location of the turbine has moved 97 meters to new UTM coordinates N5087822 E424087. The turbine now will now be 844m from R282 (nearest receptor to T14). Previously T14 was 895m away from R282. The change in location has minimal effect on noise emissions observed at R282 (especially considering the reduction in sound power of the turbines surrounding R282).

- Movement of Turbine T23 to a spot located further away from wetlands. The proposed location of the turbine has moved 71 meters to new UTM coordinates N5085949 E423020. The turbine now will now be 632m from R281 (nearest receptor to T23). Previously T23 was 703m away from R281. The change in location has minimal effect on noise emissions observed at R281 (especially considering the reduction in sound power of the turbines surrounding R281).

- Movement of Turbine T30 to a spot more suitable for construction. The proposed location of the turbine has moved 55 meters to new UTM coordinates N5084654 E424258. The turbine now will now be 1156m from V247 (nearest receptor to T30). Previously T30 was 1185m away from R282. The change in location has minimal effect on noise emissions observed at V247 (especially considering the reduction in sound power of the turbines surrounding V247).

- Revision of the main transformer to a 70 MVA unit (previously 66 MVA). The noise emission of the new unit remains essentially unchanged, with a maximum sound power level of 94.6 dBA (previously 94.4 dBA). The values provided include a 5 dB tonal penalty.

Incorporating these changes provides a lower noise impact at all points of reception. This assessment demonstrates, by means of technical assessment, that the noise impact from the operation of the Project will comply with the Ministry of the Environment's ("MOE") environmental noise guidelines for wind turbines.

Building upon the project specific guidelines, noise impact prediction modelling was undertaken. The noise impact from the Project's wind turbine array and transformers and including neighbouring wind turbines operating at maximum rated power on the nearest points of reception was predicted using an acoustic model, ISO 9613, as required by the MOE. The analysis shows that the noise impact from the Project does not exceed the most restrictive noise limits that apply for areas with acoustic designation of Class 3 (Rural) as defined by the MOE. Consequently, there is no need for the application of any additional mitigation measures and no further studies are contemplated for environmental noise in relation to the Project.

List of Tables

List of Figures

Appendices

Glossary

agl	above ground level
C of A (Air)	Certificate of Approval – Air
Northland	Northland Power Inc.
M1	Northland Power McLean's Mountain Wind Farm
dBA	decibel A-weighted
ENIA	Environmental Noise Impact Assessment
EPA	*Environmental Protection Act*
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
kW	kilowatt
kV	kilovolt
LLA	Licence and Option to Lease Agreement
m	metre
m/s	metres per second
MOE	Ontario Ministry of the Environment
MW	Megawatt
PWL	Sound Power Level

1 Introduction

Northland Power Inc. ("NPI") has retained Aercoustics Engineering Limited ("Aercoustics") to update the environmental noise impact assessment ("ENIA") for the proposed 72.44 megawatt ("MW") M1 Manitoulin Island Wind Project ("Project"). The Project is situated near Little Current, in the Municipality of North-eastern Manitoulin and the Islands, Ontario.

The Project has obtained approval under Renewable Energy Approval (REA), number 7733-8XUNS5, which was issued October 31, 2012.

The purpose of this updated environmental noise impact assessment, prepared for NPI's Project, is to reflect the following changes:

- Revision of turbine models which will be used for the project. Twenty-one (21) turbines are now proposed to be GE 2.49-103 (2.49 MW) units with a maximum sound power level of 103 dBA. Two (2) turbines (T05 and T09) are proposed to be GE 2.66-103 (2.66 MW) units with a maximum sound power level of 104 dBA. Turbine T20 will be a GE-2.38-103 (2.38 MW) unit with a maximum sound power level of 102 dBA. The new models selected generate a lower sound power level then previously used, providing a net reduction in noise impact at the nearest receptors.

- Movement of Turbine T14 to a spot more suitable for construction. The proposed location of the turbine has moved 97 meters to new UTM coordinates N5087822 E424087. The turbine now will now be 844m from R282 (nearest receptor to T14). Previously T14 was 895m away from R282. The change in location has minimal effect on noise emissions observed at R282 (especially considering the reduction in sound power of the turbines surrounding R282).

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- Movement of Turbine T30 to a spot more suitable for construction. The proposed location of the turbine has moved 55 meters to new UTM coordinates N5084654 E424258. The turbine now will now be 1156m from V247 (nearest receptor to T30). Previously T30 was 1185m away from R282. The change in location has minimal effect on noise emissions observed at V247 (especially considering the reduction in sound power of the turbines surrounding V247).

- Revision of the main transformer to a 70 MVA unit (previously 66 MVA). The noise emission of the new unit remains essentially unchanged, with a maximum sound power level of 94.6 dBA (previously 94.4 dBA). The values provided include a 5 dB tonal penalty.

This updated environmental noise impact assessment for the M1 Wind Project (the "Project), fulfils Northland Power Inc ("NPI") requirements under Ontario Regulation 359/09 of the REA regulation and provides support for an amendment to the facilities REA. In fulfilling these requirements, the objective of this assessment is to:

Predict the noise impacts from the Project at the nearest points of reception and to demonstrate, by means of technical assessment, that the noise impact from the operation of the Project will comply with the Ministry of the Environment's ("MOE") environmental noise guidelines for wind turbines.

The sound level limits and the noise assessment procedures are defined by the MOE in their October 2008 publication: *"Noise Guidelines for Wind Farms, Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities"* [17]. For continued reference, the MOE Interpretation (Appendix A) was prepared to assist proponents of wind turbine installations in determining what information should be submitted when applying for approval, under REA.

The noise assessment was based on all of the recommended procedures outlined in the MOE's "Noise Guidelines for Wind farms, October 2008" [17].

2 Discussion Of Acoustic Terminology

In order to fully understand the analysis presented in this ENIA, a brief discussion of the technical terms utilized throughout the report is included below.

The noise data presented in this report has been given in terms of sound pressure level. Sound pressure levels are measured in decibels ("dB"). It is common practice to sum sound pressure levels over the entire audible spectrum to give an overall sound pressure level.

The MOE requires that instantaneous sound pressure be processed by a special filter (i.e., A-weighting). As human hearing is less sensitive to low frequency sound, the weighting emphasizes the frequencies in the range 500 Hertz ("Hz") to 4000 Hz; while progressively diminishing the relative contributions at high and low frequencies. This corresponds approximately to the hearing response to humans at normal sound levels (e.g., 50 dB). The resulting "A-weighted" sound level is often used as a criterion to indicate a maximum allowable sound level.

The MOE defines a "point of reception" as any point on the premises of a person within 30 m of a dwelling or camping area, where sound or vibration originating from other than those premises is received. The MOE designates points of reception into three classes:

- Class 1 refers to an acoustical 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 means an area with an acoustic environment that has low ambient sound levels between 19:00 hours and 07:00 hours; where the evening and night-time levels are defined by natural sounds and infrequent human activity and there are no clearly audible sounds from stationary sources (e.g., industrial, commercial, etc,).

- Class 3 refers to areas that are rural and/or small communities with a population of less than 1,000 with an acoustic environment that is dominated by natural sounds and has little or no road traffic during the night-time period.

3 Description Of Wind Turbine Site and Surroundings

The Project is located near Little Current, in the town of North Eastern Manitoulin and the Islands, Ontario. The closest community in the vicinity of the Project is the Town of Little Current. The dominant environmental feature in the vicinity of the Project is the North Channel in Georgian Bay, located north and east of the study area shown in Figure 1.

The wind plant will have a nominal rated nameplate capacity of 72.44 MW and will include one transformer at a substation near Green Bush Rd between McLean's Mountain Rd and Columbas Mountain Rd shown in Figure 2.

Within this agricultural / rural area, the main sources of ambient sound that currently exist include:

1. Vehicular traffic on County and Concession roads.
2. Sounds due to human activity as well as agricultural and rural activities.
3. Sounds due to human domestic activities such as property maintenance and recreation.
4. Natural sounds from wind noise, insects, wildlife, atmospheric effects, etc.

The acoustic classification of the area is generally Class 3 (rural).

3.1 Description of Receptors

Noise receptors have been selected for this analysis based on two criteria: i) their spatial proximity to the Project (i.e., receptors within about 1.5 kilometers of a wind turbine); and ii) level of benefit derived from the Project (e.g., participating or non-participating receptors). In addition, vacant lots have been considered as containing receptors if they are accessible – i.e., if they are adjacent to a road. The location of the receptor within each vacant lot has been chosen to be consistent with the typical building pattern in the area (e.g., close to adjacent roads) or at the centre of the vacant lot as per MOE documentation (see Appendix A). A total of 298 receptor dwellings, 2 of which are participating, and 79 vacant lots, 23 of which are participating, have been included as receptors for this assessment.

All receptors in the study area were provided to Aercoustics by NPI. NPI verified that at the time of the application, there are no hunt camp receptors in the vicinity of any turbines for this project with the exception of R298 (see Appendix C). Each receptor has been assigned a unique identifier for modelling and reporting purposes. Their locations relative to the wind turbines and transformer station are shown in Figure 2. There will be four types of receptors used in this study labelled as shown:

1. RXXX: Existing Non-Participating Receptors
2. VXXX: Non-Participating Vacant Lot Receptors
3. PRXXX: Existing Participating Receptors
4. VPXXX: Participating Vacant Lot Receptors

For the purposes of this ENIA, points of reception have been modelled in a worst case scenario with one point of reception at 4.5m above grade, at the centre of the house, for each receptor. Additionally, although the area has significant areas of thick forested spaces with trees well over 15m high, no forest or tree attenuation was accounted for in this study. This measure is expected to overestimate the noise by up to about 1dB depending on the individual configuration of the turbine/receptors.

3.2 MOE Environmental Noise Limits

The sound limit requirements for a wind turbine or an array of such units, termed a "wind plant", have been established in accordance with the existing MOE publications (NPC-205/232/233) as well as the wind induced background noise level. The specific definition of sound limits, expressed as a function of wind speed and ambient noise levels, as outlined in the MOE Interpretation, includes the following:

3.2.1 Wind Turbine Installations in Class 1 & 2 Areas (Urban): Wind Speeds Below 8m/s

The lowest sound level limit at a Point of Reception in Class 1 and 2 Areas (Urban), under conditions of average wind speed up to 8 m/s (i.e., 29km/h), expressed in terms of the hourly L_{eq} is 45.0 dBA or the minimum hourly background sound level established in accordance with requirements in Publications NPC-205/NPC-233, whichever is higher.

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

The lowest sound level limit at a Point of Reception in Class 3 Areas (Rural), under conditions of average wind speed up to 6 m/s (i.e., 22km/h), expressed in terms of the hourly L_{eq} is 40.0 dBA or the minimum hourly background sound level established in accordance with requirements in Publications NPC-232/NPC-233, whichever is higher.

3.2.3 Wind Turbine Installations in Class 1 & 2 and Class 3 Areas: Wind Speeds Above 8m/s and 6m/s Respectively

The sound level limit at a Point of Reception in Class Areas 1 & 2 (Urban) or in Class 3 Areas (Rural), under conditions of average wind speed above 8 m/s and 6m/s respectively, expressed in terms of the hourly L_{eq}, is the wind induced background sound level, expressed in terms of ninetieth percentile sound level (L_{A90}) plus 7 dB, or the minimum hourly background sound level established in accordance with requirements in Publications NPC-205/NPC-232/NPC-233, whichever is higher. A summary of the above limits is shown in Table 1 for continued reference.

Table 1: MOE Sound Level Limits at Points of Reception for Wind Plants

Wind Speed (m/s)	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s
Wind Turbine Noise Criterion NPC-232 (dBA) Class 3	40.0	40.0	40.0	43.0	45.0	49.0	51.0
Wind Turbine Noise Criterion NPC-205 (dBA) Class 1 & 2	45.0	45.0	45.0	45.0	45.0	49.0	51.0

Notes:

1. The measurement of wind induced background sound level is not required to establish the applicable criterion. The wind induced background sound level reference curve was determined by correlating the ninetieth percentile sound level (L_{A90}) with the average wind speed measured at a particularly quiet site.
2. If the existing minimum hourly background sound level, established in accordance with requirements in Publications NPC-205/NPC-232/NPC-233, is selected as the sound level limit, the measurement of wind speed (for the purpose of determination of wind induced background sound level) is not required. The selected limit applies in the entire range of wind speed under consideration from 4m/s to 11m/s with the exception of wind turbine noise criterion values higher than the existing minimum hourly background sound level.
3. Wind Turbine Noise Criterion at wind speeds expressed as fractional values of m/s should be interpolated from the above table.

The Project sound limits are ultimately a function of several variables:

1. Current ambient levels due to sound levels caused by both natural and human activity (e.g., traffic) sounds.

2. Acoustic classification of the study area (e.g., Class 2 and/or Class 3 as defined by MOE).

3. Wind induced background sound levels.

It should be noted that the ENIA has opted to apply the more conservative Class 3 (Rural) values to all territories within the study area. Table 2 summarizes the sound level limits for Class 3 areas.

Table 2: Sound Level Limits for Class 3 Areas.

Wind Speed (m/s)	4 m/s	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s
Wind Turbine Sound Level Limit (dBA) (Class 3 Area, NPC-232)	40.0	40.0	40.0	43.0	45.0	49.0	51.0

4 Description of Sources

4.1 M1 Transformer Station

NPI plans to build a transformer substation near Green Bush Rd between McLean's Mountain Rd and Columbas Mountain Rd as part of the Project. This substation will contain one transformer unit.

The transformer proposed to be used is a unit rated at 70 MVA (ONAF). The overall dimension of the unit will be a maximum of 6.9m x 5.7m x 6.6m (length x width x height), and specifications are included in Figure 3. The maximum sound power level of this unit has been determined to be 89.6 dBA, based on IEEE standard C57.12.90-2006 [15]. Spectral data for the unit was not available from the manufacturer, as such, spectrum data for the transformer was utilized from Aercoustics database of transformer data and adjusted to for the manufacturers overall sound power level.

Transformer noise is comprised of casing noise emitted from the operating transformer itself and cooling fan noise. Transformer noise has a pronounced audible tonal quality and therefore incurs a 5dB penalty, as per MOE publication NPC-104[7]. The overall sound power level of the transformer, including this penalty, is 94.6 dBA.

The noise contribution from the substation is calculated using the DataKustik CadnaA version 3.7 environmental noise prediction software. The calculations are based on established prediction methods approved by the MOE: ISO 9613-2 standard entitled "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation". For this analysis, the noise contribution from the substation was added to the noise contributions of the wind turbines to assess the total cumulative effect of the Project.

Table 3: Location of transformer

Identifier	UTM Coordinates X (m)	Y (m)	Remarks
Substation	423616	5087363	M1 Windfarm

Table 4: Transformer Sound Spectrum

Source	Sound Power Level (dB), per 1/1 Octave Band Data (Hz)									Total	
	31.5	63	125	250	500	1000	2000	4000	8000	dB	dBA
Substation	86	92	94	90	89	83	79	73	66	98	89.6*

*Note: Presented data does not include 5 dB tonal penalty

4.2 Wind Turbine Generators

This application is to evaluate 29 turbines. It is understood that 24 turbines will be permitted in the first phase, with an additional 5 (identified on Table 8) as intended for future potential turbine locations. In this study the cumulative impact is assessed from all 29 turbines.

The Project will utilize 26 GE model 2.49-103 2.49MW wind turbines, 2 GE model 2.66-103 2.66MW (Turbine T05 and T09), and 1 GE model 2.38-103 2.38MW (Turbine T20). Each of the GE 2.49-103, GE 2.66-103, and GE 2.38-103 turbines has three blades, a 103m rotor diameter, and a hub height of 98.3m.

For the purposes of this study, all turbines will be operating at maximum capacity.

Additional information on the GE 2.49-103, GE 2.66-103, and GE 2.38-103 turbines are provided in Appendix B. Turbine coordinates are listed in Table 8.

4.2.1 Potential Sources of Noise

There are several sources that contribute to the sound emitted by a typical wind turbine. As the rotating blades of the turbine extract power from the air-stream, the blades experience lift and drag forces. These forces generate sound, much in the same manner as a rotating propeller or fan – also known as aerodynamic noise.

Infrasound

Sounds with frequency contents below 20 Hz are referred to as infrasound. There are many other sources of infrasound such as those generated by winds, waterfalls, and the sound of waves breaking on the beach. Measurements at 200 m from typical units have shown that the infrasound levels are well below the level of perceptibility [1], [2]. As noted above, there are no non-participating Points of Reception within 400 m of a wind turbine and thus the potential effect of infrasound is not anticipated.

Amplitude Modulation

Perceptible sounds are generated predominantly by mechanical bearings; the electric generator and a characteristic "swoosh" which is essentially higher frequency broadband noise that is amplitude modulated at a low frequency [3]. In contrast to the first-generation wind turbines, some 30 years ago, innovations in blade geometry, materials, and mechanical systems have significantly lowered the sound power levels of present generation wind turbines. A recent study of wind turbine noise amplitude modulation [3] by the University of Salford, UK found that amplitude modulation occurs between 7% and 15% of the time, but the causes of amplitude modulation are still open to debate therefore the causes are not fully understood and that amplitude modulation cannot be fully predicted by current state of the art. The Salford study concludes that further research is recommended to improve understanding of amplitude modulation. The MOE does not impose a penalty applied to wind turbine noise due to amplitude modulation [17].

Wind Shear Effects

Vertical Wind shear, sometimes referred to as wind shear or wind gradient, is a vertical difference in wind speed and direction over a relatively short distance in the atmosphere. For acoustic purposes, vertical wind shear is used as a measure of the change in wind speed at various vertical heights above ground level. Wind shear has been accounted for in the M1 noise assessment by adjusting the standard neutral stability wind turbine emission to an emission which accounts for the site specific average summer night time wind shear exponent. This approach is consistent with the recommendations of the MOE's Noise Guidelines for Wind Farms [17].

4.2.2 M1 Wind Turbine Noise Emission Rating

GE has provided NPI with noise emission performance for the GE 2.49-103, GE 2.66-103, and GE 2.38-103 wind turbines for wind speeds of 6ms/ to 10m/s at a reference height of 10m (see Appendix B). Table 5, Table 6, and Table 7 list the wind turbine sound power spectrums for GE 2.38MW, 2.49MW, and 2.66MW models respectively, at wind speeds from 6 m/s to 10 m/s. Under normal operation the turbine noise is not considered tonal. Please refer to the datasheets in Appendix B for the reported tonal audibility for the turbine models.

Table 5: GE 2.38-103, Sound Power Spectrums at wind speeds from 6m/s to 10m/s

GE 2.38-103	Electrical Rating: 2.38 MW Hub Height (m): 98.3m Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					Adjusted Emission Levels**				
Wind Speed* (m/s)	6	7	8	9	10-cutout	6	7	8	9	10
Frequency (Hz)										
31.5	116.8	116.8	116.9	116.9	117.2	116.8	116.8	116.8	116.8	116.8
63	113.1	113.4	113.4	113.3	113.5	113.4	113.4	113.4	113.4	113.4
125	107.7	107.9	107.9	107.8	107.7	107.9	107.9	107.9	107.9	107.9
250	102.7	102.0	101.7	101.4	100.3	102.0	102.0	102.0	102.0	102.0
500	97.9	98.0	97.7	97.4	96.1	98.0	98.0	98.0	98.0	98.0
1000	95.4	95.9	96.0	96.2	97.3	95.9	95.9	95.9	95.9	95.9
2000	94.8	94.6	94.9	95.2	95.4	94.6	94.6	94.6	94.6	94.6
4000	89.3	89.0	88.8	88.3	86.7	89.0	89.0	89.0	89.0	89.0
8000	72.3	72.0	71.2	70.5	70.1	72.0	72.0	72.0	72.0	72.0
Total dBA	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**

* At 10m reference height.

** The site specific average summer night time wind shear exponent was provided by AWS Truewind, wind engineering consultants for Northland Power Inc on this project. The noise emission from the turbines providing the worst-case noise impact is used for all the wind speed cases. It should be noted that the overall total sound emission is guaranteed by GE. The spectral data is for modelling purposes only and is not explicitly guaranteed.

Table 6: GE 2.49-103, Sound Power Spectrums at wind speeds from 6m/s to 10m/s

GE 2.49-103	Electrical Rating: 2.49 MW Hub Height (m): 98.3m Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					Adjusted Emission Levels**				
Wind Speed* (m/s)	6	7	8	9	10-cutout	6	7	8	9	10
Frequency (Hz)										
31.5	117.3	117.9	117.9	118.0	118.2	117.9	117.9	117.9	117.9	117.9
63	113.6	114.4	114.4	114.4	114.5	114.4	114.4	114.4	114.4	114.4
125	108.3	108.9	108.9	108.8	108.7	108.9	108.9	108.9	108.9	108.9
250	103.3	103.0	102.7	102.3	101.3	103.0	103.0	103.0	103.0	103.0
500	98.6	99.0	98.7	98.2	97.1	99.0	99.0	99.0	99.0	99.0
1000	95.9	96.9	97.0	97.4	98.3	96.9	96.9	96.9	96.9	96.9
2000	95.2	95.6	95.9	96.2	96.4	95.6	95.6	95.6	95.6	95.6
4000	89.8	90.0	89.8	89.1	87.7	90.0	90.0	90.0	90.0	90.0
8000	73.1	73.0	72.2	71.4	71.1	73.0	73.0	73.0	73.0	73.0
Total dBA	**102.6**	**103.0**	**103.0**	**103.0**	**103.0**	**103.0**	**103.0**	**103.0**	**103.0**	**103.0**

* At 10m reference height.

** The site specific average summer night time wind shear exponent was provided by AWS Truewind, wind engineering consultants for Northland Power Inc on this project. The noise emission from the turbines providing the worst-case noise impact is used for all the wind speed cases. It should be noted that the overall total sound emission is guaranteed by GE. The spectral data is for modelling purposes only and is not explicitly guaranteed.

Table 7: GE 2.66-103, Sound Power Spectrums at wind speeds from 6m/s to 10m/s

GE 2.66-103	Electrical Rating: 2.66 MW Hub Height (m): 98.3m Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					Adjusted Emission Levels**				
Wind Speed* (m/s)	6	7	8	9	10-cutout	6	7	8	9	10
Frequency (Hz)										
31.5	116.9	118.8	118.9	118.9	119.2	118.8	118.8	118.8	118.8	118.8
63	113.2	115.4	115.4	115.3	115.5	115.4	115.4	115.4	115.4	115.4
125	107.9	109.9	109.9	109.8	109.7	109.9	109.9	109.9	109.9	109.9
250	102.8	104.0	103.7	103.4	102.3	104.0	104.0	104.0	104.0	104.0
500	98.0	100.0	99.7	99.4	98.1	100.0	100.0	100.0	100.0	100.0
1000	95.5	97.9	98.0	98.2	99.3	97.9	97.9	97.9	97.9	97.9
2000	94.9	96.6	96.9	97.2	97.4	96.6	96.6	96.6	96.6	96.6
4000	89.4	91.0	90.8	90.3	88.7	91.0	91.0	91.0	91.0	91.0
8000	72.4	74.0	73.2	72.5	72.1	74.0	74.0	74.0	74.0	74.0
Total dBA	**102.1**	**104.0**	**104.0**	**104.0**	**104.0**	**104.0**	**104.0**	**104.0**	**104.0**	**104.0**

* At 10m reference height.

** The site specific average summer night time wind shear exponent was provided by AWS Truewind, wind engineering consultants for Northland Power Inc on this project. The noise emission from the turbines providing the worst-case noise impact is used for all the wind speed cases. It should be noted that the overall total sound emission is guaranteed by GE. The spectral data is for modelling purposes only and is not explicitly guaranteed.

Table 8: Wind Turbine Locations

Identifier	Equipment Make, Model	UTM Coordinates X (m)	UTM Coordinates Y (m)	Remarks
T05	GE 2.66-103 2.66MW	425967	5088867	M1 Windfarm
T06	GE 2.49-103 2.49MW	425374	5088648	M1 Windfarm
T09	GE 2.66-103 2.66MW	426960	5088349	M1 Windfarm
T10	GE 2.49-103 2.49MW	426243	5088273	M1 Windfarm
T11	GE 2.49-103 2.49MW	423155	5087692	M1 Windfarm
T12	GE 2.49-103 2.49MW	424685	5087875	M1 Windfarm
T13	GE 2.49-103 2.49MW	425578	5087836	M1 Windfarm
T14	GE 2.49-103 2.49MW	424087	5087822	M1 Windfarm
T15	GE 2.49-103 2.49MW	426514	5087605	M1 Windfarm
T16	GE 2.49-103 2.49MW	423976	5085277	M1 Windfarm
T17	GE 2.49-103 2.49MW	421160	5086508	M1 Windfarm
T18	GE 2.49-103 2.49MW	423020	5086314	M1 Windfarm
T19	GE 2.49-103 2.49MW	426002	5086354	M1 Windfarm
T20	GE 2.38-103 2.38MW	425263	5086379	M1 Windfarm
T21	GE 2.49-103 2.49MW	420869	5086170	M1 Windfarm
T23	GE 2.49-103 2.49MW	423020	5085949	M1 Windfarm
T25	GE 2.49-103 2.49MW	415729	5084615	M1 Windfarm
T28	GE 2.49-103 2.49MW	424742	5084943	M1 Windfarm
T29	GE 2.49-103 2.49MW	423719	5084978	M1 Windfarm
T30	GE 2.49-103 2.49MW	424258	5084654	M1 Windfarm
T31*	GE 2.49-103 2.49MW	416174	5082550	M1 Windfarm
T34*	GE 2.49-103 2.49MW	423970	5084235	M1 Windfarm
T35	GE 2.49-103 2.49MW	415668	5083842	M1 Windfarm
T36	GE 2.49-103 2.49MW	416181	5083552	M1 Windfarm
T38	GE 2.49-103 2.49MW	415679	5083197	M1 Windfarm
T39*	GE 2.49-103 2.49MW	417095	5082519	M1 Windfarm
T40*	GE 2.49-103 2.49MW	416441	5082915	M1 Windfarm
T42	GE 2.49-103 2.49MW	415354	5082675	M1 Windfarm
T43*	GE 2.49-103 2.49MW	416653	5082179	M1 Windfarm

* future potential turbine locations

4.2.3 Providence Bay Wind Farm

The Providence Bay Wind Farm is an operating 1.6 MW wind farm located near the towns of Providence Bay and Spring Bay, in the Township of Central Manitoulin, Manitoulin Island Ontario. Two Enercon E-48 800 kW wind turbine generators were commissioned and put into operation at Providence Bay on March 25, 2007. The related Providence Bay Expansion Project is in the Advanced-Stage of development.

As the Providence Bay is located more than 10km away from boundary of M1 wind farm, the total noise impact assessment on the M1 wind farm points of reception does not include the noise impact from Providence Bay wind farm

5 Noise Assessment Results

5.1 Transformer Station Impact Assessment

The overall sound power level of the transformer unit, including 5dB tonality penalty, is 94.4 dBA. DataKustik CadnaA environmental noise model generated the worst-case results shown in Table 8. These results include contributions of the wind turbines. As indicated in the table, and applying the conservative application of Class 3 (rural) areas to all Points of Reception, the transformer is expected to meet the applicable noise guidelines. The receptors identified in Table 9 are the worst-case receptors; the first being the closest to the transformer, and the second being the overall worst case receptor for the entire site. Table 9 shows the worst case receptors.

Table 9: Total Noise Impact, 6m/s wind speed

Receptor	Description	Distance to Closest Noise Source (m)	Calculated Sound Level (dBA)	Allowable Level (dBA)
R282	Residence (on Green Bush Road)	528 (to transformer)	37.7	40.0
R288	Residence (on Green Bush Road)	748 (to turbine)	38.4	40.0

5.2 Wind Turbine Impact Assessment

The noise impact at 296 receptor dwellings and 56 vacant lots has been predicted using a formula based on ISO 9613-2 Part 2; consistent with the MOE's modelling requirements. The locations and sound power levels of all the wind turbine sources, the transformer station sources and the location of the receptors were integrated into a master data file.

Noise was predicted based on the following noise modelling protocol:

- Temperature = 10°C
- Humidity = 70%
- G = 0.70 global ground attenuation factor. The area around the transformer has been modelled with ground absorption of 0.1
- Sound Level Limit = 40.0 dBA at 6m/s wind at 10m agl, i.e. precision to 1/10th of decibel

- Turbine noise emission corresponding to the manufacturer's worst case sound power level for each turbine at 10m agl, to account for M1 specific conditions of average summer night time wind shear exponent = 0.435. The spectrum used was that of 7m/s wind bin as it provides the worst case noise propagation condition.

- Analysis to include only turbines within 5km of a receptor for those receptors whose closest turbine is within 1.5km

- Two storey dwelling = 4.5m receptor height at center of dwelling

- Single storey dwelling = 4.5m receptor height at center of dwelling

- Vacant lot = 4.5m receptor height at position described in Section 3.1: Description of Receptors

The highest noise level for each receptor, which represents the worst-case prediction, is outlined in the assessment summary table at the end of this report.

The noise modelling software computes the octave band levels at the receptors from all the sound sources, including the transformer. The resultant A-weighted sound pressure levels are then transferred as a noise contour to the site map that shows both source and receiver locations. Refer to Figure 4 for the noise contour.

Worst-case sound levels have been predicted at all 296 dwellings and 49 vacant lots. A Sample detailed calculation is provided in Appendix D. The worst-case predicted sound levels at all receptors are predicted to be within the MOE environmental noise limits for Class 3 (rural) areas.

5.3 Wind Turbine Summary Tables

The sound power emitted by the wind turbines and transformer station, as well as their location with respect to the receptors determines the sound pressure levels induced by the operation of all Project components. The acoustic power of each wind turbine as provided by the manufacturer is shown in Appendix B.

The total noise impact at each receptor, including all wind turbines and transformer stations, has been summarized in the noise assessment summary table below for all 296 dwellings and 49 vacant lots. The noise impact from the simultaneous operation of all wind turbines and transformers is less than or equal to the sound level limit associated with NPC 232 (i.e., 40.0 dBA).

The closest receptor to a proposed M1 wind turbine is V229, which is located 562m from turbine T17. All other receptors are more than 562m from a turbine. The closest receptor dwelling (non-vacant lot) is R281 which is located 632m from turbine T23.

6 Conclusion

The project site is rural: therefore the MOE's Class 3 (rural) designation applies.

Building upon the project specific sound limit guidelines, noise impact prediction modelling was undertaken. The noise impact on the nearest points of reception was predicted using an acoustic model, ISO 9613, as required by the MOE, based on noise from the Project's wind turbine array, coupled with transformers with transformer tonality penalty.

The noise assessment was based on all of the recommended procedures outlined in the MOE's "Noise Guidelines for Wind farms, October 2008" [17].

The analysis shows that the cumulative noise impact from the Project does not exceed the most restrictive noise limits that apply for areas with an acoustic designation of Class 3 (Rural) as defined by the MOE. Consequently, there is no need for the application of any additional mitigation measures and no further studies are contemplated for environmental noise in relation to the Project.

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aercoustics engineering limited

50 Ronson Dr, Suite 165, Toronto ON
P: 416 249 3361 F: 416 249 9813

Scale: NTS
Drawn: RJ
Eng: PA
Date: Jan 10, 2012

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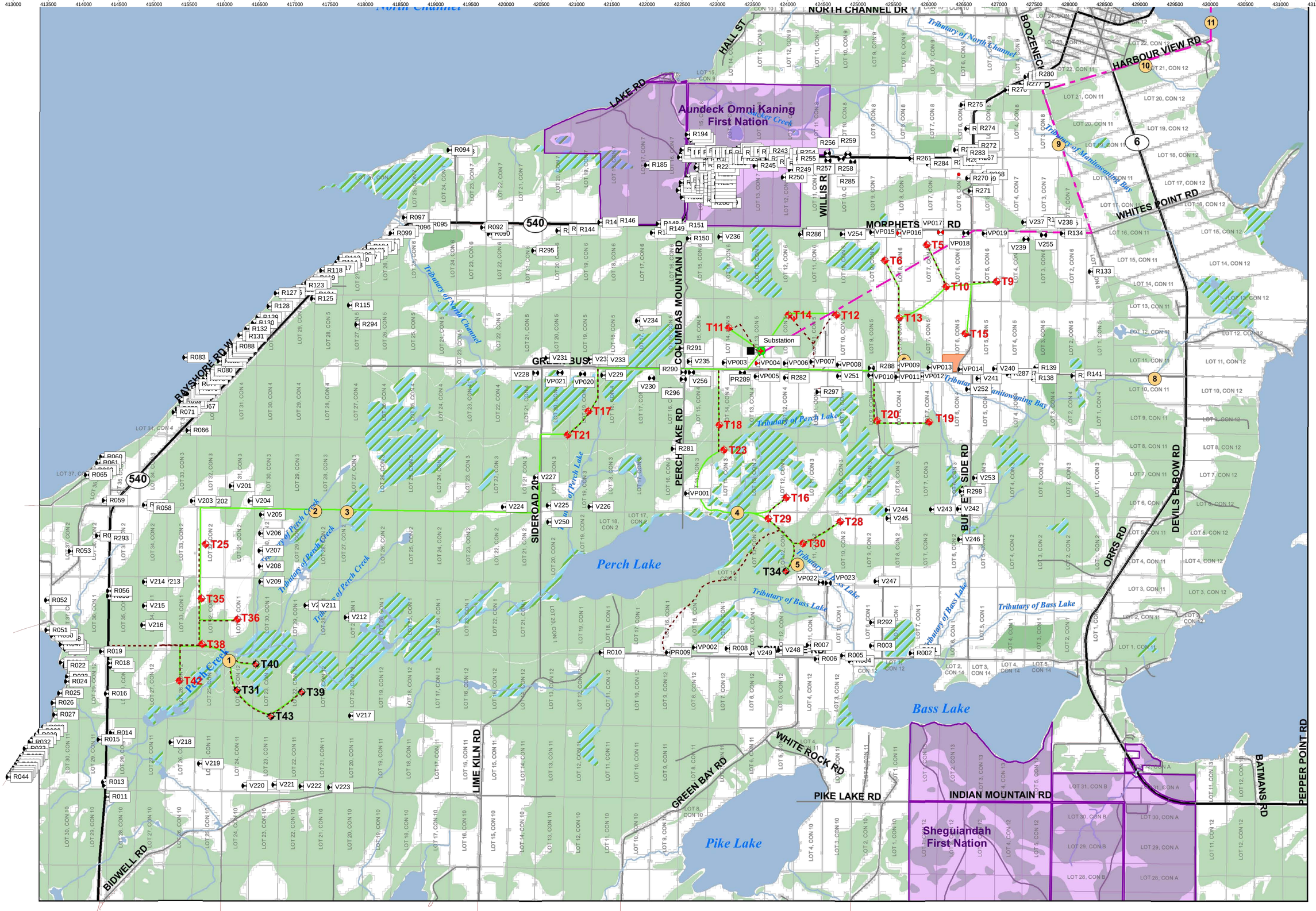
Project Name:
McLean's Mountain Wind Farm

AEL Project Number 08020

Figure Title:
Key Plan

Figure 1



aercoustics engineering limited 50 Ronson Dr, Suite 165, Toronto ON P: 416 249 3361 F: 416 249 9813	Scale: 1:25,000 on A1 Drawn: PA Eng: PA Date: August 2, 2012	Project Name: McLean's Mountain Wind Farm
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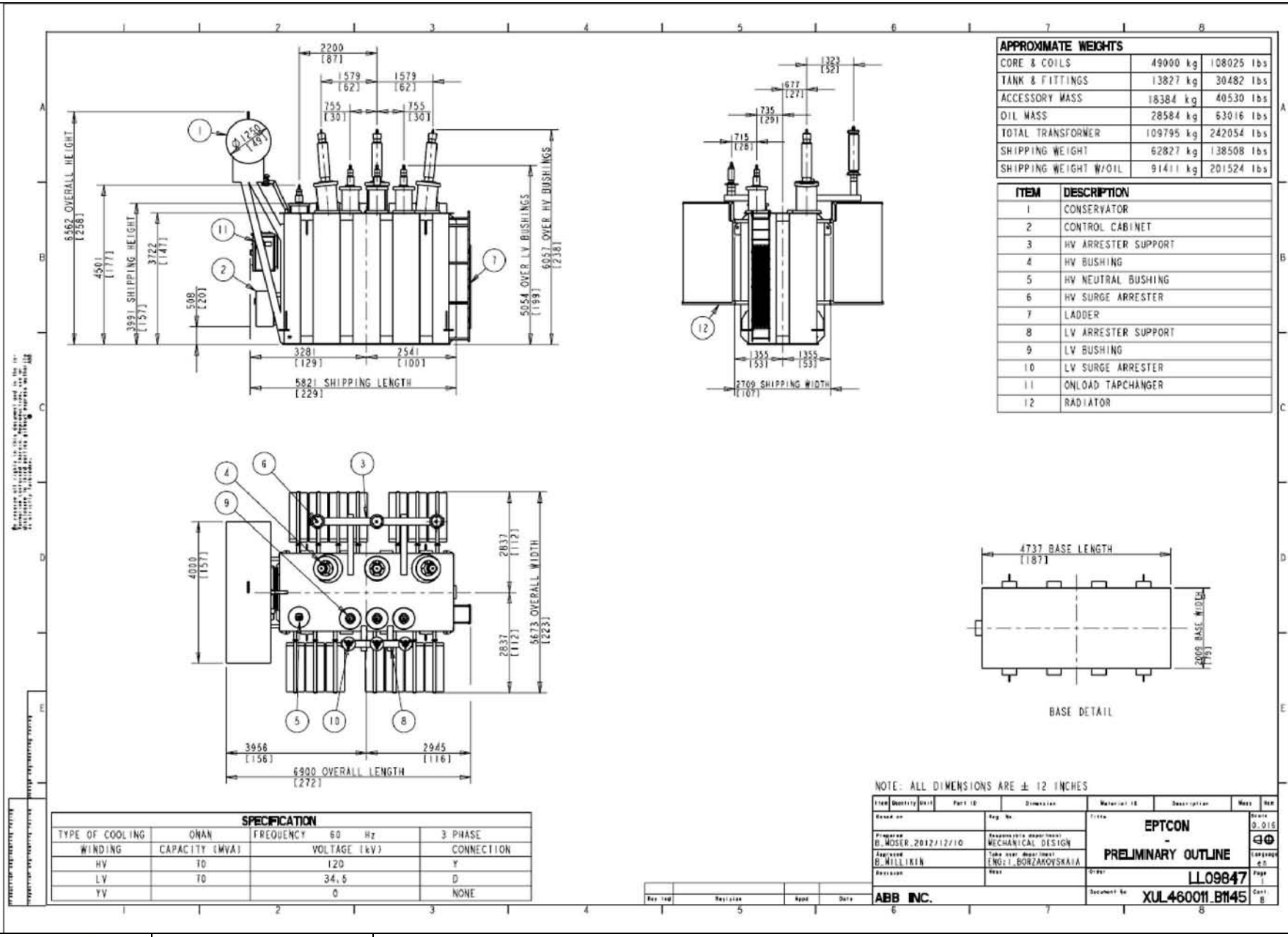
	Figure Title: Turbine, Transformer, and Receptor Layout	Twenty-Six GE-2.49-103 Turbines, Two GE2.66-103 Turbines, and One GE2.38-103 Turbine
		Figure 2



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50 Ronson Dr, Suite 165, Toronto ON
P: 416 249 3361 F: 416 249 9813

Scale: NTS
Drawn: RJ
Eng: PA
Date: Jan 10, 2013

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Project Name:
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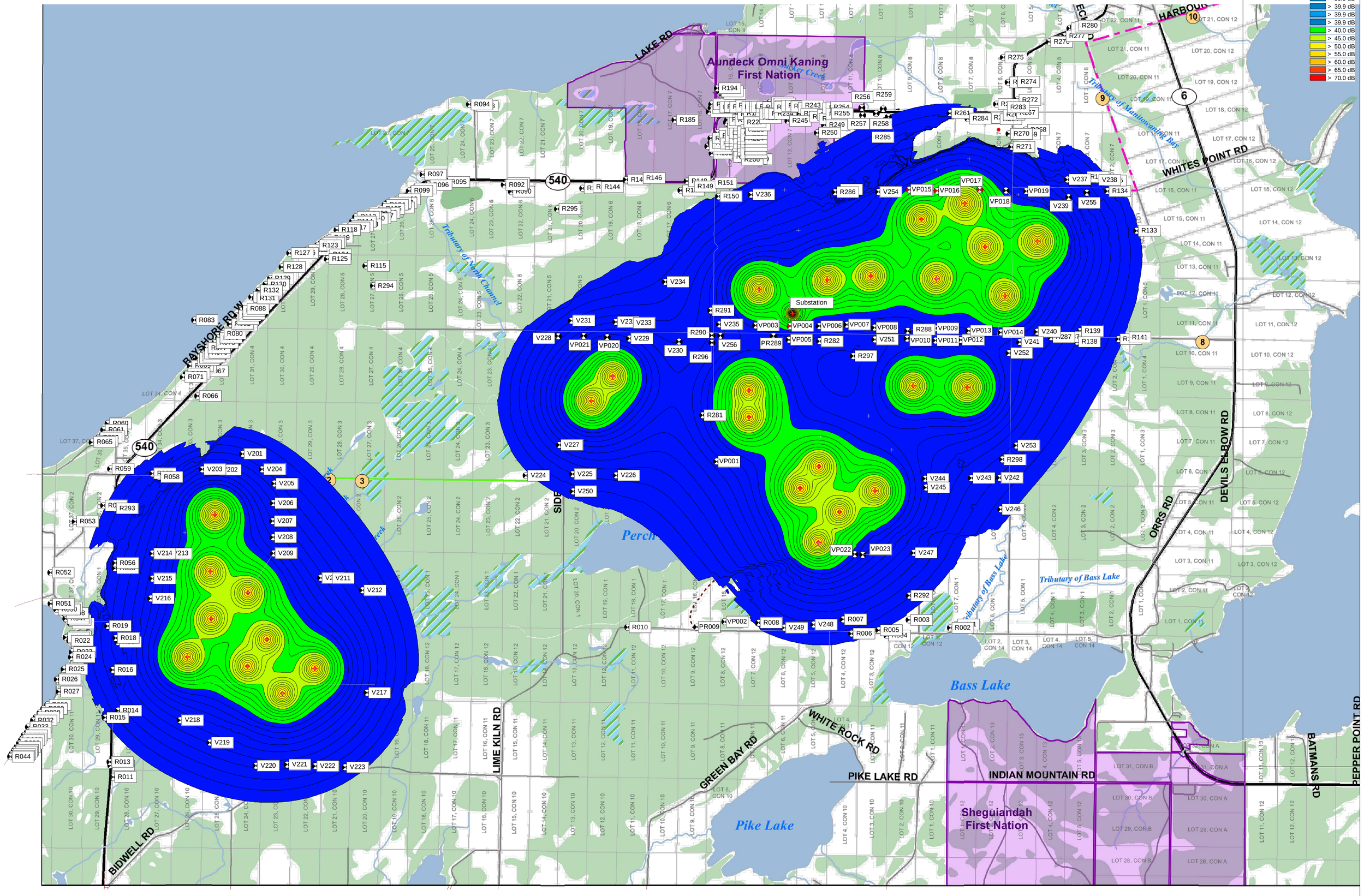
AEL Project Number 08020

Figure Title:
Transformer Drawing

Figure 3



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50 Ronson Dr, Suite 165, Toronto ON
P: 416 249 3361 F: 416 249 9813

Scale: 1:25,000
Drawn: RJ
Eng: PA
Date: Feb 25, 2013

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AEL Project Number 08020

Figure Title:
Noise Contour - 4.5m height

Figure 4

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
PR009	4.5	Residence	422309	5083084	2020	T34	26.7	26.7	26.7	26.7	26.7	40	43	45	49	51	Yes
PR289	4.5	Residence	423357	5087054	669	T11	38.8	38.8	38.8	38.8	38.8	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
R001	4.5	Residence	425848	5083118	2134	T28	27.3	27.3	27.3	27.3	27.3	40	43	45	49	51	Yes
R002	4.5	Residence	425770	5083073	2134	T28	27.4	27.4	27.4	27.4	27.4	40	43	45	49	51	Yes
R003	4.5	Residence	425207	5083180	1623	T34	29.6	29.6	29.6	29.6	29.6	40	43	45	49	51	Yes
R004	4.5	Residence	424906	5082966	1449	T34	29.3	29.3	29.3	29.3	29.3	40	43	45	49	51	Yes
R005	4.5	Residence	424795	5083040	1691	T34	30	30	30	30	30	40	43	45	49	51	Yes
R006	4.5	Residence	424422	5082993	1318	T34	30.6	30.6	30.6	30.6	30.6	40	43	45	49	51	Yes
R007	4.5	Residence	424307	5083188	1097	T34	32.1	32.1	32.1	32.1	32.1	40	43	45	49	51	Yes
R008	4.5	Residence	423155	5083142	1361	T34	30.3	30.3	30.3	30.3	30.3	40	43	45	49	51	Yes
R010	4.5	Residence	421365	5083081	2847	T34	22.9	22.9	22.9	22.9	22.9	40	43	45	49	51	Yes
R011	4.5	Residence	414344	5081036	1925	T42	27.7	27.7	27.7	27.7	27.7	40	43	45	49	51	Yes
R012	4.5	Residence	414311	5081196	1810	T42	28.2	28.2	28.2	28.2	28.2	40	43	45	49	51	Yes
R013	4.5	Residence	414299	5081242	1779	T42	28.3	28.3	28.3	28.3	28.3	40	43	45	49	51	Yes
R014	4.5	Residence	414412	5081942	1194	T42	31.5	31.5	31.5	31.5	31.5	40	43	45	49	51	Yes
R015	4.5	Residence	414235	5081847	1392	T42	30.2	30.2	30.2	30.2	30.2	40	43	45	49	51	Yes
R016	4.5	Residence	414339	5082499	1030	T42	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	Yes
R017	4.5	Residence	414409	5082880	967	T42	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	Yes
R018	4.5	Residence	414380	5082933	1008	T42	33.4	33.4	33.4	33.4	33.4	40	43	45	49	51	Yes
R019	4.5	Residence	414270	5083098	1164	T42	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	Yes
R020	4.5	Residence	413725	5082956	1653	T42	28.5	28.5	28.5	28.5	28.5	40	43	45	49	51	Yes
R021	4.5	Residence	413701	5082942	1674	T42	28.3	28.3	28.3	28.3	28.3	40	43	45	49	51	Yes
R022	4.5	Residence	413750	5082896	1619	T42	25.9	25.9	25.9	25.9	25.9	40	43	45	49	51	Yes
R023	4.5	Residence	413784	5082742	1571	T42	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R024	4.5	Residence	413775	5082673	1579	T42	24.2	24.2	24.2	24.2	24.2	40	43	45	49	51	Yes
R025	4.5	Residence	413675	5082506	1687	T42	23.5	23.5	23.5	23.5	23.5	40	43	45	49	51	Yes
R026	4.5	Residence	413581	5082369	1799	T42	25.5	25.5	25.5	25.5	25.5	40	43	45	49	51	Yes
R027	4.5	Residence	413606	5082202	1811	T42	22.7	22.7	22.7	22.7	22.7	40	43	45	49	51	Yes
R028	4.5	Residence	413448	5082021	2015	T42	23.2	23.2	23.2	23.2	23.2	40	43	45	49	51	Yes
R029	4.5	Residence	413396	5081968	2082	T42	22.9	22.9	22.9	22.9	22.9	40	43	45	49	51	Yes
R030	4.5	Residence	413345	5081912	2149	T42	23.6	23.6	23.6	23.6	23.6	40	43	45	49	51	Yes
R031	4.5	Residence	413290	5081850	2223	T42	22.3	22.3	22.3	22.3	22.3	40	43	45	49	51	Yes
R032	4.5	Residence	413255	5081810	2270	T42	22.1	22.1	22.1	22.1	22.1	40	43	45	49	51	Yes
R033	4.5	Residence	413185	5081718	2371	T42	21.8	21.8	21.8	21.8	21.8	40	43	45	49	51	Yes
R034	4.5	Residence	413172	5081643	2414	T42	20.7	20.7	20.7	20.7	20.7	40	43	45	49	51	Yes
R035	4.5	Residence	413128	5081605	2470	T42	20.5	20.5	20.5	20.5	20.5	40	43	45	49	51	Yes
R036	4.5	Residence	413108	5081561	2507	T42	20.4	20.4	20.4	20.4	20.4	40	43	45	49	51	Yes
R037	4.5	Residence	413089	5081537	2535	T42	20.3	20.3	20.3	20.3	20.3	40	43	45	49	51	Yes
R038	4.5	Residence	413062	5081495	2578	T42	20.1	20.1	20.1	20.1	20.1	40	43	45	49	51	Yes
R039	4.5	Residence	413030	5081446	2629	T42	20	20	20	20	20	40	43	45	49	51	Yes
R040	4.5	Residence	413002	5081405	2673	T42	19.8	19.8	19.8	19.8	19.8	40	43	45	49	51	Yes
R041	4.5	Residence	412988	5081382	2696	T42	19.7	19.7	19.7	19.7	19.7	40	43	45	49	51	Yes
R042	4.5	Residence	412964	5081349	2733	T42	19.6	19.6	19.6	19.6	19.6	40	43	45	49	51	Yes
R043	4.5	Residence	412949	5081327	2757	T42	19.5	19.5	19.5	19.5	19.5	40	43	45	49	51	Yes
R044	4.5	Residence	412942	5081315	2769	T42	19.5	19.5	19.5	19.5	19.5	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
R045	4.5	Residence	413762	5083132	1656	T42	28.4	28.4	28.4	28.4	28.4	40	43	45	49	51	Yes
R046	4.5	Residence	413720	5083178	1710	T42	28.5	28.5	28.5	28.5	28.5	40	43	45	49	51	Yes
R047	4.5	Residence	413696	5083199	1739	T42	28.4	28.4	28.4	28.4	28.4	40	43	45	49	51	Yes
R048	4.5	Residence	413683	5083273	1775	T42	28.6	28.6	28.6	28.6	28.6	40	43	45	49	51	Yes
R049	4.5	Residence	413601	5083352	1879	T42	28.5	28.5	28.5	28.5	28.5	40	43	45	49	51	Yes
R050	4.5	Residence	413574	5083324	1895	T42	28.4	28.4	28.4	28.4	28.4	40	43	45	49	51	Yes
R051	4.5	Residence	413495	5083401	1996	T42	28.2	28.2	28.2	28.2	28.2	40	43	45	49	51	Yes
R052	4.5	Residence	413491	5083827	2177	T35	27.9	27.9	27.9	27.9	27.9	40	43	45	49	51	Yes
R053	4.5	Residence	413825	5084524	1906	T25	28.5	28.5	28.5	28.5	28.5	40	43	45	49	51	Yes
R054	4.5	Residence	414213	5084742	1521	T25	29.8	29.8	29.8	29.8	29.8	40	43	45	49	51	Yes
R055	4.5	Residence	414370	5083886	1299	T35	32.5	32.5	32.5	32.5	32.5	40	43	45	49	51	Yes
R056	4.5	Residence	414371	5083958	1302	T35	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	Yes
R057	4.5	Residence	414879	5085178	1020	T25	31.3	31.3	31.3	31.3	31.3	40	43	45	49	51	Yes
R058	4.5	Residence	414972	5085133	917	T25	31.8	31.8	31.8	31.8	31.8	40	43	45	49	51	Yes
R059	4.5	Residence	414307	5085243	1554	T25	28.8	28.8	28.8	28.8	28.8	40	43	45	49	51	Yes
R060	4.5	Residence	414272	5085861	1917	T25	26.4	26.4	26.4	26.4	26.4	40	43	45	49	51	Yes
R061	4.5	Residence	414215	5085774	1907	T25	26.5	26.5	26.5	26.5	26.5	40	43	45	49	51	Yes
R062	4.5	Residence	414183	5085687	1881	T25	26.7	26.7	26.7	26.7	26.7	40	43	45	49	51	Yes
R063	4.5	Residence	414143	5085669	1904	T25	26.7	26.7	26.7	26.7	26.7	40	43	45	49	51	Yes
R064	4.5	Residence	414087	5085618	1924	T25	26.6	26.6	26.6	26.6	26.6	40	43	45	49	51	Yes
R065	4.5	Residence	414056	5085605	1944	T25	25.7	25.7	25.7	25.7	25.7	40	43	45	49	51	Yes
R066	4.5	Residence	415497	5086237	1639	T25	25.2	25.2	25.2	25.2	25.2	40	43	45	49	51	Yes
R067	4.5	Residence	415594	5086574	1964	T25	23.4	23.4	23.4	23.4	23.4	40	43	45	49	51	Yes
R068	4.5	Residence	415432	5086625	2032	T25	23	23	23	23	23	40	43	45	49	51	Yes
R069	4.5	Residence	415396	5086649	2061	T25	22.9	22.9	22.9	22.9	22.9	40	43	45	49	51	Yes
R070	4.5	Residence	415344	5086540	1963	T25	23.4	23.4	23.4	23.4	23.4	40	43	45	49	51	Yes
R071	4.5	Residence	415301	5086495	1928	T25	24.3	24.3	24.3	24.3	24.3	40	43	45	49	51	Yes
R072	4.5	Residence	415476	5086730	2130	T25	22.5	22.5	22.5	22.5	22.5	40	43	45	49	51	Yes
R073	4.5	Residence	415503	5086756	2153	T25	22.4	22.4	22.4	22.4	22.4	40	43	45	49	51	Yes
R074	4.5	Residence	415549	5086772	2164	T25	22.4	22.4	22.4	22.4	22.4	40	43	45	49	51	Yes
R075	4.5	Residence	415571	5086817	2208	T25	22.2	22.2	22.2	22.2	22.2	40	43	45	49	51	Yes
R076	4.5	Residence	415627	5086826	2213	T25	22.1	22.1	22.1	22.1	22.1	40	43	45	49	51	Yes
R077	4.5	Residence	415617	5086891	2279	T25	21.8	21.8	21.8	21.8	21.8	40	43	45	49	51	Yes
R078	4.5	Residence	415731	5086962	2347	T25	21.6	21.6	21.6	21.6	21.6	40	43	45	49	51	Yes
R079	4.5	Residence	415781	5087030	2416	T25	21.3	21.3	21.3	21.3	21.3	40	43	45	49	51	Yes
R080	4.5	Residence	415836	5087086	2473	T25	21	21	21	21	21	40	43	45	49	51	Yes
R081	4.5	Residence	415995	5087198	2597	T25	20.5	20.5	20.5	20.5	20.5	40	43	45	49	51	Yes
R082	4.5	Residence	415941	5087220	2614	T25	20.3	20.3	20.3	20.3	20.3	40	43	45	49	51	Yes
R083	4.5	Residence	415453	5087273	2672	T25	21.2	21.2	21.2	21.2	21.2	40	43	45	49	51	Yes
R084	4.5	Residence	416012	5087285	2685	T25	20.2	20.2	20.2	20.2	20.2	40	43	45	49	51	Yes
R085	4.5	Residence	416038	5087334	2737	T25	20	20	20	20	20	40	43	45	49	51	Yes
R086	4.5	Residence	416093	5087356	2765	T25	19.9	19.9	19.9	19.9	19.9	40	43	45	49	51	Yes
R087	4.5	Residence	416094	5087400	2809	T25	19.8	19.8	19.8	19.8	19.8	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
R088	4.5	Residence	416150	5087427	2843	T25	19.5	19.5	19.5	19.5	19.5	40	43	45	49	51	Yes
R089	4.5	Residence	416234	5087588	3016	T25	18.7	18.7	18.7	18.7	18.7	40	43	45	49	51	Yes
R090	4.5	Residence	419777	5089027	2874	T17	19.3	19.3	19.3	19.3	19.3	40	43	45	49	51	Yes
R091	4.5	Residence	419708	5089143	3009	T17	18.2	18.2	18.2	18.2	18.2	40	43	45	49	51	Yes
R092	4.5	Residence	419681	5089119	3001	T17	18.2	18.2	18.2	18.2	18.2	40	43	45	49	51	Yes
R093	4.5	Residence	419277	5090192	4137	T17	17.4	17.4	17.4	17.4	17.4	40	43	45	49	51	Yes
R094	4.5	Residence	419206	5090217	4192	T17	17.2	17.2	17.2	17.2	17.2	40	43	45	49	51	Yes
R095	4.5	Residence	418890	5089158	3489	T17	15.3	15.3	15.3	15.3	15.3	40	43	45	49	51	Yes
R096	4.5	Residence	418649	5089115	3620	T17	14.9	14.9	14.9	14.9	14.9	40	43	45	49	51	Yes
R097	4.5	Residence	418572	5089260	3778	T17	14.5	14.5	14.5	14.5	14.5	40	43	45	49	51	Yes
R098	4.5	Residence	418439	5089067	3735	T17	14.5	14.5	14.5	14.5	14.5	40	43	45	49	51	Yes
R099	4.5	Residence	418387	5089036	3752	T17	14.4	14.4	14.4	14.4	14.4	40	43	45	49	51	Yes
R100	4.5	Residence	418218	5088922	3806	T17	12.4	12.4	12.4	12.4	12.4	40	43	45	49	51	Yes
R101	4.5	Residence	418170	5088875	3814	T17	12.5	12.5	12.5	12.5	12.5	40	43	45	49	51	Yes
R102	4.5	Residence	418135	5088810	3801	T21	12.5	12.5	12.5	12.5	12.5	40	43	45	49	51	Yes
R103	4.5	Residence	418091	5088876	3876	T17	12.3	12.3	12.3	12.3	12.3	40	43	45	49	51	Yes
R104	4.5	Residence	418054	5088846	3884	T21	12.3	12.3	12.3	12.3	12.3	40	43	45	49	51	Yes
R105	4.5	Residence	418002	5088790	3884	T21	12.4	12.4	12.4	12.4	12.4	40	43	45	49	51	Yes
R106	4.5	Residence	417938	5088736	3896	T21	12.4	12.4	12.4	12.4	12.4	40	43	45	49	51	Yes
R107	4.5	Residence	417895	5088692	3899	T21	12.4	12.4	12.4	12.4	12.4	40	43	45	49	51	Yes
R108	4.5	Residence	417814	5088726	3983	T21	12.2	12.2	12.2	12.2	12.2	40	43	45	49	51	Yes
R109	4.5	Residence	417813	5088662	3943	T21	12.3	12.3	12.3	12.3	12.3	40	43	45	49	51	Yes
R110	4.5	Residence	417775	5088658	3970	T21	12.3	12.3	12.3	12.3	12.3	40	43	45	49	51	Yes
R111	4.5	Residence	417685	5088674	4051	T21	12.1	12.1	12.1	12.1	12.1	40	43	45	49	51	Yes
R112	4.5	Residence	417653	5088682	4081	T21	12	12	12	12	12	40	43	45	49	51	Yes
R113	4.5	Residence	417684	5088577	3992	T21	12.3	12.3	12.3	12.3	12.3	40	43	45	49	51	Yes
R114	4.5	Residence	417611	5088617	4075	T21	12.1	12.1	12.1	12.1	12.1	40	43	45	49	51	Yes
R115	4.5	Residence	417792	5088013	3587	T21	14.8	14.8	14.8	14.8	14.8	40	43	45	49	51	Yes
R116	4.5	Residence	417573	5088557	4070	T21	12.2	12.2	12.2	12.2	12.2	40	43	45	49	51	Yes
R117	4.5	Residence	417528	5088537	4095	T21	12.1	12.1	12.1	12.1	12.1	40	43	45	49	51	Yes
R118	4.5	Residence	417399	5088504	4182	T21	12.8	12.8	12.8	12.8	12.8	40	43	45	49	51	Yes
R119	4.5	Residence	417294	5088398	4094	T25	15.8	15.8	15.8	15.8	15.8	40	43	45	49	51	Yes
R120	4.5	Residence	417204	5088344	4010	T25	16	16	16	16	16	40	43	45	49	51	Yes
R121	4.5	Residence	417184	5088328	3988	T25	16	16	16	16	16	40	43	45	49	51	Yes
R122	4.5	Residence	416992	5088231	3830	T25	16.2	16.2	16.2	16.2	16.2	40	43	45	49	51	Yes
R123	4.5	Residence	417136	5088293	3938	T25	16.1	16.1	16.1	16.1	16.1	40	43	45	49	51	Yes
R124	4.5	Residence	417278	5088168	3876	T25	14.1	14.1	14.1	14.1	14.1	40	43	45	49	51	Yes
R125	4.5	Residence	417267	5088106	3815	T25	14.2	14.2	14.2	14.2	14.2	40	43	45	49	51	Yes
R126	4.5	Residence	416826	5088186	3736	T25	16.4	16.4	16.4	16.4	16.4	40	43	45	49	51	Yes
R127	4.5	Residence	416752	5088186	3715	T25	16.4	16.4	16.4	16.4	16.4	40	43	45	49	51	Yes
R128	4.5	Residence	416648	5087998	3506	T25	17.2	17.2	17.2	17.2	17.2	40	43	45	49	51	Yes
R129	4.5	Residence	416489	5087841	3314	T25	17.9	17.9	17.9	17.9	17.9	40	43	45	49	51	Yes
R130	4.5	Residence	416429	5087760	3222	T25	18.1	18.1	18.1	18.1	18.1	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description	Easting	Northing	Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
							<=6	7	8	9	10	<=6	7	8	9	10	
R131	4.5	Residence	416284	5087570	3007	T25	18.9	18.9	18.9	18.9	18.9	40	43	45	49	51	Yes
R132	4.5	Residence	416332	5087677	3121	T25	18.4	18.4	18.4	18.4	18.4	40	43	45	49	51	Yes
R133	4.5	Residence	428315	5088492	1363	T09	30.2	30.2	30.2	30.2	30.2	40	43	45	49	51	Yes
R134	4.5	Residence	427915	5089033	1175	T09	31.2	31.2	31.2	31.2	31.2	40	43	45	49	51	Yes
R135	4.5	Residence	427850	5089177	1216	T09	30.5	30.5	30.5	30.5	30.5	40	43	45	49	51	Yes
R136	4.5	Residence	427616	5089226	1095	T09	32	32	32	32	32	40	43	45	49	51	Yes
R137	4.5	Residence	427256	5087044	930	T15	34.6	34.6	34.6	34.6	34.6	40	43	45	49	51	Yes
R138	4.5	Residence	427499	5086978	1168	T15	33	33	33	33	33	40	43	45	49	51	Yes
R139	4.5	Residence	427540	5087122	1134	T15	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	Yes
R140	4.5	Residence	428065	5087013	1660	T15	30.3	30.3	30.3	30.3	30.3	40	43	45	49	51	Yes
R141	4.5	Residence	428189	5087035	1769	T15	29.7	29.7	29.7	29.7	29.7	40	43	45	49	51	Yes
R142	4.5	Residence	420751	5089072	2596	T17	20.3	20.3	20.3	20.3	20.3	40	43	45	49	51	Yes
R143	4.5	Residence	420871	5089092	2600	T17	20.5	20.5	20.5	20.5	20.5	40	43	45	49	51	Yes
R144	4.5	Residence	420985	5089087	2580	T11	20.5	20.5	20.5	20.5	20.5	40	43	45	49	51	Yes
R145	4.5	Residence	421348	5089190	2347	T11	21.2	21.2	21.2	21.2	21.2	40	43	45	49	51	Yes
R146	4.5	Residence	421557	5089211	2205	T11	21.6	21.6	21.6	21.6	21.6	40	43	45	49	51	Yes
R147	4.5	Residence	422092	5089042	1718	T11	23.7	23.7	23.7	23.7	23.7	40	43	45	49	51	Yes
R148	4.5	Residence	422176	5089170	1773	T11	23.5	23.5	23.5	23.5	23.5	40	43	45	49	51	Yes
R149	4.5	Residence	422257	5089097	1668	T11	23.9	23.9	23.9	23.9	23.9	40	43	45	49	51	Yes
R150	4.5	Residence	422606	5088962	1384	T11	30.5	30.5	30.5	30.5	30.5	40	43	45	49	51	Yes
R151	4.5	Residence	422536	5089145	1579	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R152	4.5	Residence	422516	5089548	1963	T11	23.5	23.5	23.5	23.5	23.5	40	43	45	49	51	Yes
R153	4.5	Residence	422511	5089612	2025	T11	23.3	23.3	23.3	23.3	23.3	40	43	45	49	51	Yes
R154	4.5	Residence	422460	5089645	2073	T11	23.1	23.1	23.1	23.1	23.1	40	43	45	49	51	Yes
R155	4.5	Residence	422502	5089691	2103	T11	23.7	23.7	23.7	23.7	23.7	40	43	45	49	51	Yes
R156	4.5	Residence	422501	5089754	2163	T11	23.8	23.8	23.8	23.8	23.8	40	43	45	49	51	Yes
R157	4.5	Residence	422590	5089829	2210	T11	24.1	24.1	24.1	24.1	24.1	40	43	45	49	51	Yes
R158	4.5	Residence	422596	5089787	2168	T11	24.2	24.2	24.2	24.2	24.2	40	43	45	49	51	Yes
R159	4.5	Residence	422609	5089684	2066	T11	24.2	24.2	24.2	24.2	24.2	40	43	45	49	51	Yes
R160	4.5	Residence	422680	5089676	2040	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R161	4.5	Residence	422678	5089714	2078	T11	24.6	24.6	24.6	24.6	24.6	40	43	45	49	51	Yes
R162	4.5	Residence	422675	5089755	2118	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R163	4.5	Residence	422680	5089791	2152	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R164	4.5	Residence	422707	5089868	2222	T11	24.3	24.3	24.3	24.3	24.3	40	43	45	49	51	Yes
R165	4.5	Residence	422748	5089886	2231	T11	24.3	24.3	24.3	24.3	24.3	40	43	45	49	51	Yes
R166	4.5	Residence	422800	5089905	2241	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R167	4.5	Residence	422731	5089673	2026	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R168	4.5	Residence	422731	5089718	2070	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R169	4.5	Residence	422731	5089757	2108	T11	24.6	24.6	24.6	24.6	24.6	40	43	45	49	51	Yes
R170	4.5	Residence	422732	5089824	2174	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R171	4.5	Residence	422788	5089835	2174	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R172	4.5	Residence	422789	5089778	2118	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R173	4.5	Residence	422789	5089728	2069	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
R174	4.5	Residence	422791	5089680	2021	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R175	4.5	Residence	422788	5089603	1946	T11	24.6	24.6	24.6	24.6	24.6	40	43	45	49	51	Yes
R176	4.5	Residence	422782	5089544	1889	T11	24.1	24.1	24.1	24.1	24.1	40	43	45	49	51	Yes
R177	4.5	Residence	422786	5089501	1846	T11	23.7	23.7	23.7	23.7	23.7	40	43	45	49	51	Yes
R178	4.5	Residence	422837	5089596	1930	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R179	4.5	Residence	423019	5089466	1779	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R180	4.5	Residence	422713	5089969	2320	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R181	4.5	Residence	422729	5090005	2352	T11	25.2	25.2	25.2	25.2	25.2	40	43	45	49	51	Yes
R182	4.5	Residence	422810	5090000	2334	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R183	4.5	Residence	422847	5090085	2413	T11	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R184	4.5	Residence	422929	5090093	2412	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R185	4.5	Residence	422011	5090004	2580	T11	23.7	23.7	23.7	23.7	23.7	40	43	45	49	51	Yes
R186	4.5	Residence	422479	5090116	2517	T11	24.3	24.3	24.3	24.3	24.3	40	43	45	49	51	Yes
R187	4.5	Residence	422506	5090166	2558	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R188	4.5	Residence	422513	5090218	2606	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R189	4.5	Residence	422602	5090178	2547	T11	25	25	25	25	25	40	43	45	49	51	Yes
R190	4.5	Residence	422663	5090181	2537	T11	25	25	25	25	25	40	43	45	49	51	Yes
R191	4.5	Residence	422739	5090180	2523	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R192	4.5	Residence	422656	5090359	2713	T11	25	25	25	25	25	40	43	45	49	51	Yes
R193	4.5	Residence	422623	5090394	2754	T11	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R194	4.5	Residence	422589	5090438	2804	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R195	4.5	Residence	422822	5090202	2532	T11	25.3	25.3	25.3	25.3	25.3	40	43	45	49	51	Yes
R196	4.5	Residence	422903	5090183	2504	T11	25.5	25.5	25.5	25.5	25.5	40	43	45	49	51	Yes
R197	4.5	Residence	422960	5090180	2496	T11	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R198	4.5	Residence	423010	5090182	2494	T11	25	25	25	25	25	40	43	45	49	51	Yes
R199	4.5	Residence	423041	5090182	2493	T11	25.7	25.7	25.7	25.7	25.7	40	43	45	49	51	Yes
R200	4.5	Residence	423104	5090182	2478	T14	25.9	25.9	25.9	25.9	25.9	40	43	45	49	51	Yes
R201	4.5	Residence	423190	5090177	2443	T14	26.1	26.1	26.1	26.1	26.1	40	43	45	49	51	Yes
R202	4.5	Residence	423098	5090087	2392	T14	25.5	25.5	25.5	25.5	25.5	40	43	45	49	51	Yes
R203	4.5	Residence	423147	5090088	2374	T14	26.2	26.2	26.2	26.2	26.2	40	43	45	49	51	Yes
R204	4.5	Residence	423094	5090033	2342	T11	25.6	25.6	25.6	25.6	25.6	40	43	45	49	51	Yes
R205	4.5	Residence	422948	5089472	1792	T11	24.2	24.2	24.2	24.2	24.2	40	43	45	49	51	Yes
R206	4.5	Residence	422895	5089462	1789	T11	24.2	24.2	24.2	24.2	24.2	40	43	45	49	51	Yes
R207	4.5	Residence	422844	5089599	1932	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R208	4.5	Residence	422845	5089639	1972	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R209	4.5	Residence	422845	5089691	2023	T11	25	25	25	25	25	40	43	45	49	51	Yes
R210	4.5	Residence	422846	5089739	2070	T11	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R211	4.5	Residence	422844	5089791	2122	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R212	4.5	Residence	422845	5089844	2174	T11	24.7	24.7	24.7	24.7	24.7	40	43	45	49	51	Yes
R213	4.5	Residence	422892	5089867	2191	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R214	4.5	Residence	422889	5089810	2135	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R215	4.5	Residence	422890	5089736	2061	T11	25	25	25	25	25	40	43	45	49	51	Yes
R216	4.5	Residence	422890	5089639	1965	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description	Easting	Northing	Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
							<=6	7	8	9	10	<=6	7	8	9	10	
R217	4.5	Residence	422890	5089639	1965	T11	24.8	24.8	24.8	24.8	24.8	40	43	45	49	51	Yes
R218	4.5	Residence	422890	5089590	1916	T11	24.9	24.9	24.9	24.9	24.9	40	43	45	49	51	Yes
R219	4.5	Residence	422889	5089547	1874	T11	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R220	4.5	Residence	422948	5089552	1871	T11	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R221	4.5	Residence	422946	5089602	1921	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R222	4.5	Residence	422948	5089653	1972	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R223	4.5	Residence	422948	5089704	2023	T11	25.3	25.3	25.3	25.3	25.3	40	43	45	49	51	Yes
R224	4.5	Residence	422948	5089749	2067	T11	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R225	4.5	Residence	422948	5089815	2133	T11	25	25	25	25	25	40	43	45	49	51	Yes
R226	4.5	Residence	422951	5089869	2187	T11	25.2	25.2	25.2	25.2	25.2	40	43	45	49	51	Yes
R227	4.5	Residence	422995	5089931	2245	T11	25.7	25.7	25.7	25.7	25.7	40	43	45	49	51	Yes
R228	4.5	Residence	422932	5089974	2293	T11	25.4	25.4	25.4	25.4	25.4	40	43	45	49	51	Yes
R229	4.5	Residence	423145	5090030	2321	T14	25.8	25.8	25.8	25.8	25.8	40	43	45	49	51	Yes
R230	4.5	Residence	423146	5090090	2377	T14	26.2	26.2	26.2	26.2	26.2	40	43	45	49	51	Yes
R231	4.5	Residence	423191	5090099	2369	T14	26.3	26.3	26.3	26.3	26.3	40	43	45	49	51	Yes
R232	4.5	Residence	423219	5090091	2352	T14	26.4	26.4	26.4	26.4	26.4	40	43	45	49	51	Yes
R233	4.5	Residence	423271	5090090	2334	T14	26.3	26.3	26.3	26.3	26.3	40	43	45	49	51	Yes
R234	4.5	Residence	423351	5090090	2310	T14	26.5	26.5	26.5	26.5	26.5	40	43	45	49	51	Yes
R235	4.5	Residence	423309	5090243	2469	T14	26.1	26.1	26.1	26.1	26.1	40	43	45	49	51	Yes
R236	4.5	Residence	423340	5090227	2445	T14	26.3	26.3	26.3	26.3	26.3	40	43	45	49	51	Yes
R237	4.5	Residence	423365	5090198	2411	T14	26.4	26.4	26.4	26.4	26.4	40	43	45	49	51	Yes
R238	4.5	Residence	423343	5090178	2397	T14	26.4	26.4	26.4	26.4	26.4	40	43	45	49	51	Yes
R239	4.5	Residence	423451	5090198	2389	T14	26.6	26.6	26.6	26.6	26.6	40	43	45	49	51	Yes
R240	4.5	Residence	423498	5090196	2377	T14	26.7	26.7	26.7	26.7	26.7	40	43	45	49	51	Yes
R241	4.5	Residence	423572	5090189	2355	T14	26.9	26.9	26.9	26.9	26.9	40	43	45	49	51	Yes
R242	4.5	Residence	423672	5090170	2283	T06	27.2	27.2	27.2	27.2	27.2	40	43	45	49	51	Yes
R243	4.5	Residence	423723	5090202	2267	T06	27.2	27.2	27.2	27.2	27.2	40	43	45	49	51	Yes
R244	4.5	Residence	423707	5090089	2203	T06	27.6	27.6	27.6	27.6	27.6	40	43	45	49	51	Yes
R245	4.5	Residence	423552	5089992	2166	T14	27.3	27.3	27.3	27.3	27.3	40	43	45	49	51	Yes
R246	4.5	Residence	423828	5090048	2086	T06	28	28	28	28	28	40	43	45	49	51	Yes
R247	4.5	Residence	423935	5090074	2026	T06	28.3	28.3	28.3	28.3	28.3	40	43	45	49	51	Yes
R248	4.5	Residence	423960	5090021	1971	T06	28.8	28.8	28.8	28.8	28.8	40	43	45	49	51	Yes
R249	4.5	Residence	424053	5089936	1845	T06	29.1	29.1	29.1	29.1	29.1	40	43	45	49	51	Yes
R250	4.5	Residence	423953	5089829	1848	T06	29.4	29.4	29.4	29.4	29.4	40	43	45	49	51	Yes
R251	4.5	Residence	424006	5090163	2041	T06	28.1	28.1	28.1	28.1	28.1	40	43	45	49	51	Yes
R252	4.5	Residence	424053	5090175	2019	T06	28.2	28.2	28.2	28.2	28.2	40	43	45	49	51	Yes
R253	4.5	Residence	424051	5090082	1951	T06	28.5	28.5	28.5	28.5	28.5	40	43	45	49	51	Yes
R254	4.5	Residence	424114	5090178	1982	T06	28.3	28.3	28.3	28.3	28.3	40	43	45	49	51	Yes
R255	4.5	Residence	424124	5090094	1911	T06	28.6	28.6	28.6	28.6	28.6	40	43	45	49	51	Yes
R256	4.5	Residence	424562	5090170	1725	T06	28.7	28.7	28.7	28.7	28.7	40	43	45	49	51	Yes
R257	4.5	Residence	424572	5090066	1629	T06	29.5	29.5	29.5	29.5	29.5	40	43	45	49	51	Yes
R258	4.5	Residence	424757	5090092	1570	T06	29.5	29.5	29.5	29.5	29.5	40	43	45	49	51	Yes
R259	4.5	Residence	424854	5090155	1594	T06	29.4	29.4	29.4	29.4	29.4	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
R260	4.5	Residence	424251	5089057	1195	T06	32.7	32.7	32.7	32.7	32.7	40	43	45	49	51	Yes
R261	4.5	Residence	425766	5090096	1245	T05	30.7	30.7	30.7	30.7	30.7	40	43	45	49	51	Yes
R262	4.5	Residence	426208	5090025	1183	T05	27.1	27.1	27.1	27.1	27.1	40	43	45	49	51	Yes
R263	4.5	Residence	426302	5090035	1215	T05	26.9	26.9	26.9	26.9	26.9	40	43	45	49	51	Yes
R264	4.5	Residence	426427	5090016	1238	T05	26.8	26.8	26.8	26.8	26.8	40	43	45	49	51	Yes
R265	4.5	Residence	426470	5090076	1309	T05	26.4	26.4	26.4	26.4	26.4	40	43	45	49	51	Yes
R266	4.5	Residence	426400	5090220	1421	T05	28.4	28.4	28.4	28.4	28.4	40	43	45	49	51	Yes
R267	4.5	Residence	426654	5090101	1412	T05	25.9	25.9	25.9	25.9	25.9	40	43	45	49	51	Yes
R268	4.5	Residence	426803	5089870	1306	T05	26.8	26.8	26.8	26.8	26.8	40	43	45	49	51	Yes
R269	4.5	Residence	426680	5089805	1178	T05	27.6	27.6	27.6	27.6	27.6	40	43	45	49	51	Yes
R270	4.5	Residence	426571	5089815	1124	T05	27.8	27.8	27.8	27.8	27.8	40	43	45	49	51	Yes
R271	4.5	Residence	426605	5089636	999	T05	29	29	29	29	29	40	43	45	49	51	Yes
R272	4.5	Residence	426686	5090278	1584	T05	27.3	27.3	27.3	27.3	27.3	40	43	45	49	51	Yes
R273	4.5	Residence	426560	5090519	1755	T05	27.9	27.9	27.9	27.9	27.9	40	43	45	49	51	Yes
R274	4.5	Residence	426669	5090525	1800	T05	27.7	27.7	27.7	27.7	27.7	40	43	45	49	51	Yes
R275	4.5	Residence	426494	5090859	2061	T05	27	27	27	27	27	40	43	45	49	51	Yes
R276	4.5	Residence	427119	5091071	2487	T05	25.5	25.5	25.5	25.5	25.5	40	43	45	49	51	Yes
R277	4.5	Residence	427330	5091149	2658	T05	25.1	25.1	25.1	25.1	25.1	40	43	45	49	51	Yes
R278	4.5	Residence	427400	5091255	2785	T05	24.6	24.6	24.6	24.6	24.6	40	43	45	49	51	Yes
R279	4.5	Residence	427452	5091277	2831	T05	24.5	24.5	24.5	24.5	24.5	40	43	45	49	51	Yes
R280	4.5	Residence	427503	5091292	2871	T05	24.4	24.4	24.4	24.4	24.4	40	43	45	49	51	Yes
R281	4.5	Residence	422388	5085974	632	T23	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	Yes
R282	4.5	Residence	423985	5086985	889	T14	37.7	37.7	37.7	37.7	37.7	40	43	45	49	51	Yes
R283	4.5	Residence	426527	5090176	1424	T05	25.7	25.7	25.7	25.7	25.7	40	43	45	49	51	Yes
R284	4.5	Residence	426010	5090024	1158	T05	30.3	30.3	30.3	30.3	30.3	40	43	45	49	51	Yes
R285	4.5	Residence	424926	5090047	1469	T06	30.1	30.1	30.1	30.1	30.1	40	43	45	49	51	Yes
R286	4.5	Residence	424200	5089019	1161	T14	32.7	32.7	32.7	32.7	32.7	40	43	45	49	51	Yes
R287	4.5	Residence	427148	5087039	850	T15	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	Yes
R288	4.5	Residence	425188	5087123	748	T20	38.4	38.4	38.4	38.4	38.4	40	43	45	49	51	Yes
R290	4.5	Residence	422517	5087064	895	T11	36.2	36.2	36.2	36.2	36.2	40	43	45	49	51	Yes
R291	4.5	Residence	422500	5087404	716	T11	36.1	36.1	36.1	36.1	36.1	40	43	45	49	51	Yes
R292	4.5	Residence	425210	5083512	1433	T34	31	31	31	31	31	40	43	45	49	51	Yes
R293	4.5	Residence	414364	5084702	1367	T25	30.7	30.7	30.7	30.7	30.7	40	43	45	49	51	Yes
R294	4.5	Residence	417895	5087741	3363	T21	15.5	15.5	15.5	15.5	15.5	40	43	45	49	51	Yes
R295	4.5	Residence	420407	5088789	2402	T17	19.6	19.6	19.6	19.6	19.6	40	43	45	49	51	Yes
R296	4.5	Residence	422517	5086964	822	T18	36.4	36.4	36.4	36.4	36.4	40	43	45	49	51	Yes
R297	4.5	Residence	424447	5086782	910	T20	36.8	36.8	36.8	36.8	36.8	40	43	45	49	51	Yes
R298	4.5	Residence	426478	5085372	1091	T19	32.7	32.7	32.7	32.7	32.7	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
V201	4.5	Vacant Lot	416111	5085448	916	T25	32.6	32.6	32.6	32.6	32.6	40	43	45	49	51	Yes
V202	4.5	Vacant Lot	415772	5085228	614	T25	35.8	35.8	35.8	35.8	35.8	40	43	45	49	51	Yes
V203	4.5	Vacant Lot	415560	5085236	644	T25	35.4	35.4	35.4	35.4	35.4	40	43	45	49	51	Yes
V204	4.5	Vacant Lot	416378	5085236	898	T25	33.1	33.1	33.1	33.1	33.1	40	43	45	49	51	Yes
V205	4.5	Vacant Lot	416543	5085041	919	T25	33.4	33.4	33.4	33.4	33.4	40	43	45	49	51	Yes
V206	4.5	Vacant Lot	416530	5084775	817	T25	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	Yes
V207	4.5	Vacant Lot	416522	5084529	797	T25	36	36	36	36	36	40	43	45	49	51	Yes
V208	4.5	Vacant Lot	416526	5084309	832	T36	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	Yes
V209	4.5	Vacant Lot	416531	5084090	642	T36	38.1	38.1	38.1	38.1	38.1	40	43	45	49	51	Yes
V210	4.5	Vacant Lot	417174	5083754	1013	T36	35.3	35.3	35.3	35.3	35.3	40	43	45	49	51	Yes
V211	4.5	Vacant Lot	417314	5083750	1150	T36	34.5	34.5	34.5	34.5	34.5	40	43	45	49	51	Yes
V212	4.5	Vacant Lot	417746	5083584	1565	T36	32.8	32.8	32.8	32.8	32.8	40	43	45	49	51	Yes
V213	4.5	Vacant Lot	415097	5084087	621	T35	37.9	37.9	37.9	37.9	37.9	40	43	45	49	51	Yes
V214	4.5	Vacant Lot	414878	5084087	827	T35	35.8	35.8	35.8	35.8	35.8	40	43	45	49	51	Yes
V215	4.5	Vacant Lot	414878	5083745	796	T35	36.5	36.5	36.5	36.5	36.5	40	43	45	49	51	Yes
V216	4.5	Vacant Lot	414857	5083473	867	T38	36.7	36.7	36.7	36.7	36.7	40	43	45	49	51	Yes
V217	4.5	Vacant Lot	417808	5082187	2124	T36	34.8	34.8	34.8	34.8	34.8	40	43	45	49	51	Yes
V218	4.5	Vacant Lot	415257	5081810	870	T42	35	35	35	35	35	40	43	45	49	51	Yes
V219	4.5	Vacant Lot	415663	5081506	1209	T42	34.1	34.1	34.1	34.1	34.1	40	43	45	49	51	Yes
V220	4.5	Vacant Lot	416293	5081191	1756	T42	33.3	33.3	33.3	33.3	33.3	40	43	45	49	51	Yes
V221	4.5	Vacant Lot	416719	5081207	2005	T42	33.4	33.4	33.4	33.4	33.4	40	43	45	49	51	Yes
V222	4.5	Vacant Lot	417104	5081186	2297	T42	32.6	32.6	32.6	32.6	32.6	40	43	45	49	51	Yes
V223	4.5	Vacant Lot	417509	5081170	2629	T42	31.2	31.2	31.2	31.2	31.2	40	43	45	49	51	Yes
V224	4.5	Vacant Lot	419978	5085151	1354	T21	29.8	29.8	29.8	29.8	29.8	40	43	45	49	51	Yes
V225	4.5	Vacant Lot	420615	5085171	1031	T21	31.9	31.9	31.9	31.9	31.9	40	43	45	49	51	Yes
V226	4.5	Vacant Lot	421208	5085154	1071	T21	32.4	32.4	32.4	32.4	32.4	40	43	45	49	51	Yes
V227	4.5	Vacant Lot	420433	5085569	742	T21	34.3	34.3	34.3	34.3	34.3	40	43	45	49	51	Yes
V228	4.5	Vacant Lot	420419	5087052	920	T17	33.5	33.5	33.5	33.5	33.5	40	43	45	49	51	Yes
V229	4.5	Vacant Lot	421390	5087021	562	T17	37.1	37.1	37.1	37.1	37.1	40	43	45	49	51	Yes
V230	4.5	Vacant Lot	422068	5086978	1022	T17	35	35	35	35	35	40	43	45	49	51	Yes
V231	4.5	Vacant Lot	420597	5087265	943	T17	33	33	33	33	33	40	43	45	49	51	Yes
V232	4.5	Vacant Lot	421205	5087247	741	T17	34.9	34.9	34.9	34.9	34.9	40	43	45	49	51	Yes
V233	4.5	Vacant Lot	421420	5087234	771	T17	34.8	34.8	34.8	34.8	34.8	40	43	45	49	51	Yes
V234	4.5	Vacant Lot	421881	5087794	1278	T11	32.3	32.3	32.3	32.3	32.3	40	43	45	49	51	Yes
V235	4.5	Vacant Lot	422617	5087216	719	T11	36.7	36.7	36.7	36.7	36.7	40	43	45	49	51	Yes
V236	4.5	Vacant Lot	423052	5088985	1297	T11	31.8	31.8	31.8	31.8	31.8	40	43	45	49	51	Yes
V237	4.5	Vacant Lot	427368	5089192	937	T09	33.6	33.6	33.6	33.6	33.6	40	43	45	49	51	Yes
V238	4.5	Vacant Lot	427775	5089185	1168	T09	31	31	31	31	31	40	43	45	49	51	Yes
V239	4.5	Vacant Lot	427385	5088950	736	T09	35.2	35.2	35.2	35.2	35.2	40	43	45	49	51	Yes
V240	4.5	Vacant Lot	426953	5087112	660	T15	36.9	36.9	36.9	36.9	36.9	40	43	45	49	51	Yes
V241	4.5	Vacant Lot	426719	5086974	664	T15	37.3	37.3	37.3	37.3	37.3	40	43	45	49	51	Yes
V242	4.5	Vacant Lot	426443	5085121	1309	T19	31.9	31.9	31.9	31.9	31.9	40	43	45	49	51	Yes
V243	4.5	Vacant Lot	426058	5085116	1239	T19	33.2	33.2	33.2	33.2	33.2	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
V244	4.5	Vacant Lot	425429	5085108	706	T28	36.5	36.5	36.5	36.5	36.5	40	43	45	49	51	Yes
V245	4.5	Vacant Lot	425439	5084988	699	T28	36.4	36.4	36.4	36.4	36.4	40	43	45	49	51	Yes
V246	4.5	Vacant Lot	426457	5084691	1724	T19	30.6	30.6	30.6	30.6	30.6	40	43	45	49	51	Yes
V247	4.5	Vacant Lot	425270	5084096	999	T28	33.7	33.7	33.7	33.7	33.7	40	43	45	49	51	Yes
V248	4.5	Vacant Lot	423904	5083118	1116	T34	31.7	31.7	31.7	31.7	31.7	40	43	45	49	51	Yes
V249	4.5	Vacant Lot	423503	5083074	1248	T34	31	31	31	31	31	40	43	45	49	51	Yes
V250	4.5	Vacant Lot	420621	5084935	1259	T21	30.5	30.5	30.5	30.5	30.5	40	43	45	49	51	Yes
V251	4.5	Vacant Lot	424740	5087008	819	T20	37.7	37.7	37.7	37.7	37.7	40	43	45	49	51	Yes
V252	4.5	Vacant Lot	426572	5086823	738	T19	37.3	37.3	37.3	37.3	37.3	40	43	45	49	51	Yes
V253	4.5	Vacant Lot	426669	5085562	1036	T19	32.8	32.8	32.8	32.8	32.8	40	43	45	49	51	Yes
V254	4.5	Vacant Lot	424789	5089024	695	T06	36.6	36.6	36.6	36.6	36.6	40	43	45	49	51	Yes
V255	4.5	Vacant Lot	427634	5089011	945	T09	32.8	32.8	32.8	32.8	32.8	40	43	45	49	51	Yes
V256	4.5	Vacant Lot	422633	5087061	819	T11	36.8	36.8	36.8	36.8	36.8	40	43	45	49	51	Yes

Point of Reception ID	Receptor Height [m]	Receptor Description			Distance to nearest Turbine [m]	Turbine ID	Calculated Sound Pressure Level [dBA] at Selected Windspeed [m/s]					Sound Level Limit [dBA] at Selected Windspeed [m/s]					Compiance with Limit [Yes/No]
			Easting	Northing			<=6	7	8	9	10	<=6	7	8	9	10	
VP001	4.5	Vacant Lot	422580	5085342	749	T23	36.5	36.5	36.5	36.5	36.5	40	43	45	49	51	Yes
VP002	4.5	Vacant Lot	422690	5083157	1671	T34	28.2	28.2	28.2	28.2	28.2	40	43	45	49	51	Yes
VP003	4.5	Vacant Lot	423112	5087199	495	T11	39.4	39.4	39.4	39.4	39.4	40	43	45	49	51	Yes
VP004	4.5	Vacant Lot	423583	5087191	659	T11	41.4	41.4	41.4	41.4	41.4	40	43	45	49	51	Yes
VP005	4.5	Vacant Lot	423568	5087004	802	T11	38.6	38.6	38.6	38.6	38.6	40	43	45	49	51	Yes
VP006	4.5	Vacant Lot	423981	5087191	684	T14	38.9	38.9	38.9	38.9	38.9	40	43	45	49	51	Yes
VP007	4.5	Vacant Lot	424359	5087212	739	T12	38.6	38.6	38.6	38.6	38.6	40	43	45	49	51	Yes
VP008	4.5	Vacant Lot	424736	5087169	707	T12	38.2	38.2	38.2	38.2	38.2	40	43	45	49	51	Yes
VP009	4.5	Vacant Lot	425568	5087161	675	T13	38.9	38.9	38.9	38.9	38.9	40	43	45	49	51	Yes
VP010	4.5	Vacant Lot	425180	5087019	645	T20	38.4	38.4	38.4	38.4	38.4	40	43	45	49	51	Yes
VP011	4.5	Vacant Lot	425568	5086995	687	T20	38.7	38.7	38.7	38.7	38.7	40	43	45	49	51	Yes
VP012	4.5	Vacant Lot	425912	5087003	655	T19	38.8	38.8	38.8	38.8	38.8	40	43	45	49	51	Yes
VP013	4.5	Vacant Lot	426023	5087129	684	T15	39	39	39	39	39	40	43	45	49	51	Yes
VP014	4.5	Vacant Lot	426459	5087105	503	T15	39.3	39.3	39.3	39.3	39.3	40	43	45	49	51	Yes
VP015	4.5	Vacant Lot	425209	5089051	436	T06	40.1	40.1	40.1	40.1	40.1	40	43	45	49	51	Yes
VP016	4.5	Vacant Lot	425590	5089039	414	T05	42.3	42.3	42.3	42.3	42.3	40	43	45	49	51	Yes
VP017	4.5	Vacant Lot	426172	5089051	276	T05	44	44	44	44	44	40	43	45	49	51	Yes
VP018	4.5	Vacant Lot	426529	5089041	589	T05	39.3	39.3	39.3	39.3	39.3	40	43	45	49	51	Yes
VP019	4.5	Vacant Lot	426807	5089032	700	T09	38	38	38	38	38	40	43	45	49	51	Yes
VP020	4.5	Vacant Lot	421088	5087038	535	T17	37.5	37.5	37.5	37.5	37.5	40	43	45	49	51	Yes
VP021	4.5	Vacant Lot	420766	5087057	676	T17	35.8	35.8	35.8	35.8	35.8	40	43	45	49	51	Yes
VP022	4.5	Vacant Lot	424467	5084077	520	T34	39.2	39.2	39.2	39.2	39.2	40	43	45	49	51	Yes
VP023	4.5	Vacant Lot	424575	5084070	625	T34	38.2	38.2	38.2	38.2	38.2	40	43	45	49	51	Yes

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Noise
Vibration

Appendix A

Reprint of Noise Guidelines for Wind Farms Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities

Ontario Ministry of Environment
October 2008

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

Noise Guidelines for Wind Farms

Interpretation for Applying MOE NPC Publications to
Wind Power Generation Facilities

Ministry of the Environment

October 2008

PIBS 4709e

NOISE GUIDELINES FOR WIND FARMS

Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities

October 2008

This document establishes the sound level limits for land-based wind power generating facilities and describes the information required for noise assessments and submissions under the Environmental Assessment Act and the Environmental Protection Act. It replaces the document "Interpretation for Applying MOE NPC Technical Publications to Wind Turbine Generators," Version 1.0, July 6, 2004.

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TABLES

FIGURE

1. SCOPE

Noise impacts of proposed land-based wind power generation facilities, i.e. Wind Farms, are considered in the course of assessing an application for a Certificate of Approval (Air/Noise), in accordance with section 9 of the *Environmental Protection Act*. Wind Farms two megawatts or more are subject to review under the Environmental Screening Process, in accordance with Ontario Regulation 116/01 under the *Environmental Assessment Act*, and noise impacts are also considered during review under the screening process. The purpose of this document is to describe the applicable sound level limits and to specify the information proponents are to submit to the Ministry of the Environment when seeking approval for a proposed land-based Wind Farm. This document has been developed to provide consistency in the submissions and to streamline the review and approval process. Accordingly, the guidance contained herein is intended to provide uniformity in planning of Wind Farms in Ontario.

Proponents of Wind Farms are to prepare and submit to the Ministry of the Environment (MOE) a Noise Assessment Report that includes details of the wind turbine design and operation, location of the wind turbine(s) within the specific site and surrounding area, as well as summary of compliance with the applicable sound level limits. If applicable, the Noise Assessment Report must also include similar details of the Transformer Substation used for transforming the power from the wind turbine units. This document defines a template for the Noise Assessment Report to be submitted to the MOE.

This document also provides guidance on the assessment of the combined noise impact produced by the proposed Wind Farm in combination with the noise impact of approved Wind Farms or Wind Farms that are in the process of being planned.

2. REFERENCES

Reference is made to the following publications:

[1] NPC-104, “Sound Level Adjustments,” Ontario Ministry of the Environment

[2] NPC-205, “Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban),” Ontario Ministry of the Environment

[3] NPC-206, “Sound Levels due to Road Traffic,” Ontario Ministry of the Environment

[4] NPC-232, “Sound Level Limits for Stationary Sources in Class 3 Areas (Rural),” Ontario Ministry of the Environment

[5] CAN/CSA-C61400-11-07, “Wind Turbine Generator Systems - Part 11: Acoustic Noise Measurement Techniques”

[6] ISO 9613-2, “Acoustics-Attenuation of sound during propagation outdoors - Part 2: General method of calculation”

[7] ANSI/IEEE C57.12.90, “Distribution, Power, and Regulating Transformers”

3. DEFINITIONS

For the purpose of this document, the following definitions apply:

“Environmental Screening Process” is a prescribed planning process for electricity projects set out in Part B of the Guide to Environmental Assessment Requirements for Electricity Projects. As set out in Ontario Regulation 116/01 under the *Environmental Assessment Act*, certain electricity projects are subject to review under the Environmental Screening Process.

"Noise Assessment Report" means a report for wind power electricity generation projects, prepared in accordance with the guidance described in this document.

"Participating Receptor" means a property that is associated with the Wind Farm by means of a legal agreement with the property owner for the installation and operation of wind turbines or related equipment located on that property.

"Switching Station" means a collection point for the outputs of the wind turbine generators. Switching Stations are not significant noise sources.

"Transformer Substation" means a central facility comprised of power transformer(s) and associated equipment such as cooling fans for transforming the electrical outputs from the wind turbine generators to a higher voltage for input to the grid transmission system. Transformer Substations are significant noise sources.

"Wind Farm" means an electrical generating facility comprised of an array of wind turbine generators and a common electrical connection point such as a Transformer Substation or a Switching Station.

The following definitions are also included in the current Publications NPC-205 and NPC-232, References [2] and [4]:

"Class 1 Area" means an area with an acoustical environment typical of a major population centre, where the background noise is dominated by the urban hum.

"Class 2 Area" means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas, and in which a low ambient sound level, normally occurring only between 23:00 and 07:00 hours in Class 1 Areas, will typically be realized as early as 19:00 hours.

Other characteristics which may indicate the presence of a Class 2 Area include:

i. absence of urban hum between 19:00 and 23:00 hours;
ii. evening background sound level defined by natural environment and infrequent human activity; and
iii. no clearly audible sound from stationary sources other than from those under consideration.

"Class 3 Area" means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

i. a small community with less than 1000 population;
ii. agricultural area;
iii. a rural recreational area such as a cottage or a resort area; or
iv. a wilderness area.

The following definition is also included in the current Publication NPC-232, Reference [4]:

"Point of Reception" means any point on the premises of a person within 30 m of a dwelling or a camping area, where sound or vibration originating from other than those premises is received.

For the purpose of approval of new sources, including verifying compliance with section 9 of the *Environmental Protection Act*, the Point of Reception may be located on any of the following existing or zoned for future use premises: permanent or seasonal residences,

hotels/motels, nursing/retirement homes, rental residences, hospitals, camp grounds, and noise sensitive buildings such as schools and places of worship.

For equipment/facilities proposed on premises such as nursing/retirement homes, rental residences, hospitals, and schools, the Point of Reception may be located on the same premises.

4. DESCRIPTION OF WIND FARM NOISE

A Wind Farm is a collection of wind turbines, located in the same area, used for the production of electric power. As the individual wind turbines are separated by several hundred metres from each other, a large wind farm covers an area of tens of square kilometres. Larger Wind Farms may include a Transformer Substation that collects and increases the voltage produced by the turbines to the higher voltage for the grid transmission system.

A typical wind turbine consists of a tall tower with a hub (nacelle or housing) containing the drive-train and generator mounted on top of the tower. Three rotating blades (typically) are connected to a horizontal hub. In general, the significant noise sources associated with the operation of a Wind Farm are the wind turbines and the Transformer Substation. Noise from wind turbines consists of the aerodynamic noise caused by blades passing through the air, and mechanical noise created by the operation of mechanical elements of the drive-train. Close to the turbine, the noise typically exhibits a swishing sound as the blades rotate; and the whirr of the drive-train and generator. However, as distance from the turbine increases, these effects are reduced. The wind turbine noise perceived at receptors is typically broadband in nature. Any tonal character associated with the wind turbine noise is generally associated with maintenance issues.

The Transformer Substation noise is produced by the vibration of the transformer core and associated components, and by the operation of other equipment such as cooling fans. The noise produced by a Transformer Substation generally exhibits a pronounced hum, associated with the fundamental electrical frequency and its harmonics. Consequently, the Transformer Substation noise perceived at receptors is typically tonal.

The noise produced by wind turbines, as well as the background noise, typically increases with wind speed. The noise produced by a Transformer Substation is unaffected by the wind speed.

5. SOUND LEVEL LIMITS FOR WIND FARMS

5.1 Limits for Wind Turbine Generators

The sound level limits for wind turbines are set relative to the existing MOE Noise Guidelines in Publications NPC-205 and NPC-232, References [2] and [4], as well as to a reference wind induced background sound level. Consistent with these guidelines, the sound level limits, expressed in terms of the hourly, “A-weighted,” equivalent sound level (L_{eq}), apply at Points of Reception.

a) Receptors in Class 1 & 2 Areas (Urban)

The sound level limits at a Point of Reception in Class 1 & 2 Areas (Urban) are given by the applicable values in Table 1 and Figure 1, or by the sound level limits, established in accordance with requirements in Publication NPC-205.

b) Receptors in Class 3 Areas (Rural)

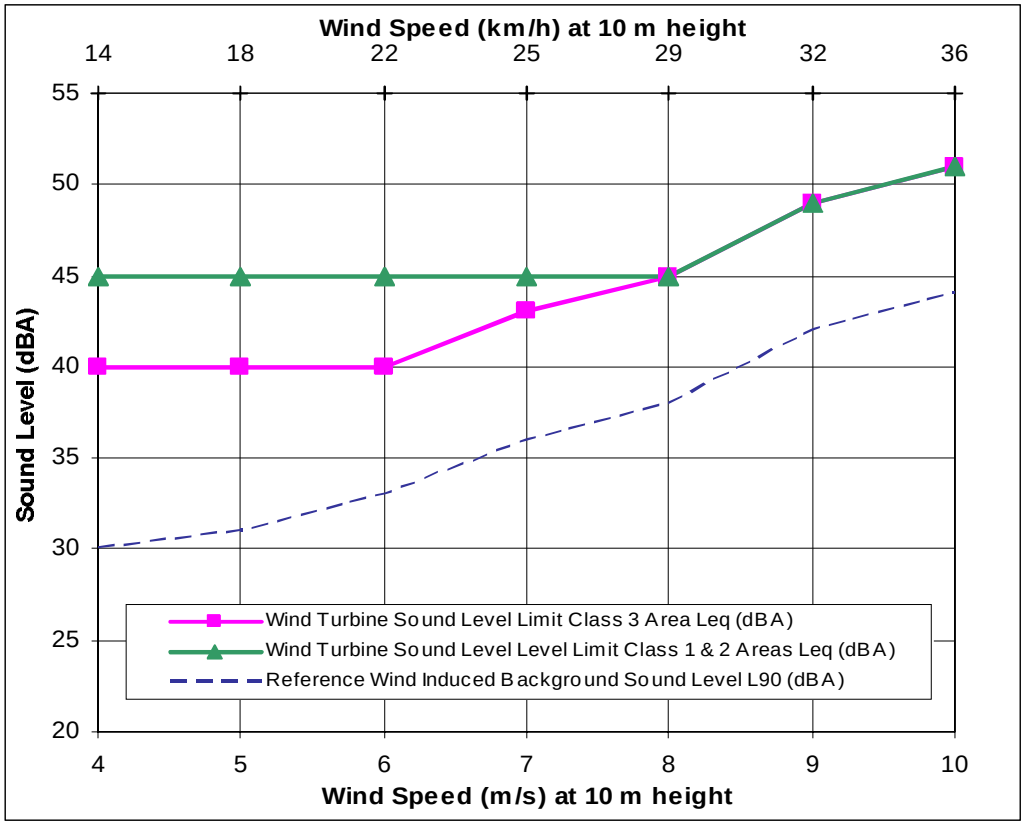
The sound level limits at a Point of Reception in Class 3 Areas (Rural) are given by the applicable values in Table 1 and Figure 1, or by the sound level limits, established in accordance with requirements in Publication NPC-232.

The wind turbine sound level limits are given at integer values of the wind speed and are shown as the solid lines in Figure 1. The dashed line in Figure 1 does not represent a limit and is included only for information purposes[1]. These sound level limits range from the lowest value of 40 dBA for Class 3 Areas and wind speeds at or below 4 m/s to the maximum value of 51 dBA for wind speeds at or above 10 m/s.

Table 1 Summary of Sound Level Limits for Wind Turbines

Wind Speed (m/s) at 10 m height	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Wind Turbine Sound Level Limits Class 3 Area, dBA	40.0	40.0	40.0	43.0	45.0	49.0	51.0
Wind Turbine Sound Level Limits Class 1 & 2 Areas, dBA	45.0	45.0	45.0	45.0	45.0	49.0	51.0

Figure 1 Summary of Sound Level Limits for Wind Turbines



[1] The measurement of wind induced background sound level is not required to establish the applicable limit. The wind induced background sound level reference curve, dashed line in Figure 1, was determined by correlating the A-weighted ninetieth percentile sound level (L_{90}) with the average wind speed measured at a particularly quiet site. The applicable L_{eq} sound level limits at higher wind speeds are given by adding 7 dB to the wind induced background L_{90} sound level reference values, using the principles for establishing sound level limits described in Publication NPC-232, Reference [4].

5.2 Limits for Wind Turbine Generators and Transformer Substations

In cases where the noise impact at a Point of Reception is composed of combined contributions due to the Transformer Substation as well as the wind turbine generators, the applicable limits are those shown in Table 1 and Figure 1, as described in Section 5.1.

The combined noise impact must comply with the limits at all the wind speeds from 0 m/s to 10 m/s. It should be noted that the acoustic emissions from a Transformer Substation are independent and unrelated to the wind speed, unlike the acoustic emissions from wind turbine generators which are wind speed dependent.

In determining the combined impact, a 5 dB adjustment must be added to the Transformer Substation noise in accordance with Publication NPC-104, Reference [1].

5.3 Limits for Transformer Substations

In unique cases where the noise impact assessment at a Point of Reception is limited to the operation of the Transformer Substation, as in a case described in Section 6.4.1, the sound level limit at a Point of Reception is given in the Publication NPC-205, Reference [2] or Publication NPC-232, Reference [4], whichever is applicable. The limit is independent of wind induced noise.

In order to account for the tonal characteristics of Transformer Substation noise, a 5 dB adjustment must be added to the acoustic emissions in accordance with Publication NPC-104, Reference [1].

6. NOISE ASSESSMENT REPORT

A Noise Assessment Report must be prepared for all proposed Wind Farms. The requirements for a detailed noise impact assessment depend on the proximity of the Wind Farm to receptors and are described in Section 6.4. The report must be submitted in a hard copy as well as in an electronic format.

The Noise Assessment Report must demonstrate compliance with the applicable sound level limits and the supporting information must be organized in a clear and concise manner. The report must be prepared by a qualified acoustical consultant and the cover document must be signed by the proponent for the project.

The Noise Assessment Report should be performed early in the planning of the project, as part of the Environmental Screening Process. The expectation of the MOE is that the submitted Noise Assessment Report be complete and accurate. Results of the Noise Assessment Report should be included in the Screening Report or Environmental Review Report prepared under the Environmental Screening Process. Any revisions to the Noise Assessment Report following the completion of the Environmental Screening Process should be very limited and clearly identified. In cases where complete information about the Wind Farm (e.g., information relating the transformer equipment) was not available at the environmental screening stage, such information must be provided to the MOE with the application for the Certificate of Approval under section 9 of the *Environmental Protection Act* for the Wind Farm.

As a minimum, the report must include the following sections in the given sequence:

6.1 Project Layout

The overall plan of the Wind Farm must be described in detail for the purpose of supporting the noise impact assessment calculations and for demonstrating compliance with the sound level

limits. General project layout description must be supported with clear maps of the site and surrounding area, complete with scale, northing, and legend information. A suitable minimum drawing scale for the overall plan of the project is 1 cm : 500 m.

The following details must be included:

a) Geographic location of the project study area;
b) Locations of wind turbines;
c) Location of Transformer Substation or Switching Station;
d) Locations of all receptors including buildings, dwellings, campsites, places of worship, and institutions, up to 2000 m from any wind turbine location; and
e) Property boundaries of lands associated with the project and location of dwellings therein.

The following additional information must be included, if applicable:

f) Municipal zoning and land-use plans;
g) Topographical features including roadways, terrain elevations, and ground cover; and
h) Available information regarding the location and scope of other approved[2] Wind Farms, and Wind Farms in the process of being planned[3], located within 5 km of any wind turbine generators of the proposed Wind Farm.

6.2 Noise Sources

For the purposes of this document, noise sources mean land-based wind turbine generators and Transformer Substations.

6.2.1 Description

The Noise Assessment Report must include the description of the wind turbine generators, including: manufacturer's make and model, maximum electrical output rating, hub height above grade, range of rotational speeds, and mode of operation.

The Noise Assessment Report must also include the description of the Transformer Substation, including all available information at the time of submission on the manufacturer's make and model designations, maximum electrical output rating, primary and secondary voltages, method of cooling, physical dimensions, drawing showing elevation and plan views of the unit, and any noise abatement measures.

Manufacturer's specifications should be included in an Appendix.

6.2.2 Wind Turbines

The acoustic emissions of the wind turbine must be specified by the manufacturer for the full range of rated operation and wind speeds. As a minimum, the information must include the sound power levels, frequency spectra in octave bands (63 to 8000 Hz), and tonality at integer

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[2] For the purposes of this document, a Wind Farm is considered to be "approved" if a Certificate of Approval (Noise) under section 9 of the *Environmental Protection Act* has been issued.

[3] For the purposes of this document, a Wind Farm is considered to be "in the process of being planned" if a Notice of Commencement has been issued for the project in accordance with the Environmental Screening Process prescribed under Ontario Regulation 116/01 under the *Environmental Assessment Act*, but for which a Certificate of Approval (Noise) under section 9 of the *Environmental Protection Act* has not yet been issued.

wind speeds from 6 to 10 m/s. The acoustic emission information must be determined and reported in accordance with the international standard CAN/CSA-C61400-11-07, Reference [5].

6.2.3 Adjustment to Wind Turbine Generator Acoustic Emissions for Wind Speed Profile

The wind speed profile on site of the Wind Farm may have an effect on the manufacturer's wind turbine acoustic emission data and, consequently, on the sound levels predicted at a Point of Reception. Therefore, the wind turbine generator acoustic emission levels must be consistent with the wind speed profile of the project area.

To address this issue, the assessment must use manufacturer's acoustic emission data adjusted for the average summer night time wind speed profile, representative of the site.

The adjusted acoustic emissions data must be used in the noise impact assessment at each receptor. The manufacturer's acoustic emissions data and the adjusted acoustic emission data used in the noise impact assessment must be tabulated in Table 3.

6.2.4 Transformer Substation

The acoustic emissions of each transformer unit must be specified by the manufacturer and conform to the standard ANSI/IEEE C57.12.90, Reference [7]. In cases where the specific information is not available in the early stages of planning the proposed Wind Farm, as described in the introduction to Section 6, proponents must submit a maximum rated value of the transformer acoustic emissions.

The requirements do not apply to the small transformer units attached to each wind turbine. These small transformers are insignificant noise sources and, therefore, their contributions do not require assessment.

The acoustic emissions data must be used in the noise impact assessment at each receptor.

6.2.5 Noise Sources and Locations

All wind turbine units and Transformer Substations must be assigned a unique source identification and must be listed along with their Universal Transverse Mercator (UTM) coordinates in a table in the report. The table should be provided in electronic form along with the report. A sample table format is shown in Table 4.

The source identifications should remain consistent throughout the submission and review process. Any changes to source identifications in revised versions of the Noise Assessment Report should be explicitly stated.

6.3 Receptors

For the purposes of this document, receptors mean Points of Reception and Participating Receptors, including vacant lots described in Section 6.3.3.

The definitions of a Point of Reception and a Participating Receptor are given in Section 3. The distance requirements for detailed noise assessments at receptors are described in Section 6.4.1. To provide clarity and consistency in the detailed noise assessments, the following describes the specific receptor locations for assessment purposes:

6.3.1 Wind Farm Does Not Include Transformer Substation

a) Single Storey Dwelling

- 4.5 m above grade at the centre of the dwelling; or
- 1.5 m above grade and 30 m horizontally from the façade of the dwelling in the direction of each wind turbine location. If the 30 m radius spans beyond the property line of the dwelling then the receptor location is at the property line.

Either of the two locations is acceptable for assessment[4].

b) Two Storey Dwelling (or Raised Bungalow)

- 4.5 m above grade at the centre of the dwelling.

c) Three Storey or Higher Dwelling

- at the centre of the highest storey of the dwelling.

6.3.2 Wind Farm Includes Transformer Substation

a) Dwellings up to Two Storey High

- 4.5 m above grade at the centre of the dwelling; or
- 1.5 m above grade and 30 m horizontally from the façade of the dwelling in the direction of each wind turbine location. If the 30 m radius spans beyond the property line of the dwelling then the receptor location is at the property line.

The location that results in the higher noise impact must be selected[5].

b) Three Storey or Higher Dwelling

- at the centre of the highest storey of the dwelling; or
- 1.5 m above grade and 30 m horizontally from the façade of the dwelling in the direction of each wind turbine location. If the 30 m radius spans beyond the property line of the dwelling then the receptor location is at the property line.

The location that results in the higher noise impact must be selected[6].

6.3.3 Vacant Lots

Receptors include vacant lots that have been zoned by the local municipality to permit residential or similar noise-sensitive uses, as described in the definition of a Point of Reception in Section 3.

The receptor location, if unknown at the time of the proposal, shall be based on a 1 hectare (10,000 m²) building envelope within the vacant lot property that would reasonably be expected to

[4] Assessment at the centre of the dwelling is simpler. The sound level at 4.5 m above grade at the centre of the dwelling is generally higher.

[5] Assessment at the centre of the dwelling is simpler. The sound level at 4.5 m above grade at the centre of the dwelling is generally higher except where transformer substation noise is a factor.

[6] Assessment at the centre of the dwelling is simpler. The sound level at the highest storey at the centre of the dwelling is generally higher except where transformer substation noise is a factor.

contain the use, and that conforms with the municipal zoning by-laws in effect. The specific receptor location for assessment purposes should be assumed to be 4.5 m above grade and:

- consistent with the typical building pattern in the area, or
- at the centre of the 1 hectare building envelope.

6.3.4 Area Classification of Receptors

Based on the rural nature of the areas surrounding most wind power projects, the Class 3 Area sound level limits shown in Table 1 and Figure 1 apply to all receptors, regardless of their proximity to a roadway, unless it can be shown clearly that less restrictive sound level limits are justified.

Less restrictive sound level limits for receptors within their designated area classification must be justified by analysis of hourly-traffic volumes data or by hourly acoustic monitoring results consistent with Publication NPC-206, Reference [3]. The use of general estimates, such as the Annual Average Daily Traffic data (AADT), is an insufficient method for determining the minimum hourly sound level of the background.

6.3.5 Receptors and Locations

All receptors must be assigned a unique receptor identification and must be tabulated along with their precise coordinates in the report. The table should be provided in electronic form along with the report. A sample table format is shown in Table 5 and Table 6.

The receptor identifications should remain consistent throughout the review process. Any changes to receptor identifications in revised versions of the Noise Assessment Report must be explicitly stated.

6.4 Detailed Noise Impact Assessment

Assessment of the sound levels produced by a Wind Farm, i.e. detailed noise impact assessment, must be made at each Point of Reception and Participating Receptor, within the distance requirements described in Section 6.4.1. In the event that all Points of Reception and Participating Receptors are outside the distance requirements described in Section 6.4.1, a detailed noise impact assessment is not required and the provisions contained in Sections 6.4.2 through to 6.4.10 are not applicable. Note that all proposals for Wind Farm projects must address the requirements described in Sections 6.1, 6.2 and 6.3, and Table 4, Table 5 and Table 6, even if a detailed noise assessment is not required.

The noise assessment must represent the maximum rated output of the Wind Farm, and reflect the principle of “predictable worst case” noise impact, Publications NPC-205 and NPC-232, References [2] and [4].

6.4.1 Distance Requirement

a) Wind Farm Does Not Include Transformer Substation

- A detailed noise impact assessment of the Wind Farm is required if one or more Points of Reception or Participating Receptors are located within 1500 m of a wind turbine generator.

b) Wind Farm Includes Transformer Substation

- A detailed noise impact assessment of the Wind Farm including a Transformer Substation is required if one or more Points of Reception or Participating Receptors are located within 1500 m of a wind turbine generator.
- A detailed noise impact assessment limited to the Transformer Substation is required if no Points of Reception or Participating Receptors are located within 1500 m of a wind turbine generator but a Point of Reception or a Participating Receptor is located within 1000 m of a Transformer Substation.

6.4.2 Whole Wind Farm Assessment

In the event that a detailed noise impact assessment is required, the assessment must not be limited to a 1500 m radius from a receptor, but must consider the impact of the whole Wind Farm subject to the limitations relating to very large distances described in Section 6.4.9.

6.4.3 Transformer Substation Assessment

In general, Transformer Substation noise impact must be assessed in combination with the noise impact from the wind turbine generators. In the unique case where the noise impact is caused only by the Transformer Substation, as described in Section 6.4.1 b), the detailed noise impact assessment is only required to consider the sound levels from the Transformer Substation.

6.4.4 Impact of Adjacent Approved Wind Farms

If a Point of Reception or a Participating Receptor is or can be affected by adjacent, approved[7] Wind Farms, the detailed noise impact assessment must address the combined impact of the proposed and the adjacent Wind Farms. The distance requirements described in Sections 6.4.1 and 6.4.9 apply.

Note that in accordance with Section 6.4.2, where a detailed noise impact assessment is required, it must consider all the wind turbine generators and Transformer Substations in the proposed as well as in the adjacent approved Wind Farms, subject to the limitations relating to very large distances described in Section 6.4.9.

6.4.5 Impact of Adjacent Wind Farms in the Process of Being Planned

If a Point of Reception or a Participating Receptor is or can be affected by adjacent Wind Farms in the process of being planned[8], the detailed noise impact assessment must address, subject to available information[9], the combined impact of the proposed and the adjacent Wind Farms. The distance requirements described in Sections 6.4.1 and 6.4.9 apply.

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[7] For the purposes of this document, a Wind Farm is considered to be "approved" if a Certificate of Approval (Noise) under section 9 of the *Environmental Protection Act* has been issued.

[8] For the purposes of this document, a Wind Farm is considered to be "in the process of being planned" if a Notice of Commencement has been issued for the project in accordance with the Environmental Screening Process prescribed under Ontario Regulation 116/01 under the *Environmental Assessment Act*, but for which a Certificate of Approval (Noise) under section 9 of the *Environmental Protection Act* has not yet been issued.

[9] The combined impact would be expected to be assessed if, for example, the information on turbine locations and models at an adjacent proposed Wind Farm is publicly available (e.g., through a Screening Report or Environmental Review Report under the Environmental Screening Process).

Note that in accordance with Section 6.4.2, where a detailed noise impact assessment is required, it must consider all the wind turbine generators and Transformer Substations in the proposed Wind Farm as well as in the adjacent Wind Farm in the process of being planned, subject to the limitations relating to very large distances described in Section 6.4.9.

6.4.6 Assessment of Participating Receptors

A receptor is a Participating Receptor and not considered as a Point of Reception if the property of the receptor is associated with the Wind Farm, see definition in Section 3. The sound level limits stated in Section 5 do not apply to Participating Receptors.

Despite this exemption, it is prudent to design Wind Farms so as to minimize the noise impact on all receptors, including Participating Receptors.

In some cases, a detailed noise assessment may be required of a receptor that was considered a Participating Receptor for an adjacent approved Wind Farm, or is being considered as a Participating Receptor for an adjacent Wind Farm in the process of being planned. Unless the property owner has also entered into an agreement with the proponent of the proposed Wind Farm, the receptor shall be considered a Point of Reception for the purposes of the detailed noise impact assessment for the proposed Wind Farm.

6.4.7 Prediction Method

Predictions of the total sound level at a Point of Reception or a Participating Receptor must be carried out according to the method described in the standard ISO 9613-2, Reference [6]. The calculations are subject to the specific parameters indicated in Section 6.4.10.

6.4.8 Adjustment for Special Quality of Sound

Should the manufacturer's data indicate that the wind turbine acoustic emissions are tonal, the acoustic emissions must be adjusted by 5 dB for tonality, in accordance with Publication NPC-104, Reference [1]. Otherwise, the prediction should assume that the wind turbine noise requires no adjustments for special quality of sound described in Publication NPC-104, Reference [1].

No special adjustments are necessary to address the variation in wind turbine sound level (swishing sound) due to the blade rotation, see Section 4. This temporal characteristic is not dissimilar to other sounds to which no adjustments are applied. It should be noted that the adjustments for special quality of sound described in Publication NPC-104, Reference [1], were not designed to apply to sounds exhibiting such temporal characteristic.

The calculations of the transformer noise must be consistent with the provisions of Section 6.2.4. Furthermore, since transformer acoustic emissions are tonal, an adjustment of 5 dB must be added to the specified acoustic emissions in accordance with Publication NPC-104, Reference [1].

6.4.9 Sound Level Contributions from Distant Wind Turbine Generators

The standard on which the noise impact prediction method is based, namely standard ISO 9613-2, Reference [6], is designed for source/receiver distances up to about 1000 m. Although the use of the standard may be extended to larger distances, other factors affecting sound level contributions from the distant sources may need to be considered. In practice, sound level contributions from sources such as wind turbines located at very large distances from receptors are affected by additional attenuation effects.

To address the above in a prediction method, contributions from sources located at very large distances from receptors, larger than approximately 5 km, do not need to be included in the calculation.

6.4.10 Specific Parameters

The assessment must use the following parameters that have been designed to provide clarity and consistency as well as reflect the principle of the "predictable worst case" noise impact.

a) All calculations must be performed in terms of octave band sound levels (63 to 8000 Hz) and for each integer wind speed from 6 to 10 m/s.

b) The attenuation due to atmospheric absorption must be based on the atmospheric attenuation coefficients for 10ºC temperature and 70% relative humidity, specifically:

Table 2 Atmospheric Absorption Coefficients

Centre Octave Band Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Atmospheric Absorption Coefficient (dB/km)	0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

c) The term for Ground Attenuation must be calculated using the "General" method in the standard ISO 9613-2, Reference [6]. For Class 2 and 3 Areas, the assessment must use ground factor values not exceeding the following:

$G_s = 1.0$
$G_m = 0.8$
$G_r = 0.5$

Where G_s is ground factor for the source region,
G_m is ground factor for the middle region, and
G_r is ground factor for the receiver region.

Alternatively, a global value ground factor not exceeding 0.7 may be used.

Ground factor values for assessments in Class 1 Areas are not specified in this document. The choice of the ground factor values for assessments in Class 1 Areas is site-specific.

6.5 Results and Compliance

6.5.1 Presentation of Results

Results of the noise impact assessment calculations must be presented in accordance with the Noise Impact Assessment Summary Tables, Table 7 and Table 8. In addition, the results should be plotted on drawings of the site plan, showing property boundaries, noise sources and receptor locations with their identifications. A suitable scale for these drawings is 1 cm : 250 m.

A separate drawing must be presented for each of the following wind speeds: 6, 8 and 10 m/s. The sound level scale should be the same on all drawings. If practical, each drawing should show the sound level contours for the 40 dBA level as well as the contour for the applicable sound level limit. The drawings should be included as an Appendix.

6.5.2 Assessment of Compliance

Compliance must be based on the comparison of the combined sound levels from all sources, described in Section 6, at each Point of Reception with the sound level limits stated in Section 5. All calculations and the determination of compliance with the sound level limits must be presented to a precision of one decimal place.

6.6 Summary Tables

6.6.1 Wind Turbine Acoustic Emissions Summary Table

The wind turbine acoustic emissions data used in the calculations must be presented as shown in Table 3. Separate tables should be used if the project involves different models of equipment.

Table 3 Wind Turbine Acoustic Emissions Summary

Make and Model: **Electrical Rating:** **Hub Height (m):** **Wind shear coefficient, as per Section 6.2.3[10]:**										
	Octave Band Sound Power Level (dB)									
	Manufacturer's Emission Levels					**Adjusted Emission Levels**				
Wind Speed[11] (m/s)	**6**	**7**	**8**	**9**	**10**	**6**	**7**	**8**	**9**	**10**
Frequency[12] (Hz)										
63										
125										
250										
500										
1000										
2000										
4000										
8000										
A-weighted										

[10] Adjustment based on the differences in wind shear factors reflecting manufacturer's data and on-site data.

[11] At 10 m reference height.

[12] Centre Octave Band Frequency.

6.6.2 Locations of Wind Turbine Generators, Transformer Substations and Receptors

Location coordinates of all wind turbine generators, Transformer Substations, Points of Reception and Participating Receptors must be given in accordance with Table 4, Table 5 and Table 6.

Table 4 Wind Turbine Locations

Project Name:				
Identifier	**Equipment Make & Model**	**UTM Coordinates**		**Remarks**
		X	**Y**	

Changes in ID or location in revised submissions must be clearly identified under the “Remarks” column.

Table 5 Point of Reception Locations

Project Name:			
Point of Reception ID	**Description**	**UTM Coordinates**	
		X	**Y**

Table 6 Participating Receptor Locations

Project Name:			
Receptor ID	**Description**	**UTM Coordinates**	
		X	**Y**

6.6.3 Noise Impact Assessment Summary Tables

Table 7 Combined Noise Impact Summary – Points of Reception

Point of Reception ID	Description	Height (m)	Distance to Nearest Turbine (m)	Nearest Turbine ID	Calculated Sound Level at Selected Wind Speeds (dBA)					Sound Level Limit (dBA)				
					6	7	8	9	10	6	7	8	9	10

Values in the table that exceed the applicable limit should be **Underlined and Bolded**.

Table 8 Combined Noise Impact Summary – Participating Receptors

Participating Receptor ID	Description	Height (m)	Distance to Nearest Turbine (m)	Nearest Turbine ID	Calculated Sound Level at Selected Wind Speeds (dBA)				
					6	7	8	9	10

Table 9 Wind Turbine Noise Impact Summary – Points of Reception

Point of Reception ID	Description	Height (m)	Distance to Nearest Turbine (m)	Nearest Turbine ID	Calculated Sound Level at Selected Wind Speeds (dBA)					Sound Level Limit (dBA)				
					6	7	8	9	10	6	7	8	9	10

Values in the table that exceed the applicable limit should be **Underlined and Bolded**.

Table 10 Wind Turbine Noise Impact Summary – Participating Receptors

Participating Receptor ID	Description	Height (m)	Distance to Nearest Turbine (m)	Nearest Turbine ID	Calculated Sound Level at Selected Wind Speeds (dBA)				
					6	7	8	9	10

6.7 Appendices

All information necessary to support the conclusions of the report, but not specifically described as required in Section 6, should be referenced and attached as Appendices to the report. Supporting information includes but is not limited to specifications, drawings, letters/agreements, photos, measurements and miscellaneous technical information.

In addition, sample calculation should be included in the Appendices. The sample calculation must include at least one detailed calculation for a source to receiver "pair," preferably addressing the closest wind turbine unit. The sample calculation must represent all other "pairs." If applicable, a sample calculation for the Transformer Substation is also required.

In cases where a Transformer Substation is part of the Wind Farm, Table 11 and Table 12 must be included in the Appendices:

Table 11 Transformer Substation Noise Impact Summary – Points of Reception

Point of Reception ID	Description	Distance to Transformer Substation (m)	Calculated Sound Level (dBA)	Sound Level Limit (dBA)

Values in the table that exceed the applicable limit should be **Underlined and Bolded**.

Table 12 Transformer Substation Noise Impact Summary – Participating Receptors

Point of Reception ID	Description	Distance to Transformer Substation (m)	Calculated Sound Level (dBA)

aercoustics
engineering limited

Acoustics
Noise
Vibration

Appendix B
Noise Data

GE-2.38-103 2.38 MW Unit
GE-2.49-103 2.49 MW Unit
GE-2.66-103 2.66 MW Unit

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

GE Energy

– Original Instructions –

Technical Documentation
Wind Turbine Generator Systems
2.38-103 - 60 Hz

Product Acoustic Specifications

Normal Operation according to IEC
Incl. Octave Band Spectra and
1/3rd Octave Band Spectra

Canada Specific

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Table of Contents

1 Introduction

This document summarizes acoustic emission characteristics of the 2.38-103 wind turbine for normal operation, including calculated apparent sound power levels $L_{WA,k}$, as well as uncertainty levels associated with apparent sound power levels, tonal audibility, and calculated 1/3rd octave band apparent sound power level.

All provided sound power levels are A-weighted.

Seller verifies specifications with measurements, including those performed by independent institutes. If a wind turbine noise performance test is carried out, it needs to be done in accordance with regulations of the international standard IEC 61400-11, ed. 2.1: 2006 and Machine Noise Performance Test document.

2 Normal Operation Calculated Apparent Sound Power Level and Octave Band Spectra

Apparent sound power levels $L_{WA,k}$ are initially calculated as a function of hub height wind speed v_{HH}. 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.

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

Calculated apparent sound power levels $L_{WA,k}$ and associated octave-band spectra are given in Table 1. 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. Uncertainties for octave sound power levels are generally higher than for total sound power levels. Guidance is given in IEC 61400-11, Annex D.

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 85 m [m/s]		**4.2**	**5.6**	**7.0**	**8.4**	**9.8**	**11.2**	**12.6**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.3	72.8	77.3	77.3	77.4	77.4	77.7
	63	78.5	78.6	82.3	86.9	87.2	87.2	87.1	87.3
	125	82.2	82.7	86.9	91.5	91.7	91.7	91.6	91.5
	250	83.3	84.4	89.0	94.0	93.3	93.0	92.7	91.6
	500	84.9	84.7	88.9	94.6	94.7	94.4	94.1	92.8
	1000	87.1	86.7	90.4	95.4	95.9	96.0	96.2	97.3
	2000	86.0	87.5	91.6	96.0	95.8	96.1	96.4	96.6
	4000	76.8	80.0	85.3	90.3	90.0	89.8	89.3	87.7
	8000	58.7	59.0	64.5	71.2	70.9	70.1	69.4	69.0
	16000	10.7	16.7	21.7	26.8	27.4	27.0	27.0	25.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**92.9**	**97.1**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**

Table 1: Normal Operation Calculated Apparent Sound Power Level, 2.38-103 with 85 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

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

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.5	73.2	77.2	77.4	77.4	77.5	77.7
	63	78.5	78.8	82.7	86.9	87.2	87.2	87.2	87.3
	125	82.2	82.9	87.3	91.5	91.7	91.7	91.6	91.5
	250	83.4	84.6	89.5	94.0	93.3	93.0	92.6	91.6
	500	84.9	84.8	89.4	94.7	94.7	94.4	93.9	92.8
	1000	87.1	86.9	90.9	95.4	95.9	96.0	96.4	97.3
	2000	86.0	87.8	92.0	95.9	95.8	96.1	96.4	96.6
	4000	76.8	80.4	85.8	90.3	90.0	89.8	89.1	87.7
	8000	58.7	59.3	65.1	71.4	70.9	70.1	69.3	69.0
	16000	11.0	17.1	22.2	27.0	27.4	26.9	26.8	25.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**

Table 2: Normal Operation Calculated Apparent Sound Power Level, 2.38-103 with 98 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

For 10 m wind speeds above 10 m/s, the wind turbine has reached rated power and blade pitch regulation acts in a way that tends to decrease noise levels. For a conservative calculation data at 10 m/s may be used.

The highest normal operation calculated apparent sound power level for the 2.38-103 is $L_{WA,k}$ = 102.0 dB.

3 Uncertainty Levels

Apparent sound power levels in Table 1, Table 2 and Table 3 are calculated mean levels. Uncertainty levels associated with measurements are described in IEC/TS 61400-14.

Per IEC/TS 61400-14, L_{WAd} is the maximum apparent sound power level for 95 % confidence level resulting from n measurements performed according to IEC 61400-11 standard: $L_{Wad} = L_{WA} + K$, where L_{WA} is the mean apparent sound power level from IEC 61400-11 testing reports and $K = 1.645\ \sigma_T$.

Testing standard deviation values σ_T, σ_R and σ_P for measured apparent sound power level are described by IEC/TS 61400-14, where σ_T is the total standard deviation, σ_P is the standard deviation for product variation and σ_R is the standard deviation for test reproducibility.

Assuming $\sigma_R < 0.8$ dB and $\sigma_P < 0.8$ dB as typical values leads to a calculated K < 2 dB for 95 % confidence level.

4 Tonal Audibility

At the reference measuring point R_0 the 2.38-103 wind turbine has a value for tonality of $\Delta L_{a,k} \leq$ **2 dB**.

5 IEC 61400-11 and IEC/TS 61400-14 Terminology

- $L_{WA,k}$ is wind turbine apparent sound power level (referenced to 10^{-12}W) measured with A-weighting as function of reference wind speed v_{10m}. Derived from multiple measurement reports per IEC 61400-11, it is considered as a mean value
- σ_P is the product variation i.e. 2.38-103 unit-to-unit product variation; typically < 0.8 dB
- σ_R is the overall measurement testing reproducibility as defined per IEC 61400-11; typically < 0.8 dB with adequate measurement conditions and sufficient amount of data samples
- σ_T is the total standard deviation combining both σ_P and σ_R
- $K = 1.645\ \sigma_T$ is defined per IEC/TS 61400-14 for 95 % confidence level
- R_0 is the ground measuring distance from the wind turbine tower axis per IEC 61400-11, which shall equal the hub height plus half the rotor diameter
- $\Delta L_{a,k}$ is the tonal audibility according to IEC 61400-11, described as potentially audible narrow band sound

6 1/3rd Octave Band Spectra

The tables in Annex I are showing the 1/3rd octave band values for different wind speeds at different hub heights.

Reference:

- IEC 61400-1, Wind turbines – part 1: Design requirements, ed. 2, 2005-08
- IEC 61400-11, wind turbine generator systems part 11: Acoustic noise measurement techniques, ed. 2.1, 2006-11
- IEC/TS 61400-14, Wind turbines – part 14: Declaration of apparent sound power level and tonality values, ed. 1, 2005-03
- MNPT – Machine Noise Performance Test, Technical documentation

Appendix I - Calculated 1/3rd Octave Band Apparent Sound Power Level $L_{WA,k}$

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		3	4	5	6	7	8	9	10-Cutout
Hub Height wind speed at 85 m [m/s]		4.2	5.6	7.0	8.4	9.8	11.2	12.6	14-Cutout
Frequency [Hz]	25	58.9	59.1	62.5	66.9	67.0	67.1	67.1	67.4
	32	63.4	63.5	66.9	71.3	71.4	71.5	71.5	71.8
	40	67.4	67.4	71.0	75.4	75.5	75.5	75.6	75.9
	50	70.6	70.6	74.2	78.7	78.8	78.8	78.8	79.1
	63	73.4	73.4	77.1	81.7	82.0	81.9	81.9	82.1
	80	75.8	75.9	79.7	84.3	84.7	84.7	84.6	84.7
	100	77.2	77.3	81.2	85.9	86.3	86.3	86.3	86.3
	125	77.6	78.0	82.2	86.8	87.0	87.0	86.9	86.9
	160	77.6	78.3	82.8	87.4	87.3	87.3	87.2	87.0
	200	77.8	78.9	83.5	88.2	87.8	87.6	87.4	86.9
	250	78.3	79.5	84.3	89.2	88.4	88.1	87.8	86.8
	315	79.3	80.2	84.8	90.1	89.2	88.8	88.4	86.9
	400	79.6	79.9	84.3	89.9	89.3	89.0	88.6	86.7
	500	80.1	79.9	84.1	89.9	90.0	89.7	89.4	87.7
	630	80.6	79.9	84.0	89.7	90.3	90.2	89.9	89.2
	800	81.2	80.4	84.4	89.8	90.6	90.5	90.4	90.9
	1000	82.1	81.6	85.2	90.3	90.9	91.0	91.2	92.4
	1250	83.4	83.4	86.9	91.5	91.8	92.1	92.5	93.8
	1600	82.7	83.5	87.2	91.5	91.5	91.9	92.3	93.1
	2000	81.4	83.1	87.1	91.5	91.3	91.6	91.9	92.0
	2500	78.5	81.4	85.9	90.6	90.3	90.4	90.3	89.6
	3150	74.9	78.8	83.6	88.5	88.2	88.1	87.7	86.1
	4000	70.9	73.1	79.6	84.5	84.2	83.8	83.1	81.6
	5000	66.5	66.4	73.5	79.3	78.9	78.3	77.3	76.5
	6300	58.4	58.6	64.2	71.0	70.7	69.8	69.2	68.7
	8000	45.7	48.4	52.1	58.3	58.3	57.8	57.3	56.9
	10000	30.1	34.7	38.7	43.6	43.9	43.9	43.5	42.7
	12500	10.7	16.7	21.7	26.8	27.4	27.0	26.9	25.3
	16000	-16.2	-10.3	-3.4	2.5	3.2	2.8	2.4	0.3
	20000	-45.2	-39.8	-31.7	-24.3	-23.6	-24.2	-24.8	-26.7
Total apparent sound power level L_{WA} [dB]		**92.4**	**92.9**	**97.1**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**

Table 3: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted) 2.38-103 with 85 m hub height as Function of Wind Speed v_{10m}

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub Height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	25	58.9	59.3	63.0	66.9	67.0	67.1	67.2	67.4
	32	63.4	63.6	67.4	71.3	71.4	71.5	71.6	71.8
	40	67.4	67.6	71.4	75.4	75.5	75.5	75.6	75.9
	50	70.6	70.8	74.6	78.7	78.8	78.8	78.9	79.1
	63	73.4	73.6	77.6	81.7	82.0	81.9	82.0	82.1
	80	75.8	76.1	80.1	84.3	84.7	84.7	84.6	84.7
	100	77.1	77.5	81.7	85.9	86.3	86.3	86.3	86.3
	125	77.6	78.3	82.6	86.8	87.0	87.0	86.9	86.9
	160	77.6	78.6	83.2	87.4	87.4	87.3	87.2	87.0
	200	77.9	79.1	84.0	88.2	87.8	87.6	87.4	86.9
	250	78.4	79.8	84.7	89.2	88.5	88.1	87.7	86.8
	315	79.4	80.5	85.3	90.1	89.3	88.8	88.3	86.9
	400	79.6	80.1	84.8	89.9	89.4	88.9	88.4	86.7
	500	80.1	80.1	84.6	90.0	90.0	89.6	89.1	87.7
	630	80.6	80.1	84.6	89.9	90.3	90.2	89.8	89.2
	800	81.1	80.6	84.9	89.9	90.5	90.5	90.5	90.9
	1000	82.1	81.7	85.7	90.3	90.9	91.0	91.3	92.4
	1250	83.4	83.6	87.4	91.5	91.8	92.1	92.7	93.8
	1600	82.8	83.7	87.6	91.4	91.5	91.9	92.5	93.1
	2000	81.5	83.3	87.6	91.4	91.3	91.6	91.9	92.0
	2500	78.6	81.7	86.4	90.5	90.3	90.4	90.3	89.6
	3150	74.9	79.2	84.0	88.4	88.2	88.1	87.5	86.1
	4000	70.8	73.6	80.0	84.5	84.1	83.8	82.8	81.6
	5000	66.4	66.9	74.2	79.3	78.9	78.3	77.1	76.5
	6300	58.5	58.9	64.9	71.2	70.7	69.8	69.0	68.7
	8000	46.0	48.6	52.7	58.7	58.3	57.8	57.2	56.9
	10000	30.4	35.0	39.1	43.9	43.9	43.9	43.5	42.7
	12500	11.0	17.1	22.2	27.0	27.4	26.9	26.8	25.3
	16000	-16.0	-9.8	-2.7	2.8	3.3	2.8	2.0	0.3
	20000	-44.9	-39.2	-30.9	-24.0	-23.6	-24.2	-25.2	-26.7
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.0**	**102.0**	**102.0**	**102.0**	**102.0**

Table 4: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted), 2.38-103 with 98 m hub height as Function of Wind Speed v_{10m}

GE Energy

– Original Instructions –

Technical Documentation
Wind Turbine Generator Systems
2.49-103 - 60 Hz

Product Acoustic Specifications

Normal Operation according to IEC
Incl. Octave Band Spectra and
1/3rd Octave Band Spectra

Canada Specific

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Table of Contents

1 Introduction

This document summarizes acoustic emission characteristics of the 2.49-103 wind turbine for normal operation, including calculated apparent sound power levels $L_{WA,k}$, as well as uncertainty levels associated with apparent sound power levels, tonal audibility, and calculated 1/3rd octave band apparent sound power level.

All provided sound power levels are A-weighted.

Seller verifies specifications with measurements, including those performed by independent institutes. If a wind turbine noise performance test is carried out, it needs to be done in accordance with regulations of the international standard IEC 61400-11, ed. 2.1: 2006 and Machine Noise Performance Test document.

2 Normal Operation Calculated Apparent Sound Power Level and Octave Band Spectra

Apparent sound power levels $L_{WA,k}$ are initially calculated as a function of hub height wind speed v_{HH}. 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.

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

Calculated apparent sound power levels $L_{WA,k}$ and associated octave-band spectra are given in Table 1. 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. Uncertainties for octave sound power levels are generally higher than for total sound power levels. Guidance is given in IEC 61400-11, Annex D.

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 85 m [m/s]		**4.2**	**5.6**	**7.0**	**8.4**	**9.8**	**11.2**	**12.6**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.3	72.8	77.4	78.3	78.4	78.4	78.7
	63	78.5	78.6	82.3	87.0	88.2	88.2	88.1	88.3
	125	82.2	82.7	86.9	91.7	92.7	92.7	92.6	92.5
	250	83.3	84.4	89.0	94.1	94.3	94.0	93.7	92.6
	500	84.9	84.7	88.9	94.7	95.7	95.4	95.1	93.8
	1000	87.1	86.7	90.4	95.5	96.9	97.0	97.2	98.3
	2000	86.0	87.5	91.6	96.1	96.8	97.1	97.4	97.6
	4000	76.8	80.0	85.3	90.4	91.0	90.8	90.3	88.7
	8000	58.7	59.0	64.5	71.3	71.9	71.1	70.4	70.0
	16000	10.7	16.7	21.7	26.9	28.4	28.0	28.0	26.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**92.9**	**97.1**	**102.1**	**103.0**	**103.0**	**103.0**	**103.0**

Table 1: Normal Operation Calculated Apparent Sound Power Level, 2.49-103 with 85 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

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

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.5	73.2	77.8	78.4	78.4	78.5	78.7
	63	78.5	78.8	82.7	87.4	88.2	88.2	88.2	88.3
	125	82.2	82.9	87.3	92.1	92.7	92.7	92.6	92.5
	250	83.4	84.6	89.5	94.6	94.3	94.0	93.6	92.6
	500	84.9	84.8	89.4	95.3	95.7	95.4	94.9	93.8
	1000	87.1	86.9	90.9	95.9	96.9	97.0	97.4	98.3
	2000	86.0	87.8	92.0	96.4	96.8	97.1	97.4	97.6
	4000	76.8	80.4	85.8	90.8	91.0	90.8	90.1	88.7
	8000	58.7	59.3	65.1	72.0	71.9	71.1	70.3	70.0
	16000	11.0	17.1	22.2	27.5	28.4	27.9	27.8	26.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.6**	**103.0**	**103.0**	**103.0**	**103.0**

Table 2: Normal Operation Calculated Apparent Sound Power Level, 2.49-103 with 98 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

For 10 m wind speeds above 10 m/s, the wind turbine has reached rated power and blade pitch regulation acts in a way that tends to decrease noise levels. For a conservative calculation data at 10 m/s may be used.

The highest normal operation calculated apparent sound power level for the 2.49-103 is $L_{WA,k}$ = 103.0 dB.

3 Uncertainty Levels

Apparent sound power levels in Table 1, Table 2 and Table 3 are calculated mean levels. Uncertainty levels associated with measurements are described in IEC/TS 61400-14.

Per IEC/TS 61400-14, L_{WAd} is the maximum apparent sound power level for 95 % confidence level resulting from n measurements performed according to IEC 61400-11 standard: $L_{Wad} = L_{WA} + K$, where L_{WA} is the mean apparent sound power level from IEC 61400-11 testing reports and $K = 1.645\ \sigma_T$.

Testing standard deviation values σ_T, σ_R and σ_P for measured apparent sound power level are described by IEC/TS 61400-14, where σ_T is the total standard deviation, σ_P is the standard deviation for product variation and σ_R is the standard deviation for test reproducibility.

Assuming $\sigma_R < 0.8$ dB and $\sigma_P < 0.8$ dB as typical values leads to a calculated K < 2 dB for 95 % confidence level.

4 Tonal Audibility

At the reference measuring point R_0 the 2.49-103 wind turbine has a value for tonality of $\Delta L_{a,k} \leq$ **2 dB**.

5 IEC 61400-11 and IEC/TS 61400-14 Terminology

- $L_{WA,k}$ is wind turbine apparent sound power level (referenced to 10^{-12}W) measured with A-weighting as function of reference wind speed v_{10m}. Derived from multiple measurement reports per IEC 61400-11, it is considered as a mean value
- σ_P is the product variation i.e. 2.49-103 unit-to-unit product variation; typically < 0.8 dB
- σ_R is the overall measurement testing reproducibility as defined per IEC 61400-11; typically < 0.8 dB with adequate measurement conditions and sufficient amount of data samples
- σ_T is the total standard deviation combining both σ_P and σ_R
- $K = 1.645\ \sigma_T$ is defined per IEC/TS 61400-14 for 95 % confidence level
- R_0 is the ground measuring distance from the wind turbine tower axis per IEC 61400-11, which shall equal the hub height plus half the rotor diameter
- $\Delta L_{a,k}$ is the tonal audibility according to IEC 61400-11, described as potentially audible narrow band sound

6 1/3rd Octave Band Spectra

The tables in Annex I are showing the 1/3rd octave band values for different wind speeds at different hub heights.

Reference:

- IEC 61400-1, Wind turbines – part 1: Design requirements, ed. 2, 2005-08
- IEC 61400-11, wind turbine generator systems part 11: Acoustic noise measurement techniques, ed. 2.1, 2006-11
- IEC/TS 61400-14, Wind turbines – part 14: Declaration of apparent sound power level and tonality values, ed. 1, 2005-03
- MNPT – Machine Noise Performance Test, Technical documentation

Appendix I - Calculated 1/3rd Octave Band Apparent Sound Power Level $L_{WA,k}$

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		3	4	5	6	7	8	9	10-Cutout
Hub Height wind speed at 85 m [m/s]		4.2	5.6	7.0	8.4	9.8	11.2	12.6	14-Cutout
Frequency [Hz]	25	58.9	59.1	62.5	67.0	68.0	68.1	68.1	68.4
	32	63.4	63.5	66.9	71.5	72.4	72.5	72.5	72.8
	40	67.4	67.4	71.0	75.5	76.5	76.5	76.6	76.9
	50	70.6	70.6	74.2	78.8	79.8	79.8	79.8	80.1
	63	73.4	73.4	77.1	81.8	83.0	82.9	82.9	83.1
	80	75.8	75.9	79.7	84.4	85.7	85.7	85.6	85.7
	100	77.2	77.3	81.2	86.0	87.3	87.3	87.3	87.3
	125	77.6	78.0	82.2	86.9	88.0	88.0	87.9	87.9
	160	77.6	78.3	82.8	87.6	88.3	88.3	88.2	88.0
	200	77.8	78.9	83.5	88.4	88.8	88.6	88.4	87.9
	250	78.3	79.5	84.3	89.3	89.4	89.1	88.8	87.8
	315	79.3	80.2	84.8	90.2	90.2	89.8	89.4	87.9
	400	79.6	79.9	84.3	90.0	90.3	90.0	89.6	87.7
	500	80.1	79.9	84.1	90.0	91.0	90.7	90.4	88.7
	630	80.6	79.9	84.0	89.9	91.3	91.2	90.9	90.2
	800	81.2	80.4	84.4	89.9	91.6	91.5	91.4	91.9
	1000	82.1	81.6	85.2	90.4	91.9	92.0	92.2	93.4
	1250	83.4	83.4	86.9	91.7	92.8	93.1	93.5	94.8
	1600	82.7	83.5	87.2	91.7	92.5	92.9	93.3	94.1
	2000	81.4	83.1	87.1	91.7	92.3	92.6	92.9	93.0
	2500	78.5	81.4	85.9	90.7	91.3	91.4	91.3	90.6
	3150	74.9	78.8	83.6	88.6	89.2	89.1	88.7	87.1
	4000	70.9	73.1	79.6	84.6	85.2	84.8	84.1	82.6
	5000	66.5	66.4	73.5	79.4	79.9	79.3	78.3	77.5
	6300	58.4	58.6	64.2	71.1	71.7	70.8	70.2	69.7
	8000	45.7	48.4	52.1	58.4	59.3	58.8	58.3	57.9
	10000	30.1	34.7	38.7	43.8	44.9	44.9	44.5	43.7
	12500	10.7	16.7	21.7	26.9	28.4	28.0	27.9	26.3
	16000	-16.2	-10.3	-3.4	2.7	4.2	3.8	3.4	1.3
	20000	-45.2	-39.8	-31.7	-24.2	-22.6	-23.2	-23.8	-25.7
Total apparent sound power level L_{WA} [dB]		**92.4**	**92.9**	**97.1**	**102.1**	**103.0**	**103.0**	**103.0**	**103.0**

Table 3: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted) 2.49-103 with 85 m hub height as Function of Wind Speed v_{10m}

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub Height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	25	58.9	59.3	63.0	67.4	68.0	68.1	68.2	68.4
	32	63.4	63.6	67.4	71.9	72.4	72.5	72.6	72.8
	40	67.4	67.6	71.4	75.9	76.5	76.5	76.6	76.9
	50	70.6	70.8	74.6	79.2	79.8	79.8	79.9	80.1
	63	73.4	73.6	77.6	82.2	83.0	82.9	83.0	83.1
	80	75.8	76.1	80.1	84.8	85.7	85.7	85.6	85.7
	100	77.1	77.5	81.7	86.4	87.3	87.3	87.3	87.3
	125	77.6	78.3	82.6	87.4	88.0	88.0	87.9	87.9
	160	77.6	78.6	83.2	88.0	88.4	88.3	88.2	88.0
	200	77.9	79.1	84.0	88.8	88.8	88.6	88.4	87.9
	250	78.4	79.8	84.7	89.7	89.5	89.1	88.7	87.8
	315	79.4	80.5	85.3	90.7	90.3	89.8	89.3	87.9
	400	79.6	80.1	84.8	90.5	90.4	89.9	89.4	87.7
	500	80.1	80.1	84.6	90.6	91.0	90.6	90.1	88.7
	630	80.6	80.1	84.6	90.4	91.3	91.2	90.8	90.2
	800	81.1	80.6	84.9	90.4	91.5	91.5	91.5	91.9
	1000	82.1	81.7	85.7	90.9	91.9	92.0	92.3	93.4
	1250	83.4	83.6	87.4	92.1	92.8	93.1	93.7	94.8
	1600	82.8	83.7	87.6	92.0	92.5	92.9	93.5	94.1
	2000	81.5	83.3	87.6	92.0	92.3	92.6	92.9	93.0
	2500	78.6	81.7	86.4	91.0	91.3	91.4	91.3	90.6
	3150	74.9	79.2	84.0	89.0	89.2	89.1	88.5	87.1
	4000	70.8	73.6	80.0	85.1	85.1	84.8	83.8	82.6
	5000	66.4	66.9	74.2	79.9	79.9	79.3	78.1	77.5
	6300	58.5	58.9	64.9	71.7	71.7	70.8	70.0	69.7
	8000	46.0	48.6	52.7	59.2	59.3	58.8	58.2	57.9
	10000	30.4	35.0	39.1	44.5	44.9	44.9	44.5	43.7
	12500	11.0	17.1	22.2	27.5	28.4	27.9	27.8	26.3
	16000	-16.0	-9.8	-2.7	3.3	4.3	3.8	3.0	1.3
	20000	-44.9	-39.2	-30.9	-23.5	-22.6	-23.2	-24.2	-25.7
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.6**	**103.0**	**103.0**	**103.0**	**103.0**

Table 4: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted), 2.49-103 with 98 m hub height as Function of Wind Speed v_{10m}

GE Energy

– Original Instructions –

Technical Documentation
Wind Turbine Generator Systems
2.66-103 - 60 Hz

Product Acoustic Specifications

Normal Operation according to IEC
Incl. Octave Band Spectra and
1/3rd Octave Band Spectra

Canada Specific

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GE Energy

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Table of Contents

1 Introduction

This document summarizes acoustic emission characteristics of the 2.66-103 wind turbine for normal operation, including calculated apparent sound power levels $L_{WA,k}$, as well as uncertainty levels associated with apparent sound power levels, tonal audibility, and calculated 1/3rd octave band apparent sound power level.

All provided sound power levels are A-weighted.

Seller verifies specifications with measurements, including those performed by independent institutes. If a wind turbine noise performance test is carried out, it needs to be done in accordance with regulations of the international standard IEC 61400-11, ed. 2.1: 2006 and Machine Noise Performance Test document.

2 Normal Operation Calculated Apparent Sound Power Level and Octave Band Spectra

Apparent sound power levels $L_{WA,k}$ are initially calculated as a function of hub height wind speed v_{HH}. 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.

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

Calculated apparent sound power levels $L_{WA,k}$ and associated octave-band spectra are given in Table 1. 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. Uncertainties for octave sound power levels are generally higher than for total sound power levels. Guidance is given in IEC 61400-11, Annex D.

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 85 m [m/s]		**4.2**	**5.6**	**7.0**	**8.4**	**9.8**	**11.2**	**12.6**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.3	72.8	77.4	79.3	79.4	79.4	79.7
	63	78.5	78.6	82.3	87.0	89.2	89.2	89.1	89.3
	125	82.2	82.7	86.9	91.7	93.7	93.7	93.6	93.5
	250	83.3	84.4	89.0	94.1	95.3	95.0	94.7	93.6
	500	84.9	84.7	88.9	94.7	96.7	96.4	96.1	94.8
	1000	87.1	86.7	90.4	95.5	97.9	98.0	98.2	99.3
	2000	86.0	87.5	91.6	96.1	97.8	98.1	98.4	98.6
	4000	76.8	80.0	85.3	90.4	92.0	91.8	91.3	89.7
	8000	58.7	59.0	64.5	71.3	72.9	72.1	71.4	71.0
	16000	10.7	16.7	21.7	26.9	29.4	29.0	29.0	27.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**92.9**	**97.1**	**102.1**	**104.0**	**104.0**	**104.0**	**104.0**

Table 1: Normal Operation Calculated Apparent Sound Power Level, 2.66-103 with 85 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

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

Normal Operation Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	31.5	69.3	69.5	73.2	77.8	79.4	79.4	79.5	79.7
	63	78.5	78.8	82.7	87.4	89.2	89.2	89.2	89.3
	125	82.2	82.9	87.3	92.1	93.7	93.7	93.6	93.5
	250	83.4	84.6	89.5	94.6	95.3	95.0	94.6	93.6
	500	84.9	84.8	89.4	95.3	96.7	96.4	95.9	94.8
	1000	87.1	86.9	90.9	95.9	97.9	98.0	98.4	99.3
	2000	86.0	87.8	92.0	96.4	97.8	98.1	98.4	98.6
	4000	76.8	80.4	85.8	90.8	92.0	91.8	91.1	89.7
	8000	58.7	59.3	65.1	72.0	72.9	72.1	71.3	71.0
	16000	11.0	17.1	22.2	27.5	29.4	28.9	28.8	27.3
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.6**	**104.0**	**104.0**	**104.0**	**104.0**

Table 2: Normal Operation Calculated Apparent Sound Power Level, 2.66-103 with 98 m hub height as a function of 10 m wind speed (z_{0ref} = 0.05 m)

For 10 m wind speeds above 10 m/s, the wind turbine has reached rated power and blade pitch regulation acts in a way that tends to decrease noise levels. For a conservative calculation data at 10 m/s may be used.

The highest normal operation calculated apparent sound power level for the 2.66-103 is $L_{WA,k}$ = 104.0 dB.

3 Uncertainty Levels

Apparent sound power levels in Table 1, Table 2 and Table 3 are calculated mean levels. Uncertainty levels associated with measurements are described in IEC/TS 61400-14.

Per IEC/TS 61400-14, L_{WAd} is the maximum apparent sound power level for 95 % confidence level resulting from n measurements performed according to IEC 61400-11 standard: $L_{Wad} = L_{WA} + K$, where L_{WA} is the mean apparent sound power level from IEC 61400-11 testing reports and $K = 1.645\ \sigma_T$.

Testing standard deviation values σ_T, σ_R and σ_P for measured apparent sound power level are described by IEC/TS 61400-14, where σ_T is the total standard deviation, σ_P is the standard deviation for product variation and σ_R is the standard deviation for test reproducibility.

Assuming $\sigma_R < 0.8$ dB and $\sigma_P < 0.8$ dB as typical values leads to a calculated K < 2 dB for 95 % confidence level.

4 Tonal Audibility

At the reference measuring point R_0 the 2.66-103 wind turbine has a value for tonality of $\Delta L_{a,k} \leq$ **2 dB**.

5 IEC 61400-11 and IEC/TS 61400-14 Terminology

- $L_{WA,k}$ is wind turbine apparent sound power level (referenced to 10^{-12}W) measured with A-weighting as function of reference wind speed v_{10m}. Derived from multiple measurement reports per IEC 61400-11, it is considered as a mean value
- σ_P is the product variation i.e. 2.66-103 unit-to-unit product variation; typically < 0.8 dB
- σ_R is the overall measurement testing reproducibility as defined per IEC 61400-11; typically < 0.8 dB with adequate measurement conditions and sufficient amount of data samples
- σ_T is the total standard deviation combining both σ_P and σ_R
- $K = 1.645\ \sigma_T$ is defined per IEC/TS 61400-14 for 95 % confidence level
- R_0 is the ground measuring distance from the wind turbine tower axis per IEC 61400-11, which shall equal the hub height plus half the rotor diameter
- $\Delta L_{a,k}$ is the tonal audibility according to IEC 61400-11, described as potentially audible narrow band sound

6 1/3rd Octave Band Spectra

The tables in Annex I are showing the 1/3rd octave band values for different wind speeds at different hub heights.

Reference:

- IEC 61400-1, Wind turbines – part 1: Design requirements, ed. 2, 2005-08
- IEC 61400-11, wind turbine generator systems part 11: Acoustic noise measurement techniques, ed. 2.1, 2006-11
- IEC/TS 61400-14, Wind turbines – part 14: Declaration of apparent sound power level and tonality values, ed. 1, 2005-03
- MNPT – Machine Noise Performance Test, Technical documentation

Appendix I - Calculated 1/3rd Octave Band Apparent Sound Power Level $L_{WA,k}$

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		3	4	5	6	7	8	9	10-Cutout
Hub Height wind speed at 85 m [m/s]		4.2	5.6	7.0	8.4	9.8	11.2	12.6	14-Cutout
Frequency [Hz]	25	58.9	59.1	62.5	67.0	69.0	69.1	69.1	69.4
	32	63.4	63.5	66.9	71.5	73.4	73.5	73.5	73.8
	40	67.4	67.4	71.0	75.5	77.5	77.5	77.6	77.9
	50	70.6	70.6	74.2	78.8	80.8	80.8	80.8	81.1
	63	73.4	73.4	77.1	81.8	84.0	83.9	83.9	84.1
	80	75.8	75.9	79.7	84.4	86.7	86.7	86.6	86.7
	100	77.2	77.3	81.2	86.0	88.3	88.3	88.3	88.3
	125	77.6	78.0	82.2	86.9	89.0	89.0	88.9	88.9
	160	77.6	78.3	82.8	87.6	89.3	89.3	89.2	89.0
	200	77.8	78.9	83.5	88.4	89.8	89.6	89.4	88.9
	250	78.3	79.5	84.3	89.3	90.4	90.1	89.8	88.8
	315	79.3	80.2	84.8	90.2	91.2	90.8	90.4	88.9
	400	79.6	79.9	84.3	90.0	91.3	91.0	90.6	88.7
	500	80.1	79.9	84.1	90.0	92.0	91.7	91.4	89.7
	630	80.6	79.9	84.0	89.9	92.3	92.2	91.9	91.2
	800	81.2	80.4	84.4	89.9	92.6	92.5	92.4	92.9
	1000	82.1	81.6	85.2	90.4	92.9	93.0	93.2	94.4
	1250	83.4	83.4	86.9	91.7	93.8	94.1	94.5	95.8
	1600	82.7	83.5	87.2	91.7	93.5	93.9	94.3	95.1
	2000	81.4	83.1	87.1	91.7	93.3	93.6	93.9	94.0
	2500	78.5	81.4	85.9	90.7	92.3	92.4	92.3	91.6
	3150	74.9	78.8	83.6	88.6	90.2	90.1	89.7	88.1
	4000	70.9	73.1	79.6	84.6	86.2	85.8	85.1	83.6
	5000	66.5	66.4	73.5	79.4	80.9	80.3	79.3	78.5
	6300	58.4	58.6	64.2	71.1	72.7	71.8	71.2	70.7
	8000	45.7	48.4	52.1	58.4	60.3	59.8	59.3	58.9
	10000	30.1	34.7	38.7	43.8	45.9	45.9	45.5	44.7
	12500	10.7	16.7	21.7	26.9	29.4	29.0	28.9	27.3
	16000	-16.2	-10.3	-3.4	2.7	5.2	4.8	4.4	2.3
	20000	-45.2	-39.8	-31.7	-24.2	-21.6	-22.2	-22.8	-24.7
Total apparent sound power level L_{WA} [dB]		92.4	92.9	97.1	102.1	104.0	104.0	104.0	104.0

Table 3: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted) 2.66-103 with 85 m hub height as Function of Wind Speed v_{10m}

Normal Operation 1/3rd Octave Band Spectra									
Standard wind speed at 10 m [m/s]		**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10-Cutout**
Hub Height wind speed at 98 m [m/s]		**4.3**	**5.7**	**7.2**	**8.6**	**10.0**	**11.4**	**12.9**	**14-Cutout**
Frequency [Hz]	25	58.9	59.3	63.0	67.4	69.0	69.1	69.2	69.4
	32	63.4	63.6	67.4	71.9	73.4	73.5	73.6	73.8
	40	67.4	67.6	71.4	75.9	77.5	77.5	77.6	77.9
	50	70.6	70.8	74.6	79.2	80.8	80.8	80.9	81.1
	63	73.4	73.6	77.6	82.2	84.0	83.9	84.0	84.1
	80	75.8	76.1	80.1	84.8	86.7	86.7	86.6	86.7
	100	77.1	77.5	81.7	86.4	88.3	88.3	88.3	88.3
	125	77.6	78.3	82.6	87.4	89.0	89.0	88.9	88.9
	160	77.6	78.6	83.2	88.0	89.4	89.3	89.2	89.0
	200	77.9	79.1	84.0	88.8	89.8	89.6	89.4	88.9
	250	78.4	79.8	84.7	89.7	90.5	90.1	89.7	88.8
	315	79.4	80.5	85.3	90.7	91.3	90.8	90.3	88.9
	400	79.6	80.1	84.8	90.5	91.4	90.9	90.4	88.7
	500	80.1	80.1	84.6	90.6	92.0	91.6	91.1	89.7
	630	80.6	80.1	84.6	90.4	92.3	92.2	91.8	91.2
	800	81.1	80.6	84.9	90.4	92.5	92.5	92.5	92.9
	1000	82.1	81.7	85.7	90.9	92.9	93.0	93.3	94.4
	1250	83.4	83.6	87.4	92.1	93.8	94.1	94.7	95.8
	1600	82.8	83.7	87.6	92.0	93.5	93.9	94.5	95.1
	2000	81.5	83.3	87.6	92.0	93.3	93.6	93.9	94.0
	2500	78.6	81.7	86.4	91.0	92.3	92.4	92.3	91.6
	3150	74.9	79.2	84.0	89.0	90.2	90.1	89.5	88.1
	4000	70.8	73.6	80.0	85.1	86.1	85.8	84.8	83.6
	5000	66.4	66.9	74.2	79.9	80.9	80.3	79.1	78.5
	6300	58.5	58.9	64.9	71.7	72.7	71.8	71.0	70.7
	8000	46.0	48.6	52.7	59.2	60.3	59.8	59.2	58.9
	10000	30.4	35.0	39.1	44.5	45.9	45.9	45.5	44.7
	12500	11.0	17.1	22.2	27.5	29.4	28.9	28.8	27.3
	16000	-16.0	-9.8	-2.7	3.3	5.3	4.8	4.0	2.3
	20000	-44.9	-39.2	-30.9	-23.5	-21.6	-22.2	-23.2	-24.7
Total apparent sound power level L_{WA} [dB]		**92.4**	**93.2**	**97.6**	**102.6**	**104.0**	**104.0**	**104.0**	**104.0**

Table 4: Calculated Apparent 1/3rd Octave Band Sound Power Level (A-weighted), 2.66-103 with 98 m hub height as Function of Wind Speed v_{10m}

aercoustics
engineering limited

Acoustics
Noise
Vibration

Appendix C

Statement from Northland Power Inc.
Re: Hunt Camps

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

NORTHLAND POWER

July 23, 2012

Payam Ashtiani, B.A. Sc., P. Eng.
Aercoustics Engineering Ltd.
50 Ronson Dr., Suite 165
Toronto, ON
M9W 1B3

Subject: McLean's Mountain Wind Farm

Dear Payam,

I confirm that there are no hunt camps that would qualify as Receptors according to the MOE definition within 1.5 km of any turbine location in the design for the McLean's Mountain Wind Farm project and as represented by the area shown in the attached project map. The one hunt camp that has been recently upgraded to a receptor in recent past (post crystallization date) has had a full sound study report completed on it and was submitted to the Ministry of Environment at their request. This building is owned by a group of people but represented by Tom Johnson.

Yours truly,

Rick Martin
Senior Project Manager
Northland Power Inc.

aercoustics
engineering limited

Acoustics
Noise
Vibration

Appendix D
Sample ISO-9613-2 Calculation

50 Ronson Drive, Suite 165
Toronto, ON, Canada
M9W 1B3
t 416 249 3361
f 416 249 3613

ISO 9613-2 Sample Calculation

Receiver: R288

Project: 8020.01

Project Number: McLean's Mountain Wind Farm - Amendment

Time Period	Total (dBA)
Day	38.4
Night	38.4

Receiver Name	Receiver ID	X	Y	Z	Ground
R288	R288	425188	5087123	293.6	289.06

Source Name	Source ID	X	Y	Z	Ground	ReflOrd	LxT	LxN	L/A	Dist.	hm	Freq	Adiv	KOb	Agr	Abar	z	Aatm	Afol	Ahous	Cmet	CmetN	Dc	RL	LtotT	LtotN
T13	T13	425578	5087836	384.8	286.47	0	103	103	1.0	818	50.9	0	69.3	0	-0.6	0.0	0.0	2.8	0.0	0.0	0.0	0.0	0.0	0.0	31.5	31.5
T20	T20	425263	5086379	392.2	293.85	0	102	102	1.0	754	51.2	0	68.6	0	-0.6	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	31.4	31.4
T12	T12	424685	5087875	412.9	314.62	0	103	103	1.0	913	49.9	0	70.2	0	-0.6	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	30.3	30.3
T19	T19	426002	5086354	368.4	270.11	0	103	103	1.0	1122	52.1	0	72.0	0	-0.5	0.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0	0.0	28.1	28.1
T14	T14	424087	5087822	420.0	321.71	0	103	103	1.0	1310	46.4	0	73.4	0	-0.5	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	26.3	26.3
T15	T15	426514	5087605	373.6	275.27	0	103	103	1.0	1413	53.5	0	74.0	0	-0.5	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0	25.5	25.5
T06	T06	425374	5088648	389.7	291.39	0	103	103	1.0	1539	48.9	0	74.8	0	-0.5	0.0	0.0	4.2	0.0	0.0	0.0	0.0	0.0	0.0	24.5	24.5
T10	T10	426243	5088273	381.9	283.64	0	103	103	1.0	1563	54.0	0	74.9	0	-0.5	0.0	0.0	4.3	0.0	0.0	0.0	0.0	0.0	0.0	24.3	24.3
T05	T05	425967	5088867	388.3	290	0	104	104	1.0	1912	51.8	0	76.6	0	-0.5	0.0	0.0	4.8	0.0	0.0	0.0	0.0	0.0	0.0	23.0	23.0
T09	T09	426960	5088349	377.5	279.21	0	104	104	1.0	2156	54.0	0	77.7	0	-0.5	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	21.6	21.6
T11	T11	423155	5087692	418.3	320	0	103	103	1.0	2114	43.3	0	77.5	0	-0.5	0.0	0.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	20.9	20.9
T16	T16	423976	5085277	395.1	296.76	0	103	103	1.0	2211	46.8	0	77.9	0	-0.5	0.0	0.0	5.2	0.0	0.0	0.0	0.0	0.0	0.0	20.3	20.3
T28	T28	424742	5084943	381.3	283	0	103	103	1.0	2227	44.8	0	78.0	0	-0.5	0.0	0.0	5.3	0.0	0.0	0.0	0.0	0.0	0.0	20.2	20.2
T18	T18	423020	5086314	408.6	310.31	0	103	103	1.0	2317	47.5	0	78.3	0	-0.5	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	19.8	19.8
T23	T23	423020	5085949	402.4	304.05	0	103	103	1.0	2468	47.5	0	78.9	0	-0.4	0.0	0.0	5.6	0.0	0.0	0.0	0.0	0.0	0.0	19.0	19.0
T29	T29	423719	5084978	391.2	292.92	0	103	103	1.0	2602	45.2	0	79.3	0	-0.4	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	18.4	18.4
T30	T30	424258	5084654	384.0	285.68	0	103	103	1.0	2640	45.1	0	79.4	0	-0.4	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	18.2	18.2
T34	T34	423970	5084235	376.0	277.67	0	103	103	1.0	3135	42.0	0	80.9	0	-0.5	0.0	-1.5	6.4	0.0	0.0	0.0	0.0	0.0	0.0	16.2	16.2
T17	T17	421160	5086508	414.3	316.03	0	103	103	1.0	4076	44.0	0	83.2	0	-0.8	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	13.3	13.3
Subsation	XFrmr	423616	5087363	323.9	320	0	95	95	1.0	1591	2.3	0	75.0	0	0.2	4.6	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	11.2	11.2
T21	T21	420869	5086170	411.3	313	0	103	103	1.0	4424	43.6	0	83.9	0	-0.9	0.0	0.0	7.6	0.0	0.0	0.0	0.0	0.0	0.0	12.4	12.4

TAB D

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO RENEWABLE ENERGY APPROVAL

NUMBER 7733-8XUNS5
Issue Date: October 25, 2013

McLean's Mountain Wind GP Inc.
30 St. Clair Ave W 12th Floor
Toronto, Ontario
M4V 3A1

Site Location: 13 Worthington Street
Northeastern Manitoulin and The Islands Town, District of Manitoulin
P0P 1K0

You are hereby notified that I have amended Approval No. 7733-8XUNS5 issued on October 31, 2012 for a Class 4 wind facility , as follows:

A. The definition of the Application on page 2 of the Approval is deleted and replaced with the following:

11. "Application" means the application for a Renewable Energy Approval dated September 15, 2011, and signed by Sam Mantenuto, Chief Operating Office and Chief Development Officer at Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc., and all supporting documentation submitted with the application, including amended documentation submitted up to October 31, 2012, and as further amended by the application dated March 14, 2013, and signed by Jim Mulvale, Manager, Environmental Health & Safety, Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc., and all supporting documentation submitted with the Application, including amended documentation submitted up to May 17, 2013; and as further amended by the application dated September 11, 2013, and signed by Jim Mulvale, Manager, Environmental Health & Safety, Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc., operating as McLean's Mountain Wind Limited Partnership, and all supporting documentation submitted with the Application, including amended documentation submitted up to the date this Approval is issued;

All other Terms and Conditions remain the same.

This Notice shall constitute part of the approval issued under Approval No. 7733-8XUNS5 dated October 31, 2012

NOTICE REGARDING HEARINGS

In accordance with Section 139 of the Environmental Protection Act, within 15 days after the service of this notice, you may by further written notice served upon the Director, the Environmental Review Tribunal and the Environmental Commissioner, require a hearing by the Tribunal.

In accordance with Section 47 of the Environmental Bill of Rights, 1993, the Environmental Commissioner will place notice of your request for a hearing on the Environmental Registry.

Section 142 of the Environmental Protection Act provides that the notice requiring the hearing shall state:

1. The portions of the renewable energy approval or each term or condition in the renewable energy approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The signed and dated notice requiring the hearing should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The renewable energy approval number;
6. The date of the renewable energy approval;
7. The name of the Director;
8. The municipality or municipalities within which the project is to be engaged in;

This notice must be served upon:

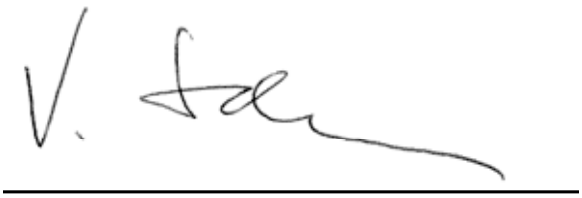
The Secretary*****		The Environmental Commissioner		The Director
Environmental Review Tribunal		1075 Bay Street, 6th Floor		Section 47.5, *Environmental Protection Act*
655 Bay Street, 15th Floor		Suite 605		Ministry of the Environment
Toronto, Ontario	AND	Toronto, Ontario	AND	2 St. Clair Avenue West, Floor 12A
M5G 1E5		M5S 2B1		Toronto, Ontario
				M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

Under Section 142.1 of the Environmental Protection Act, residents of Ontario may require a hearing by the Environmental Review Tribunal within 15 days after the day on which notice of this decision is published in the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca , you can determine when this period ends.

Approval for the above noted renewable energy project is issued to you under Section 47.5 of the Environmental Protection Act subject to the terms and conditions outlined above.

DATED AT TORONTO this 25th day of October, 2013



Vic Schroter, P.Eng.
Director
Section 47.5, *Environmental Protection Act*

MK/
c: District Manager, MOE Sudbury
Jim Mulvale, Northland Power Inc.

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDMENT TO RENEWABLE ENERGY APPROVAL

NUMBER 7733-8XUNS5
Issue Date: May 17, 2013

McLean's Mountain Wind GP Inc.
30 St. Clair Ave W 12th Floor
Toronto, Ontario
M4V 3A1

Site Location: 13 Worthington Street
Northeastern Manitoulin and The Islands Town, District of Manitoulin
P0P 1K0

You are hereby notified that I have amended Approval No. 7733-8XUNS5 issued on October 31, 2012 for a Class 4 wind facility , as follows:

A. The definitions of Acoustic Assessment Report and Application of the Approval are deleted and replaced with the following:

1. "Acoustic Assessment Report" means the report included in the Application and entitled "Revised Environmental Noise Impact Assessment Report", dated May 3, 2013 and signed by Rob Jozwiak and Payam Ashtiani, Aercoustics Engineering Limited. and includes additional correspondence submitted up to May 3, 2013;

11. "Application" means the application for a Renewable Energy Approval dated September 15, 2011, and signed by Sam Mantenuto, Chief Operating Office and Chief Development Officer at Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc., and all supporting documentation submitted with the application, including amended documentation submitted up to October 31, 2012, and the amendment application dated March 14, 2013 and signed by Jim Mulvale, Manager, Environmental Health & Safety, Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc., and all supporting documentation submitted with the Application, including amended documentation submitted up to the date this Approval is issued;

B. Condition No. A9 is deleted and replaced with the following:

A9. As described in Schedule A of the Approval the Company shall:

(1) not construct or operate more than twenty four (24) out of the twenty nine (29) wind turbine generators identified in the Schedule B of the Approval;

(2) construct and operate only two (2) GE 2.66-103 wind turbine generators at the locations with UTM coordinates for the wind turbine generators designated as sources ID No. T5 and T9; and

(3) construct and operate only the GE 2.38-103 wind turbine generator at the location with UTM coordinates for the wind turbine generator designated as source ID No. T20.

C. Subclause (3) of Condition No. F1 is deleted and replaced with following:

F1. (3) the acoustic emission measurements shall be performed on each type of the wind turbine generator used in the Facility. Specifically on:

(a) one (1) wind turbine generator rated at 2.66 megawatts generating output capacity used in the Facility;

(b) two (2) wind turbine generators rated at 2.49 megawatts generating output capacity used in the Facility; and

(c) one (1) wind turbine generator rated at 2.38 megawatts generating output capacity used in the Facility.

D. Schedules A and B are deleted and replaced with the following Schedule A and Schedule B:

SCHEDULE A
Facility Description

The Facility shall consist of the construction, installation, operation, use and retiring of the following Equipment::

(a) two (2) GE 2.66-103 wind turbine generators each rated at 2.66 megawatts generating output capacity, as specified in the Acoustic Assessment Report;

(b) a total of twenty one (21) out of twenty six (26) GE 2.49-103 wind turbine generators each rated at 2.49 megawatts generating output capacity, as specified in the Acoustic Assessment Report;

(c) one (1) GE 2.38-103 wind turbine generator rated at 2.38 megawatts generating output capacity

all with a total name plate capacity of up to approximately 60 megawatts, designated as source ID Nos. **T05, T06, T09-T21, T23, T25, T28-T30, T31, T34-T36, T38-T40, T42 and T43**, respectively each with a hub height of 98.3 metres above grade, and sited at the locations shown in Schedule B;

(d) one (1) transformer substation rated at 70 MVA and sited at the location shown in Schedule B; and

(e) associated ancillary equipment, systems and technologies including on-site access roads, underground cabling and overhead distribution lines,

all in accordance with the Application.

SCHEDULE B

Coordinates of the Equipment and Noise Specifications

Coordinates of the Equipment are listed below in UTM, Z17-NAD83 projection:

Source ID	Sound Power Level (dBA)	Easting (m)	Northing (m)	Source description
T05	**104.0**	425967	5088867	GE model 2.66-103 2.66MW
T06	**103.0**	425374	5088648	GE model 2.49-103 2.49MW
T09	**104.0**	426960	5088349	GE model 2.66-103 2.66MW
T10	**103.0**	426243	5088273	GE model 2.49-103 2.49MW
T11	**103.0**	423155	5087692	GE model 2.49-103 2.49MW
T12	**103.0**	424685	5087875	GE model 2.49-103 2.49MW
T13	**103.0**	425578	5087836	GE model 2.49-103 2.49MW
T14	**103.0**	424087	5087822	GE model 2.49-103 2.49MW
T15	**103.0**	426514	5087605	GE model 2.49-103 2.49MW
T16	**103.0**	423976	5085277	GE model 2.49-103 2.49MW
T17	**103.0**	421160	5086508	GE model 2.49-103 2.49MW
T18	**103.0**	423020	5086314	GE model 2.49-103 2.49MW
T19	**103.0**	426002	5086354	GE model 2.49-103 2.49MW
T20	**102.0**	425263	5086379	GE model 2.38-103 2.38MW
T21	**103.0**	420869	5086170	GE model 2.49-103 2.49MW
T23	**103.0**	423020	5085949	GE model 2.49-103 2.49MW
T25	**103.0**	415729	5084615	GE model 2.49-103 2.49MW
T28	**103.0**	424742	5084943	GE model 2.49-103 2.49MW
T29	**103.0**	423719	5084978	GE model 2.49-103 2.49MW
T30	**103.0**	424258	5084654	GE model 2.49-103 2.49MW
T31	**103.0**	416174	5082550	GE model 2.49-103 2.49MW
T34	**103.0**	423970	5084235	GE model 2.49-103 2.49MW
T35	**103.0**	415668	5083842	GE model 2.49-103 2.49MW
T36	**103.0**	416181	5083552	GE model 2.49-103 2.49MW
T38	**103.0**	415679	5083197	GE model 2.49-103 2.49MW
T39	**103.0**	417095	5082519	GE model 2.49-103 2.49MW
T40	**103.0**	416441	5082915	GE model 2.49-103 2.49MW
T42	**103.0**	415354	5082675	GE model 2.49-103 2.49MW
T43	**103.0**	416653	5082179	GE model 2.49-103 2.49MW
Substation Transformer	**94.6***	423616	5087363	Transformer 70 MVA

*NOTE: The Sound Power Level reported above for the Transformer Substation does include the 5 decibel (dB) adjustment for tonality as prescribed in Publication NPC-104.

All other Terms and Conditions remain the same.

This Notice shall constitute part of the approval issued under Approval No. 7733-8XUNS5 dated October 31, 2012

In accordance with Section 139 of the Environmental Protection Act, within 15 days after the service of this notice, you may by further written notice served upon the Director, the Environmental Review Tribunal and the Environmental Commissioner, require a hearing by the Tribunal.

In accordance with Section 47 of the Environmental Bill of Rights, 1993, the Environmental Commissioner will place notice of your request for a hearing on the Environmental Registry.

Section 142 of the Environmental Protection Act provides that the notice requiring the hearing shall state:

1. The portions of the renewable energy approval or each term or condition in the renewable energy approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The signed and dated notice requiring the hearing should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The renewable energy approval number;
6. The date of the renewable energy approval;
7. The name of the Director;
8. The municipality or municipalities within which the project is to be engaged in;

This notice must be served upon:

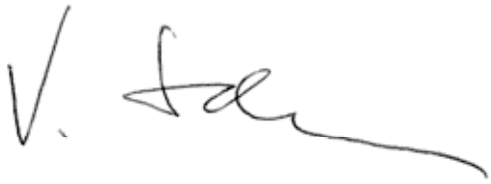
The Secretary*****		The Environmental Commissioner		The Director
Environmental Review Tribunal		1075 Bay Street, 6th Floor		Section 47.5, *Environmental Protection Act*
655 Bay Street, 15th Floor		Suite 605		Ministry of the Environment
Toronto, Ontario	AND	Toronto, Ontario	AND	2 St. Clair Avenue West, Floor 12A
M5G 1E5		M5S 2B1		Toronto, Ontario
				M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

Under Section 142.1 of the Environmental Protection Act, residents of Ontario may require a hearing by the Environmental Review Tribunal within 15 days after the day on which notice of this decision is published in the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca , you can determine when this period ends.

Approval for the above noted renewable energy project is issued to you under Section 47.5 of the Environmental Protection Act subject to the terms and conditions outlined above.

DATED AT TORONTO this 17th day of May, 2013



Vic Schroter, P.Eng.
Director
Section 47.5, *Environmental Protection Act*

DZ/

c: District Manager, MOE Sudbury
Jim Mulvale, Northland Power Inc.

RENEWABLE ENERGY APPROVAL

NUMBER 7733-8XUNS5
Issue Date: October 31, 2012

McLean's Mountain Wind GP Inc.
operating as McLean's Mountain Wind LP
30 St. Clair Ave W Suite 1700
Toronto, Ontario
M4V 3A1

Project Location: 13 Worthington Street
Town of Northeastern Manitoulin and The Islands
District of Manitoulin
P0P 1K0

You have applied in accordance with Section 47.4 of the Environmental Protection Act for approval to engage in a renewable energy project in respect of a Class 4 wind facility consisting of the following:

- the construction, installation, operation, use and retiring of a Class 4 wind facility with a total name plate capacity of 60 megawatts.

For the purpose of this renewable energy approval, the following definitions apply:

1. "Acoustic Assessment Report" means the report included in the Application and entitled "Revised Environmental Noise Impact Assessment Report", dated August 15, 2012 and signed by Payam Ashtiani and Samantha Trifoli, Aercoustics Engineering Limited.

2. "Acoustic Audit - Emission" means an investigative procedure that is compliant with the IEC Standard 61400-11 and consisting of measurements and/or acoustic modelling of noise emissions produced by wind turbine generators, assessed to determine compliance with the manufacturer's noise (acoustic) equipment specifications and emission data of the wind turbine generators, included in the Acoustic Assessment Report;

3. "Acoustic Audit - Immission" means an investigative procedure consisting of measurements and/or acoustic modelling of all sources of noise emissions due to the operation of the Equipment, assessed to determine compliance with the Noise Performance Limits set out in this Approval;

4. "Acoustic Audit Report-Emission" means a report presenting the results of the Acoustic Audit - Emission;

5. "Acoustic Audit Report-Immission" means a report presenting the results of the Acoustic Audit - Immission;

6. "Acoustic Audit - Transformer Substation" means an investigative procedure consisting of measurements and/or acoustic modelling of all noise sources comprising the transformer substation assessed to determine compliance with the Sound Power Level specification of the transformer substation described in the Acoustic Assessment Report.

7. "Acoustic Audit Report - Transformer Substation" means a report presenting the results of the Acoustic Audit - Transformer Substation.

8. "Acoustical Consultant" means a person currently active in the field of environmental acoustics and noise/vibration control, who is knowledgeable about Ministry noise guidelines and procedures and has a combination of formal university education, training and experience necessary to assess noise emissions from wind facilities;

9. "Act" means the *Environmental Protection Act* , R.S.O 1990, c.E.19, as amended;

10. "Adverse Effect" has the same meaning as in the Act;

11. "Application" means the application for a Renewable Energy Approval dated September 15, 2011, and signed by Sam Mantenuto, Chief Operating Office and Chief Development Officer at Northland Power Inc., on behalf of McLean's Mountain Wind GP Inc. all supporting documentation submitted with the Application, including amended documentation submitted up to the date this Approval is issued;

12. "Approval" means this Renewable Energy Approval issued in accordance with Section 47.4 of the Act, including any schedules to it;

13. "A-weighting" means the frequency weighting characteristic as specified in the International Electrotechnical Commission (IEC) Standard 61672, and intended to approximate the relative sensitivity of the normal human ear to different frequencies (pitches) of sound. It is denoted as “A”;

14. "A-weighted Sound Pressure Level" means the Sound Pressure Level modified by application of an A-weighting network. It is measured in decibels, A-weighted, and denoted “dBA”;

15. "Class 1 Area" means an area with an acoustical environment typical of a major population centre, where the background sound level is dominated by the activities of people, usually road traffic, often referred to as “urban hum”;

16. "Class 2 Area" means an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas:

    1. sound levels characteristic of Class 1 during daytime (07:00 to 19:00 or to 23:00 hours);

2. low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00 to 07:00 hours);

3. no clearly audible sound from stationary sources other than from those under impact assessment.

17. "Class 3 Area" means a rural area with an acoustical environment that is dominated by natural sounds having little or no road traffic, such as the following:

    1. a small community with less than 1000 population;

    2. agricultural area;

    3. a rural recreational area such as a cottage or a resort area; or

    4. a wilderness area.

18. "Company" means McLean's Mountain Wind GP Inc. as general partner for and on behalf of McLean's Mountain Wind Limited Partnership, the partnership under the laws of Ontario, and includes its successors and assignees.and includes its successors and assignees;

19. "Compliance Protocol for Wind Turbine Noise" means the Ministry document entitled, Compliance Protocol for Wind Turbine Noise, Guideline for Acoustic Assessment and Measurement, PIBS# 8540e;

20. “Decibel" means a dimensionless measure of Sound Level or Sound Pressure Level, denoted as dB;

21. "Director" means a person appointed in writing by the Minister of the Environment pursuant to section 5 of the Act as a Director for the purposes of section 47.5 of the Act;

22. "District Manager" means the District Manager of the appropriate local district office of the Ministry where the Facility is geographically located;

23. "Equipment" means the 24 wind turbine generators and a transformer substation, identified in this Approval and as further described in the Application, to the extent approved by this Approval;

24. "Equivalent Sound Level" is the value of the constant sound level which would result in exposure to the same total A-weighted energy as would the specified time-varying sound, if the constant sound level persisted over an equal time interval. It is denoted L_{eq} and is measured in dB A-weighting (dBA);

25. "Facility" means the renewable energy generation facility, including the Equipment, as described in this Approval and as further described in the Application, to the extent approved by this Approval;

26. "IEC Standard 61400-11" means the International Standard IEC Standard 61400-11, Wind turbine generator systems – Part 11: Acoustic noise measurement techniques, 2006;

27. "Independent Acoustical Consultant" means an Acoustical Consultant who is not representing the Company and was not involved in preparing the Acoustic Assessment Report. The Independent Acoustical Consultant shall not be retained by the Acoustical Consultant involved in the noise impact assessment;

28. "Ministry" means the ministry of the government of Ontario responsible for the Act and includes all officials, employees or other persons acting on its behalf;

29. "Noise Guidelines for Wind Farms" means the Ministry document entitled, “Noise Guidelines for Wind Farms - Interpretation for Applying MOE NPC Publications to Wind Power Generation Facilities”, dated October 2008;

30. “Noise Receptor” has the same meaning as in O. Reg. 359/09;

31. “O. Reg. 359/09” means Ontario Regulation 359/09 “Renewable Energy Approvals under Part V.0.1 of the Act” made under the Act;

32. "Point of Reception" has the same meaning as in the Noise Guidelines for Wind Farms and is subject to the same qualifications described in that document;

33. "Sound Level" means the A-weighted Sound Pressure Level;

34. "Sound Level Limit" is the limiting value described in terms of the one hour A-weighted Equivalent Sound Level L_{eq};

35. "Sound Power Level" means ten times the logarithm to the base of 10 of the ratio of the sound power (Watts) of a noise source to standard reference power of 10^{-12} Watts;

36. "Sound Pressure" means the instantaneous difference between the actual pressure and the average or barometric pressure at a given location. The unit of measurement is the micro pascal (µPa);

37. "Sound Pressure Level" means twenty times the logarithm to the base 10 of the ratio of the effective pressure (µPa) of a sound to the reference pressure of 20 µPa;

38. "UTM" means Universal Transverse Mercator coordinate system.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

A - GENERAL

A1. The Company shall construct, install, use, operate, maintain and retire the Facility in accordance with the terms and conditions of this Approval and the Application and in accordance with the following schedules attached hereto:

Schedule A - Facility Description
Schedule B - Coordinates of the Equipment and Noise Specifications

A2. Where there is a conflict between a provision of this Approval and any document submitted by the Company, the conditions in this Approval shall take precedence. Where there is a conflict between one or more of the documents submitted by the Company, the document bearing the most recent date shall take precedence.

A3. The Company shall ensure a copy of this Approval is:

(1) accessible, at all times, by Company staff operating the Facility and;

(2) submitted to the clerk of each local municipality and upper-tier municipality in which the Facility is situated.

A4. If the Company has a publicly accessible website, the Company shall ensure that the Approval and the Application are posted on the Company's publicly accessible website within five (5) business days of receiving this Approval.

A5. The Company shall, at least six (6) months prior to the anticipated retirement date of the entire Facility, or part of the Facility, review its Decommissioning Plan Report to ensure that it is still accurate. If the Company determines that the Facility cannot be decommissioned in accordance with the Decommissioning Plan Report, the Company shall provide the Director and District Manager a written description of plans for the decommissioning of the Facility.

A6. The Company shall, at least six (6) months prior to the anticipated retirement date of the entire Facility, or part of the Facility, contact the Ministry of Agriculture, Food and Rural Affairs to discuss its plans for the decommissioning of the Facility, including Company’s objective to restore the project location to its previous agricultural capacity.

A7. The Facility shall be retired in accordance with the Decommissioning Plan Report and any directions provided by the Director or District Manager.

A8. The Company shall provide the District Manager and the Director at least ten (10) days written notice of the following:

(1) the commencement of any construction or installation activities at the project location; and

(2) the commencement of the operation of the Facility.

A9. As described in Schedule A of the Approval the Company shall:

(1) not construct or operate more than twenty four (24) out of the twenty nine (29) wind turbine generators identified in the Schedule B of the Approval;

(2) construct and operate only the GE 2.355-103 wind turbine generator at the location with UTM coordinates for the wind turbine generator designated as source ID No. T20.

B - EXPIRY OF APPROVAL

B1. Construction and installation of the Facility must be completed within three (3) years of the later of:

(1) the date this Approval is issued; or

(2) if there is a hearing or other litigation in respect of the issuance of this Approval, the date that this hearing or litigation is disposed of, including all appeals.

B2. This Approval ceases to apply in respect of any portion of the Facility not constructed or installed before the later of the dates identified in Condition B1.

C - NOISE PERFORMANCE LIMITS

C1. The Company shall ensure that:

(1) the Sound Levels from the Equipment, at the Points of Reception identified in the Acoustic Assessment Report, comply with the Sound Level Limits set in the Noise Guidelines for Wind Farms, as applicable, and specifically as stated in the table below:

Wind Speed (m/s) at 10 m height	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Sound Level Limits, dBA	40.0	40.0	40.0	43.0	45.0	49.0	51.0

(2) the Equipment is constructed and installed at either of the following locations:

a) at the locations identified in Schedule B of this Approval; or

b) at a location that does not vary by more than 10 metres from the locations identified in Schedule B of this Approval and provided that,

i) the Equipment will comply with Condition C1 (1); and

ii) all setback prohibitions established under O. Reg. 359/09 are complied with.

(3) the Equipment complies with the noise specifications set out in Schedule B of this Approval.

C2. If the Company determines that some or all of the Equipment cannot be constructed in accordance with Condition C1 (2), prior to the construction and installation of the Equipment in question, the Company shall apply to the Director for an amendment to the terms and conditions of the Approval.

C3. Within three (3) months of the completion of the construction of the Facility, the Company shall submit to the Director a written confirmation signed by an individual who has the authority to bind the Company that the UTM coordinates of the "as constructed" Equipment comply with the requirements of Condition C1 (2).

D – CONFIRMATION OF VACANT LOT NOISE RECEPTORS

D1. The fifty six (56) locations identified in the Table entitled "McLean's Mountain wind Farm - Noise Impact Summary Table" of the Acoustic Assessment Report as Non-Participating Vacant Lots with ID numbers V201-V256 are specified as Noise Receptors for the purposes of paragraph 2 of subsection 54 (1.1) of O. Reg. 359/09 and subclause 35 (1) (a) (ii) of O. Reg. 359/09.

E - ACOUSTIC AUDIT - IMMISSION

E1. The Company shall carry out an Acoustic Audit - Immission of the Sound Levels produced by the operation of the Equipment in accordance with the following:

(1) the acoustic audit measurements shall be undertaken in accordance with Part D of the Compliance Protocol for Wind Turbine Noise;

(2) the acoustic audit measurements shall be performed by an Independent Acoustical Consultant at three (3) different Points of Reception that have been selected using the following criteria:

(a) the Points of Reception should represent the location of the greatest predicted noise impact, i.e., the highest predicted Sound Level; and

(b) the Points of Reception should be located in the direction of prevailing winds from the Facility;

(3) the acoustic audit measurements shall be performed on two (2) separate occasions within a period of twelve (12) months that represent the lowest annual ambient Sound Levels, preferably:

(a) March and April, and

(b) October and November.

E2. The Company shall submit to the District Manager and the Director an Acoustic Audit Report-Immision, prepared by an Independent Acoustical Consultant, at the following points in time:

(1) no later than nine (9) months after the commencement of the operation of the Facility for the first of the two (2) acoustic audit measurements at the three (3) Points of Reception; and

(2) no later than fifteen (15) months after the commencement of the operation of the Facility for the second of the two (2) acoustic audit measurements at the three (3) Points of Reception.

F - ACOUSTIC AUDIT- EMISSION

F1. The Company shall carry out an Acoustic Audit - Emission of the acoustic emissions produced by the operation of the wind turbine generators in accordance with the following:

(1) the acoustic emission measurements shall be undertaken in accordance with the IEC Standard 61400-11;

(2) the acoustic emission measurements shall be performed by an Independent Acoustical Consultant; and

(3) the acoustic emission measurements shall be performed on each type of the wind turbine generator used in the Facility. Specifically on:

(a) two (2) wind turbine generators rated at 2.5 megawatts generating output capacity used in the Facility; and

(b) one (1) wind turbine generator rated at 2.355 megawatts generating output capacity used in the Facility.

F2. The Company shall submit to the District Manager and the Director an Acoustic Audit Report-Emission, prepared in accordance with Section 9 of the IEC Standard 61400-11 by an Independent Acoustical Consultant, no later than six (6) months after the commencement of the operation of the Facility.

G - ACOUSTIC AUDIT - TRANSFORMER SUBSTATION

G1. The Company shall carry out an Acoustic Audit - Transformer Substation and shall submit to the District Manager and the Director an Acoustic Audit Report – Transformer Substation prepared by an Independent Acoustical Consultant no later than six (6) months after the commencement of the operation of the Facility.

H - STORMWATER MANAGEMENT

H1. The Company shall employ best management practices for stormwater management and sediment and erosion control during construction, installation, use, operation, maintenance and retiring of the Facility, as outlined in the Application.

H2. Within six (6) months of the completion of the construction of the Facility, the Company shall provide the District Manager with a stormwater management report that includes a detailed design of the stormwater management works for the collection, transmission, treatment and disposal of stormwater runoff from various catchment areas for the Facility. The stormwater management report shall also include an operations manual describing the visual inspections, frequency, and any other activity necessary for the adequate operation of the stormwater management works.

I - SEWAGE WORKS OF THE TRANSFORMER SUBSTATION SPILL CONTAINMENT FACILITY

I1. The Company shall design and construct a transformer substation spill containment facility which meets the following requirements:

(1) the spill containment area serving the transformer substation shall have a minimum volume equal to the volume of transformer oil and lubricants plus the volume equivalent to providing a minimum 24-hour duration, 50-year return storm capacity for the stormwater drainage area around the transformer under normal operating conditions;

(2) the containment facility shall have an impervious concrete floor and walls or impervious plastic liner on floor and walls, sloped toward an outlet, maintaining a freeboard of approximately 0.25 metres terminating approximately 0.30 metres above grade, and a minimum 300mm layer of crushed stoned (typical 19mm to 38mm in diameter) within, all as needed in accordance to site specific conditions and final design parameters;

(3) the containment facility shall drain to an oil control device, such as an oil/water separator, a pump-out sump, an oil absorbing material in a canister or a blind sump; and

(4) the oil control device shall be equipped with an oil detection system and appropriate sewage appurtenances, such as, but not limited to: sump, oil/grit separator, pumpout manhole, level controllers, floating oil sensors, etc., that allows for batch discharges or direct discharges and for proper implementation of the monitoring program described in Condition No. I4.

I2. The Company shall:

(1) prior to the construction of the transformer substation spill containment facility, provide the District Manager and Director a report and drawings issued for construction signed and stamped by an independent Professional Engineer licensed in Ontario and competent in electrical engineering;

(2) within six (6) months of the completion of the construction of the transformer substation spill containment facility, provide the District Manager and Director a report and drawings issued for construction signed and stamped by an independent Professional Engineer licensed in Ontario which includes the following:

(a) as-built drawings of the sewage works;
(b) confirmation that the transformer substation spill containment facility has been designed and installed according to appropriate specifications; and

(c) confirmation of the adequacy of the operating procedures and the emergency procedures manuals as it pertains to the installed sewage works.

(3) as a minimum, check the oil detection system on a monthly basis and create a written record of the inspections;

(4) ensure that the effluent is essentially free of floating and settle-able solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen or foam on the receiving waters;

(5) immediately identify and clean-up all losses of oil from the transformer;

(6) upon identification of oil in the effluent pumpout, take immediate action to prevent the further occurrence of such loss; and

(7) ensure that equipment and material for the containment, clean-up and disposal of oil and materials contaminated with oil are kept within easy access and in good repair for immediate use in the event of:

(a) loss of oil from the transformer,
(b) a spill within the meaning of Part X of the Act, or
(c) the identification of an abnormal amount of oil in the effluent.

I3. The Company shall design, construct and operate the sewage works such that the concentration of the effluent parameter named in the table below does not exceed the maximum concentration objective shown for that parameter in the effluent, and shall comply with the following requirements:

Effluent Parameters	Maximum Concentration Objective
Oil and Grease	15mg/L

(1) notify the District Manager as soon as reasonably possible of any exceedance of the maximum concentration objective set out in the table above;

(2) take immediate action to identify the cause of the exceedance; and

(3) take immediate action to prevent further exceedances.

I4. Upon commencement of the operation of the Facility, the Company shall establish and carry out the following monitoring program for the sewage works:

(1) the Company shall collect and analyze the required set of samples at the sampling points listed in the table below in accordance with the measurement frequency and sample type specified for the effluent parameter, oil and grease, and create a written record of the monitoring:

Effluent Parameters	Measurement Frequency and Sample Points	Sample Type
Oil and Grease	B – Batch, i.e., for each discrete volume in the sewer appurtenance as per I1(4) prior to pumpout; or Q – Quarterly for direct effluent discharge, i.e., four times over a year, relatively evenly spaced.	Grab

(2) in the event of an exceedance of the maximum concentration objective set out in the table in Condition No. I3, the Company shall:

(a) increase the frequency of sampling to once per month, for each month that effluent discharge occurs, and

(b) provide the District Manager, on a monthly basis, with copies of the written record created for the monitoring until the District Manager provides written direction that monthly sampling and reporting is no longer required; and

(3) if over a period of twenty-four (24) months of effluent monitoring under Condition No. I4(1), there are no exceedances of the maximum concentration set out in the table in Condition No. I3, the Company may reduce the measurement frequency of effluent monitoring to a frequency as the District Manager may specify in writing, provided that the new specified frequency is never less than annual.

I5. The Company shall comply with the following methods and protocols for any sampling, analysis and recording undertaken in accordance with Condition No. I4:

(1) Ministry of the Environment publication "Protocol for the Sampling and Analysis of Industrial/ Municipal Wastewater", January 1999, as amended from time to time by more recently published editions, and

(2) the publication "Standard Methods for the Examination of Water and Wastewater", 21st edition, 2005, as amended from time to time by more recently published editions.

J - WATER TAKING ACTIVITIES

J1. The Company shall not take more than 50,000 litres of water on any day by any means during the construction, installation, use, operation, maintenance and retiring of the Facility.

K - NATURAL HERITAGE AND PRE AND POST CONSTRUCTION MONITORING

GENERAL

K1. The Company shall implement the Environmental Effects Monitoring Plan for the McLean's Mountain Wind Farm, dated September 2012, and the commitments made in the McLean's Mountain Wind Farm Environmental Impact Study, dated August 2011, prepared by Dillon Consulting Ltd., and included in the Application, and which the Company submitted to the Ministry of Natural Resources in order to comply with O. Reg. 359/09.

K2. If the Company determines that it must deviate from either the Environmental Effects Monitoring Plan or the Environmental Impact Study, described in Condition K1, the Company shall contact the Ministry of Natural Resources and the Director, prior to making any changes to the Environmental Effects Monitoring Plan or the Environmental Impact Study, and follow any directions provided.

PRE-CONSTRUCTION MONITORING – SIGNIFICANT WILDLIFE HABITAT

K3. The Company shall implement the pre-construction monitoring described in the Environmental Effects Monitoring Plan described in Condition K1, including the following:

(1) A baseline survey of waterfowl nesting habitat for WNA 1, 4 and 5.

(2) A baseline survey of raptor winter, feeding and roosting habitat for RWFR 3 and 4.

POST-CONSTRUCTION MONITORING – SIGNIFICANT WILDLIFE HABITAT

K4. The Company shall implement the post-construction monitoring described in the Environmental Effects Monitoring Plan and the Environmental Impact Study, described in Condition K1, including the following:

(1) Disturbance Monitoring for Area Sensitive Species: Forest Birds Habitat (FB 1 and 2);

(2) Disturbance Monitoring for Open Country Breeding Bird Habitat (OCBB 3 and 4); and

(3) Bird and Bat mortality monitoring.

K5. Based on the results of the pre-construction monitoring described in Condition K3, should any of the Wildlife Habitats described in Condition K3 be deemed significant, the Company shall implement the post-construction monitoring described in the Environmental Effects Monitoring Plan described in Condition K1, at the specific habitats that are found to be significant, including the following:

(1) Disturbance Monitoring for Waterfowl Nesting Habitat (WNA 1, 4 and 5);

(2) Disturbance Monitoring for Raptor Winter Feeding and Roosting Habitat (RWFR 3 and 4); and

(3) Winter Mortality Monitoring for Raptor Winter Feeding and Roosting Habitat (RWFR 3 and 4).

POST CONSTRUCTION MONITORING - BIRD AND BAT MONITORING

THRESHOLDS AND MITIGATION

K6. The Company shall contact the Ministry of Natural Resources and the Director if any of the following bird and bat mortality thresholds, as stated in the Environmental Effects Monitoring Plan for the McLean's Mountain Wind Farm described in Condition K1, are reached or exceeded:

(1) 10 bats per turbine per year;

(2) 14 birds per turbine per year at individual turbines or turbine groups;

(3) 0.2 raptors per turbine per year (all raptors) across the wind power project;

(4) 0.1 raptors per turbine per year (provincially tracked raptors) across the wind power project;

(5) 10 or more birds at any one turbine during a single monitoring survey; or

(6) 33 or more birds (including raptors) at multiple turbines during a single monitoring survey.

K7. If the bat mortality threshold described in Condition K6(1) is reached or exceeded, the Company shall:

(1) implement operational mitigation measures consistent with those described in the Ministry of Natural Resources publication entitled "Bats and Bat Habitats: Guidelines for Wind Power Projects" dated July 2011, or in an amended version of the publication;

(2) increase cut-in speed to 5.5 m/s or feather wind turbine blades when wind speeds are below 5.5 m/s between sunset and sunrise, from July 15 to September 30 at all turbines, for the operating life of the Facility; and

(3) implement an additional three (3) years of effectiveness monitoring.

K8. If the bat mortality threshold described in Condition K6(1) is reached or exceeded after operational mitigation is implemented in accordance with Condition K7, the Company shall prepare and implement a contingency plan, in consultation with the Ministry of Natural Resources, to address mitigation actions which shall include additional mitigation and scoped monitoring requirements.

K9. If either of the bird mortality thresholds described in Conditions K6(2), K6(3) or K6(4) is reached or exceeded for turbines located within 120m of bird significant wildlife habitat, or if disturbance effects are realized at bird significant wildlife habitat within 120m of turbine(s) while monitoring is being implemented in accordance with Conditions K4 or K5, the Company shall implement immediate mitigation actions as described in the Environmental Impact Study and Environmental Effects Monitoring Plan described in Condition K1, and an additional three (3) years of effectiveness monitoring.

K10. If either of the bird mortality thresholds described in Conditions K6(2), K6(3) or K6(4) is reached or exceeded for turbines located outside 120 metres of bird significant wildlife habitat, the Company shall conduct two (2) years of subsequent scoped mortality monitoring and cause and effects monitoring. Following the completion of scoped monitoring, the Company shall implement operational mitigation for the operating life of the Facility, and effectiveness monitoring at individual turbines, for the first three (3) years following the implementation of mitigation.

K11. If either of the bird mortality thresholds described in Conditions K6(5) or K6(6) is reached or exceeded, the Company shall prepare and implement a contingency plan to address immediate mitigation actions which shall include:

(1) periodic shut-down of select turbines;

(2) blade feathering at specific times of year; or

(3) an alternate plan agreed to between the Company and the Ministry of Natural Resources.

K12. If either of the bird mortality thresholds described in Conditions K6(2), K6(3) or K6(4) is reached or exceeded while monitoring is being implemented in accordance with Conditions K9 or K10, or if either of the bird mortality thresholds described in Conditions K6(5) or K6(6) is reached or exceeded after mitigation is implemented in accordance with Condition K11, the Company shall contact the Ministry of Natural Resources and prepare and implement an appropriate response plan that shall include some or all of the following mitigation measures:

(1) increased reporting frequency to identify potential threshold exceedance;

(2) additional behavioural studies to determine factors affecting mortality rates;

(3) periodic shut-down of select turbines;

(4) blade feathering at specific times of year; or

(5) an alternate plan agreed to between the Company and the Ministry of Natural Resources.

REPORTING AND REVIEW OF RESULTS

K13. The Company shall report, in writing, the results of the post-construction disturbance monitoring described in Conditions K4 and K5, to the Ministry of Natural Resources for three (3) years on an annual basis and within three (3) months of the end of each calendar year in which the monitoring took place, with the exception of the following:

(1) if disturbance effects are realized at bird significant wildlife habitat within 120m of turbines while monitoring is being implemented in accordance with Conditions K4 or K5, the Company shall report disturbance effects to the Ministry of Natural Resources for the additional three (3) years of effectiveness monitoring described in Condition K9, on an annual basis and within three (3) months of completing the effectiveness monitoring for each year.

K14. The Company shall report, in writing, both the winter raptor mortality levels and the yearly (May-March) raptor mortality levels for the post-construction monitoring described in Conditions K4(3) and K5(3), to the Ministry of Natural Resources for three (3) years on an annual basis and within three (3) months of the conclusion of the March mortality monitoring for each year, with the exception of the following:

(1) if either of the bird mortality thresholds described in Conditions K6(5) or K6(6) is reached or exceeded , the Company shall report the mortality event to the Ministry of Natural Resources within 48 hours of observation;

(2) for any and all mortality of species at risk (including a species listed on the Species at Risk in Ontario list as Extirpated, Endangered or Threatened under the provincial *Endangered Species Act, 2007*) that occurs, the Company shall report the mortality to the Ministry of Natural Resources within 24 hours of observation or the next business day;

(3) if either of the raptor mortality thresholds described in Conditions K6(3) or K6(4) is reached or exceeded for turbines located within 120m of bird significant wildlife habitat, the Company shall report mortality levels to the Ministry of Natural Resources for the additional three (3) years of effectiveness monitoring described in Condition K9, on an annual basis and within (3) months of the conclusion of the March mortality monitoring for each year;

(4) if either of the raptor mortality thresholds described in Conditions K6(3) or K6(4) is reached or exceeded for turbines located outside 120 m of bird significant wildlife habitat, the Company shall report mortality levels to the Ministry of Natural Resources for the additional two (2) years of cause and effects monitoring described in Condition K10, on an annual basis and within three (3) months of the conclusion of the March mortality monitoring for each year; and

(5) if the Company implements operational mitigation following cause and effects monitoring in accordance with Condition K10 due to raptor mortality thresholds being reached or exceeded, the Company shall report mortality levels to the Ministry of Natural Resources for the three (3) years of subsequent effectiveness monitoring described in Condition K10, on an annual basis and within three (3) months of the conclusion of the March mortality monitoring for each year.

K15. The Company shall report, in writing, bird and bat mortality levels to the Ministry of Natural Resources for three (3) years on an annual basis and within three (3) months of the conclusion of the November mortality monitoring, with the exception of the following:

(1) if either of the bird mortality thresholds described in Conditions K6(5) or K6(6) is reached or exceeded , the Company shall report the mortality event to the Ministry of Natural Resources within 48 hours of observation;

(2) for any and all mortality of species at risk (including a species listed on the Species at Risk in Ontario list as Extirpated, Endangered or Threatened under the provincial *Endangered Species Act, 2007*) that occurs, the Company shall report the mortality to the Ministry of Natural Resources within 24 hours of observation or the next business day;

(3) if the bat mortality threshold described in Condition K6(1) is reached or exceeded, the Company shall report mortality levels to the Ministry of Natural Resources for the additional three (3) years of monitoring described in Condition K7, on an annual basis and within three (3) months of the conclusion of the October mortality monitoring for each year;

(4) if either of the bird mortality thresholds described in Conditions K6(2), K6(3) or K6(4) is reached or exceeded for turbines located within 120m of bird significant wildlife habitat, the Company shall report mortality levels to the Ministry of Natural Resources for the additional three (3) years of effectiveness monitoring described in Condition K9, on an annual basis and within (3) months of the conclusion of the November mortality monitoring for each year;

(5) if either of the bird mortality thresholds described in Conditions K6(2), K6(3) or K6(4) is reached or exceeded for turbines located outside 120 m of bird significant wildlife habitat, the Company shall report mortality levels to the Ministry of Natural Resources for the additional two (2) years of cause and effects monitoring described in Condition K10, on an annual basis and within three (3) months of the conclusion of the November mortality monitoring for each year; and

(6) if the Company implements operational mitigation following cause and effects monitoring in accordance with Condition K10, the Company shall report mortality levels to the Ministry of Natural Resources for the three (3) years of subsequent effectiveness monitoring described in Condition K10, on an annual basis and within three (3) months of the conclusion of the November mortality monitoring for each year.

L - TRAFFIC MANAGEMENT PLANNING

L1. Within three (3) months of receiving this Approval, the Company shall prepare a Traffic Management Plan and provide it to the Municipality of Northeastern Manitoulin and the Islands.

L2. Within three (3) months of having provided the Traffic Management Plan to the Municipality of Northeastern Manitoulin and the Islands, the Company shall make reasonable efforts to enter into a Road Users Agreement with the Municipality of Northeastern Manitoulin and the Islands.

L3. If a Road Users Agreement has not been signed with the Municipality of Northeastern Manitoulin and the Islands within three (3) months of having provided the Traffic Management Plan to the Municipality of Northeastern Manitoulin and the Islands, the Company shall provide a written explanation to the Director as to why this has not occurred.

M - ARCHAEOLOGICAL RESOURCES

M1. The Company shall implement all of the recommendations, if any, for further archaeological fieldwork and for the protection of archaeological sites found in the consultant archaeologist's report included in the Application, and which the Company submitted to the Ministry of Tourism, Culture and Sport in order to comply with clause O. Reg. 359/09.

M2. Should any previously undocumented archaeological resources be discovered, the Company shall:

(1) cease all alteration of the area in which the resources were discovered immediately;

(2) engage a consultant archaeologist to carry out the archaeological fieldwork necessary to further assess the area and to either protect and avoid or excavate any sites in the area in accordance with the Ontario *Heritage Act*, the regulations under that act and the Ministry of Tourism, Culture and Sport's "Standards and Guidelines for Consultant Archaeologists"; and

(3) notify the Director as soon as reasonably possible.

N - COMMUNITY LIAISON COMMITTEE

N1. Within three (3) months of receiving this Approval, the Company shall make reasonable efforts to establish a Community Liaison Committee. The Community Liaison Committee shall be a forum to exchange ideas and share concerns with interested residents and members of the public. The Community Liaison Committee shall be established by:

(1) publishing a notice in a newspaper with general circulation in each local municipality in which the project location is situated; and

(2) posting a notice on the Company's publicly accessible website, if the Company has a website;

to notify members of the public about the proposal for a Community Liaison Committee and invite residents living within a one (1) kilometre radius of the Facility that may have an interest in the Facility to participate on the Community Liaison Committee.

N2. The Company may invite other members of stakeholders to participate in the Community Liaison Committee, including, but not limited to, members of local municipalities, local conservation authorities, Aboriginal communities, federal or provincial agencies, and local community groups.

N3. The Community Liaison Committee shall consist of at least one Company representative who shall attend all meetings.

N4. The purpose of the Community Liaison Committee shall be to:

(1) act as a liaison facilitating two way communications between the Company and members of the public with respect to issues relating to the construction, installation, use, operation, maintenance and retirement of the Facility;

(2) provide a forum for the Company to provide regular updates on, and to discuss issues or concerns relating to, the construction, installation, use, operation, maintenance and retirement of the Facility with members of the public; and

(3) ensure that any issues or concerns resulting from the construction, installation, use, operation, maintenance and retirement of the Facility are discussed and communicated to the Company.

N5. The Community Liaison Committee shall be deemed to be established on the day the Director is provided with written notice from the Company that representative Community Liaison Committee members have been chosen and a date for a first Community Liaison Committee meeting has been set.

N6. If a Community Liaison Committee has not been established within three (3) months of receiving this Approval, the Company shall provide a written explanation to the Director as to why this has not occurred.

N7. The Company shall ensure that the Community Liaison Committee operates for a minimum period of two (2) years from the day it is established. During this two (2) year period, the Company shall ensure that the Community Liaison Committee meets a minimum of two (2) times per year. At the end of this two (2) year period, the Company shall contact the Director to discuss the continued operation of the Community Liaison Committee.

N8. The Company shall ensure that all Community Liaison Committee meetings are open to the general public.

N9. The Company shall provide administrative support for the Community Liaison Committee including, at a minimum:

(1) providing a meeting space for Community Liaison Committee meetings;

(2) providing access to resources, such as a photocopier, stationery, and office supplies, so that the Community Liaison Committee can:

(a) prepare and distribute meeting notices;

(b) record and distribute minutes of each meeting; and

(c) prepare reports about the Community Liaison Committee's activities.

N10. The Company shall submit any reports of the Community Liaison Committee to the Director and post it on the Company's publicly accessible website, if the Company has a website.

O - ABORIGINAL CONSULTATION

O1. During the construction, installation, and operation of the Facility, the Company shall:

(1) maintain communications with interested Aboriginal communities;

(2) create and maintain written records of the communications; and

(3) make the written records available for review by the Ministry upon request.

O2. The Company shall provide the following to interested Aboriginal communities that have requested or may request it:

(1) updated project information, including the results of monitoring activities undertaken and copies of additional archaeological assessment reports that may be prepared; and

(2) updates on key steps in the construction, installation and operation phases of the Facility, including notice of the commencement of construction activities at the project location.

O3. If an interested Aboriginal community requests a meeting to obtain information relating to the construction, installation, operation, use and retiring of the Facility, the Company shall make reasonable efforts to arrange and participate in such a meeting.

O4. If any archaeological resources of Aboriginal origin are found during the construction of the Facility, the Company shall:

(1) notify any Aboriginal community considered likely to be interested or which has expressed an interest in such finds; and,

(2) arrange and participate in any meeting requested by an interested Aboriginal community to discuss the archaeological find(s) and/or the use of Aboriginal archaeological liaisons.

P - OPERATION AND MAINTENANCE

P1. Prior to the commencement of the operation of the Facility, the Company shall prepare a written manual for use by Company staff outlining the operating procedures and a maintenance program for the Equipment that includes as a minimum the following:

(1) routine operating and maintenance procedures in accordance with good engineering practices and as recommended by the Equipment suppliers;

(2) emergency procedures;

(3) procedures for any record keeping activities relating to operation and maintenance of the Equipment; and

(4) all appropriate measures to minimize noise emissions from the Equipment.

P2. The Company shall;

(1) update, as required, the manual described in Condition P1; and

(2) make the manual described in Condition P1 available for review by the Ministry upon request.

P3. The Company shall ensure that the Facility is operated and maintained in accordance with the Approval and the manual described in Condition P1.

Q - RECORD CREATION AND RETENTION

Q1. The Company shall create written records consisting of the following:

(1) an operations log summarizing the operation and maintenance activities of the Facility;

(2) within the operations log, a summary of routine and Ministry inspections of the Facility; and

(3) a record of any complaint alleging an Adverse Effect caused by the construction, installation, use, operation, maintenance or retirement of the Facility.

Q2. A record described under Condition Q1 (3) shall include:

(1) a description of the complaint that includes as a minimum the following:

(a) the date and time the complaint was made;

(b) the name, address and contact information of the person who submitted the complaint;

(2) a description of each incident to which the complaint relates that includes as a minimum the following:

(a) the date and time of each incident;

(b) the duration of each incident;

(c) the wind speed and wind direction at the time of each incident;

(d) the ID of the Equipment involved in each incident and its output at the time of each incident;

(e) the location of the person who submitted the complaint at the time of each incident; and

(3) a description of the measures taken to address the cause of each incident to which the complaint relates and to prevent a similar occurrence in the future.

Q3. The Company shall retain, for a minimum of five (5) years from the date of their creation, all records described in Condition Q1, and make these records available for review by the Ministry upon request.

R - NOTIFICATION OF COMPLAINTS

R1. The Company shall notify the District Manager of each complaint within two (2) business days of the receipt of the complaint.

R2. The Company shall provide the District Manager with the written records created under Condition Q2 within eight (8) business days of the receipt of the complaint.

S - CHANGE OF OWNERSHIP

S1. The Company shall notify the Director in writing, and forward a copy of the notification to the District Manager, within thirty (30) days of the occurrence of any of the following changes:

(1) the ownership of the Facility;

(2) the operator of the Facility;

(3) the address of the Company;

(4) the partners, where the Company is or at any time becomes a partnership and a copy of the most recent declaration filed under the *Business Names Act*, R.S.O. 1990, c.B.17, as amended, shall be included in the notification; and

(5) the name of the corporation where the Company is or at any time becomes a corporation, other than a municipal corporation, and a copy of the most current information filed under the *Corporations Information Act*, R.S.O. 1990, c. C.39, as amended, shall be included in the notification.

SCHEDULE A

Facility Description

The Facility shall consist of the construction, installation, operation, use and retiring of the following Equipment::

(a) a total of twenty three (23) out of twenty eight (28) GE 2.5-103 wind turbine generators each rated at 2.5 megawatts generating output capacity, as specified in the Acoustic Assessment Report;

(b) one (1) GE 2.355-103 wind turbine generator rated at 2.355 megawatts generating output capacity

with a total name plate capacity of up to approximately 60 megawatts, designated as source ID Nos. **T05, T06, T09-T21, T23, T25, T28, T30, T31, T34-T36, T38-T40, T42 and T43**, respectively each with a hub height of 98.3 metres above grade, and sited at the locations shown in Schedule B;

(c) one (1) transformer substation rated at 66 MVA and sited at the location shown in Schedule B; and

(d) associated ancillary equipment, systems and technologies including on-site access roads, underground cabling and overhead distribution lines,

all in accordance with the Application.

SCHEDULE B

Coordinates of the Equipment and Noise Specifications

Coordinates of the Equipment are listed below in UTM, Z17-NAD83 projection:

Source ID	Sound Power Level (dBA)	Easting (m)	Northing (m)	Source description
T05	**104.0**	425967	5088867	GE model 2.5-103 2.5MW
T06	**104.0**	425374	5088648	GE model 2.5-103 2.5MW
T09	**104.0**	426960	5088349	GE model 2.5-103 2.5MW
T10	**104.0**	426243	5088273	GE model 2.5-103 2.5MW
T11	**104.0**	423155	5087692	GE model 2.5-103 2.5MW
T12	**104.0**	424685	5087875	GE model 2.5-103 2.5MW
T13	**104.0**	425578	5087836	GE model 2.5-103 2.5MW
T14	**104.0**	424005	5087874	GE model 2.5-103 2.5MW
T15	**104.0**	426514	5087605	GE model 2.5-103 2.5MW
T16	**104.0**	423976	5085277	GE model 2.5-103 2.5MW
T17	**104.0**	421160	5086508	GE model 2.5-103 2.5MW
T18	**104.0**	423020	5086314	GE model 2.5-103 2.5MW
T19	**104.0**	426002	5086354	GE model 2.5-103 2.5MW
T20	**102.0**	425263	5086379	GE model 2.355-103 2.355MW
T21	**104.0**	420869	5086170	GE model 2.5-103 2.5MW
T23	**104.0**	423091	5085958	GE model 2.5-103 2.5MW
T25	**104.0**	415729	5084615	GE model 2.5-103 2.5MW
T28	**104.0**	424742	5084943	GE model 2.5-103 2.5MW
T29	**104.0**	423719	5084978	GE model 2.5-103 2.5MW
T30	**104.0**	424211	5084627	GE model 2.5-103 2.5MW
T31	**104.0**	416174	5082550	GE model 2.5-103 2.5MW
T34	**104.0**	423970	5084235	GE model 2.5-103 2.5MW
T35	**104.0**	415668	5083842	GE model 2.5-103 2.5MW
T36	**104.0**	416181	5083552	GE model 2.5-103 2.5MW
T38	**104.0**	415679	5083197	GE model 2.5-103 2.5MW
T39	**104.0**	417095	5082519	GE model 2.5-103 2.5MW
T40	**104.0**	416441	5082915	GE model 2.5-103 2.5MW
T42	**104.0**	415354	508675	GE model 2.5-103 2.5MW
T43	**104.0**	416653	5082179	GE model 2.5-103 2.5MW
Substation Transformer	**94.4***	423616	5087363	Transformer 66 MVA

*NOTE: The Sound Power Level reported above for the Transformer Substation does include the 5 decibel (dB) adjustment for tonality as prescribed in Publication NPC-104.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition A1, A2, and A9 are included to ensure that the Facility is constructed, installed, used, operated, maintained and retired in the manner in which it was described for review and upon which Approval was granted. These conditions are also included to emphasize the precedence of conditions in the Approval and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

2. Condition A3 and A4 are included to require the Company to provide information to the public and the local municipality.

3. Condition A5, A6 and A7 are included to ensure that final retirement of the Facility is completed in an aesthetically pleasing manner, in accordance with Ministry standards, and to ensure long-term protection of the health and safety of the public and the environment.

4. Condition A8 is included to require the Company to inform the Ministry of the commencement of activities related to the construction, installation and operation of the Facility.

5. Condition B is intended to limit the time period of the Approval.

6. Condition C1 is included to provide the minimum performance requirement considered necessary to prevent an Adverse Effect resulting from the operation of the Equipment and to ensure that the noise emissions from the Equipment will be in compliance with applicable limits set in the Noise Guidelines for Wind Farms.

7. Conditions C2, C3 and D are included to ensure that the Equipment is constructed, installed, used, operated, maintained and retired in a way that meets the regulatory setback prohibitions set out in O. Reg. 359/09.

8. Conditions E, F and G are included to require the Company to gather accurate information so that the environmental noise impact and subsequent compliance with the Act, O. Reg. 359/09, the Noise Guidelines for Wind Farms and this Approval can be verified.
9. Condition H, I, J, K, and L are included to ensure that the Facility is constructed, installed, used, operated, maintained and retired in a way that does not result in an Adverse Effect or hazard to the natural environment or any persons.

10. Condition M is included to ensure that is included to protect archaeological resources that may be found at the project location.

11. Condition N is included to ensure continued communication between the Company and the local residents.

12. Condition O included to require the Company to ensure continued communication between the Company and Aboriginal communities.

13. Condition P is included to emphasize that the Equipment must be maintained and operated according to a procedure that will result in compliance with the Act, O. Reg. 359/09 and this Approval.

14. Condition Q is included to require the Company to keep records and provide information to the Ministry so that compliance with the Act, O. Reg. 359/09 and this Approval can be verified.
15. Condition R is included to ensure that any complaints regarding the construction, installation, use, operation, maintenance or retirement of the Facility are responded to in a timely and efficient manner.

16. Condition S is included to ensure that the Facility is operated under the corporate name which appears on the application form submitted for this Approval and to ensure that the Director is informed of any changes.

NOTICE REGARDING HEARINGS

In accordance with Section 139 of the Environmental Protection Act, within 15 days after the service of this notice, you may by further written notice served upon the Director, the Environmental Review Tribunal and the Environmental Commissioner, require a hearing by the Tribunal.

In accordance with Section 47 of the Environmental Bill of Rights, 1993, the Environmental Commissioner will place notice of your request for a hearing on the Environmental Registry.

Section 142 of the Environmental Protection Act provides that the notice requiring the hearing shall state:

1. The portions of the renewable energy approval or each term or condition in the renewable energy approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The signed and dated notice requiring the hearing should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The renewable energy approval number;
6. The date of the renewable energy approval;
7. The name of the Director;
8. The municipality or municipalities within which the project is to be engaged in;

This notice must be served upon:

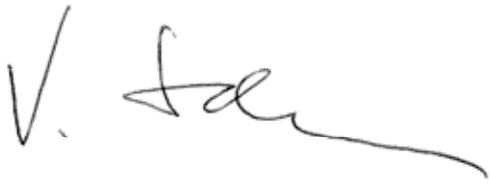
The Secretary***** Environmental Review Tribunal 655 Bay Street, 15th Floor Toronto, Ontario M5G 1E5	AND	The Environmental Commissioner 1075 Bay Street, 6th Floor Suite 605 Toronto, Ontario M5S 2B1	AND	The Director Section 47.5, *Environmental Protection Act* Ministry of the Environment 2 St. Clair Avenue West, Floor 12A Toronto, Ontario M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

Under Section 142.1 of the Environmental Protection Act, residents of Ontario may require a hearing by the Environmental Review Tribunal within 15 days after the day on which notice of this decision is published in the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca, you can determine when this period ends.

Approval for the above noted renewable energy project is issued to you under Section 47.5 of the Environmental Protection Act subject to the terms and conditions outlined above.

DATED AT TORONTO this 31st day of October, 2012



Vic Schroter, P.Eng.
Director
Section 47.5, *Environmental Protection Act*

KR/
c: District Manager, MOE Sudbury
Rick Martin, Northland Power Inc.

TAB E

Ministry of the Environment and Climate Change

Environmental Approvals Branch

135 St. Clair Avenue West
1st Floor
Toronto ON M4V 1P5
Tel.: 416 314-8001
Fax: 416 314-8452

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction des autorisations environnementales

135, avenue St. Clair Ouest
Rez-de-chaussée
Toronto ON M4V 1P5
Tél : 416 314-8001
Téléc. : 416 314-8452

Ontario

July 11, 2017

TO: Jim Mulvale
McLean's Mountain Wind GP Inc. (Northland Power)
30 St. Clair Ave W 12th Floor
Toronto, ON, M4V 3A1

RE: REA Approval #7733-8XUNS5 – Acoustic Audit Status and Options

Dear Mr. Mulvale,

Ministry of the Environment and Climate Change (ministry) records indicate that the McLean's Mountain Wind Farm Project is operational and has been issued Renewable Energy Approval (Approval) #7733-8XUNS5. Within the Approval are two acoustic audit Conditions (E and F) that require your attention.

I-Audit (Condition E):

Condition E of the Approval requires two (2) sets of Acoustic Audit -Immission (I-Audit) Reports to be conducted at three (3) Points of Reception. The first set of I-Audit Reports must be conducted and submitted to the ministry no later than nine (9) months, and the second set, no later than fifteen (15) months after commencement of operations. Based on a preliminary review of the I-Audit Reports submitted, the ministry has determined that they do not contain enough information to begin our comprehensive review process required to demonstrate compliance with the noise performance limits.

Based on consultation with the regulated community, the ministry released on April 19, 2017 an updated Compliance Protocol for Wind Turbine Noise – 2017, NPC 350 (Protocol), which outlines the options available to proponents with incomplete acoustic audits. Here is a summary of options available:

Option #1. Supplement Audits with Existing Data

The proponent or the consultant that conducted the audit may have additional data that was not initially provided to the ministry. This option allows proponents to revisit all existing data already

collected and use it to supplement their audit reports, and then re-submit them to the ministry. The supplementary data may be enough to deem the I-Audit Report(s) complete without further measurements being required. For additional details, please refer to the Protocol.

If Option #1 is selected, you must submit the additional information to the ministry within 3 months of the date of this letter.

Option #2. Combining Audit Measurements

The proponent may combine data from two existing, but incomplete, I-Audit Reports (audits conducted prior to April 19, 2017) if the background noise criteria are met. This may result in one complete I-Audit Report based on the previous Compliance Protocol for Wind Turbine Noise, July 2011. The proponent would then be required to conduct an additional I-Audit in accordance with the Protocol. For additional details, please refer to the Protocol.

If Option #2 is selected, you must submit the first I-Audit Report (combined and complete) within 3 months of the date of this letter and the second (new) I-Audit Report, within 9 months of the date of this letter.

Option #3. Conduct Two Audits as per 2017 Protocol

The proponent may opt to conduct two audits in accordance with the Protocol, and submit to the ministry for review.

If Option #3 is selected, the proponent must submit the additional information to the ministry within 15 months of the date of this letter.

Please select an option above and notify the ministry of your selection, in writing, within 30 days of the date of this letter. In addition, please re-submit your I-Audit Reports / additional information according to the requirements and timelines outlined above.

E-Audit (Condition F):

Condition F of the Approval requires an Acoustic Audit -Emission (E-Audit) Report to be conducted at three (3) different turbine locations, and submitted to the ministry no later than six (6) months after commencement of operations. Based on a preliminary review of the E-Audit Report submitted, the ministry has determined that it does not contain enough information to begin our comprehensive review process required to demonstrate compliance with the noise performance limits.

The Protocol outlines options available to proponents with incomplete E-Audit Reports. Please submit the missing data to the ministry within 60 days of the date of this letter (per section E.3.2), or consult section E.3 of the Compliance Protocol for additional options to address this matter.

The ministry looks forward to your prompt reply and continued cooperation in addressing the items outlined above. Failure to comply with this request will result in a referral to the local district office which may choose to utilize appropriate compliance and enforcement tools to bring the facility into compliance. These tools may include a Provincial Officer's Order requiring a

company implement a Noise Abatement Action Plan (e.g. de-rate turbines) or requiring turbine operation to be suspended until compliance can be assured. If you have any questions or require any further information regarding the above, please contact me at 416-326-6095 or mohsen.keyvani@ontario.ca.

Yours truly,

Mohsen Keyvani, P.Eng.
Director
Section 47.5, *Environmental Protection Act*

c.c. Ron Dorscht, District Manager, Sudbury District Office

Jim Mulvale

From: Keyvani, Mohsen (MOECC) <Mohsen.Keyvani@ontario.ca>
Sent: September-20-17 4:47 PM
To: Jim Mulvale
Cc: Cameron, Brian (MOECC); Brennan, Drew (MOECC); Moggy, Steven (MOECC); Miller, Denton (MOECC); Zangeneh, Mahdi (MOECC); Satkunanathan, Kuruparan (MOECC); Keyvani, Mohsen (MOECC)
Subject: RE: McLean's Mtn Wind Farm - Follow-up to MOE Noise Audit Letter (E-Audit)

This correspondence is in response to your September 8, 2017 letter to myself and Mr. Steven Moggy, Sr. Environmental Officer, Sudbury District Office.

The September 8, 2017 letter acknowledges / states that:

1. the REA approval (as amended) requires the following E-Audits:

   a. One (1) audit at a 2.66 MW turbine;
   b. Two (2) audits at turbines rated at 2.49 MW; and
   c. One (1) audit at the only turbine rated at 2.38 MW in the facility.

2. None of the submitted audits have adequate data for a detailed review. *(To date only three of the required four audit were submitted. An audit for the only 2.38 MW turbine in the facility was not submitted.)*

3. Your firm will resubmit the following audits, assessed by edition three of the applicable standard by **October 15, 2017** (this submission date exceeds a date of 60 days after my July 11, 2017 which was September 9, 2017):

   a. One (1) audit at a 2.66 MW turbine; and
   b. Two (2) audits at turbines rated at 2.49 MW.

4. In regards to the fourth E-Audit which was to address the only 2.38 MW turbine, your firm proposes to submit an application to amend the REA. The amendment will provide justification to delete the audit requirement for the 2.38 MW turbine.

   The rationale for the exclusion of an audit at this location is primarily due to the topography and vegetation in proximity to the 2.38 MW turbine. It is stated that the subject area is heavily forested and very hilly. As a result of the proximity of the trees, it is not possible to install the sound level meter and the wind mast/anemometer to conform to the requirements of the IEC standard. Please submit the REA amendment application no later than **October 15, 2017** (this submission date exceeds a date of 60 days after my July 11, 2017 which was September 9, 2017).

In response to items 3 and 4 above, we find the proposed approach and timings to be acceptable. Please proceed as detailed above.

Furthermore, it is ministry's expectation that you post a copy of the complete acoustic audit reports on the company's website within 10 days of submission of the reports to the ministry.

Sincerely,

Mohsen Keyvani

Mohsen Keyvani, P.Eng. | Supervisor – Team 5 (Renewable Energy) | Environmental Approvals Branch | Ministry of the Environment and Climate Change
2 St. Clair Avenue West, Floor 12A, Toronto, ON M4V 1L5 | Tel: 416-314-8573 | Fax: 416-314-8452 | Toll Free: 1 800 461-6290 | Email: mohsen.keyvani@ontario.ca

Jim Mulvale

From: Jim Mulvale
Sent: September-08-17 10:47 AM
To: 'Moggy, Steven (MOECC)'; 'Keyvani, Mohsen (MOECC)'
Cc: 'Miller, Denton (MOECC)'
Subject: McLean's Mtn Wind Farm - Follow-up to MOE Noise Audit Letter (E-Audit)
Attachments: MMWF_MOE_Noise E-Audit Action Ltr-2017 09 08.pdf

Further to our discussion on August 24, 2017, please find our response to the MOE&CC letter of July 11, 2017, related to the E-Audits of the McLean's Mountain Wind Farm and the determination that some aspects of the reporting are "incomplete".

Sorry for the delay in documenting our corrective action approach, Aercoustics needed a bit of time to review the data we had previously collected.

Regards

Jim Mulvale, P.Eng. | Sr. Director, EH&S
Northland Power Inc
30 St. Clair Ave. West, 12th Floor
Toronto, Ontario
M4V 3A1

d: 647.288.1273 | c: 416 662 1437

September 8, 2017

Mr. Mohsen Keyvani
Director, Section 47.5, EPA
Ministry of the Environment & Climate Change
(by e-mail)

Mr. Steven Moggy
Sr. Environmental Officer, Sudbury District
Ministry of the Environment & Climate Change
(by e-mail)

SUBJECT : McLean's Mountain Wind Farm - REA Approval # 7733-8XUNS5
2014 Acoustic E-Audit Review Status and Corrective Action

This letter is in reply to your letter dated July 11, 2017, specifically regarding the Acoustic E-Audit (REA Condition F) section, and is also a follow-up to our phone conference call of August 24, 2017.

As discussed during our conference call, the REA approval (as amended) requires E-Audits at 4 turbines, and specifically 1 audit at a 2.66 MW turbine, 2 audits at the 2.49 turbines and 1 audit at the only 2.38 MW turbine. The E-audits are to be completed in accordance with the IEC-61400-11 standard. Based on a preliminary review of the E-Audits submitted under a cover page dated November 21, 2014, the MOE&CC concludes that the submitted audits are not complete enough to proceed to a comprehensive review.

Your letter, dated July 11, 2017, suggested that we should review the Compliance Protocol Section 3 for options on how to address the incomplete report situation.

As discussed in our phone call, and upon review of the Compliance Protocol, we wish to confirm that we will prepare and re-submit E-Audit reports for the 2.66 MW and the two 2.49 MW turbines and the analysis and reports will conform to Edition 3 of the IEC 61400-11 Standard. Your letter, dated July 11, 2017, stipulated a due date of September 11 for submission of any corrections to the original reports, and we respectfully request an extended due date of October 31, 2017, to allow the acoustic consultant time to fully analyze the historical data and prepare three new reports.

In regards to the fourth E-audit covering the only 2.38 MW, I propose to submit an application to amend our REA permit to delete this audit requirement. As the acoustic consultant described, the physical location of the 2.38 MW turbine is situated in a forest area which is very hilly and undulating. As a result of the trees, there is no way to install the noise meter and the wind mast/anemometer and conform to the IEC standard. Since we have never received a noise complaint associated with the operation of this turbine, we feel that the E-Audit requirement can be removed. We will provide further rationale in our amendment application. I would also ask that we be allowed to submit the amendment application not later than October 31, 2017.

We trust this letter meets with your satisfaction. Please feel free to contact me if you have any concerns about this matter.

Regards

Jim Mulvale

Senior Director, EH&S
Northland Power Inc.
30 St. Clair Ave West, 12 th Floor
Toronto, Ontario M4V 3A1
416 662 1437 (cell)
647 288 1273 (phone)
jim.mulvale@northlandpower.ca