

Section 3

Supplementary REA Reports

Project Description Report

Northland Power Inc – McLean's Mountain Wind Farm Project Description Report

1.0 INTRODUCTION

The following presents the Project Description Report (PDR) for the NPI McLean's Mountain Wind Farm that has been submitted to the MOE to initiate the REA process for this project.

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 approximately 43 wind turbines that will generate about 77 MW of electricity. Based on the REA Regulations, we understand this project to be a "Class 4" wind facility.

NPI intends to develop the project under the new Green Energy Act (GEA) Feed-In-Tariff (FIT) program.

The following figure shows the general location of the project.



The selection of the project area was based primarily on the wind resource assessment results, access to the local electrical distribution system, environmental constraints and local landowner support. The wind turbines will be located entirely on private land. Some sections of the



electrical system will be contained within municipal rights-of-way. NPI currently holds land lease "options" for the private properties where project components are to be located.

The project proponent's contact information is as follows:

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Company: Northland Power Inc.
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2.0 Project Facilities, Equipment and Technology

The basic components of the Project include 43 wind turbines with an initial installed capacity of 77 MW. All turbines will be located within the Project Area as shown in the figure attached to this PDR. The electrical components will comprise an overhead grid collection system, a step-up transformer and an aboveground 10 km transmission line (115 kV) to connect with the Hydro One Transmission system, circuit S2B that is located on Goat Island. There will be the need to cross the North Channel to Goat Island with a submarine cable to facilitate the transmission connection.

2.1 Wind Turbines

The wind turbines consist of towers, tower foundations, rotor blades, and gearbox/electrical generator housing. The project will use VESTAS V90 – 1.8 MW turbine, the towers will be approximately 80 m in height and the blade diameter including hub, will be approximately 90 m.

The land base required for each turbine, excluding the access road, is less than half an acre once in operation.

The wind farm layout was developed taking into consideration the following:

- a) results from wind profile studies and anemometer data;
- b) site access;
- c) existing land use;
- d) environmental and socio-economic information;
- e) results from the sound assessment;
- f) interconnection economics; and
- g) REA setback requirements.

Please note that the wind farm layout presented in the ESR is to be considered as draft subject to revisions based on the input received from government agencies, aboriginal communities, the public and landowners through the REA consultation process.

2.2 Ancillary Facilities

Each wind turbine will require several ancillary facilities, including: access road, and overhead electrical collection system. Access roads will be required to access each turbine site from existing public roads during both the construction and operation phases of the project.

The wind turbine transmits its generated electricity via a collection system to a step-up transformer substation to be located within the project area. It is anticipated that 34.5 kV overhead lines would be used for the collection system. From the step-up transformer, a 115 kV transmission line will need to be constructed to connect the project to the existing Hydro One transmission line located on Goat Island. The project's transmission line will be largely contained within municipal road rights-of-way. Some private land may be crossed and NPI will acquire easements through the affected parcels of private land.

3.0 Project Activities

The following project activities are expected:

Project Activities	
Construction Activities	<ul style="list-style-type: none"> ➤ Turbine_Sites: <ul style="list-style-type: none"> • Site clearing and grading • Construction of access roads • Delineation of temporary work areas • Completion of necessary site grading. • Installation of crane pads. • Installation of tower foundations. • Tower/turbine erection. • Connection of wind turbine to electrical collection system. • Remediation of temporary work areas. • Completion of permanent access roads. • Site landscaping (final grading, topsoil replacement, fence installation, etc.). ➤ Collection_System: <ul style="list-style-type: none"> • RoW clearing as required. • Installation of single poles • Installation of 34.5 kV overhead lines on leased lands and within municipal road rights-of-way. • Construction of step-up transformer substation.

Project Activities	
	<ul style="list-style-type: none"> ▶ Transmission Line and Interconnection: <ul style="list-style-type: none"> • 8-10 m right-of-way clearing as required. • Installation of primarily single poles. • Installation of transmission line conductors. • Installation of submerged line. • Installation of switch gear at connection point with Hydro One transmission line (Provincial grid). • Commissioning of the Project.
Operation and Maintenance Phase Activities	<ul style="list-style-type: none"> ▶ Turbine Sites: <ul style="list-style-type: none"> • Periodic vehicle access for maintenance. • Remote condition monitoring and meter calibrations. • Grounds keeping.
	<ul style="list-style-type: none"> ▶ Overhead Collection System: <ul style="list-style-type: none"> • Testing and maintenance of electrical equipment.
Decommissioning Phase Activities	<ul style="list-style-type: none"> ▶ Turbine Sites: <ul style="list-style-type: none"> • Removal of tower and turbine infrastructure. • Removal of foundation to not less than 3' below grade. • Turbine site grading and rehabilitation (dependent upon new proposed use). • Removal of all waste from the site
	<ul style="list-style-type: none"> ▶ Access roads <ul style="list-style-type: none"> • Access roads will be left at landowner's requests or graded to restore terrain profiles (as much as possible), and vegetated.
	<ul style="list-style-type: none"> ▶ Collection Lines: <ul style="list-style-type: none"> • Removal of overhead collection line conductors and poles.
	<ul style="list-style-type: none"> ▶ Transmission Line and Substation: <ul style="list-style-type: none"> • Removal of transmission line above-ground conductors. • Removal of sub-station components. • Removal of poles. • Removal of all waste from the site

4.0 Potential Project Effects

The following potential environmental effects were evaluated through the REA process:

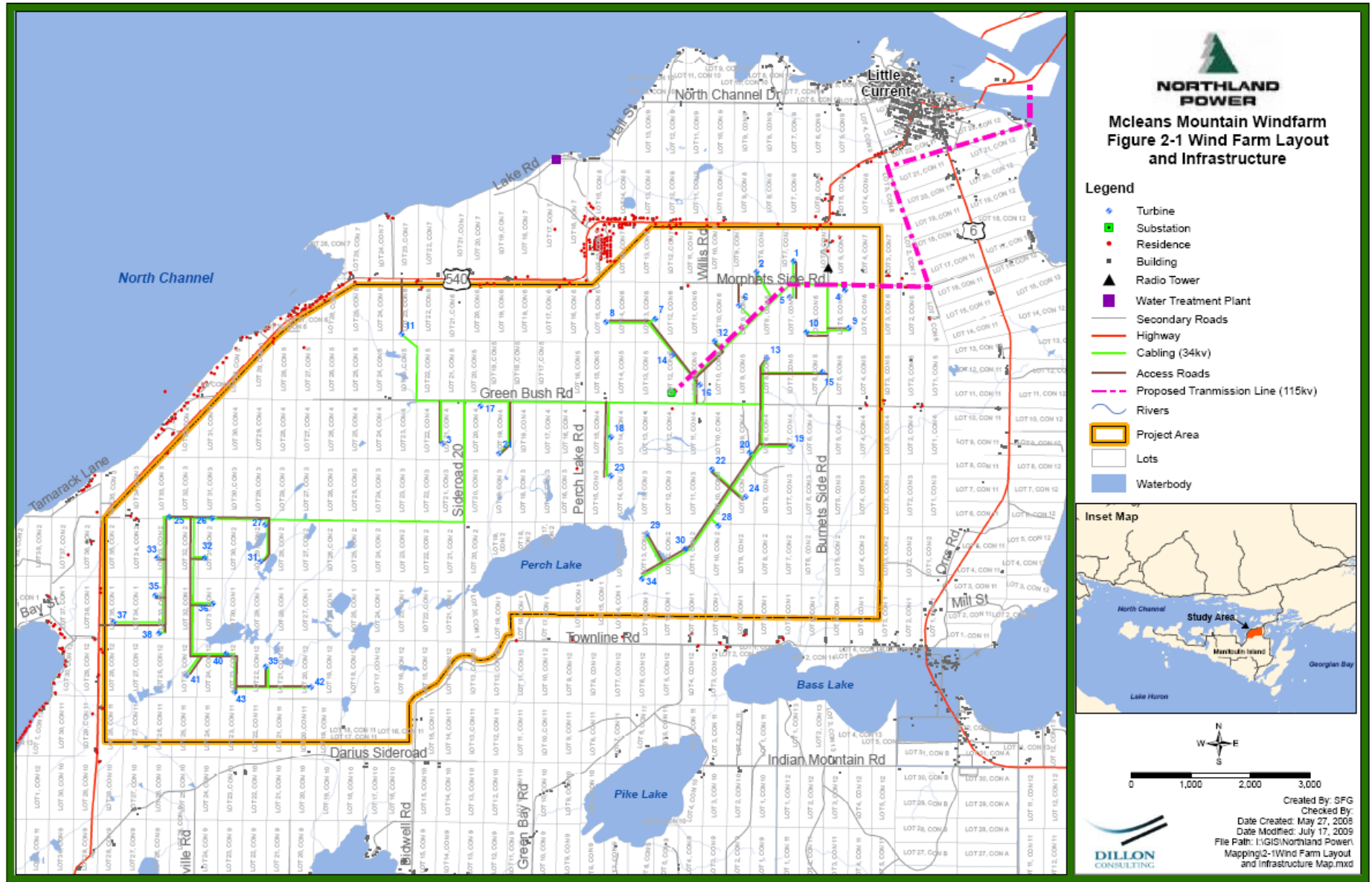
Construction (short-term)

- Erosion/storm runoff could affect water quality (increased sediment loads) of local streams
- Potential for soil/water (surface & ground) from spills of fuel and oil
- Removal of active agricultural (pasture) land from production
- Increase in particular matter (dust) in the local area

- Noise effects from the operation of construction machinery and transport of materials into the project area
- Potential for loss of fish habitat as a result of stream crossings by the turbine access roads (to be confirmed)
- Loss of vegetation/terrestrial habitat through project construction (wind turbines, access roads and electrical lines)
- Disturbance of wildlife in adjacent habitat from construction noise and human presence
- Potential for traffic delays on local roads from construction related traffic
- Public safety effects from operation of heavy equipment
- Potential for effects on archaeological resources
- Potential for effects on aboriginal areas of interest (to be confirmed)

Operation Period (long-term)

- Noise from operating wind turbines (all turbines will meet the 40 dBA limit for non-project participating receptors)
- Visual impact of turbines
- Potential for bird and bat kills
- Potential for short term noise disturbance effects in local area from infrequent major turbine repairs



Construction Plan Report (Construction Schedule)

Construction Schedule
Supplementary Information for Construction Plan Report
Under the Renewable Energy Approval (REA) Requirements, Ontario
Regulation 359/09 for Class 4 Wind Facility

Section 2.2 Description of Project activities, Table 2.2 of the Northland Power Inc's McLean's Mountain Wind Farm Environmental Screening Report/Environmental Impact Statement (ESR) Document, July 2009 provides a description of Construction activities for the proposed project. The anticipated construction schedule for the proposed McLean's Mountain Wind Farm project as follows:

Access Road Construction:	Fall 2010
Foundation Construction:	Fall 2010
Electrical interconnection:	Spring 2011
Commissioning:	Spring 2011

The description of the construction, operation, and decommissioning phases of the project are provided in **Table 2.2** as excerpted from the ESR, July 2009 is as follows:

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 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. 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	Graders, bulldozers, and backhoes will be used to strip any soil that could



Project Activities	
Physical Works/Activities	Description of Activity
Grading	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	Each turbine will be connected to the transformer substation through a collector line system. The line will run along the turbine access roads as much as possible. The lines will be predominately 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 75 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. Any top soil would be stockpiled for future use. It is expected that either a spread base foundation or rock anchor 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 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 will 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 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, a suitable sized area 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 tower section. The rotor blades will be lifted, assembled in the air and attached to the nacelle.

Project Activities	
Physical Works/Activities	Description of Activity
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	<p>Garbage and debris will be removed and disposed of at an approved location. Slash trees will be chipped. 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.</p> <p>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.</p>
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 the equivalent of ten full time people 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.
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 is expected not to 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 and removed from the site for re-use, reconditioning or disposal using flatbed trucks.
Removal of access	All permanent access roads would be deep-ploughed, as appropriate and



Project Activities	
Physical Works/Activities	Description of Activity
roads	graded to restore terrain profiles, and vegetated.
Removal of concrete foundation	Within 12 months of termination of lease, the foundations will be removed to not less than 3 feet below grade or 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	<p>All waste material would be removed from the site and disposed at an appropriate facility (e.g. licensed landfill).</p> <p>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</p>

**Design and Operations Report
(Community Response Plan)**

Supplementary Information for the
Design and Operations Report – Community Response Plan
Under the Renewable Energy Approval (REA) Requirements, Ontario
Regulation 359/09 for Class 4 Wind Facility

Section 7.1 Community Liaison and Follow-up as excerpted from the Northland Power Inc's McLean's Mountain Wind Farm Environmental Screening Report/Environmental Impact Statement (ESR) Document, July 2009 provides a description of community liaison and follow-up measures for the proposed project:

7.1 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.

The Community Response Plan will engage and inform the public, identified Aboriginal communities and the Municipality of project activities in the following manner:

- Project update bulletins will be posted at the Project Office and distributed to the local Aboriginal communities' offices as well as to the Municipal Town Office.
- A McLean's Mountain Wind Farm Project Office was established. The office is located in the Town of Little Current. The project office will serve as central point of information regarding the proposed project. The project office's address is as follows:



Northland Power Inc.
Little Current Office
McLean's Mountain Wind Farm Office
23A Vankoughnet St. East

- Little Current ON, POP 1K0All correspondence regarding the proposed project will be directed to the main project contact – the Project Manager who will be available via the project office and may be contacted as follows:

Rick Martin
Manager, Business Development, Renewable Energy
Project Manager, McLean Mountain Wind Farm
Northland Power Inc.
(705)271-5358 cell
(705)368-0303 Manitoulin Island Office
rickmartin@northlandpower.ca

**Draft
Environmental Management Plan**



*McLean's Mountain Wind Farm
Draft Environmental Management and Protection Plan*

**Supplementary Information for the Design and Operations Report
Under the Renewable Energy Approval (REA) Requirements, Ontario
Regulation 359/09 for Class 4 Wind Facility**

DRAFT

Prepared by:

**Dillon Consulting Limited
January 2010**



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A. INTRODUCTION

The Environmental Management and Protection Plan (“EMP” or “the Plan”) is intended to identify key project environmental information, instructions and mitigation measures specific to the McLean’s Mountain Wind Farm Project. This Plan fulfills the requirements of both: the Design and Operations Report as well as the Construction Report under the Ontario Regulation 359/09 – Renewable Energy Approval (REA) under the *Green Energy Act*. This Plan will ensure that the relevant permitting conditions, environmental mitigation and enhancement measures identified in the Environmental Screening Report/Environmental Impact Statement (“ESR”) the consenting permitting conditions and requirements of any legal agreements (including landowner agreements) are established and implemented in the pre-construction, construction and subsequent operation & maintenance phase of the wind farm.

This Plan is applicable to Northland Power Inc.’s (“NPI”) employees working on the pre-construction, construction, and operation & maintenance phases of the McLean’s Mountain Wind Farm Project.

The Plan will be adhered to, the relevant section completed and the document signed off, issued and handed over to the relevant Manager (detailed below in brackets) at the end of the following stages:

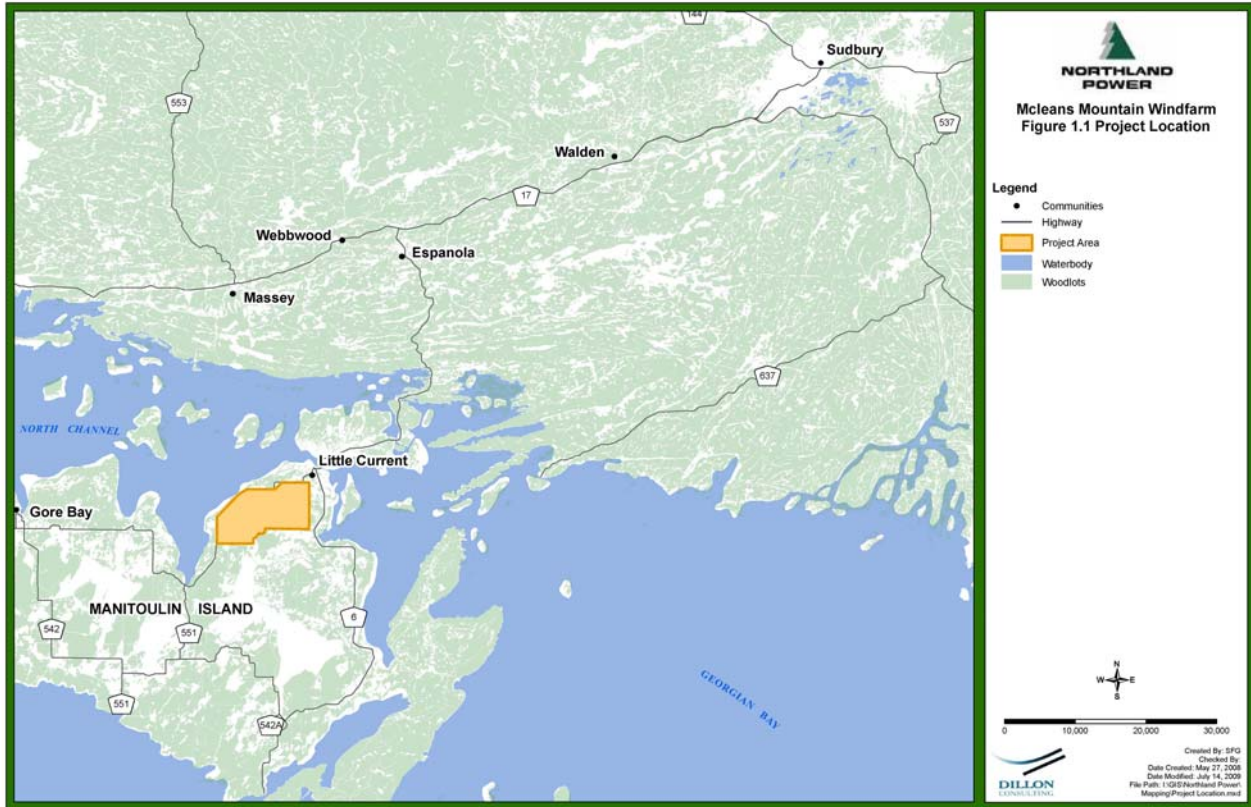
- *Pre-construction (Development Project Manager DPM) – Issue 01*
- *Construction (Construction Project Manager CPM) – Issue 02*
- *Operation (Operations Manager OM/Wind Farm Owner) – Issue 03*

- This Plan also provides general guidance to NPI’s subcontractors on environmentally safe working procedures and standards for particular operations that are to be implemented during the construction phase of this wind project

B. PROJECT DESCRIPTION

NPI is proposing to construct and develop the McLean’s Mountain Wind Farm (“MMWF” or “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 (“NEMI”), Ontario. The wind farm is expected to consist of approximately 43 wind turbines that will generate about 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 north-east of the study area to connect the MMWF to the Hydro One Transmission grid on Goat Island (located just north of Little Current). **Figure 1** presents the project location and study area.

*Figure 1:
Project Location*



The project components include:

- approximately 43 wind turbines;
- 690V /34 kV pad-mount transformers
- 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 100 meters. This would be determined in the final design for the project);
- Transformer substation (to step up the electric output from 34 kV to 115 kV);
- A 10.3 km, 115 kV single circuit transmission line, including a submerged crossing to Goat Island;
- 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 required during construction; and
- A temporary concrete batch plant (only required if concrete cannot be sourced through local suppliers).

Foundations for the wind turbines shall be constructed with poured concrete. Construction is anticipated to take approximately 12 to 15 months.

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.

C. EMPLOYMENT & AUTHORITY OF ENVIRONMENTAL MONITOR

NPI will appoint an Environmental Monitor (“EM”) to observe all aspects of site construction work throughout the construction phase of the project.

The EM will ensure that NPI’s own environmental management system, as set down in Section **D. Environmental Monitoring**, is being observed and will ensure compliance with all site permits and mitigation measures required by local, provincial or national law or applicable Contracts.

Reporting: The EM will report on a weekly basis with respect to any environmental problems identified or discovered as well as corrective actions taken to resolve the problem. In the event of a noncompliance issue, the EM will work directly with those contractors and individuals involved to correct the violation. Weekly reports to be prepared and sent to NPI and the Owners and will include:

- *Period covered by the report;*
- *Construction Activities observed;*
- *Compliance with applicable SCA conditions; and,*
- *Details of any corrective action that becomes necessary.*

The EM will co-ordinate activities with the Archaeological Monitor who will be working in accordance with the requirements of the “Cultural Resources Construction Monitoring and Construction Plan”.

Stop Work Criteria: The EM will have authority to stop work in the location of the non-compliance and/or stop the activity causing the non-compliance, until such time as satisfactory measures are taken to stop continuing non-compliance. The following are considered “stop work” criteria:

- *Failure of best industry practices which result in off-site sedimentation that violates applicable water quality standards.*
- *The failure of pollution prevention control measures designed to prevent the discharge of hazardous substances or oil in storm water discharges from the site which causes a release to the environment.*
- *The presence of unidentified hazardous materials as evidenced by significant soil staining, odor, or oil in ground water.*
- *Failure to take corrective action within an acceptable time period following a non-compliance with Applicable permits & legislation, the Site Certification Agreement or restrictions in respect of archaeologically sensitive areas.*

In the event of any work stoppage or in response to any emergency situation the EM must promptly inform the NPI site management, (who will inform the Owner), and any appropriate local authorities, either by phone or in person with facsimile (fax) confirmation as required. The EM shall observe implementation of the corrective actions to determine whether and when compliance is achieved. As soon as compliance is achieved the EM shall withdraw the stop-work notice.

D. ENVIRONMENTAL MONITORING

To aid all parties involved, an environmental checklist has been created (**Appendix 1**). This covers all environmental risks commonly experienced during wind project construction. It is vital that this checklist is reviewed to ensure that all environmental risks for this particular project location are included.

The following sections refer to the numbered checklist and provide minimum requirements to address each environmental hazard.

E. OBJECTIVES AND PHILOSOPHY

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.

This EMP has been developed by Dillon Consulting Limited ("Dillon") to provide the required protection measures for the activities associated with the construction, maintenance and operation phases of the McLean's Mountain Wind Farm, as such these are long term initiatives. The purpose of the EMP is to further expand on the environmental protection and management measures that were committed in Northland's McLean's Mountain Wind Farm Environmental Screening Report/Environmental Impact Statement (ESR Dillon, July 2009).

This EMP forms an integral component of all construction work to be done on this project. The purpose of the EMP is to:

- *Ensure that the Municipality of Northeastern Manitoulin and the Islands' ("NEMI") commitments to minimize environmental effects in general, and specific regulatory requirements, will be met;*
- *Provide concise and clear instructions regarding measures for protecting the environment and archaeological resources, and minimizing potential adverse environmental effects;*
- *Document environmental concerns and describe appropriate protection measures associated with Project construction;*
- *Provide a reference document for planning and/or conducting specific activities that may have an effect on the environment;*
- *Function as a training aid for environmental education and orientation; and,*
- *Communicate changes in the program through a revision process.*

Through field directives and advice offered by trained and experienced personnel, all users of the EMP will apply appropriate environmental protection practices. The EMP is a standalone document that provides guidance for the implementation of sound environmental protection practices, though it can be read in conjunction with other environmental regulatory documents such as the ESR (Dillon July, 2009) as well as other approval applications for further detail and background.

F. A LIVING PLAN

NPI recognizes the importance of the EMP and its execution during all phases of the project. Many of the commitments and construction measures discussed in the plan were done with the latest information and with best industry practices. NPI realizes that during the construction, operation and maintenance of the project new and innovative techniques may be developed which are more beneficial to the protection of the natural environment.

As such, NPI will encourage the investigation and use of these new techniques should they improve upon the ones discussed in the following EMP. This *Living* approach to the EMP will ensure that these new techniques can be used to improve our performance and to further mitigate any potential impacts to the natural environment.

1.0 ENVIRONMENTAL PROTECTION AND CONSTRUCTION MEASURES

Site development and road construction projects require a variety of construction practices to complete the work. Potential environmental interactions related to these construction practices are identified in this section. Environmental management measures, designed to reduce potential for environmental effects, are included within each subsection. General environmental protection measures are listed below.

1.1 General Measures

- *Environmentally sensitive areas will be staked out prior to work operations so that these areas are protected.*
- *Work will comply with conditions outlined in the Approval-to-Proceed and any associated permits/approvals.*
- *A Setback has been provided for the following natural or sensitive feature:*
 - *30m Watercourse Setback;*
 - *120m River/Stream Setback;*
 - *55 m Non Participating Lot Setback;*
 - *55 m Road Setback;*
 - *120m Wetland Setback (in the majority of cases);*
 - *120m Life Science ANSI Setback;*
 - *305m Perch Lake Setback; and*
 - *550m Residence Setback*
- *Work conducted in the vicinity of wetlands/watercourses will be conducted in a manner which ensures that erosion and sedimentation of wetlands/watercourses is minimized.*
- *Erodible soils will not remain exposed for longer than absolutely necessary. In areas where extensive erosion occurs (e.g., along steep slopes) or in environmentally sensitive areas, an active re-vegetation program will be implemented as soon as possible following disturbance to ensure rapid re-vegetation.*
- *Appropriate erosion control measures will be installed prior to conducting the work. Work will be completed as soon as possible, and will be suspended during and immediately after intense rainstorms and during periods of high runoff.*
- *The area of disturbance will be limited to that which is absolutely necessary to conduct the work.*
- *Necessary means will be undertaken to ensure that work does not intrude on property outside the project boundary. This may include staking out private property prior to work operations.*

Activity-specific environmental protection measures are provided in the following subsections.

1.2 Vegetation Clearing and Disposal

Outline of Procedure

Vegetation clearing consists of the removal and disposal of all trees, shrubs, fallen timber, logs and other surface litter within the work area as directed and designated by the plans/drawings or the Environmental

Monitor. Vegetation clearing may be required prior to the removal of soil during site development and/or road construction.

Principal Environmental Concerns

Cut vegetation piled near or in a watercourse could degrade aquatic habitat or obstruct fish passage. Other potential environmental effects include altering wildlife habitat. Over-cutting exposes remaining trees to an increased risk of blow down. Removal of forest or hedgerow vegetation can result in wind stress, desiccation, and increased soil erosion.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of vegetation clearing and disposal.

- *Clearing will be minimized to that necessary to construct and operate the proposed turbines, install collector lines and transmission lines and implement access roads.*
- *Best efforts will be made to schedule clearing of land outside of the sensitive bird breeding and nesting season, which is considered to be May 9 to July 23.*
- *Hedgerows will be left intact, where possible.*
- *Slash and any other construction material or debris will not be permitted to enter any watercourse.*
- *Slash will be piled outside the buffer zone of a wetland or watercourse (i.e., greater than 30 m from a wetland or watercourse) for subsequent chipping. In cases where maintaining a 30 m buffer around watercourses would interfere with the landowner's agricultural operations, temporary storage of slash may occur within the 30 m buffer but not within 10 m of a watercourse.*
- *Slash will not be burned.*

1.3 Ditching

Outline of Procedure

Ditching consists of excavation and grading to construct a new ditch or to re-establish an existing, deteriorated ditch. Ditching is undertaken to affect drainage and to correct deficiencies such as erosion, non-conformity in grade and restrictive vegetative growth that impedes drainage.

Principal Environmental Concerns

Where ditching is undertaken, potential runoff of sediment-laden water could result in effects on water quality, aquatic ecosystems or other environmentally sensitive areas.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection

measures will minimize the potential environmental effects of ditching:

- *Ditching will proceed in the upslope direction.*
- *Trapezoidal ditches result in less erosion of the ditch bottom and will be installed where space requirements allow. In cases where the available right-of-way is insufficient in width to achieve the desired cross-section, the alternative V-bottom ditch will be constructed.*
- *Where ditching takes place near a watercourse, no ditching will be done within 30 m of the watercourse. Vegetation located in this 30 m buffer area acts to filter any sediment laden runoff water prior to entering the watercourse.*
- *Within a week of doing ditching work, or as directed by the Environmental Monitor, all exposed soils will be either seeded with non-invasive, herbaceous, native species or receive straw/hay mulch application.*
- *Ditching will not be done within an existing ditch prior to July 1 or after September 30, unless a letter of advice has been obtained from the Department of Fisheries and Oceans.*
- *If ditching prior to July 1 or after September 30, mulch or an erosion control blanket (i.e., jute mat, erosion control mat) must be applied overtop of the seed.*
- *If seeding is not possible due to lateness of the season, the exposed soils will be completely covered for "overwintering" with either mulch or an erosion control blanket.*
- *Erosion control material will be removed during the following spring, and the area will be prepared for seeding.*
- *The Environmental Monitor will direct additional seeding or erosion control requirements within this 30 m zone, as appropriate.*
- *A check dam will be installed at the end of the ditch where it meets the Buffer Zone or other environmentally sensitive area. Additional erosion control structures will be installed further up the ditch as required or as directed by the Environmental Monitor.*
- *Natural drainage will be maintained whenever practical.*
- *Ditches will be directed into surrounding vegetation where possible, or a sediment collection pond, rather than emptying into a natural wetland/watercourse.*
- *Depending on the erosion potential or to ensure stabilization, the ditch may be hay mulched, hand seeded, hydro seeded or lined with an erosion control mat (i.e., jute mat and/or vegetative erosion control blanket).*
- *Rip-rap or an erosion control blanket designed for high flows will be used to line the bottom of ditches that have steep grades and/or excessive erosion as directed by the Environmental Monitor.*
- *Petroleum, septic wastes or otherwise contaminated material encountered in the ditch will be reported to the Environmental Monitor and to the Emergency Response.*

1.4 Grubbing, Stripping, and Excavation

Outline of Procedure

Grubbing refers to the removal of all stumps, roots, root mat and other debris, while stripping refers to the removal of topsoil. Materials excavation refers to the excavation of all other soil materials as included in earthworks, preparation of roadbed, site development, trenches, drains, borrow from adjacent land or pits,

intersections, private entrances and other similar works.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of grubbing, stripping, and excavation:

- *Erosion control measures are to be in place prior to any grubbing activities if site conditions warrant or as directed by the Environmental Monitor.*
- *Topsoil and excavated overburden and bedrock will be stored in separate stockpiles for later use during rehabilitation.*
- *Dewatering of excavated areas will make use of measures to minimize and control the release of sediment laden water through the use of filtration through erosion control devices, settling ponds, straw bales, geotextiles or other devices as necessary.*
- *Water from dewatering will not be permitted to directly enter a watercourse or wetland.*
- *Care will be taken during excavation activities as there is potential for disturbing a decommissioned landfill present in the Study Area.*
- *Watercourse culvert crossings as required for access roads for the turbine locations will span the watercourses in accordance with MOE and MNR practices.*

1.5 Disposal of Excavated Waste Materials

Outline of Procedure

Waste materials are generated during excavations involved with site development and road construction practices.

Principal Environmental Concerns

The principal concern associated with this activity is the potential for erosion of disposed materials and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Protection Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of the disposal of excavated waste materials. It is

important to note that, once material is deemed to be waste material, it may become the property of the Contractor or other party. Where this occurs, these same protective measures are recommended to be followed by the user of the material once removed from the site:

- *If the excavated waste material is to remain in one disposal location for extended periods of time, appropriate protection measures will be taken such as stabilization of the material and/or perimeter sediment control.*
- *Excavated waste materials will not be disposed of in an environmentally sensitive area or in the Buffer Zone of a watercourse/wetland.*
- *Excavated materials will largely be used on original clearing sites, where appropriate.*

1.6 Infilling and Grading

Outline of Procedure

Infilling consists of placing soil and/or rock for site development and construction purposes. This includes preparation and construction of roadbeds, embankments, and slopes. Placing material in depressions to level them off helps to minimize ponding. Grading consists of shaping the unpaved road or site surface and is used to stabilize a surface, improve surface drainage and to provide for runoff in a controlled manner.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of infilling and grading:

- *When grassed areas are encountered during grading, every effort will be made to leave such grassed areas intact.*
- *Areas where little or no vegetation exists can be graded after a light rain when the surface is in an optimum state for compaction, but not after heavy rains which promote runoff conditions.*
- *The elevation of the in filled or graded area will be maintained higher than the ditch it is draining into.*

1.7 Culvert Installation and Stabilization

Outline of Procedure

Culvert construction will include the installation of a steel, concrete or plastic culvert, backfilling around the

culvert, construction of the roadbed, and stabilization of culvert inlets and outlets.

Principal Environmental Concerns

The principal concerns associated with culvert installation and stabilization include the potential erosion of material around the culvert, sedimentation of the water, alteration of the hydraulic regime leading to streambed or bank scouring, and disruption of fish habitat and migration patterns.

Access roads will be approximately 10 m wide to accommodate the turbine erection cranes, maintenance vehicles and heavy equipment for larger repairs/replacements. In order to access the wind turbine sites, it will be necessary to construct access roads across various open drains. Some drains/watercourses will need to be crossed by the turbine access roads. In most cases, culverts of approximately 13 to 15 m in width will be required to accommodate the crossing of the watercourses/drains by the access roads. In some cases to accommodate a wider turning radius for the cranes, culverts of 20 to 30 m wide may be required in order to accommodate vehicular access and construction traffic across the drain while maintaining unimpeded flow within the drain.

There will be the need to cross the North Channel with a submarine cable to facilitate the transmission connection. It is therefore expected that navigable waterways will be traversed and that a determination by Transport Canada will be sought prior to construction.

Environmental Management Measures

Where there is the potential for effects to watercourses including drains from the construction of the turbines and watercourse crossings, the following will be taken into consideration:

- 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); and
- the *MNR Technical Guidelines- Erosion and Sediment Control* (1989).

To provide source controls and minimize adverse impacts, the following drainage mitigation will be followed:

- *Minimize disturbance of existing vegetation outside ditching and grassed slopes where regrading is required;*
- *Minimize time exposure of un-vegetated soils;*
- *Maximize length of overland flow through to points where storm water 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;*
- *Each watercourse crossing is 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 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. This process will not hinder or block natural water flow.*

In addition to the general environmental protection measures described above, the following protection

measures will minimize the potential environmental effects of culvert installation and stabilization:

- *Culverts will be installed parallel to the watercourse, and located along a section of the watercourse that is straight and of uniform gradient.*
- *Culvert size and design will be based on peak flows, and will allow for sufficient depth of flow and appropriate water velocities for fish passage.*
- *Fill slopes will be stabilized to ensure that roadbed materials do not enter the watercourses.*
- *Gabions, rip rap, or rocks of sufficient size to prevent erosion, will be placed around culvert inlets and outlets.*
- *Gabions, rip rap, filter fabric, or rocks used for stabilization will completely cover road fill, gravel and other unstabilized materials around culvert inlets and outlets.*
- *Stabilization material will be clean and non erodible.*

1.8 Installation of Underground Collection Cables

Outline of Procedure

Electrical collection lines connecting the wind turbines to the substation will be overhead until within 100 m (or some suitable distance) of the turbine whereby an overhead to underground terminal pole will be placed and the underground electrical lines will be placed in trenches approximately 1 m deep where possible and covered with fill.

Principal Environmental Concerns

The principal concern associated with the installation of underground cables is the potential for erosion due to exposed soil areas and the effects of sediment-laden runoff on surface water quality. This could disturb fish habitat.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will provide the erosion control measures for streamside activities:

- *Any excavation or grading during the construction of the site will be conducted in a manner that ensures the minimum amount of disturbance necessary.*
- *Access roads will be used, where possible, for all equipment, including cable reels, line trucks, and tensioning equipment.*
- *Erosion and sedimentation control measures will be in place prior to any grubbing activity.*
- *In extremely erodible areas, hay or straw mulch will be used as required for protection.*
- *Silt or sediment control fences will consist of woven synthetic fiber fabric attached to wooden posts.*
- *Silt fences will not be used in watercourses.*

- *Where a vegetation buffer between erodible slopes and water bodies is less than 15 m, an engineered silt fence will be constructed to control silt runoff and the silt fence will be placed along the down gradient perimeter of the construction area.*
- *Replanting will occur upon completion of cable-laying operations to maintain bank stabilization.*

1.9 Handling, Storage, and Use of Aggregate Materials

Outline of Procedure

Handling of aggregate materials is required for the foundation construction of each turbine. Outdoor storage piles are often used in operations that use minerals in aggregate form, largely due to the need for frequent material transfers.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas. Storage piles can be left uncovered and dust emissions may occur from disturbances to the piles. Handling, storage, and use of aggregate materials can result in any of the following environmental impacts:

- *Cross-contamination can occur if adjacent aggregate stockpiles are allowed to overlap.*
- *Underlying soil may be disturbed with the use of a front-end loader for moving aggregates from a stockpile.*
- *Mixing of aggregates can result from dumping the wrong size aggregate in a bin or pile.*
- *Leaves and other contaminants may also fall into the stockpile.*
- *Leakage can occur through or around bulkheads in storage bins.*
- *Vegetation may grow in the stockpile if left alone and unused for an extended period of time.*
- *Soil admixing, compaction, and stoniness can occur as a result of grading, heavy traffic, and excavation activities.*

Environmental Management Measures

These measures apply to the handling, storage and use of aggregate material. The following conditions apply:

- *Aggregate will not be stored within the buffer zone of a wetland or watercourse (i.e., aggregate will not be stored within 30 m of a wetland or watercourse). In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.*
- *All sand, aggregate, soil, or other materials in place or in stockpiles must be contained to prevent materials from producing dusty conditions and from cross contamination, as determined necessary by the Environmental Monitor.*

- *Sand and soil stockpiles will be bermed and sloped (and seeded with non-invasive, herbaceous, native species, if abandoned) to minimize runoff. If stockpiles are not needed immediately, temporary erosion and sediment control devices will be installed and regularly maintained.*
- *Stripping of topsoil separately from the subsoil, approximately 10-15 cm, will occur to minimize the potential for soil admixing.*
- *Soil compaction will be avoided by limiting the traffic flow on access roads.*
- *Stoniness will be avoided by removing any noticeable stone concentration to an approved location.*

1.10 Concrete Pouring Operations

Outline of Procedure

Concrete will be required to construct the foundations of the turbines, approximately 15-17 m in diameter, and 1-1.5 m thick. This section contains measures to minimize adverse effects that may result from concrete pouring activities.

Principal Environmental Concerns

Liquid wastes from uncontrolled release of wash water which may contain hazardous materials such as cement, concrete additives and form oil. This wash water may be harmful to fish. Cement is alkaline and wash water from spoiled concrete or from the cleaning of the mixer trucks and pipe delivery systems can be expected to have high pH and high total suspended solids ("TSS") concentration. Similarly, spoiled concrete or wash water would contain additives and agents, some of which are toxic to aquatic species. Aggregates, particularly the finer sand fractions, washed from spoiled concrete or discharged in water to the environment may result in direct fish and wildlife mortality and/or habitat destruction.

Environmental Management Measures

The following measures are intended to minimize the potential for wash water and uncured concrete to enter water bodies:

- *Form oil may be used sparingly to allow forms to separate from concrete following curing.*
- *Only the chutes of concrete trucks will require on-site cleaning of wet concrete to permit their storage for transport. The volume of water used and extent of washing will be kept to a minimum.*
- *Washing of chutes on-site will occur at a designated location that will permit containment of the wash water in a settling pond away from any subsurface drains, streams or storm drains. If such a system cannot be located on-site, then the wash area should permit containment of the wash water so that it can be disposed of off-site at the ready mix plant.*
- *Washing of the drum at the end of a day's delivery will occur at the ready-mix concrete plant.*
- *No chemicals will be used in the washing of concrete trucks or forms on-site.*
- *Aggregate used in the production of concrete will not be stored on-site and concrete will not be produced on-site.*

- *In the event that water from the wash water containment area requires release to the environment, the effluent will be tested prior to release as required by applicable regulations.*
- *If concrete is mixed on site, drainage from the concrete production area and aggregate storage area, and wash water from the cleaning of batch plant mixers, mixer trucks, conveyors, and pipe delivery systems will be directed to a settling pond for control and treatment, as appropriate. Effluent will be treated as appropriate before release to receiving waters, or alternatively, effluent will be recycled for reuse after treatment. Solids which accumulate in a settling pond will be removed on a regular basis to ensure the settling pond remains effective.*

1.11 Surveying

Outline of Procedure

Surveying includes gathering all the information required for the design and identification of a property or the right-of-way of a specific section of road. This includes cutting centerline and cross-section offsets of sufficient width to provide a clear line of sight for survey equipment and access to the site for soils testing equipment.

Principal Environmental Concerns

Disturbance to terrestrial and watercourse/wetland habitats and species are the primary environmental concerns associated with surveying.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of surveying:

- *The cutting of survey lines will be kept to a minimum. Where possible, alternate areas not requiring cut lines will be used.*
- *Whenever possible, cutting lines to the boundary between treed and open areas will be avoided.*
- *Survey lines will be limited in width to that which is absolutely necessary for line of sight and not more than 1.5 m.*
- *As required, trees and shrubs will be cut no more than 300 mm above the ground.*
- *All trees not exactly on survey lines will be left standing and trees partly on line will be notched (notch not to exceed 1/3 tree diameter) instead of removal, to allow sighting.*
- *Trees will be felled in a way that damage to standing trees adjacent to the survey line is minimized. Trees will be felled away from and not into or over a wetland/watercourse.*
- *Slash will not be placed or left in wetlands/watercourses. Any debris material removed from a wetland/watercourse and adjacent areas will be disposed of, or placed in a manner such that it cannot enter a wetland/watercourse.*
- *Felled trees having a top diameter of 8 cm or more will be cut in lengths and piled for reuse as merchantable timber. Non-merchantable timber will be chipped and spread outside the buffer zone of*

a wetland or watercourse (i.e., greater than 30 m from a wetland or watercourse). In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.

- *When surveying construction layouts, areas that will be cleared do not require strict adherence to the above, except trees, shrubs and areas to be saved or left natural as noted on the plans or marked in the field.*
- *Vehicles will yield the right-of-way to wildlife and no attempt to harass or disturb wildlife will be made by any person.*
- *There will be no cutting in areas designated as environmentally sensitive by the Environmental Monitor.*
- *ATVs will remain within the right-of-way except as approved by the Environmental Monitor.*
- *No heavy equipment or motorized vehicles will enter the areas designated as environmentally sensitive by the Environmental Monitor.*
- *The extent of activities in environmentally sensitive areas will be minimized, including the restriction of walking to established walking paths if available.*
- *Petroleum products will be handled, stored, and disposed of in a manner that will minimize the potential for spills.*
- *Fuelling of equipment will not occur within the Buffer Zone of a watercourse/wetland or other environmentally sensitive areas.*

1.12 Equipment Movement

Outline of Procedure

A variety of equipment is required to complete the many components of site development and road construction.

Principal Environmental Concerns

The environmental concerns associated with equipment movement are the potential impacts on aquatic ecosystems and water quality, as well as disturbance to environmentally sensitive areas.

Environmental Management Measures

In addition to the general environmental protection measures described above, the following protection measures will minimize the potential environmental effects of equipment movement:

- *Imported equipment will be thoroughly cleaned before it arrives into Ontario in order to prevent the introduction of exotic plant species.*
- *Equipment and vehicles will only operate on cleared right-of-ways or areas designated for construction activities in the Plans/Drawings.*

- *Routine maintenance of machinery will be performed off-site as much as possible. Some heavy equipment, such as the cranes, will be maintained on-site due to the challenges involved in moving the equipment.*
- *The Contractor will make daily inspections of hydraulic and fuel systems on machinery, and leaks will be repaired immediately. All leaks will be reported to the Environmental Monitor and the Construction Manager.*
- *Construction equipment will not enter Buffer Zones of wetlands/watercourses or environmentally sensitive areas.*
- *If there is soil (not rock) in the lay-down areas used for storage of turbine parts adjacent to the turbine foundations, the soil will be aerated and loosened after use to counteract the compaction caused by the equipment. The vegetation will be allowed to return to a natural state.*
- *Erosion control measures will be monitored during construction activities within the right-of-way and any areas associated with Project construction activities. Where damage to these erosion control measures is observed, they will be promptly repaired to prevent siltation of wetlands/watercourses or other environmentally sensitive areas.*

2.0 ENVIRONMENTAL PROTECTION MEASURES - MAINTENANCE ACTIVITIES

2.1 Structure Maintenance and Cleaning

Outline of Procedure

Repair and replacement of damaged or deteriorated superstructure and substructure components are undertaken as required to ensure their structural integrity. Cleaning is undertaken to prevent the accumulation of dirt and debris which may restrict normal movement on the structure and/or retain moisture or chemicals, leading to structural component deterioration. Potential activities could include cleaning, lubrication, and painting.

Principal Environmental Concerns

There is concern for aquatic species due to direct mortality and loss of aquatic habitat. The primary concern is the release of materials and siltation into the aquatic environment such as abrasives and protective coatings. Lubrication materials may contain petroleum compounds, which are potentially toxic to aquatic species.

Environmental Management Measures

In addition to the general environmental protection measures described in Section 3.0, the following protection measures will minimize the potential environmental effects of structure maintenance and cleaning:

- *All waste generated in the removal of damaged and deteriorated components will be collected for proper disposal.*
- *All materials, where possible, will be reused. Non-salvageable materials will be disposed of at a provincially approved location.*
- *All necessary precautions will be taken to prevent discharge or loss of any harmful material or substance into a watercourse.*
- *All empty containers of paint, solvents, and cleaners will be disposed of in an appropriate manner at a provincially approved location.*
- *If sandblasting is required, it will be done in an off-site maintenance shop.*
- *If on-site sandblasting is necessary, screens or traps will enclose the area to be sandblasted. Sandblasting will be performed over a surface which allows the sand or residue to be collected upon completion of sandblasting (i.e. plastic or plywood).*
- *Sandblasting will not be performed in high wind conditions.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

2.2 Road Maintenance

2.2.1 Grading

Outline of Procedure

Grading is used to reshape unpaved roads to maintain a proper crown and remove ruts, potholes and washboard conditions. Grading helps to maintain proper drainage and keeps road surfaces stable.

Principal Environmental Concerns

Grading loosens the top of the exposed road, leaving more potential for erosion of the surface. If not conducted properly, grading can inhibit controlled drainage of runoff. Dust is generated during grading processes.

Environmental Management Measures

Grading measures as outlined earlier in this EMP will be implemented.

2.2.2 Ditch Maintenance and Shouldering

Outline of Procedure

Ditching is undertaken to affect drainage of the roadbed and to correct deficiencies such as erosion; nonconformity in grade, line, or cross section of ditch; water ponding on road; and restrictive vegetative growth that impedes drainage of the roadbed.

Principal Environmental Concerns

The principal concern associated with these activities is the potential for erosion due to exposed soil areas and the associated sediment-laden runoff effects on water quality, aquatic ecosystems and environmentally sensitive areas.

Environmental Management Measures

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will minimize the potential environmental effects of ditch maintenance and shouldering:

- *A Buffer Zone will be maintained between the end of ditching and all wetlands/watercourses.*
- *A check dam will be maintained at the end of the ditch (where the ditch meets the Buffer Zone). Additional erosion control structures will be installed further up the ditch as required.*
- *Natural drainage will be maintained whenever practical.*

- *Sediment deposited in the ditch will be removed when it reduces the capacity of the channel. Removed material and sediment will be disposed of at a location outside the Buffer Zone of a wetland/watercourse or other environmentally sensitive area, and such that it cannot wash into a wetland/watercourse.*
- *Suitable material will be used when needed to fill in washouts, depressions, and the like on foreslopes or backslopes. To ensure stabilization, the ditch may be hay mulched, hand seeded, hydroseeded or lined with jute matting, depending on the erosion potential.*
- *Petroleum contaminated material encountered in the ditch will be reported to the Environmental Monitor and the Construction Manager.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

2.2.3 Surfacing

Outline of Procedure

For the purposes of this EMP, surfacing refers to the placement of aggregate on an unsealed road surface for stabilization or to restore grades, and to shape shoulders.

Principal Environmental Concerns

When handling and placing aggregate, there is potential for sedimentation of the aquatic environment and for dust impacts on air quality.

Environmental Management Measures

In addition to the general environmental protection measures, the following protection measures will minimize the potential environmental effects of surfacing:

- *Any aggregate placement will be conducted in such a manner to ensure road surface drainage flows from the centre of the surface to the drainage control structures (i.e., ditching), as appropriate.*
- *Any aggregate materials placed must be compacted to reduce moisture penetration.*
- *As required, dust will be controlled.*
- *Sensitive features (i.e. rare plants, watercourses, environmentally sensitive habitats) identified during construction will be protected during maintenance activities.*

2.3 Snow Removal

Outline of Procedure

Snow removal and application of sand and/or de-icing agents (i.e., salt) may be required during the winter months to maintain safe conditions for maintenance activities.

Principal Environmental Concerns

Excessive salt use can cause saline runoff into watercourses. Excessive sand use can contribute to sediment-laden runoff into watercourses and may cause blockages in drainage structures.

Environmental Management Measures

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will minimize the potential environmental effects of Snow Removal, Sanding and De-icing.

- *A service provider will be used for snow and ice removal on roads. Best Management Practices as described in Environment Canada's "Best Management Practices for Salt Use on Private Roads, Parking Lots and Sidewalks" will be followed.*
- *The use of sand, salt and combinations thereof, will be minimized to that which is necessary to ensure the safety of the maintenance staff. Sand application will be the primary means of maintaining safe driving conditions. Salt will only be used as necessary.*
- *Prior to salt application, as much snow as possible will be removed from the road through plowing.*
- *Salt application will be targeted to areas requiring treatment in order to minimize the volume of salt used and the amount of salt lost to adjacent areas.*
- *Snow removed from access roads and site surfaces will not be dumped within the Buffer Zone of a watercourse/wetland or other environmentally sensitive area.*

3.0 SPECIFIC ENVIRONMENTAL PROTECTION MEASURES

3.1 Erosion Control

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.

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. In most cases, culverts of approximately 13 to 15 m in width will be required to accommodate the crossing of the watercourses/drains by the access roads. In some cases to accommodate a wider turning radius for the cranes, culverts of 20 to 30 m wide may be required.

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 DFO and MNR.

There will be the need to cross the North Channel with a submarine cable to facilitate the transmission connection. It is therefore expected that navigable waterways will be traversed and that a determination by Transport Canada will be sought prior to construction.

Mitigation Measures

Timing: Attempts will be made to construct new crossings and improve existing drain crossings when the ditch is dry. For applicable coldwater watercourses, crossings will be consistent with the coldwater timing restrictions. For ditches which have standing water at the time of construction, in stream sediment control will be installed prior to any construction equipment initiating work. These features should be removed immediately following completion of all in stream or stream bank disturbance, including installation of the culvert and revetment. Vegetation removal should be kept to a minimum to provide bank stability following culvert installation.

Sediment: Adequate sediment and erosion control during construction along with re-vegetation of disturbed areas will be necessary to avoid potential effects of construction to downstream habitat. Sediment and erosion control systems should be maintained repaired and not removed until the site is suitably stabilized.

Equipment: All equipment for culvert installation should arrive on site in a clean condition and maintained to prevent fluid leaks (gas, oil, lubricants, hydraulic fluids). All equipment should operate on the land with

minimal disturbance to the ditch banks. Refueling, servicing, equipment maintenance and associated materials for equipment operation should be stored away from the ditch bank with appropriate containment systems in the event of accidental spills.

Placement: Culverts should be embedded in the substrate, a minimum 10% embedment of the pipe diameter below the drain bottom, to ensure there is no loss of habitat through the culvert section. The culvert will eventually silt into match upstream and downstream grades as this area is extremely flat. In an open water course setting, culverts will provide refuge in low flow and cover from predators for any of the resident fish population.

Approvals: Any work within waterways that contain fish habitat or potential fish habitat will require a letter of advice notifying the Department of Fisheries and Oceans when work is to be initiated and completed.

Outline of Procedure

During construction, site preparation work and use of heavy construction vehicles at the site will result in exposed solids, susceptible to erosion. Control of erosion and potential sedimentation of receiving water bodies is one of the most critical environmental management concerns for this Project. Erosion control is first priority in preventing these impacts. The amount and duration of exposed soil will be kept to a minimum. Erosion control methods will be applied where there is the potential for erosion due to rain, flowing water, steep slopes, and highly erodible soils. Preventing erosion at the source reduces the amount of sediment that needs to be managed by downstream sediment control measures. It is also important that sediment controls are in place to prevent sediment from leaving the site.

Principal Environmental Concerns

Exposed soil will result from site preparation activities such as clearing, grubbing, grading and ditching. Precipitation, flowing water, steep slopes, or highly erodible soils will increase the potential for erosion. The principal environmental concern is the associated sediment-laden runoff and the resulting effects on water quality, aquatic ecosystems and environmentally sensitive areas such as wetlands.

Environmental Management Measures

In addition to the general environmental protection measures described earlier in this EMP, the following protection measures will provide the erosion control measures.

General

Where there is the potential for effects to watercourses including drains from the construction of the turbines and watercourse crossings, the following will be taken into consideration:

- *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); and*
- *the MNR Technical Guidelines- Erosion and Sediment Control (1989).*

To provide source controls and minimize adverse impacts, the following drainage mitigation will be followed:

- *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 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 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 (this activity would require a Certificate of Approval under the OWRA from MOE. In addition, should dewatering activities exceed a rate of 50,000 litres per day, a PTTW would be required as well); and,*
- *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.*
- *The OMNR in-water construction-timing window (July 1 to September 30) should be implemented for the summer months when work can be completed in the dry or when resident fish communities in permanent systems have completed their annual reproductive activities.*
- *Compensation measures, where required, should involve riparian plantings, bank stabilization through bioengineering, or the construction of in-stream fish habitat features and/or the removal of blockages/barriers (this is a possibility along the shoreline at the mouths of some tributaries).*

The majority of road crossings over small creeks and/or drains are handled by installing an appropriately-sized culvert by open cutting creek/drain beds to properly install at an acceptable elevation to ensure proper fluvial function and fish passage. Standard mitigation measures to address typical negative impacts resulting from construction activities of these kinds are presented above.

For reference, please refer to the Department of Fisheries and Oceans' ("DFO") Operation Statements for "Overhead Line Construction" and "Isolated or Dry Open-Cut Stream Crossings" for more detailed information on environmental mitigation and protection appropriate to these types of watercourse crossing. Provided the listed conditions in the Operational Statements are met, review and approval by DFO is not likely required.

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.

Structures/Products

- *Silt or sediment control fences will consist of woven synthetic fibre fabric attached to wooden posts.*

- *Erosion control structures or check dams will be constructed in accordance with Ontario Provincial Standards for Roads and Public Works in partnership with the Ontario Ministry of Transportation (MTO).*
- *In extremely erodible areas, hay or straw mulch will be used as required for protection.*
- *Erosion and sedimentation control measures will be in place prior to any grubbing activity.*
- *Erosion control structures will be installed as directed by the Environmental Monitor, Site Supervisor or Construction Manager.*
- *Silt fences will not be used to control sedimentation within a ditch or watercourse.*
- *Where erosion control within a drainage ditch is required, geotextile wrapped straw bales will be installed to provide a check dam and prevent downstream sedimentation. Some rock fill or rip rap may be installed on the downstream side of the check dam to secure the structure during heavy rainfall events.*

Maintenance

- *The Contractor will maintain the erosion control structures in a functional condition as long as necessary to contain sediment from run-off, from time of installation until a sufficient vegetative cover growth (>90% cover) has been established.*
- *All erosion control structures and sediment control fences will be inspected before, during and following each rainfall event and at least daily during periods of prolonged rainfall. Any damage arising from major storm events will be repaired as soon as possible to the satisfaction of the Site Supervisor.*
- *Retained sediment will be removed when it has accumulated to a level of half the height of the fence/barrier and disposed at least 30 m away from any wetland or watercourse in a manner that prevents it from entering a wetland or watercourse. In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.*

3.2 Air Quality and Dust Control

Outline of Procedure

The construction phase of the project consists mainly of heavy construction work. There can be significant dust generation that may have a substantial temporary impact on local air quality. Dust emissions often vary substantially on a daily basis at construction-sites depending on the level of activity, the specific operations, and the prevailing meteorological conditions. In addition, to a lesser degree emissions during construction will be associated with combustion gases from heavy vehicles, which produce particulate-containing exhaust consisting of a variety of contaminants. The typical contaminants associated with construction activities include carbon monoxide (CO), nitrogen oxides (NO_x), carbon (CO₂), hydrocarbons (HC), total suspended particulate (TSP), and fine and respirable particulates (PM₁₀ and PM_{2.5}).

Principal Environmental Concerns

The on-site construction activities could impact ambient air quality due to vehicular emissions. There are a

variety of activities that can lead to the generation of contaminant emissions, primarily of particulate matter, on the construction-site. The primary potential sources include exhaust gas emissions due to incomplete combustion from diesel compression engine, road dust, wind erosion on storage piles, material handling, material transport; and truck loading / truck unloading. There are also emissions of combustion gases and products of incomplete combustion from the exhaust of on-site vehicles and equipment. The table below shows typical output ranges of emissions from diesel engines, depending on the age and technology of the engines.

Typical Emissions from Diesel Engines (Nett Technologies)

CO vppm	HC vppm	PM vppm		NO_x vppm	SO₂ vppm
5 - 1,500	20 - 400	0.1	0.25	50 - 2,500	10 - 150

Environmental Management Measures

The following measures will be implemented, to the extent possible, to control air emissions from construction activities:

- *Use 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;*
- *Cover or otherwise contain loose construction materials that have potential to release airborne particulates during transport, installation or removal; and*
- *Spray water to minimize the release of dust from gravel and exposed soils. Use environmentally-friendly chemical dust suppressants (e.g. Petro-Canada's Dust Suppressant Fluid 65 [DSF65]) only where necessary on problem areas.*

3.3 Noise Control

Outline of Procedure

Noise generated at the site during construction activities, will be largely attributable to operation of heavy construction vehicles as well as activities associated with turbine assembly and site preparation. This section contains measures to minimize noise emissions that may result from construction activities.

Principal Environmental Concerns

The construction phase of the proposed wind farm has the potential to be a noise source, contributing to the ambient acoustic environment of the region. This noise is mainly produced from the operation of construction equipment and vehicular activity. Construction activities will result in noise emissions in the surrounding environment. Noise associated with operation of heavy equipment will be in the range of 80-90 dBA at the source. Unmitigated, these noise emissions can disturb wildlife and may also interfere with the enjoyment of property for residents in the area.

Environmental Management Measures

The following measures will be implemented, to the extent possible, to control noise from construction activities:

- *All site activities will be carefully planned and performed in such a manner that noise is minimized.*
- *The frequency and/or duration of noise producing activities will be minimized wherever possible.*
- *All heavy construction equipment will be maintained in accordance with the manufacturer's specifications and equipped with appropriate mufflers and other noise control equipment to minimize noise where appropriate.*
- *Contractors will comply with the restrictions on hours of work for the site as determined by any applicable bylaws.*
- *All Project vehicles will be properly maintained and muffled to reduce noise emissions.*
- *The Contractor will ensure idling of construction vehicles is limited.*
- *The routing of truck traffic through residential areas will be controlled during the maximum period of activity.*
- *If complaints arise due to noise from truck traffic, acceptable alternate routing may be evaluated by the Contractor and the Municipality and implemented accordingly.*

3.4 Lighting Control

Outline of Procedure

Lights may be associated with equipment operation requirements and general lighting of work areas.

Principal Environmental Concerns

Excessive light emissions may cause a public disturbance in the vicinity of the project area, particularly during regular public off-work hours. Some lighting can also affect migratory paths of birds and lead to increased bird mortalities.

Environmental Management Measures

- *Minimum amount of aviation lighting required by Transport Canada ("TC") should be used, and TC should be consulted to see if white strobe lights with a minimum number of flashes per minute can be used.*
- *Strong lights, such as sodium vapor lights which are often used for security at substation buildings, should be avoided or shielded.*
- *Building lights will be positioned such that the direction of light is opposite to that of any residences, where possible.*
- *Where nuisance to local residents is an issue, scheduling of specific activities may be directed by the Environmental Monitor.*
- *Area lighting will be positioned and directed so as not to cause glare to approaching traffic.*
- *Building and area lighting will be directed toward the ground wherever possible.*

4.0 ENVIRONMENTAL PROTECTION MEASURES - MATERIALS, EQUIPMENT, FACILITIES

4.1 Petroleum, Oils, Lubricants, and Other Hazardous Materials

Outline of Procedure

A variety of potentially hazardous materials will be in use or stored for construction and maintenance activities for the proposed wind farm. Potentially hazardous materials routinely used include: *POLs, hydraulic fluids, acetylene, paints and solvents*. The procedures and requirements of the WHMIS program will be in place to protect employees and are generally applicable to the protection of the environment. These WHMIS procedures and requirements reinforce the proper handling, storage, and control of hazardous or toxic materials thereby reducing the potential for accidental release and consequent potential environmental effects.

Principal Environmental Concerns

The major concern regarding the use of these substances is their uncontrolled release to the environment through accidental spillage, and subsequent adverse effects on terrestrial, aquatic and marine habitat and species, soil, groundwater quality and human health and safety. The following protection measures are intended to minimize the potential for any POL spills on soil, vegetation, surface water, and groundwater.

Storage of Petroleum, Oil, Lubricant and Chemical Handling

All necessary precautions to prevent and minimize the spillage, misplacement or loss of fuels and other hazardous materials shall be taken. All Acts and Regulations pertaining to special substances shall be followed.

The delivery, storage, use and disposal of these hazardous materials will be handled only by trained personnel in accordance with government laws and regulations. The following precautions will be taken in handling POLs and chemicals:

- *The transport of fuel will be conducted in compliance with the Transportation of Dangerous Goods Act.*
- *Mobile fuelling trucks will be used to minimize the requirements for onsite storage of POLs.*
- *Diesel fuel and gasoline may be stored on site in limited quantities. Drums as required for one day's use will be on site, and drums will be delivered on a daily basis. Fuel drums will be stored upright on a deck with drip trays for the collection of spilled substances.*
- *Where possible, vehicle maintenance will be performed off site, at a nearby commercial fuelling station, in order to minimize the amount of lubricants and oils stored on site. On-site POL storage will be in a ventilated, lockable steel container. The container will be equipped with galvanized steel drip trays for the collection of spilled substances.*

- *The on-site POL storage container shall be located on level terrain, at least 100 m from any water body or wetland.*
- *Spill decks will be used for transferring products to smaller containers.*
- *No POL storage will occur in sensitive areas (e.g., near wetlands, watercourses or wells).*
- *Fire extinguishers and a spill kits will be located near POL storage areas.*
- *POL storage areas will be identified by signs, and “No Smoking” signs will be displayed at all POL storage sites and refueling areas.*
- *Smoking will not be permitted within 50 m of any POL storage area. On-site signage will indicate the location of smoking areas.*

POL and Chemical Handling Measures

- Equipment used will be mechanically sound with no oil or gas leaks. The Contractor shall undertake frequent inspection of equipment and repair leaks immediately.
- Fuelling, storage and servicing of vehicles and construction equipment is not allowed within 30 m of a watercourse, drainage ditch, areas with a high water table, or exposed and shallow bedrock.
- Spill clean-up materials shall be accessible and maintained in the areas of fuel and chemical storage. Any spilled fuel or lubricants shall be promptly cleaned up and disposed of in accordance with Ontario MOE requirements (MOE Spills Action Centre - 1-800-268-6060).
- No equipment shall be washed within 30 m of a watercourse.
- All tanks shall be protected from collision damage by the use of snow fencing to alert operators, or by the placement of barriers to impede equipment movement near the tank.
- Handling and fuelling practices shall ensure that contamination of groundwater will not occur.
- Fuel storage areas and transfer lines shall be clearly marked or barricaded to prevent damage from vehicles.
- If drums are stored on their sides, the drums shall be stored so that the bungs are in the 9" and 3" position, on level ground and prevented from rolling.
- Drum storage areas shall be marked or fenced with temporary fence to avoid impacts.
- Day-use quantities can be stored upright or on the side as required. Drip pans lined with absorbent pads shall be used beneath taps.
- All stained soil resulting from the use of chemicals or fuels shall be cleaned-up and disposed of prior to leaving the work area.
- Waste oils and lubricants will be retained in a closed container, and disposed of in an environmentally acceptable manner.

Equipment Fuelling

Only equipment that is not easily transported will be refueled on site. All other vehicles and equipment will be refueled at a central fuelling station:

When refueling equipment, operators will:

- *Use designated fuelling locations where practical;*
- *Use drips trays;*
- *Use leak free containers and reinforced rip and puncture proof hoses and nozzles;*
- *Be in attendance for the duration of the procedure; and*
- *Seal all storage container outlets except the outlet currently in use.*

Fuelling must be done at least 30 m from a wetland or water body. The Construction Manager will make daily

inspections of hydraulic and fuel systems on machinery and leaks will be repaired immediately. All spills will be reported to the MOE Spills Action Centre (1-800-268-6060). Servicing of equipment will not be allowed within 100 m of a wetland, watercourse or drainage ditch. Fuelling attendants will be trained in the requirements under the Fuel and Hazardous Material Spills Contingency Plan in this EMP.

POL Waste Disposal

- *Waste POLs will be stored in a ventilated, lockable steel container. The container will be equipped with galvanized steel drip trays for the collection of spilled substances.*
- *Waste solvents and oils will be stored separately.*
- *All used oil and petroleum products will be removed as required and disposed of in an acceptable manner in accordance with government regulations, and requirements.*
- *Waste oil will be collected separately and offered for recycling or stored for collection by an appropriate special waste collection and disposal company.*
- *Greasy or oily rags or materials subject to spontaneous combustion will be deposited, and kept, in an appropriate receptacle. This material will be removed from the work site on a regular basis and will be disposed of in an approved existing waste disposal facility.*
- *POL waste disposal will be the responsibility of the Contractor.*

Spills Response

Various lubricants, oils and fuels will be required during the operations period. Although unlikely, any leakage of oils from the turbines would be captured within the containment system. Spills response activities during the operations will be governed by this EMP. Legislation of relevance to spills management and response include:

- *Environmental Protection Act;*
- *Fisheries Act;*
- *Gasoline Handling Act;*
- *Ontario Pesticides Act;*
- *Ontario Water Resources Act; and,*
- *Transportation of Dangerous Goods Act.*

Federal and Provincial legislation place the responsibility for spill prevention and mitigation on the owner or controller of products or materials that can be spilled. Spills are defined under these Acts, as, but not limited to:

- *Spills from containers including drums and tanks;*
- *Spills resulting from breaks in hydraulic or transfer hoses or piping; and*
- *Spills resulting from traffic accidents and fire fighting.*

In accordance with these Acts, NPI has an obligation to:

- *Prevent, eliminate or remediate an adverse affect resulting from a spill; and*
- *Report the spill to NPI and the Ontario MOE (Spills Action Centre; Tel: 1-800-268-6060).*

NPI and its contractors shall reduce the likelihood of spills by implementing effective spill prevention measures such as the careful handling and proper storage of the products in use. In the event of a spill, the procedures detailed below shall be followed to facilitate a quick response.

Spills Response Measures

- The individual who discovers a leak or spill shall immediately attempt to stop and contain the release.
- Any spill or leak shall be reported immediately to NPI.
- NPI shall immediately report the release to the MOE Spills Action Centre (1-800-268-6060).
- NPI will have the authority to take appropriate action without unnecessary delay.
- NPI shall assume the overall responsibility of coordinating a cleanup and maintaining this contingency plan current and up-to-date. NPI shall, in consultation with regulatory authorities:
 - Deploy on-site personnel to contain the spilled material using a dyke, pit, absorbent material or booms, as appropriate;
 - Assess site conditions and environmental impact of various clean up procedures;
 - Choose and implement appropriate clean up procedure;
 - Deploy on-site personnel to mobilize pumps and empty drums (or other appropriate storage) to the spill site;
 - Apply absorbents as necessary;
 - Dispose of contaminate debris, cleaning materials, and absorbents by placing in an approved disposal site; and,
 - Take all necessary precautions to ensure that the incident does not reoccur.
- NPI shall submit a written report to appropriate regulatory authorities as required by applicable legislation.
- In order to respond to accidental releases, the following resources shall be made available on-site in an appropriate location to allow for immediate use:
 - Absorbent material (i.e., sorbent pads, Sorb-All, vermiculite); and
 - Protective equipment, shovels, rakes, tool kit, buckets and drums, stakes and tarpaulins.

4.2 Solid Waste Disposal

Outline of Procedure

During site preparation, construction, and maintenance, solid waste will be generated. Waste streams have been provisionally classified as domestic waste, paper, card board, wood and scrap steel and metals. This section contains measures for waste minimization, recycling and disposal.

Principal Environmental Concerns

Solid waste if not properly controlled and disposed of, can be unsightly and cause human safety and health concerns. Uncontrolled hazardous waste can contaminate soils, surface and groundwater, and can be toxic to vegetation, fish and wildlife if ingested in sufficient quantities.

Environmental Management Measures

The following protection measures will minimize the potential environmental effects of solid waste disposal:

- *Waste produced during the construction of the McLean's Mountain Wind Farm will be sorted as per the requirements of the Ontario "Waste Watch" Program.*
- *Domestic waste from temporary office quarters will be gathered on a regular basis and stored in closed containers until recycled or disposed of as per the requirements of the Ontario Waste Watch Program.*
- *Food waste will be stored in a manner that ensures wildlife will not be attracted and will be removed from the site on a daily basis.*
- *On-site temporary disposal areas for surplus material will be designated and will be located a minimum of 30 m from a wetland or watercourse. In circumstances where landowners will not permit the use of alternate locations the buffer zone will be reduced to a minimum of 10 m.*
- *The Contractor will, with the prior approval of the Site Supervisor, designate and use areas for the transfer and limited temporary storage of hazardous materials and special wastes. These sites will be properly labeled and appropriately controlled, and will be located a minimum of 30 m from a wetland or watercourse.*
- *All surplus materials, rubbish, waste materials, and construction debris will be removed from the site upon completion of construction of the project.*
- *All waste will be handled in accordance with relevant provincial and federal requirements.*
- *Waste material will not be dumped on-site. In such case as waste materials are inadvertently dumped, the Construction Manager (or designate) will immediately act to have the dumped material cleaned up and removed.*
- *No waste or debris will be permitted to enter any watercourse.*
- *Only material approved by the Environmental Monitor and the Site Supervisor will be disposed of or reused onsite (e.g., clean fill materials).*
- *Run-off from a disposal/storage area will not be allowed to enter a watercourse.*

4.3 Sewage Disposal

Outline of Procedure

Work area facilities for personnel will have sewage collection systems that will comprise temporary toilet and washing facilities or hook-ups to permanent facilities.

Principal Environmental Concerns

In most cases, it is not feasible to install permanent sewage treatment facilities at work sites. Employees will require toilet and washing facilities. The release of untreated sewage is a concern to human health, drinking water quality, and freshwater and marine ecosystems.

Environmental Management Measures

The following protection measures will minimize the potential environmental effects of sewage disposal:

- *Temporary or permanent facilities will be developed in compliance with Ontario's Environmental Protection Act to ensure that sewage effluent is not released untreated to the environment.*

Temporary Sewage Disposal

- *During the initial stages of site development and where it is not feasible to install sewage treatment facilities, portable and/or temporary toilets and wash cars will be developed with holding tanks.*
- *The holding tanks will be pumped and emptied at the treatment facilities, as required.*

Permanent Sewage Disposal

- *Where sewage facilities are required, developments will proceed, in accordance with*
- *Ontario's Environmental Protection Act, for a temporary or permanent sewage collection and treatment system (if required).*

5.0 CONTINGENCY PLANS FOR UNPLANNED EVENTS

5.1 Emergency Response Plan

Employee Training Program

NPI will develop and an operations training program to ensure personnel receive appropriate training in relation to operation and maintenance programs, environmental, health, and safety procedures, and emergency response plan. Training will cover issues such as:

- *Accident reporting;*
- *Chemical and hazardous materials handling;*
- *Fall and arrest protection;*
- *Eye, ears, head, hands, feet, and body protective equipment;*
- *First aid training and equipment;*
- *Equipment operation and hazards;*
- *Fire prevention and response;*
- *Lockout and tag out procedures;*
- *Scaffolds and ladders;*
- *Fire preparedness and response;*
- *Natural disasters (i.e., extreme weather events);*
- *Hazardous materials and spill response;*
- *Medical emergencies; and*
- *Rescue procedures.*

Training should begin as initial staff is hired during the pre-operational mobilization period. There should also be on-going training for personnel as well as specific training sessions for new hires.

5.2 Erosion Control Failure

Outline of Procedure

Control of erosion and potential sedimentation of receiving water bodies is one of the most critical environmental management concerns for this Project. Erosion control methods will be applied where there is the potential for erosion due to rain, flowing water, steep slopes and highly erodible soils. This program contains measures to prevent failure of erosion control structures.

Principal Environmental Concerns

The principal environmental concern is the associated sediment-laden runoff and the resulting effects on water quality, aquatic ecosystems and environmentally sensitive areas such as wetlands.

Environmental Management Measures

The following measures will be implemented to minimize the potential environmental effects in the event of erosion control failure.

Prevention:

- *Erosion control measures will be implemented as described earlier in this EMP, or as deemed necessary by the Construction Project Manager.*
- *Supplies for any emergency response will be on hand at all times. This may include, but not be limited to, straw bales, filter fabric and silt curtains.*

Emergency Response Action Plan:

- *If siltation of the nearby watercourses is observed, notify the Construction Project Manager and identify the source of the siltation. Siltation indicates preventative measures have been ineffective.*
- *Suspend any construction operations contributing to the problem.*
- *Isolate, contain, and control the source using measures such as straw bales or brush mats. Erosion control structures will be fixed immediately.*
- *If the release has affected, or has the potential to affect, a sensitive area (i.e., a wetland or watercourse), the Construction Project Manager or Environmental Monitor will contact and consult with the appropriate regulatory authorities (e.g., OMNR, Fisheries and Oceans Canada) as required for notification and planning.*
- *To ensure that erosion and sediment control measures are in effective working order, their condition will be monitored periodically and prior to, during, and following storm events.*
- *Accumulated sediment will be removed once it reaches a depth of one-half the effective height of the control measure or a depth of 300 mm immediately upstream of the control measure.*
- *For all erosion control measures, accumulated sediment will be removed as necessary to perform maintenance repairs.*
- *Accumulated sediment will be removed immediately prior to the removal of control measures.*
- *The sediment removed will be deposited in an area that is approved by the Construction Project Manager and will not result in erosion and runoff into a watercourse.*

5.2 Fuel and Hazardous Materials Spills

Outline of Procedure

This Fuel and Hazardous Material Spills Contingency Plan presents a detailed response system to deal with accidents such as the release of POLs or other hazardous materials. The objectives of the Plan are to minimize the following:

- *danger to persons;*
- *pollution of land and water;*

- *size of affected area; and*
- *degree of disturbance during clean-up.*

Principal Environmental Concerns

The day-to-day operations of construction equipment, machinery and vehicles, as well as the transfer of fuel from storage containers to these, offer the potential for fuel spills. Other hazardous material products include hydraulic fluids, lubricating oil, solvents, anti-freeze, and paint. Fuels and other hazardous materials can be damaging to vegetation, soil, surface water, groundwater, human health, wildlife and aquatic organisms. Please see **Appendix 2** for the required arrangement for a static refueling point.

Environmental Management Measures

Prevention of Fuel and Hazardous Materials Spills

The following measures will be implemented to minimize the potential environmental effects in the event of a fuel or hazardous material spill:

- *Hazardous materials will be handled only by personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations. The WHMIS program will be implemented in accordance with the Ontario Occupational Health and Safety Act and Regulations.*
- *All employees involved with hazardous materials will be trained in the use of safety equipment, spill prevention equipment and emergency response procedures.*
- *Hazardous materials will be stored and handled in accordance with applicable provincial and federal regulations, codes and guidelines.*
- *Storage of hazardous materials will not occur in environmentally sensitive areas, such as wetlands or watercourses. Hazardous material containers will be properly labeled in compliance with the requirements of WHMIS.*
- *Material Safety Data Sheets (MSDS) will be available for all hazardous materials in use or stored on-site.*
- *A Fuel and Hazardous Material Spill Contingency Plan has been developed below.*
- *Designated personnel will be trained in the procedures and responsibilities outlined in the Contingency Plan.*
- *All hazardous materials will be removed and disposed of in an acceptable manner in accordance with government regulations and requirements. Hazardous materials may be removed from the site by an appropriate special waste collection and disposal company.*
- *Contaminated materials will be separated from uncontaminated materials and disposed of at approved waste disposal facilities.*
- *Reduce the need for hazardous substances by substituting for less harmful ones.*
- *Incorporate appropriate preventative and response measures and construction practices.*
- *Providing environmental awareness training to contractors and workers involved in the Project. Training will include the handling, clean-up, reporting and disposal of contaminated material.*

- *Maintaining appropriate spill response equipment in a readily accessible location.*
- *Reporting all spills to applicable authorities (e.g., 24-hour emergency reporting system at the MOE Spills Action Centre (1-800-268-6060)).*
- *The inspection of equipment (e.g., construction vehicles, exhaust systems) by the site personnel to ensure that vehicles with obvious fuel or oil leaks do not enter the project area.*

Best management practices prescribe the presence of spill kits on location and on the vehicles. Spill management procedures as outlined in the contingency plan will be followed when a spill occurs. Spill kits are mandatory on site. Any discharge will be cleaned immediately and authorities notified (e.g. OMNR, Department of Fisheries and Oceans).

Contingency and Response Plan

- *If it is safe to do so, the individual who discovers the leak or spill will immediately attempt to stop and contain the leak or spill.*
- *Any spill or leak must be reported immediately to the Construction Project Manager or designate.*
- *The Construction Project Manager will immediately report the spill to the MOE Spills Action Centre 24-hour Report Line (1-800-268-6060).*
- *A Spill Report Form will be filled out and will include:*
 - *a description of the source, including the name of the owner or operator;*
 - *the nature, extent, duration and environmental impact of the release;*
 - *the cause or suspected cause of the release;*
 - *any remedial action taken or to be taken to prevent a recurrence of the leak or spill;*
 - *The site Contractor will have the full authority to take appropriate action without unnecessary delay. The Spill Report Form will be filled out immediately following the discovery of the spill or leak, by the Contractor, and forwarded to the Environmental Monitor; Spill Reports will be made available to the OMNR upon request; and,*
 - *The Contractor will assume the overall responsibility for coordinating the clean-up and maintaining this contingency plan current and up-to-date.*
- *The Contractor will, in consultation with the regulatory authorities (if warranted):*
 - *deploy on-site personnel to contain the spilled material using a dyke, pit, or absorbent material;*
 - *assess site conditions and environmental impact of various cleanup procedures;*
 - *choose and implement an appropriate cleanup procedure;*
 - *deploy on-site personnel to mobilize pumps and empty drums (or other appropriate storage) to the spill site;*
 - *dispose of all contaminated debris, cleaning materials, and absorbents by placing in an approved disposal site; and take all necessary precautions to ensure that the incident does not recur; and,*
 - *The Contractor, with approval by the Environmental Monitor, will send a completed Spill Report Form to the OMNR, as soon as possible, and no later than 30 days after the spill.*

Spill Cleanup Resource List

During construction, the following resources will be available at an appropriate location in readiness to respond to accidental releases of fuels and/or hazardous materials:

- *Absorbent materials (i.e., sorbent pads, Sorb-All, peat moss);*
- *Small equipment such as shovels, rakes, tool kit, sledgehammer, buckets, stakes, tarpaulins, one empty drum, and protective equipment; and,*
- *Refer to the contact list of this EMP which contains the spill response information.*

5.3 Archaeological and Heritage Resources

Outline of Procedure

Archaeological/heritage resources are defined as known archaeological sites, designated historic sites, and heritage structures. These resources are considered important as they are recognized by the Province and form part of a collective body of information used to understand and define the Provincial heritage.

The geographical extent of any adverse effects will be the entire resource and adjacent areas associated with heritage resources that occur within the Project footprint. The magnitude of construction effects on unknown heritage resources will be high, as clearing and excavation activities will expose the resource. This effect will be immediate and irreversible. If unknown resources are encountered during either the construction or operation phase, they will be affected, and effects will be site-specific. However, the potential for significant loss of knowledge would be minimized through the initiation of a contingency plan for affected resources.

In addition to these resources, although much less likely, there is the potential for human remains to be encountered during construction. This plan will guide the Municipality and/or their contractors and subcontractors in how to respond in the event that a potential archaeological resource is encountered during construction activities.

Principal Environmental Concerns

These features represent a valuable cultural resource, and uncontrolled disturbance could result in loss of or damage to these resources and the information represented by them.

Environmental Management Measures

The following measures will be implemented to minimize the potential environmental or cultural effects in the event of the discovery of heritage resources

Preventing Archaeological and Heritage Resource Encounters

- *All areas containing known historic or archaeological resources will be avoided where possible, and will be flagged or otherwise clearly marked to indicate that the area has elevated archaeological potential and /or significance.*
- *All mechanized vehicles/equipment will remain within the existing site roads except where required for clearing and other construction activities. Vehicles and equipment will avoid areas marked as having elevated archaeological potential.*

Contingency and Response Plan

- *All work will cease in the immediate area of the discovery until such time as the Environmental Monitor, having consulted with provincial authorities, advises those involved as to the disposition of the discovery and authorizes a resumption of the work.*
- *Archaeological materials encountered will be reported to the Environmental Monitor with the following information:*
 - *nature of activity resulting in the discovery;*
 - *nature of the material discovered;*
 - *the precise location of the find; and*
 - *names of persons witnessing the discovery.*

All heritage resources, including archaeological objects and sites of archaeological or historical interest or significance discovered on the site, will be deemed to be the property of the Crown and will not be disturbed. All precautions will be taken to prevent employees or other persons from removing any artifacts or damaging sites, as personnel may be held liable by prosecution for all contraventions. All human remains will be reported directly to the local police.

5.4 Wildlife Encounters

Outline of Procedure

This program contains measures to minimize interactions that Municipal and Contractor personnel may have with wildlife during Project construction.

Principal Environmental Concerns

Encounters with wildlife may result in distress for both the animal and the employee. Serious injury could result to site workers in some instances. Threats to personnel include encounters with wildlife especially animals with young and rabid animals. Bites from any animals are potentially dangerous. Wildlife encounters have the potential to distress animals to the point of altering feeding and breeding behavior. Physical injury or death to wildlife could also occur.

Environmental Management Measures

Personnel Training

Personnel will be advised of the appropriate measures to use in the event of a wildlife encounter. Personnel will be instructed in the correct and sanitary method of garbage disposal in designated disposal locations; this will minimize wildlife encounters.

Prevention

The following waste disposal recommendations will minimize the attraction of wildlife:

- *Keep work area clean of food scraps and garbage.*
- *Transport waste to an approved landfill on a regular basis.*

Contingency and Response Plan

- *All personnel will report the presence of wildlife to the Construction Project Manager.*
- *When wildlife sightings are reported to the Construction Project Manager, the Construction Project Manager will initiate any reasonable action to reduce the chance of disruption or injury.*
- *Should disruption or injury to the wildlife occur, the Construction Manager will contact the on-call Conservation Officer.*
- *In the case of wildlife encounters in sensitive areas, and for consultation on appropriate action to be taken for any encounter, the Construction Manager will contact the on-call Conservation Officer.*
- *No attempt to harass wildlife will be made by any person at the work site.*
- *Equipment and vehicles will yield the right-of-way to wildlife.*
- *If dead animals are encountered (including birds or bats), they will be removed and disposed of, as soon as possible, in consultation with the local Provincial Wildlife Officer (or, in the case of a pet, the Ontario Humane Society). All handling of bird carcasses will be in accordance with the MBCA salvage permit. If Species at Risk ("SAR") species carcasses are found they will be sent to the Ontario Region Canadian Wildlife Service ("CWS") office with suitable permitting as advised by the Canadian Wildlife Service.*
- *In the case of encounters with injured or diseased wildlife at the work site (including birds or bats), the Construction Manager will contact the on-call Conservation Officer. No attempt will be made to harass the animal, and no person at the work site will come into direct contact with the animal.*
- *Injured birds and other wildlife will be transported to the Wild at Heart Wildlife Refuge Centre in Sudbury (11 White Rd. – Lively, ON Canada P3Y 1C3 - mail@wahrefugecentre.org – 705-692-4478) which has been operating for over 20 years as a non-profit and registered charity, has provided veterinary treatment and rehabilitation to wild animals that are orphaned, sick or injured, so that they may be reintroduced into the wild. The centre's volunteers treat up to 500 animals per year, including songbirds, raptors, shorebirds, waterfowl, small mammals, and orphaned large mammals.*

- *If an injured or dead bird or bat is encountered, the following information will be recorded: date and time it was found, injury sustained (if identifiable), cause of injury (if known), and species. This information will be kept on file for incorporation into the post-construction bird monitoring program.*

5.5 Fires

Outline of Procedure

Activities related to construction could result in a fire that could spread to the surrounding area. Alternatively, a fire started off-site could spread into the Project area. This Contingency Plan contains measures for fire prevention as well as response action plans.

Principal Environmental Concerns

Fires could result in terrestrial habitat alteration, and direct mortality of wildlife. Fire fighting chemicals and spilled materials could enter aquatic habitat and adversely affect biota and habitat. Fires also have the potential to adversely affect air quality and could pose risks to human health and safety.

Environmental Management Measures

The following measures will be implemented to minimize the potential for causing a fire and the potential environmental effects in the event of a fire.

Personnel Training

All persons working on the site will be trained in the use of on-site firefighting equipment, fire prevention and response.

Prevention

- *All flammable waste will be disposed of on a regular basis.*
- *There will be no smoking within 50 m of flammable product storage or usage. Areas for disposal of smoking material will be clearly posted.*
- *Firefighting equipment, sufficient to suit on-site fire hazards, will be maintained in proper condition and to the manufacturer's standards.*

Contingency and Response Plan

- *Notify nearby personnel.*
- *On-site personnel will take immediate steps to extinguish the fire using appropriate equipment.*
- *Notify the Environmental Monitor and Construction Manager.*
- *If the fire cannot be contained, contact the NEMI Fire Department at 9-1-1.*
- *In case of related medical emergencies, emergency medical assistance will be requested from 9-1-1.*

Decommissioning Program

The design life of the wind turbines is estimated to be approximately 30 years, but it is possible that the turbines could continue to operate at the same location after the design life either through major turbine overhauls or with the replacement of the turbines with newer models.

Should decommissioning become necessary, NPI would follow the standard industry accepted practices in effect at that time. Such practices include the removal of facilities, recycling of suitable materials (e.g., metal and parts), reuse of components and equipment in other facilities, conversion of buildings to other uses, and/or rehabilitation of the site areas. This would include the removal of the turbines bases to a depth of approximately 1 m or bedrock and backfilling with a final layer of top soil. Similarly, access road base material would be removed and the areas returned to their former state (e.g., agriculture on natural habitat).

Health and Safety Plan

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.

6.0 ENVIRONMENTAL INSPECTION AND MONITORING

6.1 Bird Monitoring Program Overview and Mitigation Measures

Dillon completed numerous surveys between 2004-2008 for the purpose of documenting bird usage of the study area during all seasons. The specific target species or groups of these surveys and the methods used were the result of issues identified during a background information review and local knowledge of the area.

Overall, a total of 14 349 individual birds were observed during surveys, which were made up of 105 species. High numbers were observed for a select few groups including: landbirds (10 176 [70.8%]), and waterbirds (2 455 [17.1%]). The latter is primarily a result of high numbers of Ring-billed Gulls.

During spring bird surveys in 2005 and 2008, gulls and landbirds such as sparrows, crows, ravens and warblers made up the majority of species numbers. These species use both grassland and forest habitat and may be displaced by turbine placement. Additionally, a Sharp-tailed Grouse lek was identified in a field within the study site.

Breeding bird surveys in 2007 and 2008 revealed that forest habitats supported the greatest number of species in the study area. In woodland areas, among the most abundant species were Red-eyed Vireos, Song Sparrows, American Robins and Ovenbirds. In marsh areas, a few pairs of Sandhill Cranes were seen nesting, however this portion of Manitoulin Island does not appear to support the larger numbers seen outside of the study area. Little information is available to predict the effects of turbines on Sandhill Cranes, but it is anticipated that they will behave similarly to geese and waterfowl and will be fairly adaptable to the turbines if they are spaced widely apart.

During fall migration the largest numbers observed were flocks of American Pipits. These flocks were seen frequently during surveys foraging in fields and along roadways. A few other landbird species such as European Starlings, Red-winged Blackbirds and American Crows were also recorded in high numbers. No large migration of hawks in the project area was observed.

In the winter, approximately 300 individuals were recorded during survey studies. Although 15 species were reported, half of the individuals observed were Common Ravens and Black-capped Chickadees.

Species at risk or other conservation concern species observed in the study area did not occur in any significant numbers. Impacts likely to remain in some capacity include some potential for interaction between BCR 13 Open Country and Forest habitat birds. It is recommended that, where possible, construction occur outside of the core breeding period for birds in the area.

Mitigation Measures

The potential for effects on wildlife and wildlife habitat has been reduced through the siting of turbines away from sensitive habitat. Mitigation measures to be implemented were discussed with OMNR staff. From these discussions and as guided by the new Ontario Regulation 359/09 setbacks were developed.

A Setback has been provided for the following natural or sensitive feature:

- *30m Watercourse Setback;*
- *120m River/Stream Setback;*
- *55m Non Participating Lot Setback;*
- *55m Road Setback;*
- *120m Wetland Setback;*
- *120m Life Science ANSI Setback;*
- *305m Perch Lake Setback;*
- *550m Residence Setback; and*
- *150 m Unknown Stick Nests Setback*

It is recommended that no vegetation clearing take place during the core breeding season of May 9 to July 23. If clearing does take place during this period, 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.

6.2 Bat Monitoring Program Overview and Mitigation Measures

Natural Resource Solutions Inc. ("NRSI") conducted bat monitoring on the McLean's Mountain study area in 2008 during late July and September. Additional monitoring was conducted in August 2009 to ensure overlap with peak periods of bat movement, for the fall season. The level of bat monitoring that was conducted was based on recommendations from Sudbury district MNR (2008) and the Espanola district MNR (2009). The total number of stations, including one elevated station, within the study area was also approved by local MNR staff.

Collection and review of background information on biological features of the study area and vicinity have occurred since work commenced in July 2008, and have continued until the completion of this report. Background collection and review included frequent reference to Natural Heritage Information Centre ("NHIC"), Species at Risk Act, and liaison with knowledgeable local naturalists and agency staff.

The proposed 2008 work program was submitted to Bruce Richard (MNR District Planner) and Jim Brinsmead (MNR Management Biologist) on July 17, 2008 by Caroline Walmsley (NRSI). Following review of this document and mapping, MNR Biologist Jim Brinsmead provided comments (dated July 28, 2008) on the work program, and suggested the number of monitoring nights and number of stations (7), including one station elevated to a height of 30m. On August 10, 2009 the proposed 2009 work program was submitted to Caleigh Sinclair (Espanola District MNR) by Caroline Walmsley (NRSI). Ms Sinclair provided comments (dated August 24, 2009) on the work program. These comments were taken into consideration by NRSI staff and the work programs were revised prior to the monitoring periods.

Based on the habitat and landscape features present within the study area and the placement of 7 monitoring stations, 3 radar stations and 7 point count locations, data collected by NSRI adequately characterizes bat populations and activity patterns within McLean's Mountain study area. Data has been collected in such a

way to allow for accurate comparison with post-construction monitoring results and easy study replication during the operational phase of this wind facility to determine the extent of impact.

Based on the results from the 2008 and 2009 monitoring period, the MMWF is found to have a relatively low level of bat activity.

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. NPI will enter into discussions with the OMNR regarding the need for post-construction mortality monitoring for bats for this project.

6.3 Species at Risk and BCR 13 Program Overview and Mitigation Measures

Outline of Procedure

Extensive fieldwork has confirmed that SAR occur in the project area, and historical records indicate the potential presence of several others. Mitigations (e.g. setbacks from natural features) have been implemented to reduce possible impacts to these species. However, some potential interaction with these species during and post-construction may occur. This section outlines measures to be implemented during construction and operation of the wind farm. Species at risk considered in the development of the program include:

- Houghton's goldenrod (*Solidago houghtonii*) Federally Special Concern, Provincially Threatened
- Blanding's turtle (*Emydoidea blandingii*) Federally and Provincially Threatened
- Massasauga rattlesnake (*Sistrurus catenatus*) Federally and Provincially Threatened
- Loggerhead shrike (*Lanus ludovicianus*) Federally and Provincially Endangered
- Canada warbler (*Wilsonia canadensis*) Provincially Special Concern
- Common nighthawk (*Chordeiles minor*) Federally and Provincially Special Concern
- Chimney swift (*Chaetura pelagica*) Provincially Special Concern
- Short-eared owl (*Asio flammeus*) Federally and Provincially Special Concern
- Golden-winged warbler (*Vermivora chrysoptera*) Federally Threatened, Provincially Special Concern

Other species, such as the 17 BCR 13 priority birds that were observed during fieldwork were also considered during the development of program. The implementation of this program during the construction and operational phases of the project will help mitigate mortality as well as track possible interactions with these species.

Principal Environmental Concerns

Species at risk as well as other sensitive species may be impacted by the construction and/or operation of the wind farm. These impacts vary depending on the species and their utilization of the study area. In some cases impacts may result in mortality (e.g. collisions) or displacement as a result of infrastructure placed in key habitat.

Houghton's Goldenrod

Though not observed during botanical surveys, the potential exists that individuals or colonies of Houghton's goldenrod may occur in the project area at planned turbine and access road locations and thus be disturbed or removed during construction. This species is usually found in damp or wet inter-dunal areas, and on alvar habitats that are flooded in the spring, but become dry through the growing season (COSEWIC 2005a). Though potential habitat exists for this species, the majority of areas with alvar characteristics have been disturbed through cattle grazing.

Blanding's Turtle and Massasauga Rattlesnake

Blanding's turtle was not observed at any point during fieldwork conducted from 2004-2008. Potential breeding habitat exists at Perch Lake and other small wetlands in the project area. (MNR has recent records for this species at Perch Lake). Blanding's turtles usually construct nests in loose sand and organic soil but may also use roadside gravel, and nests are usually constructed within approximately 400 meters of a water body. However, it is also recognized that Blanding's turtle is a mobile species and can disperse up to 7km from wetlands, though it is more likely to be found in closer proximity to wetland habitats (i.e. within 1km) (COSEWIC 2005b).

Massasauga rattlesnake was not observed at any point during fieldwork conducted from 2004-2008. Records for this species in the project area date from the mid 1980's, though the species is known to currently occur on Manitoulin Island outside of the Study Area (Eric Cobb MNR SAR Biologist, Personal Communication). Massasaugas can inhabit a wide variety of habitats but generally require open areas to bask for thermoregulation. Hibernacula are often located at damp or water saturated sites and massasaugas are known to associate with wetlands, particularly near river mouths (COSEWIC 2002).

In general, turbine locations and access roads will maintain a setback of 120m from wetlands, avoiding impacts to potential hibernacula and the potential nesting sites for herptile SAR during construction. A small number of planned turbines locations are within the 120m wetland buffer including turbine numbers 3, 6, 11, 17 and 39. In addition, a 305m setback will be provided for Perch Lake. The construction of access roads and turbines outside of wetlands/Perch Lake and their buffers will not impede corridor connections with other seasonal habitats. However, potential nesting along access road edges, dispersal and basking behaviours will likely still pose a risk to Blanding's turtle and massasauga rattlesnake during the construction and operational phases of the project.

Avian SAR and BCR 13 Birds

Concerns have been identified regarding potential mortality effects to SAR birds as well as the risk of disturbance impacts on the 17 BCR 13 priority species that were observed during fieldwork. Results show 8 forest species, 7 open country species and 2 marsh/water species BCR 13 bird species occur in the study area. A full list of the BCR 13 priority species observed in the Study Area can be found in Table 7 (p.28) of the

Bird Study Report, Appendix D in the ESR, and in Section 6.9 of the ESR. Additionally, species such as sharp-tailed grouse, upland sandpiper and Wilson's snipe have been identified as being susceptible to impacts due to their aerial flight displays.

Environmental Management Measures

Houghton's Goldenrod

Prior to construction, trained individuals will conduct a search for Houghton's goldenrod, during the month of August when this species is most easily identified (Eric Cobb MNR SAR Biologist, Personal Communication), in areas where appropriate habitat exists at proposed access road and turbine sites. This includes turbines 1, 4, 5, 9, 10, 13, 15, 16, 17, 19, 25, 26, 28, 31 and 32 and the access roads associated with these turbines. In the event that Houghton's goldenrod individuals are found on a road allowance or turbine site, options for mitigation will include, slightly modifying the proposed road or turbine location; in instances where moving an access road and/or turbines is unfeasible, NPI will apply for the appropriate permit under section 17, subsection 2, of Ontario's Endangered Species Act, 2007 to transplant affected individuals or collect seeds to establish plants at an alternate location that is agreeable to the MNR.

Blanding's Turtle and Massasauga Rattlesnake

Pre-Construction

Pre-construction surveys will be conducted at proposed access road and turbine locations in areas that contain potentially suitable hibernacula and nesting features. These habitat features would be most likely to be found at turbines 3, 6, 11, 17, and 39 which are located within the 120m wetland setback but could also include turbines 19, 27, 29, 31, 34, 40 and 41 which are all located adjacent to wetland or stream features but remain outside the 120m setback. In addition, sections of access roads planned for turbines 3, 6, 13, 21, 27, 29, 31, 34, 39, 40 and 41 cross or come close to wetland and stream features.

Pre-construction surveys for potential Blanding's turtle nest sites will include visual encounter surveys and terrestrial habitat searches adapted from the MNR's Wildlife Monitoring Programs and Techniques for Ontario document (Konze and McLaren 1997) and will occur during the first three weeks of June, when the species is breeding and most active in Ontario (COSEWIC 2005b). Guidelines developed by the Massasauga Recovery Team (2005) will be used to assess the presence of potential massasauga rattlesnake habitat features associated with the turbines identified above. Massasauga surveys will be conducted during late April to early May, as the snakes tend to spend much of their time basking near hibernacula sites and would be most conspicuous at this time.

In the event that active nesting sites or hibernacula are found in future road allowance or turbine site, options for mitigation will be considered including: moving the proposed road or turbine as feasible; or if moving access roads and turbines is unfeasible, applying for a permit under section 17, subsection 2 in Ontario's Endangered Species Act, 2007 and fulfilling obligations of this permit.

Construction and Operation

Fencing will be placed around turbine construction zones within 120m of wetland habitats to prevent herptiles from entering. In the event that a herptile SAR is observed in the construction zone and needs to be relocated, the MNR will be notified for direction. The stockpile of construction materials and equipment will be located in specific areas outside of the 120m wetland buffer zone.

Construction and maintenance workers will be educated in identification of Blanding's turtles and massasauga rattlesnakes and habitat areas with a higher potential occurrence of these species. Access roads will be used intermittently at low speeds by maintenance, environmental monitoring and operational personnel. Implementation of specially posted speed limits for construction and maintenance vehicles in areas within a specified distance of wetland habitats and the use of signage to alert personnel of the potential presence of these species will be implemented to further reduce the likelihood of negative impacts. Personnel will avoid handling herptile SAR and all instances of road kill will be immediately reported the MNR.

Avian SAR and BCR 13 Birds

Pre-Construction

Additional monitoring will be completed in the study area for common nighthawk and Wilson's snipe, prior to construction. Monitoring will consist of evening point count surveys between mid April to the end of May, where turbines are within 500m of appropriate habitat.

Construction and Operation

The majority of the concerns related to Avian SAR and BCR 13 birds are being monitored as part of the Avian Post-construction Monitoring Plan, which is appended. The following details information relevant to the operation of the wind farm.

Construction and maintenance personnel will be educated in the identification of SAR bird species that may occur in the Study Area, including which habitat these species prefer. Observations of these species during the operation of the wind farm will be provided to EC and the MNR as they occur.

Destruction and disturbance of active migratory bird nests (with eggs or young birds) as well as wounding and/or killing protected species, which includes the birds discussed above, is prohibited under the *Migratory Birds Convention Act (MBCA)* (1994) and the provincial *Fish and Wildlife Conservation Act* (1997). Vegetation clearing for the construction of the McLeans Mountain Wind Farm during the core breeding bird period could impact nesting birds, resulting in a contravention to the *MBCA*, *Species at Risk Act* and/or the *Endangered Species Act*. To protect birds and comply with relevant federal and provincial legislation, all vegetation removal should be completed outside of the bird-breeding season from May 9th to July 23rd. Although discouraged, any vegetation removal during this breeding period will require a nest search by a qualified Avian Biologist prior to clearing the area. Nest discovered will receive a protective buffer zone.

In general, if bird SAR are discovered nesting close to turbines or if observed mortality impacts for any avian

SAR are found to occur, EC and the MNR will be consulted to establish the appropriate mitigative responses. The potential need for operational modifications can be discussed with the MNR and will be considered on a turbine by turbine basis, based on areas of concern identified through existing knowledge at the time and as deemed economically feasible. Actions taken in response to the mortality of a SAR or other sensitive species identified above will depend on species involved, behaviour implicated (migration, foraging etc.) and geographical extent of the observed mortality, as agreed upon by the relevant agencies.

6.4 Post-Construction Monitoring for the McLean's Mountain Wind Farm

NPI has prepared a post construction avian and bat monitoring program, which is provided in Appendix 4. Environment Canada/CWS and the Ontario MNR will be consulted regarding the scope of the program.

Terrestrial Habitat/Wildlife

Terrestrial habitat/wildlife in the area could be affected through disturbance effects from the operation of heavy equipment in the area. As the study area is actively farmed, it is expected that many species have become adapted to the operation of heavy machinery. Nevertheless, NPI will take reasonable measures to ensure that construction equipment is kept in good working condition and that excessive noise and air emissions from machinery is avoided.

Accidental spills could also affect habitat. NPI will be required to 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.

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

Aquatic Habitat/Surface Water

It is expected that monitoring activities relating to aquatic habitat will be confirmed through the ongoing permitting process with the MNR and DFO. The monitoring of aquatic habitat will occur at different levels. During construction, NPI 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. Some 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 feasible.

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 rehab works not be effective.

All culverts will also be inspected on a frequent basis during construction to ensure that they are conveying

water flow and not resulting in upstream flooding (either through blockage from debris or because of their under sizing).

Pasture Land

Potential effects on pasture soil as a result of the project include: soil compaction, increased stoniness soil subsidence after trench refilling and soil erosion. The movement of construction equipment such as the erection cranes has the potential to compact soils in pasture areas. Soil compaction will be monitored and where necessary it will be decompacted. Trench areas will be monitored for excessive stoniness and soil subsidence. Stones may need to be removed and additional soil added to some sections of the refilled trench. The Class of this land is expected to be below Class 3.

Areas that have had topsoil removed and then replaced will be inspected to ensure that topsoil/sub soil layer mixing has not occurred. Through sampling, if soil mixing has occurred, appropriate measures will be put in place to correct this.

Construction Disturbance Effects

During the construction period, there is the potential for disturbance effects such as a noise and dust. It is expected that standard construction practices will minimize these effects as much as feasible. 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.

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.

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 could potentially 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;*
- *Creation of a Community Benefit Fund, whereby landowners and community member will have input into funding priorities;*
- *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 may hold another community public information centre to present the final proposed transmission line route if required; and*
- *Ongoing consultations and meetings with project landowners.*

7.0 KEY CONTACT LIST

The following section lists key organizations and/or individuals that may be contacted during emergency situations and regarding regulatory issues, followed by the Project Contact List. This list will be posted in the base of each turbine, and it will be carried by maintenance personnel during the operation phase of the project.

Agency	Area	Phone Number
Emergency Contacts		
Ambulance/Police/Fire/Rescue		9-1-1
RCMP/OPP		9-1-1
Regulatory and Municipal Contacts		
Ontario Ministry of Environment	Paula Allen Environmental Planner/ EA Coordinator Ministry of the Environment 199 Larch Street, Suite 1201 Sudbury ON P3E 5P9	705-564-3273
Ministry of Transportation Ontario (MTO)	Sudbury 159 Cedar Street 5th Floor, Suite 503 Sudbury, ON P3E 6A5	705-564-7722
Association of Worker's Compensation Board of Canada	Customer Liaison Officer	905-542-3633
Department of Fisheries and Oceans	Fisheries and Oceans Canada Ontario Area 867 Lakeshore Road	905-336-4595



	Burlington Ontario L7R 4A6	
Environment Canada (EC) / Canadian Wildlife Service (CWS)	Bird / Bat Conservation Officer	1-800-668-6767
Ministry of Natural Resources (OMNR)	Ms. Caleigh Sinclair Espanola District Office Ministry of Natural Resources 148 Fleming Street, 2nd Floor Espanola, ON, P5E 1R8	705-869-1330
Environmental Emergencies and Spills		
Local Hospitals with Emergency Services	Sudbury Regional Hospital 700 Paris Street, Sudbury, ON, P3E 3B5	1-866-469-0822
MOE Spills Action Centre	24-hour Report Line	1-800-268-6060
Project Contacts		
Development Manager	TBD	
Environmental Monitor	TBD	
Site Supervisor	TBD	
Construction Manager	TBD	

8.0 REFERENCES

- Cadman, M.D., D. A. Sutherland, G. G. Beck, D. Lepage, and A. R. Couturier. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, and Ontario Nature. 728 pages.
- COSEWIC 2002. COSEWIC assessment and update status report on the massasauga *Sistrurus catenatus* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 23 pp.
- COSEWIC 2005a. COSEWIC assessment and status report on the Houghton's goldenrod *Solidago houghtonii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 17 pp.
- COSEWIC 2005b. COSEWIC assessment and update status report on the Blanding's Turtle *Emydoidea blandingii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. viii + 40 pp.
- Environment Canada. 2007. Wind Turbines and Birds: A Guidance Document for Environmental Assessment. Final Report. February 2007.
- Konze, Karl and McLaren, Margaret. 1997. Wildlife Monitoring Programs and Inventory Techniques for Ontario. Ontario Ministry of Natural Resources. Northeast Science and Technology. Technical Manual TM-009. 139 pp.
- Massasauga Recovery Team. 2005. Guidelines for Identifying Significant Habitat, and Significant Wildlife Habitat, for the Massasauga in Eastern Georgian Bay and Bruce Peninsula Populations, Ontario. Version 1.0 – July 2005.
- Stantec. 2008. Post-Construction Follow-up Plan for Bird and Bat Resources for the Wolfe Island Wind Plant (the "Plan"). Final Draft Report. Report developed among Canadian Renewable Energy Corporation, Environment Canada, Natural Resources Canada, Ontario Ministry of Natural Resources and Ducks Unlimited Canada. November 2008.



APPENDIX 1: ENVIRONMENTAL CHECKLIST

Project Number:	Project Name:			
Environmental checklist				
Originated by:				
Name	Organisation	Date		
1	Existing Conditions	Y	N	N/A
1.1	Are areas of contaminated land being protected/remediated properly?			
1.2	Are all underground services identified and excavation permits used?			
1.3	Have existing storage tanks been checked and safely emptied?			
1.4	Is the site reasonably protected from vandalism and dumping?			
1.5	Are procedures in place to prevent fires on site?			
1.6	Are all survey monuments protected?			
1.7	Are existing communication lines protected?			
1.8	Are land improvements further than 500 yards from water tanks?			
1.9	Is Archaeological Monitoring being carried out in accordance with the requirements of the "Cultural Resources Construction Monitoring and Construction Plan"			
2	Site Drainage			
2.1	Is surface and foul water drainage independent and identified?			
2.2	Is there sufficient surface water drainage?			
2.3	Are pad sites rehabilitated for drainage?			
3	Deliveries			
3.1	Are material deliveries being correctly supervised?			
4	Storage			
4.1	Are all static fuel and oil storage units located in suitable bunds?			

4.2	Are all fuel bowsers bunded or double-skinned?			
4.3	Are all fuel bowsers secured in sensible locations?			
4.4	Is all subcontractors work, plant and materials secure?			
4.5	Are all chemicals stored in accordance with the material data sheets?			
4.6	Is fuel delivery manual and are all valves locked when not in use?			
4.7	Do all tanks display their contents and other warning notices?			
4.8	Is a competent contractor removing all storage tanks off site?			
5	Waste Management			
5.1	Is waste being stored in designated areas away from watercourses?			
5.2	Are all skips on site covered and being replaced when full?			
5.3	Is all waste being disposed of quickly and correctly?			
5.4	Is "special waste" being identified and disposed of correctly?			
5.5	Are copies of consignment notes being kept in the job book?			
5.6	Are all fuel/oil leaks properly removed?			
5.7	Has sewage been properly disposed in portable toilets?			
6	Earthworks			
6.1	Does excavation drainage prevent silty water reaching watercourses?			
6.2	Are temporary stockpiles protected from silt/dust loss?			
6.3	Are roads being kept free of excess mud or dust?			
6.4	If silty water exists is it being treated prior to meeting a watercourse?			
6.5	Are excavated and demolition materials being re-used?			
6.6	Are all blasting activities being adequately controlled?			
6.7	Are the requirements of the SWPPP being followed?			
6.8	Are the requirements of the Pollutants Discharge Elimination Systems permits being followed?			
6.9	Are the requirements of the Temporary Air Quality permits being met?			
7	Plant			

7.1	Is refueling of plant taking place in a clean and controlled way?			
7.2	Does all site plant appear to be in good condition and free from leaks?			
7.3	Is plant servicing taking place over a well-maintained drip-tray?			
7.4	Are plant operators aware of the sites environmental responsibilities?			
8	Concrete			
8.1	Are concrete trucks washing out in the agreed locations?			
8.2	Is cement or mortar being allowed to enter watercourses?			
8.3	Is site batching in accordance with the agreed method statement and permits?			
8.4	Are the requirements of the sand and gravel permit being met?			
9	Emergencies			
9.1	Is site personnel trained and able to perform emergency procedures?			
9.2	Are the relevant environmental emergency numbers widely posted?			
9.3	Are there adequate fire precautions in operation?			
9.4	Has Owner been notified of any Emergencies within 24hrs?			
10	Wildlife			
10.1	Is wildlife protected from becoming trapped/injured in the works?			
11	<i>Site Restoration and Reclamation</i>			
11.1	Are areas disturbed by construction being kept to a minimum?			
11.2	Has a site reclamation plan been agreed for all construction facilities?			
11.3	<i>Are there measures to stop introduction and spread of noxious plants?</i>			
11.4	<i>Has the use of pesticides complied with Applicable laws?</i>			
12	<i>Installation</i>			
12.1	<i>Are all leaks being promptly repaired?</i>			
12.2	<i>Has all work met proper requirements?</i>			
13	<i>Final Job Book</i>			



13.1	Is the Job Book being developed during the construction period?			
14	<i>Personnel Reprimands</i>			
14.1	Has personnel been reprimanded for failure to comply with above?			

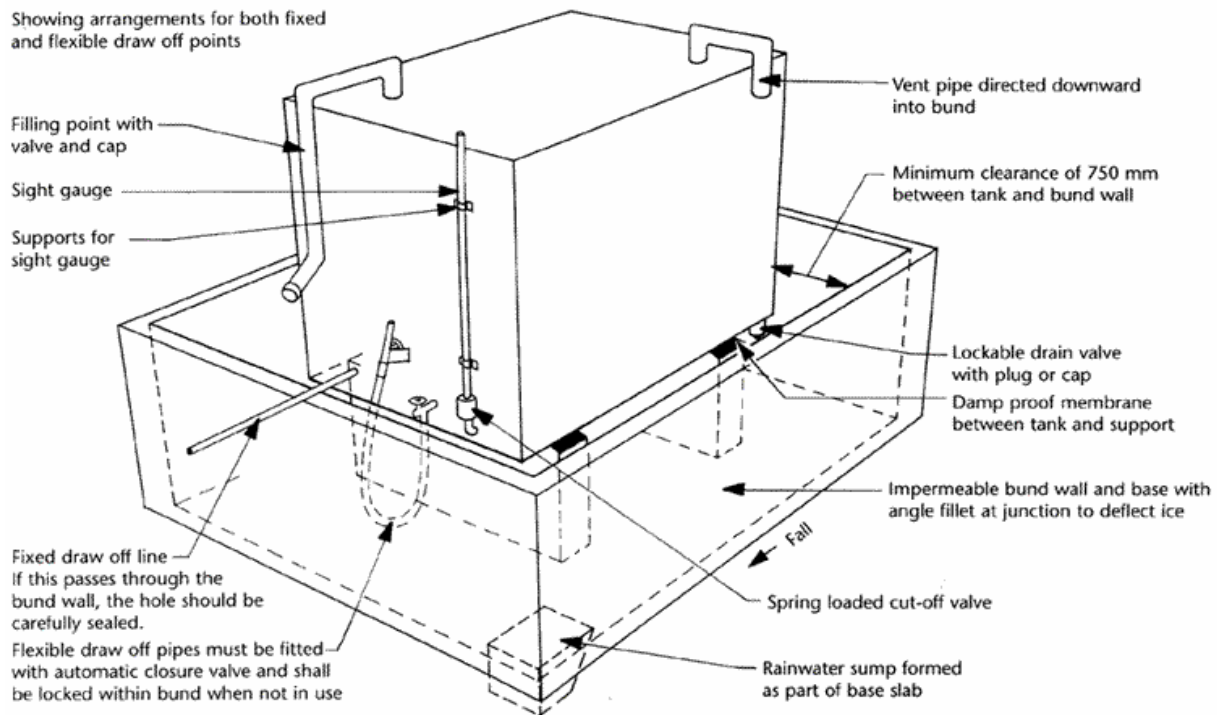
N.B. If the answer to any of the questions on the previous page are "No," then please confirm what further preventative measures will be taken to prevent any environmental problems from occurring. Should any environmental concerns specific to the site not be covered in the above document please detail the steps necessary to mitigate possible problems, below.

APPENDIX 2: FUEL AND OIL STORAGE (STATIC REFUELING POINT)

The required arrangement for a static refueling point is shown below:

BUNDED OIL TANK

Showing arrangements for both fixed and flexible draw off points



Bund design for storage tanks of up to 25m³ capacity can be found in a report produced by the Construction Industry Research and Information Association (CIRIA):

CIRIA Report 163 "Construction of bunds for oil storage tanks" ISBN 0 86017 468 9



APPENDIX 3: SUMMARY OF EMERGENCY SERVICES

(to be developed prior to Construction)



APPENDIX 4: AVIAN MONITORING

***Avian and Bat DRAFT Post-
Construction Monitoring Plan:
McLeans Mountain Wind Farm,
Northland Power Inc.***

***Renewable Energy Approval
(REA)
Draft Submission Package
January 18, 2010***

09-1983

Submitted to:

Northland Power Inc.

Submitted by

Dillon Consulting Limited

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Appendix A:	BCR 13 Priority Species and Sensitive Species in Close Proximity to Turbines.
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1.0 INTRODUCTION

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 approximately 43 wind turbines that will generate about 77 MW of electricity. Based on the REA Regulations, we understand this project to be a "Class 4" wind facility. The project area covers approximately 8,200 hectares, which is illustrated in **Figure 1**, along with the proposed wind farm layout. The project location is largely rural in nature with the major land cover being pasture and forest.

The major project components include:

- VESTAS V90 – 1.8 MW 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)

With a total of 43 - 1.8 MW VESTAS turbines, the wind farm will have an installed capacity of 77 MW.

In developing this post-construction monitoring plan, protocols outlined in several guidance documents provided by Environment Canada (EC) and the Ministry of Natural Resources (MNR) were consulted including:

- *Wind Turbines and Birds – A Guidance Document for Environmental Assessment* (EC 2007a);
- *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC 2007b);
- *Wind Turbines and Birds – A Background Review for Environmental Assessment* (EC 2007c);
- *Guidelines to Assist in the Review of Wind Power Proposals – Potential Impacts to Birds and Bird Habitats* (MNR 2006a);
- *Wind Turbines and Bats: Bat Ecology Background Information and Literature Review of Impacts* (MNR 2006b); and,
- *Guidelines to Assist MNR Staff in the Review of Wind Power Proposals – Potential Impacts to Bats and Bat Habitats* (MNR 2007).

This draft plan has been designed by NPI to evaluate the accuracy of the predicted environmental impacts on birds and bats and to meet requirements set out in both the *Canadian Environmental Assessment Act*, and Regulation 359/09. EC and the MNR are being consulted to confirm this monitoring strategy. Once their input is received, this plan will be finalized.

Kerns *et al* (2005), Erickson *et al* (2003) and Stantec (2008a) were also consulted in developing statistical analysis methods for searcher efficiency, carcass removal testing and calculation of corrected fatality counts.

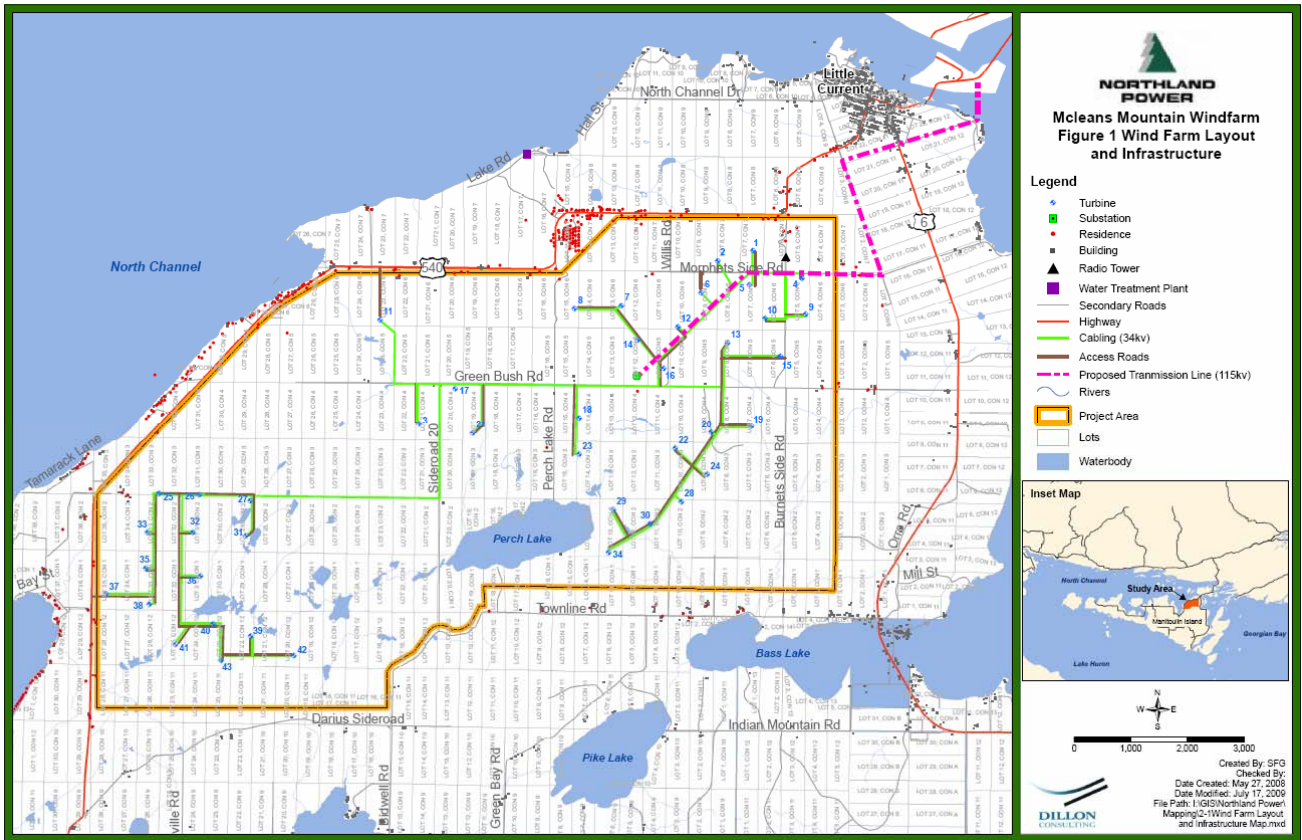


Figure 1: McLeans Mountain Wind Farm Layout/Project Area Location.

1.1 Project Area Features Relating to Birds and Bats

The project area is located close to the north shore of Manitoulin Island (closest turbine is about 1.5 km away from the shore) and the North Channel of Lake Huron, which separates the Island from the Ontario mainland. The Manitoulin Island North Shore Important Bird Area (IBA) is located to the northwest of the Project, with a portion of this IBA overlapping the west end of the Study Area. This IBA is well known as a migration staging area for waterbirds, particularly red-necked grebes during the fall and early winter. Despite the location of this IBA nearby, low numbers of waterbirds have been observed during migration field surveys in the Study Area and this group of birds is considered to be at very low risk of suffering impacts. In addition to the nearby IBA, several Species at Risk have been recorded breeding in the Study Area including loggerhead shrike, common nighthawk and Canada warbler. Due to the proposed size of the wind farm and the historical occurrences of breeding Species at Risk, the Project has been determined to have a Very High sensitivity with regards to birds and has been assigned a Category 4 Level of Concern based on criteria provided by EC (EC 2007a).

The project area has been assigned a Sensitivity Rating of 3 (High) in relation to bats, based on criteria provided by the MNR (MNR 2007). The major concern for the project area is the proximity to the North Channel shoreline, the presence of a forested ridge feature and the potential for these features to concentrate migrating bats. The closest turbine to the North Channel shoreline is approximately 1.5 km away.

Details of bird and bat pre-construction surveys are provided in sections 6.6 and 6.7, and Appendices D and E, of the Environmental Study Report (ESR) respectively (part of the current Renewable Energy Approvals (REA) Package). As stated in these sections, the expected level of impact to all guilds of birds and bats, after protection and mitigation measures have been implemented, is considered to be low. A list of setbacks protecting sensitive natural features and habitats is provided in Table 1, Item 1 of the concordance table outlining project fulfilment of REA requirements.

Concerns that have been identified and will require specific monitoring include:

- Potential mortality effects to birds and bats in the project area (ESR Sections 6.6.2 and 6.7.2).
- Potential risk of disturbance impacts to the 17 BCR 13 priority species that were observed during fieldwork in the Study Area (which includes 8 forest species, 7 open country species and 2 marsh/water species) and other sensitive species occurring, including sharp-tailed grouse, upland sandpiper and Wilson's snipe. A full list of the BCR 13 priority species observed in the Study Area can be found in Table 7 (p.28) of the Bird Study Report, Appendix D in the ESR, and in Section 6.9 of the ESR.

Species or groups that were determined to be of limited concern, and therefore not requiring specific monitoring, include:

- Fall migration of raptors, waterbirds and sandhill cranes (ESR Sections 6.6.2).
- Species at Risk not observed during surveys including short-eared owl and golden-winged warbler; Canada warbler, common nighthawk and chimney swift, which were rarely observed; and loggerhead shrike which was historically observed in 1999 and 2000 (ESR Section 6.9).

Because large wind farm facilities are a relatively new addition to Ontario's infrastructure, large datasets with multiple years of study relating to environmental impacts do not exist to inform the accurate prediction of impacts. To address this uncertainty an adaptive monitoring and management plan has been developed. In the event that unexpected negative impacts occur, employment of this plan will allow for flexibility in the operation of the wind farm in an attempt to reduce these negative impacts and the likelihood of their future occurrence.

2.0 PROJECT TEAM

Table 1: Post Construction Environmental Monitoring Team

Staff	Role
Don McKinnon	Dillon Consulting Limited – Project Manager
Michael Enright	Dillon Consulting Limited – Natural Environment Coordinator
Dave Restivo	Dillon Consulting Limited – Field Ornithologist
Richard Baxter	Dillon Consulting Limited – Field Ornithologist

Don P. McKinnon MES, MCIP –is an Associate and Senior Environmental Planner at Dillon with over 19 years of experience. Don has worked in many parts of Canada and internationally, and has extensive experience with Environmental Assessments. Don has direct experience in the preparation of EIAs for wind power project facilities having been involved in more than ten wind farm projects.

Michael Enright, BSc. (Hons) - is a Terrestrial Biologist with fourteen years of education and professional employment in the biological sciences. During this time, Michael has acquired an in-depth knowledge of natural systems and their protection under the various levels of the legislative framework. He has been involved in numerous Environmental Assessments and developed environmental solutions for multi-disciplinary projects. Michael has been the Project Manager or environmental coordinator for nine wind energy projects.

David Restivo, BSc. (Hons), CEPIT - is a Biologist with over five years of professional experience conducting biological assessments including avian surveys. Prior to working with Dillon, David worked with Bird Studies Canada conducting migration monitoring studies on the shores of Lake Erie. David has been involved in avian surveys for three wind power projects.

Richard Baxter, BSc. - is a Biologist with over three years of professional experience conducting biological assessments including avian surveys. Prior to working with Dillon, Richard worked with Ducks Unlimited Canada as a Biological Technician, the University of Alberta as a Research Assistant on a cavity nester study and with Bird Studies Canada conducting migration monitoring studies on the shores of Lake Erie. Richard has been involved in avian surveys for four wind power projects.

3.0 POST-CONSTRUCTION MONITORING PLAN

3.1 The Need for Monitoring - Bird and Bat Mortality at Wind Farms in North America

Birds

Data available from studies of wind farms in North America indicate that the number of passerine birds killed due to blade strikes is not numerically significant in terms of population effects. Estimates of total passerine fatalities from a review of 14 studies of North American wind farms vary considerably, however on a per turbine and per MW basis, fatality rates are similar (Arnett et al 2007). Annual fatality rates ranged from 0 at a Searsburg, Vermont wind farm (Kerlinger 1997 in Arnett et al 2007) to 11.7 birds/MW/year at Buffalo Mountain, Tennessee (Nicholson 2003 in Arnett et al 2007). Most studies indicate that passerine fatalities occur throughout the wind farm facility, with no relationship to specific features within the facility. In general, fatalities occur throughout the year but are most common from April to October (Arnett et al 2007). It appears that certain seasons pose a higher risk to birds at specific facilities; for example spring migration at Buffalo Ridge, Minnesota (Johnson et al 2002 in Arnett et al 2007) and fall migration at Stateline, Washington (Erickson et al 2004 in Arnett et al 2007).

The highest recorded raptor fatality rates relating to wind power facilities have occurred in California at a few specific sites that were designed and constructed with little thought given to impacts on avian resources. Outside of California, studies of 14 newer generation wind farm facilities in North America indicate that the mean fatality rate for raptors was 0.03 raptors per turbine and 0.04 raptors per MW. These studies occurred over at least a one-year period and included correction for scavenging and searcher efficiency (Arnett et al 2007).

Several studies on wind farms in Ontario have been performed which can provide more area specific context for the McLeans Mountain Wind Farm project. James (2003) reported finding 3 bird carcasses in association with the single turbine present near the Lake Ontario shore at Pickering, with monitoring conducted throughout 2002. James and Coady (2004) reported finding 2 bird carcasses in association with the single turbine present at Exhibition Place in Toronto, over 11 weeks of monitoring during the spring and fall of 2003. James (2008) estimated a range of 0.41-2.6 native birds/turbine/year at the 66 turbine Erie Shores Wind Farm near Port Burwell. For the Erie Shores project, all but 4 individual turbines had estimates of below 1 bird/turbine/year. For raptors a mortality estimate of 0.04 raptors/turbine/year was

observed at Erie Shores. Natural Resource Solutions Inc. (2008a) estimated an annual mortality rate for birds at 0.39 birds/turbine (0.26 birds/MW) at the 126 turbine Prince Wind Power Project (Stantec 2008a). Stantec Consulting Ltd (2008b) estimated an annual mortality rate for birds at 1.4 birds/turbine (0.9 birds/MW) at the Melancthon 1 Wind Plant, based on 12 weeks of post construction monitoring during the spring and fall of 2007 (Stantec 2008a).

Bats

Large numbers of bat fatalities have been reported at some wind energy facilities in North America. In general, bat fatalities at wind farms are higher than at other man made structures. Estimates of bat fatalities from 21 studies located at 19 wind farms in North America range from 0.9-53.3 bats/MW/year. The highest bat fatality rates have been found to occur near forested ridges. Bat fatalities appear to be higher in late summer and early fall, with migratory species like hoary bat, eastern red bat and silver haired bat being most susceptible. Bat activity and associated wind farm mortality appear to be higher on nights with low wind speeds (Arnett et al 2007).

3.2 Methods

Post-construction monitoring for birds and bats will be done concurrently to improve efficiency of fieldwork. Therefore, the methods outlined below are designed to address both faunal groups. The work being proposed will be refined through consultation with Environment Canada and the MNR. The current program as present herein is designed to monitor the most sensitive seasonal periods for each species or group of concern as identified in the ESR, including:

- Bird and bat mortality monitoring through spring, summer and fall, due to the possibility of mortality resulting from wind farm operation.
- Disturbance effects monitoring for BCR 13 priority species and other sensitive species due to the potential for disturbance to forest and open country species.

Personnel conducting fieldwork will be skilled at identifying all species birds, both by sight and sound, and all species of bats by sight, that are likely to occur in the project area. Detailed monitoring methods, including duration and frequency, are outlined below. See **Table 2** for a summary of proposed post construction monitoring effort.

3.2.1 Bird Mortality Monitoring

As this project has been assigned a Category 4 Level of Concern in relation to birds according to EC's guidance criteria, it will be subject to the highest level of effort to assess environmental effects. Surveys will include two years of carcass searching and post-construction mortality monitoring around turbines during the spring migration period (6 weeks from the last two weeks of April through to the end of May), the summer breeding season (a 6 week search period from

the beginning of June to mid July) and the fall migration period (an 8 week search period from early September to late October).

Protocols used to perform carcass searches will follow those set out in EC's *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC 2007b). Carcass searches will be performed by trained technicians, under the guidance of an experienced biologist, and will be limited to open areas such as access roads and turbine pads, within 80 m of the turbine base. As this is a large project, a subset of one third of the 43 turbines will be selected for each sampling event (groups of 14, 14 and 15). The subset of turbines will be rotated every two weeks so that each turbine will be sampled at least twice per week during each two week sampling period. Subsets of turbines will be spread throughout the Study Area, rather than selecting closely grouped turbines, to ensure adequate geographic coverage.

For each carcass found, the following data will be recorded: date and time, state of decomposition, extent and type of injury, species if possible, distance and direction from the turbine, GPS location of carcass and substrate on which the carcass was found. Information will also be gathered for wind speeds and direction on each night preceding searches, extending to the last search event.

Scavenging Rate Trials

Scavenging rate trials will be performed to estimate the proportion of carcasses that were scavenged before the search period. Trials will be conducted twice during each season in each monitoring year, and will use native species that are freshly dead or frozen (and were freshly dead prior to being frozen). Carcasses will be laid out in a search area with their location marked by GPS in advance of a search being conducted. Technicians will wear gloves to avoid getting human scent on the test specimens, which could bias results. Carcasses can be laid out in varying time intervals before a search, or can be resurveyed multiple times to test for carcass persistence. Carcasses should be laid out for trials at each turbine that will be searched, with a small number used (1 to 2 specimens) at each site. Carcasses should be distributed on substrates in proportion to the availability of these substrates. Scavenger trials will be repeated during each survey year, as efficiency of scavengers may change among years. Presence or absence of scavenging, and degree of scavenging if present, will be recorded for trial specimens.

The rate of carcass removal by scavenging will be calculated using the following equation:

$$R_s = (n_{\text{visit1}} + n_{\text{visit2}} + n_{\text{visit3}}) / (n_{\text{visit0}} + n_{\text{visit1}} + n_{\text{visit2}})$$

Where:

R_s = Rate of scavenging

n_{visit0} = Number of carcasses originally placed

$n_{\text{visit1}} - n_{\text{visit3}}$ = Number of carcasses remaining on visit 1 through 3

Searcher Efficiency Trials

Because individual surveyors will have different search success rates, searcher efficiency trials will be conducted once per year as required by EC's guidelines. Each searcher will be tested and if survey personnel changes, searcher efficiency trials will be repeated as needed. Carcasses will be laid out in random locations at a search location on the night before a search period and will have their location marked by GPS. A small number will be used (1 to 2 specimens) for a test at various locations; however overall at least twenty carcasses should be used over each season. Native species will be used in searcher efficiency tests so that searchers are not aware that they are trial specimens. The date, time and location that test specimens were planted will be recorded, as will the date it was searched for and whether or not it was retrieved. The condition of the carcass when it was retrieved will also be recorded.

The following equation will be used to calculate searcher efficiency:

$$E_s = C_f / C_p$$

Where:

- E_s = Searcher efficiency
- C_f = Carcasses found
- C_p = Carcasses placed

Calculating corrected number of bird and bat fatalities will then be done using the following formula:

$$C = c / [(E_s)(R_s)(P_s)]$$

Where:

- C = Corrected number of carcasses
- c = Number of carcasses found
- E_s = Searcher efficiency
- R_s = Rate of scavenging
- P_s = Percentage of area searched

3.2.2 Bat Mortality Monitoring

As the project area has been assigned a Sensitivity Rating of 3 (High) according to the MNR's *Guidelines to Assist in the Review of Wind Power Proposals – Potential Impacts to Bats and Bat Habitats* (MNR 2007), at least two years of post-construction monitoring will be required from May to September to assess impacts to bats. The major associated risk for the project area is the proximity to the North Channel shoreline and the presence of forested Niagara Escarpment ridge features, which may concentrate migrating bats.

Bat mortality monitoring will be conducted, as is recommended in the MNR's *Guidelines to Assist in the Review of Wind Power Proposals – Potential Impacts to Bats and Bat Habitats*

(MNR 2007) and using the same protocol as listed above for bird mortality monitoring. Bat mortality data will be collected along with bird mortality data using the same methods, to improve efficiency.

Any bats encountered outside of the sensitive seasons of late summer and early fall (i.e. spring, early summer) will also be collected and recorded.

During carcass searches, technicians will use protective gear (gloves, tools etc.) and ensure that they have updated rabies pre-exposure vaccination. Biological waste will be disposed of in a way that will not pose a risk to public or environmental health, and that will comply with appropriate legislation. Mortality monitoring can be focused on turbines that are in close proximity to landscape features that are likely to concentrate bats (e.g. riparian areas, larger woodlots and buildings). For example, pre-construction monitoring found the highest bat passage rate near the monitoring station BAT-004 in the north of the Study Area, on Greenbush Road east of Side Road 20, which was located along the fence line of an oldfield/wetland area with trembling aspen, shrubs and grasses. This monitoring station was also located south of the forested ridge feature in the Study Area (NRSI 2008b).

3.2.3 Disturbance Effects Monitoring

3.2.3.1 BCR 13 Priority Species and Sensitive Species Monitoring - Forest and Grassland Species

It is likely that some forest and open habitat (grassland/pasture) will be impacted as areas are cleared for turbines and there is the possibility that some BCR 13 priority birds as well as other sensitive species (e.g. sharp-tailed grouse) may experience some displacement depending on the proximity of their habitat to the turbines. Appendix A of this report summarizes BCR birds and species at risk observed in the Study Area and their location relative to turbines within 500m of the observation. Environment Canada has also indicated specific concern with respect to the removal of interior forest habitat and Canada warblers.

Post construction monitoring will include breeding surveys of open and forested habitats at select turbines to assess displacement of the above species. Paired ten-minute point counts will be used at each turbine with each point count being located at a specified distance from the turbine (e.g. 100m and 300m). Point counts will record birds in distance bands of 0-50m and 51-100m from the station.

Monitoring possible effect of the sharp-tailed grouse lek observed in the study area will be conducted in April at sunrise. Observations will collect behavioural information and number of individuals to assess concerns surrounding the possible displacement of this species.

Monitoring of other species identified as a concern and observed during surveys (e.g. common nighthawk and Wilson's snipe) are being monitored during additional pre-construction activities, which are summarized in Section 6.3 of the Environmental Management Plan.

3.2.3.2 *Species at Risk*

Construction and Operational staff will be made aware of the potential for occurrence and identification of avian SAR and any future observations of these species in the Study Area will be communicated to the MNR and EC. Species to be aware of include Canada warbler, loggerhead shrike, common nighthawk, short-eared owl, golden-winged warbler and chimney swift.

Table 2: Post Construction Monitoring Summary for Birds and Bats.

Monitoring	Timing	Sampling Protocol	Sampling Frequency
Spring Migration: Bird and Bat	Last two weeks of April to the end of May	Sunrise carcass searching/mortality monitoring	Twice weekly
Summer Breeding: Bird and Bat	Beginning of June to mid July	Sunrise carcass searching/mortality monitoring	Twice weekly
Fall Migration: Bird and Bat	Early September to late October	Sunrise carcass searching/mortality monitoring	Twice weekly
BCR 13 Priority Species Monitoring - Forest and Grassland Species	Beginning of June to mid July	Point counts and area searches at locations where potential displacement from turbines has been identified.	Twice weekly

4.0 REPORTING

Reporting of fieldwork results will be submitted annually, and results will be expressed both in terms of fatalities/turbine/year and fatalities/MW/year, to enable comparison between studies. Reports will include comparisons between projected annual avian mortality rates for the McLeans Mountain Project and rates reported at other projects throughout North America (e.g. as summarized in Arnett et al 2007). If these projected annual mortality rates fall within the low or middle ranges of reported rates, no immediate mitigation is needed. However, if mortality rates approach the higher end of the reported scale as described below, NPI will consult with the relevant agencies as needed to determine the reasons for the high mortality rates, adjust monitoring and/or to develop possible mitigation measures.

If a potentially serious negative effect is observed during monitoring, NPI will notify the relevant agencies during the survey period. If needed, NPI may take action prior to contacting the relevant agencies. Specific thresholds that will trigger the need for notification are outlined in **Table 3** below.

Table 3: Observed Mortality Thresholds Triggering Notification of Relevant Authorities

Species group	Single Mortality Event	Observed Mortality Rate	Number of Mortalities Observed During Surveys (sampling 18 turbines)
General Birds	33 or more observed ^a	11.7 fatalities/MW/year ^b	18 fatalities observed over 3 weeks
Raptors	1 or more observed	0.09 fatalities/MW/year ^c	1 fatality observed over 3 weeks
Bats		20 fatalities/turbine/year ^d	20 fatalities observed over 3 weeks
Species at Risk	Any mortality	Any mortality	Any mortality

^a - the largest single mortality event observed at a wind farm in North America, at the Mountaineer site (Kerlinger and Kerlinger 2004).

^b - the highest recorded rate in North America observed at the Buffalo Mountain Facility in Tennessee (Arnett et al 2007).

^c - the highest recorded in North America, outside of California, from the Stateline Facility in Oregon (Arnett et al 2007).

^d - the highest documented bat mortality in Ontario (Stantec 2008a).

5.0 ADAPTIVE MONITORING AND MANAGEMENT

In general, if observed mortality impacts for any group of birds, bats and/or Species at Risk are found to exceed thresholds noted in **Table 3** above, EC and the MNR will be consulted to establish the appropriate mitigative response, which could include: conducting research with the goal of identifying the factors leading to the observed mortality rate; conducting more frequent surveys; increasing reporting frequency; and operational modifications.

If bats are experiencing disproportionate mortality, and rates are near the higher reported levels, NPI may consider installation of ultrasonic deterrent devices. However, as yet this technology has limited ability to effectively deter bats from areas as large as a turbines blade-sweep radius (Szewczak and Arnett 2008). Increasing the wind speed required to start a turbine on specific turbines having a high associated mortality could occur, as bats tend to be active at lower wind speeds (Arnett et al 2007).

If a review of environmental conditions unrelated to the wind farms operation is unable to shed light on increased mortality rates, then further action will be required. This could include blade feathering, and if necessary, shutting down specific problem turbines.

Blade feathering involves adjusting the pitch of the turbine blade such that reduced aerodynamics precludes efficient turbine operation. Blade rotation would be slowed and energy output reduced. This approach would be used to manage the turbine operation during specific time periods or weather conditions considered a high risk for bats or birds.

Turbine shut down would include the temporary removal of a turbine from service, stopping production of power. This action could be taken during a set period (and could occur during certain times of the day), such as a core seasonal migration window, and turbine operation would resume after the period of high risk has passed (EC 2007a).

These actions will be considered on a turbine by turbine basis, based on areas of concern identified through the monitoring program and as deemed economically feasible. Actions taken in response to mortality events will depend on species involved, behaviour implicated (migration, foraging etc.) and geographical extent of the observed mortality, as agreed upon by the relevant agencies.

6.0 SUMMARY

The project area for NPI's McLeans Mountain Wind Farm has been designated as having a Very High Sensitivity, Category 4 Level of Concern with respect to birds, and a Sensitivity Rating of 3 (High) with respect to bats. These sensitivity ratings trigger the need for this post-construction monitoring plan as stipulated in EC and MNR guideline documents. The potential for bird and bat mortality, the recent presence of breeding Species at Risk and the presence of BCR 13 priority species in forest and open country habitats are the main focus of this post-construction monitoring program. Post-construction monitoring is planned for two years after the wind farm is in operation. EC and the MNR will be kept up to date on monitoring results through annual reporting and will be notified of unexpected negative environmental effects. Mitigation measures have also been outlined for unexpected negative environmental effects that may occur but cannot be explained by factors unrelated to the wind farms operation.

7.0 REFERENCES

- Arnett, E.B. 2007. Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitats. Wildlife Society Technical Review.
- Bird Studies Canada (BSC). 2005. Migration and Nesting Dates for Ontario's Bird Species. Accessed December 11 2008. <http://www.ofnc.ca/birding/bbanestdates.html>
- Dillon Consulting. 2009a. Northland Power Inc. McLeans Mountain Avian Report.
- Dillon Consulting. 2009b. Environmental Screening Report/Environmental Impact Statement.
- Environment Canada. 2007a. Wind Turbines and Birds: A Guidance Document for Environmental Assessment. Final Report. February 2007.
- Environment Canada. 2007b. Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds. Final Report. February 19, 2007.
- Environment Canada. 2007c. Wind Turbines and Birds: A Background Review for Environmental Assessment. Draft Report. April 2, 2007.
- Erickson, W.P., B. Gritski and K. Kronner. 2003. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002-August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee.
- Erickson W.P., J. Jeffrey, K. Kronner and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report: July 2001-December 2003. Western Ecosystems Technology, Inc. Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. Pendleton Oregon. Western Ecosystems Technology Inc. Cheyenne, Wyoming, USA
- James, R.D. 2003. Bird Observation at the Pickering Wind Turbine. Ontario Birds. 21(2):84-97.
- James, R.D and G. Coady. 2004. Bird Monitoring at Toronto's Exhibition Place Wind Turbine. Ontario Birds. 22: 79-89.
- James, R.D. 2008. Erie Shores Wind Farm, Port Burwell Ontario: Fieldwork Report for 2006 and 2007 During the First Two Years of Operation. Report to Environment Canada, Ontario Ministry of Natural Resources, Eris Shores Wind Farm LP – McQuarrie North American, and AIM PowerGen Corporation.
- Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Sheppard and S.A. Sarappo. 2002. Collision Mortality of Local and Migrant Birds at a Large-scale Wind Power Development on Buffalo Ridge Minnesota. Wildlife Society Bulletin 30:879-887.

- Kerlinger, P. 1997. A Study of Avian Fatalities at Green Mountain Power Corporations Searsburg, Vermont Wind Power Facility – 1997. Prepared for Vermont Department of Public Service, Green Mountain Power Corporation, National Renewable Energy Laboratory and Vermont Environmental Research Associates.
- Kerlinger, J. and P. Kerlinger. 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Curry and Kerlinger, LLC, Mclean, New Jersey USA.
- Kerns, J., W.P. Erickson and E.B Arnett. 2005. Chapter 2: Bat and Bird Fatality at Wind Energy Facilities in Pennsylvania and West Virginia. *in* E.B. Arnett, Technical Editor, Relationships Between Bats and Wind Turbines in Pennsylvania and West Virginia: an Assessment of Bat Fatality Search Protocols, Patterns of Fatality, and Behavioural Interactions with Wind Turbines. A Final Report Submitted to the Bats and Wind Energy Cooperative. Bat Conservation International. Austin Texas.
- Natural Resource Solutions Inc. 2008a. 2007 Bird and Bat Mortality Monitoring: Prince Wind Power Project. Report prepared for Brookfield Power, Gatineau Quebec.
- Natural Resource Solutions Inc (NRSI). 2008b. McLeans Mountain Wind Farm 2008 Bat Monitoring. Report Prepared for Northland Power Inc. June 2008.
- Nicholson, C.P. 2003. Buffalo Mountain Wind Facility Bird and Bat Mortality Monitoring Report: October 2001-September 2002. Tennessee Valley Authority, Knoxville Tennessee, USA.
- Ontario Ministry of Natural Resources. 2006a. Guidelines to Assist MNR Staff in the Review of Wind Power Proposals – Potential Impacts to Birds and Bird Habitats. Draft Report. October 2006
- Ontario Ministry of Natural Resources. 2006b. Wind Turbines and Bats: Bat Ecology Background Information and Literature Review of Impacts. December 2006.
- Ontario Ministry of Natural Resources. 2007. Guidelines to Assist in the Review of Wind Power Proposals – Potential Impacts to Bats and Bat Habitats. Developmental Working Draft. August 2007.
- Stantec. 2008a. Post-Construction Follow-up Plan for Bird and Bat Resources for the Wolfe Island Wind Plant (the “Plan”). Final Draft Report. Report developed among Canadian Renewable Energy Corporation, Environment Canada, Natural Resources Canada, Ontario Ministry of Natural Resources and Ducks Unlimited Canada. November 2008.



Stantec Consulting Ltd. 2008b. Melancthon 1 Wind Plant: Post-construction Bird and Bat Monitoring Report: 2007. Report Prepared for Canadian Hydro Developers, Inc. Guelph, Ontario.

Szewczak, J.M. and E.B. Arnett. 2008. Field Test Results of a Potential Acoustic Deterrent to Reduce Bat Mortality from Wind Turbines. Bats and Wind Energy Cooperative.

APPENDIX A

BCR 13 Priority Species and Sensitive Species in Proximity to Turbines

Table A1: Bird Conservation Region 13 and other potentially sensitive birds observed in the study area during fieldwork summarized by habitat guild with turbines located within 500m of observation.

Habitat Guild	Primary Nesting Habitat	BCR 13 Species	Total Observed In Study Area 2007	Total Observed In Study Area 2008	2007 Breeding Survey. Turbine #'s located within 500m of observation	2008 Breeding Survey. Turbine #'s located within 500m of observation
BCR 13 Priority Species						
Forest	Deciduous Woodland	Wood Thrush	2	0	20, 22	
		Baltimore Oriole	1	0	6	
		Rose-breasted Grosbeak	3	2	14, 19	21, 24, 28
		Red-shouldered Hawk	0	1		
		Canada warbler	0	4		11
		Eastern Wood-Pewee	28	6	1, 6, 12, 13, 14, 16, 18, 19, 20, 23	30
	Early Successional	Black-billed Cuckoo	2	0	13, 19, 20	
Mixed Woodlands	Northern Flicker	15	14	7, 8, 14, 18, 19, 20, 22, 23, 24, 28, 30	3, 11, 17, 24, 25, 28, 32, 33, 35, 36, 38	
Open Country						
Open Country	Agricultural	Bobolink	7	0	6, 12, 19, 20	
		American Kestrel	0	1		
		Eastern Meadowlark	5	1	1, 19	17
		Savannah Sparrow	127	7	1, 2, 6, 7, 8, 13, 19, 20	11, 17, 18
		Vesper Sparrow	0	5		18, 28, 36
	Early Successional	Brown Thrasher	2	12	19, 20	18, 24, 25, 26, 27, 28, 31, 32, 33, 36
		Eastern Kingbird	15	2	2, 6, 12, 13	24, 28
Marsh/Water						
Marsh/Water	Lakes/Ponds/Rivers	Belted Kingfisher	1	3		28, 30
	Marsh	Northern Harrier	7	0	1, 13, 19, 20	
Other Sensitive Species						
Open Country	Burned/Logged Areas	Sharp-tailed Grouse	2	0	Note: Lek observed during 2005 surveys in the vicinity of turbine 19.	
	Agricultural	Upland Sandpiper	1	15		22, 24, 28, 15
	Woodlands	Common Nighthawk	0	2		27, 31
Marsh/Water	Marsh	Wilson's Snipe	0	9		11, 24, 25, 26, 28, 32, 33, 36

Decommissioning Plan Report

Supplementary Information for the
Decommissioning Plan Report
Under the Renewable Energy Approval (REA) Requirements, Ontario
Regulation 359/09 for Class 4 Wind Facility

1.0 Introduction

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 approximately 43 wind turbines that will generate about 77 MW of electricity. Based on the REA Regulations, we understand this project to be a "Class 4" wind facility. This *Decommissioning Plan Report* is written in accordance with Ontario Regulation 359/09 – Renewable Energy Approval (REA) under the *Green Energy Act*. The project will require approval under Ontario Regulation 359/09 – REA under the *Green Energy Act*. This report is one component of the Renewable Energy Approvals documentation. Other reports written under the REA process will include:

1. Project Description Report;
2. Consultation Report;
3. Design and Operations Report;
4. Construction Plan Report; and,
5. Wind Turbine Specifications Report.

As per REA the current project is classified as a Class 4 Wind Facility making it subject to the level of reporting described above. NPI has fulfilled most of the REA requirements through the McLean's Mountain Wind Farm Environmental Screening Report/Environmental Impact Statement (ESR) released in July 2009. The McLean's Mountain Wind Farm ESR document was released in July 2009 for a 30-day public review as part of the former Environmental Assessment process. The ESR document is consistent with the former Environmental Screening provisions of Ontario Regulation 116/01 for a Category B project and with the requirements of the *Canadian Environmental Assessment Act*. The ESR document was developed to assist in the determination of potential environmental effects, including both the social and natural environment, which could result from the proposed project. NPI is relying on the previously completed Environmental Study Report to fulfill much of the REA reporting requirements. The MOE advised that this is an acceptable approach for this project. NPI has fulfilled other requirements of REA by providing a Natural Heritage Summary, a Water Bodies Summary, and a Cultural Heritage Summary in accordance with the requirements of the Green Energy Act, 2009.



2.0 The Proponent

Northland Power Inc. (NPI) is a developer, owner and operator of power generation and the proponent of the "McLean's Mountain Wind Farm Wind Farm Project". NPI's development activities include building, owning and operating wind energy facilities. In the course of developing these wind energy Projects, NPI meets various environmental approval requirements and obtains regulatory approvals that vary depending on the jurisdiction, project capacity and site location.

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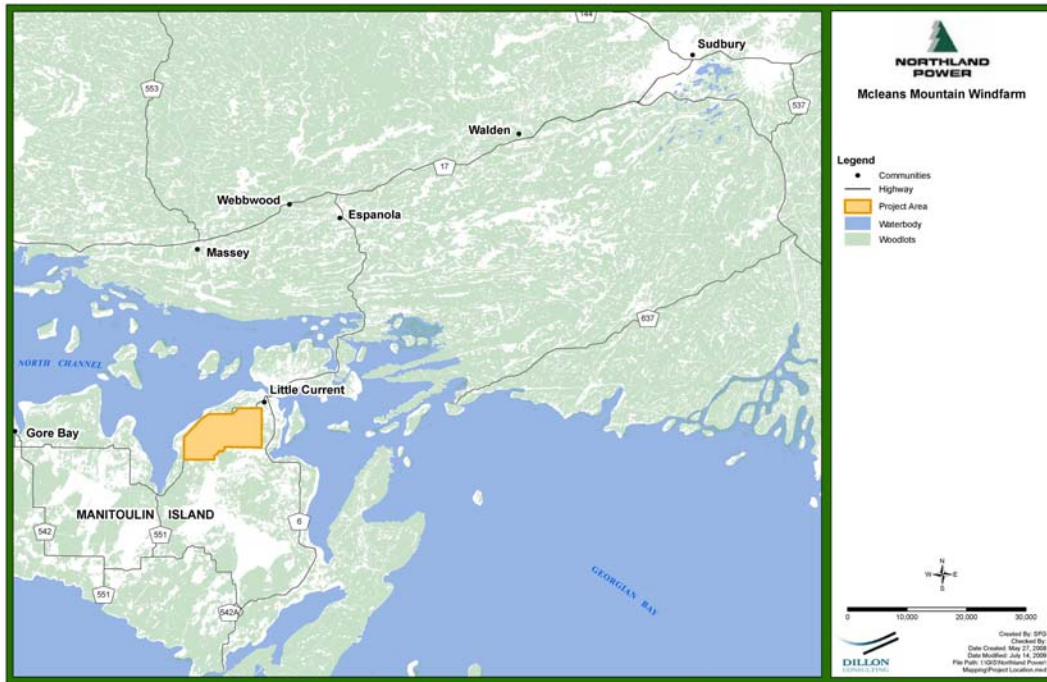
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3.0 Project Location

The Project Study Area is located entirely in the Municipality of Northeastern Manitoulin and the Islands; geographic Township of Howland, and the geographic Township of Bidwell in the District of Manitoulin approximately 5 kilometers from the Town of Little Current. Within this broader Project Study Area is the Project Site Area within which the turbines and associated wind farm infrastructure will largely be located. **Figure 1** provides the location of the Project Study Area and illustrates the geographic limits of the Project Site Area.

Figure 1: Location of the Study Area



4.0 Decommissioning Plan Overview

The wind turbine decommissioning process shall be initiated upon the termination of the Leases with the landowners. The primary reason for the leases to be terminated would be the completion of the project's useful life or the end of the power purchase agreement with the Ontario Power Authority.

The decommissioning involves removing the wind turbine generator, equipment, cables, fixtures and all personal property and otherwise restoring the premises to their original condition. If it is agreed upon with the landowner or at the landowner's request, access roads will be left in place for their continued use. Foundations shall be removed to three feet below grade and replaced with topsoil.

All decommissioning work will be performed according to applicable federal, provincial and municipal regulations.

NPI agrees to meet with the landowner prior to the lease expiration date to ensure that NPI performs its obligations to remove its property and restore the premises. Within 12 months

of initiating the decommissioning, NPI will have removed the relevant components from the leased land.

NPI or a contractor selected by NPI will disassemble the wind turbine generators.

The decommissioning of the McLean's Mountain Wind Farm will follow the Ontario Health and Safety Act along with any applicable municipal, provincial and federal regulations and standards. As with the construction, a safety manager will be present on site for the duration of the work.

5.0 Procedures for Dismantling/Demolishing Facility

Properly maintained wind turbines have an expected life of 30 years. At the end of the project life, depending on market conditions and project viability, the wind turbines may be 're-powered' with new nacelles, towers, and/or blades. Alternatively, the wind turbines may be decommissioned.

In the event the project requires decommissioning, the following sequence for the removal of the components will be used:

- Remove Collection and Transmission System including substation and switchyard
- Remove wind turbines
- Partial Removal of Wind Turbine Foundations
- Remove Access Roads

This decommissioning plan is based on current procedures and experience. These procedures may be subject to revision based on new experiences and requirements.

5.1 Wind Turbines

The first stage of the disassembly will be to have wiring crews disconnect the tower from the collection system and disconnect the wiring between turbine sections. A crane will then, supported by a disassembly crew, remove the rotor, nacelle and then the towers section by section. The rotor blades will be removed from the hub once it has been placed on the ground. As the turbine is being disassembled, the various components will be transported off site.

The components will be either sent to a salvaging yard or be reused for another project. As with the construction process, any land that was disturbed or compacted during the decommissioning will be de-compacted and graded. This includes reclaimed areas.

5.2 Wind Turbine Foundations

Once all the turbine components have been cleared from a site, the top four to five feet of the soil around the foundation will be excavated and stockpiled. Once cleared, the top three feet of the foundation will be demolished. The concrete and rebar scrap will be

hauled off site and properly disposed of. Afterwards, the stockpiled soil will be used to replace the now cleared area. The disturbed area will be feathered out and graded. No off site soil is predicted to be needed.

5.3 Access Road Removal

Access roads will be left at landowner's requests or graded to restore terrain profiles (as much as possible), and vegetated.

5.4 Cable Wire and Trench Decommissioning

If environmentally appropriate at the time of decommissioning, the underground cables will be left in place.

Overhead collection and transmission systems will be removed, including conductors and poles.

5.5 Electrical Substation Decommissioning

The substation electrical components (e.g. GSU, cable, cooling equipment, etc) will be either removed as a whole or disassembled, pending reuse or recycling. Once cleared. The gravel around the yard will be reclaimed (unless the land owner wishes to keep the area as is) and the fence removed. As with the turbine foundation, the substation foundation will be excavated and the top 1 m of concrete (or to bedrock) will be demolished and hauled off site to be properly disposed off. The excavated area will then be filled in native soil and will be re-graded.

5.6 Crane Pad Decommissioning

Crane pads will be approximately 60 feet by 40 feet and consist of compacted native material. Approximately 1 foot of base fill is expected to be used for the crane pads. After decommissioning, the crane pad aggregate will be removed and areas will be filled.

6.0 Restoration of Land and Water Negatively Affected by Facility

Once all of the turbines and ancillary facilities are removed, the remaining work to complete the decommissioning of the Project will consist of shaping and grading of the areas to as near as practicable to the original contour prior to construction of the wind turbines and access roads. All areas, including the access roads, transformer pads and crane pads will be restored as near as practical to their original condition with native soils and seeded.

Other than the concrete, which will remain three feet below the soil, no other residual impact is foreseen. The decommissioning will affect the agricultural practices directly around the access roads, substation and turbine locations, but only during their removal. Also, no impacts to terrestrial vegetation and wildlife are expected since all the McLean's Mountain Wind Farm infrastructures will be located exclusively on agricultural land.

The most significant risk to the aquatic environment will be when the access roads near drains or municipal drain crossings are removed. Similar to the construction phase, the plant decommissioning will follow a storm water protection plan that will ensure proper steps are followed to mitigate erosion and silt/sediment runoff.

As with the projects construction, noise levels around the decommissioning work will be higher than average. Proper steps will be followed to minimize this disturbance, such as working only during daylight hours. Also, as with the projects construction, road traffic in the area will increase due to crews and heavy equipment movements.

7.0 Procedures for Managing Waste and Materials

The major components of the wind turbines (tower, nacelle, blades) are modular items that allow for ease of construction and disassembly of the wind turbines during replacement or decommissioning. Each tower is made up of approximately 138 tons of painted steel that is potentially salvageable. The nacelle has an overall unit weight of 52 tons and is constructed of a combination of steel along with various other materials. Portions of the components within the nacelle and generators can also be salvaged for scrap value.

Based on the construction details for the Vestas model V-90 wind turbines and associated tower and components, it is assumed that both the tower and nacelle will yield approximately 80% salvageable materials. Since the hub assembly and bedplate is manufactured steel, it is anticipated that the hub will yield 100% salvageable metallic materials. Copper salvage estimates were derived by assuming 5% of the total tower and nacelle weight consists of salvageable copper bearing materials. Since the rotor/blades are constructed of predominantly non-metallic materials (fiberglass reinforced epoxy and carbon fibers), no salvage for the rotor or blades is currently assumed.

It is assumed that 75% of the aggregate material from the decommissioning of the crane pads can be salvaged for future use as aggregate base course. It is also assumed that 50% of the aggregate base course could be reused as aggregate base course. The remaining materials would be viable for general fill on non-structural fill areas. The geotextile fabric cannot be salvaged.