Northland Power Inc.
McLean's Mountain Wind Farm
Environmental Screening Report/Environmental Impact Statement

July 2009

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Submitted by

Dillon Consulting Limited

Executive Summary

Northland Power Inc. (NPI) proposes to develop the McLean's Mountain Wind Farm (MMWF), located south of the community of Little Current, in the Municipality of Northeastern Manitoulin and the Islands (NEMI); geographic Township of Howland, and the geographic Township of Bidwell in the District of Manitoulin, Ontario. This wind farm is expected to consist of up to 43 wind turbines that will generate 77 MW of electricity. NPI intends to develop the project under the new Green Energy Act (GEA) Feed-In-Tariff (FIT) program.

This Environmental Screening Report/ Environmental Impact Statement (ESR/EIS, referred to in this report as 'ESR') is consistent with the Environmental Screening provisions of Ontario Regulation 116/01 for a Category B project and with the requirements of the *Canadian Environmental Assessment Act*. A team of interdisciplinary professionals completed the screening and this report using best practices. Field work and data collection, based on agency-approved protocols and methodology, was undertaken to assist in the determination of potential environmental effects, including both the social and natural environment, which could result from this project. Key data collection activities included one full year of bat surveys and initial aquatic habitat surveys. A mitigation and monitoring strategy has been developed to manage the potential effects. NPI is also committed to conducting additional bat survey work to meet MNR guidelines.

The level of environmental investigation that has been undertaken to support this environmental screening is consistent with the level of work undertaken for an environmental review. A significant amount of field work and detailed assessment of effects has been undertaken that goes well beyond the expectations of an environmental screening as outlined in the *"Guide to Environmental Assessment Requirements for Energy Projects"* (MOE, 2001a) (the Guide).

Significant effects to the natural and social environment have been avoided through careful site selection, good planning, the implementation of mitigation measures, and adherence to regulatory requirements. The project is located in a rural area where the wind farm will not interfere with the existing land uses. No significant adverse environmental effects are anticipated.

The overall conclusion of this ESR is that this project can be constructed, operated and decommissioned without any significant impacts to the environment, including the natural and social environment.

Public and government agency consultation activities have been undertaken and will continue. NEMI, in principle, has indicated their support for the project.

NPI has been in discussion with several Aboriginal communities in regards to this project since 2004. NPI is committed to continuing these discussions and accommodating the concerns and interests of Aboriginal communities regarding this project.

There are significant net benefits of this project including the generation of clean renewable energy for Ontario, increased economic activity for the region, and employment opportunities for the local communities, particularly during the construction phase of the project. During the operational phase, the project, it will also provide annual economic benefits through municipal taxes paid to NEMI, and a continuing need for services from the local economy.

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1. Project Summary

In response to the Province of Ontario's policy commitments to support opportunities for the generation and use of renewable energy, Northland Power Inc. (NPI) is proposing to construct and develop the McLean's Mountain Wind Farm ("the project") to generate electricity in Ontario. The project is located approximately three (3) kilometers southwest of the Town of Little Current and lies within the Municipality of Northeastern Manitoulin and the Islands, Ontario (see **Figure 1-1**). The wind farm is expected to consist of up to 43 wind turbines that will generate 77 megawatt (MW) of electricity. In addition to the wind turbines, the project will require a 10.3 km 115 kV power transmission line to be constructed to the west of the study area to connect the McLean's Mountain Wind Farm to the Hydro One Transmission grid on Goat Island (located just north of Little Current). This Environmental Screening Report/ Environmental Impacts Statement (ESR) assess the effects of both the wind farm and the transmission line.

1.1 Project Proponent

Northland Power Inc. (NPI), founded in 1987, is one of Canada's leading power developers, owners and operators. NPI has earned a reputation for consistently and successfully applying unique solutions to meeting the increasing demands for safe, clean and economical power. Since its inception NPI has completed power generation projects totaling more than 740 MW of capacity and financings totaling over $2 billion. In addition to managing the Fund and its 349 MW of generation assets, NPI owns or has a significant financial interest in four power generation projects totaling 459 MW of capacity, two of which are under construction and expected to be on-line in less than a year. NPI also has a development pipeline comprised of approximately 1,230 MW of projects to be submitted to active Requests for Proposals and over 2,400 MW of additional development.

NPI's reputation for developing, constructing and operating wind farms is well regarded and follow best practices to ensure that projects are compatible with existing land uses, minimize impact of the environment and are well accepted by local communities.

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1.2 Title of Project

The project name is the McLean's Mountain Wind Farm. Throughout this ESR the terms "project" and "McLean's Mountain Wind Farm (MMWF)" are used interchangeably and include the transmission line component of the project.

1.3 Project Location

The project is located in the Municipality of Northeastern Manitoulin and the Islands (NEMI) in northeastern Ontario. The study area is located south of the Town of Little Current and is comprised of approximately 8,200 ha of land. **Figure 1-1** illustrates the location of the project.

1.4 Estimated Capacity of Wind Farm

The project is designed with a total of forty-three (43) 1.8 MW Vestas, model V-90 wind turbines, the wind farm, once fully built, will have an installed capacity of 77 MW. Should another turbine model be used, the Project's same general dimensions shall be observed.

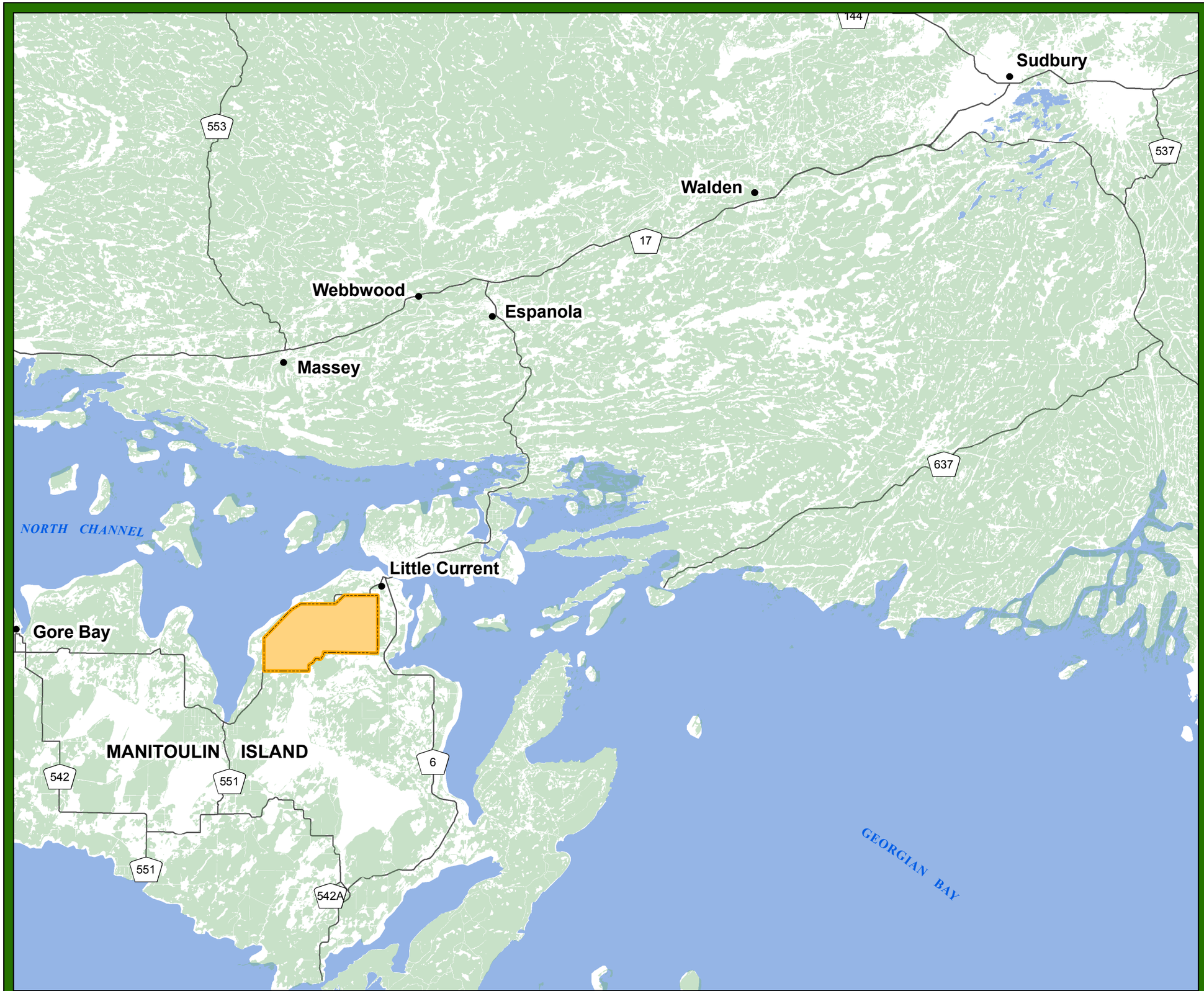
1.5 ESR Report

This Environmental Screening Report/ Environmental Impact Statement provides: a description of the proposed McLean's Mountain Wind Farm, the existing environmental conditions, the effects that may result from the undertaking, proposed mitigation and monitoring measures, and the net effects of the project. Consultation with a wide range of Aboriginal communities and organizations, community stakeholders, and government agencies was an integral part of the environmental screening (ES) process; the activities and result of the consultation program are summarized in this ESR document.

The project is subject to the Environmental Screening Process (ESP) outlined in the Ontario Ministry of the Environment's (MOE) *"Guide to Environmental Assessment Requirements for Energy Projects"* (MOE, 2001a) (the Guide). Potential issues that fall under federal jurisdiction have also been anticipated and addressed (in the event that the project triggers CEAA).

1.6 ESR Study Team

Dillon Consulting Limited (Dillon), in consultation with NPI, undertook the screening level assessment and prepared this ESR. Dillon was supported by several sub-consultants including: Aerocoustics (noise) Ross Archaeological Research Associates, Natural Resource Solutions Inc. (bat studies), and Ortech Power (visual simulations and flicker assessment).



NORTHLAND POWER

Mcleans Mountain Windfarm
Figure 1.1 Project Location

Legend

- Communities
- Highway
- Project Area
- Waterbody
- Woodlots

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1.7 Environmental Assessment (EA) Requirements

1.7.1 Provincial EA Requirements

The McLean's Mountain Wind Farm is considered to be a Category B project under the "Guide to Environmental Assessment Requirements for Electricity Projects" under the *Ontario Environmental Assessment Act* (the "Guide"). All Category B projects are subject to the Environmental Screening Process (ESP). The environmental screening and review process, as outlined in the Guide, is summarized in **Figure 1-2**. All projects subject to the ESP are required to go through the screening stage to identify the potential environmental effects of project activities as required by the MOE to determine the impacts on a variety of local and regional conditions. The proponent is required to consider as part of its assessment, the potential for effects to:

- Air Quality and Noise;
- Surface and Groundwater (Water Resources);
- Land Uses,
- Human and Ecological Health;
- Vegetation;
- Wildlife and Birds;
- Soils;
- Social and Economic Conditions;
- Natural and Cultural Heritage; and
- Visual.

Once the environmental screening process has been completed and the ESR is prepared, the proponent can then release a Notice of Completion of ESR and post it for a 30 day comment period. If no significant environmental or public issues are raised, and no 'elevation requests' are received during the 30 day review period, the proponent submits a Statement of Completion to the Director of Environmental Assessment and Approvals Branch (EAAB) of the MOE, and may proceed with construction, pending any other required approvals.

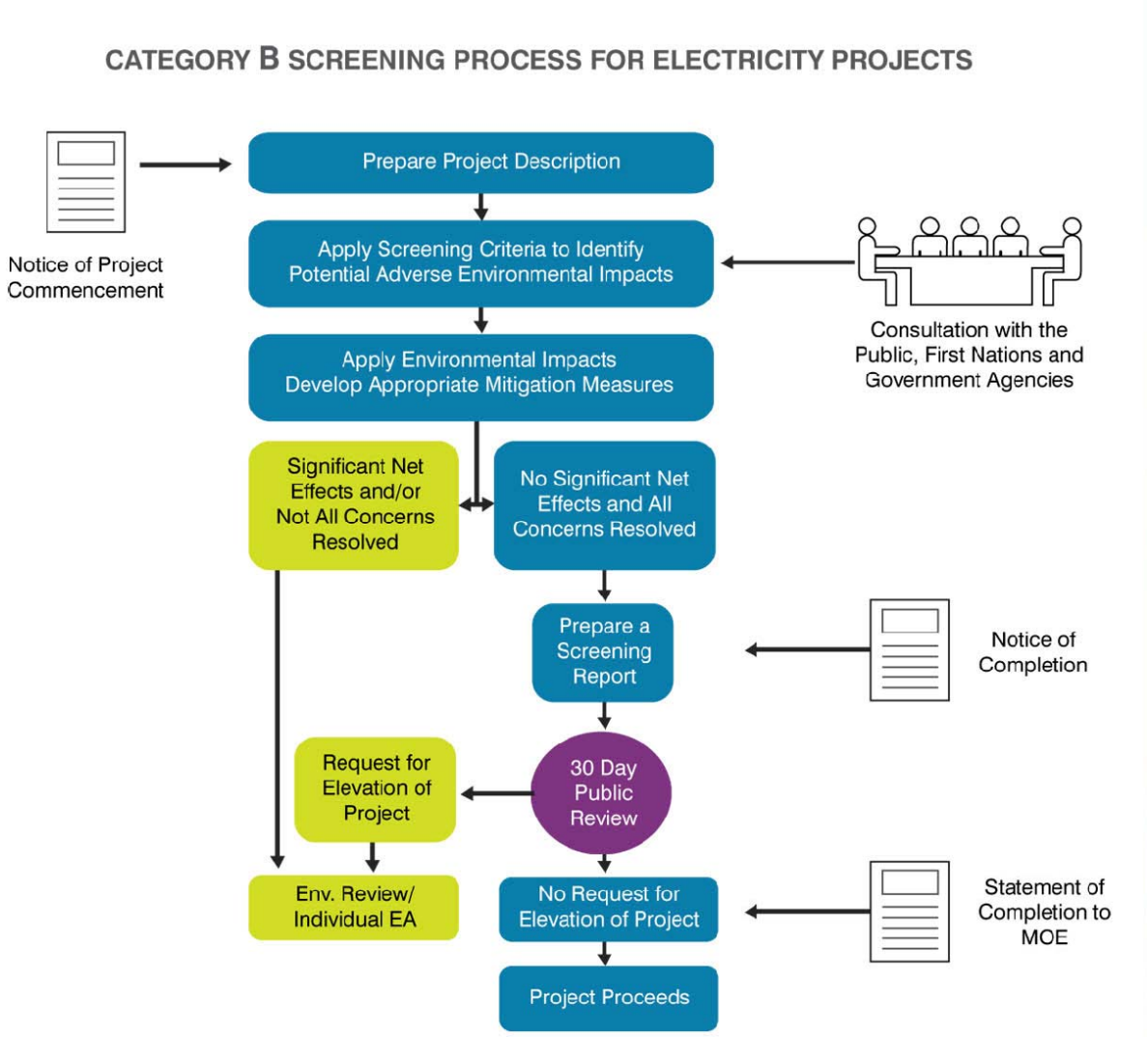
Upon completing the Environmental Screening Process, a project may be elevated to the Environmental Review if:

- There are potentially significant negative environmental effects or public issues raised;
- Substantive public or agency concerns are received during the 30-day review of the Screening Report; or
- The Director of the EAAB receives substantive elevation requests from the public or government agencies during the 30-day period.

The level of environmental investigation that has been undertaken to support this screening is consistent with the level of work undertaken for an environmental review. A significant amount of field work and detailed assessment of effects has been undertaken that goes well beyond the expectations of an environmental screening as outlined in the "Guide".

As part of the EA requirements, a consultation process has been undertaken to provide the opportunity the public, government agencies and aboriginal communities to identify any issues that they may have with the project and obtain information to mitigate their concerns.

Figure 1-2: Environmental Screening Process



1.7.2 Federal EA Requirements

Wind farm developments can trigger an EA under the *Canadian Environmental Assessment Act* (CEAA). CEAA can be triggered through the need for federal funding, federal permits and/or federal lands. There is the potential that federal permits could be required for approval under the *Fisheries Act* (due to the access road crossings of water courses and the crossing of the North Channel with a submarine power cable), which could trigger CEAA. The need for this will be confirmed with applicable federal agencies.

1.7.3 Coordinated Approach to Federal and Provincial Approvals

This Environmental Screening (ES) has been undertaken recognizing the various federal and provincial environmental approval processes that apply to this project and has been prepared to be consistent with the MOE's Environmental Assessment process (i.e., environmental screening) and federal CEAA requirements.

1.8 Agencies Involved in the Environmental Screening

The following government agencies have been contacted (including notification of the release of this final ESR).

Federal Agencies

- Indian and Northern Affairs Canada (INAC)
- Environment Canada (EC) / Canadian Wildlife Service (CWS)
- Department of Fisheries and Oceans (DFO)
- Transport Canada (TC)
- NAV Canada

Provincial Agencies

- Ministry of the Environment (MOE) – Sudbury Regional Office
- Ministry of Natural Resources (MNR) – Sudbury Regional Office
- Ministry of Northern Development and Mines – Sudbury Office
- Ontario Ministry of Aboriginal Affairs (OMAA)
- Ministry of Transportation Ontario (MTO) – Northeastern Region
- Ministry of Energy
- Ministry of Culture
- Ministry of Municipal Affairs (MMA) – Northeastern Municipal Services Office
- Government of Ontario Public Safety Network (Communication Towers)

Conservation Authorities

The proposed project is located on Manitoulin Island and therefore does not fall under the jurisdiction of Conservation Authorities of Ontario.

1.9 Required Permits and Approvals

In addition to the environmental screening requirements, other provincial environmental related permits that may be required for this project include:

- Ontario MOE Permit to Take Water under the *Environmental Protection Act*, should water be extracted for use in the temporary cement plant/concrete batch plant (if necessary) or for other purposes from a surface and or groundwater source in excess of 50,000 liters per day;
- Certificate of Approval (sewage) with respect to settling ponds as per Section 53 of the *Ontario Water Resources Act* (if required);
- Generator Registration under Ontario Regulation 347 for generation of subject waste;
- Ontario Ministry of Culture "clearance" under the *Heritage Act* regarding effects on cultural resources;
- Several permits from the MNR that could include:
    - Water Crossing Work Permit under Regulation 453-96 of the *Lake and Rivers Improvement Act*;
    - Burning Permit under Section 5 of Regulation 207/96 of the *Forest Fire Prevention Act*;
    - Aggregate Permit under section 34(1) of the *Aggregate Resources Act* (MNR) (only if a new aggregate pit is to be developed for the project);
    - Permit under *Fish and Wildlife Conservation Act* (MNR).

This project will also require a number of other provincial level permits, which are not directly related to the environment such as: Ontario Energy Board – Leave to Construct for the Transmission Line; a generator's license from the Ontario Energy Board and agreements and/or approvals with the Independent Electricity System Operator (IESO) and Hydro One.

NPI has also consulted with the Government of Ontario Public Safety Network under the Ministry of Government Services and the owners of specific communication towers in the area, regarding the potential for effects on communication tower signals.

The project is located within the in the Municipality of North Eastern Manitoulin and the Islands (NEMI). Wind turbines are considered to be permitted uses in the NEMI Official Plan/Zoning By-law for these lands. No approvals under the Planning Act are therefore required.

Federal permits and approvals that may be required include:

- Approvals under the *Fisheries Act*;
- Navigable Water Protection Act (NWPA) clearance;
- Aeronautical Obstruction Clearance Permit from Transport Canada in response to potential turbine height hazards and navigation lighting; and
- Air Safety and Land Use Application from NAV Canada for navigational mapping requirements.

1.10 Project Schedule

The proposed McLean's Mountain Wind Farm was announced through a formal Notice of Study Commencement in June 2004. The completion of the ESR and acquisition of permits is anticipated in 2009. Project construction is expected to commence in 2010.

1.11 Report Organization

This ESR is organized into the following sections:

Section 2.0 Project Description
Section 3.0 Scope of Assessment
Section 4.0 Stakeholder Consultation
Section 5.0 Environmental Features Screening
Section 6.0 Effects Assessment and Mitigation
Section 7.0 Project Follow-up Measures and Monitoring
Section 8.0 Conclusions
Section 9.0 References

Several Technical Support Reports are attached which contain further details regarding the studies that were conducted:

Appendix A Turbine Coordinates and Specifications
Appendix B Stakeholder Consultation Report
Appendix C Natural Environment Report
Appendix D Bird Study Report
Appendix E Bat Study Report
Appendix F Archaeology Report
Appendix G Noise Analysis Report
Appendix H Visual Assessment Report
Appendix I Shadow Flicker Report
Appendix J Aboriginal Consultation Summary

2. Project Description

NPI is proposing to develop the McLean's Mountain Wind Farm in northeastern Ontario. The project contributes to the Province's target of procuring 10% of all electrical generating capacity to come from renewable sources by 2010 (2700 MW). This project will help Ontario meet its electricity needs while reducing emissions of smog and greenhouse gases. The location of this project is based on the following factors:

- **Strong Wind Resource** - The project area has very good wind conditions due to its proximity to the North Channel.
- **Access to Electrical Grid** - Transmission connection points, with available capacity, are in proximity to the project area.
- **Municipal Support** - The Municipality of North Eastern Manitoulin and the Islands has expressed their support for wind farms in the form of passing of the zoning by-law and setbacks that permits the project.

2.1 Description of Project Components

The major components of the Project are as follows:

- Wind turbines;
- 690V /34 kV step up transformers (located in the nacelle of each turbine);
- 34 kV collection system to link the wind turbines to the substation. While these lines are expected to be primarily above ground there may be sections of the line where buried cables would be preferable. The buried cable would extend out from the base of the wind turbine tower for a minimum distance of 50 meters. This would be determined in the final design for the project);
- Substation (to step up the electric output from 34 kV to 115 kV);
- A 10.3 km, 115 kV single circuit transmission line;
- A switching station at the point of connection with the provincial grid;
- Turbine access roads;
- Four (4) meteorological towers (which are already installed and operating);
- Staging areas for assembly of wind turbines, only during construction; and
- A temporary concrete batch plant (only required if concrete cannot be sourced through local suppliers).

2.1.1 Wind Turbines

The project has been designed with up to 43 wind turbines that will generate 77 MW of electrical power. The manufacturer's specifications for the VESTAS V90 – 1.8 MW wind turbines are presented in **Table 2.1**

Foundations for the wind turbines shall be constructed with poured concrete into a pre-fabricated steel structure. Detailed foundation design will be finalized after full site geotechnical data is obtained.

Table 2-1: Wind Turbine Description – VESTAS V90 – 1.8 MW

Operating Data	Specification
General	
Rated Capacity	1815kW
Cut-in wind speed (m/s)	3
Cut-out wind speed (m/s)	25
Rated wind speed (m/s)	13
Rotor	
Number of rotor blades	3
Rotor diameter (m)	90
Swept area (m2)	6,362 m2
Rotor speed (rpm)	9-14.5 rpm
Tower	
Hub height (m)	80m
Power Control	Pitch regulation with variable speed

The turbine layout took into consideration the following factors:

- Results from wind profile studies and anemometer data;
- Site access;
- Environmental constraint information;
- Public and agency input; and
- Interconnection considerations.

The wind turbine setback distance requirements as specified in the NEMI zoning by-law is observed or even surpassed in the siting the wind turbines for this project. These setbacks are:

1) *Separation distance from dwellings, the great of*
    a) *250m, or*
    b) *Ministry of the Environment, Certificate of Approval requirement, (NPC232)*
2) *Participant property line setback – 10 m*
3) *Non-participant property line setback – rotor radius plus 10 m*
4) *Setback from road right-of-way line – rotor radius plus 10m*
5) *Separation distance from non-dwelling principal and accessory structures – rotor radius plus 10m.*

A key aspect of all project phases is to minimize environmental effects. The wind turbines have been sited to target areas with the best wind energy potential, avoid sensitive natural

areas/habitats, optimize use of existing roads, minimize the visual impacts of the turbines, and respect all municipal set back requirements. Access roads and electrical connection lines have been routed to minimize their length and avoid sensitive natural features.

Table A-1 in Appendix A contains the coordinates of the wind turbines (UTM NAD 83, Zone 17N coordinate system). The final turbine locations may be refined as a result of geotechnical consideration and environmental considerations. **Figure 2-1** presents the wind farm layout.

NORTHLAND POWER

Mcleans Mountain Windfarm
Figure 2-1 Wind Farm Layout and Infrastructure

Legend

- Turbine
- Substation
- Residence
- Building
- Radio Tower
- Water Treatment Plant
- Secondary Roads
- Highway
- Cabling (34kv)
- Access Roads
- Proposed Tranmission Line (115kv)
- Rivers
- Project Area
- Lots
- Waterbody

Inset Map

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2.1.2 Access Roads

Access roads are required in order to deliver the wind turbine components as well as allow operations and maintenance of the wind turbines. The central and eastern areas of the project will be accessed via Highway 6 and Green Bush Road, while the western area of the project will be accessed via Highway 540. The access roads to be constructed will, in most sections, be approximately 10 meters wide with no ditches and be composed of a gravel base. In sections with steeper terrain, ditches and culverts will be incorporated to avoid washout of the road. Where turning is required, the width of the road will be wider. **Figure 2-1** illustrates the locations of the proposed turbine access roads.

Any soils encountered along the proposed roads Right-of-Way (ROW) will be excavated and used as fill material to bring low areas to desired grade. The foundation of the road (roadbed) will be at the depth required to support the anticipated traffic loads associated with the construction and operations of the wind farm.

During construction, concrete trucks, pick-up trucks, cranes on tracks and transport trucks bringing turbine components to the site will use these access roads.

2.1.3 Electrical Connections/Substation

A 34 kV electrical power collection system will be installed to connect the turbines to the Transformer (or Sub) Station. Generally, each wind turbine will be interconnected with a largely overhead line that would first follow the turbine access roads and then run along the municipal road right-of-way. **Figure 2-1** shows the electrical connection lines as proposed.

The substation (which serves to convert the generated electricity from 34 kV to 115 kV so that the wind farm can be tied into the Hydro One Transmission line) will be located within the study area, as shown in **Figure 2-1**. A switching station would be required next to the point of connection with the Hydro One transmission line. About 0.4 ha of land would be required for this switching station.

The substation has been included in the noise analysis of the wind farm. As final substation specifications are not know at this time, maximum noise emission specifications were used, corresponding to the worst case scenario. Required noise mitigation for the substation has been proposed.

Transmission Line

The proposed new 115 kV transmission line to connect the wind farm to the Hydro One Transmission line system is approximately 10 km in length. The right-of-way (ROW) width will depend on the structure type. It is anticipated that the maximum width of the ROW would be approximately 8-10 meters depending on the distance of poles and conductor swing. The transmission line route as shown in **Figure 2-1** is largely contained within municipal road rights-of-way. Some private land will be crossed and easements through the affected parcels of private land have been acquired by NPI. Some adjustments to the routing may be made subject to public input, engineering and detailed vegetation survey work.

Ontario Energy Board (OEB) approvals will be required for the proposed 115kV transmission line. These approvals are: Leave to Construct the line (Section 92), Right of Entry (Section 98) for gathering survey and engineering data) and Authority to Expropriate (Section 99).

2.1.4 Staging/Laydown Areas

Turbine staging areas are located at each turbine site. The turbine staging area is comprised of three different zones. The crane pad is the area needed to support the crane used for construction and will be approximately 12 meters wide by 36.5 meters deep and will be accessible from the access road with a slope of less than 1% or less in all directions. Each turbine position will also require a staging and equipment storage area for the safe erection of the towers and the lift and securing of the nacelle and blades. Thus, a total leveled surface of approximately 40m by 40m will be required at each turbine. Furthermore, a 360 degree radius around the base of the turbine to a distance of 50 meters at a 5% grade is needed for the assembly and erection of the turbines. General guidelines for a wind turbine staging area are described below. Note these dimensions are indicative and may be modified once detailed engineering design is performed.

Construction Site at Each Tower Foundation

- At each wind turbine location, a lay-down area will be provided adjacent to the access road of sufficient area to permit any Turbine Equipment being delivered to the Crane Pad to be offloaded and stored pending erecting and installation of the same. Vegetation from this area will be cut short and a graded working area will be provided with a 150' radius from center of Turbine Foundation with berms removed.
- Any portion of the lay-down area, or other travel path between the access roads and the lay-down area, over which delivery trucks are expected to travel in order to deliver the relevant Turbine Equipment shall satisfy the requirements set for Site Access Roads.
- The maximum construction site required at each foundation is 225 feet (69 m) by 250 feet (76 m) (the "Construction Site"); the Construction Site includes a crane pad area of 80 feet (24 m) by 60 feet (18m), which may have a maximum slope of 1% in any direction.
- The crane pad, the Construction Site and the access road parallel to the Construction Site will generally all be at the same grade.
- The remainder of the Construction Site will be cleared of vegetation, rocks and other obstructions that may impede access by erection equipment.
- Soil compaction to provide ground-bearing capacity of nominal 4,500 pounds per square foot.
- Shoulder slopes, if required, for crane pad will be no greater than 45°. Pad area will be graded to drain all water away from crane pad.

Lay Down, Storage and Staging Area

- An open area of not less than 300 feet (92 m) by 600 feet (183 m) will be required as a staging area.

- The periphery of the staging area will be cleared of trees, and topsoil, gravel, and revetment berms and other like excavations removed, to ensure that there are no overhanging obstructions that could prevent unhindered access and operation of construction vehicles including cranes.
- All overhead obstructions will be removed prior to start of Turbine Equipment deliveries.
- The laydown area will have a single entrance and a single exit, which will be at opposite ends of the laydown area so as to allow one-way drive-through access to trucks and trailers servicing the laydown area. The entrance and exit will be 40 feet (12 m) wide and have an inside turning radius of at least 150 feet (46 m).
- Roads leading to entrances / from exits will be in accordance with access roads described above.

The land for the staging area will be disturbed with some tree removal, grubbing and compaction during the construction period. The crane pad will remain on site for the duration of operations for maintenance.

2.2 Description of Project Activities

The key project activity phases include: construction, operations and decommissioning of the wind farm and transmission line. **Table 2-2** provides a description of the key activities that will occur under each project phase. A key aspect of all project phases will be on the minimization of environmental and social effects. The wind turbines have been sited to maximize distances from sensitive natural features. Access roads and electrical connection lines have been routed to minimize their length and avoid sensitive natural features.

2.2.1 Construction Phase

The construction phase of any major project such as this has the potential for adverse effects on the environment. Key activities during the construction phase include: clearing, topsoil stripping, grading, access road development, trenching of underground distribution lines, watercourse crossing construction, foundation excavation, transportation, assembling and erecting of the turbines and distribution poles. Key activities during the construction of the transmission line include: surveying, clearing, and installation of the poles and stringing of the conductors.

An Environmental Management Plan will be developed and its implementation monitored by a NPI environmental inspector.

2.2.2 Operation and Maintenance Phase

Once the project is operational, the wind turbines and transmission line will operate automatically. There is little maintenance required for the turbines and transmission line, aside from periodic routine servicing. Any wastes generated, including fluids and oils, will be recycled where possible and if not possible, will be disposed of at an approved facility. The turbines will be accessed primarily by all-terrain vehicles or light trucks. Larger trucks or cranes may be

required for repairs from time to time. Winter access vehicles may be used to expand accessibility of the site after periods of heavy snowfalls.

2.2.3 Decommissioning Phase

The project is designed to have a life of at least 20 years. A decommissioning plan will be prepared in accordance with provincial legislation and guidelines that exist at the time of decommissioning. Decommissioning will involve the removal of the turbines and other associated infrastructure including the turbine foundations to below grade and the removal of electrical lines/facilities. Infrastructure that is left below grade will not affect future land use. Previously disturbed lands would be rehabilitated and returned to their previous state.

Table 2-2: Project Activities

Project Activities	
Physical Works/Activities	**Description of Activity**
Construction	
Surveying & Geotechnical Investigations	The land survey activities are to include staking the boundaries of the construction areas, temporary workspace, access roads, distribution line routes, transmission line route, as well as marking the location of existing underground pipelines and cables. Areas to be avoided will be fenced and/or flagged and avoided. Geotechnical work will involve bore samples being taken in the proposed turbine locations.
Development of access roads	Access roads will be approximately 10 m wide to accommodate maintenance vehicles and heavy equipment for larger repairs/replacements. The excavation of earth and some blasting of rock is expected to be required for the construction of the turbine access roads. The number and location of the crossings is to be confirmed based on additional planned field work. Access road culverts, comprised of various diameters, are to be constructed across the various watercourses in order to accommodate vehicular access and construction traffic across the watercourse while maintaining unimpeded flow within the watercourse. The type of crossings and the mitigation measures will be developed in consultation with the appropriate governing bodies (DFO, OMNR).
Clearing	Bush, trees, and other vegetation will be cleared from the construction areas as required. An area of approximately 1ha will be required for each turbine location for assembly of the turbine rotor before being erected onto the turbine tower. The clearing of a right-of-way will be required for the turbine access roads and the 115 kV transmission line (details below).
Soil stripping and Grading	Graders, bulldozers, and backhoes will be used to strip any soil that could be present. Following soil stripping, grading will be conducted on irregular ground surfaces to provide a safe and clean work surface. Grading will be done in such a manner so as to not alter drainage patterns in the area.
Collector Line Installation	The 34 kV collector lines will run from each turbine to the transformer (sub-) station. The line will run along the turbine access roads as much as possible. The lines will be supported by single poles.
Transmission Line Installation	A 115 kV line will be constructed to transmit the power to the Hydro One Transmission line on Goat Island and will require submarine crossing of the North Channel. The 115 kV transmission line will require the clearing of a right-of-way of approximately 8-10 m. It is expected that the tower structures would be composed of single poles and be spaced approximately 400 m apart. The line has been routed to minimize its distance and avoid sensitive environmental features. The line will be above ground. Some minor variations to the alignment are possible dependant on public input and engineering considerations.
Foundation excavation	Depending on soil conditions, the size of the excavation for the turbine tower will be approximately 2.5 meters to 3 meters deep and about 20 meters wide. If soil conditions permit, a tracked excavator will be used for excavation. Excavation will proceed until bedrock is exposed; in some cases this might be shallower than 12 inches. If depth is appropriate, gravity caisson foundations will be used. If bedrock is exposed and solid, rock anchors or a P&H socketed foundation will be used. Depending on rock strength, blasting may be required for excavation in the bedrock. Blasting would be undertaken as per MNR and local municipal requirements.
Pouring turbine foundation	For a gravity caisson or socket foundation, concrete will be poured into the forms continuously. The amount of concrete required will depend on ground/soil characteristics. The forms for the foundations will be removed and the excavated area is back-filled and compressed such that only the tower base portion of the foundation is above ground.
Turbine Transportation	Each of the disassembled turbines and generators will be trucked to the site on a flat-deck trailer. It may be necessary to undertake some local road intersection improvements to allow the trucks to make turns. It might also be necessary to reinforce some of the

Project Activities	
Physical Works/Activities	**Description of Activity**
	bridges leading up to the site. The nature of these improvements will be confirmed in consultation with the municipality and all appropriate permitting and approvals will be obtained.
Equipment lay-down	To create a safe and level work area for storing and assembling the wind turbine generators and towers, an area of 100 m in diameter from each turbine location may have to be stripped and leveled, depending on the local conditions. Each of the turbines and generators will be trucked on a flat-deck trailer to the site and assembled within this temporary construction area.
Tower, generator, and rotor assembly	The tower comes in three sections that are assembled at the turbine sites one section at a time. The nacelle, which houses the generator is lifted by a crane and attached to the top of the top tower section. The rotor blades will be lifted, assembled in the air and attached to the nacelle.
Spills Management	Hazardous materials such as oils, fuels and paints will be required. Fuel will be delivered to the site by tanker with temporary fuel storage at the project construction site. Although the quantity of materials to be used is of low volume, there is the potential for some spills during the construction period. Spills will be managed in accordance with provincial legislation and guidelines such as NPI's Waste Management Plan.
Waste Management, clean-up and reclamation	Garbage and debris will be removed and disposed of at an approved location. Slash trees will be left to decompose among the remaining trees. All equipment and vehicles will be removed from the construction area. The temporary lay-down areas and disturbed areas around the foundation of each turbine and at the substation will be replaced with the stockpiled topsoil. The disturbed areas (including trenches/plough seams) will be re-seeded. High voltage signage will be installed at the substation and elsewhere, as necessary. The proponent will prepare a Generator Waste Registration Report for each waste that will be generated on site as per O.Reg. 347 of the EPA. All waste fluids and oils will be removed from the site and recycled, where possible, or disposed of according to provincial guidelines.
Drainage System	Drainage patterns will be maintained as much as possible in the construction of the access roads and turbine foundations. Culverts will be installed under roadways as required to maintain the flow of watercourses.
Wind Farm Commissioning	Turbine commissioning can occur once the wind turbines have been fully installed and the electrical connections are completed. The commissioning involves testing and inspection of electrical, mechanical, and communications operability. A detailed set of operating instructions must be followed in order to connect with the local electrical system.
Operations and Maintenance	
Wind Turbine Operation	The wind farm will require full time technical and administrative staff to maintain and operate the facility. It is expected that ten full time employees will be required to keep the facility operating properly. Typically, only a small percentage of the turbines would need to be accessed with large equipment during their operating life. Monitoring of potential bird and bat effects from the operating wind farm will be undertaken. The program would involve area searches for bat and bird carcasses. The nature and duration of the post construction monitoring program will be developed with the input of Environment Canada and the MNR.

Project Activities	
Physical Works/Activities	**Description of Activity**
Inspection, Maintenance and Repairs	Maintenance inspections will be required approximately every 3 months for routine servicing and lubricant replacement. Light 4x4 trucks, vehicles, and ATVs may be used to access the towers. Larger trucks and cranes may be required periodically for larger repairs, but this will not happen frequently. Scheduled maintenance on turbines will occur every quarter for the first few years and may move to twice annually thereafter.
Decommissioning and Abandonment A decommissioning plan will be prepared in accordance with provincial legislation and guidelines that exist at the time of decommissioning.	
Rotor, generator and tower disassembly	The rotor, generator and towers would be disassembled using a crane and removed from the site for re-use, reconditioning or disposal using a flatbed truck.
Removal of access roads	All permanent access roads would be deep-ploughed, as appropriate and graded to restore terrain profiles, and vegetated.
Removal of concrete foundation	Within 12 months of termination of lease, all above grade facilities will be removed to not less than 3 feet below grade [but not below bedrock], and covered with subsoil to rebuild the grade. Topsoil would be replaced over the area to current depths of adjacent horizons and the area replanted with trees, depending on the land use at the time and removal plan developed with MNR.
Removal of electrical collection and transmission lines	The above ground collection and transmission lines and poles will be removed.
Waste Management	All waste material would be removed from the site and disposed at an appropriate facility (e.g. licensed landfill). The proponent will prepare a Generator Waste Registration Report for each waste that will be generated on site as per O.Reg. 347 of the EPA. All waste fluids and oils will be removed from the site and recycled, where possible, or disposed of according to provincial guidelines

2.3 Economic Benefits of the Project

Project specific economic benefits are described below.

Construction Spending

The construction of the McLean's Mountain wind farm will require a capital spend of approximately $200 million on turbine components, civil construction, electrical, crane and many additional specialist contractors. Approximately 20% of the overall capital spend is on "balance of plant" (i.e. everything except the turbine) which are generally not specialist contractors and would include, for example local road, concrete, aggregate, and electrical contractors/suppliers. Opportunities to provide these services and supplies would be through the EPC contractor. In total, up to $5 million in contracting services would be available to companies.

A portion of the direct local capital spend will be duplicated by support and contracting services to the wind farm project. Typically this could represent orders to fabrication shops, catering, hoteliers, electrical sub-suppliers, etc.

The construction of the wind farm would generate about 150 jobs at the peak of the construction period. The income generated through these jobs is expected to be about $4 million.

Operation Spending

The overall annual spending on wind farm operations and maintenance activities is estimated at $6 million. The wind farm will be operated and maintained from an operations and maintenance facility to be located in the vicinity of the wind farm. The facility will have stores for spare parts, and scheduled and unscheduled maintenance will be dispatched from this facility. Operations will directly employ up to 8 people whose tasks will be to monitor and operate the wind farm. These long term employment opportunities will generate total annual incomes of about $600,000.

Sub-contracts will be also awarded to contractors for road maintenance, snow clearance, electrical maintenance, etc. The annual value of these sub-contracts is estimated at $150,000.

A percentage of direct local operations spending will be duplicated by support and contracting services to the wind farm project. As with construction, this could represent orders to fabrication shops, catering, hoteliers, and electrical sub-suppliers.

Municipal Tax Payments

The McLean's Mountain Wind Farm is located in the in NEMI. This will represent an annual tax payment to the Municipality of approximately $95,000 per year.

Aboriginal Communities and Organizations

Local Aboriginal communities and organizations are expected to benefit economically from this project through capacity funding during the environmental screening process and direct employment opportunities during the construction and operational phases of the project. During the construction and decommissioning phases, opportunities for contracting, as well as supply of machinery and labour will be made available to local Aboriginal communities.

Economic Summary

In addition to the estimated $240 million to be spent to construct the project, over an assumed 20 year life span of the facility, the project is expected to result in approximately $11.4 million being generated in taxes and land payments (all 2009 dollars not including inflation).

3. Scope of the Assessment

The following describes the environmental components that were considered to meet both Ontario and federal EA requirements. This ESR has been structured according to the provincial process but all key components required to fulfill federal EA requirements have also been addressed. Sections pertinent to provincial authorities or federal authorities only have been labeled accordingly.

3.1 Scope of Assessment

The Ontario's Environmental Assessment Act and MOE's March 2001 *Guide to Environmental Assessment Requirements for Electricity Projects* (the "Guide"), defines "environment" as:

> *air, land or water; plant and animal life, including man; the social, economic and cultural conditions that influence the life of man or a community; any building, structure, machine or other device or thing made by man; any solid, liquid, gas, odour, heat, vibration or radiation resulting directly or indirectly from the activities of man; or any part or combination of the foregoing and the interrelationships between any two or more of them*.

Further, the Guide states that:

> *Negative environmental effects include the negative effects that a project has, or could potentially have, directly or indirectly on the environment at any stage in the project life cycle. Negative environmental effects may include, but are not limited to, the harmful alteration, disruption, destruction, or loss of natural features, flora or fauna and their habitat, ecological functions, natural resources, air or water quality, and cultural or heritage resources. Negative environmental effects may also include the displacement, impairment, conflict or interference with existing land uses, approved land use plans, businesses or economic enterprises, recreational uses or activities, cultural pursuits, social conditions or economic structure.*

The Guide also states that "net effects" are "negative environmental effects of a project and related activities that will remain after mitigation and impact management measures have been applied".

Section 16 of *CEAA* identifies the factors that need to be considered in the environmental assessment screening:

16(1) *Every screening…shall include a consideration of the following factors:*

a) *the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and*

any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

b) the significance of the effects referred to in paragraph (a);

c) comments from the public that are received in accordance with this Act and the regulations;

d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and

e) *any other matter relevant to the screening… such as the need for the project and alternatives to the project, that the responsible authority… may require to be considered.*

CEAA defines "environmental effect" as any change that the project may cause in the environment including any change to a listed wildlife species, its critical habitat or the residences of individuals in that species [per the Species at Risk Act]; the effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources for traditional purposes by aboriginal persons, or on any structure, site or thing that is of historical, archaeological, paleontological or architectural significance; or any change to the project that may be caused by the environment, whether any such change occurs within or outside Canada.

CEAA includes the following definition of "environment":

(a) land, water and air, including all layers of the atmosphere;

(b) all organic and inorganic matter and living organisms; and

(c) the interacting natural systems that include components referred to in paragraphs (a) and (b).

The scope of the assessment for the McLean's Mountain Wind Farm project includes the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project, cumulative environmental effects that are likely to result from the project in combination with other approved projects or activities that have been or will be carried out and the effect of the environment on the project.

3.2 Scope of Factors

The screening has considered the potential changes to both the biophysical and the socio-economic environment caused by the project as described in the scope of the project. The environmental factors considered in the assessment were:

Biophysical Environment

- Physiography/Topography
- Surface Water Quality and Soil Erosion
- Geotechnical

- Fish and Fish Habitat
- Groundwater Quality
- Air Quality
- Birds
- Bats
- Wildlife and Wildlife Habitat
- Vulnerable, Threatened or Endangered Species

Related Effects on Socio-Economic Conditions

(Under CEAA, these effects should be directly linked to the project's environmental effects)

- Population and Existing Land Use
- Disposal of Waste Materials
- Environmental Noise
- Agricultural and Rural Resources
- Neighbourhood and Community Characteristics
- Traditional Land Use by Aboriginal Peoples
- Recreation and Tourism Areas
- Construction Related Traffic
- Public Health and Safety
- Effects on Communications
- Historical and Archaeological Resources
- Viewscape
- Accidents and Malfunctions

Effects of the Environment on the Project

- Climate Change
- Extreme weather events
- Earthquakes

In assessing the potential for cumulative effects, the assessment has considered other projects or activities that could combine with the potential effects of the project regardless of where these other projects/activities are located.

To determine the potential for environmental effects that could occur and the significance of those effects, the following questions were examined:

- What are the possible environmental effects of the project?
- Are the identified effects positive or negative?
- Can the predicted adverse effects be avoided or mitigated?
- After mitigation of adverse effects, are there residual effects?
- Taking into consideration any cumulative effects, what are the magnitude, geographic extent, duration and frequency of adverse residual effects or positive effects?
- Are the residual adverse effects reversible?
- Is the ecological setting of the undertaking sensitive?

The environmental screening has considered both the potential direct net effects of the proposed project and the potential for combined effects from other existing and future activities and projects. Existing activities and projects have been addressed through the consideration of the existing environment. Cumulative effects with other future project/activities have been considered where there is some reasonable expectation for development (such as some commitment to develop) and there is some potential for effect overlap with the project in terms of time and space.

3.3 Study Objectives

The following outlines the study objectives:

- To ensure environmental considerations are addressed and incorporated into the planning, design, and decision-making processes;
- To identify, define and assess the potential effects of the project on the environment, including the natural and social environment. The environmental and social features identified in this document represent features that were known to occur or had a reasonable probability of occurrence within the study area (See Section 1.2) and which could be affected by the project. These environmental and social features that were selected for assessment are listed above in Section 3.2 and are further discussed in Section 6 and the technical appendices; and
- Considering the above, to design a project follow-up and monitoring program that contains plans to prevent, and mitigate, for the potentially adverse environmental effects of the project.

3.4 Methodology of Environmental Screening/Environmental Impact Assessment

In conducting the environmental screening, the following primary and secondary data collection activities were undertaken to determine key baseline conditions in and around the study area:

- Review of maps and air photos;
- Review of natural heritage data and studies for the area;
- Review of land use planning related documents and policies;
- 1 year, 4-season bird survey program;
- Bat summer and fall migration surveys;
- Field visits to examine water crossing locations/fish habitat;
- Archaeological investigations;
- Consultation with district MNR office; and
- Discussions with local stakeholders regarding the project.

3.5 Study Area

The study area for data collection (spatial boundary) considered in the assessment of the project largely included the project area boundary as shown previously in **Figure 1-2.** The study area was expanded to include the transmission line which extends outside of the project area boundary.

3.6 Uncertainty and Data Gaps

Identifying uncertainty and data gaps is important when evaluating the occurrence and significance of potentially adverse environmental effects and their probabilities. Having regard for potentially incomplete data sets the following supporting field studies were undertaken to complete the required datasets listed below:

- Natural Heritage Studies (Appendix C);
- Bird Surveys (winter, breeding bird, fall and spring migration) (Appendix D);
- Bat Surveys (Appendix E);
- Archaeological Resources (Appendix F);
- Sound Modeling (Appendix G);
- Visual Assessment (Appendix H); and
- Shadow Flicker (Appendix I).

4. STAKEHOLDER CONSULTATION

Public and agency consultation has been a cornerstone of this project with multiple information sharing and stakeholder feedback opportunities provided throughout the course of this study. The consultation program was initiated in June 2004 and continues throughout 2009 with the issuing of the Notice of Completion and release of the ESR. The following sections describe the key consultation activities that were undertaken. Comments received at these consultation events were considered in the completion of this environmental screening. **Appendix B and J** provides the supporting documentation from the project consultation activities.

4.1 Consultation Methodology

This project has been in the formal planning stages since the spring of 2004. Since that time, various forms of consultation and discussions have taken place. A detailed account of these activities is outlined in the following sections, and includes: public notifications, discussions with government agencies, discussions with key interest groups, meetings with the local municipal council, meetings with Aboriginal communities and organizations, and the holding of Public Information Centres (PICs).

The objectives of the McLean's Mountain Wind Farm public, agency and Aboriginal consultation process were to:

- Identify potentially interested stakeholders and the nature of their interests;
- Inform stakeholders of preliminary plans for the wind farm and how the project might affect the physical, natural, social and economic environment in the community; and
- Incorporate stakeholder interests into the planning, design, construction, and operation of the wind farm, where possible.

A number of methods have been undertaken to achieve these objectives including:

- Discussions with local government, provincial agencies and Aboriginal communities and organizations to obtain data and to identify issues associated with the project;
- Advertising in the local newspaper (Manitoulin Expositor) to introduce the project/Notice of Commencement, to provide notice of the PICs, and to notify the release of this ESR through the Notice of Project Completion);
- Receipt of public, agency and Aboriginal community verbal and written comments through meetings, letters, email and telephone calls;
- Production and analysis of questionnaires distributed during the PICs;
- Circulation of information to government agencies and local/regional government interests;

- The release of this ESR to the public, agencies and Aboriginal communities for review and comment; and
- A project website with all project news and key documents: www.northlandpower.ca

Potential stakeholders were identified and contacted early in project planning to identify areas of concern. Stakeholders were defined as:

- Individuals and organizations with a potential interest in the wind farm including neighbouring residents and landowners, environmental organizations, community organizations, and other interested groups or individuals;
- Federal, provincial, regional or municipal government representatives and agencies with a legislative mandate for any aspect of the project's planning, construction or operations; and,
- First Nations and Aboriginal communities and organizations.

4.2 Project Notices

In mid-June 2004, the first notice of the project and Public Information Centre (PIC) #1 (held on June 30, 2004) was published in the *Manitoulin Expositor***.**

In mid-June 2005 the notice for PIC #2 (held on June 28, 2005) was published in the *Manitoulin Expositor.*

On August 3rd and 10th, 2005 Notice of Commencement of the Environmental Screening was published in the *Manitoulin Expositor***.**

On June 8th and 15th, 2009 the Notice of study restart and PIC #3was published in the *Manitoulin Expositor***.** The notice was also sent on June 15th, 2009 to all residents in the project area and the larger area through Canada Post Ad Mail.

On June 10th, 2009 a Notice for a Public Information Centre #3 was mailed out to federal, provincial, municipal stakeholders, and Aboriginal communities and organizations**.** The PIC notice provided information on the project, a map of the project area and details about the information centre.

On July 15 and July 22, 2009, the ESR Notice of Completion was published in the *Manitoulin Expositor* informing the public and aboriginal communities that the ESR for the project is complete and available for 30-day review as of July 23, 2009. The Notice of Completion was also distributed to residents within the project area and the larger area through Canada Post Ad Mail to arrive prior to July 23, 2009. Further, letters were sent out on July 8, 2009 to government agencies and Aboriginal communities advising them of the NOC and the July 23, 2009 release of the final ESR.

4.3 Aboriginal Consultation

The following resources were used in developing and implementing NPI's Aboriginal consultation process:

- Correspondence received from government agencies, including INAC (Specific Claims, Assessment and Historical Research Directorate);
- Discussions with OMAA;
- Correspondence received from Aboriginal communities and organizations;
- Identified Aboriginal community and Aboriginal organization websites (where available);
- INAC Specific Claims Public Information Summary Reports;
- INAC Comprehensive Claims Information per INAC website;
- Ontario Power Authority "Best Practices, Good Business: Consulting with First Nation and Métis Communities"; MAA "Draft Guidelines for Ministries on Consultation with Aboriginal Peoples Related to Aboriginal Rights and Treaty Rights"; Government of Canada "Aboriginal Consultation and Accommodation: Interim Guidelines for Federal Officials to Fulfill the Legal Duty to Consult"; and
- Other selected publicly available information (media reports, court records, government agency websites, internet searches, etc.).

4.3.1 Aboriginal Consultation to Date

To promote a successful Aboriginal consultation process, NPI undertook the following activities:

- Confirmed with the assistance of Aboriginal organizations and communities and government agency input which Aboriginal communities should be consulted with;
- Provided information to the Aboriginal communities on the project and study process;
- Kept up-to-date on community contact or governance changes within the Aboriginal communities;
- NPI made itself available to any Aboriginal community that responded to information requests or accepted the invitation to hold an in-person meeting;
- NPI met with representatives from the following four (4) First Nations communities: The Aundec Omnikaning First Nation, Sheguiandah First Nation, Wikwemikong First Nation, and M'Chigeeng First Nation. Such meetings provided opportunities to NPI and these Aboriginal communities to engage in a meaningful way and to discuss the Project in general and specific terms, as well as the communities' concerns and interests with regard to the Project and the Project area, the consultation process, applicable regulatory processes, and other related matters; and
- Gathered and took into account information provided by the Aboriginal communities regarding their potential interests in the Project area, as well as information relating to concerns of potential impacts on such interests in the formulation of mitigation, approval and operations plans.

Since 2004, NPI has had discussions with several Aboriginal communities in proximity to the project area. NPI has stated it's willingness to meet with community representatives to discuss

the Project and to receive any comments or questions. These past discussions are detailed in the sections below.

On June 10th, 2009, NPI sent several Aboriginal communities a letter advising of the project restart, an offer to meet with the communities to discuss their concerns and interests, and an invitation to the June 25, 2009 PIC. Copies of these letters are contained in **Appendix J.** Aboriginal communities and organizations that were sent the letter included:

- Aundeck Omni Kaning (Sucker Creek);
- Sheguiandah First Nation;
- West Bay (M'Chigeeng) First Nation;
- Whitefish River First Nation;
- Wikwemikong First Nation;
- Zhiibaahaasing First Nation;
- United Chiefs and Councils of Manitoulin;
- Union of Ontario Indians;
- Ontario Natives Women's Association; and
- Métis Nation of Ontario.

The above Aboriginal communities and organizations were also sent the ESR Notice of Completion on July 8, 2009 (**Appendix J**).

Subsequent to the June 10, 2009 letter being sent out, INAC advised that the Sagamok Anishnawbek First Nation should also be consulted with (**Appendix J**). Further, OMAA then advised that the Serpent River First Nation as well as Métis Consultation Unit and the Métis Council in Sudbury should also be consulted with. These Aboriginal communities were sent the ESR Notice of Completion.

Summary of Discussions with Aboriginal Communities to Date

Discussion with Aboriginal organizations and communities have been largely focused with the United Chiefs and Councils of Manitoulin (UCCM) and the four closest First Nation communities to the project area including: Aundec Omnikaning First Nation, Sheguiandah First Nation, M'Chigeeng First Nation, and Wikwemikong First Nation.

These discussions have been focused on the following issues:

- Concerns regarding the availability of the local distribution system capacity on Manitoulin Island for the earlier proposed "Standard Offer Contract Project";
- Treaty rights and ceremonial lands; and,
- Providing economic development opportunities to First Nation communities including employment opportunities.

These past discussions are summarized below:

United Chiefs and Councils of Manitoulin

NPI met with the UCCM on June 9, 2009. Key items discussed at the meeting included:

- UCCM is creating a protocol for all First Nations of the UCCM to follow for engagement with developers;
- That it is NPI's intention to complete permitting and FN consultations to ensure that the project can begin construction as soon as conditions (economic and other) are favorable;
- Chief Franklin Paibomsai mentioned that as the Aundeck Omni Kaning and Sheguiandah were the nearest FN's and that these FN would likely have the greatest interest in this project;
- NPI advised that a public meeting would be held June 25, 2009 that the UCCM and the individual FN would be invited and encouraged to come, but that NPI are willing to meet separately with them later; and
- UCCM indicated that that want the project to create jobs for FN members.

On July 17, 2009 NPI received a letter from UCCM advising that the UCCM will only consult with the Province in regards to the proposed project.

Aundec Omnikaning First Nation

The Aundec Omnikaning First Nation is located on Highway 540 partially within the north-east portion of the study area. It is physically the closest First Nation community to the project area.

In July 2004, NPI held meetings with Chief, Patrick Mahdabee, Aundec Omnikaning First Nation. NPI also developed a working relationship with the Aundec Omnikaning First Nation's construction company. The Aundec Omnikaning First Nations provided NPI with water and snow removal equipment when a team came to drill core samples for a preliminary geotechnical study on 3 locations of the proposed project. NPI discussed with the Aundec Omnikaning First Nation the future employment opportunities during the construction phases of the proposed project. Follow-up meetings have been planned and will focus community's questions, comments, and aboriginal and treaty concerns.

In July 2008 NPI met with Chief Patrick Mahdabee at the Band Office to talk to him about project layout and to confirm their interest in providing services to the project.

In Oct 2008, NPI informed Aundec Omnikaning (Chief Mahdabee) of plan to complete Stage 1 Archeological Study and invited their attendance and review.

Sheguiandah First Nation

Sheguiandah First Nation is located approximately two (2) kilometers south-east from the boundary of the study area.

In June 2008 NPI held meetings with the Sheguiandah First Nation, Chief Georgina Thompson and former band manager Vicky Corbiere along with current band manager Audrey Bone. The members of the Sheguiandah First Nation have all been very supportive of the proposed McLean's Wind Farm project. In agreement with a recommendation of the Chief, NPI is considering employing young members of the Sheguiandah First Nation in the construction of the proposed project. This would motivate the young band members into pursuing an interest in the construction and/or operation of wind farms. A meeting in the form of a community forum has been agreed upon and NPI is awaiting a mutually agreed upon date to do this.

In Aug 08 NPI attended Can WEA "Wind and Aboriginal Lands" Conference in Ottawa and met with Audrey Bone of Sheguiandah.

M'Chigeeng First Nation and Wikwemikong First Nation

M'Chigeeng First Nation is located where Highway 540 and Highway 551 meet, approximately thirteen (13) kilometers south-west from the boundary of the study area. Wikwemikong First Nation is located approximately thirty (30) kilometers south-east from the boundary of the study area.

M'Chigeeng and Wikwemikong First Nation communities have both been developing wind projects of their own on Manitouin Island. Meetings that have been held with these two First Nations include:

- June 2006 - Discussions with Wikwemikong on Power development and their activities going forward.
- July-Oct 2006 - Several visits by NPI to Wikwemikong band office to discuss treaty vs non treaty items.
- Dec. 2006 - Meeting with Roger Peltier on project progress and their concerns about local distribution line capacity.
- Feb. 2007 Attended Casino Rama "First Nations Energy Alliance" Conference as per invitation by Wikwemikong.
- April 2007 - NPI met with Chief Joe Hare, of M'Chigeeng First Nation and Chief Robert Corbierre of Wikwemikong First Nation to discuss the availability of the local distribution system capacity when NPI was considering the development of "Standard Offer Projects" that all three parties were trying to develop.
- May 2007 - Visited the Minister of Energy's office with Chief Corbiere to appeal for local distribution line upgrades.
- July – August 2007 – Further discussions with Wikwemikong regarding the distribution lines.

- May 2008 - Meeting in Little Current with Roger Peltier and Rolland Pangowish regarding their concerns with NPIs bidding a wind farm SOC project.

- June 2008 - Discussions with Sheguiandah First Nations about using their ceremonial lands to erect turbines.

- July 2008 - Dinner Meeting with Band Manager Audry Bone and one councilor to discuss further the use of Seguiandah lands and introduce the group to an informal layout for turbines and roads.

- Aug. 2008 - NPI met the economic development officer of the M'Chigeeng First Nation at a conference in Toronto.

- Oct. 2008 - NPI talked with Rolland Pangowish and Roger Peltier of Wikwemikong First Nation regarding a shared use of lines agreement.

- Oct. 2008 - Informed Sheguiandah (Chief Thompson) of the plan to complete Stage 1 Archeological Study and invited their attendance and review.

It is noted that the issue regarding the use of the local distribution lines was resolved when NPI decided to develop the project as a utility scale project that would feed directly into the provincial grid.

4.3.2 Future Consultation

NPI is committed to the continuation of discussions and consultation with Aboriginal communities that have asserted interest with the project area. These consultations will include:

- Continuing to meet and engage the Aboriginal communities to better understand their interests in the area, to address any material concerns and to keep them apprised of the Project's development;
- Assessing need, and where appropriate providing capacity funding, for Aboriginal communities to effectively participate in the consultation process;
- Continuing attempts to determine potentially affected traditional land use and archaeological interests in the project area. Where necessary, NPI will formulate appropriate mitigation, approval and operation plans with affected Aboriginal communities; and,
- Identifying employment and contracting opportunities for Aboriginal communities.

4.4 Agency Notification and Consultation

4.4.1 Federal Agencies

Federal agencies that have been notified of the project include:

- Environment Canada, Environmental Assessment and Federal Programs Section - Environmental Protection and Operations Division Ontario

- Department of Fisheries and Oceans, Fish Habitat Management
- Canadian Environmental Assessment Agency (CEAA)
- Transport Canada, Ontario Region
- CN Rail
- Department of Indian & Northern Affairs (INAC)
    - Environment & Natural Resources, Lands & Trust Services
    - Environment & Natural Resources
    - Specific Claims Branch
    - Litigation Management and Resolution Branch
- Health Canada
    - Environmental Health Assessment, Services Healthy Environments and Consumer Safety Branch

A copy of the June 2009 project restart letter that was sent to federal agencies is contained in **Appendix B**.

A summary of correspondence/discussions with federal agencies is found in **Table 4-1** below.

Table 4-1: Summary of Meetings/Contact with Federal Agencies

Name	Group/Affiliation	Date of Contact	Topic
Haya Finan	Transport Canada - Ontario Region (PHE) Environmental Officer Environment and Engineering	June 2009	Advised that certain approvals under the *Navigable Waters Protection Act* trigger the requirement for a federal environmental assessment under the Canadian Environmental Assessment Act.
Connie Smith	Department of Fisheries and Oceans Sudbury Region	June 2009	Fisheries issues relating to the crossing of the North Channel with a submarine power cable.
Sheryl Lusk	Environment Canada EA Coordinator	October 2008	Bird Studies Phase 1 Summary report submitted for comment.

The previously noted Federal agencies were also sent a notice in July 2009 advising them of the release of the Notice of Completion and this final ESR.

4.4.2 Provincial Agencies

Provincial agencies that have been notified of the project include:

- Ministry of Natural Resources
- Ontario Provincial Police
    - Northeast Region Headquarters
- Hydro One Inc.
- iSERV Ontario - IT Service Delivery
- Ontario Ministry of Aboriginal Affairs
    - Policy & Relationship Branch
    - Policy and Relationships Branch
    - Negotiations Branch
- Ministry of the Attorney General
- Ministry of Culture
    - Heritage Operations Section, Heritage and Libraries Branch, Ministry of Culture
- Ministry of Energy
    - Renewable Energy Supply
    - Strategic Policy Branch, Conservation & Strategic Policy Division
- Ontario Power Generation
- Ministry of Tourism and Recreation
- Ministry of Municipal Affairs and Housing
- Ministry of Northern Development and Mines
    - Policy Analysis & Development, Corporate Policy Secretariat
- Ministry of the Environment
    - Sudbury Regional Office
- Ministry of Natural Resources
- Ontario Ministry of Aboriginal Affairs
- Ontario Parks

A copy of the June 2009 project restart letter that was sent to provincial agencies is contained in **Appendix B**.

A summary of the contact/meetings, with provincial agencies is found below in **Table 4-2**.

Table 4-2: Summary of Meetings/Contact with Provincial Agencies

Name	Group/Affiliation	Date of Contact	Topic
Scott Dingwall	Ontario Ministry of Natural Resources, Sudbury District District Planner	July 2004	Letter detailing the project, and requested information regarding species at risk, environmental features and other items of concern to the MNR.
Ms. Holly Simpson	MNR Espanola office	October 2004	Discussed background fish community information.
Bud Hebner	MNR Espanola office	October 2004	Discussed North Channel cable crossing and potential MNR permitting requirements.
Jeff Brinsmead	Ontario Ministry of Natural Resources Sudbury District Management Biologist	July 2008	Comments on the bat survey program
Mr. Bud Hebner	Ontario Ministry of Natural Resources, Espanola District Area Supervisor	October 2008	Bird Studies Phase 1 Summary report submitted for comment.
Mr. Wayne Selinger	MNR Espanola office	October 2008	Discussed background fish community information.
Mr. Tony Midena	MNR Espanola office	June 2009	Discussed permitting requirements regarding the laying of a cable across the North Channel. An in-water permit from MNR would be required. MNR would need to receive detailed plans that show appropriate on-shore mitigation. The coldwater in-water restriction would apply for in-water work in the North Channel, meaning in-water work would typically be required to take place from July 15th to September 1st. MNR's input on this matter is subject to their review of detailed plans of the cable crossing.

Provincial agencies were notified in July 2009 of the release of the ESR Notice of Completion.

4.4.3 Municipal Agencies

The Municipality of Northeastern Manitoulin and the Islands has received notices regarding the proposed project and the PICs that have been held. Further, the Mayor, Councilors and the Clerk were sent a copy of the June 2009 letter advising them of the project restart and the ESR Notice of Completion (**Appendix B)**.

4.5 Communication Tower Consultation

As per Radio Advisory Board of Canada (RABC) Communication Tower Consultation Guidelines (2007), the following agencies were sent a letter in June 2009 providing information on the proposed project and a request for any concerns or issues in regards to the project:

- Radio Advisory Board of Canada (RABC);
- Transport Canada- Aerodromes and Air Navigation Unit;
- Royal Canadian Mounted Police – RCMP Communication Towers;
- Department of National Defence – National Defence Communication Towers;
- Environment Canada – Weather Radars;
- NAV Canada – Civilian ATC Radars;
- Department of National Defence – Military Air Defence and ATC Radars;
- Canadian Coast Guard – Vessel Traffic System Radars;
- Natural Resources Canada – Seismological Monitoring Arrays; and
- Government Mobile Communications Office.

A copy of the letter that was sent to agencies is contained in **Appendix B**.

A summary of the responses received to date from communications agencies is found below in **Table 4-3**.

Table 4-3: Summary of Communications Agencies Responses to Date

Name	Group/Affiliation	Date of Contact	Topic
Bob Clements	P.Eng. Mobile Radio Engineer GMCO	March 29, 2007	Confirmed that the proposed wind turbine installation at McLean's Mountain near Little Current, Ontario will pose no threat to the microwave system used by the province's public safety radio system, as long as it remains within the boundaries.
Bob Clements	P.Eng. Mobile Radio Engineer GMCO	June 11, 2009	Confirmed receipt of noticed of project restart for the proposed project. Advised that unless there have been any changes since the last correspondence with GMCO office on this project GMCO had no concerns with possible interference to Ontario's public safety mobile radio system.
Milan Vujosevic	P.Eng. Manager, Transmission Engineering Rogers Wireless Partnership	June 24, 2009	Confirmed that the proposed McLean's Mountain Wind Farm installation will not have any negative impact on existing Rogers Wireless' cellular or microwave point-to-point systems in the area.
Lillian Yao	Observing Systems and Engineering Meteorological Service of Canada	July 3, 2009	Inquiry to provide the following information in order to perform a preliminary assessment regarding its potential impact on the nearby weather radar(s): • Turbine coordinates • Tower height • Rotor blade diameter • Tower material Dillon provided the required information.

4.6 Public Meetings and Presentations

4.6.1 2004 Public Information Centre

The first Public Information Centre was held on June 30th, 2004 in the Town of Little Current (NEMI Recreation Centre/Arena) to provide the public with general information about the project and NPI's intent to undertake an environmental screening.

4.6.2 2004 Presentation to NEMI Council

On August 12, 2004 NPI provided information on the project to the NEMI council (see **Appendix B**). In this presentation to NEMI Council, NPI addressed the following issues regarding the proposed project that were expressed by the community:

- Local Economic Benefits;
- Visual and noise impacts;
- Impacts on Natural environment; as well as
- Impacts on tourism.

4.6.3 2005 Public Information Centre

The second Public Information Centre was held on June 28th, 2005 in Little Current (NEMI Recreation Centre/Arena) to provide the public with an update on the project (**Appendix B)**.

The purpose of the PIC was to:

- Make information about the project available to the public;
- Provide the public with an opportunity to learn more about the EA process; and,
- To provide a venue for questions and for providing feedback to NPI about the project.

Issues raised by the public at this information centre included: impacts on birds, visibility of the turbines, project economic benefits and the effects of the project on tourism.

4.6.4 2009 Public Information Centre

The final PIC was held on June 25, 2009 at the NEMI Recreation Centre/Arena in Little Current, Ontario from 7:30 pm to 9:30 pm. During the PIC, several information panels were displayed to provide the public with information about the project **(see Appendix B)**. The purpose of the PIC was to present:

- The results of environmental studies and evaluations of the siting of the wind turbine and transmission line route;
- The assessment of project impacts on the environment with potential mitigation measures and identification of residual effects;
- The specific information on the project; and,
- To provide a venue for questions and for providing feedback to NPI about the project.

The PIC was organized as a drop-in centre. In total, thirty-four (34) participants signed in. Overall the PIC was well received. A summary of the received written comments (and a response to those comments) are included in **Appendix B**.

Representatives from NPI, Aerocoustics Engineering and Dillon Consulting were present at the PIC #2 to answer questions about the proposed project and to provide additional project information to the public.

Among the attendees, there were representatives from the Municipality of The Northeastern Manitoulin and the Islands, First Nations', local business owners, members of non-profit membership association and media. The remainder of the attendants were residents of the area.

The most common concerns expressed at the PIC by residents were:

- Visual impacts;
- Impacts on wildlife;
- Power line routing;
- Impacts to birds and bats;
- Level of noise generated by the turbines and how the setbacks were established to accommodate the level of noise;
- Human and animal health and safety;
- Radio communication towers interference; and
- Location of the turbines.

NPI received many comments subsequent to the PIC in June 2009. Attempts were made to respond to these comments as much as possible. Follow-up discussions were held with residents regarding the routing of the transmission line along Morphet's Side Road.

4.7 Notice of Completion and Release of Environmental Screening Report (ESR)

An ESR Notice of Completion (NOC) has been issued to inform the public, agencies and Aboriginal Communities that the environmental screening for the project has been completed. The Notice was published in the Manitoulin Expositor on July 15th, and July 22nd, 2009. The NOC includes a map showing the location of the project, a summary of project background information, information on where the ESR can be obtained to review and contact information for the MOE and the project proponent. (See **Appendix B**)

Notice was also sent to residents in the project area and larger area (through Canada Post Ad Mail) advising them of the availability of the final ESR for review and comment.

The ESR was made available at:

- Township of NEMI Clerk's Office; and,
- The project website www.northlandpower.ca.

Copies of the final ESR have also been released to key government agencies (Environment Canada, Ontario Ministry of the Environment and the Ministry of Natural Resources) and Aboriginal Communities for review during the 30-day review period.

4.8 Future Consultation Commitments

NPI will continue its stakeholder consultation and communications through project construction and implementation phases. Planned stakeholder consultation and communications activities will include:

- Web site with updates on project progress;
- The appointment of a construction community liaison officer who shall directly address issues raised by the community during the construction phase of the project;
- Project update bulletin or bulletins as required, mailed or hand delivered to keep area residents apprised of the progress of construction, dates and timing of any traffic disruptions connected with the project and any other matters that may affect or be of interest to area residents and other project stakeholders;
- Newspaper notices regarding traffic disruptions and construction timings of interest;
- Personal consultations as requested or if warranted;
- Meetings with municipal and other local and provincial government authorities;
- Ongoing consultation and meetings with local Aboriginal communities and organizations; and,
- Post-construction: public gathering to present post-construction study results.

5. Environmental Features Screening

As required by MOE regulation 116/01 and the "*MOE Guide to Environmental Assessment Requirements for Electricity Projects*", a screening of environmental features was undertaken. The MOE screening criteria as contained in Appendix C of the "Electricity Project EA Guide" was used as a basis for the screening and has been reproduced in **Table 5-1**. A "No" listing in the table indicates that the environmental feature will not be affected by the proposed project and is not considered further in the environmental screening. A "Yes" listing indicates the possibility of the environmental feature being affected by the project. As in the Electricity Project EA Guide, mitigation or impact management measures are not to be considered in completing this table. Environmental features, which could be affected by the project, were then assessed in greater detail as described in this section of the report. A summary of effects and mitigation can be found in **Section 6.24** and **Table 6-5**.

Table 5-1: Provincial Screening Checklist

Provincial Screening Checklist			
Criterion: Will the project……..	**Yes**	**No**	**Additional Information**
1. Surface and Ground Water			
1.1 have negative effects on surface water quality, quantities or flow?	**X**		▪ Potential for effects on water quality (sediments) and flow obstruction from the construction of the turbine access roads. ▪ Potential for some sedimentation effects related to the laying of the submarine cable across the North Channel ▪ No surface water will be required for the project. ▪ See Section 6.2 for effects assessment/mitigation.
1.2 have negative effects on ground water quality, quantity or movement?		**X**	▪ Some de-watering of the turbine foundation area may be required. Affects on groundwater levels are not expected because of this. ▪ See Section 6.4 for effects assessment/mitigation.
1.3 cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off site?	**X**		▪ In-water works for access roads and electrical lines could increase erosion/sedimentation rates in watercourses. It is expected that these effects can be mitigated. ▪ See Section 6.2 for effects assessment and mitigation measures.
1.4 cause potential negative effects on surface or ground water from accidental spills or releases to the environment?	**X**		▪ Fuels and lubricants will be required during all project phases. As with any infrastructure project, there is the potential for spills of these materials. The quantities of these materials to be used are not large. Some temporary storage at the project construction site compound (staging area) is likely. ▪ See Section 6.2 for effects assessment/mitigation
2. Land			
2.1 have negative effects on residential, commercial or institutional land uses within 500 metres of the site?	**X**		▪ There are no commercial or institutional land uses in the project area. ▪ There are a few residences in the vicinity of the turbines. The turbines are set back at least 550 m from each residence and future building envelopes. ▪ See Section 6.10 for effects assessment/mitigation
2.2 be inconsistent with the Provincial Policy Statement, provincial land use or resource management plans?		**X**	▪ The project respects the pertinent Provincial Policy Statement
2.3 be inconsistent with municipal land use policies, plans and zoning by-laws?		**X**	▪ Turbines are a permitted land use for the project lands as per the Manitoulin Planning Board Official Plan and Zoning by-law for the Municipality of Northeastern Manitoulin and the Islands (NEMI).
2.4 use hazard lands or unstable lands subject to erosion?		**X**	▪ The turbines are located outside of hazard lands (i.e. flood plain).
2.5 have potential negative effects related to		**X**	▪ As lands required for the project are rural. It is very unlikely that the lands are

Provincial Screening Checklist				
Criterion: Will the project……..		**Yes**	**No**	**Additional Information**
	the remediation of contaminated land?			contaminated and require remediation.
3.	**Air and Noise**			
3.1	have negative effects on air quality due to emissions of nitrogen dioxide, sulphur dioxide, suspended particulates, or other pollutants?	**X**		▪ The operation of the wind farm will not result in air emissions. ▪ During the construction period, air emissions from construction machinery and related traffic will occur, although there are no receptors nearby. ▪ Movement of construction equipment and excavation activities could increase TSP levels in a localized area, although the turbines are well removed from receptors in the area. ▪ See Section 6.5 for effects assessment/mitigation.
3.2	cause negative effects from the emission of greenhouse gases (CO_2, methane)?		**X**	▪ The construction machinery will emit greenhouse gases. ▪ The operation of the wind turbines will not result in the release of greenhouse gases. ▪ See Section 6.5 for effects assessment/mitigation.
3.3	cause negative effects from the emission of dust or odour?	**X**		▪ During the construction period there is the potential for increased dust levels. ▪ No odours are expected during operations. ▪ See Section 6.5 for effects assessment/mitigation.
3.4	cause negative effects from the emission of noise?	**X**		▪ The operation of the construction equipment will result in noise increases in a localized area. ▪ The operation of the turbines will result in noise, although the turbines have been sited to meet MOE noise criteria. ▪ Increased road traffic from the construction workforce could increase road traffic noise levels in area. ▪ See Section 6.12 or effects assessment/mitigation.
4. Natural Environment				
4.1	cause negative effects on rare, threatened or endangered species of flora or fauna or their habitat?	**X**		▪ Based on an extensive literature review, consultations with local experts, and a full year of fieldwork, rare, threatened or endangered species are unlikely to be affected by the project. ▪ See Section 6.13 for effects assessment and proposed mitigation.
4.2	cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?		**X**	▪ There are no known ESAs in the study area. The one ANSI (life science) in the area has been avoided. ▪ See Section 6 for effects assessment/mitigation.
4.3	cause negative effects on wetlands?	X		▪ Wetlands in the study area have been avoided as much as possible. ▪ Measures to minimize run off effects have been recommended.

Provincial Screening Checklist				
Criterion: Will the project……..		**Yes**	**No**	**Additional Information**
4.4	have negative effects on wildlife habitat, populations, corridors or movement?	**X**		▪ The construction and installation of project components has the potential to result in effects to wildlife through the removal of some habitat. ▪ See Section 6 for effects assessment/mitigation.
4.5	have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g. water temperature, turbidity, etc.)?	**X**		▪ It will be necessary to cross some watercourses with the access roads, electrical collector lines and the 115 kV transmission line – this could result in effects to fish and fish habitat. ▪ The crossing of the North Channel with a submarine power cable has the potential to affect fish habitat ▪ Watercourse crossings will be designed to minimize effects on aquatic habitat ▪ See Section 6.2 for effects assessment/mitigation.
4.6	have negative effects on migratory birds, including effects on their habitat or staging areas?	**X**		▪ The operation of the wind farm has the potential to result in effects on migratory birds through collisions and habitat alteration. The scale and significance of these effects has been assessed in this Environmental Screening. ▪ See Section 6.6 for effects assessment/mitigation.
4.7	have negative effects on locally important or valued ecosystems or vegetation?	**X**		▪ For some turbine sites, natural vegetation will need to be cleared for the turbines, collector lines and access roads ▪ Some vegetation may need to be cleared for the transmission line right-of-way. ▪ See Section 6 for effects assessment/mitigation.
5.	**Resources**			
5.1	result in inefficient (below 40%) use of a non-renewable resource (efficiency is defined as the ratio of output energy to input energy, where output energy includes electricity produced plus useful heat captures)?		**X**	▪ Wind, a renewable resource, will be used to generate the electricity.
5.2	have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural lands?		**X**	▪ Some of the turbines are located on pasture land. The class of this land is expected to be below Class 3 ▪ See Section 6.13 for effects assessment/mitigation.
5.3	have negative effects on existing agricultural production?	**X**		▪ Most of the turbines are located on pasture land. A small amount of pasture land would be removed for some of the turbines and supporting infrastructure.

Provincial Screening Checklist				
Criterion: Will the project……..		**Yes**	**No**	**Additional Information**
				▪ See Section 6.17 for effects assessment/mitigation.
5.4	have negative effects on the availability of mineral, aggregate or petroleum resources?		**X**	▪ The project area is not known to contain mineral or petroleum resources
5.5	have negative effects on the availability of forest resources?		**X**	▪ The affected lands do not support harvestable forest resources.
5.6	have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?	**X**		▪ The project is located in an area that may be used for recreational hunting. ▪ None of the affected lands can be considered as inaccessible. ▪ See Section 6.3.3 and 6.3.3 for effects assessment/mitigation.
6.	**Socio-Economic**			
6.1	have negative effects on neighbourhood or community character?		**X**	▪ There are no built communities in the vicinity of the project, the area is rural in nature with a few scattered residences. ▪ See Section 6.14 for effects assessment/mitigation.
6.2	have negative effects on local businesses, institutions or public facilities?		**X**	▪ There are no businesses in the vicinity of the project that could be negatively affected. ▪ The development of the wind project will result in economic benefits in the area through employment creation and demand for supplies and services. ▪ See Section 6.20 for effects assessment and mitigation measures.
6.3	have negative effects on recreation, cottaging or tourism?	**X**		▪ The project could temporarily affecting hunting activity in the area during construction. Disruption during operations is not expected. ▪ No recreation cottages are within the project area. There are a couple of hunt camps in the project area. ▪ See Section 6.20 for effects assessment/mitigation.
6.4	have negative effects related to increases in the demands on community services and infrastructure?	**X**		▪ Potential (although low) for demand on emergency service in the event of an accidental event. ▪ NPI is to provide funding for appropriate training to local emergency services.
6.5	have negative effects on the economic base of a municipality or community?		**X**	▪ Negative effects on the area economy are not expected. The project will result in positive economic impacts through payments to land owners and taxes that will be paid to the municipality and job creation. Supplies and services will be obtained in the local area as much as possible.
6.6	have negative effects on local employment and labour supply?		**X**	▪ It expected that the project will result in positive effects through the creation of employment opportunities.
6.7	have negative effects related to traffic?	**X**		▪ The turbines and other related supplies will be transported to the study area by truck. This could create some short term road congestion during the construction period. A

Provincial Screening Checklist				
Criterion: Will the project……..		**Yes**	**No**	**Additional Information**
				▪ transportation permit will be required to transport turbine components to site. ▪ See Section 6.21 for effects assessment/mitigation.
6.8	cause public concerns related to public health and safety?	**X**		▪ There exists the potential for public safety issues during the construction and operation period. While the affected lands are private, safety protocols and procedures will be established to limit access to construction areas. ▪ Potential effects to public health and safety during the operations period are minimal ▪ As this project will not emit any greenhouse gases, it will offset electrical production from other generation sources that could have public health impacts. ▪ Project Health and Safety concerns have been responded to – local residents are generally supportive of the project ▪ See Section 6.22 for effects assessment/mitigation.
7.	**Heritage and Culture**			
7.1	have negative effects on heritage buildings, structures or sites, archaeological resources, or cultural heritage landscapes?	**X**		▪ Based on the Stage 1 archaeological assessment, the project lands have limited potential for effects if some key areas are avoided. Nevertheless, there is still the potential to affect archaeological resources. ▪ See Section 6.20 for effects assessment/mitigation.
7.2	have negative effects on scenic or aesthetically pleasing landscapes or views?	**X**		▪ The wind farm will be visible at various locations throughout the area. This will change the landscape of the area. There also exist the potential for flicker effects. ▪ See Section 6.19 for effects assessment/mitigation.
8.	**Aboriginal**			
8.1	cause negative effects on First Nations or other Aboriginal communities?	**X**		▪ At this time, it is not anticipated, subject to NPI' continuing consultations with the relevant Aboriginal communities and appropriate mitigation measures, where needed, that there will be any significant adverse effects on Aboriginal communities' interests arising from the project.
9.	**Other**			
9.1	result in the creation of waste materials requiring disposal?	**X**		▪ The project will result in the creation of some solid waste materials such as packaging and other constructed related materials and used lubricants. ▪ See Section 6.11 for effects assessment/mitigation.
9.2	cause any other negative environmental effects not covered by the criteria outlined above?		**X**	

6. Effects Assessment and Mitigation

The construction, operation and maintenance of the McLean's Mountain Wind Farm have the potential to affect the environment, including the social and natural environment. This section examines the interactions between the project activities and the natural and social features that they could potentially affect.

The *Guide to Environmental Assessment Requirements for Electricity Projects* and the *Environmental Impact Statement Guidelines for Screening of Inland Wind Farms under the Canadian Environmental Assessment Act* both require that for each project specific issue identified through the environmental screening checklist (**Table 6-1**) the following analysis be completed:

- **Existing Environment** - describes the potentially affected environmental feature.
- **Potential Effects** – describes the potential effects, both positive and negative, to the environment that may occur as a result of the Project.
- **Mitigation Measures** – Recommends specific mitigation measures that will be implemented to minimize any potential negative effect of the Project on environmental features.
- **Net Effects and Significance** – Describes the residual effects after mitigation measures have been applied and the significance of the net effects. The criteria for assessing the level of significance of net effects after mitigation measures have been applied are illustrated in **Table 6-1**, as described in the *Environmental Impact Statement Guidelines for Screening of Inland Wind Farms under the Canadian Environmental Assessment Act*.

Table 6-1: Determining Significance of Net Effects

Level	Definition
High	Potential impact could threaten sustainability of the resource and should be considered a management concern. Research, monitoring and/or recovery initiatives should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-baseline but stable levels in the study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives many be required.
Low	Potential impact may result in a slight decline in resource in study area during the life of the project. Research, monitoring and/or recovery initiatives would not normally be required.
Minimal	Potential impact may result in a slight decline in resource in study area during the construction phase, but the resource should return to baseline levels.

The following section describe the potential for projects effects considering the results of the screening that was undertaken as previously documented in **Table 5-1**. For each component of the environment that was considered, a description of the following is provided: existing conditions, potential effects, proposed mitigation, and the net effect/effect significance.

Natural Environment

6.1 Physiography/Topography

6.1.1 Existing Environment

According to Chapman and Putnam (1984), Manitoulin Island is 129 km long and from 5 to 48 km wide, covering 4113 km^2. Manitoulin contains over 100 lakes with the 3 largest covering 168 km^2. The island is part of the Niagara cuesta, a dolomitic saucer underlying the Lake Michigan basin. With exception to escarpment areas, where elevation changes drastically over a short distance, the topography of the area is comprised of limestone tablelands tilted slightly to the south-southwest, generally appearing flat. The island is underlain by rocks of the Ordovician and Silurian ages that outcrop in many places and contain limestone shale from the Utica formation. The shales of the Utica formation are grey to dark bluish grey in colour and contain layers of calcareous sandstone and sandy shale. The proposed project site is located south of Little Current in the Town of Northeastern Manitoulin and the Islands, Ontario on McLean's Mountain.

Immediately to the south of the wind farm study area, in the vicinity of Sheguiandah, a ridge of quartzite of Precambrian age protrudes through the Palaeozoic strata (Chapman and Putnam 1984).

Soils in the wind farm project area are typically imperfectly or poorly drained and have varying development of a gley horizon at the base of the profile. Some smaller areas also have a covering of peat or muck. According to Hoffman et al. (1959) the most obvious and most important characteristic of the soil cover is its shallowness. Soils in the immediate area are too shallow for cultivation and are suitable only for woods or rough pasture. The surface deposits are primarily of glacial origin and they form the parent material from which the soils have developed (Hoffman et al. 1959).

During fieldwork, the above conditions were observed throughout the open portions of the study area. Subtle changes in slope and the presence of limestone depressions formed a complex array of dry/wet old-field meadows to meadow marsh environments, the majority of which are culturally maintained by grazing cattle.

6.1.2 Potential Effects

There exists the potential for some slight alterations to topography as a result of grading and blasting required for turbine foundations and access road construction. This could result in some localized alterations to topography.

No potential effects are anticipated during the operation of the wind farm.

6.1.3 Mitigation Measures

During construction, the extent of grading will be minimized as much as possible so as to not substantially alter drainage patterns in the area. No mitigation measures are required as there are no anticipated effects during the operation of the wind farm.

6.1.4 Significance of Net Effects

No adverse significant effects are expected.

6.2 Surface Water Quality and Soil Erosion

This section refers to items 1.1, 1.3, 1.4 and 2.4 of the MOE's environmental screening checklist" will the projects:

- ***Have negative effects on surface water quantity, quantities or flow?***
- ***Cause significant sedimentation, soil erosion or shoreline or riverbank erosion on or off-site?***
- ***Cause potential negative effects on surface or ground water from accidental spills or releases into the environment?***
- ***Use hazard lands or unstable lands subject to erosion?***

6.2.1 Existing Environment

The study area contains many small lakes and streams. In general, the majority of watercourses flowing off McLean's Mountain within the study area flow to the Sucker Creek and/or the Perch Creek systems, which both flow to the North Channel of Lake Huron. Watercourses flowing easterly from the east side of McLean's Mountain flow toward Strawberry Channel. On the south side of the study area, westerly watercourses generally flow toward the North Channel via Perch Lake and easterly watercourses generally flow toward Bass Lake near Sheguiandah.

6.2.2 Potential Effects

It will be necessary to cross several watercourses with the turbine access roads and electrical lines. For the roads crossings, culverts will need to be installed so as to not obstruct the flow of water from access road construction. There is also the potential for the movement of construction equipment across the water courses and erosion effects from construction activity in the vicinity of surface water (e.g. to construct the 115 kV transmission line). These temporary disturbances may include downstream sediment transport and bed and bank disturbance and will be minimized as much as possible through the selection of the appropriate crossing techniques and culvert design determined in consultation with The Department of Fisheries and Oceans (DFO) and the MNR.

6.2.3 Mitigation Measures

The following will be taken into consideration to mitigate effects on surface water:

- The Ontario MOE Stormwater Management Planning and Design Manual (2003);

- The Ontario Provincial Standards and Specifications (OPSS 182, 518 & 577);
- The Ontario MOE Stormwater Pollution Prevention Handbook (Part I); and the Part II – Pollution Prevention and Flow Reduction Measures Fact Sheets; the Ontario MNR Guidelines on Erosion Control for Urban Construction Sites (1989);
- The MNR Technical Guidelines- Erosion and Sediment Control (1989); and
- Forest Management Guide for Conserving Biodiversity and the Stand and Sites Scales, draft (2008).

To provide source controls and minimize adverse impacts, the following drainage mitigation will be incorporated into the environmental management plan (EMP) that the project constructor will be required to comply with:

- Minimize disturbance of existing vegetation outside ditching and grassed slopes where re-grading is required;
- Minimize time exposure of un-vegetated soils;
- Maximize length of overland flow through to points where stormwater leaves the site;
- Complete an erosion assessment on all new and existing ditches to determine the need for
- additional erosion protection;
- Top of bank barriers (e.g. silt fencing) are to be put in place for any construction activity that is in proximity to watercourses;
- Where ditch re-grading is required, where appropriate, utilize flat bottom ditches in lieu of 'V' ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term storm water storage;
- Use of in-line erosion control measures such as erosion blanket, rip rap, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation;
- Stream banks are to be stabilized and restored to their pre-construction condition immediately following construction activity. This is particularly important in erosion prone areas such as steep sloped stream banks;
- The watercourse crossing is to be assessed in advance and the most appropriate mitigation measures determined. Alternative watercourse crossing locations should be considered it the proposed crossing location appears to be particularly sensitive to erosion;
- Any stockpiled materials are to be stored and stabilized away from watercourses;
- Ensure all materials placed within the flood line are clean and free of silt and clay size particles. All materials must meet applicable regulations governing placement of fill in water bodies;
- Ensure that all materials and equipment used for the purpose of site preparation and the completion of any work is operated and stored in a manner that prevents any deleterious substance from entering the water;
- Refueling and handling of potential hazardous substances are to be done away from watercourses;

- Sediment and erosion control measures are to be left in place until all disturbed areas have been stabilized;
- The sediment control plan be designed and implemented to mitigate impacts associated with construction of the project - to prevent suspended sediment, mud, debris, fill, rock dust, etc. from entering downstream watercourses. Areas disturbed by work must be minimized. Silt fences/curtains, sediment traps, check dams must be installed as appropriate;
- Measures are to be in place to minimize mud tracking by construction vehicles, and to ensure timely cleanup of any tracked mud, dirt and debris along local roads and areas outside of the immediate work area where the above sediment controls would not be in place;
- Work is to be suspended if excessive flows of sediment discharges occur, and, any appropriate action should be immediately taken to reduce sediment loading;
- If it is necessary to de-water foundation excavations, prior to its discharge to a watercourse, the water is to be discharged to a settling pond, filter bag, or vegetated buffer strip of adequate size, to filter out suspended sediment;
- Temporary mitigation measures are to be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on regular basis, prior to and after runoff events. Any accumulated materials are to be cleaned out during maintenance and prior to their removal. All disturbed areas on land to be restored to natural conditions should be re-vegetated as soon as conditions allow preventing erosion and restoring habitat functions. Land based measures must not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures) so as to provide adequate erosion protection to disturbed work areas; and
- Timbers spaced to allow water flow and then covered with mats will be used for wet water crossings if required.

There are no anticipated effects on surface water during the operations phase of the wind farm.

6.2.4 Significance of Net Effects

Most of the surface water related effects will occur during a 6-month construction window and thus will be relatively short term. Mitigation measures will be implemented, which are expected to be largely effective, to minimize these effects. As a result no adverse effects are expected.

Net effects are expected to be of low magnitude and temporary in nature. As a result, the net effects are not considered to be significant.

6.3 Fisheries Habitat

This section refers to items 4.5 and 5.6 of the MOE's environmental screening checklist: will the project:

- ***Have negative effects on fish or their habitat, spawning, movement or environmental conditions (e.g. Water temperature, turbidity, etc)?***
- ***Have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?***

6.3.1 Existing Environment

To collect background information, the Ontario Ministry of Natural Resources (OMNR; Espanola office) was contacted to obtain existing fisheries/aquatic information for watercourses and lakes in the study area. In 2004, there was no background fish community information in OMNR's records for any of the eastern watercourses of the project area. However, it was conveyed by OMNR that many of the streams flowing off McLeans Mountain are likely spring-fed and several are known to flow over limestone (Holly Simpson, OMNR Espanola office, personal communication). The east branch of Sucker Creek (see **Figure 6-1**) is considered by OMNR to be a coldwater stream (Holly Simpson, OMNR Espanola office, personal communication).

In October 2008, OMNR indicated that Perch Creek is designated as a coldwater system, which may include potential salmonid (trout and salmon) migration up into the lower reaches from the North Channel. Furthermore, there may be brook trout in the upper reaches of the system (Wayne Selinger, OMNR Espanola Office, Personal Communication); however, no records exist to date to confirm this possibility. OMNR also noted that Perch Lake has an average surface area of 480 acres, a maximum depth of 6 feet, and a fish community primarily consisting of the following as indicated in (**Table 6-2**):

Table 6-2: Perch Lake – Existing Environment

Common Name	Scientific Name
Northern redbelly dace	*Phoxinus eos*
Finescale dace	*Phoxinus neogaeus*
Pearl dace	*Margariscus margarita*
Rainbow darter	*Etheostoma caeruleum*
Iowa darter	*Etheostoma exile*
Brook stickleback	*Culaea inconstans*
Fathead minnow	*Pimephales promelas*
Central mudminnnow	*Umbra limi*

* Source: OMNR Lake Survey 1965

Although the data are historical, none of the species listed above are considered to be rare, threatened, or endangered according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The presence of top predators in the lake is not known.

In general, the majority of watercourses flowing off McLean's Mountain within the study area flow to the Sucker Creek and/or the Perch Creek systems, which both flow to the North Channel of Lake Huron. Watercourses flowing easterly from the east side of McLean's Mountain flow toward Strawberry Channel. On the south side of the study area, westerly watercourses generally flow toward the North Channel via Perch Lake and easterly watercourses generally flow toward Bass Lake near Sheguiandah (**Figure 2-1**).

Field Reconnaissance

Several crossings in the eastern portion of the study area were originally examined in October 2004 and then again in October 2008. A total of twenty-four (24) stations were examined; their

locations were chosen based on the potential for access roads and/or aboveground transmission line crossings from proposed turbine locations. Crossings in the western portion of the project area were examined in October 2008 to reflect the expanded project area. Where possible, exact crossing locations were chosen based on the current proposed transmission line route and new access roads. When exact crossing locations were not known or not easily accessible at the time of survey, representative stations were selected at existing road crossings (see **Figure 6-1**) nearest to the proposed crossing site that share the same aquatic feature. At each station, general channel and habitat features were noted, and representative photographs were taken. Photographs for each station can be found in **Appendix C.**

The aquatic features within the study area are generally a mixture of natural and altered channel systems, low-lying wet pockets/wetlands, and overland swales and drainage ditches. Many of them are considered coldwater systems; however, a few are significantly degraded by unrestricted cattle access and poorly installed/degraded road/farm path culverts. Based on field investigations completed to date, it appears that the majority have the potential to function as direct fish habitat (approx. 70% of the stations investigated). The remaining stations appear to represent either indirect habitat or no fish habitat potential. Confirmatory field investigations under spring conditions, including a fish presence/absence survey, may be necessary to identify habitat sensitivity and appropriate mitigation measures for each potential crossing.

NORTHLAND POWER

Mcleans Mountain Windfarm
Figure 6-1 Aquatic Features and Stations

Legend

- Turbine
- Aquatic Survey Stations
- Substation
- Building
- Secondary Roads
- Highway
- Rivers
- Access Roads
- Transmission Line (115kv)
- Project Area
- Lots
- First Nation Reserve
- Waterbody
- Wetland
- Woodlots

Inset Map

N
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S

0 1,000 2,000 3,000

DILLON CONSULTING

Created By: KWR
Checked By: JP
Date Created: June 08, 2009
Date Modified: June 16 2009
File Path: I:\GIS\Northland Power\Mapping\Aquatic Stations.mxd

North Channel
North Channel Dr
Little Current
Hall St
Lake Rd
Aundeck Omni Kaning First Nation
Willis Rd
Morphets Side Rd
Green Bush Rd
Sideroad 20
Perch Lake
Burnets Side Rd
Orrs Rd
Mill St
Townline Rd
Darius Sideroad
Indian Mountain Rd
Rockville Rd
Bidwell Rd
Bay Rd
Perch Lake
Bass Lake
Pike Lake
540
6
Sta. 1
Sta. 2
Sta. 3
Sta. 4
Sta. 5
Sta. 6
Sta. 7
Sta. 8
Sta. 9
Sta. 10
Sta. 11
Sta. 12
Sta. 13
Sta. 14
Sta. 15
Sta. 16
Sta. 17
Sta. 18
Sta. 19
Sta. 20
Sta. 21
Sta. 22
Sta. 23
Sta. 24

6.3.2 Potential Effects

The main effects of the project are summarized in **Table 6-3** below. There are 2 major activities proposed at or near the anticipated stations that have the potential to negatively affect fish and fish habitat. These activities are described below.

Overhead Line Construction for Transmission Line Installation
Several watercourses will need to be crossed with the electrical lines. It is expected that the electrical lines will span all of the watercourses and there would be no required in-water works for these crossings. Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. Potential impacts to fish and fish habitat include excessive loss of riparian vegetation, erosion and sedimentation resulting from bank disturbance and loss of plant root systems, rutting and compaction of stream substrate at crossing sites, and disruption of sensitive fish life stages.

Submarine Cable Crossing of the North Channel

The placement of a cable across the North Channel is not expected to have a significant impact on aquatic resources, as the cable will not be trenched across the channel but will lay on the bottom. Impacts would be associated with any required cable trenching that may be required at the shoreline of the North Channel, however it is expected that disturbance to the shoreline and adjacent aquatic habitat can be mitigated with appropriate in-water work timing and site isolation, sediment and erosion controls, stabilization measures and vegetation restoration. DFO has an Operational Statement that applies to underwater cables which provides guidance on mitigation measures to be employed.

Culvert Crossings for Access Road Construction
Based on the proposed project layout new watercourse crossings will be required for the turbine access roads. The total number and location of the crossings and their sensitivity is to be confirmed in future planned field work prior to construction. The risks to fish and fish habitat associated with isolated open cut stream crossings to install a culvert include the potential for direct damage to substrates, release of excessive sediments, loss of riparian habitat, stranding of fish in dewatered areas, impingement/entrainment of fish at pump intakes, and disruption of essential fish movement patterns. Similarly, dry open-cut stream crossings pose a risk to fish and fish habitat due to potential harmful alteration of substrates, loss of riparian habitat, and release of excessive sediment once stream flows resume.

6.3.3 Mitigation Measures

The majority of road crossings over small to medium watercourses will be handled by installing an appropriately-sized culvert by open cutting creek/drain beds to install at an acceptable elevation to ensure proper fluvial function and fish passage. Conversely, electrical wires are generally suspended and installed over aquatic features. Standard mitigation measures to address

typical negative impacts resulting from construction of access roads and overhead power lines are presented in **Table 6-3** below.

Table 6-3: Potential Impacts, Mitigation Measures, and Net Effects

Potential Impact	Appropriate Mitigation/Restoration	Net Effects (if any) / Rationale
Erosion and sedimentation/silt release (due to bank disturbance, loss of root systems, rutting, and compaction of stream substrates)	- install sufficient silt fencing, rock/straw bail check dams, erosion blankets to control exposed surfaces - work during dry/frozen conditions or create dry conditions (i.e., dam and pump) - cross watercourses at straight sections where banks are more stable	**NO Net Negative Effect** - mitigation measures will catch the majority of release
Site dewatering & fish stranding (due to cofferdam installation to create dry work conditions)	- install filter bags/sediment basins/ splash pads to capture and filter sediment-laden water prior to reentry - capture and relocate stranded fish prior to dewatering any enclosures	**NO Net Negative Effect** - mitigation measures will filter the discharge - relocated fish will be well downstream of the work area
Disturbance to or removal of existing vegetation and banks (due to site access for heavy equipment)	- use existing trails, cut-lines, roads to avoid/minimize unnecessary removal and keep within the utility ROW - replant and/or reseed disturbed areas as required using native species - reshape bank to original or better shape	**LOW Net Negative Effect** - limited riparian vegetation is expected to be removed per site - exposed areas will be restored and re-vegetated to minimize soil exposure.
Disturbance (compaction) to or removal of existing substrates (due to crossing of heavy equipment and culvert footprints)	- operate machinery only in channel area proposed to be disturbed (e.g., footprint of the culvert) - similar or improved substrate will be installed throughout the new culvert	**LOW Net Negative Effect** - some native substrate will be removed within the footprint of the new culvert - disturbed substrate will be replaced with same or better
Disruption to sensitive life stages (due to untimely in-water work)	- adhere to the appropriate MNR In-water Construction Timing Window.	**NO Net Negative Effect** - avoids spawning, incubation, and rearing times
Introduction of deleterious substances (due to heavy equipment on-site and in-water)	- ensure that machinery used is clean and free of fluid leaks - refuel and store fuel far back from the watercourse and keep a spill kit ready on-site	**NO Net Negative Effect** - standard measures will prevent petroleum products from entering the watercourse
Impingement of fish at pump intakes (due to cofferdam dewatering or dam and pumping – if methods utilized)	- prevent fish from gaining access to pump intakes by using screens and temporary gravel berms	**NO Net Negative Effect** - standard measures will protect fish
Disruption of migratory movements (due to cofferdam or dam and pumping construction methods)	- work in a manner that minimizes time in the channel - work outside of migratory times	**NO Net Negative Effect** - disruption is temporary and to occur within the approved In-water Construction Timing Window

As detailed in the above table, few net effects will remain after appropriate mitigation measures have been implemented. These effects are considered minor and can generally be compensated

through the implementation of basic restoration activities to replace what was lost (e.g., riparian plantings, reseeding, substrate enhancement/replacement etc.).

For more detailed information on environmental mitigation and protection appropriate to these types of watercourse crossings, the DFO Operational Statements for "*Overhead Line Construction*" and "*Isolated or Dry Open-Cut Stream Crossings*" will be consulted.

To minimize or prevent impacts to direct fish habitat, implementation of the mitigation measures listed in **Table 6-3** and in **Appendix C - Attachment 4** would be required to prevent the occurrence of Harmful Alteration, Disruption or Destruction (HADD) in the vicinity of these stations.

6.3.4 Significance of Net Effects

A summary of negative residual effects of anticipated construction activities is provided in **Table 6-3.** This assessment of residual effects was used to determine the potential risk of the project, and subsequently the determination of HADD from proposed activities. There are no known Species at Risk associated with the watercourse crossings within the study area.

As the proposed project activities are addressed in specific DFO Operational Statements (**see Appendix C – Attachment 4**), the low net effects identified in **Table 6-3** are not considered to be significant provided that mitigation recommendations are followed as directed. Some of the proposed in-stream works may result in a HADD of fish habitat and as such, may require more detailed investigations (e.g., habitat within specific development footprints).

Permitting and Construction Considerations

DFO will be consulted with regarding the need for approval under the federal *Fisheries Act*. Additional field work at each crossing location is planned prior to construction to confirm its aquatic habitat sensitivity and to assist in the development of the mitigation plan and additional approval requirements. Any potential impacts on fish habitat from access road crossings or aboveground transmission lines for the proposed turbine locations should be mitigated (by following the OP statements). When the harmful alteration, disruption or destruction (HADD) of fish habitat cannot be avoided, an Authorization will be required from DFO and fish habitat compensation measures may need to be implemented.

6.4 Groundwater Quality

This section refers to items 12 and 1.4 of the MOE's environmental screening checklist: will the project:

- ***have negative effects on ground water quality, quantity of movement?***
- ***Cause potential negative effects on surface or groundwater from accidental spills or releases to the environment?***

6.4.1 Existing Environment

The site lies mainly above an escarpment, which trends along the northern, eastern and southeastern boundaries of the property. The escarpment is 300 m high and is a major physiographic feature of the area. The terrain across most of the site consists of a flat plain, underlain by Paleozoic limestones and dolostones of the Manitoulin and Georgian Bay Formations. These rock units have a gentle regional dip toward the southwest (Chapman and Putnam, 1984; Johnson et al, 1992; Ontario Division of Mines, 1972a and b). The base of the escarpment is underlain by older shale/limestone beds.

On the site above the escarpment, the glacial overburden is thin (<1 m, based on Hoffman et al, 1959) and the bedrock outcrops at many locations. The linear segments of stream courses shown on a topographic map of the site indicate the pattern of vertical fractures in the bedrock, which have been widened near the surface by dissolution. Several intermittent streams are present on the site. The water table is likely lies within about 2 m depth, as indicated by the numerous wetlands. All of these factors indicate rapid infiltration of precipitation to the water table.

A water table divide follows higher ground around an area in the central part of the site. This divide encloses the catchment area around Perch Lake and its outflowing stream, both of which are local discharge zones for shallow groundwater. The general groundwater flow direction within this catchment area is toward the North Channel on the west side of the site. Outside this catchment area, shallow groundwater on the site flows away from the water table divide toward the north, east and south.

6.4.2 Potential Effects

As the project will result in the creation of very limited impervious areas (wind turbine base, transmission line pole base), the project will not alter infiltration rates and thus will not affect groundwater recharge.

Groundwater supplies could be affected by spills of hazardous material such as fuel and oils. There may be temporary fuel storage at the project site compound during the construction phase. Given the volume of materials to be used is relatively small; the potential for these types of effects is minimal. In addition, once operational, lubricant oils within the turbine nacelle are contained in sealed mechanism to prevent any seepage. Again, given the volume of materials is relatively small; the potential for these types of effects is minimal.

No potential effects are anticipated during the operation of the wind farm.

Fuels and lubricants will be required during all project phases. As with any infrastructure project, there is the potential for spills of these materials. The quantities of these materials to be used are not large. Some temporary storage at the project construction office is likely.

Hazardous wastes such as lubricants will be collected, contained, and then transported to an off-site facility that collects hazardous waste.

During the operation phase, where oils and lubricants will be used to maintain turbines and ancillary equipment will be collected and where possible recycled. These spent oils and lubricants will be transported off site by a licensed transporting company and recycled or disposed of according to provincial regulations. NPI will submit a Generator's Registration Report for each waste generated by the wind farm and its ancillary facilities, according to O.Reg 347 of the *Environmental Protection Act*.

6.4.3 Mitigation Measures

Fuels and oils will be managed per provincial requirements. In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislation as governed by the *Environmental Protection Act and the Ontario Water Resources Act*.

6.4.4 Significance of Net Effects

Groundwater supplies will not be adversely affected by the project. No significant effects to groundwater supplies are anticipated.

6.5 Air Quality

This section refers to items 3.1, 3.2 and 3.3 of the MOE's environmental screening checklist: will the project:

- ***Have negative effects on air quality due to emissions of nitrogen oxide, sulphur dioxide, suspended particulates, or other pollutants?***
- ***Cause negative effects from the emission of greenhouse gases?***
- ***Cause negatives effects from the emission of dust or odour?***

6.5.1 Existing Environment

Due to the maritime influence of the Great Lakes, Manitoulin Island enjoys a moderate climate. Summers tend to be dry and the hottest summer days are gently cooled by off-shore breezes. Winters are snowy but can be mild.

The air quality on Manitoulin Island tends to be in the good to very good range (as tracked by the Ministry of the Environment) with some moderate days recorded in the summer. The region lies across one of the major storm tracks of North America, and the passage of high and low pressure systems over the area produces wide variations in the day-to-day weather. Weather systems may be expected to traverse the region every two to five days throughout the year. Spells of dry or wet, hot or cold weather are seldom long.

In the area of the wind turbines, the average monthly temperatures ranges from –10°C in January to 19°C in July and August.

Precipitation data for the area of the wind turbines is not available as there is no Environment Canada meteorological station within the area. Total precipitation data from the closest stations is summarized below:

- Gore Bay (24 km from wind farm): 809 mm annual
- Sudbury (131 km from wind farm): 899 mm annual

6.5.2 Potential Effects

Project related air quality effects would largely occur during the construction phase. This would include emissions from construction equipment and increased dust levels during soil excavation and from road traffic. As the construction areas are generally well removed from receptors, air quality related effects are expected to be minimal and would be temporary.

As electricity is to be generated through wind, during the operations period there will be no negative effects on air quality due to odor or emissions of nitrogen dioxide, sulphur dioxide, suspended particulates or other pollutants, including greenhouse gases.

6.5.3 Mitigation Measures

During the construction period, the contractor will implement standard practices to minimize air emissions including:

- Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers;
- Motorized equipment should meet design specifications for emission controls and conform to provincial Drive Clean standards where appropriate;
- Comply with operating specifications for heavy equipment and machinery;
- Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories – this is to be strictly monitored;
- Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material;
- Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensure timely cleanup of any tracked mud, dirt and debris.
- Avoid excavation and other construction activities with potential to release airborne particulates during windy and prolonged dry periods;
- Stabilize stockpiled excavated soils in areas that are upwind of sensitive receptors;
- Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal;
- Use of Spray water and environmentally friendly dust suppressants applied at an environmentally acceptable rate may be used to minimize the release of dust from gravel, paved areas and exposed soils only where necessary on problem areas; and
- Restore disturbed areas as soon as possible to minimize the duration of soil exposure.

6.5.4 Significance of Net Effects

Given the large separation distances from receptors, air related effects during the construction period would be minimal and temporary.

The operation of the wind farm will result in a net benefit to air quality by offsetting the need to produce electricity from other sources such as fossil fuel generators that emit greenhouse gases.

Construction related air quality effects would be of short duration and low in magnitude. They are therefore not considered to be significant. During the long-term operations periods, the project will contribute to improved air quality in the Province by offsetting other forms of electricity production.

No adverse significant net effects are anticipated.

6.6 Birds

This section refers to item 4.6 of the MOE's environmental screening checklist: will the project:

- ***Have negative effects on migratory birds, including effects on their habitat or staging areas?***

The following provides a summary of the bird survey and assessment work. Details of this work are provided in **Appendix D**.

6.6.1 Existing Environment

Fieldwork was conducted between 2004 and 2008 and involved the collection of seasonal bird data. Intermittent consultation has occurred with the Ministry of Natural Resources (MNR) from inception of the project. Scott Dingwall (Sudbury District Planner, MNR) and Bruce Richard (Information and Resource Management Supervisor, MNR) were contacted in June and November of 2004, respectively, to attain natural features and species at risk information. This was followed up with a letter to Mr. Dingwall in July 2004 detailing the possible natural environment issues identified for the study area. During 2004 and 2005 Dr. Ross James had ongoing conversations with Environment Canada biologists regarding the sight, specifically potential habitat and historical occurrences of Loggerhead Shrikes in the area.

An October 7, 2008, letter was sent to the MNR as well as Environment Canada (EC), which summarized the information collected during a review of background information and field work. A reply from Caleigh Sinclair (Assistant Planning Biologist), Eric Cobb (Renewable Energy Planner, MNR), and Deb Jacobs (Species at Risk Biologist, MNR) in March 2009 provided useful comments from and identified species that required additional documentation and assessment of effects.

Data collected as part of this study include:

Spring Survey

April – May 2005
- Area searches using wandering transects
- 5-minute non-fixed radius roadside point counts

April – May 2008
- Point Counts
- Stopover Counts

Breeding Birds

June/July 2007/2008
- Combined 10-minute fixed/non-fixed radius point counts. Area searches using wandering transects

Fall Migration

September, October and November 2004
- Area searches using wandering transects
- Roadside Surveys
- Passage Migration
- Stopover Counts

Winter

January, February and March 2007
- Area searches using wandering transects
- Stopover counts

Throughout the field investigations from 2004 to 2008, a total of 11, 553 individual birds were recorded during spring and fall migration surveys, winter resident surveys and breeding bird surveys. This represented approximately 105 different species in 5 major bird groups. Landbirds were the most abundant birds in the study area, with 82.1% of the individuals recorded belonging to this group. Waterbirds were also abundant in the study area comprising 14.9% of the individuals recorded with gulls being the most numerous species observed in this group.

Table 6-4 provides a summary of annual observations by bird groups including, shorebirds, waterfowl, waterbirds, landbirds and raptors. The waterbird group is a combination of species that are closely tied to water environments for part or most of their life history. The raptors category combines vultures and owls with diurnal raptors.

Table 6-4:
Annual Observations
By
Bird Groups

Species or Group	Total Number of Individuals Observed	Maximum Number of Species	Percent (%) of Total Observation
Shorebirds	100	6	0.8
Waterfowl	132	7	1.1
Waterbirds	1719	15	14.9
Landbirds	9484	63	82.1
Raptors	118	14	1.0

6.6.1.1 Spring Migration

In spring 2005, a total of 1, 674 individuals and 97 species were observed. The majority of species were landbirds (59.3%) and waterbirds (36%). Table 3 provides a summary of all bird observations during spring 2005 migration monitoring, broken down by major species guilds. The most numerous species groups were gulls (21.1%), Sparrows (12.4%) and Jays, Crows and Ravens (12.1%).

In spring 2008, a total of 1, 650 individuals and 75 species were observed. Table 4 provides a summary of all bird observations during spring 2008 migration monitoring, broken down by major species guilds. Similar to 2005, landbirds (51.3%) and waterbirds (41.7%) made up the majority of observations.

When the spring migration survey data from 2005 and 2008 are combined, landbirds account for 55.4% of all individuals recorded and waterbirds make up 38.8%.

Shorebirds

Shorebirds made up a very small percentage of spring observations (approximately 1.4%) with only 38 individuals documented in 2005 and 9 in 2008. The majority of these individuals represent Sandpipers (~25%) and Snipes (~50%).

Wilson's Snipe was observed during all point counts in 2005. They were seen in small numbers (17 individuals) displaying aerially, a likely sign of courtship and/or nesting. This species typically nests in wet, grassy habitats such as in wet fields, along ponds or rivers, near streams or ditches and in hummocks of grass close to water.

Upland Sandpipers were also observed in May, but were not abundant (8 individuals observed on two occasions). This species is unlike other sandpipers as it prefers to nest in grassland areas away from water sources. It nests in scraped-out depressions in the ground and feeds while walking. During courtship, this bird often perches on fences and/or telephone poles and

performs aerial displays first for courtship and to distract potential predators from its nest. This species has been steadily declining since the mid-19th century as is listed as a BCR 13 priority species.

Waterfowl

Waterfowl accounted for 2.4% of all individuals observed during spring surveys (0.9% in 2005 and 3.9% in 2008). Two groups of Common Merganser were observed during spring migration monitoring; one group of 19 birds flying south on April 30, 2008 and one group of 6 on Perch Lake on May 16, 2008.

Of the waterfowl species observed, some, such as the Common Merganser and Wood Duck, breed along lakes and rivers bordering forests, usually in tree cavities. This type of habitat occurs in the study area (such as along the shores of Perch Lake). Others, such as the Mallard and Blue-winged Teal, nest on the ground in grassy wetland areas near water. Many of the species of waterfowl observed in the spring migration survey are listed as BCR 13 priority species.

Waterbirds

Waterbirds contributed to approximately 39% of all individuals observed during the spring (36% in 2005; 41.7% in 2008). Gulls (25.9% in 2005; 37.3% in 2008) made up the majority of these sightings. Ringed-billed Gulls were observed most often in comparison to other gulls in both years and likely account for the majority of unidentified gulls as well. Most gulls were observed over fields near the landfill site close to the town of Little Current. Gulls were also observed in several flocks, ranging in size from 15 to 275 birds, in pastures throughout the study area during spring migration on several occasions. Ring-billed Gulls often nest in colonies on the ground or in vegetation around areas such as fresh water, agricultural fields and coastal beaches.

Flocks of Sandhill Cranes were observed in both 2005 and 2008 in fields along Greenbush Road near Columbus Mountain Road. In 2005 approximately 3-4 breeding pairs were observed. Sandhill Cranes breed in open marshes or wet grasslands and meadows where their nests are large mounds of vegetation either floating in the water or attached to aquatic vegetation. These nests were observed at several wetland areas in the northeastern portion of the study site. The individuals observed during these surveys were regularly seen feeding in the fields; they mostly eat grains and seeds.

Many of the waterbirds observed are listed as BCR 13 priority species, including the Sandhill Crane, Common Loon and Ring-billed Gull.

Landbirds

This group corresponds to approximately 55.4% of all individuals observed (59.3% in 2005; 51.3% in 2008). During both the 2005 and 2008 surveys, sparrows occurred in the highest numbers (11.6% and 11.8% of all individuals, respectively). On average, 10 warbler species were identified and comprised 4% of all individuals in 2005 and 10.2% in 2008. Other abundant

species groups to note include jays, ravens and crows (11.4% and 7.3% respectively), American Robins (9.5%), of which more than half were American Robins and thrashers (5.1%). Many landbirds will breed in trees and occupy a wide variety of habitats.

In 2005, a Sharp-tailed Grouse lek was identified about 200 m west of Burnett's Side Road and 300 m south of Green Bush Road, in the middle of a field.

Raptors

In total, raptors made up only approximately 2% of birds observed during the spring. In 2008, Turkey Vultures made up more than half of all raptors observed. The other half was a mix of diurnal raptors, seen in numbers similar to data collected in 2005. In 2005, this included 5 American Kestrels (2 pairs), 4 Bald Eagles (all seen circling high on the eastern boundary of the study area, near a landfill site), a pair of nesting Red-tailed Hawks and a single Red-shouldered Hawk flying northward high overhead. Three species of owls were observed in 2005, but not in 2008. These included the Great Horned Owl, the Barred Owl and the Saw-whet owl.

6.6.1.2 Breeding Birds

A total of 2, 910 individuals and 87 species were observed during 2007 and 2008 breeding bird surveys. The number of individuals and species observed over the two seasons remained fairly consistent with 1 583 (76 species) observed during 2007 and 1 327 (76 species) during 2008.

Reporting breeding bird observations by habitat was chosen to allow for potential identification of important habitat types requiring protection during constraint mapping and the turbine siting process.

During 2007 and 2008 surveys, forest breeding species ranged between 59.2% and 70.6% of all individuals observed. One Red-shouldered Hawk was observed in 2008. Wetland habitat contributed approximately 20% of all species observed and included a total of 127 Sandhill Cranes and 9 Wilson's Snipes. Open country birds contributed between 6.6% and 14.1% of individuals observed and included 16 Upland Sandpipers and 2 Sharp-tailed Grouse. European Starlings were the only non-native species observed and accounted for 3% to 7.3% of all individuals documented. Similarly, Turkey Vultures were the only cliff species observed and accounted for less than 1% of possible breeding individuals.

The majority of species observed over the two years were landbirds, which accounted for 85% of all observations (66 of the 87 species). Five species of waterbirds were observed and accounted for 10.6% of all observations. Shorebirds, waterfowl, raptors and upland gamebirds comprised 4.4% of the remaining observations.

6.6.1.3 Fall Migration

A total of 29 man-hours were spent conducting roadside, forest and diurnal migration surveys during the fall of 2004, with approximately 22 species recorded. Observation time in September totaled 21 hours over 4 days while in October 8 hours were logged over 2 days. Approximately

a few thousand individuals were observed in or flying over the project area. High numbers of American Pipits (1100-5000; ~82%), American Crows (700; ~14%), European Starlings (100; 1.6%) and Gulls (80; 1%) were observed. The majority of species were observed either flying over the study site or using the site for foraging.

Shorebirds

No shorebirds were observed during fall surveys.

Waterfowl

Waterfowl was rare in the project site. This may have been due to drier conditions at the site during survey periods time. Only 1 duck was noted.

Waterbirds

On one occasion a group of 30 Canada Geese were observed flying through the study area, high above the projected sweep of the turbine blades. Numerous gulls were also observed. Of the two largest groups of gulls observed, one group (50 individuals) was situated in a field for an extended period of time and another group (30 individuals) moved slowly along a road and its adjacent fields.

Two Great Blue Herons were noted east of the project area on one occasion, flying low over fields. Sandhill Cranes were seen in September but were not observed in October when numerous individuals were staging elsewhere on Manitoulin Island.

Landbirds

American Pipits were abundant during fall migration surveys, with large groups of 50-60 individuals frequently observed passing through the project site. In one day, approximately 1100 individuals were recorded. Most groups foraged in fields and along roads throughout the study site. The groups tended to move slowly and fly close to the ground to forage as they moved. A few Horned Larks were observed to be moving with the groups of pipits.

American Crows were also seen in large numbers. Approximately 500 were tallied on a single day in September and a group of 200 remained into October. They were mostly observed foraging on or near to the ground.

Small mixed groups of European Starlings and Red-winged Blackbirds, totaling approximately 150 individuals, were observed moving within the project boundaries. Compared to numbers generally observed in southern Ontario, this was a small concentration. All were on or close to the ground foraging as they moved. In addition, a few sparrows and juncos were seen in the fields and woodpeckers were heard calling from wooded areas.

One small group of Sharp-tailed Grouse was seen walking along a road; when they were disturbed by a passing car they flew low to the ground.

Raptors

No large migration of hawks in the project area was observed. Species noted during September observations included: Five American Kestrels hunting along roadsides, two Northern Harriers hunting low over fields on five occasions, a Sharp-shinned Hawk flying low and hunting along the forest's edge and a single Bald Eagle that few high above the project site above the height turbine blades reach. Fourteen Turkey Vultures were seen over the four days.

Hawks observed during October's diurnal migrant observations were very rare. Only two Rough-legged Hawks and one Northern Harrier was observed. The number of raptors observed in the project site is very low in comparison with the rest of southern Ontario.

6.6.1.4 Wintering Birds

A total of 319 individuals of 17 species were observed during 2007 winter bird surveys, which represents 2.8% of all birds observed over the course of the study.

Landbirds made up 99.4 % of winter bird observations. Of the 317 landbirds observed, comprised of 15 species, 89 (27.9%) were Common Ravens, 82 (25.7%) were Black-capped Chickadees, 59 (18.5%) were Snow Buntings, 25 (7.8%) were nuthatches, 15 (4.7%) European Starlings and 14 (4.4%) were woodpeckers. Various species making up the remaining individuals include 1 Red-Tailed Hawk, 1 Ring-Billed Gull, 3 Ruffed Grouse, 9 Blue Jays and 13 American Crows. No waterfowl were observed during winter surveys as ice was observed on all watercourses in the study area. Winter resident birds were primarily observed in forest habitat, while a few observations were made in open country and marsh habitats.

6.6.2 Potential Effects

Potential effects primarily focus on two distinct factors including:

- Direct mortality from collisions with turbines or power lines; and
- Displacement as a result of turbine infrastructure. Displacement can include displacement from breeding territories, staging areas and other changes in migratory behaviour.

The evaluation of birds which appear to be at greatest risk of either mortality or disturbance in the project area is based on:

- Literature related to direct mortality and displacement;
- High numbers of landbirds observed and;
- Behavioural attributes;

The effects assessment of species/groups is largely discussed below as an aggregate (e.g. Landbirds and Waterbirds). All species have been considered in this assessment however, only

those identified as potentially sensitive to wind turbines as a result of literature or through field work have been specifically mentioned. Potential impacts to those not mentioned are comparatively at a low level of risk. Prior to discussion of species/group effects a general overview of the current knowledge of effects of wind turbines on birds, effects relative to other types of human-made structures and influence of weather is described.

General Overview

Studies undertaken around the world indicate that, with few exceptions, very low numbers of bird fatalities occur at wind energy facilities (Kingsley and Whittam 2005, Erickson et al. 2001, Gill et al. 1996, Langston and Pullan 2002). Furthermore, there is no evidence that any large-scale kills are occurring at night similar to those commonly reported at tall buildings and tall communications towers (Anderson et al. 1999). Wind turbine related morality has been far less than that reported for many other sources of human-caused avian mortality (Erickson et al. 2001).

While avian mortality has been of primary concern in North America at operating wind farms, it has not proven to have had significant impact on any bird populations (Kerlinger 2001). Average mortality rate was estimated at 1.83 birds/turbine/year outside California (Erickson et al. 2001). A more recent estimate of average mortality placed it at 2.3 birds/turbine/year outside California, and this increase was largely due to a single site in Tennessee (NWCC 2004). Mortality rates in agricultural sites may be below one bird/turbine/year (NWCC 2004, Koford et al. 2004, Johnson et al. 2003). According to James (2008) mortality between 2.0 and 2.5 birds/turbine/year was estimated for the Erie Shores wind farm, which is located in southern Ontario along the north shore of Lake Erie.

It is not possible to accurately predict potential mortality through pre-construction surveys of numbers of birds present in an area (Thelander and Rugge 2001, Gill et al. 1996). Behavioural studies demonstrate that the reason collision fatalities are rare at wind turbines is a result of the fact that birds apparently see the turbines, recognize them as obstacles, change flight direction when they encounter them and fly around the turbines (EchoTracks 2005, Kerlinger 2003). Birds have excellent vision with very quick motor control and spend much of their life avoiding obstacles at close range in the habitat they fly through. Birds can readily detect slowly rotating turbine blades, and tend to avoid operating turbines, but easily fly close to and among turbines when not operating (Nelson and Curry 1995). Radar observations have shown that birds will generally be able to detect and avoid a wind turbine (Pederson and Poulsen 1991, EchoTracks Inc. 2005).

Summary of Avian Collisions with Human-made Structures

It has been estimated that from 100 million to well over 1 billion birds are killed annually in the United States due to collisions with human-made structures, including vehicles, buildings and windows, powerlines, communication towers, and wind turbines. Although wind energy is generally considered environmentally friendly it has been associated with the deaths of birds colliding with turbines and other wind plant structures, especially in California. It is commonly recognized that seasonal concentrations of birds, geographic and weather conditions can

potentially increase the risk of avian mortality with respect to wind power structures. In order to put the issue of avian mortality associated with windpower into perspective with other sources of avian collision mortality across the U.S, Erickson et al. (2001) reviewed several sources of avian mortality. Reviewed reports indicated that the following estimated annual avian collision mortality in the United States:

- Vehicles: 60 million - 80 million;
- Buildings and Windows: 98 million - 980 million;
- Powerlines: tens of thousands - 174 million;
- Communication Towers: 4 million - 50 million; and
- Wind Generation Facilities: 10,000 - 40,000.

The large differences in total mortality from these sources are strongly related to the differences in the number (or miles) of structures in each category. There are approximately 4 million miles of road, 4.5 million commercial buildings and 93.5 million houses, 500,000 miles of bulk transmission lines (and an unknown number of miles of distribution lines), 80,000 communication towers and 15,000 commercial wind turbines (by end of 2001) in the U.S. Even if wind plants were quite numerous (e.g., 1 million turbines), they would likely cause no more than a few percent of all collision deaths related to human structures (Erickson et al. 2001).

Where communication towers are greater than 150m in height, some large numbers of dead birds have been found. Studies at communications towers across the United States, including northern states at similar latitudes to southern Ontario, indicate that towers less than about 135 m have not been involved in mass mortality events (Kerlinger 2000, Kemper 1996, Ugoretz 2001). The taller the structure the greater the number of birds likely to be killed (Manville 2001). The wind turbines to be used in this project are shorter than 135 m.

Literature which examines the impacts of wind turbines on the bird community identifies three main (and often interactive) factors that contribute to avian mortality at a particular site. These three factors include weather conditions, the density of birds in an area and landscape features funneling birds through the area (e.g. raptors). Literature also suggests that appropriate sighting of wind turbines is the best way to reduce bird interactions with wind turbine infrastructure. Density of birds and landscape/habitat features of the study area have been reported above.

Weather Conditions

At many sites, nocturnal migrant collisions tend to occur during episodes of poor weather with low visibility. Although most examples appear to be isolated incidences, weather conditions should be kept in mind if a site is being proposed in an area that has a large number of poor visibility days (<200m) during the spring and fall, and has other confounding factors (e.g. large numbers of nocturnal migrants and landform features such as ridges present).

Inclement weather can increase the risk of bird collision with wind farm structures. (Winkelman 1995, Strickland et al. 2001, Johnson et al. 2002). Even then mortality has been only a tiny fraction of passing birds (Crockford 1992, Winkelman 1985, 1995, Pearson 1992). For example,

clouds have an influence on the altitude of migrants by forcing higher flying migrants to lower altitudes, which increases the density of migrants near the ground and increases the probability of collisions with tall obstacles. A cloud ceiling that drops to near or below the height of the turbines will affect high altitude migration, inducing migrants to move at or below treetop level (Robbins 2002 in Environment Canada 2007c). Drizzle and fog impair visibility and also cause birds to fly at lower altitudes, to follow topographical clues. Combined with lighting that may attract migrating birds, migrants may collide with turbines or they may circle the structure until exhausted, falling to the ground where they are at risk of dying due to exposure or predation. If there are a high proportion of fog days during migration at the project site, there may be an increased risk of collision. Even in bad weather there has never been a mass kill of birds at a wind turbine. The largest recorded mortality event in North America was 14 birds at 2 turbines following a severe thunderstorm (Johnson et al. 2002).

6.6.2.1 Waterfowl and Waterbirds

Mortality

Waterfowl appear to be among the least susceptible birds to collision with wind turbines, despite considerable numbers in areas studied. In some cases, sea ducks are believed to learn to avoid turbines, resulting in fewer collisions over time (Percival, 2001). In terms of dabbling ducks, sites reporting the most fatalities are those with year-round waterfowl use, with waterfowl making up to 10% or more of the total number of fatalities. However, numbers of fatalities are still very small, especially in relation to the number of ducks that use the areas (Erickson et al., 2002). Based on a recent study completed for the Erie Shores wind farm (James, 2008), which is located along the north shore of Lake Erie east and west of Port Burwell in a similar geographic and bird community setting, no waterfowl mortality occurred over a two year post-construction period.

Literature found regarding the affect of development on sandhill cranes is sparse. It is suspected that, like geese and waterfowl, they will be fairly adaptable to turbines. Turbines are spaced a minimum distance of 400m apart and should allow sandhill cranes to move from open wet fields to roosting sites without an increased risk of mortality. Habitat suitable for sandhill cranes is abundant on Manitoulin Island, including areas surrounding the McLean Mountain study area. Therefore, if this species is deterred from using the study area, abundant adjacent habitat capable of meeting breeding, foraging and roosting needs is available.

Like sandhill cranes, Canada geese and mallards make use of wet agricultural fields in spring. According to James (2003) both species continued to fly around the Pickering turbine in areas previously used before turbines were erected. The geese continue to forage right to the base of the tower and mallards nested below the rotating blades without incident. Canada geese also have been observed flying almost daily near the Exhibition Place turbine without incident (James and Coady 2004).

At a 16 turbine facility in Oregon in wheat fields and grasslands Canada Geese were abundant with nearly 5000 birds observed flying through the area prior to construction. Only 2 individuals were killed in the year following construction, apparently in conditions of poor visibility (Johnson et al., 2003a).

In Minnesota, Canada Geese and Mallard (with Greater White-fronted Goose and Snow Goose) were considered at high risk because of numbers flying through the site at rotor height during spring and fall, prior to construction. Following the erection of 73 turbines and the completion of two years of post-construction monitoring only one dead duck was found (Osborne et al., 1998). After four years of searches, no geese, and three ducks were found (Johnson et al. 2002).

In the Montezuma Hills, California, 600 turbines were erected in a pass between two wildlife sanctuaries where thousands of waterfowl moved between two wetlands. In two years of post construction surveys, no waterfowl were found dead. More than 15,000 observations of waterfowl flying through the pass indicated waterfowl avoided flying near the turbines and avoided collision (Howell and Noone, 1992, Gipe, 1995).

In several European studies involving large numbers of wintering and migrating diving ducks, it was clear that waterfowl clearly avoided flying near turbines and that mortality was low (Guillemette, et al., 1998, Lowther, 2000, Winkelman, 1985, Dirksen et al., 1997, Musters et al., 1996).

In Iowa, an 89-turbine facility was located between three Wildlife Management Areas which attracted waterfowl species including up to 40,000 Canada Geese and 20,000 ducks each year. No fatalities were recorded during a year of post-construction searches at 26 turbines (Koford et al., 2004).

In an Oregon/Washington project, Canada Geese were one of the four most common species reported on avian surveys and during incidental observations. One fatality was recorded in 2.5 years of searches at this 273-turbine facility. There was also only one Mallard fatality in 2.5 years, although they were not nearly as numerous in the area as geese (Erickson et al., 2004).

At the Nysted off-shore wind farm in Denmark, a mortality rate of 1.4 collision/year/turbine was estimated for Common Eiders based on a validated predictive model (Desholm, 2006). The wind farm consists of 69, 2.3 MW turbines with a hub height of 69m and blade length of 41m.

Gulls, which are frequently found in the study area in low numbers, are potentially at greater risk due to the height they fly. This species has been identified as potentially at risk in a variety of sites in North America and Europe, but subsequent studies of mortality revealed a very low casualty rate (Strickand et al. 2000, Therlander and Rugge 2000, Lowther 2000, Musters et al. 1996). Even where small colonies of gulls were near three turbines, casualties were light (Meek et al. 1993). Gulls seem to habituate readily to the presence of turbines (Winkelman 1995, 1992d). Gulls flew daily past the turbines near the Lake Ontario shore at Pickering and Exhibition Place, and continued to forage in nearby areas, without suffering any mortality (James 2003, James and Coady 2004). It is likely that gulls will continue to pass through the study area much as they do now with very low risk of mortality.

In Minnesota, at a wind farm near a lake, Ring-billed Gulls and Franklin's Gulls were identified as being at high risk during the fall and spring because of the high numbers flying through the area. None were found dead after two years of searches. However, one Herring Gull was documented as a casualty (Strickland et al., 2000).

In the Altamont Pass, California, California Gulls and Ring-billed Gulls were identified as some of the most common species flying through the area. Searches around 685 turbines for 11 months found only one fatality (Thelander and Rugge, 2001).

A nine turbine site at Blythe Harbour in Britain where a large population of wintering gulls occurred was documented to have very few collisions all birds combined (one bird/turbine/year, including gulls (Lowther, 2000).

At Pickering, Ring-billed gulls flew past the turbine daily, and foraged and loafed on nearby grassy areas, without suffering any mortality. Herring and Great Black-backed Gulls were also regular users of the lakeshore within 100 m and suffered no mortality (James, 2003).

At the Exhibition Place turbine, Ring-billed Gulls flew around the turbine within 100 m almost daily over several months without incident (James and Coady, 2004).

Displacement
Disturbance effects have been of greater concern than mortality in European studies and are probably of greater importance to waterfowl than potential mortality (Kingsley and Whittam, 2005). Desholm (2006) demonstrated that there is indeed an avoidance effect for at least Common Eiders. It was also noted a reduction in flight height and adoption of a straight line flight path were behavioural changes which reduced exposure to turbines blades and towers. However, much of these European studies have been directed toward diving ducks, and there appears to be very species-specific reactions to wind turbines, with even closely related species showing different effects (Kingsley and Whittam, 2005).

In Washington/Oregon, with 454 turbines, with 47 m rotors, spaced only 70 or 105 m apart, in strings 800 m apart, avian use surveys showed a slight increase in waterfowl two years after construction (Erickson et al. 2004). In Minnesota, with 73 turbines with 33 m rotor diameter, spaced 91 – 183 m apart, in 10 strings, Mallards were the second most common bird seen in avian surveys (Osborne et al., 1998). In Iowa, with 86 turbines located between three Wildlife Management Areas, observations found 270 flocks of geese foraging in the wind farm area in fields with and without turbines (Koford et al, 2004), although the proportion in the two types of field was not given.

At Pickering Canada Geese regularly flew within 100 m of the turbine and walked to the base of the turbine when foraging, on numerous occasions (James, 2003). They also regularly flew in the gap between the turbine and other buildings as close on the other side. Canada Geese also regularly flew within 100 m or the Exhibition Place wind turbine, although ground conditions were not conducive to foraging close (James and Coady, 2004). Mallards regularly approached the Pickering turbine, flying within 50 m of the blades to a small marsh below the blade tips. One pair nested below the blades in this wetland (James, 2003). In Minnesota, a Mallard nested within 31 m of a turbine base (Osborne et al., 1998).

In European studies Winkelman (1992) listed Mallard as sensitive to disturbance however; this may have resulted from much closer turbine spacing. Studies at several coastal wind farms

indicated that flights of waterfowl flocks were the same in areas with and without wind turbines. The waterfowl were well aware of and readily avoided the turbines (Dirksen et al., 1997).

Gulls apparently habituate to the presence of turbines very rapidly (Winkelman, 1985, 1992, James, 2003, James and Coady, 2004).

6.6.2.2 Landbirds

Mortality

Migrant songbirds have always been considered at highest risk among birds, as they constitute the majority of collision victims. In North America, songbirds comprise about 78 % of all fatalities (Erickson et al. 2001). However, only in conditions where nocturnal migrating birds are suddenly overtaken by poor weather conditions is higher than normal mortality likely to be experienced, and even in such situations only a tiny fraction of passing birds are involved (Crockford 1992, Winkelman, 1985, 1995, Pearson 1992). The timing and location of poor weather is unpredictable and cannot be used as a determinant of turbine placement in inland locations (Hanowski and Hawrot 2000, Evans, 2000). Even in poor weather, there has never been a mass kill of birds at a wind turbine. The largest recorded mortality event in North America was 14 birds, seven at each of two turbines, following a severe thunderstorm (Johnson et al., 2002).

It is recognized that nocturnal migrants typically fly in broad fronts through Ontario. As a result, many areas can experience a high proportion of individuals at anyone time during spring or fall migration. Several radar studies and ceilometer studies at seven sites in New York, Vermont, Maine and North Dakota, found that migration traffic rates detected would suggest that mortality rates would be less than 1/1000th of 1 % of populations of common species that would likely be involved in spring migration (Kerlinger, 2003). Studies at Sandusky, Ohio, indicated a passage rate of nocturnal birds at 5380 birds/mile of front/hour during peak migration. In four migration seasons, only one dead bird was found (Rogers et al., 1997). Radar studies in Minnesota indicated that approximately 3.5 million birds migrated over the 354-turbine wind farm each year. From 4 years of searches (1996 – 1999), adjusted for predator removal and observer ability, the fatality rate estimate for migrant passerines was about 1.5 birds/turbine/year (Johnson et al., 2002).

Most nocturnal migrants also fly at elevations too high to encounter the largest turbines (Parslow, 1969, Able 1999, Richardson, 2000). Birds apparently climb quickly once they set out, reaching as high as 2000 m within 10 minutes (Parslow, 1969). Radar studies operating at St. Catharines found that most birds are above 350 m with some above 1100 m (Black 1998, 2000). In the fall of 2004 Natural Resource Solutions Inc. conducted a radar monitoring study for the purpose of documenting the general height of nocturnal migrants (birds and/or bats) flying over the Kingsbridge Wind Power Project (Natural Resource Solutions Inc. 2004), which is located along the shore of Lake Huron, near Goderich. Monitoring was conducted on September 28, October 19, and November 2, 2004 for a total of eight hours each night. Radar observations showed that the average height was well above turbine sphere height. However the percent of total targets that flew at turbine sphere height was 18.6%.

Mating displays of some landbirds involve flights close to the height of perches or nests, not aerial flights that would bring them into contact with turbine blades (Bent 1950; Yosef 1996). Territorial and display songs are given from perches where they are foraging. Nests are never high, 2 to 3 meters being the average for Ontario (Peck and James 1987). The maximum recorded else where appears to be 12m (Bent 1950).

Sharp-tailed grouse in the area will always be well below turbine blades, and their breeding is unlikely to be deterred by the presence of turbines. They are tolerant of many types of disturbance in their habitat (Baycack and Hein 1987), as well as the erection of windmills (Johnsgard 1983).

Overall, the autumn migrants observed in the study area are few and not particularly diverse. The most numerous were pipits, a ground foraging species, not likely to be impacted by turbines. Crows were also numerous, and much more likely to be at turbine blade height. However, it is expected that their ability to avoid turbines will be similar to that of ravens. In California, where ravens are common and regularly fly among smaller, more closely spaced variable speed turbines, they rarely suffer mortality (Orloff 1992). Being scavengers more than predators, crows and ravens will not be drawn close to the turbines by their foraging habits.

Displacement

The greatest threat to songbirds is habitat loss and destruction. Very little detailed information is available regarding the effects of wind energy developments on landbirds, with the exception of grassland species. It has been shown that turbines may displace many (but not all) grassland species. Leddy et al. (1999) found a linear relationship between breeding bird density (males/100ha) and distance from turbines (0-180 m). Densities decreased by more than 50% within the increments measured (180-80 m, 80-40 m and 40-0 m). Species richness also appears to be impacted in areas closer than 180 m. It remains unknown if nesting grassland birds will become habituated to turbines and return to areas from where they were previously displaced. It should also be noted that not all grassland species are displaced by turbines. At the Ponnequin Wind Energy Facility in Colorado, grassland songbirds like Horned Larks forage directly beneath turbines and Western Meadowlarks (*Sturnella neglecta*) were also found to forage directly beneath turbines at Altamont in California (Curry and Kerlinger cited in Kerlinger, 2003b).

For forest environments, it is anticipated that $100m^2$ will need to be cleared around the base of each turbine to allow construction as well as the need to clear areas for access roads and power line right-of-ways. This removal of habitat will displace breeding birds in the immediate area. Based on the wind farm layout, 12 turbines are situated amongst forest vegetation, resulting in approximately $333m^2$ of forest habitat being cleared. There is little evidence to determine what influence turbines, located adjacent to forest environments, may have on forest breeding birds. Based on conversations with a variety of individuals (D. Stephenson, R. James) and post-construction monitoring (James 2008) it would appear that forest breeding bird diversity remains similar in areas greater than 50m from turbines.

6.6.2.3 Raptors

Mortality

Hawks, eagles, and falcons have been a major concern for wind farm developments in North America. However, they have experienced problems primarily at older facilities in California, and largely in one location, where there are several factors contributing to the problem (Arnett et al. 2007). In 1989, the California Energy Commission issued a report that reviewed data on bird collisions with wind turbines in this state between 1984 and 1988 (California Energy Commission 1989). Observations and mortality searches were conducted for six seasons examining a sample of approximately 16% of the 7000 turbines at Altamont. Of the 183 dead birds found during this study, 119 (65%) were raptors, the majority of which were Red-tailed Hawks (Buteo jamaicensis), American Kestrels (Falco sparverius), and Golden Eagles (Aquila chrysaetos). Approximately 55% of all raptor deaths were attributed to turbine collision, 8% to electrocution, 11% to wire collision, and 26% could not be determined (Orloff and Flannery 1992).

Differences in fatalities between Californian sites appear to be related to raptor density as well as turbine type and spacing (Arnett et al. 2007). For Altamont, which has the highest fatalities, there is a high prey base of small mammals in the uncultivated grasslands to attract large numbers to the area. The raptor mortality has been associated with the clustering of prey near the turbines, the perching of birds on the turbines, where other perches are unavailable, and the foraging of birds living among the turbines for long periods (Nelson and Curry 1995). Several turbine factors were proposed as posing the greatest risk to raptors such as, end-row turbines, turbines within 500m of a canyon and turbines with a lattice-type tower (Orloff and Flannery 1992). High raptor mortality in the Altamont Pass area continues to be seen. Between 1998 and 2000, 256 dead birds were found, 139 (54.3%) of which were raptors (Erickson et al. 2002, Hunt 2002).

Another wind energy site that has had significant raptor mortality is in Tarifa, Spain. This site is on the edge of the Strait of Gibraltar and forms a "bottleneck" that concentrates bird migration in the Mediterranean basin. Soaring birds are generally of greatest concern, since at least 30,000 individual raptors and large numbers of storks pass through the area in the autumn. Many collisions with the turbines have been recorded, including those of 14 protected species. A total of 106 individuals were estimated to have been killed over the span of one year (Marti and Barrios 1995). A subsequent study over 14 months including 2 autumn migration periods recorded over 72 000 birds during 1000 hours of observation. But, only 2 bird carcasses were found, including one Griffon Vulture (Gyps fulvus – of 45 000 seen) and one Short-toed Eagle (Circaetus gallicus – of 2500 seen). This indicates that death rates can vary year to year and from area to area (Janss 2000). Studies in both California and southern Spain clearly indicate that there is a disproportionately high mortality at a relatively few turbines on ridges (Barrios and Rodriguez 2004, Hoover and Morrison 2005).

There have been very few raptor fatalities reported at the several thousands of other wind farm locations other than Altamount and Tarifa. It is recognized that a major contributor to raptor fatalities at these two facilities was the use of lattice towers, appropriate for perching, the low rating and close spacing of turbines (50m from each other) and fast rpm of the small blade. In

the U.S. outside of California, raptors comprise only 2.7% of turbine-related deaths (Erickson et al. 2001, Kerlinger 2001). A comparison of the different mortality rates between older and newer facilities in the United States is in agreement with this. The subject study (Arnett et al. 2007) found three of the four older sites reported higher fatality rates than at all newer, larger turbine sites.

Results from 14 avian fatality studies at newer sites, where surveys were conducted using a systematic process for a minimum of one year and where appropriate correction factors were incorporated into the estimates, indicate that combined mean fatality rate for these sites are 0.03 raptors per turbine and 0.04 per megawatt (Arnett et al. 2007). Landscapes vary from mountains, plateaus, and ridges, to areas of low relief, but aside from size of rotor-swept area, all of these facilities had new generation turbines with lower rotational speeds (~15-27 rpm, tips exceeding 280km/hr) and primarily underground transmission lines. These results are in-line with a study (James 2008) completed for the Erie Shores site, located along the north shore of Lake Erie.

Based on 2 years of post-construction observations for the Erie Shores wind farm near Port Burwell, Ontario, no elevated mortality occurred with respect to raptors, despite the presence of large numbers in the fall and turbines near the shoreline. Five raptors including 1 Turkey Vulture were found over the 2 years of post-construction monitoring. These five raptors represent approximately 8.5% of all bird fatalities. Based on the correction factors applied a mortality rate of about 0.04 raptors/turbine/year, was estimated (James 2008). This estimate includes residents as well as the thousands of migrants passing through the wind farm each year. In addition, approximately 15,000 raptors move along the north shores of Lake Ontario in autumn, none were found dead at either the Pickering or the Exhibition Place turbines, both within 100 m of the lakeshore.

Displacement

There is little information on how raptor species react behaviorally to turbines but, they do appear to be among the least likely birds to be displaced by wind turbines. In Washington/Oregon, nesting of raptor species was slightly higher after construction; new nest sites were discovered in the wind facility area after construction; and avian use surveys showed only a slight decrease in raptor numbers after construction (Erickson et al. 2004). In California, raptors were considered less likely to display evasive avoidance behaviour in relation to wind turbines than any other group (McCrary et al. 1986). In the Altamont Pass, observations of behaviour indicated that the distribution of raptors in areas of many turbines was similar to areas where there were no turbines (Orloff and Flannery 1992). In Minnesota, 80 % and 74.8 % seen in two successive years flew 31 m or more from turbines, and 5 % and 14 % flew within 16 m. The group of birds most likely to migrate near the turbine in the Yukon was raptors (Mossop 1998).

Based on anecdotal information reported by James (2008) it would appear that raptors continue to use the landscape and habitat similar to the way they did prior to turbine development and easily avoid collisions during migration.

6.6.3 Mitigation Measures

The potential for effects on wildlife and wildlife habitat has been minimized addressed through the siting of the turbines away form sensitive habitat. Mitigation measures to be implemented were discussed with OMNR staff. From these discussions and as guided by the Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (OMNR November 2008) setbacks were developed.

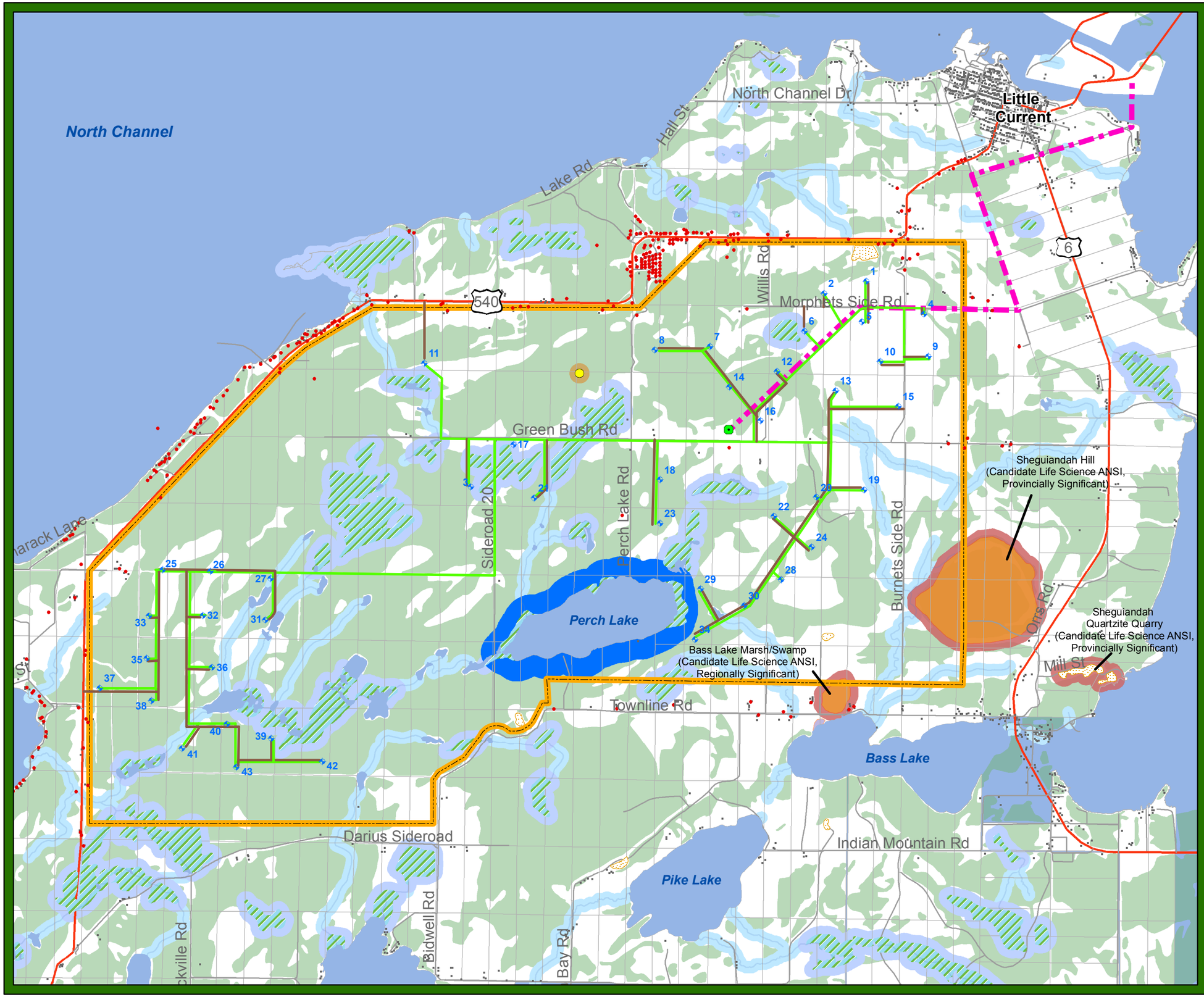
Setbacks specific to birds that will be observed include the following:

- 90 m River/Stream Setback
- 120 m Wetland Setback – none of the wetlands in the project area are considered to be significant. Attempts have been made to meet this setback as much as possible. In a few cases, some encroachment into the area has occurred.
- 120 m Area of Natural and Scientific Interest Setback (ANSI)
- 150 m Unknown Stick Nests Setback– An existing stick nest will be buffered by a 150 m setback. This nest has not been associated with a specific species. Breeding season will be defined as March 1 to July 31 for raptors. The non-breeding season is considered August 1 to February 28. If new nests are found that apply to a more restrictive group an OMNR biologist should be notified.
- 300 m Perch Lake Setback

Figure 6-2 shows the location of the setbacks above as well as those proposed for other wildlife.

Other mitigation measures to be implemented include:

- The setbacks and timing restrictions proposed in the Stand and Site Guide were developed mainly in association with forestry operations. This was to deal with disturbances associated with seasonal woodlands operations that were not permanent. It is difficult to predict the disturbance values of one development activity verses another. Therefore, it is recommended that further discussion between with the OMNR occur to confirm the need for other mitigation.
- If construction does take place during the core breeding season (May 1 to August 15), it is recommended that a qualified biologist conduct nest searches in areas to be cleared and identify nests, which require protection until young have fledged. Based on this nest search an appropriate buffer will be provided for each nest based on an initial determination by the biologist on site.



NORTHLAND POWER

Mcleans Mountain Windfarm
Figure 6-2 Natural Features Constraints

Legend

- Turbine
- Residence
- Substation
- Building
- Unknown Large Stick Nest
- Secondary Roads
- Highway
- Cabling (34kv)
- Access Roads
- Proposed Tranmission Line (115kv)
- Rivers
- Project Area
- Lots
- ANSI
- Pit or Quarry
- Waterbody
- Wetland
- Woodlots
- 90m River/Stream Setback
- 120m Wetlands Setback
- 120m Life Science Area of Natural and Scientific Interest (ANSI) Setback
- 150m Unknown Large Stick Nest Setback
- 305m (1000') Perch Lake Setback

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6.6.4 Significance of Net Effects

Shorebirds

A total of 100 observations of shorebirds were documented throughout the fieldwork completed for this project, which represent 0.8% of all observations. These species were primarily observed during spring and breeding seasons. Of these individuals, Wilson's Snipe and Upland Sandpiper are the most notable. Both species were seen in small numbers throughout the wetland and open county habitats (Oldfield/Grassland/Pasture) of the study area (see Figure 2 Appendix D), displaying aerially. Some turbines are planned in appropriate breeding habitat for these species (with exception to wetland) and may pose some risk to birds displaying aerially. The significance of net effects of this risk is considered low to medium. The abundance of these species in the study area should be monitored post-construction as they have experienced declines in other parts of their range. This information could also help inform similar projects as to potential impacts on this species.

Waterbirds and Waterfowl

Very few waterfowl and waterbirds were observed in the study area with exception of gulls and small flocks of Sandhill Cranes. Waterfowl appear to be among the least susceptible birds to collision with wind turbines. No waterfowl mortality occurred over a two year post-construction period for the Erie Shores wind farm (James 2008). Desholm (2006) demonstrated there is an avoidance effect and behavioural changes which reduced exposure to turbines blades and towers.

Little information is available on the impacts of wind turbines on Sandhill Cranes. It is thought that turbines spacing will allow cranes to move between sites without an increased risk of mortality. Some very localized displacement of Sandhill Cranes may occur in areas immediately adjacent to turbines. With habitat suitable for Sandhill Cranes abundant on Manitoulin Island, the significance of net effects of this project on Sandhill Cranes is anticipated to be low.

Gulls were observed in the study area and/or along the lake environment in high numbers during the spring and the breeding bird surveys. Despite large numbers of gulls present in the study area fields the projects significance of net effects on this species is considered to be minimal.

Landbirds

Landbirds were the most abundant birds in the study area, with 82.1% of all the individuals recorded belonging to this group. This dominance of landbirds was consistent throughout each season studied. Landbirds breeding in the study area are likely to be effected the most as some may be displaced through the removal of breeding habitat.

Among the breeding birds present in the area, Priority Landbird Species for BCR 13, especially Open Country Birds (grassland birds), are of primary management concern due to population decline being experienced throughout the North American continent (McCracken, 2005). A large number of grassland birds were observed in the study area during breeding bird surveys. Some of these birds are known to display aerially for mating or as a distraction tactic.

Interaction between BCR 13 Open Country habitat birds is a possibility at a number of turbine locations. The significance of net effects to open country birds is considered to be low to medium.

The impact of turbines on forest nesting birds has only been examined once in North America, during a short-term study at Searsburg, Vermont (Kerlinger, 2003b). It was found that disturbance to most birds was low, with several species nesting in the forest within 20-30m of the turbines. A few species were, however, found to avoid the clearing where the turbines were located and some appeared to move further into the forest, most notably Swainson's Thrush. It is unclear whether this movement was related to avoidance of the turbines or of the clearing (Kerlinger, 2003b). The significance of net effects to forest breeding birds is considered to be low.

Recent post construction work completed for the Erie Shores wind farm reasoned that the mortality rate was 2.0 to 2.5 native birds/turbine/year (James, 2008). The majority of turbine-related mortality was passerine birds, accounting for 79.7 % of species recorded over 2 years (James, 2008). Nocturnal migrants made up about half the passerines at 48.9 % (James, 2008), which suggests diurnal migrants made up the remaining 30.8%. At McLean's Mountain the mortality rate is expected to be similar or lower. Based on this information the potential significance of net effects to landbirds is considered low.

Raptors

The study area is not considered to be a major flyway for fall migrating raptors, based on results from this study. Mortality rates calculated from newer wind farm sites indicate a mean fatality rate of 0.03 raptors per turbine and 0.04 per megawatt (Arnett et al., 2007). (James 2008) found a similar fatality rate for the Erie Shores site. The best evidence available suggests that the potential significance of net effects on raptors is minimal.

6.7 Bats

6.7.1 Existing Environment

The overall study area, proposed turbine layout, and natural features were compared with the Ministry of Natural Resource's August 2007 Draft Guidance Document for bat monitoring at proposed wind farms (OMNR 2007), and as a result the McLean's Mountain study area has been ranked as having a 'High' site sensitivity for bats. This is due to the study area boundary being located <1 km from the shore of the North Channel. A portion of the wind farm is also located on a forested ridge, which is part of the Niagara Escarpment and could provide suitable habitat for roosting bats.

The habitat found within the study area is a, mix of forest and agricultural lands. Old fields and grassland/pasture are found in patches within the site, along with small pockets of wetlands. Also present within the study area are hedgerows, snags, and farm structures. These habitat types are all expected to provide limited potential roosting habitat for local bat populations. Snags, buildings, and riparian and aquatic habitat are considered significant bat habitat and are

all present within the study area. Other significant bat habitats, caves and abandoned mines, are not present within the proposed study area. However the north-western boundary of the study area is located on forested ridge, which is part of the Niagara Escarpment and could provide suitable habitat within the cliff rock face. The northwestern boundary is also in close proximity to the shoreline of the North Channel, which could provide potential migration routes for migrating bats.

Bat surveys have been conducted in the study area as per the input and recommendations received from the OMNR. Radar and acoustic data were collected simultaneously from sunset to sunrise across 7 sampling sites within the study area. Sampling to date has been conducted in July and September. The location of each sampling station is indicated on **Figure 2** in the bat study report, located in **Appendix E** of this document. The primary tool for data gathering acoustic data in this study was a Pettersson D240X ultrasound bat detector paired with a portable computer to record all bat activity. Acoustic monitoring was conducted at 7 stations and radar monitoring was conducted at 3 stations. A total of 24 nights of acoustic monitoring and 19 nights of radar monitoring has been conducted to date. 2797 individual flights of night migrants in just over 866.2 hours of radar-and stationary-acoustic sampling were recorded from sunset to sunrise, resulting in an overall passage rate of 2.9 passes/hr. Radar-determined flight activity of night migrants fluctuated over the migration season. Flight activity of bats was greatest on July 19th and 23rd. The nightly pattern of radar-determined bird and bat flight activity was consistent with other sites; peaking within the first few hours of darkness, decreasing gradually in the midnight hours and peaking again in the early morning.

Of the eight species of bats potentially present in the study area, five were recorded, including: the Hoary bat, the Big Brown or Silver-haired Bat, which are not distinguishable by voice, the Red Bat, the Northern Long-eared and the Little Brown bat. No species classified as "at risk" were found. Bat diversity was low compared to other sites in southern Ontario. The most common species on all plots is the little brown bat and then the red bat.

There was no evidence of hibernacula at the McLean's Mountain site. There were no swarming events observed in August or September as would be expected if bats were making nocturnal visits to the site they intended to use for hibernation.

Comparison of the survey results from other locations with similar land use and topography that were sampled using the same radar-acoustic technology, and within the same season and year, suggests that the McLean's Mountain Wind Farm site has a low concentration of night bat migrants.

There is little known about bat passage rates and migration routes within Ontario, making comparison of passage rates with known areas of concentrated bat activity difficult. However, based on additional bat monitoring conducted by NRSI within similar geographical areas and habitats, some comparison in bat activity levels can be made. The MERE Wind Farm, which is proposed to be located in West Bay near the McLean's Mountain study area had an overall average passage rate of 10.3 passes/hr (NRSI 2007), which is much higher than the results from the 2008 monitoring at the McLean's' Wind Farm. Further, at the Prince Wind Farm, located approximately 200km northwest of the McLean's Mount study area, the flight density during the

spring monitoring period was 3.3 $x10^{-6}$ passes/$m^{3/}$hr which is also slightly higher than the McLean's Mountain study site. Radar monitoring conducted between July and October at another, unnamed northern Ontario wind farm, located approximately 50km north of the Prince Wind Farm, also resulted in a lower flight density (1.3 $x10^{-6}$ passes/m^3/hr) than found at McLean's Mountain Wind Farm. As this unnamed wind farm is located at the edge of the physical range of migratory bats, these results are to be expected.

To meet the MNR protocol for bat survey work and to better define the level of bat activity in the project area, additional bat survey work is planned. The future survey program has taken into account comments received from the MNR. The proposed program includes both acoustic and radar survey work that is to be conducted during the month of August (the survey work conducted to date does not include any August survey work).

6.7.2 Potential Effects

Concerns for bat collision mortality at wind farms have increased recently due to some recent accounts of high bat mortality events (Kerns and Kerlinger 2004, Kerns *et al* 2005, Nicholson et al 2005). According to Johnson's 2005 report summarizing bat mortality data from 4 areas in the United States, 80% of bat mortalities at wind farms were migratory tree bats (45.5% hoary bats, 26.3% Red Bats and 11.4% Silver-haired bats). Locating wind farms close to landscape features important to bats, particularly forested ridges are believed to be a major factor in increasing risk of bat deaths. Johnson et al (2003, 2004) found that the number of bat deaths decreases as the distance of a turbine from a forest increases and that the number of bat passes increases as the proportion of turbines within 100m of woodlots increases.

As an indication of the effects of wind farms on bats, post construction monitoring reports conducted in 2006 at the Erie Shores wind farm in southern Ontario, found a total of 74 bat carcasses from 6 species, including *Myotis* sp. (11 individuals), Silver-haired Bat (13 individuals), Big Brown Bat (26 individuals), Eastern Red Bat (13 individuals) and Hoary Bat (11 individuals). Surveys in 2007 found 89 bat carcasses from 7 species, including *Myotis* sp. (1 individual), Little Brown Bat (5 individuals), N. Long-eared Bat (6 individuals), Silver-haired Bat (11 individuals), Big Brown Bat (34 individuals), Eastern Red Bat (24) and Hoary Bat (8 individuals)(James 2008).

Weather is another factor that may affect bat mortality (Arnett et al 2005, 2006). It was noted by Arnett et al (2005) that the majority of bat mortality occurs on low wind nights. It has also been hypothesized that reduced visibility could increase the collision risk to night migrants (EC 2005). To test for this, meteorological data (i.e., wind speed, wind direction, temperature and barometric pressure) from an on-site meteorological tower were correlated with heights and activity patterns of night migrants (birds and bats).

The study results for nocturnal migrant birds and bats suggest that the risk at McLean's Mountain is low.

6.7.3 Mitigation Measures

It is recommended that a 200 m buffer be placed around large water bodies which are expected to be an attractant to bats in the project area.

As noted previously, additional August bat survey work will be conducted to meet MNR survey protocol requirements. Consultation with the MNR has already occurred regarding this.

In addition to the 1 year of pre-construction bat monitoring that was conducted, the OMNR bat guideline document indicates that at least two years of post-construction monitoring will be required from May through September. Northland Power will enter into discussions with the OMNR regarding the need for post-construction mortality monitoring for bats for this project.

6.7.4 Significance of Net Effects

The study results suggest that the risk to night bats is low. Significant impacts to bats beyond the average documented are not expected. Potential future post construction monitoring will confirm impacts. Further wind farm operational changes may be required depending on the results.

6.8 Wildlife and Wildlife Habitat

This section refers to item 4.2, 4.4, 4.7 and 5.6 of the MOE's environmental screening checklist: will the project:

- ***Cause negative effects on protected natural areas such as ANSIs, ESAs or other significant natural areas?***
- ***Have negative effects on wildlife habitat, populations, corridors or movement?***
- ***Have negative effects on locally important or valued ecosystems or vegetation?***
- ***Have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?***

Details regarding natural heritage conditions are contained in **Appendix C**. A summary of this information is provided below.

6.8.1 Existing Environment

6.8.1.1 Protected Natural Features

Several sources, including: Natural Heritage Information Centre database; Atlas of Mammals of Ontario (Dobbyn 1994); Ontario Herpetofauna Atlas (Oldham and Weller 2000); Breeding Bird Atlas (http://www.birdsontario.org/atlas/atlasmain.html); Important Bird Areas (http://www.ibacanada.ca); federal Species at Risk Act (SARA) Public Registry (http://www.sararegistry.gc.ca/default_e.cfm); and provincial Species at Risk (SAR) (http://www.mnr.gov.on.ca/MNR/speciesatrisk/status.html) formed the basis of the background review.

Aerial photographs were initially used to determine major habitat types in the study area. The description of major habitat types contained herein is based on observations completed during seasonal field surveys for birds as well as vegetation survey plots conducted at a subset of turbines, access roads and transmission line route. See **Appendix C** for a complete account of habitat in the study area.

Consultation with Ontario Ministry of Natural Resources (OMNR) staff including Scott Dingwall (District Planner), Eric Cobb (Renewable Energy Planner), Deb Jacobs (Species at Risk Biologist), and Bruce Richard (Information and Resource Management Supervisor) was completed as part of the background review.

Important Bird Area

This IBA follows the northern Manitoulin Island shoreline from Cole Bay to West Bay and overlaps with a portion of the western edge of the study area as seen in Figure 2 of Appendix C. The area is characterized by sloping shorelines and includes a number of bays and inlets. Large numbers of moulting red-necked grebes are found in this IBA between September and December. Total numbers of red-necked grebes recorded here have been as high as 1,163 in 1995 and 2,000 in 1996 which represents approximately 4% of the North American population of the species. The moulting locations that red-necked grebes use share several characteristic such as they are generally between 100 to 2,000 meters away from the shoreline, the water depth varies from 3 to 55 m, they are partially sheltered, and they have varied late bottom topography containing shelves or holes. Other open water birds observed here include common loons, horned grebes, scoters and oldsquaw (Birdlife International 2007a).

Areas of Natural and Scientific Interest

Six candidate Areas of Natural and Scientific Interest (ANSI's) have been identified by the MNR as occurring in the general area of the project. Only four of these are in close proximity to the study area boundary, including *Sheguiandah Hill*, *Bass Lake Marsh*, *Sheguiahdah Quartzite Quarry* (See Figure 6-2) and *Bidwell Well Road Bog* (Figure 2, Appendix C). The two candidate ANSIs have been discussed below but have not been mapped due to their distance from the study area. According to the Town of Northeastern Manitoulin and the Islands, no additional natural areas exist in the study area.

Freer Point Limestone Alvar – Provincially Significant, Candidate Life Science ANSI (255 ha)

Freer Point Limestone Alvar is designated an ANSI because of its limestone features and may also provide representation of limestone alvar vegetation (dry and wet dominance types). The tree community has been categorized as swamp with thicket and marsh dominance types occurring near the bay shoreline. Noble (1995) notes that limestone alvar affiliate species are expected to be represented here but field confirmation is needed for the above vegetation classifications. This area is located northwest of the study area, below the ridge and in close proximity to the North Channel.

Sheguiandah Hill – Provincially Significant, Candidate Life Science ANSI (440 ha)

Sheguiandah Hill is noted as one of the few remaining areas in the Sheguiandah area that supports relatively extensive deciduous forest, particularly sugar maple and red oak. This site is centred on the shoreline terraced Sheguiandah Hill and includes two outlier ridges of quartzite in the southwest corner (Noble 1995).

Bass Lake Marsh/Swamp – Regionally Significant, Candidate Life Science ANSI (46 ha)

The west end of Bass Lake supports a small shoreline marsh/swamp complex. The swamp portion marks an abrupt change in soil moisture regime from surrounding agricultural land and is dominated by red maple and sensitive fern. Immediately off shore, the lake supports a number of deep and shallow marsh communities (Noble 1995).

Sheguiandah Quartzite Quarry – Provincially Significant, Candidate Life Science ANSI (90 ha)

Minimal information is available regarding this site. A summary of Noble's (1995) report highlights that this area is considered a significant archaeological site, with potential presence of significant plant species. This land is privately owned and was not investigated further during fieldwork.

Strawberry Channel Wetlands – Regionally Significant, Candidate Life Science ANSI (165 ha)

Large Great Lakes open water shoreline marshes are found east of the study area on the east and west shores of Strawberry Channel. These types of marshes are rare on Manitoulin Islands Lake Huron shoreline (Noble 1995).

Bidwell Road Bog – Provincially Significant, Candidate Life Science ANSI (120 ha)

True bog habitats are considered rare on Manitoulin Island. This site may contain a floating domed bog which would make it provincially significant, as these features are rare at this latitude. Aerial photographs indicate that the bog consists of open bog dominance vegetation types (possibly low shrub bog). The north and east flanks of the bog contain mixed swamp dominated by eastern white cedar with some portions of forest possibly being coniferous (Noble 1995). No mapping for this area was available form the MNR however, during field work and vegetation surveys the approximate boundaries of the bog were mapped (see Figure 2, **Appendix C**).

6.8.1.2 Wildlife Habitat, Populations, Corridors or Movements

Major Habitat Types

The underlying bedrock, shallow and seasonally wet soils has influenced local land-use and vegetation and prevented agricultural crops from being grown. Due to these conditions, historical and current land use in the surrounding area has been primarily pastureland for beef

cattle, which is sometimes cut for hay. Forests are general confined to steep slopes or lowland areas. Major habitat types observed in the study are summarized below.

On pastureland, subtle changes in elevation modify drainage characteristics, which results in a complex pattern of Old Field Meadow (pasture) (CUM 1) and Meadow Marsh (MAM 1) community types. The influence of elevation changes is magnified by the relatively thin soil (0.3m) overlying the limestone bedrock. All Old Field Meadow (pasture) including many Meadow Marsh areas are maintained by cultural uses (grazing cattle) and as such, no Alvar communities were observed. The more culturally maintained and impacted Meadow Marsh areas have not been included in wetland boundaries but rather remain part of the larger Old Field Meadow (pasture) designation due to their small size.

Forests are generally confined to steep slopes or lowland areas. Cattle regularly graze in the forested areas, which has resulted in a reduction in ground layer plant regeneration. Generally, forest cover on or immediately adjacent to lease sites is dominated by a Sugar Maple Deciduous Forest (FOD5, FOD6).

with small isolated areas of Dry Cedar Coniferous Forest (FOC 2) and Fresh White Cedar Mixed Forest (FOM 4) with white spruce, white birch and trembling aspen as co-dominant species.

Multiple small-unevaluated wetlands comprised of mostly White Cedar Mineral Mixed Swamp (SWM 1) and Red Maple Mineral Deciduous Swamp (SWD 3), with some smaller isolated portions of Mineral Thicket Swamp (SWT 2) and Shallow Meadow Marsh (MAS 2) communities are contained in the study area. These areas are primarily identified from MNR base mapping (2002), with additional areas being added using field observations.

All terrestrial vegetation communities observed in the study area are common in the province of Ontario. No rare plant species were found in vegetation survey plots.

Mammals

Mammals potentially occurring in the study area are taken from Dobbyn (1994). See **Appendix C** for details on mammals potentially occurring in the study area and **Appendix E** for information on Bat observations in the study area. Overall, 41 mammal species were identified as potentially occurring in the study area. Of these, 14 species were observed including: Snowshoe Hare, Eastern Chipmunk, Red Squirrel, Beaver, Porcupine, Black Bear, Racoon, Striped Skunk, White-tailed Deer, Hoary bat, the Big Brown or Silver-haired Bat, which are not distinguishable by voice, the Red Bat, the Northern Long-eared and the Little Brown bat.

Herpetozoa

Herptile species potentially occurring in the study area are taken from Oldham and Weller (2000) and summarized in **Appendix C**. Overall, 23 species of herptiles were documented as potentially occurring in the study area. Of these, 7 species were found while conducting field observations, including: American Toad, Spring Peeper, Gray Treefrog, Northern Leopard Frog, Common Snapping Turtle, Eastern Garter Snake and Brown Snake.

Corridors or Movements

The entire study area essentially functions as a corridor for a variety of wildlife necessary for both seasonal changes in habitat requirements and foraging needs.

6.8.2 Potential Effects

6.8.2.1 Protected Natural Areas

Several natural heritage features have been identified in the study area. The importance of these areas for maintaining wildlife habitat and biodiversity in the study area was identified during the project. It is not anticipated that these areas will be negatively affected by the proposed undertaking as no development is being proposed in close proximity to their boundaries.

6.8.2.2 Wildlife Habitat, Populations, Corridors or Movements

Wildlife Habitat

About half of the turbines sites are in forested areas. Turbines placed in forested environments will require 1ha area cleared around the turbine base to facilitate the construction of the foundation and erection of the turbine structure. As well, in some cases, forested areas will need to be cleared to construct the access road to each turbine. It is anticipated that this will displace species in the immediate vicinity of the clearing. For some of the more sensitive species, there is potential that additional displacement beyond the area cleared could occur for approximately another 50-100m.

Seasonal Concentration Areas

Based on field work and an assessment of background information no seasonal concentration areas have been located in the study area. The Natural Heritage Information Centre database does not show the presence of any large colonial nesting species associate with the Lake Huron (e.g. ring-billed gull) within or immediately adjacent to the study area. Although some congregations of species have been identified along the shores of Manitoulin Island during migration, they are sufficiently removed from the study area, several kilometres inland. During the spring and fall when migration monitoring was completed no large concentrations of any species were observed in the study area. No potential effect to seasonal concentration areas has been identified

Specialized Habitats

Based on fieldwork, we understand that some small areas of amphibian woodland breeding ponds, sharp-tailed grouse lek and cliffs (forested ridge) occur in the study area. Mitigation measures being implemented will minimize impacts to these habitats during construction. There will be no effects on specialized habitats during operations.

Populations

Species population levels are not anticipated to be effect by this project. In some cases, some species may experience a localized decline in the immediate area surrounding a wind turbine. Each of these cases has been specifically discussed in other section of this document.

Animal Movement Corridors

Animal movement corridors can often be determined accurately using maps, aerial photographs, and a sound knowledge of species' habitat requirements. Based on an initial assessment the entire study area functions as a corridor. The corridor function provided by the entire study area is not expected to be impacted by the development of a wind farm.

6.8.3 Mitigation Measures

The potential for effects on wildlife and wildlife habitat will be addressed through avoidance with respect to turbine placement. Mitigation measures include the following (see **Figure 6-2**):

- **90m Lake/Stream/Pond Fisheries Setback –** A setback has been established along the shoreline of the stream or lake and will be measured in the field from the edge of vegetation communities capable of providing an effective barrier to the movement of sediment. This will normally be those communities with ≥25% canopy cover of trees, tall (≥1m high) woody shrubs such as alder or willow, or low (≤1m high) woody evergreen shrubs such as Labrador tea or leatherleaf. Rather than establish a series of setbacks based on increasing slope as indicated in the Stand and Site Guide, the most restrictive buffer has been used in all cases.

- **120m Wetland Setback** – This setback is to be established from permanent and seasonal wetland types as identified using MNR mapping. Because of their small size and potentially temporary nature wetlands may not be fully identified on the current mapping. Additional wetlands will marked in the field as they encountered and less restrictive setbacks can be applied as detailed in the Stand and Site Guide. Attempts were made to meet this setback as much as possible. None of the wetlands in the project area are considered to be "significant". Three turbine sites encroach within this 120 m buffer as shown on **Figure 6-2**.

- **120m Area of Natural and Scientific Interest Setback** - A 120 m setback has been provided for around areas of natural and scientific interest. The Natural Heritage Reference Manual identifies 120m as the adjacent lands for a Life Science ANSI designation. Encroachment of adjacent lands requires additional evaluation prior to any site alteration or development occurring.

- **150m Unknown Stick Nests Setback–** existing stick nest regardless of size will be buffered by a 150m setback. Breeding season will be defined as March 1 to July 31 for

raptors. The non-breeding season is considered August 1 to February 28. If new nests are found during construction an MNR biologist should be notified.

- **305 m (1000 ft.) Perch Lake Setback–** The NEMI municipal set back requirement identifies Perch Lake as a sensitive lake and requires a 305 m (1000 ft) setback for all building activity. This set back would also address the lake as a potential attractant to bats.

For the proposed undertaking, the constraints identified preclude the placement of wind turbines and where possible, the development of any associated infrastructure (some encroachment of roads onto the stream setbacks occurs to facilitate their crossing). If necessary, associated infrastructure or equipment encroachment into these constraint areas will follow the Standards and Guidelines identified in the Stand and Site Guide.

In some cases, despite due diligence, some environmental features that are identified in the Stand and Site Guide (e.g. hawk nests, vernal pools, etc.) may not be identified until construction has commenced. In these cases, when a new constraint is identified during construction, mitigation measures should be implemented that comply with the direction to the extent practical and feasible identified in the Stand and Site Guide.

Further, no herbicides or pesticides will be used by NPI during the operations period.

6.8.4 Significance of Net Effects

The significance of net effects to wildlife habitat, populations, corridors or movements is considered to be low. While the removal of habitat required to construct and maintain turbine infrastructure will be of impact to local individuals it is not anticipated that this will effect their populations or impede corridor function within the study area.

6.9 Threatened, Rare or Endangered Species

This section refers to items 4.1 of the MOE's screening checklist: will the project:

- ***Cause negative effects on rare, threatened or endangered species of flora or fauna or their habitat?***

6.9.1 Existing Environment

6.9.1.1 Rare Vegetation Communities

The Natural Heritage Information Centre (NHIC) provides a list of rare vegetation communities present within Manitoulin County. None of these rare communities were observed within the McLean's Mountain project area (see **Appendix C**).

6.9.1.2 Rare, Threatened or Endangered Wildlife

The Ministry of Natural Resource's Natural Heritage Information Centre (NHIC) uses Provincial (or Subnational) ranks to set protection priorities for rare species and natural communities in Ontario. Eight rare species of flora and fauna considered sensitive by the OMNR have been identified through NHIC historical records in areas surrounding the study area, including Houghton's goldenrod (*Solidago houghtonii*), arrow-arum (*Peltandra virginica*), small-flowered blue-eyed Mary (*Collinsia parviflora*), a liverwort species (*Cephaloziella rubella var. bifida*), boreal snaketail (*Ophiogomphus colubrinus*), loggerhead shrike (*Lanias ludovicianus*), red-shouldered hawk (*Buteo lineatus*) and black tern (*Chlidonias niger*).

Breeding Bird Atlas data identify eight nationally/provincially rare species within or adjacent to the study area (four 10 x 10 km squares). Of these species, only four, including bald eagle (*Haliaeetus leucocephalus - S4B,SZN, ESA – population North of French and Mattawa Rivers is considered Special Concern*), short-eared owl (*Asio flammeus* - S3S4B,SZN, *SARA* and *ESA – Special Concern*), and loggerhead shrike (S2B,SZN, *SARA* and *ESA - Endangered*), are considered as having potential to occur in the study area based on habitat requirements. None of these species were observed during breeding bird surveys.

The Ontario Herpetofaunal atlas identifies 2 species of conservation concern potentially occurring in or immediately adjacent to the study area including, the Eastern Massasauga (S3, SARA and ESA - Threatened) and Blanding's turtle (S3, SARA and ESA - Threatened), and when considering specific habitat attributes and life history needs for each species it is possible that both species have the potential to occur within or near the study area (Canadian Amphibian and Reptile Conservation Network, 2007). However, neither of these species were observed in the study area (see Appendix C).

A description of basic habitat information and general relevance to the study area for these species are provided below.

Houghton's goldenrod – occurs in swamps and moist beaches often in the moist sandy swales behind dunes (Gleason and Cronquist 1991). This species was not observed during fieldwork.

Arrow-arum – occurs in swamps and shallow waters (Gleason and Cronquist 1991). This species was not observed during fieldwork.

Small-flowered blue-eyed Mary – occurs in sterile rocky soils (Gleason and Cronquist 1991). This species was not observed during fieldwork.

Boreal snaketail – Dragonflies in this genus generally inhabit stream habitats though no information for this species was available (Needham, Westfall, Jr. and May 2000). This species was not observed during fieldwork.

Red-shouldered hawk - red-shouldered hawk occurrences from circa 1971 and 1974 are recorded for the Pike Lake area, several kilometers south of the study area. This species is known to vacate disturbed/cleared landscapes and areas in close proximity to human settlements. One red-

shouldered hawk was located on a point count during breeding bird surveys in the summer of 2008 in an area of deciduous forest. A nest observed close to the bird may have belonged to this species though no direct activity was observed on the nest.

Bald Eagle - The bald eagle is considered of special concern north of the French and Mattawa Rivers in Ontario. Breeding activity for this species was observed in squares 17ML28, 17ML29 and 17ML38 during the second Ontario Breeding Bird Atlas project but was not observed on Breeding Bird Surveys in the area. No bald eagles were observed during winter monitoring but a single bird was observed during spring migration monitoring in April 2008 at the Townline Road - Greenbay Road Junction area soaring from 50-100m in the air and a single bald eagle was observed during fall migration monitoring in September 2004 but was flying well above turbine height.

Short-eared owl - Short-eared owl was observed in suitable breeding habitat during the second Ontario Breeding Bird Atlas project in squares 17ML28 and 17ML29 but breeding bird surveys in the study area did not locate this species.

Black tern - More recent reports of black terns from the west end of Bass Lake during 1990 and 1991 were also identified. This species has a strong affiliation with emergent marsh environments bordering lakes. The study area lacks any habitat feature of this type and therefore this species would not be found in the vicinity of the proposed wind farm and is not considered a management issue.

Loggerhead shrike - One historical record for a loggerhead shrike (*Lanius ludovicianus*) in the year 2000 exists for the southeast portion of the study area. This species is listed as an endangered species in Schedule 1 of the Species at Risk Act. During fieldwork, the historical presence of loggerhead shrikes was known and the species was actively searched for in areas where potential habitat might exist. No observation of the species was documented for the area during fieldwork.

Ontario Bird Conservation Region 13

In total, 273 individuals representing seventeen priority species were observed during the 2007 and 2008 breeding bird surveys. Savannah Sparrows observed in agricultural fields represented approximately half (49%) of all individuals. BCR species observed during fieldwork are listed below.

Wood Thrush
Rose-breasted Grosbeak
Canada warbler
Black-billed Cuckoo
Bobolink
Eastern Meadowlark
Vesper Sparrow
Eastern Kingbird
Northern Harrier
Baltimore Oriole
Red-shouldered hawk
Eastern Wood-Pewee
Northern Flicker
American Kestrel
Savannah Sparrow
Brown Thrasher
Belted Kingfisher

Eastern massasauga – Eastern massasaugas are generally associated with wet habitats particularly wetlands near river mouths (Canadian Amphibian and Reptile Conservation Network, 2007). There were 3 massasauga rattlesnake individuals sighted in 1985 approximately 1km west of the study area. Schedule 1 of the Species at Risk Act (SARA) has designated the massasauga rattlesnake as threatened. This species was not observed during fieldwork.

Blanding's turtle – This species can be found in productive shallow lakes, ponds and wetlands with clean water and mucky bottoms (Canadian Amphibian and Reptile Conservation Network, 2007). No data was available for the Blanding's turtle records in the study area. This species was not observed during fieldwork.

6.9.2 Potential Effects

With exception to birds, the rare species discussed above were not observed in the study area. The majority of the species, which have not been observed, prefer wetland environments. Wetland environments will not be disturbed by the proposed development and no effect to these species is anticipated. For species, which were not observed during fieldwork, but have some potential to occur in the area of construction may experience some limited effects such displacement from the immediate area of new infrastructure or mortality as a result of traffic on access roads. The majority of these effects can be mitigated through operational measures.

Bird species at risk observed in the study area may be affected to some degree and have been discussed in more detail in the bird section of this report.

6.9.3 Mitigation Measures

Eastern massasauga – Eastern massasaugas are generally associated with wet habitats particularly wetlands near river mouths. Mitigation measures will include educating contractors on the identification of this species and providing them with protocol to be followed should and individuals be found. This information will form part of the Environmental Management Plan that is to be prepared by NPI.

Blanding's turtle – This species can be found in productive shallow lakes, ponds and wetlands with clean water and mucky bottoms. Mitigation measures will include educating contractors on the identification of this species and providing them with protocol to be followed should and individuals be found. This information will form part of the Environmental Management Plan that is to be prepared by NPI.

Small-flowered blue-eyed Mary – This species occurs in sterile rocky soils. Additional searches for this species in areas to be disturbed that meet this habitat type will be searched prior to construction. Mitigation measures may include replanting of any species observed, subject to the conditions of the Environmental Management Plan that is to be prepared by NPI.

6.9.4 Significance of Net Effects

The risk to rare, threatened and endangered species in the area is low, provided mitigation measures are implemented. Minimal adverse significant effects are anticipated.

Social Environment

6.10 Population, Land Use and Economics

This section refers to items 6.2, 6.4, 6.5 and 6.6 of the MOE's screening checklist: will the project:

- ***Be consistent with municipal land use policies, plans and zoning by-laws?***
- ***Have negative effects on local businesses, institutions or public facilities?***
- ***Have negative effects related to increases in demand on community services or infrastructure?***
- ***Have negative effects on the economic base or a municipality of community?***
- ***Have negative effects on local employment and labour supply?***

6.10.1 Existing Environment

The location of the proposed McLean's Mountain Wind Farm is approximately three (3) kilometers south of Little Current in the Municipality of Northeastern Manitoulin and the Islands (NEMI) in Ontario.

6.10.1.1 Jurisdictional Boundaries

Municipality of Northeastern Manitoulin and the Islands (NEMI)

The Municipality of Northeastern Manitoulin and the Islands (NEMI) is a rural community located on Manitoulin Island at the top of Lake Huron. Manitoulin Island is a wedge-shaped island, situated in the northern portion of Lake Huron, one of the Great Lakes of Canada. It is 130 kilometers (81 miles) long and 5-50 kilometers (3-30 miles) wide - the largest freshwater island in the world. It is accessible by bridge at the Town of Little Current or by ferry from the Town of Tobermory. NEMI is situated at the northern gateway to Manitoulin Island and is the largest municipality within the District of Manitoulin. It is located 120 km southwest of Sudbury on Highways 6 and 540. NEMI is a restructured municipality, which includes the former Township of Howland, Town of Little Current and the annexed unincorporated areas of McGregor Bay and the Islands (1999). The Township of Bidwell falls within the boundaries of both NEMI and the Township of Assiginack. Little Current and Sheguindah are the largest communities within NEMI.

Little Current is the largest community within NEMI as well as its administrative centre. Formerly an independent town, Little Current was named variously by different groups for the swift strong currents of water running between the narrow passageway which connects the North Channel and Georgian Bay.

NEMI primarily consists of northern boreal forest that plays an important role in the local economy, for mining, forest harvesting and tourism. Misery Bay Nature Reserve (MBNR) is located along remote stretches of Lake Huron shoreline at Misery Bay. The local economy in NEMI includes mainly farming and lumbering where tourism is a main aspect of the local economy. The nature reserve lies 35 kilometers west of the Town of Gore Bay.

District of Manitoulin

The project area is located in the District of Manitoulin. Established in 1888 from Algoma District Manitoulin it comprises Manitoulin Island and a number of small islands around it, making it the smallest district in Ontario. Manitoulin Island took its name from Ojibwa, Algonquin, and Ottawa concept of the great spirit Manitou, the master of life and ruler of all things. The District of Manitoulin includes the islands of Manitoulin, Cockburn, Fitzwilliam, Great Cloche, and some lesser islands, as well as a portion of the mainland and is a district and census division in Northeastern Ontario. The District of Manitoulin covers approximately 4,759.74 kilometres and acts as the access region between southern and northern Ontario. Dairying, lumbering, mixed farming, and tourism are the major activities throughout the District.

Manitoulin Island has two incorporated towns: Northeastern Manitoulin and the Islands (Township of NEMI) and Gore Bay; eight townships (Assiginack, Billings, Burpee and Mills, Central Manitoulin, Dawson, Gordon, Robinson and Tehkummah) and six Anishinaabe reserves: M'Chigeeng, Sheguiandah, Sheshegwaning, Aundeck Omni Kaning, Wikwemikong and Zhiibaahaasing.

6.10.1.2 Land Use

The McLean's Mountain Wind Farm consists of a land parcel of approximately 8,200 ha located immediately south of Highway 540, between North Channel and Georgian Bay. The entire proposed site lies in NEMI. The project properties include:

Township of Howland: Concession 1, Lots 31, 32, 33, south part of lots 34 and 35 (25 acres of each lot); Concession 2, Lots 10, 11, 12 &, 13, 29, 31, 32, and 33; Concession 3, Lots 9, 10, 14 and 15; Concession 4, Lots 6, 7, 8, 9, 14, 15, 19, and 20; Concession 5, Lots 6, 7, 8, 10, 11 and 12;Concession 6, Lots 5, 6, 7, 8, 10 13, 14, 15, 23 and 24;Concession 7, Lots 6, 7, 8 ,9 and 10; and

Township of Bidwell: Concession 12, Lots 21 to 27.

Please refer to **Figure 6-3**.

The proposed wind farm on McLean's Mountain is to be located on lands zoned rural. Land use is primarily vacant land with some cattle grazing. Lands are all privately owned. There are few residences within the proposed study area which are located along existing roadways (Green Bush Road, Morphet's Sideroad and McLean's Mountain Road). The proposed wind farm's terrestrial habitat has been impacted by grazing cattle and general agricultural practices associated with beef cattle production. Forests size and shape in the study is general reduced, fragmented and confined to steep slopes or lowland areas. Cattle regularly graze in the forests, which has resulted in reduced regeneration and species diversity. There are no businesses in the vicinity of the study site.

In addition, the proposed power transmission line required to connect the wind farm to the Hydro One Transmission line will extend along Morphets Side Road and then extend north along an

unopened road allowance to then connect with Harbour View Road along the southern edge of Little Current. Existing land use along this proposed route includes about 5 residences along Morphets Side Road. and approximately 4 businesses along Harbour View Road.

6.10.1.3 Planning Policies

With regards to land uses in the Study Area, the Official Plan for the Manitoulin Planning Area and the applicable Comprehensive Zoning By-law, were reviewed.

Provincial Policy Statement (2005)

The Provincial Policy Statement (PPS) (2005) consists of provincial level policies of the various provincial Ministries. The PPS permits wind farms on rural designated land and rural designations in unorganized townships with the provision that provincial Ministries approve the development based on compliance to applicable Ministry policies. The proposed McLean's Mountain Wind Farm is in conformity with the PPS and will have particular regard for ensuring the minimized impact of development on natural vegetation.

Municipality of Northeastern Manitoulin and the Islands (Township of NEMI)

The Official Plan for the Manitoulin Planning Area designates the land within the study area as "rural" and "agricultural". Polices of relevance to the McLean's Mountain Wind Farm include *Section 'B', B-1 General Provisions – General Policy, Section 1.4, sub-section 1.4.2* of the Manitoulin Planning Area Official Plan that permits electricity facilities (including wind turbines) presented as follows:

> *"all existing electric power facilities and the development of any new (M-2) electric power facilities, including all works as defined by the Power Corporation Act, shall be permitted in all parts of the Planning Area, provided that such development satisfies the provisions of the Environmental Assessment Act, including regulations made under the Act and any other relevant studies".*

To permit the development of a wind farm on these lands, the Municipality of Northeastern Manitoulin and the Islands passed a Resolution No. 36-02-07 in September 2008 that adopted the following setbacks with respect to wind farms:

1) *Separation distance from dwellings, the greater of*
    a) *250m, or*
    b) *Ministry of the Environment, Certificate of Approval requirement, (NPC232)*
2) *Participant property line setback – 10m*
3) *Non-Participants property line setback – rotor radius plus 10 m*
4) *Setback from road right-of- way line – rotor radius plus 10m*

5) *Separation distance from non-dwelling principal and accessory structures – rotor radius plus 10 m.*

Surrounding Uses

The proposed McLean's Mountain Wind Farm as well as the surrounding uses are primarily rural in nature. The La Cloche Provincial Park located approximately twenty kilometers to the north-east of the project area, across the North Channel was considered in this assessment (Section 6.20). The La Cloche Mountains, also called the La Cloche Range, are a range of hills that extend roughly from La Cloche Provincial Park, south of Massey, to Killarney Provincial Park, southwest of Sudbury. The hills are crossed by Highway 6.

6.10.1.4 Population

The island, along with several smaller neighbouring islands, constitutes the Manitoulin District census division of Ontario. The population in the District of Manitoulin has been rising in the recent years. In 2001, the population of Manitoulin District was 12,679; in 2006, it had risen to 13,090. During the summer, the population (12,600 permanent residents) on the island grows by more than a quarter due to the popularity of boating and other activities offered to tourists.

6.10.1.5 Services

All services in the District of Manitoulin are provided either by the individual municipalities or directly by the provincial government. However, in many cases the District of Manitoulin does not have its own administrative area for provincial government services, instead, many services are provided jointly with the Sudbury District from its district seat in Espanola.

Municipal Works

NEMI obtains its services, such as regional road maintenance, water and wastewater infrastructure, primarily via the Manitoulin-Sudbury District Social Services Administration Board (DSSAB). The DSSAB is a municipal service management organization created by the provincial government to oversee the local planning, coordination and delivery of a range of services and programs divested to the municipal order of government. The Manitoulin-Sudbury DSSAB is responsible for the delivery of its services to the residents of the districts of Manitoulin and Sudbury.

Transportation

The Manitoulin District is served by one primary provincial highway, Highway 6. This highway enters the district at the ferry docks in South Baymouth, in the Township of Tehkummah, where the Chi-Cheemaun ferry travels to and from Tobermory in the municipality of Northern Bruce Peninsula. The highway exits the district in the Whitefish River First Nation, just south of Whitefish Falls, when it crosses into the Sudbury District. In NEMI Highway 6 provides access north to the TransCanada Highway.

Health and Emergency Services

The Little Current Hospital - Manitoulin Health Centre is the primary hospital serving the residents of NEMI. A 16-bed hospital with emergency services and specialists' clinics is located within the Town. It employs a staff of 160, including staff of a second hospital site. Ambulance service is provided. Air ambulance helicopter service provides rapid access to regional hospitals in Sudbury. Home care, occupational and physiotherapy, and palliative care are provided through OHIP and the Victorian Order of Nurses. The community also has a 60-bed long-term care facility, holistic medical centre, a massage therapist, two dental offices, denture clinic, and optometrist. The emergency services within the NEMI include an Ontario Provincial Police detachment.

6.10.1.6 Economy

Originally important as an agricultural and coal shipping centre, NEMI has developed a more diverse economy. A commercial fishery, processing plant and tourism are now important economic factors. Four-season recreational opportunities and special events draw large numbers of visitors to Little Current. Highway 6 provides access north to the TransCanada Highway and south via the Ontario Northland Transportation Commission Ferry to Tobermory and South-western Ontario. A regional airport provides access by air. The Little Current Harbour provides deepwater access for private yachts and cruise ships. Tourism is an important economic factor. Four-season recreational opportunities and special events draw visitors to the NEMI. Tourist attractions in NEMI consist of many public beaches, fishing, hiking, fossil hunting, variety of tours, summer theatres, and wildlife watching. Hunting is popular in the fall. Winter attractions consist of ice fishing, cross-country skiing, skating and snowmobiling. NEMI is on the provincial snowmobile trail system. NEMI is a popular summer destination for sports enthusiasts, boaters, sailors, campers and cottagers.

Mcleans Mountain Windfarm
Figure 6-3 Land Use Map

Legend

- Turbine
- Substation
- Residence
- Building
- Active Landfills
- Closed Landfills
- 5m Contours
- Secondary Roads
- Highway
- Proposed Tranmission Line (115kv)
- Rivers
- Project Area
- Lots
- First Nation Reserve
- ANSI
- Pit or Quarry
- Waterbody

Land Use Designations

- Agricultural District
- Hamlet District
- Mobile Home Park
- Rural District
- Settlement Area
- Shoreline Development
- Urban District

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6.10.2 Potential Effects

The following areas were considered to be relevant for the assessment of socio-economic impacts associated with the proposed McLean's Mountain Wind Farm:

- Within 500 metres of construction activity for construction-related impacts such as noise and dust, and property-related concerns;
- NEMI for community-related concerns such as future land use plans, economic growth and community character; and'
- Local and regional economic impacts.

6.10.2.1 Land Use

The following addresses the potential for land use impacts from the McLean's Mountain Wind Farm as organized on the basis of the applicable screening criteria.

- ***Be consistent with municipal land use policies, plans and zoning by-laws?***

Based on the documents reviewed above, the proposed development of the McLean's Mountain Wind Farm conforms with the PPS and to the Official Plan and Zoning By-Laws of the Municipality of Northeastern Manitoulin and the Islands (NEMI).

6.10.2.2 Economics

The following addresses the potential for economic impacts from the McLean's Mountain Wind Farm as organized on the basis of the applicable screening criteria.

- ***Have negative effects on local businesses, institutions or public facilities?***

No businesses, institutions or public facilities were identified that would be adversely affected by the project. Rather, the payment that local businesses may receive through project related contracts will help to support the local economy as further noted below.

The project lands are not likely to be of interest to visitors to the Island, with the possible exception of hunters although all of the project lands are private. Nevertheless, some residents have expressed concern that the visibility of the turbines could affect tourism activity and related businesses. The project is well set back from shoreline areas which is the focus of tourism activity in the general area. (three turbines are about 1.5- 2 km from the shoreline and the rest are at least 3 km away). Visual simulations (see **Section 6.21**) indicate that the visibility of the turbines will be limited from Highway 6 to the east of the project area. From Hwy 540 to the north of the project area, there is the potential for greater visibility. The reasons which attract people to the Island will not be affected by the project, as such; it is very unlikely that the project would negatively affect tourism related business activity.

- ***Have negative effects related to increases in demand on community services or infrastructure?***

The project will not result in increase demand on community services or infrastructure during its operations. During construction, an influx of construction workers to the area could temporary increase the demand for services. The wind turbines require no municipal servicing connections. A central office for the wind farm would likely be located in an existing nearby community where servicing is readily available. Municipal roads used during the construction period would be repaired if damaged and returned to existing if not better condition. NPI will provide funding to applicable emergency service providers such as the fire department for required training.

- ***Have negative effects on the economic base or a municipality of community?***

The effects of the project on the area's economic base are all positive as described below:

Construction Spending
The construction of the McLean's Mountain Wind Farm will require a capital spend of approximately $200 million on turbine components, civil construction, electrical, crane and many additional specialist contractors. Approximately 20% of the overall capital spend is on "balance of plant" (i.e. everything except the turbine) which are generally not specialist contractors and would include, for example local road, concrete, aggregate, and electrical contractors/suppliers. Opportunities to provide these services and supplies would likely be through regional contractors. In total, up to $5 million in contracting services would be available to companies in northwestern Ontario.

A portion of the direct local capital spend will be duplicated by support and contracting services to the wind farm project. Typically this could represent orders to fabrication shops, catering, hoteliers, electrical sub-suppliers, etc.

Operation Spending
The overall annual spending on wind farm operations and maintenance activities is estimated at $5 million. The wind farm will be operated and maintained from an operations and maintenance facility to be located in the vicinity of the wind farm. The facility will have stores for spare parts, and scheduled and unscheduled maintenance will be dispatched from this facility. Operations will directly employ up to 8 people whose tasks will be to monitor and operate the wind farm. These long term employment opportunities will generate total annual incomes of about $600,000.

Further sub-contracts will be awarded to contractors for road maintenance, snow clearance, electrical maintenance, etc. The annual value of these sub-contracts is estimated at $150,000.

A percentage of direct local operations spending will be duplicated by support and contracting services to the wind farm project. As with construction, this could represent orders to fabrication shops, catering, hoteliers, and electrical sub-suppliers.

Municipal Tax Payments
The proposed McLean's Mountain Wind Farm is located in the Town of Northeastern Manitoulin and the Islands. This will represent an annual tax payment to the Municipality of approximately $92,400 per year.

Aboriginal Communities and Organizations
Local Aboriginal communities and organizations are expected to benefit economically from this project through capacity funding during the environmental screening process and direct employment opportunities during the construction and operational phases of the project. During the construction and decommissioning phases, opportunities for contracting, as well as supply of machinery and labour will be made available to local Aboriginal communities.

Economic Summary
In addition to the estimated $300 million to be spent to construct the initial phase of the project, over an assumed 20 year life span of the facility, the proposed project is expected to result in approximately $11.4 million being generated in taxes and land payments (all 2009 dollars not including inflation).

- ***Have negative effects on local employment and labour supply?***

During the construction period, workers will be required; much of this employment will be sourced through the overall project contractor, Northland Power Inc. (NPI). As NPI is a vertically integrated company it will be directly managing the construction phase of the project and will have greater control on regional sourcing. It is expected that the labour supply will be drawn from throughout Northeastern Ontario. No negative effects are anticipated on the local labour supply.

6.10.3 Mitigation Measures

As described above, the project is not expected to result in negative effects on land use or the economy. As such, no specific mitigation measures are required.

6.10.4 Significance of Net Effects

Given the predominant rural designation of the lands in the project area and the general absence of development activity; the wind farm is unlikely to result in adverse effects on land use. Due to expected low magnitude of negative effects on land use and economic considerations, the effects are not expected to be significant. The expected positive economic effects of the project are considered to be substantial.

The project is expected to result in substantial positive economic effects during both construction and operation periods through project capital expenditures and employment opportunities that are generated.

6.11 Disposal of Waste Materials

This section refers to item 9.1 of the MOE environmental screening checklist: will the project:

- ***Cause negative effects of waste materials requiring disposal?***

6.11.1 Existing Environment

The Ministry of the Environment has an interest for all development projects that are located within 500 meters of an active or closed landfill site, through Section 46 of the *Environmental protection Act* and the MOE Guideline D-4. The MOE's Guideline, D-4, Land Use On or Near Landfills and Dumps (1994) describes acceptable and unacceptable land use controls for lands within 30 meters, 500 meters and beyond 500 meters of a fill area.

Based on MOE records and information provided by NEMI there is one active landfill adjacent to the study area. This landfill is located adjacent to the west side of Highway 6 approximately four (4) kilometers south of the Town of Little Current. There are two closed landfills located outside of the study area: one located to the south of the study area adjacent to the western shore of the Pike Lake and the other located to the north of the study area, approximately one kilometer to the southwest of the Town of Little Current (see **Figure 6-3**).

6.11.2 Potential Effects

The project components are separated from the active and closed landfills in the area. No effects or mitigation is warranted.

The construction process will generate waste material most of which will be solid, non-hazardous materials such as packaging, excess lumber, used equipment, office wastes and other such material.

Wastes generated during the construction phase of the project will be disposed of at a licensed waste disposal facility.

During the operation phase of the wind farm, oils and other fluids are typically used to maintain the turbines and ancillary equipment. O.Reg 347 of the *Environmental Protection Act* requires that proponents submit a generator waste registration report for each waste generated at the facility. NPI will submit such reports before the construction period.

6.11.3 Mitigation Measures

During construction the Contractor will implement a site-specific waste collection and disposal management plan and system. Waste collection best practices could include:

- Systematic collection of on-site waste in weather protected bins;
- Labeling and proper storage of liquid wastes in a secure area to ensure containment of the material in the event of a spill. If any spills do occur, which could produce an environmental effect, it will be reported to MOE's Spills Action Centre;
- Appropriate spill kits will be provided on-site during construction;

- Prohibition of dumping or burying wastes within the project site;
- Should contaminated soil be encountered during the course of excavations the contaminated material will be disposed of in accordance with the current provincial legislation, such as Ontario regulation 461/05;
- Disposal of non-hazardous waste at a registered disposal facility;
- Hazardous wastes such as lubricants will be collected, contained, and then transported to an off-site facility that collects hazardous waste; and,
- Implementation of an on-going waste management program that encourages reducing, reusing and recycling materials.

During the operation phase, where oils and lubricants will be used to maintain turbines and ancillary equipment will be collected and where possible recycled. These spent oils and lubricants will be transported off site by a licensed transporting company and recycled or disposed of according to provincial regulations. NPI will submit a Generator's Registration Report for each waste generated by the wind farm and its ancillary facilities, according to O.Reg 347 of the *Environmental Protection Act.*

Consultation with the MOE is on-going with regards to the number of, if any, active or closed landfill facilities within 500 m of the study area. Once confirmed if there are any active or closed landfills in the area, any potential effects that are foreseen will be addressed.

6.11.4 Significance of Net Effects

During construction the temporary on-site storage of waste should not create any adverse effect provided that the mitigation measures are implemented. Like all waste however, it is possible that waste disposal could have an incremental effect on soil, groundwater and surface water at the waste disposal site. It is assumed that the registered landfill facilities are legally compliant.

As a result of responsible waste management practices, no significant net effects are anticipated.

6.12 Environmental Noise

This section refers to item 3.4 of the MOE's environmental screening checklist: Will the project:

- ***Cause negative effects from the emission of noise?***

Noise levels for the proposed turbine sites (assuming the VESTAS V-90 1.8 MW wind turbine) were modeled for receptors within 1500 m of the turbines. Please refer to **Appendix H** for the complete Noise Report.

6.12.1 Existing Environment

The main sources of ambient noise that currently exist in the study area are due to:

- Natural Sounds; and
- Occasional sounds due to road traffic on rural roads.

The MOE designated points of reception into three classes. Class 1 is an environmental typical of a major population centre. Class 2 is an environment similar to Class 1 in the daytime, with low ambient sound levels in the evening and nighttime, defined by natural sounds and infrequent human activity. Class 3 refers to rural areas and/or small communities with a population of less than 1000 and an environment dominated by natural sounds and little or no road traffic.

All potential receptors in the noise study area are defined as Class 3 areas for purposes of the noise assessment. This approach triggers the most stringent of noise criteria for use in the noise assessment.

Figures 6-4 shows the receptor locations considered in the noise modeling. The closest receptor is 500 meters of a turbine.

6.12.2 Potential Effects

During construction of the wind farm noise will be generated by the operation of heavy equipment and vehicular traffic. The audible noise at receptors beyond the construction site is expected to be minor and temporary.

During the operation phase of the wind farm noise will be generated from the mechanical and aerodynamic noise emitted from the turbines and the transformer station (see **Figure 2.1** for locations). The potential noise emissions were determined by comparing the noise levels for various wind speeds as per the MOE's Interpretation for Applying MOE NPC Technical Publications to Wind Turbine Generators, 2004.

Noise levels were modeled by a specialized noise consultant using the MOE endorsed CadnaA V3.7 3-D acoustic model. Hourly sound exposures were determined for the receptors at different wind speeds (4 to 12 m/s). The noise modeling undertaken recognized recent guidance from the MOE including:

- Acoustically "soft" ground (sound absorbing) assumed between each receptor and all turbines (an attenuation factor of 0.7 was assumed);
- All receptors are assumed to be downwind of all turbines, simultaneously.

Analysis of noise levels shows that the noise impact from the operating phase of the wind farm would not exceed the most restrictive nighttime noise limits that apply for an area with a Class 3 (Rural) acoustic designation. As the turbines have been sited to comply with MOE noise restrictions (40 dB level) at receptors within 1500 m of each wind turbine there is no need to apply mitigation measures.

Figure 6-4 shows the hourly sound exposure levels with the noise contours for the worst case scenario. The most stringent MOE noise guidelines are predicted to be met at all non project participating receptors.

The noise report is contained in **Appendix G.**

6.12.3 Mitigation Measures

As noise levels will be higher during the construction phase due to the use of heavy equipment traveling to and from the site and working on the site all engines associated with construction equipment will be equipped with mufflers and/or silencers to comply with MOE guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by the MOE.

Construction activities that create excessive noise will be restricted to daylight hours and adhere to local noise by-laws. If activities that create excessive noise levels must be performed outside of regular working hours adjacent residents will be notified in advance.

During operations the wind farm, when modeled according to MOE ISO 9613-2 standard and VESTAS noise level data, the environmental noise produced by the wind farm was found to not exceed the levels that apply for areas that have an acoustic designation of Class 3. The MOE's most stringent noise guidelines are predicted to be met at all receptors based on the current wind turbine layout. No additional noise mitigation measures are warranted for the turbines.

6.12.4 Significance of Net Effects

Noise levels at the identified receptor locations in proximity to the wind farm are below MOE criteria. No adverse significant effects are predicted.

Mcleans Mountain Windfarm
Figure 6-4 Noise Receptor Locations and Noise Contours

NORTHLAND POWER

Legend

- Turbine
- Substation
- Residence
- Residences Exceeding 30mins Per Day Threshold
- Secondary Roads
- Highway
- Rivers
- Proposed Transmission Line (115kv)
- 40 dBA Noise Contour
- Project Area
- Lots
- Waterbody
- Wetland
- Woodlots

Inset Map

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Created By: KWR
Checked By: JP
Date Created: June 08, 2009
Date Modified: July 22, 2009
File Path: I:\GIS\Northland Power\Mapping\Figure 1 Map of Project Area with Residences Exceeding 30min Per Day Threshold Highlighted.mxd

6.13 Rural Resources

This section refers to item 5.2, 5.3, 5.4, 5.5 and 5.6 of the MOE environmental screening checklist. The checklist covers the following questions: will the project:

- ***Have negative effects on the use of Canada Land Inventory Class 1-3, specialty crop or locally significant agricultural land?***
- ***Have negative effects on existing agricultural production?***
- ***Have negative effects on the availability of mineral, aggregate or petroleum resources?***
- ***Have negative effects on the availability of forest resources?***
- ***Have negative effects on game and fishery resources, including negative effects caused by creating access to previously inaccessible areas?***

6.13.1 Existing Environment

The proposed wind farm project area is rural in nature with a mix of some pasture lands and forested areas. The agricultural land is of limited quality. The area is not known to contain mineral or petroleum resources. The forested areas are not suited for commercial forestry harvesting. Opportunities for fishing in the project area are limited. Some hunting (deer and small game) is expected to occur in the project area (although all the lands are private).

6.13.2 Potential Effects

The project will result in some effects to marginal quality agricultural land. Many of the wind turbines will be located on lands that are used to pasture cattle (including some lands that are forested). Some pasture land will be removed from project development. The transmission line route passes through some cleared lands within the project area. Pasture activity can continue within the right-of-way of the transmission line.

If construction activity occurs in the Fall there is a potential for some short term disturbance to hunting activity. Disruption to hunting activity during the operations period is not anticipated.

6.13.3 Mitigation Measures

The wind turbines, access roads and ancillary facilities have all been sited in a way that minimizes disturbance to existing land uses. NPI has made an effort to avoid or minimize land fragmentation and making use of existing roads.

Standard measures to minimize forest fire risk such as no slash burning during dry conditions will be followed.

There are no anticipated effects to rural resources during the operations phase.

6.13.4 Significance of Net Effects

The effects to agricultural land are not considered to be significant due to the limited area of effects and the marginal quality of the land. There will be minor disturbances during the construction phase to resource use such as hunting. However, this is temporary and is not considered to be significant.

6.14 Neighbourhood and Community Characteristics

This section refers to item 6.1 of the MOE environmental screening checklist: will the project:

- ***Have negative effects on neighbourhood or community characteristics?***

6.14.1 Existing Environment

The proposed site for the McLean's Mountain Wind Farm is primarily rural in nature with only a few scattered residences in the project area. The closest residence to a wind turbine is 550 meters away. About 5 residences will be in proximity to the planned transmission line route along Morphets Side Road.

6.14.2 Potential Effects

The presence of wind turbines will alter the current rural "bush" nature of the study area. Some residences in the project area may experience temporary disruption effects during project construction (e.g. noise, dust and additional traffic). Although these effects are common to any large-scale construction project, they do have the ability to temporarily affect the character of the area during the construction of the project. The visual impact of wind turbines is subjective, with people's reaction being either positive, negative or neutral in regards to their influence on the landscape. The alteration of the viewscape is further discussed in **Section 6.25**.

Some residents along Morphets Side Rd have expressed concerns related to the proposed transmission line route. While this transmission line will not result in any nuisance effects to residents along the road way, its presence may be perceived as a visual intrusion to the area and impact the rural character of the area.

6.14.3 Mitigation Measures

Dust from the construction areas will be controlled through environmentally friendly suppressants. Environmental noise will be reduced through standard operating practices. NPI will designate a representative to maintain community relations throughout the construction and operations phase of the project. This person will be available to address concerns expressed by stakeholders.

NPI has held discussions with some of the residents along Morphets Side Road regarding the proposed transmission line route. Options to address these concerns are being explored.

6.14.4 Significance of Net Effects

Construction activities will produce temporary nuisances in the form of increased dust and noise. As there are few residents in the vicinity of the project and all are well removed from the turbine

sites, these types of effects are expected to be minimal. Changes to the character of the area will result from the turbines being visible from some areas (e.g. Highway 540).

6.15 Traditional Land Use by Aboriginal Peoples

This section refers to item 8.1 of the MOE environmental screening checklist: will the project:

- ***Cause negative effects on First Nations or other Aboriginal communities?***

6.15.1 Existing Environment

The Aundeck Omni Kaning First Nation reserve is the closest to the project area and is located on the northern edge of the project on the North Channel and Highway 540, five (5) kilometers west of Little Current. The Aundeck Omni Kaning First Nation land mass consists of 897ha (2214ac) of which 59% is managed by the Band Council while the remaining 49% is held owned by individual Band members through Certificate of Possession. There are no turbines or project components proposed within the reserve lands of this First Nation.

Other First Nations located on Manitoulin in proximity to the project area include:

- M'Chigeeng First Nation located approximately 6.5 km from the boundary of the project area;
- Sheguiandah First Nation located approximately 3.5 km from the boundary of the project area;
- Sheshegwaning First Nation located approximately 84.5 km from the boundary of the project area;
- Wikwemikong First Nation located approximately 30 km from the boundary of the project area; and
- Zhiibaahaasing First Nation located approximately 88.5 km from the boundary of the project area.

In June 2008, NPI held discussions with the Sheguiandah First Nation regarding the usage of their ceremonial lands. Based on these discussions NPI revised their original layout of the proposed wind farm to respect avoid the Sheguiandah ceremonial lands while developing the proposed project.

According to INAC – Comprehensive Claims Branch, there are no comprehensive claims in the project area. INAC has also advised that there are several specific claims in the vicinity of the project have been filed by various First Nations. The nature and location of these specific claims are being examined by NPI.

NPI will continue with its consultation efforts to understand Aboriginal communities' interests in the project area, if any**,** and to identify potential impacts on such interests, if any, relating to the Project Area.

6.15.2 Aboriginal Input to Date on Traditional Land Use and Archaeological Interest

Since the Aboriginal consultation process began, four (4) Aboriginal communities have responded to NPI's requests for information on potentially affected interests. These are:

- The Aundec Omnikaning First Nation;
- Sheguiandah First Nation;
- Wikwemikong First Nation; and,
- M'Chigeeng First Nation.

No information regarding Aboriginal traditional use and archaeological interests has been received by NPI to date. The Aundec Omnikaning First Nation and Sheguiandah First Nation were invited to participate in the archaeological investigations for the project.

6.15.3 On-going Aboriginal Consultation

As part of its ongoing consultation process, NPI is committed to continuing to solicit and obtain input from Aboriginal communities regarding traditional land use and archaeological interest in the Project area. The identified Aboriginal communities have been given notice of the study and of the release of the final ESR for their review.

6.15.4 Potential Effects

Certain Aboriginal communities noted in **Section 4.3** have expressed a potential interest in the vicinity of the Project while all of the affected lands are private, there is potential that the affected lands could be used for traditional activities.

The Phase I Archaeological study indicated there was low archaeological potential for much of the proposed project property (please refer to **Appendix F**).

Potential effects on the natural environment (including wildlife) from the project, could affect potential interests of the Aboriginal communities such as hunting, fishing or trapping. This ESR documents the extensive natural feature surveys and studies that have been conducted. Mitigation measures are proposed in **Sections 6.1-6.9** for dealing with any potential effects to the natural environment.

At this time, it is not anticipated, subject to NPI's continuing consultations with the relevant Aboriginal communities and appropriate mitigation measures, where needed, that there will be any significant adverse effects on Aboriginal communities' interests arising from the Project.

6.15.5 Mitigation Measures

As part of its on-going consultation activities with Aboriginal communities and this environmental screening process, NPI will continue its efforts to understand and address any potentially affected interests of Aboriginal communities. In consultation with affected Aboriginal communities, NPI will formulate appropriate mitigation, approval and operation plans.

Please see **Section 6.20** relating to a protocol in the event that archaeological material of potential interest to Aboriginal communities is uncovered over course of Project construction**.**

Natural features mitigation measures are described in **Sections 6.1-6.9** of this Environmental Screening Report.

6.15.6 Significance of Net Effects

At this time, it is not anticipated, subject to NPI's continuing consultations with the relevant Aboriginal communities and appropriate mitigation measures, where needed, that there will be any significant adverse net effects on Aboriginal communities' interests arising from the Project.

6.16 Recreation and Tourism Areas

This section refers to item 6.3 of the MOE environmental screening checklist: will the project:

- ***Have negative effects on recreation, cottaging or tourism?***

6.16.1 Existing Environment

The District of Manitoulin Island offers a variety of recreation and tourist activities and venues. The main recreation opportunities on the Island are related to water including boating and fishing. Lake Manitou is the island's largest body of water and is a popular destination for fishing by tourists. The project area is generally well removed from the shoreline and offers little in the way of interest to the typical tourist to the area.

Town of Little Current

The Town of Little Current located on the north-west edge of the island is the entry point from Espanola. The Town of Little Current is the largest community within the Municipality of Northeastern Manitoulin and The Islands. Formerly an independent town, Little Current was named variously by different groups for the swift strong currents of water running between the narrow passageway which connects the North Channel and Georgian Bay. The only land access to Manitoulin is the Little Current Swing Bridge, located on Highway 6, crossing the North Channel of Lake Huron to the mainland, where the highway continues northward to Espanola. The proposed study area is located approximately three (3) kilometers south of the Town of Little Current with the closest proposed wind turbine (#1) located approximately three kilometers from the edge of the Town.

The Shoreline Development District

The shore line around the Town of Little Current is designated as Shoreline Development District (Manitoulin Planning Area, Official Plan, and June 2009). The Shoreline Development District permits a broad range of uses including seasonal, commercial; recreational, open space uses, public uses and permanent residential. The western portion of the proposed project extends to approximately 1.5 kilometers from the shoreline of the North Channel. The North Channel is

the body of water along the north shore of Lake Huron. The closest wind turbine (WT#25) to the North Channel is located approximately (1.5) kilometers from the shoreline.

La Cloche Provincial Park

La Cloche Provincial Park (7,456 ha) sits within the southern area of the Canadian Shield. The park is located in the District of Sudbury on the North Channel of Lake Huron, 19 kilometers from Espanola. Southwest of Sagamok village on Toulouse Bay Road, off Highway 17, west of Massey. The park also contains ridge and terrace forests, and various wetlands and shoreline vegetation.

The project is approximately twenty kilometers away from the southern boundary of the La Cloche Provincial Park.

Lake Manitou

Lake Manitou is the largest lake on Manitoulin Island. Lake Manitou has an area of about 104 km² (40 sq. mi.). It is drained by the Manitou River.

The closest turbine (WT#43) is approximately 2.6 kilometers away from the north-western boundary of the Manitou Lake.

6.16.2 Potential Effects

As the wind farm is well removed from major recreation features such as La Cloche Provincial Park (>20 km away), effects to recreation/tourism are unlikely.

McLean's Mountain is one of many scenic lookouts of Manitoulin Island. There is a viewing platform at the top of the bluff on the west side of Burnets Side Road. While the project will not affect views from this platform (the views are to the north over the North Channel), there may be an opportunity to improve this facility with the addition of a project information kiosk at this location. .

The wind turbines will be visible along Highway 540 of the North Channel on Manitoulin Island and to a limited extent along Highway 6 east of the project. Discussions regarding the visual effects of the project are contained in **Section 6.25.**

The closest wind turbine (WT 25) is about 1.5 kilometers away from the North Channel shoreline. There are some homes/cottages along the shoreline in the south-east corner of the study area. Some of the turbines along the western edge of the project are expected to be visible from these cottages/homes (although the view would be opposite from the water).

The proposed project lands are of limited value to tourism. Some recreational hunting for small game and waterfowl may occur in the project area early in October and early in December. These activities are not expected to be affected during the project operations period (some temporary disruption may occur during construction).

This project may have the potential to attract visitors. At NPI's Miller Mountain project in a remote part of Quebec, 3500 tourists visited the project in 2008. The Providence Bay Wind Farm located to the south east of the proposed project, approximately 45 km away, established an interpretation centre for the project, which attracts numerous visitors over the summer visitor months.

6.16.3 Mitigation Measures

The wind turbines will be neutrally coloured (white towers) with a minimal use of logos to ensure they blend into the area as much as possible so as to minimize visual effects.

Opportunities to develop a information kiosk at the viewing platform on the west side of Burnets Side Road will be explored.

6.16.4 Significance of Net Effects

The visibility of the turbines beyond the immediate project area area will be very limited. No significant changes to recreation and tourism activity are expected as a result of the project. As such, no significant effects to tourism and recreation activity are expected.

6.17 Construction Related Traffic

This section refers to item 6.7 of the MOE environmental screening checklist: will the project:

- ***Have negative effects related to traffic?***

6.17.1 Existing Environment

The study area is located south of Highway 540 in the eastern part of the Manitoulin Island in a predominantly rural area. Access to the project area for the delivery of material during construction will be via Highway 540 (western end of the project) and Green Bush Road (eastern end of the project that connects with Highway 6). Highway 540 is one of the main highways that travel across the east part of the Manitoulin Island.

The construction phase of any major project such as this has the potential for adverse but temporary effects on the environment. Key activities during the construction phase include: clearing, grading, access road development, trenching of underground distribution lines (if required for select line sections), water course crossing construction, foundation excavation, transportation, assembling and erecting of the turbines and distribution poles. To minimize the potential for environmental effects during the construction phase the contractors will be made well aware of the environmental management commitments that have been made. An Environmental Management Plan (EMP) will be developed and followed during the construction stage. A NPI's compliance inspector will monitor the project contractor's compliance with the EMP throughout the construction phase.

6.17.2 Potential Effects

During the project construction phase truck traffic will increase along Highway 540, Hwy 6 as well as the local roads within the project area in order to deliver turbine parts and accessories to the project. There will also be an increase in regular vehicular traffic as construction workers drive to the construction site. Project related traffic volumes will be reduced after all turbine components are on site. This increase in vehicular and truck traffic may result in short-term localized disturbance to traffic patterns, produce abnormal wear and tear on existing roadways, and have the potential to create truck safety hazards.

During normal operations there will be no noticeable difference in either vehicular or truck traffic over existing conditions as a result of the wind farm.

6.17.3 Mitigation Measures

There will be instances where excess loads will require special traffic planning. Widening turning radius and road widths may also be required. As appropriate, these permits will be obtained from municipal and provincial agencies.

The use of local roads by construction equipment has the potential to affect the road/bed condition. The roads will be returned to their pre-construction condition. The roads will be monitored after heavy rain events during the construction period and road repairs will be made if necessary.

Once in operation project related traffic will be limited to maintenance staff. No mitigation measures are required.

6.17.4 Significance of Net Effects

During the construction stage there is the possibility of having a short-term effect on traffic. With appropriate mitigation measures, especially during the transportation of the turbine parts to the study area, the net effects are expected to be minimal.

6.18 Public Health and Safety

This section refers to item 6.8 of the MOE environmental screening checklist: will the project:

- ***Cause public concerns related to public health and safety?***

6.18.1 Existing Environment

Wind farms generally present no danger to public safety and health. They do not emit any atmospheric pollutants or greenhouse gases. Commonly perceived health and safety risks associated with wind turbines include: noise, shadow flicker, ice and blade throw and turbine collapse. The following addresses these common concerns.

6.18.2 Potential Effects

Potential health and safety risks of the project are minimized through the low number of residences in the project area and the location of turbines at least 550 m from residents. The following examines potential health and safety concerns of wind turbines.

Shadow Flicker
Shadow flicker is caused as rotating turbine blades disrupt the sun's rays as they are cast on incident surfaces. When the incident surfaces affected are windows at nearby houses, shadow flicker may become a concern that must be minimized through effective planning and design.

Wind turbines located near residences can cast a flickering shadow on the windows that is generally described as annoying. There are rare cases in which flickering light above 3 HZ can trigger epileptic seizures in those prone to the condition. The rotor speeds of the proposed Vestas V90 1.8MW turbine are variable, changing with the strength of the wind, but will always range from 9 to 14.5 revolutions per minute (RPM). If sunlight were to pass directly between one of these three-bladed wind turbines, rotating near its maximum speed, the maximum respective flicker frequency would be approximately 60 RPM, or 1 Hz (3 blades x 20 RPM each). Although the Vestas V90 1.8MW turbine rotates too slowly to trigger serious epileptic seizures or other health effects, it is considered a visual annoyance if experienced on a regular basis.

There are no established regulations defining acceptable levels of shadow flicker at residences located near wind turbines in Canada or North America. However, a commonly-adopted industry guideline is to allow no more than 30 hours of flicker at any individual receptor. Internet sources often quote that the "German Standard" of 30 hrs/year was implemented by a judge in a German court case, but specific details are vague (Danish Wind Industry, 2009). A 1999 German report (Hau. E, 2006). on the visual aspects of wind turbines in the state of Schleswig-Holstein, which were subsequently adopted by most federal states in Germany for their licensing procedures, recommended that "the maximum permissible time that a shadow can be cast at an emission point was 30 hours annually or 30 minutes per day, respectively, based on the astronomical possible maximum period". These limits however, were only to apply in times when the residence was occupied. The 30 hr/yr limit is also consistent with *Enbridge Wind Farm OMB Decision* hearing report, where Bruce County recommended that "no more than 30 hours per year be accepted when the modelling of shadow flicker is being undertaken".

Shadow Flicker was modeled for the project and the results are presented in **Appendix J**. The shadow flicker analysis has shown that there are no houses which receive greater than 30 hours of shadow flicker per year when accounting for cloud cover, while seven homes may experience a maximum daily shadow flicker greater than 30 minutes. As this simulation is based on a worst case scenario, it is unlikely that the houses would noticeably experience the modeled number of hours of shadow flicker (vegetation cover around any of the homes for example would reduce the modeled levels of flicker).

NPI will monitor the actual effects and should excess shadow flicker problems occur, will provide mitigation measures such as tree plantings as appropriate.

Ice Fall and Throw

All of the turbines are located on private lands that are not publicly accessible. During icing events it is possible for ice to fall or be thrown from turbine blades. Any ice that is accumulated may be shed from the turbine both due to gravity and the mechanical force of the blades. An increase in temperature or solar radiation may cause sheets or fragments of ice to loosen and fall, making the area directly under the turbine subject to the greatest risk. Rotating turbine blades may propel ice fragments up to several hundred meters for the turbine location. The turbine blades will be equipped with sensors that would shut the turbines down should ice build-up be detected therefore the effects of ice fall and throw are considered not significant.

Electro-Magnetic Fields

Humans are exposed to a wide variety of electro-magnetic fields, whose sources range from transmission lines to fridge magnets. Transmission line facilities that are installed to transmit power from power generating facilities emit EMF at extremely low frequencies. This low frequency is unable to break molecular bonds and is considered to be non-ionizing. In comparison, x-rays have sufficiency energy to cause ionization. The human health impacts of EMF have been widely studied. In Canada, the Federal-Provincial Territorial Radiation Protection Committee was established to advance the development and harmonization of practices and standards for radiation protection. This Committee has concluded that research to date had not identified any biophysical mechanisms that link the initiation or promotion of cancer to power frequency field properties (Health Canada, 2004).

Infra Sound

Infrasound or low frequency noise emissions were characteristics of some of the earlier models of wind turbines. This was attributed to early designs in which the turbine blades are downwind of the main tower. This phenomenon does not occur with modern upwind turbine technology (MOE, 2005). Infrasound has been studied extensively for current wind turbine technologies (JCAA, June 2006; HGC, 2006; Defra, 2003). At present, there are a significant number of wind turbines in operation in Ontario, including in several in proximity to residences; with no adverse impact from infrasound.

A study performed by HCG (2006) conclude, "All in all, based on Canadian and international studies, infrasound generated by wind turbines should not be considered a concern to the health of nearby residences. At the closest distances at which residences are typically located near large wind turbines, approximately 300 meters, the infrasonic levels are low enough to not be of concern. In any event, the discussion of whether or not infrasound poses a health risk at low levels is somewhat academic since, in the absence of wind turbines, comparable infrasonic levels are present in the natural environment." The evidence is that the current turbine technologies do not present any adverse impact related to the generation of infrasound.

All wind turbines are greater than 550 meters away from any residence, so there should clearly be no issue. In addition, the MOE noise standard meets the range of the Health Canada guidelines of 40 dB(A) to residences.

Turbine Collapse
Although it is highly unlikely there always is the probability that any tall structure could collapse. There is also a very slight probability that a blade could become detached from the nacelle under extreme conditions. Should these events occur there is the potential for damage to the area directly under the turbine and to the collapse zone surrounding the turbine. As all of the turbines are located on privately owned farm land, in the remote chance that such an event were to occur, effects are highly unlikely.

Stray Voltage
Stray voltage is a potential by-product of the electrical distribution system as distribution lines are grounded to the earth. Stray voltage occurs when two separate objects, that can be simultaneously touched by a person or an animal, are at different electrical potentials. The result of this difference in voltage can range from a minor "zap" to the uncommon but potentially severe electric shock. However, stray voltage is only known to cause nuisance problems when there is poor wiring between the local distribution grid and areas used by people and animals, or if electrical systems are poorly grounded. An official definition for stray voltage is provided by the Institute of Electrical and Electronics Engineers (IEEE Canada):

> *"A voltage resulting from the normal delivery and/or use of electricity (usually smaller than 10 volts) that may be present between two conductive surfaces that can be simultaneously contacted by members of the general public and/or their animals. Stray voltage is caused by primary and/or secondary return current, and power system induced currents, as these currents flow through the impedance of the intended return pathway, its parallel conductive pathways, and conductive loops in close proximity to the power system. Stray voltage is not related to power system faults, and is generally not considered hazardous."*

Stray voltage is known to be a concern for farmers. On a farm, stray voltage is usually caused by improper grounding, faulty wiring, defective equipment or from telephone lines. The impact has mainly been observed in dairy cattle (which are known to be sensitive to 'tingle voltage'), where it is known to have caused behavioral, health, and problems with the production of milk.

Wind farms do not increase the likelihood of stray voltage in an area.

6.18.3 Mitigation Measures

Implementing good transportation planning and safety measures during construction will minimize the potential for any traffic accidents and safety concerns. Safety concerns relating to construction traffic are addressed in **Section 7.17**.

Public safety is incorporated into the project design. Land access during construction will be controlled through signs and restricted to authorized personnel only. The Construction Contractor will employ site safety practices during this phase.

Shadow Flicker
The wind farm has been designed to ensure a minimal amount of shadow flicker to nearby receptors. Shadow flicker can also be minimized by planting trees with landowner consent.

The analysis indicates there are no houses which receive greater than 30 hours of shadow flicker per year when accounting for cloud cover, while seven homes may experience a maximum daily shadow flicker greater than 30 minutes. As this simulation is based on a worst case scenario, it is unlikely that many of the houses will noticeably experience the number of hours of shadow flicker that has been modeled.

Any potential future need for additional mitigation will be discussed with affected residents. NPI commits to adding screening as is appropriate to address any excess flicker effects as reported by residents.

Ice fall and Throw
Modern wind turbines have sensors that detect an imbalance in the rotor system and cause the turbine to stop rotating its blades and powers off until the imbalance is corrected. Since each wind turbine will be constructed on privately owned land that is generally publicly inaccessible the threat posed from ice throw and fall is greatly diminished. Turbines have all been sited with appropriate setbacks from residences to alleviate this risk. Furthermore, icefall and throw occur in the winter when agricultural fields are not in use. Therefore there should not be very much activity on or in the vicinity of turbines during the winter months.

Turbine Collapse
Although highly unlikely there always is the possibility of critical failure. The wind turbines will be constructed to code and every measure will be taken to ensure good construction and engineering practices are observed. Turbines have all been sited with appropriate setbacks from residences to alleviate this risk.

Stray Voltage
There is no anticipated impact from stray voltage to rural landowners as a result of the project. As such, no mitigation measures are necessary.

6.18.4 Significance of Net Effects

When all mitigation measures are put into practice any effects to public health and safety are expected to be limited to levels well below those that could cause significant net negative effects. All the above health impacts were taken into consideration during the effects assessment.

6.19 Telecommunications Interference

Wind turbines can cause interference to telecommunications systems. The interference can be caused as a result of the turbine being in the line-of-sight between a receiver and the signal source (RABC, 2007). Frequency modulated (FM) signals are much more immune to this phenomena and only become impaired in very close proximity to wind turbines. Amplitude modulated (AM) signals are more susceptible to interference in the following three ways:

1. Signal Blockage –the radio signal can be blocked as a result of the turbine being directly between the signal source and the receiver.

2. Static Ghosting – the broadcast signal is reflected off the tower of the wind turbine and results in the signal being delayed to the receiver.
3. Pulsing – the receiver picks up an interference signal, in addition to the direct signal, as a result of the signal reflecting off of the turbine blades. This results in periodic variations in the television picture quality.

As per the RABC, 2007 guidelines, NPI consulted with the following communications agencies:

- Radio Advisory Board of Canada (RABC)
- Canadian Wind Energy Association (CanWEA)
- Transport Canada- Aerodromes and Air Navigation Unit
- Royal Canadian Mounted Police – RCMP Communication Towers
- Department of National Defence – National Defence Communication Towers
- Environment Canada – Weather Radars
- NAV Canada – Civilian ATC Radars
- Department of National Defence – Military Air Defence and ATC Radars
- Canadian Coast Guard – Vessel Traffic System Radars
- Natural Resources Canada – Seismological Monitoring Arrays

In addition to the above agencies, NPI also consulted with CBC Radio One, as there is a CBC tower within the study area.

While not all agencies have responded to the request for comments, agencies that have responded have not indicated any concern with the project layout. NPI will continue to consult with these agencies to confirm that no concerns exists and or to propose mitigation as is appropriate.

6.20 Historical and Archaeological Resources

This section refers to item 7.1 of the MOE's environmental screening checklist: will the project:

- ***Have negative effects on heritage buildings, structures or sites, archaeological resources, or cultural heritage landscapes?***

In February 2009, a Stage 1 Archaeological Resource Assessment was undertaken Dr. P. Julig of the Archaeological Survey of Laurentian University as part of the site evaluation process. The Stage 1 background study of the McLean's Mountain Wind Farm study area was initiated to inventory known archaeological resources and identify areas of archaeological sensitivity. While

the full results of this assessment are contained in **Appendix F**, the following summarizes the methodology and results of the archaeological assessment.

A Stage 1 Archaeological background study, as required by the Ontario Ministry of Culture (OMC), is intended to identify archaeological resource potential within a specific geographical area and form the basis for subsequent stages of archaeological assessment, testing and mitigation. In general terms, the background study consists of the following: review of the OMC archaeological site data base; consultation with researchers and others familiar with the archaeology of the study area; archaeological potential modeling based on archival research and geographical review; and, site reconnaissance.

6.20.1 Existing Environment

The Study Area being developed by NPI is proposed on an area that includes parts of about 66 lots located on an elevated plateau and on ridges in the former Township of Howland, Based on the Stage 1 Archaeological background study no sites were reported on the lots planned for development. However the broader study that was assessed has several previously reported sites: the Giant site and the Buttermilk Falls site. These sites are over 250 meters from planned development areas.

The surficial geological and water level history for this area has been very dynamic, with major changes in shoreline locations through time. The entire area was glaciated prior to about 11,000 B.P., and then covered by Lake Algonquin between ca. 11,500 and 10,500 years ago. The water levels then subsided to uncover major portions of the island, but many areas (below about 225 meters) may have again been flooded at about 9,500 B.P. during the Early Mattawa flood (Lewis and Anderson 1989; Julig 2002). The upper parts of the project area became dry land after about 9,500 until about 5,500 B. P., when portions were again flooded by the rising Lake Nipissing stage, and then dries again after water levels decline by about 2000 years ago until the present. During much of this time the lower elevations were likely thick cedar and mixed deciduous forest.

6.20.2 Potential Effects

There are no known sites (reported sites) on or within 250 meters of the MacLean's Mountain Wind Farm and the proposed project turbine locations. However a large surface site near Bass Lake (Giant site) and another smaller site (Buttermilk Falls) fall within the larger area. The presence of any known reported archaeological sites in the properties being developed, or within 250 meters of the project boundaries, indicates high potential, and could trigger a Stage 2 assessment.

The proposed project is located on relatively high topography, with elevations typically over 900 feet (275 m) (asl). These elevations of turbine locations are above the ancient (9500 year) Korah Phase beach levels (about 750-775 ft asl) where the first Paleoindian sites, such as Sheguiandah site, are typically located. The McLean's Mountain, a high ridge "look-out", where turbines 1 and 2 are located was considered as contributing to archaeological site potential. The access roads follow the crest of some of the ridges at several "look-out" locations. A field visit was

conducted to visit several of these "look out" locations to check if the ridges were sand or gravel, and to evaluate the archaeological site potential.

The major archaeological attraction in the southeast part of the project area is the presence of the Bar River and Lorrain formation quartzite rock, which was excellent for making spear points, scrapers and other stone tools, and these natural quarries were used for thousands of years. Several sites are known from within the project area, but not specifically at or within any planned turbine location.

In the boreal forest archaeological sites are often found within 300 meters of permanent water sources, particularly major lakes and rivers. The majority of the development has relatively high topography, above the ancient Korah level beach, associated with Paleoindian sites on Manitoulin. The upland plateau is well removed from most permanent water sources, and there are few other natural features to be attractive for ancient campsites. There are no eskers or sand ridges across these high plateaus, they are quite flat, and we have found no sites on them in survey elsewhere on Manitoulin. It was concluded that turbine locations and access roads as presently planned, would not impact this area.

The major permanent water body in the study area is Perch Lake; however no development is planned within 300 meters or more of this lake. There are several small streams, however most are ephemeral first-order streams that may dry out in late summer, and not suitable for fish spawning. There is some semi-permanent water (wetlands) associated with the small streams, however this is not permanent water and the majority of the property has bedrock fairly near the surface. The one stream that is permanent runs from Perch Lake to Honora Bay. Stage 2 survey work would be required if an access road is to cross this stream.

The final permanent water associated with this development is the transmission line crossing of the North Channel east of Little Current, to connect with the provincial grid on Goat Island. Stage 2 survey work would be required for any project activities along the shoreline in relation to the laying of the submarine cable, as these are high potential shoreline locations.

Based on the assessment and summary of previous sites and finds, environment and geomorphology, the proposed project area is considered to have a relatively low potential for prehistoric and early historic sites. There are few permanent streams or lakes on this bluff and most of the planned turbine sites are well above the ancient shoreline, which is a well developed geomorphic feature. Some parts of the upland bluff would have been an island in ancient Paleoindian times, when water levels were high. There may have been hunting of woodland caribou on these upland regions in more ancient times, as the remains of a butchered caribou were recovered at the Shawana site to the east.

In summary:

- The majority of the project area has low archaeological potential, and well removed above most permanent water, is mostly high plateau with near surface bedrock, has no evidence of eskers or similar features, and the vast majority of the area does not contain useable toolstone.

- The stream draining Perch Lake to Honora Bay is permanent water, has moderate to high archaeological potential, and if an access road is built across, a Stage 2 survey and test-pitting is required.

- Shoreline areas at the North Channel power cable crossing location will likely require Stage 2 survey work.

Although this study has found low archaeological potential for much of this property, there is always the possibility of buried deposits. If artifacts or human remains are found in the course of excavation of the property the appropriate authorities should be contacted.

6.20.3 Mitigation Measures

Stage 2 survey work is to be conducted in the higher potential areas as noted above.As required by the *Ontario Heritage Act Regulations*, all archaeological reports must state that there is always a possibility of deeply buried, undetected archaeological remains existing in the study area. If such materials are encountered during construction activities, the proponent must immediately stop construction and contact the Ministry of Culture.

In the event that human remains are encountered during construction, the proponent must immediately stop all work in the area and contact the local Police Department, the Ministry of Culture, and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit of the Ministry of Consumer and Commercial Relations.

The *Standards and Guidelines for Consultant Archaeologists Final Draft Unit 5 – the Discovery of Human Remains: Best Practices* will also be reviewed. As noted in the document, it is a "best practices" guideline describing the procedures for the treatment of human skeletal remains discovered outside a licensed cemetery. It reflects an agreement among members of the various ministries and agencies involved in the resolution of such burials.

6.20.4 Significance of Net Effects

As the potential for archaeological resources is low, no significant net effects are expected.

6.21 Viewscape

This section refers to item 7.2 of the MOE's environmental screening checklist: will the project:

- ***Have negative effects on scenic or aesthetically pleasing landscapes or views?***

6.21.1 Existing Environment

The study area is primarily forested with rural and agricultural character. The proposed project is located on a bluff that rises from the lands and the shoreline of Lake Huron. The project is located in the vicinity of the Town of Little Current.

There are no significant landscape features in the greater study area.

6.21.2 Potential Effects

There are no regulations or policies regarding the visual impacts of wind turbines in Ontario although some municipalities have begun to stipulate the requirements for visual assessment. NEMI has no such policies. Furthermore, there are no known designated or recognized viewscapes.

A set of photomontages have been prepared from six (6) locations throughout the study area that simulate the to-scale appearance of the wind farm and are presented in **Appendix H**. These locations represent the locations that have the highest potential for turbine visibility or are viewpoints of interest brought to the attention of NPI by project stakeholders.

Based on the visual simulations from select vantage points, views of the turbines in the surrounding lands will vary depending on the location of the vantage point. In most cases, only a portion of the turbine may be visible (e.g. blade tip). The variability in the level of visibility is due to topography, existing vegetation and the separation distance from potential viewing locations of concern. It is not expected that the views, if any, would contribute to a perceived change in the visual character of the area (which is highly subjective and can somewhat depend on one's viewpoint regarding wind energy - supporters tend to like the look of turbines while those opposed to wind energy do not).

There have been numerous studies regarding the potential effect of wind farm visibility on tourism, particularly in the U.K. In Canada, the most comprehensive study undertaken to date regarding the opinions of residents and visitors regarding wind turbines is a study that was undertaken by the Tourism Research Centre at the University of Prince Edward Island (Wind Energy Report: View of Residents of PEI and Visitors to PEI, September 2008). The report was based on responses from 1,676 respondents including both residents and visitors to PEI. The results of the survey indicated that there was strong support for wind turbines in PEI by both residents and visitors (which is important considering the economic importance of tourism to PEI). The results also indicated that respondents strongly agreed that there should be more wind farms on PEI. As well, the results indicated that while respondents do not feel that "a wind farm adds to the attractiveness of the area", they also think that wind farms do not "ruin the view in the areas they area based".

Some residents have expressed concerns with the turbine lighting. Attempts will be made to minimize the number of turbines to be lit to reduce this effect. As per Transport Canada requirements some of the wind turbines will require navigation lighting. Wind turbines will be lit according to Transport Canada (TC) standards. Select WTs on the perimeter will be lit with a single red flashing light (horizontal distance between lit WTs not to exceed 900 meters for any approaching aircraft). The highest WT in the wind farm will be lit. All lit WTs will flash simultaneously.

A study regarding the impact of wind farms on tourism was also prepared for the Scottish Government (The Economic Impacts of Wind Farms on Scottish Tourism, March 2008). Scottish tourism depends heavily on the landscape, thus concerns regarding the visual impacts of wind turbines are understandable. Interviews were conducted with 380 tourists in areas where there would have been a high likelihood that the respondent would have seen a wind farm. Some findings from the study include:

- In general, 75% of people felt that wind farms had a positive or neutral impact on the landscape;
- 68% were positive about the statement "A well sited wind farm does not ruin the landscape" while 12% were neutral;
- 48% indicated that they like to see wind farms while 12% were neutral;
- Respondents who had seen a wind farm were more supportive than those that had not;
- Only a very small group of visitors changed there intentions about re-visiting Scotland because of wind farms.

6.21.3 Mitigation Measures

During construction, activities will be confined to the workspace which will limit the potential disruptions to the viewscape. All the turbines are of the same model and will all be neutrally coloured.

To soften the look of the erected wind turbines they will be painted white/light grey and made out of rolled steel (not latticed tower turbines). The nacelle and blades will also be painted similarly. White and light grey were selected based on the generally understood notion that this colouring blends with the environment in comparison to other colour schemes.

6.21.4 Significance of Net Effects

During the construction phase visual effects are expected to be minimal, temporary and limited to the lands immediately surrounding the turbine sites. Views of the turbines outside of the project area will be very limited and are not expected to alter the landscape of the area. Overall, the effects on the landscape are expected to be very minimal and not significant.

Appropriate tower colouring and navigation lighting will combine to reduce the extent of this effect.

6.22 Accidents and Malfunctions

The primary protective measures for accidents and malfunctions are in the safe design, construction, operations and maintenance and decommissioning of the turbine and ancillary facilities. The appropriate training and education of all employees can also minimize accidents and malfunctions. NPI will ensure that the local townships are aware of the procedures to follow in the event of an emergency. Training will be offered to local emergency response teams and all local municipal emergency agencies will be contacted to ensure they are aware of the exact locations of the wind turbines. Response to malfunctions or accidents, which could result as a result of the operation of the wind turbines, will be addressed in NPI's Emergency Response Plan.

6.22.1 Potential Effects

During the construction period there is potential public safety issues associated with the movement of heavy equipment and other construction activities. There also exists the potential for spills of hazardous materials such as fuel, lubricants and hydraulic fluids.

6.22.2 Mitigation Measures

The project constructor will be required to construct the project in as safe a manner as possible. All standard construction safety procedures will be followed including appropriate signage and public restrictions from work site areas. Construction equipment using public roads will obey speed limits. Construction personnel will receive safety training. A health and safety plan will be developed for the wind farm.

Regarding the operations period, the wind farm is in a rural area with no residents in the immediate vicinity. Therefore, few people are expected to be in close proximity to the turbines on a regular basis.

An Emergency Response Plan (ERP) will be prepared for the project prior to the initiation of the construction period. The ERP will be submitted for review and comments to the Municipality of NEMI The ERP will be used in the event of an emergency and will contain contact information for regulators, landowners, and other stakeholders. Equipment required to respond to an emergency will be outlined in the ERP. All appropriate regulators will be notified should the emergency include any potential impact to the health and safety of local residents or the environment.
NEMI will be consulted on the development of the ERP. NPI will also work with the local fire department(s) and emergency response units to ensure that they are aware of the unique requirements of wind farms and potential associated accidents/events that they may need to respond to.

A Spills Response Plan (SRP) will also be developed which will address the requirements of the Ontario *Environmental Protection Act*. The SRP will address spill containment; spill reporting and spill clean-up procedures. Also to be included as part of this plan is the training activities for the construction work force that will be implemented to minimize the likelihood of spills.

NPI values the safety of its employees and the public, and will implement a Health and Safety plan during construction and operation phases of the project.

The wind farm will be operated in a manner that meets all applicable codes and practices. Sensors and detectors on the turbines will confirm that they are operating properly. Access doors at the base of the turbines will be kept locked. Gates will be placed at the access road entrances, the need for this will be determined in discussion with landowners and NEMI. Turbines will be equipped with obstruction marking and lighting according to Transportation Canada guidelines and determination.

The project has been designed and will be constructed, operated and decommissioned using applicable standards and industry best practices. Equipment will be inspected regularly and maintained to prevent any potential health or safety issues.

Accidents and malfunctions with short-term impacts may occur. More serious impacts are considered to be highly unlikely.

The likelihood of accidents/malfunctions associated with the Wind farm is considered to be low. The potential risks associated with accidents and malfunctions are also considered to be low.

6.23 Effects of the Environment on the Project

This section assesses the potential of climatic fluctuations and the potential effects of extreme weather and natural events that could have an effect on the project.

Climatic Fluctuations

Global climate models indicate an increase in global average temperatures with an increase in precipitation amounts. It is expected that the severity and frequency of extreme weather events will also increase as a result of global warming.

An increase in average wind speeds may be expected as a result of an extreme weather event. Modern wind turbines have the ability to pitch their blades, turn out of the wind and automatically shut down at wind speeds of 25 m/s or greater to preserve the structural integrity of the turbine. Similarly, during an extreme freezing rain or ice storm a sensor on the turbine registers the ice loading on the blades and the turbine automatically stops turning.

Extreme Events

Table 6-5 lists the probable extreme events that have the potential to affect the McLean's Mountain Wind Farm. The likely effects and mitigation measures that are planned to address these events are also listed.

Table 6-5: Extreme Events

Event	Effect	Mitigation Measure
Heavy Rain/Flooding	Surficial drainage to remain intact and continue to convey water	None Required
Hail	Damage to turbine blades	Turbine blades are constructed to withstand hail impact
Heavy Snow	No effect anticipated	None Required
Ice Storms/Freezing Rain	Icing on turbine blades resulting in the potential of ice fall or throw	Turbine automatically powers down when it senses an imbalance in blades due to ice loading
High Winds/Tornado	No effect anticipated	Turbine blades designed to stop moving at wind speeds greater than 25 m/s. Turbine and foundation structures are designed to withstand a Level 2 tornado (200 km/h winds)
Lighting	Potential for fire in the nacelle	Lighting receptors installed along blades and surge protection in electrical components
Earthquake	Not located on an active fault area. No effects anticipated	Structure will be designed to meet the earthquake loads as per the Ontario Building Code.

6.24 Summary of Potential Effects and Mitigation Measures

Table 6-6 below provides a summary of the mitigation measures for the project specified issues identified.

Table 6-6: Summary of Mitigation Measures

Potential Effects - Feature	Mitigation Measures
Physiography/Topography	• Grading will be minimized as to not affect drainage patterns
Surface Water Quality and Soil Erosion	• Minimize disturbance of existing vegetation outside ditching and grassed slopes where re-grading is required; • Minimize time exposure of un-vegetated soils; • Maximize length of overland flow through to points where stormwater leaves the site; • Complete an erosion assessment on all new and existing ditches to determine the need for additional erosion protection; • Top of bank barriers (e.g. silt fencing) are to be put in place for any construction activity that is in proximity to watercourses; • Where ditch regrading is required, where appropriate, utilize flat bottom ditches in lieu of 'V' ditches to reduce velocities and erosion potential, promote peak flow attenuation and provide short-term storm water storage; • Use of in-line erosion control measures such as erosion blanket, rip rap, straw bale, rock flow checks and vegetated buffers, thereby mitigating high flow velocities and excessive erosion/sedimentation; • Stream banks are to be stabilized and restored to their pre-construction condition immediately following construction activity. This is particularly important in erosion prone areas such as steep sloped stream banks; • The watercourse crossings are to be assessed in advance and the most appropriate mitigative measures determined. Alternative watercourse crossing locations should be considered if the proposed crossing location appears to be particularly sensitive to erosion; • Any stockpiled materials are to be stored and stabilized away from watercourses; • Ensure all materials placed within the flood line are clean and free of silt and clay size particles. All materials must meet applicable regulations governing placement of fill in water bodies; • Ensure that all materials and equipment used for the purpose of site preparation and the completion of any work is operated and stored in a manner that prevents any deleterious substance from entering the water; • Refuelling and handling of potential hazardous substances are to be done away from watercourses; • Sediment and erosion control measures are to be left in place until all disturbed areas have been stabilized; • The sediment control plan be designed and implemented to mitigate impacts associated with construction of the project - to prevent suspended sediment, mud, debris, fill, rock dust, etc. from entering downstream watercourses. Areas disturbed by work must be minimized. Silt fences/curtains, sediment traps, check dams must be installed as appropriate; • Measures are to be in place to minimize mud tracking by construction vehicles, and to ensure timely cleanup of any tracked mud, dirt and

Potential Effects - Feature	Mitigation Measures
	debris along local roads and areas outside of the immediate work area where the above sediment controls would not be in place; • Work is to be suspended if excessive flows of sediment discharges occur, and, any appropriate action should be immediately taken to reduce sediment loading; • If it is necessary to de-water foundation excavations, prior to its discharge to a watercourse, the water is to be discharged to a settling pond, filter bag, or vegetated buffer strip of adequate size, to filter out suspended sediment; • Temporary mitigation measures are to be installed prior to commencement of any site clearing, grubbing, excavation, filling or grading works and maintained on regular basis, prior to and after runoff events. Any accumulated materials are to be cleaned out during maintenance and prior to their removal. All disturbed areas on land to be restored to natural conditions should be re-vegetated as soon as conditions allow preventing erosion, and restoring habitat functions. Land based measures must not be removed until vegetation has been re-established to a sufficient degree (or surface soils stabilized using other measures) so as to provide adequate erosion protection to disturbed work areas; and • There are no anticipated effects during the operations phase of the wind farm.
Fisheries Habitat	• Adequate sediment and erosion control during construction along with revegetation of disturbed areas will be necessary to avoid any potential effects of construction to downstream habitat. • Sediment and erosion control systems should not be removed until the site is suitably stabilized. • Culverts should be embedded in the substrate to ensure there is no loss of habitat through the culvert section. In an open water course setting culverts will provide refuge in low flow and cover from predators for any fish population.
Groundwater Quality	• Given the relatively low volume of water that would be extracted during turbine base construction from dewatering and extracted for water use, no mitigation measures are required. • Fuels and oils will be managed per provincial requirements. • In the event of a spill of hazardous materials, clean-up procedures will be undertaken as per provincial protocols and legislations as governed by the *Environmental Protection Act* and the *Ontario Water Resources Act*.

Potential Effects - Feature	Mitigation Measures
Air Quality	• Use new or well-maintained heavy equipment and machinery, preferably fitted with muffler/exhaust system baffles, engine covers; • Motorized equipment should meet design specifications for emission controls and conform to provincial Drive Clean standards where appropriate; • Comply with operating specifications for heavy equipment and machinery; • Minimize operation and idling of gas-powered equipment and vehicles, in particular, during smog advisories – this is to be strictly monitored; • Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material; • Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensure timely cleanup of any tracked mud, dirt and debris. • Avoid excavation and other construction activities with potential to release airborne particulates during windy and prolonged dry periods; • Stabilize stockpiled excavated soils in areas that are upwind of sensitive receptors • Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal; • Spray water to minimize the release of dust from gravel, paved areas and exposed soils. Use chemical dust suppressants only where necessary on problem areas; and • Restore disturbed areas as soon as possible to minimize the duration of soil exposure.
Birds	• Mono-tubular towers, blade design and navigational lighting standards have all contributed too much lower bird mortalities. • Turbine placement and wind farm design are the key critical mitigating measures to minimize risk. • To avoid potential effects, turbines have been well set back from important habitat areas. • Inter-turbine spacing of approximately 600 meters apart to provide plenty of room for birds to move within the study area. • NPI will enter into discussions with the OMNR regarding the need for post construction bird mortality monitoring for this project. • If construction does take place during the core breeding season (May 1 to August 15), it is recommended that a qualified biologist conduct nest searches in areas to be cleared (e.g. road ROWs) and identify nests, which require protection until young have fledged. Based on this nest search an appropriate buffer should be provided for each nest based on an initial determination by the biologist on site.
Bats	• Minimize the need for lighting towers and the use of strobe lighting • Dismantle turbines at the end of the project life • NPI will enter into discussions with the Ontario MNR regarding the

Potential Effects - Feature	Mitigation Measures
	need for post construction bat mortality monitoring for this project.
Wildlife and Wildlife Habitat	• Observe the identified setbacks from sensitive wildlife habitat in the siting of the turbines
Threatened, Rare or Endangered Species	• A Species at Risk Interaction Plan for during the construction period will be developed to ensure that any interactions with identified local species are appropriately mitigated. The MNR will be consulted in the development of this plan.
Population and Existing Land Use	• No mitigation measures specific to effects on existing or future land use are proposed.
Disposal of Waste Materials	• Systematic collection of waste on-site in weather protected bins • Labeling and proper storage of liquid wastes in a secure area that will ensure containment of the material in the event of a spill. If any spills do occur, which could produce an environmental effect; it will be reported to MOE's Spills Action Centre. • Appropriate spill kits will be provided on-site during construction. • Prohibition of dumping or burying wastes within the project site. • Should contaminated soil be encountered (unlikely as the area is relatively untouched with limited to no development) during the course of excavations the contaminated material will be disposed of in accordance with the current provincial legislation, such as Ontario regulation 461/05. • Disposal of non-hazardous waste at a registered disposal facility • Implementation of an on-going waste management program consisting of reduction, reuse and recycling of materials. • NPI will complete a Registration of Generators Report for each waste material.
Environmental Noise	• As noise levels will be higher during the construction phase due to the use of heavy equipment traveling to and from the site and working on the site all engines associated with construction equipment will be equipped with mufflers and/or silencers to comply with MOE guidelines and regulations. Noise levels arising from equipment will also be compliant with sound levels established by the MOE. • Construction activities that create excessive noise will be restricted to daylight hours and adhere to local noise by-laws. If activities that create excessive noise levels must be performed outside of regular working hours adjacent residents will be notified in advance. • During operations the wind farm, when modeled according to MOE ISO 9613-2 standard and Vestas noise level data, the environmental noise produced by the wind farm was found to not exceed the levels that apply for areas that have an acoustic designation of Class 3. The MOE's most stringent noise guidelines are predicted to be met at all receptors based on the current wind turbine layout. No additional noise mitigation measures are warranted.
Agricultural and Rural Resources	• Construction activity will be limited to designated construction areas. • Travel to and from construction areas will be made via access roads.

Potential Effects - Feature	Mitigation Measures
	• Following the completion of construction the temporary construction areas will be restored.
Neighbourhood and Community Characteristics	• No specific mitigation measures required given rural/sparsely populated nature of study area
Traditional Land Use by Aboriginal Peoples	• At this time, it is not anticipated, subject to NPI's continuing consultations with the relevant Aboriginal communities and appropriate mitigation measures, where needed, that there will be any significant adverse effects on Aboriginal communities' interests arising from the Project.
Recreation and Tourism Areas	• No mitigation measures are required for the construction phase of the project. • The wind turbines will be neutrally coloured (white towers) with a minimal use of logos to ensure they blend into the area as much as possible.
Construction Related Traffic	• There will be instances where excess loads will require special traffic planning. • Widening turning radius and road widths may also be required. • As appropriate these permits will be obtained from municipal and provincial agencies. • Once in operation project related traffic will be limited to maintenance staff. Therefore, no mitigation measures are required.
Public Health and Safety	• Implementing good transportation planning and safety measures during construction will minimize the potential for any traffic accidents and safety concerns. Safety concerns relating to construction traffic are addressed in Section 7.17. No additional mitigation measures will be taken. • Public safety is incorporated into the project design. Land access during construction will be controlled through signs. The Construction Contractor will employ site safety practices during this phase. ***Shadow Flicker*** • NPI commits to adding screening as is appropriate to address any excess flicker effects as reported by residents. ***Ice Fall and Throw*** • Modern wind turbines have sensors that detect an imbalance in the rotor system and cause the turbine to stop rotating its blades and powers off until the imbalance is corrected. • Since each wind turbine will be constructed on private land that is generally publicly inaccessible the threat posed from ice throw and fall is greatly diminished. • Turbines have all been sited with appropriate setbacks from residents to minimize this risk. ***Turbine Collapse*** • Although highly unlikely there always is the possibility of critical failure. The wind turbines will be constructed to code and every

Potential Effects - Feature	Mitigation Measures
	possible measure will be taken to ensure good construction and engineering practices are observed.
Communications	***Impacts to Telecommunications*** • In order to ensure the wind farm would not negatively affect any radio communication systems, appropriate agencies have been contacted. No concerns have been expressed to date.
Historical and Archaeological Resources	• Most of the project area is considered to be of low archaeological potential. Stage 2 assessment work has been recommended for select sites near water crossing locations. • In the event that human remains are found all work will stop immediately, the Ministry of Culture will be contacted and the Registrar of the Cemeteries Regulation Unit of the Ontario Ministry of Consumer and Commercial Relations notified, as well as the appropriate police and local medical officer of health. • No mitigation measures are required for the Operation phase of the wind farm due to the conclusion that no additional effects are expected.
Viewscape	• The turbines will all be of the same make and neutrally coloured. No other mitigation is proposed. • Naviagation and turbine lighting will be minimised and determined in consultation with Transport Canada.

6.25 Cumulative Effects

CEAA requires that the potential for cumulative effects to be considered as part of a CEAA screening assessment. Cumulative effects are defined as effects from the project that could combine with the effects of other possible future projects and activities. Only those future projects and activities that are considered as "certain" or "reasonably foreseeable" are to be considered in the cumulative effects assessment. In assessing the potential for cumulative effects from this project, the CEA Agency's guidance materials, such as the *Practitioner's Guide: Cumulative Effects Assessment Guide* was considered. Ultimately what a CEA considers is the potential for multiple similar effects occurring over the same geographic area and possibly time period, that individually may have insignificant effects but when combined could potentially amount to a significant adverse effect. For an effect to be considered cumulative, the following was deemed necessary:

- There must be a measurable environmental effect of the project being proposed;
- Any environmental effect must be demonstrates to interact cumulatively with the environmental effects from other projects or activities; and
- It must be known that the other projects or activities have been, or will be, carried out and are not hypothetical.

In undertaking the assessment of project effects as previously described in this section, it was understood that the existing conditions of the various environmental components considered reflect past and ongoing activities that are occurring within or outside of the study area. As such, the CEA was focused on the potential for cumulative effects from planned future projects or activities.

The CEA addressed the following questions:

- What residual effects of the project are likely?
- What other planned activities or projects are expected to occur in the study area?
- Is there a potential for cumulative effects to result and if yes, what is the significance of these potential cumulative effects?
- What measures should be put in place to address the potential for these cumulative effects?

6.25.1 Potential Adverse Environmental Effects from the Project

Based on the assessment of direct effects of the project on the various environmental components that were considered in this EA, the following adverse potential effects are likely.

Construction

- Disturbance to wildlife during the construction phase;
- Short-term erosion/sedimentation from water crossings and potential for loss of fish habitat;
- Traffic delays from the transport of project components to the study area and the movement of equipment within the study area.

Operation

- Change in the visual landscape of the area;
- Increase in noise levels although noise levels will be within MOE criteria; and
- Potential for birds and bats to collide with the wind turbines.

6.25.2 Other Future Projects/Activities

The project area is rural in nature and as such, the area is sparsely developed. In contacting the local municipality and provincial planning departments, no other planned developments within the project area were identified.

NPI understands that the following are the proposed wind farms on Manitoulin Island, in proximity to the proposed project site:

- The 10 MW wind farm, MERE Project, on the High Hill – the Cup and Saucer Trail located at the intersection of Highway 540 and Bidwell Road, between Honora Bay on M'Chigeeng First Nation land and the Billings Township. It is assumed that this project is far enough away from the proposed project (approximately 16 kilometers south-east to the West Bay) so as to not result in any cumulative effects.
- The 6.5 MW Spring Bay Wind Farm (also known as the Providence Bay Expansion Project) in Providence Bay located between Providence Bay and Spring Bay, along Highway 542 on Manitoulin Island, approximately five kilometers from the shores of Lake Huron. It is assumed that this project is far enough away from the proposed project (approximately forty kilometers) so as to not result in any cumulative effects.

6.25.3 Potential Cumulative Effects

No cumulative effects are expected to result regarding the neighbouring projects.

6.25.4 Mitigation Measures to Address Cumulative Effects

None required.

6.26 Summary of Potential Effects and Mitigation

Potential effects of the project are summarized as follows:

6.26.1 Construction Effects

- Some minimal disturbance effects to residents travelling Green Bush Road and Highway 540 in the form of dust and noise from equipment operation;
- Traffic delays from the transport of project components to the study area and the movement of equipment within the study area;
- Disturbance to wildlife during the construction period;
- Short term erosion/sedimentation effects from water crossings and potential for loss of fish habitat; and
- The loss of some natural vegetation/wildlife habitat.

6.26.2 Operation Effects

- Change in visual landscape of the area through visibility of the turbines; this effect is highly dependent on one's perception of wind turbines;
- Increase in noise levels in the area which will be within MOE criteria;
- Loss of some wildlife habitat;
- Potential for increased access due to the turbine access roads and collector line RoWs; and
- Potential for a small number of birds and bats to collide with the turbines.

The assessment has concluded that with the implemented mitigation measures, none of the adverse environmental effects are to be considered as significant. Project monitoring (See **Section 7**) will be undertaken to confirm the effects assessment and respond appropriately if necessary.

The previous **Table 6-5** provides a summary of key mitigation recommendations to be implemented. NPI will also prepare and Environmental Management Plan in advance of construction initiation that will provide guidance to the Contractor in constructing the project.

7 Project Follow-Up Measures and Monitoring

7.1 Construction Monitoring

7.1.1 Terrestrial Habitat/Wildlife

A Species at Risk Interaction Plan for during the construction period will be developed to ensure that any interactions with Eastern Massassauga or Blanding's Turtles are appropriately mitigated. The OMNR will be consulted with in the development of this plan.

Replanted and reclaimed areas will be inspected one year after their planting to ensure that they are established.

7.1.2 Aquatic Habitat/Surface Water

It is expected that monitoring activities relating to aquatic habitat will be confirmed through the ongoing permitting process with DFO. The monitoring of aquatic habitat will occur at different levels. During construction, Northland Power will ensure that the watercourse is crossed in an appropriate manner and that committed mitigation measures (e.g. erosion/sediment control) are being implemented and are effective. Water quality sampling may be undertaken to ensure the effectiveness of the implemented measures. Weather conditions will be monitored to ensure that watercourses are being crossed at appropriate times so as to avoid in-water works during high flow events as much as possible.

Site rehabilitation measures such as vegetation plantings in the riparian zone and fish habitat compensation measures (if required) will be monitored to ensure that they have been implemented correctly and inspected after the following year spring melt period. Corrective action will be taken should the rehabilitation works not function as predicted.

All culverts will also be inspected on a frequent basis to ensure that they are conveying water flow and not resulting in upstream flooding.

Accidental spills could also affect habitat. NPI will ensure that should a spill of a hazardous material occur (e.g. fuel), that the spill would be quickly responded to as per the requirements of the Spills Contingency Plan.

7.1.3 Noise and Dust Disturbance Effects

During the construction period, there is the potential for disturbance effects such as noise and dust, particularly along the local roads to access the project site. It is expected that standard construction practices will minimize these effects as much as possible. NPI will advertise in the community a contact number should residents wish to voice a complaint regarding the construction process and/or to obtain more information. NPI will respond to these calls and address the problem.

7.1.4 Roads

The use of local roads by the construction equipment has the potential to affect the road bed/condition. The roads will be returned to their preconstruction condition. The roads will be monitored after heavy rain events during the construction period and road repairs made if required. This will include new access points and roadside drain crossings.

7.2 Operations Monitoring

A draft avian monitoring program will be developed. The MNR and Environment Canada will be consulted in the development of this program. Turbines will be sampled as soon as is reasonable after a target weather condition has passed through the area. This sampling of target weather conditions will be conducted on a seasonal basis in an attempt to model any difference in mortality rate during a particular weather event.

7.3 Aboriginal Community and Organization Liaison and Follow-up

NPI will continue consulting with Aboriginal communities regarding their areas of concern and interest including traditional land use in the project area.

7.4 Community Liaison and Follow-up

NPI will provide information releases to the community if new issues arise or if the community has specific concerns. Company representative contact information will be available to the public to address concerns and questions during operations. Stakeholder consultation and communications activities going forward will include:

- Project update bulletin or bulletins as required, mailed or hand-delivered to keep area residents apprised of the progress of construction, dates and timings of any traffic disruptions connected with the project and any other matters that may affect or be of interest to area residents and other project stakeholders;
- Newspaper notices regarding traffic disruptions and construction timings of interest;
- Personal consultations as requested or if warranted by project activity;
- Meetings with municipal and other local and provincial government authorities;
- NPI will hold another community public information centre to present the final proposed project infrastructure and transmission line route; and
- Ongoing consultations and meetings with local stakeholders.

8 CONCLUSION

The natural and social environment has been thoroughly studied through the environmental screening process and has involved the following key activities:

- Review of maps and air photos;
- Review of natural heritage data and studies for the area;
- Review of land use planning related documents and policies;
- 1 year, 4-season bird survey program;
- Bat summer and fall migration surveys;
- Field visits to examine water crossing locations/fish habitat;
- Archaeological investigations;
- Consultation with district MNR office; and
- Discussions with local stakeholders and Aboriginal communities regarding the project.

The turbines and associated infrastructure has been sited and routed to avoid sensitive natural features in the project area. Mitigation measures, as outlined in this ESR/EIS, will be undertaken to minimize effects to the environment. It is expected that no significant effects to the natural environment will result from the project. Further, NPI is committed to the following:

- Additional bat survey work (August period) to meet the MNR guidelines;
- The preparation and implementation of an avian monitoring program;
- Additional aquatic survey work to confirm the location and form of access road water crossings and the need for mitigation/habitat compensation;
- Vegetaion surveys within the areas to be disturbed prior to contsrtuction to confirm absence of threatened, rare or sensitive species;
- The preparation of an Environmental Management Plan to guide construction activities; and,
- Any other work required to secure necessary permits.

Regarding effects on the social environment, the project is generally removed from any residences (> 550 m) and there are no businesses in the immediate vicinity of the project. Some short term disruption to recreation users of the site (e.g., hunters, snowmobilers) is possible depending on the timing of construction.

Consultation and discussions have been held with local residents, government agencies, and Aboriginal communities. Discussions with Aboriginal communities continue. The project enjoys municipal support. The project will contribute to the local and regional economy and create employment opportunities during both the construction and operational phases.

Every reasonable step has been taken to ensure this project adheres to all federal, provincial and municipal regulatory requirements. **Based on the environmental screening that was undertaken, the McLean's Mountain Wind Farm, including the mitigation commitments, will not likely cause significant effects on the environment, including the natural and social environment.**

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