July 2011

NORTHLAND POWER

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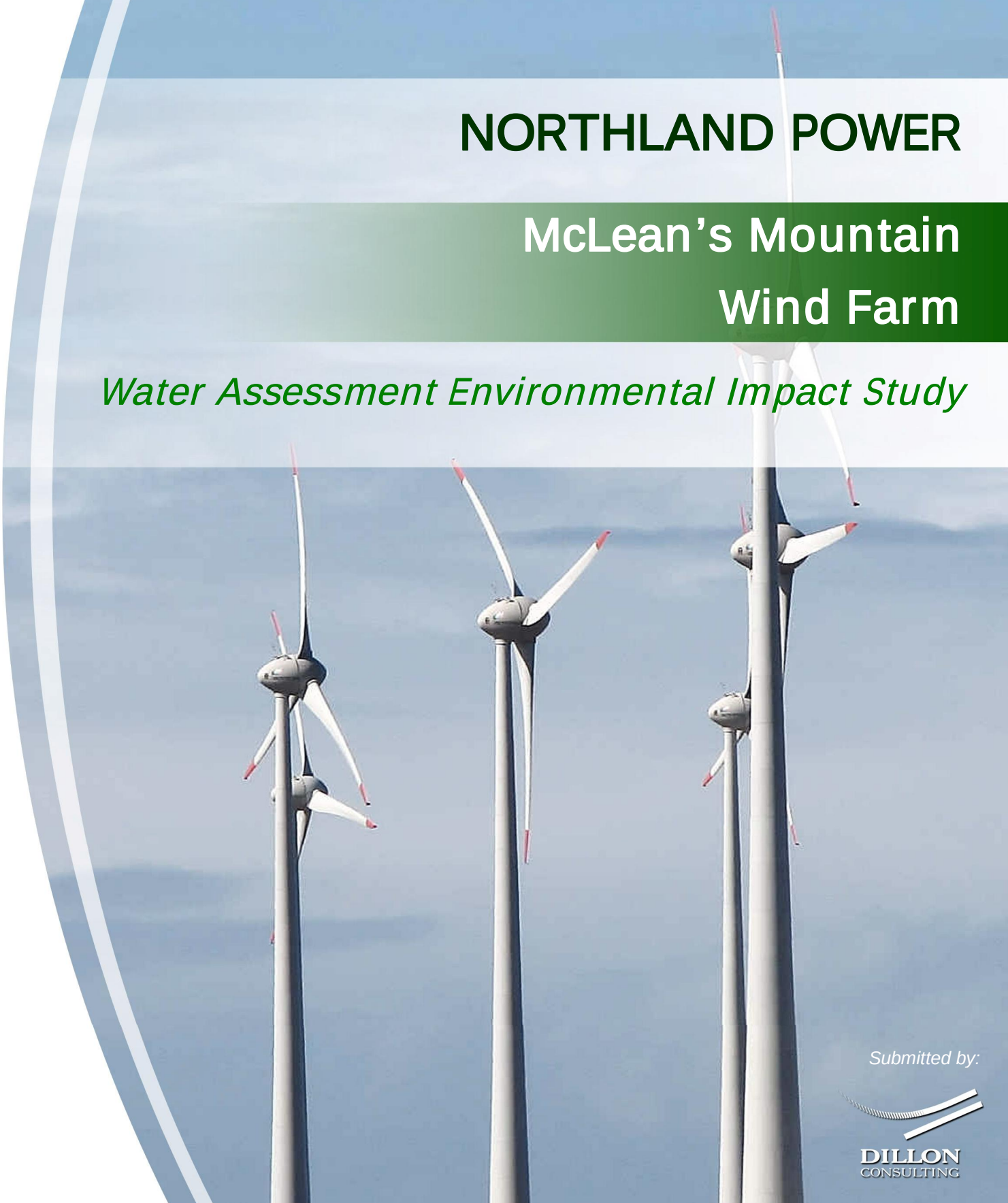
McLean's Mountain Wind Farm

Water Assessment Environmental Impact Study



Submitted by:

DILLON CONSULTING

Table of Contents

List of Figures

List of Tables

List of Appendices

1. Introduction

Northland Power Inc. (Northland Power) and Mnidoo Mnising Power (MMP) propose to develop a wind facility with a maximum name plate capacity of 60 megawatts (MW) located south of Little Current in the Municipality of Northeastern Manitoulin and the Islands, Ontario (Figure 1). The renewable energy facility will be known as the McLean's Mountain Wind Farm and will be rated as a Class 4 wind facility. Northland Power has received a contract from the Ontario Power Authority (OPA) for the purchase of electricity generated by wind turbines from this renewable facility through the Province's Feed-in-Tariff (FIT) program (enabled by the Green Energy and Green Economy Act). The project will require approval under *Ontario Regulation 359/09 – Renewable Energy Approval* (*REA* or *Ontario Regulation 359/09*) under Section V.0.1 of the *Ontario Environmental Protection Act*.

Ontario Regulation 359/09 requires that all renewable energy projects prepare an Environmental Impact Study (EIS) Report to address any water bodies that have been identified within 120 m of the project location (REA Sections 39 and 40). This EIS Report was completed to address the regulatory requirements for the REA process and is the third and final report in a series that fulfills the requirements of the water body reporting that is required by Ontario Regulation 359/09. The reports (Records Review Report, Site Investigation Report and EIS Report) will be submitted to the Ontario Ministry of the Environment (MOE) for review and comment as required in Ontario Regulation 359/09.

Key project activity phases will include: construction, operations and decommissioning of the wind farm facility. A key aspect of all project phases will be the minimization of environmental effects. Once the project is operational, the wind turbines and transmission line will operate automatically and there will be little maintenance required for the wind farm aside from periodic routine servicing. The project is designed to have a life of at least 30 years.

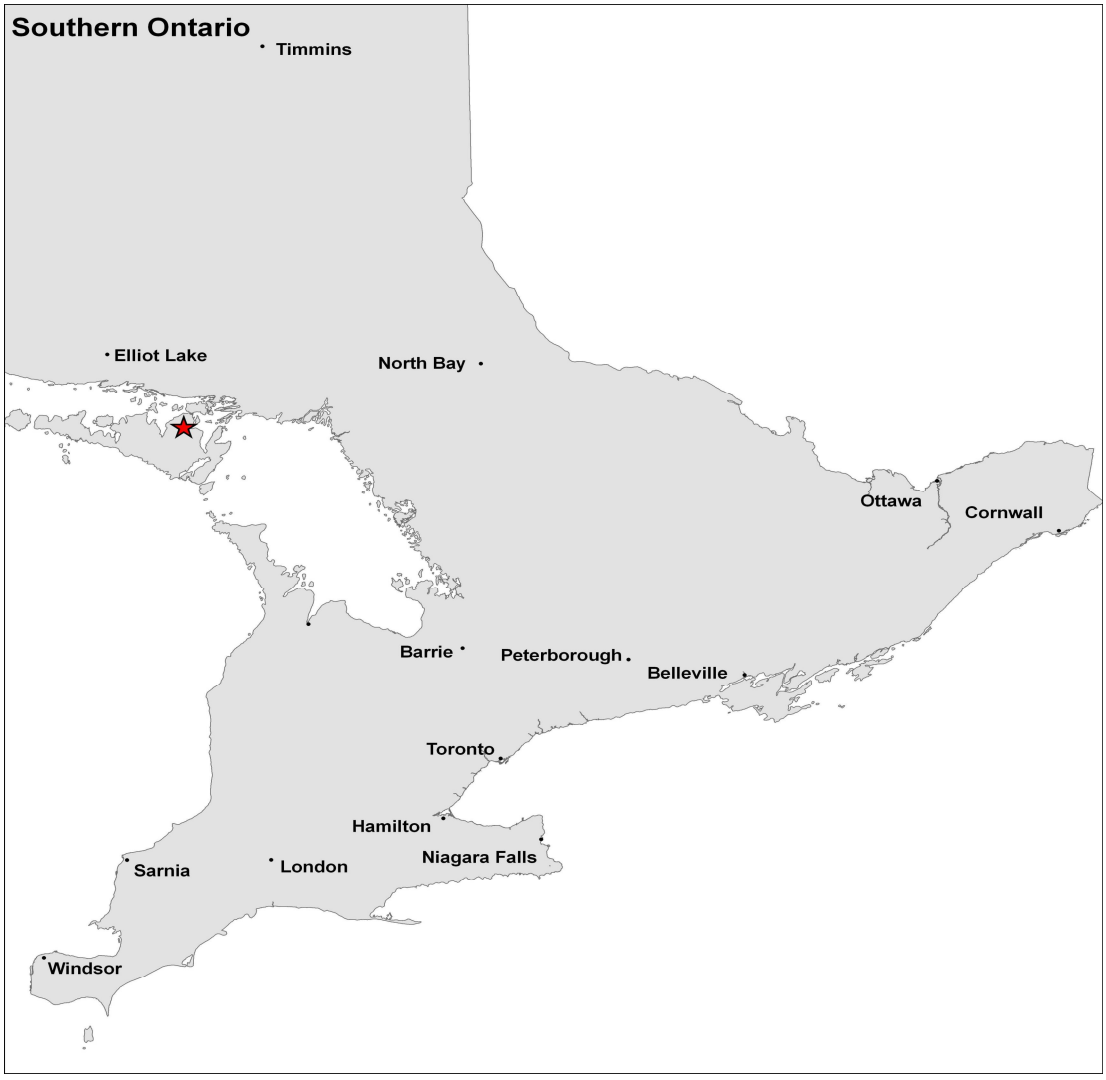


Figure 1: General Location of the McLean's Mountain Wind Farm Project in Ontario

2. The Proponent

Northland Power, founded in 1987, is an experienced developer, owner and operator of renewable power generation in Canada and abroad. Company activities include developing, managing, financing and owning renewable energy facilities. In the course of developing renewable energy projects, Northland Power and MMP strive to satisfy the various environmental approval requirements that vary depending on the jurisdiction, project capacity and site location. In addition, Northland Power and MMP build long-term relationships with the communities that host its' projects. Northland Power and MMP are committed to the health and welfare of the community of Little Current and the Municipality of Northeastern Manitoulin and the Islands.

Contact information for the Proponent is as follows:

Full Name of Company:	*Northland Power Incorporated*
Address:	*30 St. Clair Avenue West, 17th Floor*
Telephone:	*(705) 271-5358, (705) 368-0303*
Prime Contact:	*Rick Martin - Project Manager*
Email:	*rickmartin@northlandpower.ca*

Dillon Consulting Limited is the prime contractor for the preparation of this Environmental Impact Study. The contact at Dillon is:

Full Name of Company:	*Dillon Consulting Limited*
Address:	*235 Yorkland Blvd, Suite 800* *Toronto, Ontario, M2J 4Y8*
Telephone:	*(416) 229-4646 ext 2355*
Fax:	*(416) 229-4692*
Prime Contact:	*Don McKinnon, REA Project Manager*
Email:	*DPMckinnon@dillon.ca*

3. Project Location

The proposed Class 4 wind facility is located in the Municipality of Northeastern Manitoulin and the Islands in northeastern Ontario, and covers approximately 8,200 ha of land south of the Town of Little Current. Figure 1 shows the general location of the project. Figure 2 shows the project location, as defined in Ontario Regulation 359/09 as the location encompassing all projects components, and includes a 120 m setback for adjacent water bodies. All project components, including wind turbines, access roads, and electrical facilities such as transmission lines, inverters, transformers, substations and electrical feeder lines, will be located on private land or municipal rights-of-way. Figure 2 also displays the results of the determinations made during the Water Assessment Records Review and Site Investigation Reports. The planned wind facility will occur primarily within lands currently zoned as rural, with small areas used for agriculture (Municipality of Northeastern Manitoulin and the Islands Official Plan 2002; see Appendix A).

NORTHLAND POWER

McLean's Mountain Wind Farm
Figure 2: Water Assessment
Site Investigation

North Channel

Quaternary Watershed 2CG-07

Quaternary Watershed 2CG-08

Quaternary Watershed 2CG-09

Perch Lake

Bass Lake

Pike Lake

NORTH CHANNEL DR
HALL ST
LAKE RD
BOOZENDOCK RD
HARBOUR VIEW RD
WHITES POINT RD
WILLIS RD
MORPHETS SIDE RD
COLUMBAS MOUNTAIN RD
GREEN BUSH RD
BAYSHORE RD W
SIDEROAD 20
PERCH LAKE RD
BURNETS SIDE RD
DEVILS ELBOW RD
ORRS RD
MILL ST
TOWNLINE RD
LIME KILN RD
GREEN BAY RD
WHITE ROCK RD
PIKE LAKE RD
INDIAN MOUNTAIN RD
BATMANS RD
PEPPER POINT RD
BIDWELL RD

Legend

- Watercourse Crossing
- Local Roads
- Highway
- Watercourse
- 120 m Project Component Setback
- 300 m Project Component Setback
- 30 m Water Features Setback
- 120 m Water Feature Setback
- Quaternary Watershed Boundary
- Lots/Concessions
- Water Body
- Woodland
- Wetland

Project Components

- 24 Wind Turbine Locations
- Five Extra Permitted Sites
- Substation
- Operations Building
- Horizontal Directional Drilling Access/Exit Pit
- Access Road
- Feeder Lines
- Transmission Line
- Construction Staging Area

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4. Project Summary

As shown on Figure 2, a site investigation was completed according to Section 31 of Ontario Regulation 359/09. This work was preceded by a records review as per Section 30 of Ontario Regulation 359/09. A summary of the water bodies within 120 m of the project location, detailed in the previous water assessment reports, is outlined in Table 1.

Table 1: Summary of the Water Assessment for the McLean's Mountain Wind Farm

Water Body ID	Was the water body identified during records review?	Site Investigation Summary		Distance to nearest project components	Project Components within 120 m of the water body	EIS Required?
		Is the project location in the water body?	Is the project location within 120 m of the water body?			
Lakes						
Station 11: North Channel of Lake Huron	✓	✓	✓	Overlaps	Transmission Line	✓
Lake Trout Lakes						
Not applicable to project location						
Permanent and/or Intermittent Streams						
Station 1: Perch Creek	✓	✓	✓	Overlaps	Feeder Line	✓
				72 and 90	HDD* access/exit pit	
				55	Turbine 40	
Station 2: Tributary to Perch Creek #1	✓	✓	✓	Overlaps	Feeder Line	✓
Station 3: Tributary to Perch Creek #2	✓	✓	✓	Overlaps	Feeder Line	✓
				110	HDD* access/exit pit	
Station 4: Tributary to Perch Lake #2	✓	✓	✓	Overlaps	Feeder Line	✓
Station 5: Tributary to Bass Lake #2	✓	✓	✓	Overlaps	Feeder Line	✓
				Overlaps	Access Road	
				98	Turbine 34	
Station 6:	✓	✓	✓	Overlaps	Feeder Line	✓

Water Body ID	Was the water body identified during records review?	Site Investigation Summary		Distance to nearest project components	Project Components within 120 m of the water body	EIS Required?
		Is the project location in the water body?	Is the project location within 120 m of the water body?			
Tributary to Bass Lake #3						
Station 7: Tributary to Manitowaning Bay #1	✓	☒	✓	40	Construction Staging Area	✓
Station 8: Tributary to Bass Lake #3	✓	☒	✓	104	Turbine 19	✓
Station 9: Tributary to Manitowaning Bay #2	✓	✓	✓	Overlaps	Transmission Line	✓
Station 10: Unnamed Tributary	✓	✓	✓	Overlaps	Transmission Line	✓
Seepage Areas						
Not applicable to project location						

* indicates high pressure directional drilling

5. Environmental Impact Study Purpose

This EIS Report was completed so that Subsection (1) of Section 40 (Ontario Regulation 359/09), which prohibits construction and development of a renewable facility within 120 m of the average annual high water mark of a water body, does not apply. By completing an EIS Report in accordance with guidelines established by the MOE, project components may be constructed and installed within 120 m of a water body. This report is consistent with Section 40 of Ontario Regulation 359/09, which details that an EIS Report must include the following:

- Identification and assessment of any negative environmental effects of the project on a water body and on land within 30 m of the water body;
- Identification of mitigation measures in respect of any negative environmental effects;
- Description of how the environmental effects monitoring plan in the Design and Operations Report addresses any negative environmental effects; and,
- Description of how the Construction Plan Report addresses any negative environmental effects.

The focus of this EIS Report will be to fulfill the requirements of Section 40 for the water bodies identified in Table 1 that meet the definition of "water body" under Ontario Regulation 359/09 and are within 120 m of the project location.

6. Rationale for Development Within a Water Body or Setback

The development of this wind farm has been ongoing since 2004 and numerous field visits have been conducted during this time to identify constraints to development. Based on information collected, the project location has been revised and several turbines removed to avoid natural features and water bodies. This effort has resulted in the reduction of the name plate capacity of the project. In order to minimize the impacts on natural features and maximize the available lands in such a way to achieve the maximum name plate capacity possible, water bodies fall within 120 m of the project location. The project components that are within the setback area of applicable water bodies primarily include access roads and feeder lines. Due to the complexity of the natural features in the project location, avoidance of the 120 m water body setback was not feasible.

7. Description of Project Activities

Subject to the receipt of the necessary permits and approvals, site work for the McLean's Mountain Wind Farm is expected to begin as early as November 2011 and last for approximately 12-15 months. No special housing, healthcare or food facilities will be required during the construction period. Complete details of the project activities, construction, design, operations and decommissioning of this project can be found in the respective REA reports (i.e. Construction Report, Design and Operations Report and Decommissioning Report). Below, we provide a summary of key construction schedule dates and details of the construction operation and decommissioning phases of the project relative to the evaluation of impacts.

The anticipated construction schedule for the Proposed McLean's Mountain Wind Farm project is as follows:

- Site Preparation and Clearing: Fall 2011 for 4 weeks;
- Access Road Construction: May – June 2012;
- Foundation Construction: June – August 2012;
- Collector Line Installation May – June 2012
- Transmission Line Construction: June – August 2012;
- Installation of Transformer Substation July 2012
- Turbine Transportation & Lay Down June 2012
- Crane Erection June 2012
- Tower, Generator & Rotor Assembly July – August 2012
- Operations Building August - September 2012
- Electrical Interconnection: May 2012; and
- Commissioning: September 2012;

7.1 Construction Phase

A summary of the construction phase project activities is provided in Table 2.

Table 2: Summary of the Construction Phase Project Activities

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
Surveying & Geotechnical Investigations	The land survey activities included 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. Geotechnical work involved taking bore samples in all proposed turbine locations. Required materials and equipment were transported to and removed from the site in light trucks. No materials were stored on site. Surveying and geotechnical investigations were conducted from March 29 to May 10, 2011.	• 2- 10 tonne truck mounted drill rigs • Light trucks for transportation	• Exclusion fencing • Survey stakes
Site Preparation and Clearing	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. Bush, trees, and other vegetation will be cleared from the construction areas as required. An area of 0.3 hectares will be required for each turbine location for assembly of the turbine. There will also be some minor disturbance to the vegetation outside of the 0.3 hectares lay-down area as the wind turbine blades extend beyond this area.	• 15-20 deliveries with flatbed trucks • 5-6 light trucks • 2 tracked bulldozers • 5 dump trucks • 2 compactors • 2 graders • 2 water trucks • Excavator	• 200-400 mm of pit run gravel • 50 mm of ¾ inch gravel • Geotextile material • Fuel and lubricating grease for construction equipment

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	The clearing of a right-of-way will be required for some sections of the turbine access roads (15 metres) and sections of the 115 kV transmission line (8-10 metres) (details below). Graders, bulldozers, and backhoes will be used to strip any soil that could be present at the turbine foundation locations. All soil will be stored on-site for use in remediation. Following soil stripping, grading will be conducted on irregular ground surfaces, if any, 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. All materials will be transported to site in the dump trucks, flatbed and light trucks. Gravel will be delivered directly to site from a local supplier/pit, as needed for construction activities. The geotextiles will be stored at the construction lay-down area until required for access road and turbine foundation construction. All debris will be collected and disposed of at approved facilities. There is potential for noise and dust emissions and mitigation		

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	measures are discussed in the following section.		
Local Roads Improvements	Green Bush Road will have to be improved in at least two locations. Additional stone base may be added for strengthening as required. The width may be increased to 5.5 metres in some places and up to 8 metres in other places. Improvements may be required to 2 existing crossings along Greenbush Road of the Tributary of Manitowaning Bay) The intersection at Hwy 6 would be temporarily widened and the road grade and vertical curves would be adjusted. Townline Road may have to be widened in at least 1 location to accommodate the turbine deliveries. There is the potential that the intersection of Green Bush Road and McLean's Mountain Road will require widening of the turning radius. A 38.1 metre turning radius is required for the delivery of the wind turbine components. Widening of the turning radius would involve the placement of granular material to create a widened roadbed. The widened intersections would be removed after component delivery but the entrances and any culverts would remain.	• Similar equipment will be used as Site Preparation and Clearing activity.	• 200-400 mm of pit run gravel • 50 mm of ¾ inch gravel • Geotextile material • Fuel and lubricating grease for construction equipment

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
Access Road Construction	Turbine access roads will be installed to accommodate construction and maintenance vehicles and heavy equipment for larger repairs/replacements. Access roads will be 5 metres wide during both the construction and operations phases. For areas of crane walks, there will also be the need for a 6 metre compacted shoulder of native material. The excavation of earth and some blasting of rock are expected to be required for the construction of the turbine access roads. One new water crossing will be installed in order to develop the access roads (Tributary of Bass Lake #2). Access road culvert, either a box culvert of CSP, will be constructed across the watercourses at the project location in order to accommodate vehicular access and construction traffic 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 (Department of Fisheries and Oceans (DFO), Ontario Ministry of Natural Resources (OMNR)). It is not anticipated that a Permit to Take Water	• Similar equipment will be used as Site Preparation and Clearing activity.	• 200-400 mm of pit run gravel • 50 mm of ¾ inch gravel • Geotextile material • Fuel and lubricating grease for construction equipment • Culverts of various sizes

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	(removal/pumping of more than 50,000 L/day) will be required as flow has been observed to be minimal. If it is found that 50,000L/day or more water is required to be pumped out of the bedrock a Category 2 Permit to Take Water will be obtained if pumping does not exceed 30 days. Otherwise, a Category 3 Permit and a Hydrogeological Impact Study will be required. All materials brought to site will be stored at the construction lay-down area until required for construction. Construction debris will be collected and disposed of at approved facilities. There is potential for noise and dust emissions and mitigation measures are discussed in the following section.		
Foundation Construction	Depending on soil conditions, the size of the excavation for the turbine tower will be 2.5 metres to 3 metres deep and 20 metres wide. There is the potential to encounter groundwater seepage. The amount of seepage will depend on seasonal conditions at the time of construction, the degree and continuity of bedrock fracturing and the depth of the excavation relative to the groundwater table. It is not anticipated that a Permit to Take Water (removal/pumping of more than 50,000 L/day) will be required as significant	• Tracked excavator • Tracked bulldozer • Concrete Pump Truck • Rough terrain mobile crane • Approximately 45 deliveries using 8-9 m3 concrete trucks • Truck-mounted crane or rough terrain forklift	• The same equipment and materials land clearing activities • Approximately 365 m3 of concrete • Approximately 32 metric tonnes of rebar plus formwork, anchor bolts, and embed rings

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	excavations into the bedrock are not anticipated. If it is found that 50,000L/day or more water is required to be pumped out of the bedrock a Category 2 Permit to Take Water will be obtained if pumping does not exceed 30 days. Otherwise, a Category 3 Permit and a Hydrogeological Impact Study will be required. Excavation will proceed until bedrock is exposed; in most cases this will be shallower than 12 inches. Any top soil would be stockpiled on site for future use. A spread base 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. Suitable excavation material will be utilized in the foundation backfill and unsuitable excavated materials will be disposed of off-site at a licensed facility. The concrete will be sourced from a local supplier. 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 compressed such that only the tower base portion of the foundation will be above ground. There is potential for noise and dust emissions and mitigation measures are discussed in the following section.		

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
Collector Line Installation	Each turbine will be connected to the on-site transformer substation through a collector line system. The lines will primarily run along the turbine access roads and then along municipal roads RoW. The feeder lines will be buried. The underground lines will be installed using a combination of trenching and ploughing to a depth of 1-1.5 m and a width of 1 m. In an effort to minimize impacts to environmentally sensitive areas four locations will be directionally drilled in order to avoid impact to wetland features. Four wetlands will be crossed with feeder lines using "High-Pressure Directional Drilling" (HDD) to avoid impacts to the wetlands. HDD will be required: 1. On Greenbush Road, lots 17 and 18 between Concession 4 and 5 (Approximately 600 m). 2. Sideroad 20 to T21, south end of Lot 20 Concession 4 (under wooded area, approximately 400 m). 3. Lot 27 between Concession 2 and 3, Guida's Sideroad (Approximately 600 m). 4. North side of Perch Lake lots 13 and 14 between Concession 2 and 3 (Approximately 600 m). A directional boring machine (Vermeer machine) is to be used. HDD requires the use of a drilling fluid or "mud" consisting of silica and	• The same equipment as land clearing activities will be used • 1 – 2 Trenching machines • 1 Boom trucks • 1 - 2 Cable reels trailers	• Up to 35 km of 34.5 kV utility cable

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	bentonite. HDD requires the excavation of pits at the desired inverts of the conduit at each end; the machine may or may not be in the pit. The bore will be approximately 20 cm in size. Once bored, a HDPE casing is then advanced, then the three conductors (one per phase), fiber optic duct, and separate ground cable (if used), are pulled through the casing. Where the underground line will cross a watercourse, the appropriate Department of Fisheries and Oceans (DFO) Operational Statements will be followed or a letter of authorization will be obtained (see Appendix B) Construction debris will be collected and disposed of at approved facilities.		
Transmission Line Installation	A 115 kV line will be constructed to transmit the power to the Hydro One Transmission line on Goat Island. A connection station will be installed at the point of connection to the provincial grid. Transmission line routing to the grid will require submarine crossing of the North Channel (see below). The 115 kV transmission line will require a right-of-way of 8-10 metres. Some sections of the right-of-	• The same equipment as land clearing activities will be used • 2 - 4 Auger trucks • 2 - 4 Boom/Bucket trucks • Approximately 2 Cable reels trucks and trailers	• Wood poles • Circuits (electrical wires) • Switching station • Submarine cable • Terminal structure at South side of Channel crossing

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	way will require clearing. The tower structures of the transmission line would be composed of single poles and be spaced about 125 metres apart and installed to a typical depth of approximately 2.5 metres. The line has been routed to minimize its length and avoid sensitive environmental features. The transmission line will be above ground. Some minor variations to the alignment are possible dependant on public input and engineering considerations. Construction debris associated with the transmission will be collected and disposed of at approved facilities.		
North Chanel Submarine Cable Crossing	It is proposed that the electrical transmission cables (115 kV) will cross the North Channel at the eastern end of Manitoulin Island in a north-south orientation. A total of three (3) electrical cables are to be installed across the channel, in addition to one fiber optic cable. The marine cables crossing portion of the project extends between the north and south shores of the channel. At each shore, the marine cables will terminate at a concrete manhole installed on the respective banks back from the shoreline. On the south shore, the manhole is set back approximately 18 metres from water's edge. On the north shore where the ground slopes more gradually, the manhole is positioned approximately 40	• The same equipment as land clearing activities will be used • 1 – 2 trenching machines • 1 Boom trucks • 1 - 2 Cable reels trailers • Barge to install the marine cable	• Armored 115 kV marine cable • Fiber optic cable

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	metres beyond water's edge. Accordingly, the total length of the channel crossing of the marine cables between manholes on the north and south shores measures 490 metres. The armored cables are to be laid on the bottom of the channel. The cable will be placed underground at both shoreline locations. Conventional open cut trenching methods will be used for the near-shore and bank sections of the proposed channel crossing, the marine transmission cables will be buried in an excavated marine trench to provide the necessary protection and security with a minimum cover of 865 mm (34") over the top of the cables after backfilling. Some rock blasting could be required. Details regarding the cable design and method of construction is provided in Appendix C to this Construction Plan Report. Note that instead of trenching it is possible that the constructor may choose to directional drill the cable for the channel crossing. Once on Goat Island, the cable would remain underground to the point of interconnect with the provincial grid. The cable would be installed through conventional trenching construction methods. The property which the alignment passes through is owned by Canadian Pacific Railway, for which NPI has obtained an easement to pass through this property.		

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
Installation of Transformer Substation	The transformer substation will be constructed on Company owned land, Lot 13, Concession 5, Township of Howland. The substation site will be graded and graveled as per code The substation will comply with the requirements of O.Reg 359/09 by meeting the 40 dB noise limit at the nearest receptor. It will be located at least 500 metres from the nearest noise receptor. Substation grounding will follow the Canadian Electrical Code (CEC) Construction debris will be collected and disposed of at approved facilities.	• Tracked bulldozers, crane and excavators for installation	• Circuit breakers • Step-up power transformer • Isolation switch • Distribution switch-gear • Instrument transformers • Grounding • Revenue metering • Substation control and communication building • Oil containment system
Turbine Transportation and Lay Down	Each of the disassembled turbines and generators will be trucked to the site on a flat-deck trailer for assembly within a temporary construction area. Thirteen flat-bed trucks are required for each complete wind turbine unit. It will be necessary to undertake some local road intersection improvements to allow the trucks to make turns to access the project location. It may 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.	▪ 14 – 16 heavy haul trucks per WTG delivery including 9-10 specialized 34-60 meter transport trucks ▪ Will be concurrent with and will use the same equipment and materials as land clearing activities	▪ about 6–8 trailers to be located in laydown area including EPC Contractor, WTG Supplier, Specialty Subcontractor(s) and Owner

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
Crane Erection	A crane pad will be installed at each turbine site to accommodate cranes to erect the turbine. The crane pads will be constructed at-grade with a maximum slope of 1%. An area of approximately 200 m2 will be leveled and stoned to a 300-600 mm depth to accommodate each crane pad. An area 50 metres of each crane pad will be used for assembly of the wind turbine rotor and storage of the turbine components. Construction debris will be collected and disposed of at approved facilities.	• Approximately 15 heavy duty trucks to transport crane equipment • Will use the same equipment and materials as land clearing activities	
Tower, Generator, and Rotor Assembly	The tower comes in four sections that are assembled at the turbine sites one section at a time. The nacelle, which houses the generator, is lifted by a crane and attached to the top of the top tower section. The rotor will be lifted by crane and attached to the nacelle. Construction debris will be collected and disposed of at approved facilities.	• 1-Crane (600-800 tonnes crane with two assist crane) • Crane (200-300Ton) Rough terrain mobile cranes • 2 rough terrain fork lifts	Turbine towers, delivered in 5 sections: • nacelles • blades • rotors and hubs • pad-mounted transformers
Operations Building Construction	An operations building will be constructed on-site next to the sub-station location. The operations building will be approximately 15 metres by 30 metres (450 m2) in size. It will provide office and storage space and a workspace for maintenance of equipment. A well will be required to provide a potable source of water for the Operations and Maintenance building. Domestic waste water will be	• deliveries with flatbed trucks • light trucks • tracked bulldozers • dump trucks • compactors • graders	Typical building materials (wood, brick, metal, concrete, etc.)

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	managed by the construction of a small septic tank and field bed..	• Excavator	
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.	• Same equipment as site clearing activity • 4000 L Sewage tank • piping	• Sand • Stone • Weeping Tile
Site Rehabilitation	Garbage and debris will be removed and disposed of at an approved location. Slash trees will be set aside and piled. All equipment and vehicles will be removed from the construction area. 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. If spills occurred during the construction phase, spill affected areas will be remediated. Emergency oil spill kits will be maintained on site during the construction and operation of the project. All waste fluids and oils will be removed from the site and recycled, where possible, or disposed of according to	• Graders • Dump Trucks • Loaders • Excavators • Tracked bulldozers • Light Trucks	• Fuel and grease for equipment

Construction: Physical Works/Activities	Description of Activity	Equipment Required	Materials Required
	provincial guidelines. 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 allowed to re-naturalize or be re-seeded and maintained at the discretion of the landowner.		

7.1.1 Environmental Construction Monitoring

An environmental construction monitoring program will be carried out during the construction phase of the McLean's Mountain Wind Farm project to ensure that the committed mitigation measures (see Section 9 and 10 of this document) are carried out and are effective. The environmental monitoring program will be carried out by the project owner's "Environmental Monitor" who will be independent from the construction contractor. The Environmental Monitor will have the authority to halt construction if, in their opinion, the required mitigating measures are not being adhered to and which potentially could result in unacceptable environmental effects.

Daily written logs will be compiled to document the inspection work. Documentation will include any instructions given to the contractor regarding environmental effects and the corrective actions taken. Upon completion of the work, a site inspection and rehabilitation report will be prepared.

7.1.2 Emergency Response Plan

The Emergency Response Plan (ERP) is described in the Environmental Management and Protection Plan (EMPP) in the Design Operations Report. The ERP is to be used in the event of an emergency and includes contact information for regulators, landowners, and other stakeholders. All appropriate regulators will be notified should the emergency include any potential impact to the health and safety of local residents or the environment.

7.2 Operations Phase

7.2.1 Wind Turbine Operation

The wind turbines will be operated in a manner consistent with nationally recognized standards for operation of wind turbine facilities in Canada. The project will be operated by a staff of 10 people who would work out of the on-site operations building. Typical generated traffic would be low and include staff traveling to and from the operations building to visit/inspect the turbines, as required.

A communication system will be installed that will provide on-site notification and also allow remote monitoring of the status of the turbines. Components defined as critical, such as the

rotor, generator, gearbox and cooling system, will be monitored using a supplier designed system to ensure safe shutdown. Controls will be implemented for fail safe action in the event of electrical or instrument losses.

The wind turbine system will be integrated with the electric interconnection Supervisory Control and Data Acquisition (SCADA) to ensure that the project critical controls, alarms and functions are properly coordinated for safe, secure and reliable operation.

At least one (1), but possibly all, of the existing four (4) currently installed meteorological monitoring towers will continue to be operated throughout the operation of the wind farm to assist NPI and MMP in assessing the performance of the turbines.

7.2.2 Wind Turbine and Ancillary Facilities Maintenance

Normal maintenance on the individual wind turbines occurs twice per year. It involves complete checks of structural soundness, checks of the electronics systems, changing of hydraulic and lubricating fluids, etc. Two person teams, for safety reasons, conduct maintenance. The expected maintenance time involved is two days per turbine. Unexpected maintenance occurs infrequently and typically involves the replacement of a major component, such as a gearbox, transformer or blade. In the event of a major malfunction, a crane may be required to lift the affected component. Maintenance of the wind farm also includes other activities such as line maintenance and inspection and snow clearing.

7.3 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 lack of a power purchase agreement with the Ontario Power Authority (or legal successor) or another green energy power purchaser.

The decommissioning involves removing the wind turbine including, tower, generator, auxiliary equipment, above ground cables/poles, fixtures, all other personal property and otherwise restoring the premises to its original condition. If it is agreed upon with the landowner, access roads may be left in place for their continued use. Foundations shall be removed to original soil depth or three feet below grade, whichever is the lesser, and replaced with topsoil.

The project owners agree to meet with the landowner prior to the lease expiration date to ensure that the owners perform its obligations to remove its property and restore the premises. Within twelve (12) months of initiating the decommissioning, the project owners will have removed the relevant components from the leased land.

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 manager responsible for safety will be present on site for the duration of the work.

7.3.1 Decommissioning During Construction (Abandonment of Proposed Project)

While not expected, and considered to be extremely unlikely, in the event that construction of the proposed project and associated work may not be completed, the project would be decommissioned in a manner as described in this report. Further, mitigation measures as described in the Environmental Management and Protection Plan (part of the Design and Operations Report) would be implemented.

7.3.2 Decommissioning After Ceasing Operation

Properly maintained wind turbines have an expected life of thirty (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. Decommissioning activities such as removal of cables and access roads will be conducted in consultation with land owners.

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

- Remove above ground collection and transmission system including substation and switchyard;
- Remove wind turbines;
- Partial removal of wind turbine foundations; and
- Remove turbine access roads, if required by landowners.

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

7.3.3 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 blades, the rotor, nacelle and then the towers section by section. The lubricating oil will be drained from the generator once it has been placed on the ground, and the oil will be disposed of in accordance with *O.Reg 347*. As the turbine is being disassembled, the various components will be transported off site.

7.3.4 Wind Turbine Foundations

Once all the turbine components have been cleared from a site, the top metre of overburden around the foundation will be excavated and stockpiled. Once cleared, the top metre of the foundation (or to bedrock) will be demolished. The resulting concrete and rebar will be hauled off site and disposed of at an off-site licensed facility. 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.

7.3.5 Access Road Removal

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

7.3.6 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. The submarine portion of the transmission line will be removed using best practices at the time of decommissioning.

7.3.7 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. 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. Any material that has been used as a sound attenuating berm will be levelled and replanted to the requirements of the land holder.

7.3.8 Crane Pad Decommissioning

Crane pads will be approximately 200 m^2 and consist of compacted native material. Approximately 300-600 mm 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 unless the land holder asks for it to remain.

7.3.9 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 at the depth of the native bedrock, 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 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 project's 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 project's construction, road traffic in the area will increase temporarily due to crews and heavy equipment movements.

7.3.10 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. Dismantled wind turbines have a high salvage value due to the steel and copper components. These components are easily recyclable and there is a ready market for scrap metals. Transformers and transmission lines are designed for a 50 year lifespan so these items could be refurbished and sold for reuse.

Based on the construction details for the GE 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 (fibreglass reinforced epoxy and carbon fibres), 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.

7.3.11 Emergency Response and Communications Plans

The Emergency Response and Communications Plans are included in Section 8 of the Design and Operations Report prepared as part of the Renewable Energy Approval application for the proposed McLean's Mountain Wind Farm Project.

7.3.12 Decommissioning Notification

The process for notification of decommissioning activities will be the same as the process for notification of construction activities and is detailed in Section 8.1 of the Emergency Response and Communications Plans in the Design and Operations Report prepared as part of the Renewable Energy Approval application for the proposed McLean's Mountain Wind Farm Project.

8. Existing Environmental Conditions of Relevant Water Bodies

The project location falls within the Manitoulin Islands Tertiary Watershed 2CG, which lies between the north end of Georgian Bay and Lake Huron and drains into Lake Huron. This watershed consists of Manitoulin Island and many smaller islands surrounding it. Characteristics of this watershed include coastal areas, stream systems, lakes and wetlands. A significant portion of the watershed is alvar, with mixed forests, sparse deciduous and coniferous forest and dense deciduous forest found throughout the remainder of the watershed. Approximately 9% of the watershed is made up of stream systems; less than 8% is comprised of lake systems (Phair *et al.*, 2005). The project location is split between two quaternary watersheds (2CG-08 and 2CG-07; see Figure 2).

8.1 Average Annual High Water Mark Determination

Average annual high water mark determination was approximated from bankfull width due to the relatively flat topography or deep cut channels at most water crossings.

8.2 Lakes

A search and analysis of the records and resources outlined in the records review did not identify any lakes in the project location or within the surrounding 120 m. The results of the site investigation verified this determination.

8.3 Lake Trout Lakes

A search and analysis of the records and resources outlined in the records review did not identify any Lake Trout lakes in the project location or within the surrounding 300 m (MNR 2006).

There is only one lake on Manitoulin Island which is considered a natural Lake Trout lake; Lake Manitou is located approximately 5 km south of the project location. Lake Huron is part of the Great Lakes system and is not currently designated for Lake Trout management.

8.4 Permanent and Intermittent Streams

Multiple permanent and intermittent streams are located throughout the project location (see Figure 2). Each of these streams is described below in Table 3.

Table 3: Permanent and Intermittent Stream Description

Station #	Water Body	Water Body Type							Habitat Type				Substrate Type(s)	Approximate Channel Measurements (m)		In-stream Cover	Surrounding Vegetation Community
		Natural	Channelized	Lake/Pond	Permanent	Intermittent	Ephemeral	Not existing	Riffle	Run	Flat	Pool		Wetted Width	Wetted Depth		
1	Perch Creek	✓	✓	---	✓	---	----	---	✓	✓	✓	✓	Bedrock, Cobble, Gravel, Detritus	2.5 – 20.0	0.06 – 0.3	Cobble, Macrophytes and Woody Debris	Hardwood Mixed Forest, Deciduous Swamp, Deciduous Woodland
2	Tributary to Perch Creek #1	✓	✓	---	✓	---	---	---	--	✓	--	✓	Muck, Detritus	---	---	Algae	Hardwood Mixed Forest
3	Tributary to Perch Creek #2	✓	✓	✓	✓	---	---	---	--	--	✓	✓	Muck, Detritus	---	---	Grass mats in open marsh, Macrophytes	Reed Canary Grass Mineral Shallow Marsh
4	Tributary to Perch Lake #2	✓	✓	---	---	✓	---	---	--	--	--	✓	Mud, Detritus	---	---	Macrophytes and Woody Debris	Coniferous Swamp, Deciduous Swamp, Thicket Swamp and Treed Pasture
5	Tributary to Bass Lake #2	✓	✓	---	✓	---	---	---	✓	--	--	✓	Muck, Cobble, Gravel	0.5 – 0.8	0.05 - 0.1	Undercut banks, Cobble, Woody Debris, Organic Debris	Deciduous Forest and Open Pasture

Station #	Water Body	Water Body Type							Habitat Type				Substrate Type(s)	Approximate Channel Measurements (m)		In-stream Cover	Surrounding Vegetation Community
		Natural	Channelized	Lake/Pond	Permanent	Intermittent	Ephemeral	Not existing	Riffle	Run	Flat	Pool		Wetted Width	Wetted Depth		
6	Tributary to Bass Lake #3	✓	---	---	---	✓	---	---	--	--	✓	--	Gravel, Sand, Detritus, Muck	2.0 – 3.5	0.05	Woody Debris, Macrophytes	Deciduous Forest and Open Pasture
7	Tributary to Manitowaning Bay #1	✓	---	---	---	✓	---	---	--	--	✓	--	Gravel, Sand, Detritus, Muck	2.0 – 3.5	0.05	Woody Debris, Macrophytes	Open Pasture
8	Tributary to Bass Lake #3	✓	---	---	---	✓	---	---	--	--	✓	--	Gravel, Sand, Detritus, Muck	2.0 – 3.5	0.05	Woody Debris, Macrophytes	Deciduous Forest and Open Pasture
9	Tributary to Manitowaning Bay #2	✓	✓	---	---	✓	---	---	--	✓	✓	--	---	2.5 – 3.0	0.5 - 1.0	---	Deciduous Forest and Open Pasture
10	Unnamed Tributary	✓	---	---	---	✓	---	---	--	--	✓	✓	---	0.5	0.05	---	Deciduous Forest and Common Juniper Shrub Alvar

8.5 Seepage Areas

A search and analysis of the records and resources outlined in the records review did not identify any seepage areas in the project location or within the surrounding 120 m. The results of the site investigation verified this determination.

9. Environmental Effects of the Project

A summary of features contained in Table 3 that contribute to the persistence of the quality of the water bodies in the project location and the habitat they provide that may be sensitive to development and/or serve as good indicators of negative environmental effects are described below in Table 4.

The evaluation of potential impacts, mitigation and residual effects are discussed in Table 5. The natural features identified as associated with each water body are detailed in the Natural Heritage Assessment Report Package. In many cases activities listed overlap (e.g. clearing and equipment lay-down). Where activities overlap, the first activity in the project construction sequence or which has the broadest impact is evaluated in Table 5.

Table 4: A Summary of Water Body Key Features and Functions and other Characteristics that may be Sensitive to Development

Station[1]	Water Body	Features & Attributes Necessary for Persistence	Features Potentially Sensitive to Development	Features that may serve as Indicators
1	Perch Creek	▪ Bedrock, cobble, gravel and detritus substrate ▪ In-stream cover consisting of cobble, woody debris and macrophytes ▪ Riffle-pool habitat sequences ▪ Minimal disturbance by grazing cattle ▪ Diversity of fish species ▪ Connectivity to wetland habitat	Physical: ▪ In-stream cover ▪ Substrate ▪ Habitat diversity Functional: ▪ Flow conveyance ▪ Species diversity ▪ Connectivity between creek and wetland	Water quality, bank stability, fish species diversity
2	Tributary to Perch Creek #1	▪ Connectivity to Perch Creek system and wetlands downstream	Physical: ▪ Riparian cover Functional: ▪ Flow conveyance ▪ Connectivity between creek and wetland	Bank stability
3	Tributary to Perch Creek #2	▪ Connectivity to Perch Creek system and wetlands downstream	Physical: ▪ Riparian cover ▪ Substrate ▪ In-stream cover Functional: ▪ Flow conveyance ▪ Connectivity between creek and	Bank stability and erosion, water quality

Station[1]	Water Body	Features & Attributes Necessary for Persistence	Features Potentially Sensitive to Development	Features that may serve as Indicators
			wetland	
4	Tributary to Perch Lake #2	▪ Connectivity to Perch Creek system and wetlands downstream	Physical: ▪ Riparian cover ▪ Substrate ▪ In-stream cover Functional: ▪ Flow conveyance ▪ Connectivity between creek and wetland	Water quality
5	Tributary To Bass Lake #2	▪ Contribution to downstream fish habitat ▪ Substrate consisting of muck, cobble and gravel ▪ Connectivity to Bass Lake downstream and wetland upstream	Physical: ▪ Riparian cover ▪ Substrate ▪ In-stream cover Functional: ▪ Flow conveyance ▪ Connectivity between creek and wetland	Water quality
6	Tributary to Bass Lake #3	▪ Contribution to downstream fish habitat and wetland areas	Physical: ▪ In-stream cover Functional: ▪ Flow conveyance	Water quality, fish presence
7	Tributary to Manitowaning Bay #1	▪ Contribution to downstream fish habitat and wetland areas	Physical: ▪ In-stream cover Functional: ▪ Flow conveyance	Water quality
8	Tributary to Bass Lake #3	▪ Contribution to downstream fish	Physical: ▪ In-stream cover	Water quality

Station[1]	Water Body	Features & Attributes Necessary for Persistence	Features Potentially Sensitive to Development	Features that may serve as Indicators
		habitat and wetland areas	Functional: ▪ Flow conveyance	
9	Tributary to Manitowaning Bay #2	▪ Connectivity to lagoons upstream and Manitowaning Bay downstream	Physical: ▪ Riparian cover ▪ Substrate ▪ In-stream cover Functional: ▪ Flow conveyance ▪ Connectivity between creek and lagoons	Water quality, bank stability
10	Unnamed Tributary	▪ Connectivity to Lake Huron	Physical: ▪ In-stream cover Functional: ▪ Flow conveyance	Water quality

Table 5: Summary of Potential Negative Effects and Mitigation Measures for Water Bodies and Lands Within 30 m

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
Perch Creek (Station #1)	Waterfowl Nesting Area, Turtle Overwintering Area and Woodland Amphibian Breeding Habitat Provincially Significant Wetland	*Site Preparation*: Vegetation Removal in Riparian or Shoreline Areas and Grading. *Decommissioning:* Rotor, Generator and Tower disassembly. Foundation removal.	Overlaps Feeder Line 55 m from Turbine 40 72 m and 90 m from High-pressure Directional Drilling access/exit pit	▪ Loss of shade ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species assemblage and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Two High-pressure Directional Drilling access/exit pits (10 m x 10 m) will need to be cleared 72 m and 90 m from Perch Creek and associated riparian wetland. Removal of 0.3 ha of upland forest edge habitat 55 m from Perch Creek to accommodate T40.	Once to facilitate construction of feeder line, access road and turbine T40 Once during decommissioning	One growing season until vegetation is re-established	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species once construction/ decommissioning is complete ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management	No Residual Effect
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment		▪ Limited potential for accidental spills or contamination of soil and/or surface runoff ▪ Limited potential for "frac-out" as a result of a spill, tunnel collapse or rupture of drilling mud to the surface during directional drilling	▪ Runoff of contaminated soil or drilling mud and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer ▪ Proper geotechnical assessment practices, drill planning and execution. ▪ Extent of frac-out can be limited by careful monitoring, having appropriate equipment and response plans ready ▪ Follow DFO Operational Statement for High-Pressure Directional Drilling (Appendix B)	No Residual Effect. Construction is not directly adjacent to Perch Creek. If frac-out does occur response plan will remediate drilling mud exposure to the surrounding area.

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
		Construction: Feeder Line Installation	72 m and 90 m from High-pressure Directional Drilling access/exit pit	▪ Limited potential for increased erosion and sedimentation to enter into watercourse ▪ Removal/storage of spoils from HDD Access/Exit Pit on either side of Perch Creek.	▪ Localized temporary displacement of fish due to noise and vibration ▪ Runoff of spoils into Perch Creek may impact fish habitat and water quality of any downstream receiving waters	1.5 m deep x 1.0 m wide trench in access road leading to HDD Access/Exit Pit HDD will be 160 m long at a depth of 2.5 m under Perch Creek tributary and have a diameter of 20 cm.	Once during construction	1 week during construction only	▪ Ensure all spoils from site are removed in a timely manner. If any storage of spoils is required they should be no closer than 30 m from Perch Creek ▪ Implement erosion and sediment control plan to ensure no transportation of spoils into adjacent areas ▪ Follow DFO Operational Statement for High-Pressure Directional Drilling (Appendix B)	No Residual Effect. Access/exit pits are located greater than 30 m from Perch Lake.
		Construction: Crane Pad Installation, Foundation and Turbine Instalment	55 m from Turbine 40	▪ Noise, dust and emissions from excavation and potential blasting ▪ Potential for increased erosion and sedimentation ▪ Limited potential for concrete spill, contaminants entering surrounding environment	▪ Runoff of dust and debris into watercourse which may impact fish habitat and water quality downstream	Crane pad approximately 200 m^2, foundation excavation 2.5 – 3.0 m deep and 20 m wide	Once during construction	One growing season until vegetation has re-established	▪ Construction debris should be collected and disposed of at approved facilities ▪ Implement erosion and sediment control plan to ensure disturbed substrate/contaminants do not enter watercourse	No Residual Effect.
		Operation: Accidental Spills from Inverters	55 m from Turbine 40	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During operations phase	Short-term effect; potential throughout lifespan of wind farm	▪ Design an Emergency Response and Communication Plan ▪ Notify MOE (Spills Action Centre) immediately in the event of a spill	No Residual Effects. In the event of a spill from an inverter, the area of the spill will be remediated.
Tributary to Perch Creek #1 (Station #2)	Sites Supporting Area-sensitive Species: Forest Birds Provincially Significant Wetland downstream	*Construction:* Feeder Line Installation	Overlaps buried Feeder Line	▪ Potential for increased erosion and sedimentation to enter the watercourse	▪ May impact potential fish habitat and water quality of Perch Creek downstream	1.5 m deep x 1.0 m wide trench in existing trail	Once during construction	1 week during construction only	▪ Implement erosion and sediment control plan to ensure disturbed substrate does not enter into adjacent watercourse	No Residual Effect
		Construction: Storage and Use of Construction Materials and Equipment		▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek Tributary and	No Residual Effect.

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
					waters			activity	construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	
Tributary to Perch Creek #2 (Station #3)	Sites Supporting Area-sensitive Species: Forest Birds Provincially Significant Wetland	*Site Preparation*: Vegetation Removal in Riparian or Shoreline Areas and Grading	110 m from High-pressure Directional Drilling access/exit pit Overlaps buried Feeder Line	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Two High-pressure Directional Drilling access/exit pits (10 m x 10 m) will need to be cleared 110 m from the Perch Creek tributary	Once to facilitate construction of feeder line	One growing season until vegetation is re-established	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species once construction/ decommissioning is complete ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management ▪ Maintain pre-construction surface water flow during grading	No Residual Effect
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment		▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil or drilling mud may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek Tributary and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect.
		Construction: Feeder Line Installation		▪ Limited potential for increased erosion and sedimentation to enter into watercourse ▪ Removal/storage of spoils from HDD Access/Exit Pit on either side of a Perch Creek Tributary.	▪ Localized temporary displacement of fish due to noise and vibration ▪ Potential for frac-out to occur within the watercourse or water body system resulting in direct impacts to fish habitat	1.5 m deep x 1.0 m wide trench in access road leading to HDD Access/Exit Pit HDD will be 600 m long at a depth of 2.5 m under Perch Creek tributary and	Once during construction	Once during directional drilling	▪ Ensure all spoils from site are removed in a timely manner. If any storage of spoils is required they should be no closer than 30 m from the water body system ▪ Implement erosion and sediment control plan to ensure no transportation of spoils into adjacent areas	No Residual Effect.. If frac-out does occur response plan will remediate drilling mud exposure to the surrounding area.

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
				▪ Limited potential for "frac-out" as a result of a spill, tunnel collapse or rupture of drilling mud to the surface during directional drilling		wetland with a diameter of 20 cm.			▪ Proper geotechnical assessment practices, drill planning and execution. ▪ Extent of frac-out can be limited by careful monitoring, having appropriate equipment and response plans ready ▪ Follow DFO Operational Statement for High-Pressure Directional Drilling (Appendix B)	
Tributary to Perch Lake #2 (Station #4)	Waterfowl Nesting Area, Turtle Overwintering Area and Woodland Amphibian Breeding Habitat Provincially Significant Wetland	*Construction:* Feeder Line Installation	Overlaps Feeder Line	▪ Potential for increased erosion and sedimentation to enter the watercourse	▪ May impact potential fish habitat and water quality of Perch Creek downstream	1.5 m deep x 1.0 m wide trench in existing trail	Once during construction	1 week during construction only	▪ Implement erosion and sediment control plan to ensure disturbed substrate does not enter into adjacent watercourse	No Residual Effect
		Construction: Storage and Use of Construction Materials and Equipment		▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Lake Tributary and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect.
Tributary to Bass Lake #2 (Station #5)	Raptor Winter Feeding and Roosting Area and Sites Supporting Area-sensitive Species: Open Country Breeding Birds Downstream of Provincially Significant Wetland	*Site Preparation*: Vegetation Removal in Riparian or Shoreline Areas and Grading *Decommissioning:* Access Road Removal (if requested by Landowner), Rotor, Generator and Tower disassembly. Foundation removal.	Overlaps Feeder Line Overlaps Access Road 98 m from Turbine 34	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Removal of 0.3 ha of upland forest edge habitat adjacent to wetland to accommodate T34. 15 m wide clearing for a length of 100 m (0.15 ha)	Once to facilitate construction of turbine 34 and associated access road and feeder line Once during decommissioning	One growing season until vegetation is re-established	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management	No Residual Effect

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment	Overlaps Feeder Line Overlaps Access Road 98 m from Turbine 34	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect. Construction will not be performed directly adjacent to Perch Creek due to High-pressure Directional Drilling the Feeder Line.
		Construction: Feeder Line Installation	Overlaps Feeder Line	▪ Potential for increased erosion and sedimentation to enter the watercourse	▪ May impact potential fish habitat and water quality of Perch Creek downstream	1.5 m deep x 1.0 m wide trench in existing trail	Once during construction	1 week during construction only	▪ Implement erosion and sediment control plan to ensure disturbed substrate does not enter into adjacent watercourse	No Residual Effect
		Construction: Access Road	Overlaps Access Road	▪ Loss of native substrate and potential for imported gravel material to enter into immediately adjacent habitat as a result of increase in surface water runoff entering adjacent environments ▪ Disruption or impediment of flow ▪ Disruption or alteration of watercourse substrates	▪ Loss of plant diversity in localized area adjacent to road ▪ Where road substrate is removed post-construction, imported soil has the potential to support the growth of non-native species which may indirectly effect riparian areas of this Bass Lake tributary ▪ Barrier to fish movement ▪ Destruction of fish habitat ▪ Decrease in water quality	11 m wide x 520 m long (from Turbine 30 to Turbine 34) to be reduced to 5 m wide after construction	During and immediately after construction as well as during storm events	Medium-term - Project Lifespan	▪ Design roads to promote infiltration (e.g. use of gravel materials); ▪ Maintain or provide vegetative buffers; ▪ In-water work to take place during appropriate timing windows as determined through DFO (Appendix B) ▪ Maintain flow conveyance throughout construction	Minimal Residual Effect. Road area small, thus marginal decrease in localized infiltration expected; negligible change to surface water runoff volumes expected from pre-development conditions - Box or CSP culvert will be installed to minimize impacts to substrate and flow at crossing
		Operation: Accidental Spills from Inverters	98 m from Turbine 34	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During operations phase	Short-term effect; potential throughout lifespan of wind farm	▪ Design an Emergency Response and Communication Plan ▪ Notify MOE (Spills Action Centre) immediately in the event of a spill	No Residual Effects. In the event of a spill from an inverter, the area of the spill will be remediated.
Tributary to Bass Lake #3 (Station #6 and #8)	Raptor Winter Feeding and Roosting Area and Sites Supporting Area-sensitive Species: Open Country Breeding Birds	*Site Preparation*: Vegetation Removal in Riparian or Shoreline Areas and Grading *Decommissioning:*	Overlaps Feeder Line Overlaps Access Road	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse	▪ Increase in water temperatures ▪ Changes in fish species assemblage and abundance ▪ Drying up of refugia due to increased evaporation	Removal of 0.3 ha of upland forest edge habitat adjacent to wetland to accommodate T19.	Once to facilitate construction of turbine 19 and associated access road and feeder line	One growing season until vegetation is re-established	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species	No Residual Effect

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
		Access Road Removal (if requested by Landowner), Rotor, Generator and Tower disassembly. Foundation removal.	104 m from Turbine 19	▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	15 m wide clearing for a length of 100 m (0.15 ha)	Once during decommissioning		▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management	
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment	Overlaps Feeder Line Overlaps Access Road 104 m from Turbine 19	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect. Construction will not be performed directly adjacent to Perch Creek due to High-pressure Directional Drilling the Feeder Line.
		Construction: Feeder Line Installation	Overlaps Feeder Line	▪ Potential for increased erosion and sedimentation to enter the watercourse	▪ May impact potential fish habitat and water quality of Perch Creek downstream	1.5 m deep x 1.0 m wide trench in existing trail	Once during construction	1 week during construction only	▪ Implement erosion and sediment control plan to ensure disturbed substrate does not enter into adjacent watercourse	No Residual Effect
		Construction: Access Road	Overlaps Access Road	▪ Loss of native substrate and potential for imported gravel material to enter into immediately adjacent habitat as a result of increase in surface water runoff entering adjacent environments	▪ Loss of plant diversity in localized area adjacent to road ▪ Where road substrate is removed post-construction, imported soil has the potential to support the growth of non-native species which may indirectly effect riparian areas of this Bass Lake tributary ▪ Decrease in water quality downstream	11 m wide x 1,615 m long (From Greenbush Road to Turbine 6) to be reduced to 5 m wide after construction	During and immediately after construction as well as during storm events	Medium-term - Project Lifespan	▪ Design roads to promote infiltration (e.g. use of gravel materials) ▪ Maintain or provide vegetative buffers	Minimal Residual Effect – road area small, thus marginal decrease in localized infiltration expected; negligible change to surface water runoff volumes expected from pre-development conditions
		Construction: Crane Pad Installation, Foundation and Turbine Instalment	104 m from Turbine 19	▪ Noise, dust and emissions from excavation and potential blasting ▪ Potential for increased erosion and	▪ Runoff of dust and debris into watercourse which may impact fish habitat and water quality downstream	Crane pad approximately 200 m^2, foundation excavation 2.5 – 3.0 m deep and 20 m	Once during construction	One growing season until vegetation has re-established	▪ Construction debris should be collected and disposed of at approved facilities ▪ Implement erosion and sediment control plan to ensure	No Residual Effect

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
				sedimentation ▪ Limited potential for concrete spill, contaminants entering surrounding environment		wide			disturbed substrate/contaminants do not enter watercourse	
		Operation: Accidental Spills from Inverters	104 m from Turbine 19	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During operations phase	Short-term effect; potential throughout lifespan of wind farm	▪ Design an Emergency Response and Communication Plan ▪ Notify MOE (Spills Action Centre) immediately in the event of a spill	No Residual Effects. In the event of a spill from an inverter, the area of the spill will be remediated.
Tributary to Manitowaning Bay #1 (Station #7)	Raptor Winter Feeding Roosting Area and Sites Supporting Area-sensitive Species: Open Country Breeding Birds	*Site Preparation:* Vegetation Removal, Grubbing and Grading *Decommissioning:* Removal of Construction Staging Area	50 m to Construction Staging Area	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species assemblage and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	4 ha	Once during construction and Once during Decommissioning	Temporary during construction and decommissioning	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management	No Residual Effect
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment	50 m to Construction Staging Area	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance to water body systems ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect. .
Tributary to Manitowaning Bay #2 (Station #9)	Raptor Winter Feeding and Roosting Area, Sites Supporting Area-sensitive Species: Open Country Breeding Birds	*Site Preparation:* Vegetation Removal, Grubbing and Grading *Decommissioning:* Removal of Transmission Line	Overlaps Transmission Line	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability	▪ Increase in water temperatures ▪ Changes in fish species assemblages and abundance ▪ Drying up of refugia due to increased evaporation	Low. Line will be composed of single poles spaced 125 m apart and installed to a depth of 2.5 m	Once during construction Once during decommissioning	Temporary during construction and decommissioning	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an	No Residual Effect

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
				and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth				erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management ▪ Follow DFO Operational Statement for Overhead Line Construction (Appendix B)	
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment	Overlaps Transmission Line	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance their distance to water body systems ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect.
Unnamed Tributary (Station #10)	Rare Vegetation Community	*Site Preparation:* Vegetation Removal, Grubbing and Grading *Decommissioning:* Removal of Transmission Line	Overlaps Transmission Line	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species assemblage and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Low. Line will be composed of single poles spaced 125 m apart and installed to a depth of 2.5 m	Once during construction Once during decommissioning	Temporary during construction and decommissioning	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management ▪ Follow DFO Operational Statement for Overhead Line Construction (Appendix B)	No Residual Effect
		Site Preparation and Construction: Storage and Use of Construction Materials	Overlaps Transmission Line	▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete	▪ All construction equipment and materials should be stored in areas of the project location that maximize their distance to water	No Residual Effect.

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
		and Equipment			downstream receiving waters			mitigation of activity	body systems ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	
North Channel of Lake Huron (Station #11)	None	*Site Preparation:* Vegetation Removal, Grubbing and Grading	Overlaps Transmission Line: Submarine Cable	▪ Loss of shade possibly increasing water temperatures ▪ Reduced input of leaves, twigs and insects to watercourse ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Increase in water temperatures ▪ Changes in fish species and abundance ▪ Drying up of refugia due to increased evaporation ▪ Reduced food supply for aquatic life including fish ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Low - Land clearing in preparation for man holes 18 m and 40 m from the water's edge	Once during construction	Temporary during construction	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management	No Residual Effect
		Site Preparation and Construction: Storage and Use of Construction Materials and Equipment		▪ Limited potential for accidental spills or contamination of soil and/or surface runoff	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Low	During site preparation and construction stages	6 – 8 month construction schedule for complete mitigation of activity	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between Perch Creek and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer	No Residual Effect.
		Construction: Installation of Submarine Cable		▪ Alteration of North Channel substrates through excavation and potential rock blasting ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	490 m of cable at a depth of 865 mm with manholes positioned 40 m and 18 m beyond the water's edge	Once during construction	Temporary during construction	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater	Minimal effect to substrate of the North Channel and temporary disturbance to fish.

Water Body Affected by Activity	Significant/Provincially Significant Natural Features Linked to the Water Body	Project Phase & Activity within 120 m of Water Body	Distance to Nearest Project Component and Components within 120 m	Potential Negative/Positive Effect(s) to Water Body		Magnitude of Effect	Frequency of Effect	Duration of Effect	Mitigation Measures	Residual Effects
				Physical	Functional					
									management ▪ Follow the DFO Operational Statement for Underwater Cables (Appendix B)	

10. Environmental Effects Monitoring Plan

The environmental effects monitoring plan (EEMP) prepared for the McLean's Mountain Wind Farm project is targeted towards environmental effects that have potential to occur during the construction, operation, and decommissioning phases of the facility. The potential negative environmental effects outlined in Table 6 are specific to water bodies within 120 m of the project location and will form part of the overall EEMP for the project in the Design and Operations Report and the Construction Plan Report, as applicable. Table 6 also summarizes the monitoring plan and monitoring frequency during operation of the facility, as well as contingency measures that will be undertaken if performance objectives are not achieved. Table 6 should be read in conjunction with Table 4, which outlines the features and attributes necessary for persistence, features potentially sensitive to development and indicator features or species.

Table 6: Environmental Effects Monitoring Plan

Potential Negative/Positive Effect(s)		Water Body Affected by Activity	Performance Objective	Mitigation Measures	Residual Effects	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional									
▪ Loss of shade possibly increasing water temperatures ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity	▪ Increase in water temperatures ▪ Changes in fish species and abundance ▪ Drying up of refugia due to increased evaporation ▪ Greater potential for reduced water quality ▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	Perch Creek, Tributary of Perch Creek #2, Tributary of Bass Lake #2 and #3, North Channel of Lake Huron, Unnamed Tributary, Tributary of Manitowaning Bay #1 and #2	Ensure that vegetation/seed mix is appropriate for the locale and a site condition by ensuring growth is established. Prevent erosion and sedimentation of adjacent lands and minimize removal of vegetation.	▪ Develop and implement an erosion and sediment control plan before removing vegetation ▪ Fencing of area between watercourse/wetland and area to be cleared ▪ Maintain as much riparian vegetation as possible to maximize shading ▪ Plant appropriate native species	None. Re-vegetation will establish suitable shade conditions and maintain stability of soil.	Visual check to monitor the effectiveness of the erosion and sedimentation control measures in the project location and to ensure grasses and appropriate vegetation are growing once re-planted.	Areas of clearing and grubbing within 30 m of a waterbody or wetland connected to a waterbody system	Biweekly and/or after a 10 mm rain event until vegetation is re-established	Notification of any incident to the appropriate onsite personnel Identification of results, issue and resolution in annual report, which is to be submitted to the MNR	Soils stabilization treatment and replacement plantings to be provided in significantly disturbed areas with repeated erosion and sedimentation control measure failures
▪ Limited potential for accidental spills or contamination of soil and/or surface runoff ▪ Limited potential for "frac-out" as a result of a spill, tunnel collapse or rupture of drilling mud to the surface during directional drilling	▪ Runoff of contaminated soil or drilling mud and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Perch Creek, Tributary to Perch Creek #1, Tributary to Perch Creek #2, Tributary to Perch Lake #2, Tributary of Bass Lake #2 and #3, North Channel of Lake Huron, Unnamed Tributary, Tributary of Manitowaning Bay #1 and #2	Ensure that a response plan is prepared before construction activities in case of a frac-out occurring. Remediate areas to prevent drilling mud from entering adjacent water body systems. Prevent construction equipment and materials from being stored in proximity to water body systems where possible.	▪ All construction equipment and materials should be stored in areas of the project location that maximize distance between the water body and construction laydown areas ▪ Existing vegetation in the project location should be maintained to act as a natural buffer ▪ Proper geotechnical assessment practices, drill planning and execution. ▪ Extent of frac-out can be limited by careful monitoring, having appropriate equipment and response plans ready ▪ Follow the Operational	No Residual Effect. If frac-out does occur response plan will remediate drilling mud exposure to the surrounding area. HDD access/exit pits are located greater than 30 m from any water body.	Visual check of pits and surrounding vegetation	Directionally drilled feeder line (entire area) Areas where construction equipment is used or stored	Once during HDD of feeder lines. Turbidity monitoring biweekly and/or after a 10 mm rain event until vegetation is re-established	Notification of any incident to the appropriate onsite personnel Identification of results, issue and resolution in annual report, which is to be submitted to the MNR	Soils stabilization treatment and replacement plantings to be provided in significantly disturbed areas with repeated erosion and sedimentation control measure failures

Potential Negative/Positive Effect(s)		Water Body Affected by Activity	Performance Objective	Mitigation Measures	Residual Effects	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional									
				Statement outlined by Fisheries and Oceans Canada (DFO).						
▪ Removal/storage of spoils from HDD Access/Exit Pit on either side of Perch Creek ▪ Noise and vibration of directional drilling	▪ Localized temporary displacement of fish due to noise and vibration ▪ Runoff of spoils into a water body may impact fish habitat and water quality of any downstream receiving waters	Perch Creek, Tributary to Perch Creek #2	Remove or contain spoils from HDD on site	▪ Ensure all spoils from site are removed in a timely manner. If any storage of spoils is required they should be no closer than 30 m from the water body ▪ Implement erosion and sediment control plan to ensure no transportation of spoils into adjacent areas	No Residual Effect	Monitor the effectiveness of the erosion and sedimentation control measures	In areas where HDD spoils are stored between 120 m and 30 m from water bodies or wetlands connected to water body systems	Biweekly and/or after a 10 mm rain event until spoils are removed and vegetation is re-established	Notification of any incident to the appropriate onsite personnel Identification of results, issue and resolution in annual report, which is to be submitted to the MNR	Any failure of sediment and erosion control measures meant to contain spoils will result in spoils being truck offsite or at a minimum stored > 120 m away from a water body
▪ Noise, dust and emissions from excavation and potential blasting ▪ Potential for increased erosion and sedimentation ▪ Limited potential for concrete spill, contaminants entering surrounding environment	▪ Runoff of dust and debris into watercourse which may impact fish habitat and water quality downstream	Perch Creek, Tributary of Bass Lake #3	Prevent	▪ Construction debris should be collected and disposed of at approved facilities ▪ Implement erosion and sediment control plan to ensure disturbed substrate/contaminants do not enter watercourse	No Residual Effect. Turbines are located greater than 30 m from water body systems.	Monitor the effectiveness of the erosion and sedimentation control measures	In areas where Crane pad instalments, turbine foundation and turbine instalment is to take place	Biweekly and/or after a 10 mm rain event until construction is complete and vegetation is established	Notification of any incident to the appropriate onsite personnel Identification of results, issue and resolution in annual report, which is to be submitted to the MNR	Soils stabilization treatment and replacement plantings to be provided in significantly disturbed areas with repeated erosion and sedimentation control measure failures
▪ Limited potential for accidental spills or contamination of soil and/or surface runoff from turbine inverter	▪ Runoff of contaminated soil and/or surface runoff may impact fish habitat and water quality of any downstream receiving waters	Perch Creek, Tributary of Bass Lake #3	To contain any spills and prevent contamination of adjacent features	▪ Design an Emergency Response and Communication Plan ▪ Notify MOE (Spills Action Centre) immediately in the event of a spill	No Residual Effects. In the event of a spill from an inverter, the area of the spill will be remediated. Turbines are located greater than 30 m from water body systems.	Monitor inverter	Each turbine inverter in proximity to a water body system	No monitoring plan required unless one is put forth after a spill by the MOE.	---	---

Potential Negative/Positive Effect(s)		Water Body Affected by Activity	Performance Objective	Mitigation Measures	Residual Effects	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional									
▪ Loss of native substrate and potential for imported gravel material to enter into immediately adjacent habitat as a result of increase in surface water runoff entering adjacent environments ▪ Disruption or impediment of flow ▪ Disruption or alteration of watercourse substrates	▪ Loss of plant diversity in localized area adjacent to road ▪ Where road substrate is removed post-construction, imported soil has the potential to support the growth of non-native species which may indirectly effect riparian areas of this Bass Lake tributary ▪ Barrier to fish movement ▪ Destruction of fish habitat ▪ Decrease in water quality	Tributary to Bass Lake #2	Maintain natural substrates and habitat in water body systems. Maintain continual flow.	▪ Design roads to promote infiltration (e.g. use of gravel materials); ▪ Maintain or provide vegetative buffers; ▪ In-water work to take place during appropriate timing windows as determined through DFO (Appendix B) ▪ Maintain flow conveyance throughout construction	Minimal Residual Effect. Road area small, thus marginal decrease in localized infiltration expected; negligible change to surface water runoff volumes expected from pre-development conditions - Box or CSP culvert installation design will minimize impacts to substrate and flow at crossing	Monitor area around each access road.	Visual assessment of vegetation communities for disturbance . Monitoring of flow conveyance during installation of culvert	During construction and then biweekly until area is restored	At the end of construction and once the area is restored	Consultation with MNR/DFO. Identification of results, issue and resolution in annual report, which is to be submitted to the MNR
▪ Alteration of North Channel substrates through excavation and potential rock blasting ▪ Reduced bank stability and ability to trap sediment from upland areas; increase erosion, sedimentation and turbidity ▪ Potential for runoff and contaminants into watercourse	▪ Decreased photosynthesis, loss of productivity, loss of fish habitat, avoidance by fish ▪ Increased nutrients promoting algae growth	North Channel of Lake Huron	Maintain natural substrates and minimize disturbance to the North Channel.	▪ Maintain as much riparian vegetation as possible to maximize shading and provide food supply ▪ Plant appropriate native species ▪ Develop and implement an erosion and sediment control plan before removing vegetation; stabilize banks where necessary ▪ Ensure that local water levels are not negatively effected or contaminated; stormwater management ▪ Follow the DFO Operational	Minimal effect to substrate of the North Channel and temporary disturbance to fish.	Monitor stormwater management/ erosion and sediment control measures at the locations of entrance/exit of the submarine cable to land	Near manholes on the north and south shorelines of the North Channel.	During construction and then biweekly until area is restored	At the end of construction and once the area is restored	Consultation with MNR/DFO. Identification of results, issue and resolution in annual report, which is to be submitted to the MNR

Potential Negative/Positive Effect(s)		Water Body Affected by Activity	Performance Objective	Mitigation Measures	Residual Effects	Monitoring Strategy & Methods	Monitoring Locations	Frequency & Duration	Reporting Requirements	Contingency Measures
Physical	Functional									
				Statement for Underwater Cables						

11. Negative Environmental Effects, Design and Operations

The REA regulation requires an environmental effects monitoring plan as a part of the Design and Operations Report to demonstrate how negative environmental effects of the project will be mitigated, and set out a program for ongoing monitoring of the effectiveness of the mitigation measures. Table 6 above provides a description of performance objectives in respect of each negative environmental effect; mitigation measures planned to achieve performance objectives; how the project is to be monitored; and a contingency plan to be implemented should monitoring reveal that mitigation measures have failed. Table 6 has been prepared for inclusion in the McLean's Mountain Wind Farm project Design and Operations Report. Additional mitigation measures proposed to minimize impacts of the facility and not related to natural features are summarized in the Design and Operations Report.

12. Negative Environmental Effects, Construction

The REA regulation requires that a Construction Plan Report be prepared to demonstrate how negative environmental effects of construction activities will be mitigated including modifications to construction activities, use of treatment technologies (e.g. Erosion and Sediment Control structures), and scheduling of activities. Table 6 above provides a description of performance objectives in respect of each negative environmental effect; mitigation measures planned to achieve performance objectives; how the project is to be monitored; and a contingency plan to be implemented should monitoring reveal that mitigation measures have failed. Table 6 has been prepared for inclusion in the McLean's Mountain Wind Farm project Construction Plan Report. Additional mitigation measures proposed to minimize impacts of the facility and not related to natural features are summarized in the Construction Plan Report.

13. Additional Approval and Permit Requirements

A permit is likely required from DFO for Habitat Alteration, Disturbance and Destruction of Fish Habitat along the North Channel of Lake Huron. This permit relates to activities required for the submarine cable of the transmission line running from Manitoulin Island to Goat Island which include trenching and possible blasting within the North Channel to bury 3 lines of submarine cable and one fibre optic cable into the substrate to a depth of 865 mm. Additional approvals and permitting may not be required if the appropriate *Measures to Protect Fish and Fish Habitat* provided in DFO's Ontario Operational Statements are implemented (Appendix B).

14. Conclusions

Through a records review and site investigation, it was determined that water bodies exist within the project location or prescribed setback areas (Figure 2). As such, an EIS Report was required under Section 39 and 40 of Ontario Regulation 359/09. This third and final report therefore satisfies the requirements under Ontario Regulation 359/09 with respect to water body assessment reporting.

This EIS Report demonstrates how negative environmental effects of the project will be mitigated, and sets out a program for ongoing monitoring of the effectiveness of the mitigation measures. Table 6 above provides a description of performance objectives in respect of each negative environmental effect; mitigation measures planned to achieve performance objectives; how the project is to be monitored; and a contingency plan to be implemented should monitoring reveal that mitigation measures have failed. The EIS Report was completed to mitigate any potential negative environmental effects to the following water bodies (i.e., permanent and intermittent streams):

- Perch Creek
- Tributary to Perch Creek #1
- Tributary to Perch Creek #2
- Tributary to Bass Lake #2
- Tributary to Bass Lake #3
- Tributary to Manitowaning Bay #1
- Tributary to Manitowaning Bay #2
- Unnamed Tributary
- North Channel of Lake Huron

Table 6 outlines how the activities related to the construction, operation and decommissioning of the facility may affect these water bodies and the appropriate mitigation and monitoring work to be implemented and are included in the Construction Plan and Design and Operations Reports as required.

15. References

Fisheries and Oceans Canada. 2009. Ontario Operational Statements: High-pressure Directional Drilling Version 3.0 and Underwater Cables Version 3.0. (Last updated September 2009).

Ontario Ministry of Natural Resources. May 2006. Inland Ontario Lakes Designated for Lake Trout Management. 58 pp.

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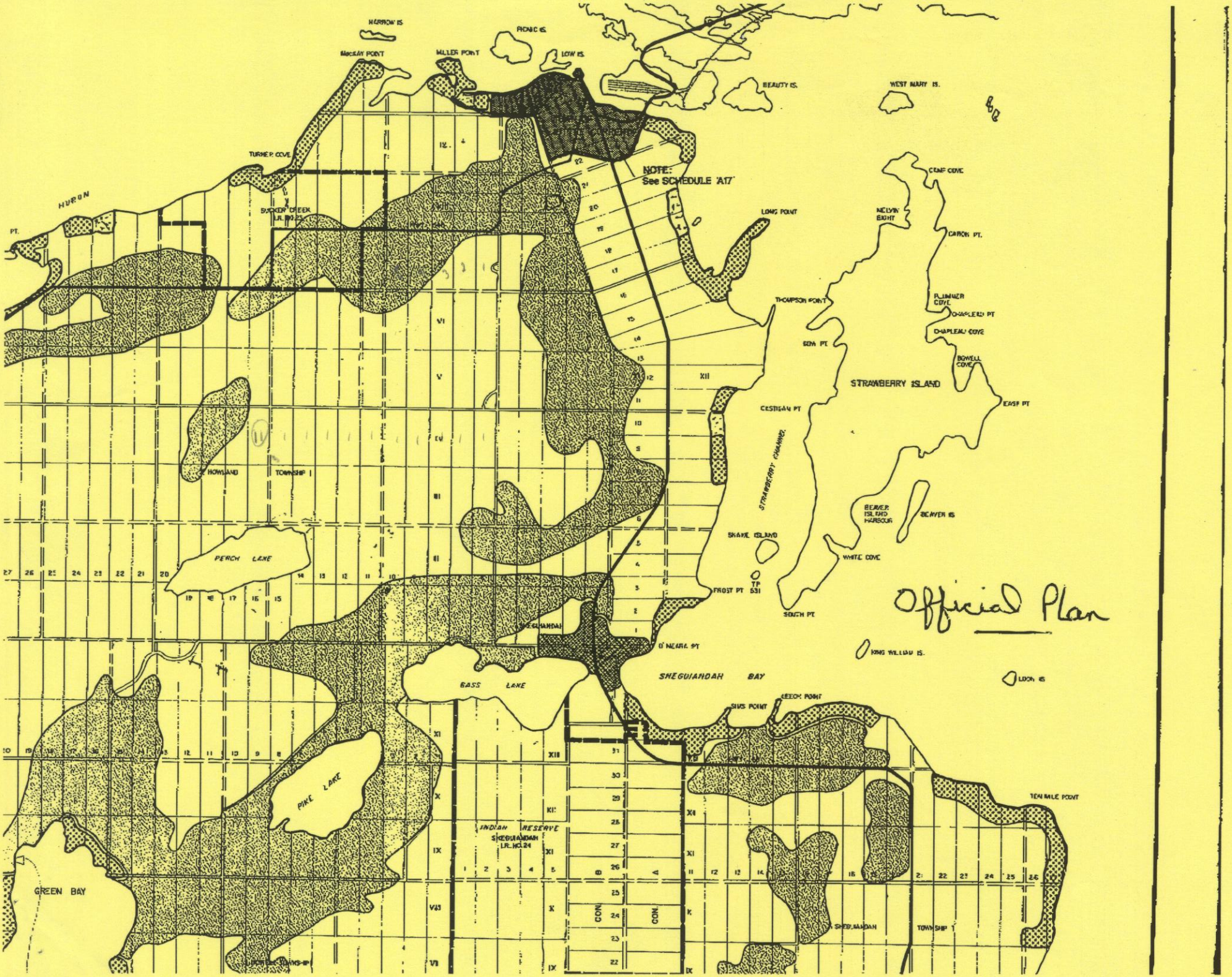
APPENDIX A

Supplementary Information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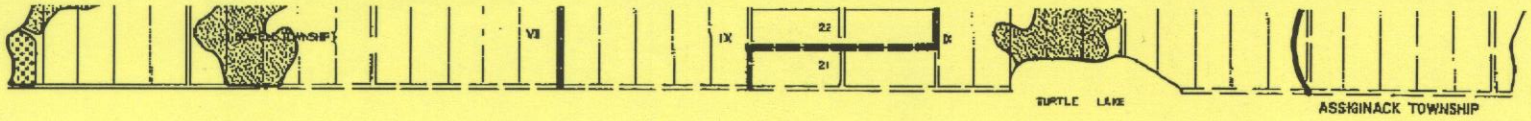
PICNIC IS.
MacKAY POINT
MILLER POINT
LOW IS.
BEAUTY IS.
WEST MARY IS.
TURNER COVE
HURON PT.
SUCKER CREEK I.R. No. 25
NOTE: See SCHEDULE 'A17'
LONG POINT
CAMP COVE
NELVIN BIGHT
CARON PT.
THOMPSON POINT
PLUMMER COVE
CHAPLEAU PT
CHAPLEAU COVE
BOM PT.
BOWELL COVE
STRAWBERRY ISLAND
EAGLE PT
CESTREAU PT
STRAWBERRY CHANNEL
HOWLAND TOWNSHIP I
PERCH LAKE
BEAVER ISLAND HARBOUR
BEAVER IS
SNAKE ISLAND
WHITE COVE
FROST PT
TP 531
SOUTH PT
Official Plan
O'NEARA PT
KING WILLIAM IS.
LOON IS
SHEGUIANDAH BAY
BASS LAKE
SIMS POINT
LEECH POINT
PIKE LAKE
INDIAN RESERVE SHEGUIANDAH I.R. No. 24
TEN MILE POINT
GREEN BAY
CON.
CON.
SHEGUIANDAH TOWNSHIP I



OPA 9.7

N E MANITOULIN

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N

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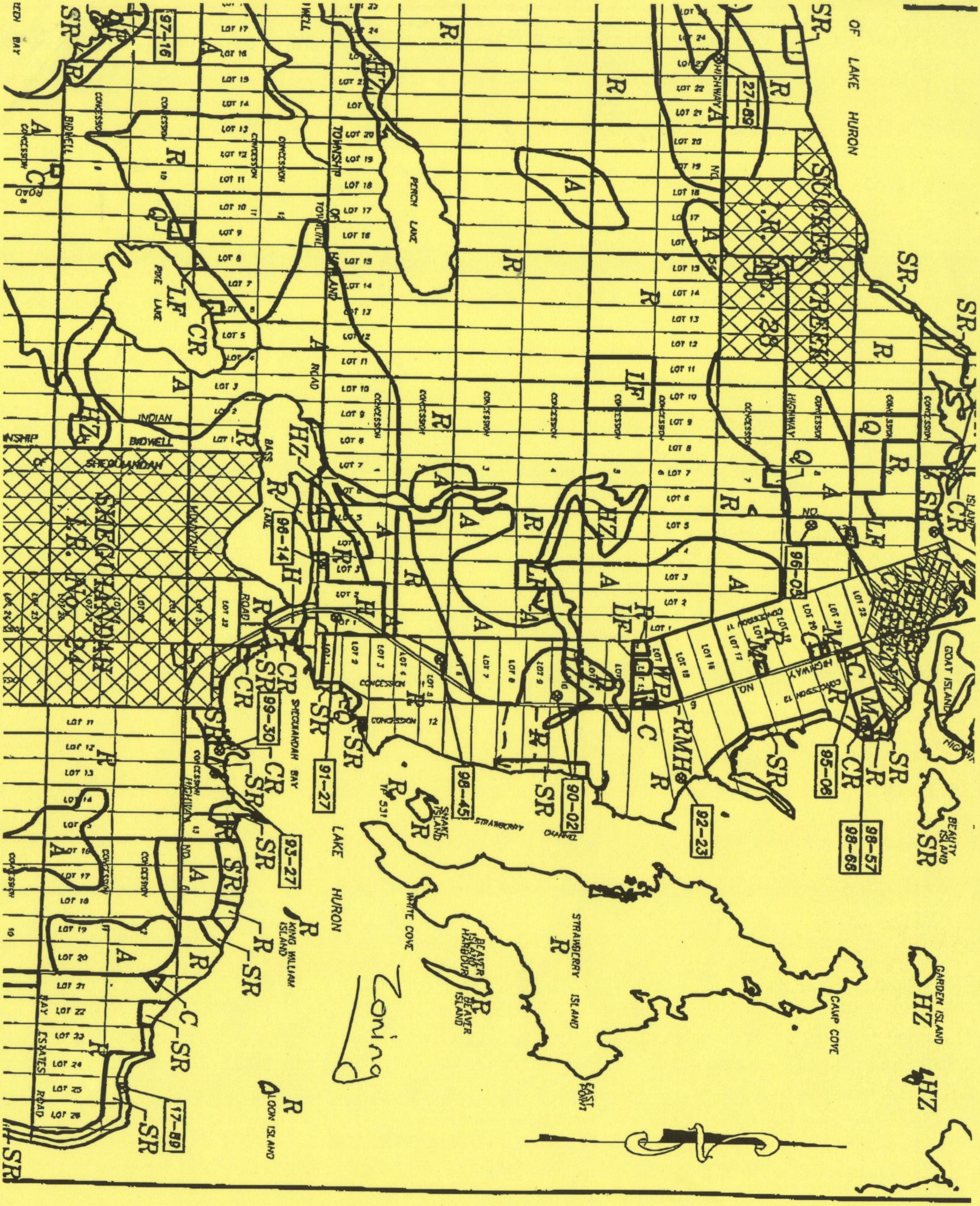
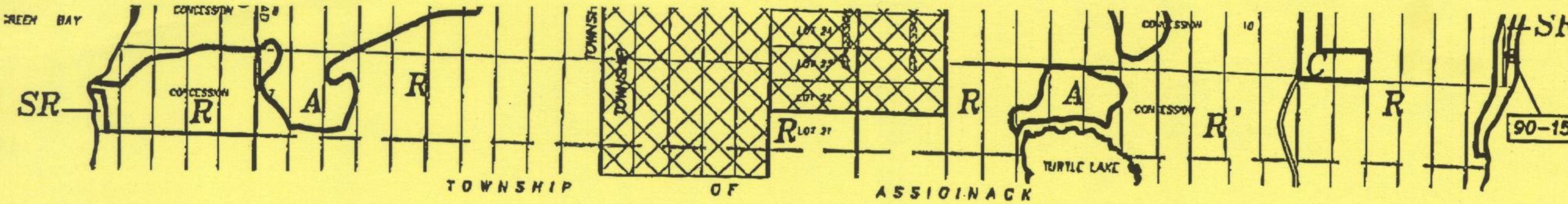
Official Plan

Future Land Use
Legend:

- Rural District
- Shoreline Development Dist.
- Agricultural District
- Hamlet District
- Urban District
- Settlement Area

SCHEDULE
A8


LAKE HURON
OF LAKE HURON
SUCKER CREEK I.R. NO. 28
SHEGUIANDAH I.R. NO. 24
PIKE LAKE
PERCH LAKE
BASS LAKE
SHEGUIANDAH BAY
STRAWBERRY ISLAND
STRAWBERRY CHANNEL
GOAT ISLAND
BEAUTY ISLAND
GARDEN ISLAND
BEAVER ISLAND
KING WILLIAM ISLAND
LOON ISLAND
SNAKE ISLAND
WHITE COVE
CAMP COVE
EAST POINT
BAY ESTATES ROAD
Zoning



ZONES

Zone	Symbol
Agricultural (A)	A
Rural (R)	R
Hamlet (H)	H
Settlement (S)	S
Shoreline Residential (SR)	SR
Mobile Home Park (RMH)	RMH
Restricted Commercial (C)	C
Commercial Recreational (CR)	CR
Restricted Industrial (M)	M
Pit & Quarry (Q)	Q
Recreation (RE)	RE
Hazard (HZ)	HZ
Landfill (LF)	LF
Waste Processing (WP)	WP
Special Provision	By-Law No. ⊗

NOTE:

No new habitable structure shall be constructed below the 178.3 metre contour adjacent to Lake Huron unless the setback from the shoreline is a minimum of 61 metres and the structure is flood proofed to the 179.6 metre contour.

This is Schedule A
to By-Law No. 2002-32
Passed this day of 18/12/2002.

Mayor [signature]

Clerk [signature]

[redacted]

APPENDIX B

Fisheries and Oceans Canada Operational Statements: Ontario

TIMING WINDOWS

Fisheries and Oceans Canada
Ontario Operational Statement

Version 1.0

ONTARIO IN-WATER CONSTRUCTION TIMING WINDOW GUIDELINES FOR THE PROTECTION OF FISH AND FISH HABITAT

Restricted activity timing windows are just one of many measures used to protect fish and fish habitat when carrying out a work or undertaking in or around water. Be sure to follow all of the measures outlined in the Operational Statements to avoid negative impacts to fish habitat.

Restricted activity timing windows are applied to protect fish from impacts of works or undertakings in and around water during spawning migrations and other critical life history stages. In Ontario, the Ministry of Natural Resources (MNR) has the responsibility for setting timing window guidelines. These guidelines are determined on a case by case basis according to the species of fish in the water body, whether those fish spawn in the spring or fall, and whether the water body is located in the Northwest, Northeast or Southern Region of Ontario.

The timing windows in Table 1 identify periods when **no** in-water work is allowed, except with permission (see measure #5) and the implementation of protective measures.

Note that the restricted activity timing windows below only apply to projects completed using an Operational Statement. Timing windows identified on Conservation Authority permits, MNR work permits or DFO *Fisheries Act* authorizations may differ and take precedence.

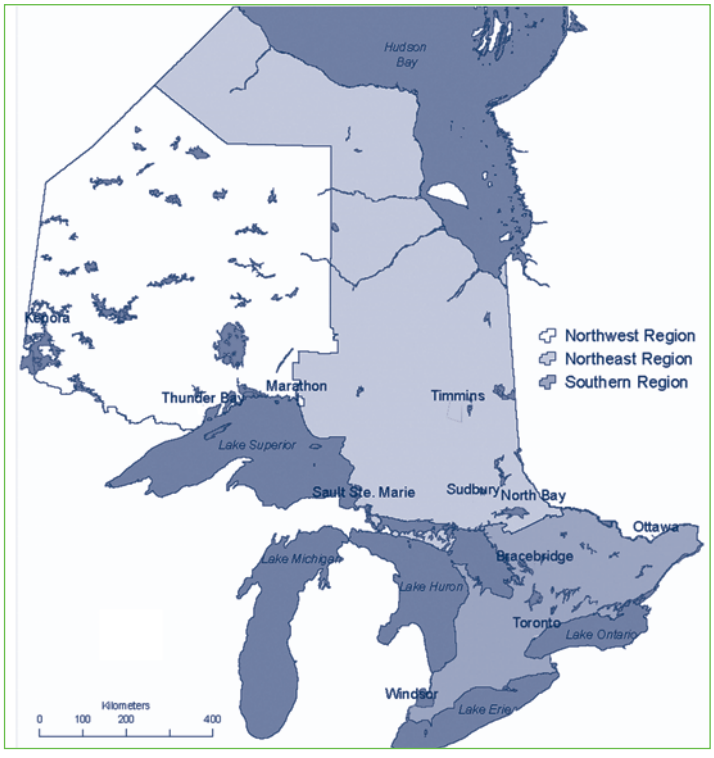


Figure 1:
Ontario's Northwest, Northeast and Southern Region boundaries for determining application of restricted activity timing windows.

How To Determine Timing Windows

1. Determine the fish species living in the water body where you wish to do work. Consult your Ontario Ministry of Natural Resources, Conservation Authority, Parks Canada (if the project is located within an area under its jurisdiction, including the Trent-Severn Waterway and Rideau Canal), or Fisheries and Oceans Canada (DFO) office.
2. Determine if the water body is located in the Northwest, Northeast or Southern Region of Ontario according to Figure 1.
3. Use Table 1 to determine the in-water restricted activity timing windows according to the location of the waterbody and all of the species of fish found within that waterbody (spring or fall spawners).
4. For water bodies with more than one species, the most restrictive timing windows should be combined for all species present (e.g. for a water body with both walleye and bass in Southern Region, the combined timing window should be: Mar. 15 to July 15).
5. If the intended work cannot be conducted outside of the timing windows below, please contact your local Conservation Authority, DFO or Parks Canada office (if the project is located within an area under its jurisdiction), as appropriate, for other options.

Table 1:
Restricted Activity timing windows for the protection of spawning fish and developing eggs and fry. Dates represent the period of time when NO in-water work should occur. Regional boundaries are shown in Figure 1.

Spawning Period	Fish Species	Northwest Region	Northeast Region	Southern Region
Spring	Walleye	Apr. 1 to June 20	Apr.1 to June 20	Mar. 15 to May 31
	Northern Pike	Apr. 1 to June 15	Apr. 1 to June 15	Mar. 15 to May 31
	Lake Sturgeon	May 1 to June 30	May 1 to July 15	May 1 to June 30
	Muskellunge	May 1 to July 15	May 15 to July 15	Mar. 15 to May 31
	Large/Smallmouth Bass	May 15 to July 15	May 15 to July 15	May 1 to July 15
	Rainbow Trout	Apr. 1 to June 15	Apr. 1 to June 15	Mar. 15 to June 15
	Other/Unknown Spring Spawning Species	Apr. 1 to June 15	Apr. 1 to June 15	Mar. 15 to July 15
Fall	Lake Trout	Sept. 1 to May 31	Sept. 1 to May 31	Oct. 1 to May 31
	Brook Trout	Sept. 1 to June 15	Sept. 1 to June 15	Oct. 1 to May 31
	Pacific Salmon	Sept. 1 to June 15	Sept. 1 to June 15	Sept. 15 to May 31
	Lake Whitefish	Sept. 15 to May 31	Sept. 15 to May 15	Oct. 15 to May 31
	Lake Herring	Oct. 1 to May 31	Oct. 1 to May 31	Oct. 15 to May 31
	Other/Unknown Fall Spawning Species	Sept. 1 to June 15	Sept. 1 to June 15	Oct. 1 to May 31

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Fax: (705) 522-6421
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Thunder Bay and Kenora
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Fax: (807) 346-8545
Email: ReferralsThunderBay@DFO-MPO.GC.CA

Aussi disponible en français

http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

HIGH-PRESSURE DIRECTIONAL DRILLING

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

For the purpose of this Operational Statement, the term High-Pressure Directional Drilling (HPDD) means trenchless methods of crossing a watercourse using pressurized mud systems. HPDD is used to install cables and pipelines for gas, telecommunications, fibre optics, power, sewer, oil and water lines underneath watercourses and roads. This method is preferable to open-cut and isolated crossings since the cable or pipeline is drilled underneath the watercourse with very little disturbance to the bed or banks. HPDD involves drilling a pilot bore hole underneath the watercourse towards a surface target, back-reaming the bore hole to the drill rig while pulling the pipe along through the hole. This process typically uses the freshwater gel mud system composed of a mixture of clean, freshwater as the base, bentonite (clay-based drilling lubricant) as the viscosifier and synthetic polymers.

The general order of preference for carrying out a cable or pipeline stream crossing in order to protect fish and fish habitat is: a) a punch or bore crossing (see *Punch & Bore Crossings* Operational Statement), b) HPDD crossing, c) dry open-cut crossing, and d) isolated open-cut crossing (see *Isolated or Dry Open-cut Stream Crossings* Operational Statement). This order must be balanced with practical considerations at the site.

One of the risks associated with HPDD is the escape of drilling mud into the environment as a result of a spill, tunnel collapse or the rupture of mud to the surface, commonly known as "frac-out". A frac-out is caused when excessive drilling pressure results in drilling mud propagating toward the surface. The risk of a frac-out can be reduced through proper geotechnical assessment practices and drill planning and execution. The extent of a frac-out can be limited by careful monitoring and having appropriate equipment and response plans ready in the event that one occurs. HPDD can also result in excessive disturbance of riparian vegetation and sedimentation and erosion due to operation of equipment on the shoreline or fording to access the opposite bank.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act.*

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your high-pressure directional drill project without a DFO review when you meet the following conditions:

- the crossing technique will not damage the stream bed and thereby negatively impact fish or fish habitat,
- the crossing is not a wet open-cut crossing,
- you have an emergency frac-out response plan and a contingency crossing plan in place that outline the protocol to monitor, contain and clean-up a potential frac-out and an alternative method for carrying out the crossing, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when High-Pressure Directional Drilling

1. Use existing trails, roads or cut lines wherever possible, as access routes to avoid disturbance to the riparian vegetation.

2. Design the drill path to an appropriate depth below the watercourse to minimize the risk of frac-out and to a depth

to prevent the line from becoming exposed due to natural scouring of the stream bed. The drill entry and exit points are far enough from the banks of the watercourse to have minimal impact on these areas.

3. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to access the construction site. This removal should be kept to a minimum and within the road or utility right-of-way.

4. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **4.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **4.2.** Grading of the stream banks for the approaches should not occur.
- **4.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation are likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **4.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **4.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

5. Operate machinery on land above the ordinary high water mark (see definition below) and in a manner that minimizes disturbance to the banks of the watercourse.

- **5.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **5.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **5.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **5.4.** Restore banks to original condition if any disturbance occurs.

6. Construct a dugout/settling basin at the drilling exit site to contain drilling mud to prevent sediment and other deleterious substances from entering the watercourse. If this cannot be achieved, use silt fences or other effective sediment and erosion control measures to prevent drilling mud from entering the watercourse. Inspect these measures regularly during the course of construction and make all necessary repairs if any damage occurs.

- **6.1.** Dispose of excess drilling mud, cuttings and other waste materials at an adequately sized disposal facility located away from the water to prevent it from entering the watercourse.

7. Monitor the watercourse to observe signs of surface migration (frac-out) of drilling mud during all phases of construction.

Emergency Frac-out Response and Contingency Planning

8. Keep all material and equipment needed to contain and clean up drilling mud releases on site and readily accessible in the event of a frac-out.

9. Implement the frac-out response plan that includes measures to stop work, contain the drilling mud and prevent its further migration into the watercourse and notify all applicable authorities, including the closest DFO office in the area (see Ontario DFO office list). Prioritize clean up activities relative to the risk of potential harm and dispose of the drilling mud in a manner that prevents re-entry into the watercourse.

10. Ensure clean up measures do not result in greater damage to the banks and watercourse than from leaving the drilling mud in place.

11. Implement the contingency crossing plan including measures to either re-drill at a more appropriate location or to isolate the watercourse to complete the crossing at the current location. See *Isolated or Dry Open-cut Stream Crossings* Operational Statement for carrying out an isolated trenched crossing.

12. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with preferably native grass or shrubs.

13. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

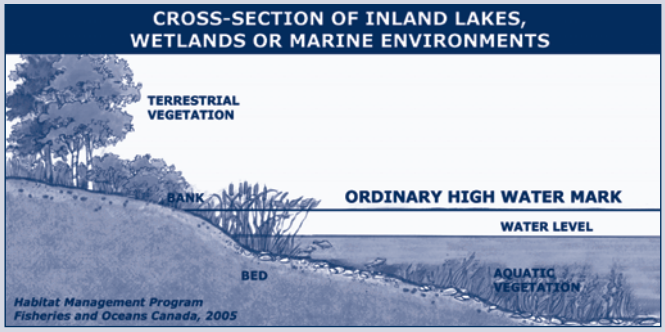
- **13.1.** Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

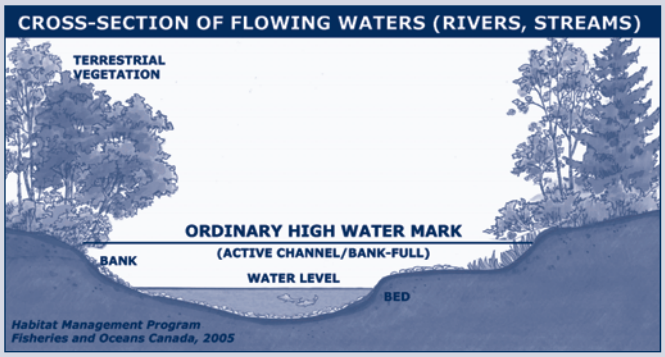
Definition:

Ordinary high water mark – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the “active channel/bank-full level” which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial

vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

For the Great Lakes this refers to the 80th percentile elevation above chart datum as described in DFO's *Fish Habitat and Determining the High Water Mark on Lakes*.





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http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_f.asp

DFO/2007-1329

OVERHEAD LINE CONSTRUCTION

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

Overhead lines are constructed for electrical or telecommunication transmission across many watercourses that range in size from small streams and ponds to large rivers, lakes and reservoirs. This Operational Statement applies to selective removal of vegetation along the right-of-way to provide for installation and safe operation of overhead lines, and passage of equipment and materials across the water body.

Although fish habitat occurs throughout a water system, it is the riparian habitat that is most sensitive to overhead line construction. Riparian vegetation occurs adjacent to the watercourse and directly contributes to fish habitat by providing shade, cover, and spawning and food production areas. It is important to design and build your overhead line project to meet your needs while also protecting riparian areas. Potential impacts to fish and fish habitat include excessive loss of riparian vegetation, erosion and sedimentation resulting from bank disturbance and loss of plant root systems, rutting and compaction of stream substrate at crossing sites, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your overhead line project without a DFO review when you meet the following conditions:

- it does not require the construction or placement of any temporary or permanent structures (e.g. islands, poles, crib works, etc.) below the ordinary high water mark (HWM) (see definition below), and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act.*

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Constructing Overhead Lines

1. Installing overhead lines under frozen conditions is preferable in all situations. On wet terrains (e.g., bogs), lines should be installed under frozen conditions, where possible, or using aerial methods (i.e., helicopter).

2. Design and construct approaches so that they are perpendicular to the watercourse wherever possible to minimize loss or disturbance to riparian vegetation.

3. Avoid building structures on meander bends, braided streams, alluvial fans, active floodplains or any other area that is inherently unstable and may result in erosion and scouring of the stream bed or overhead line structures.

3.1. Wherever possible, locate all temporary or permanent structures, such as poles, sufficiently above the HWM to prevent erosion.

4. While this Operational Statement does not cover the clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the overhead line. This removal

should be kept to a minimum and within the road or utility right-of-way.

5. Machinery fording the watercourse to bring equipment required for construction to the opposite side is limited to a one-time event (over and back) and should occur only if an existing crossing at another location is not available or practical to use. A *Temporary Stream Crossing* Operational Statement is also available.

- **5.1.** If minor rutting is likely to occur, stream bank and bed protection methods (e.g., swamp mats, pads) should be used provided they do not constrict flows or block fish passage.
- **5.2.** Grading of the stream banks for the approaches should not occur.
- **5.3.** If the stream bed and banks are steep and highly erodible (e.g., dominated by organic materials and silts) and erosion and degradation is likely to occur as a result of equipment fording, then a temporary crossing structure or other practice should be used to protect these areas.
- **5.4.** Time the one-time fording to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).
- **5.5.** Fording should occur under low flow conditions and not when flows are elevated due to local rain events or seasonal flooding.

6. Operate machinery on land and in a manner that minimizes disturbance to the banks of the watercourse.

- **6.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **6.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **6.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **6.4.** Restore banks to original condition if any disturbance occurs.

7. Install effective sediment and erosion control measures before starting work to prevent entry of sediment into the watercourse. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

- **7.1.** Avoid work during wet, rainy conditions or use alternative techniques such as aerial methods (i.e., helicopter) to install overhead lines.

8. Stabilize any waste materials removed from the work site to prevent them from entering the watercourse. This could include covering spoil piles with biodegradable mats or tarps or planting them with grass or shrubs.

9. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

- **9.1.** Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

Ordinary high water mark (HWM) – The usual or average level to which a body of water rises at its highest point and remains for sufficient time so as to change the characteristics of the land. In flowing waters (rivers, streams) this refers to the "active channel/bank-full level" which is often the 1:2 year flood flow return level. In inland lakes, wetlands or marine environments it refers to those parts of the water body bed and banks that are frequently flooded by water so as to leave a mark on the land and where the natural vegetation changes from predominately aquatic vegetation to terrestrial vegetation (excepting water tolerant species). For reservoirs this refers to normal high operating levels (Full Supply Level).

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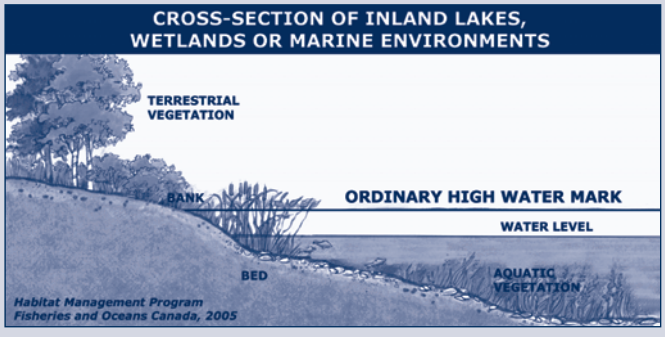

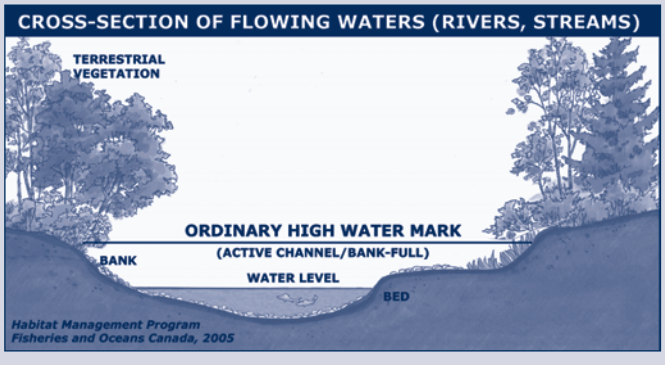

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DFO/2007-1329

UNDERWATER CABLES

Fisheries and Oceans Canada
Ontario Operational Statement

Version 3.0

The placement of cables on the beds of freshwater lakes and rivers is a common practice used to deliver utility services (i.e., electricity and telephone) across water bodies when overhead lines are not feasible. The placement of underwater cables is more favourable than using unconfined open trench methods, which bury the cables within the substrate of the lake or river. Placing cables on the beds of freshwater lakes or rivers typically generates less sediment and avoids the need to use machinery in the water. In some instances, however, excavation may be required as cables may need to be buried near the shoreline for operational safety reasons.

Potential impacts to fish and fish habitat include disruption of sensitive fish spawning areas (e.g., gravel, cobble, and rock rubble), erosion and sedimentation caused by disturbance to the shoreline and bed of water bodies, removal of riparian (bank) vegetation and underwater rocks and logs that provide cover, shade and food, and disruption of sensitive fish life stages.

Fisheries and Oceans Canada (DFO) is responsible for protecting fish and fish habitat across Canada. Under the *Fisheries Act* no one may carry out a work or undertaking that will cause the harmful alteration, disruption or destruction (HADD) of fish habitat unless it has been authorized by DFO. By following the conditions and measures set out below you will be in compliance with subsection 35(1) of the *Fisheries Act*.

The purpose of this Operational Statement is to describe the conditions under which it is applicable to your project and the measures to incorporate into your project in order to avoid negative impacts to fish habitat. You may proceed with your underwater cable project without a DFO review when you meet the following conditions:

- if working within the Thames River, Sydenham River, Ausable River, Grand River, or Maitland River, you have contacted your Conservation Authority or local DFO Office (see Ontario DFO office list) to ensure that your project will not impact Schedule 1 mussel species at risk under the federal *Species at Risk Act*, before proceeding,
- unconfined open trench methods, including ploughing and water-jetting, to bury cable are not used,
- underwater cables are not installed on or within known fish spawning habitat,
- cable trenching is limited to near shore areas and is to be no greater in width than that required to accommodate the cable,
- any near shore excavation to bury the cable extends a maximum total of 10 metres measured horizontally from the ordinary high water mark (HWM) (see definition below), but in no case will involve more than 10% of a stream channel width (in total),
- explosives are not used to trench the cable, and
- you incorporate the *Measures to Protect Fish and Fish Habitat when Placing Underwater Cables* listed below in this Operational Statement.

If you cannot meet all of the conditions listed above and cannot incorporate all of the measures listed below then your project may result in a violation of subsection 35(1) of the *Fisheries Act* and you could be subject to enforcement action. In this case, you should contact your Conservation Authority, or the DFO office in your area (see Ontario DFO office list) or Parks Canada if the project is located within its jurisdiction, including the Trent-Severn Waterway and the Rideau Canal, if you wish to obtain an opinion on the possible options you should consider to avoid contravention of the *Fisheries Act*.

You are required to respect all municipal, provincial or federal legislation that applies to the work being carried out in relation to this Operational Statement. The activities undertaken in this Operational Statement must also comply with the *Species at Risk Act* (**www.sararegistry.gc.ca**). If you have questions regarding this Operational Statement, please contact one of the agencies listed above.

We ask that you notify DFO, preferably 10 working days before starting your work by filling out and sending the Ontario Operational Statement notification form (**www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/prov-terr/index_e.htm**) to the DFO office in your area. This information is requested in order to evaluate the effectiveness of the work carried out in relation to this Operational Statement.

Measures to Protect Fish and Fish Habitat when Placing Underwater Cables

1. Use existing trails, roads, or cut lines wherever possible to avoid disturbance to the riparian vegetation.

2. While this Operational Statement does not cover the extensive clearing of riparian vegetation, the removal of select plants may be necessary to accommodate the cable. This removal should be kept to a minimum.

3. Where cables are buried within 10 metres of the HWM, time the installation to prevent disruption to sensitive fish life stages by adhering to appropriate fisheries timing windows (see the *Ontario In-Water Construction Timing Windows*).

4. Isolate any in-water trench work to contain suspended sediment and prevent it from entering the surrounding waters.

5. Install effective sediment and erosion control measures on land before starting trench work to prevent entry of sediment into the water body. Inspect them regularly during the course of construction and make all necessary repairs if any damage occurs.

6. Operate machinery on land or on water (i.e., from a barge or vessel) in a manner that minimizes disturbance to the banks or bed of the water body.

- **6.1.** Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- **6.2.** Wash, refuel and service machinery and store fuel and other materials for the machinery away from the water to prevent any deleterious substance from entering the water.
- **6.3.** Keep an emergency spill kit on site in case of fluid leaks or spills from machinery.
- **6.4.** Restore banks to original condition if any disturbance occurs.

7. Relocate any fish trapped within an isolated area to the main water body before starting any trenching.

8. During dry land trenching, stockpile the material that is moved from the bank of the water body (below the HWM) and return it to its original location once the cable is installed.

9. If any material (e.g., rock, cobble, woody material) is moved to place the cable on the bottom, it should be relocated to a similar depth within the water body in close proximity to its original location.

10. Restore the original contour, gradient and bottom of the water body, bank and shore. Allow sediment to fully settle inside any isolated area before removing sediment and erosion control measures.

11. Vegetate any disturbed areas by planting and seeding preferably with native trees, shrubs or grasses and cover such areas with mulch to prevent erosion and to help seeds germinate. If there is insufficient time remaining in the growing season, the site should be stabilized (e.g., cover exposed areas with erosion control blankets to keep the soil in place and prevent erosion) and vegetated the following spring.

- **11.1.** Maintain effective sediment and erosion control measures until re-vegetation of disturbed areas is achieved.

Definition:

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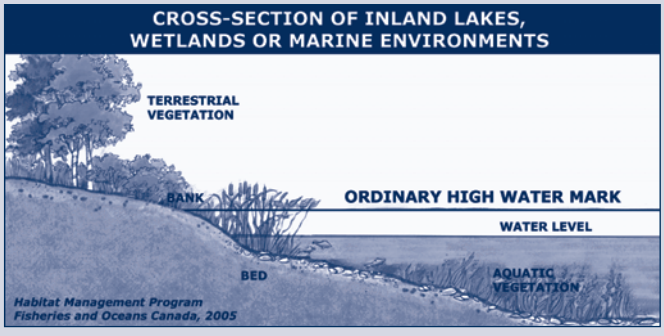

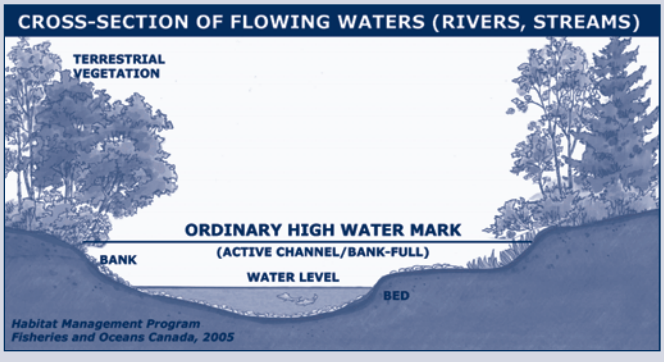

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