BORNISH WIND ENERGY CENTRE

RENEWABLE ENERGY APPROVAL APPLICATION

CONSTRUCTION PLAN REPORT

April 2012

GL Garrad Hassan

GL Garrad Hassan

RENEWABLE ENERGY APPROVAL APPLICATION – CONSTRUCTION PLAN REPORT

BORNISH WIND ENERGY CENTRE, ONTARIO

Client	NextEra Energy Canada, ULC
Contact	Adam Camp
Document No	1008-CAMO-R-07
Issue	C
Status	Final
Classification	Client's Discretion
Date	2 April 2012

Author

N. O'Blenes

Checked by

P. Henn

Approved by

P. Henn

GL Garrad Hassan Canada, Inc.

151 Slater Street, Suite 806, Ottawa, Ontario CANADA
Phone: (613) 230-3787 | Fax: (613) 230-1742
www.gl-garradhassan.com

IMPORTANT NOTICE AND DISCLAIMER

1. Acceptance of this document by the Client is on the basis that GL Garrad Hassan Canada, Inc. a GL group member operating under the GL Garrad Hassan brand (hereafter ''GL GH''), is not in any way to be held responsible for the application or use made of the findings and the results of the analysis herein and that such responsibility remains with the Client.

   This Report shall be for the sole use of the Client for whom the Report is prepared. The document is subject to the terms of the Agreement between the Client and GL GH and should not be relied upon by third parties for any use whatsoever without the express written consent of GL GH. The Report may only be reproduced and circulated in accordance with the Document Classification and associated conditions stipulated in the Agreement, and may not be disclosed in any offering memorandum without the express written consent of GL GH.

   GL GH does not provide legal, regulatory, tax and/or accounting advice. The Client must make its own arrangements for consulting in these areas.

   This document has been produced from information as of the date hereof and, where applicable, from information relating to dates and periods referred to in this document. The Report is subject to change without notice and for any reason including, but not limited to, changes in information, conclusion and directions from the Client.

2. This Report has been produced from information relating to dates and periods referred to herein. Any information contained in this Report is subject to change.

KEY TO DOCUMENT CLASSIFICATION

Strictly Confidential	For disclosure only to named individuals within the Client's organization
Private and Confidential	For disclosure only to individuals directly concerned with the subject matter of the Report within the Client's organization
Commercial in Confidence	Not to be disclosed outside the Client's organization
GL GH only	Not to be disclosed to non-GL GH staff
Client's Discretion	Distribution for information only at the discretion of the Client (subject to the above Important Notice and Disclaimer)
Published	Available for information only to the general public (subject to the above Important Notice and Disclaimer)

REVISION HISTORY

Issue	Issue Date	Summary
A	9 February 2012	Original issue
B	27 February 2012	Client Edits
C	2 April 2012	Revised mitigation measures as recommended by the Ministry of Natural Resources

TABLE OF CONTENTS

LIST OF TABLES

1 PREAMBLE

Bornish Wind LP is proposing to develop the Bornish Wind Energy Centre (the "Project") which is subject to Ontario Regulation 359/09 (Renewable Energy Approvals (REA) [1] under Part V.0.1 of the Ontario Environmental Protection Act (EPA)) and Regulation 521/10 [2]. Bornish Wind LP was awarded a FIT Contract for this Project in July 2011 and is seeking a Renewable Energy Approval from the Ontario Ministry of the Environment (MOE). Bornish Wind LP is a wholly-owned subsidiary of NextEra Energy Canada ULC. The parent company of NextEra Energy Canada ULC is NextEra Energy Resources, LLC, with a current portfolio of nearly 8,800 operating wind turbines across North America.

This Project is considered to be a Class 4 Wind Facility. The Project is located in the Municipality of North Middlesex and is proposed to consist of 45, 1.62 MW turbines with a total nameplate capacity of 72.9 MW, though 48 turbine locations will be permitted

This Construction Plan Report has been prepared in accordance with section 54.1 of O. Reg. 359/09 and the MOE's "Technical Guide to Renewable Energy Approvals"(2011) [3].

1.1 General Project Description

As explained in the Project Description Report, the proposed Project Study Area comprises two main parts, the Wind Energy Centre Study Area, which contains the wind farm itself and its associated infrastructure, and the Transmission Line Study Area, consisting of a proposed 115 kV transmission line to run from the Project's substation to a switchyard directly adjacent to the substation, and then to a Point of Common Coupling (PCC) on Hydro One's 500 kV transmission line at the east end of the Transmission Line Study Area. It is important to note that the 115 kV line running from the switchyard to Hydro One's existing 500 kV line is common to three of NextEra's Projects, i.e. Adelaide, Bornish and Jericho Wind Energy Centres.

The wind farm Project area is located in south-western Ontario, in the Municipality of North Middlesex, Middlesex County, Ontario. More specifically, the Project is located south of Elginfield Road, east of Pete Sebe Road, north of Elmtree Drive and west of Fort Rose Road. The total Project area is approximately 5,177 ha. Project components will be installed on privately-owned agricultural lots within this area; however, it is anticipated that the Project's collection system may be partially located on public rights-of-way. General geographic coordinates of the Project area are presented in Table 1-1.

Table 1-1: Geographic coordinates of the Project Study Area

Site Location	Easting	Northing
Northwest corner	435927	4777569
Northeast corner	434798	4770596
Southwest corner	449163	4775470
Southeast corner	448036	4768497

The Project also comprises a proposed transmission route which is to run from the Project's substation to a switchyard directly adjacent to the substation, and then to a Point of Common Coupling (PCC) on Hydro One's 500 kV transmission line at the east end of the Transmission Line Study Area. The proposed transmission route is to travel from the switchyard east along Elginfield and Nairn Roads within municipal rights-of-way to an existing Hydro One 500 kV transmission line. As the proposed route is using existing rights-of-way, limited environmental studies were undertaken for this section; however general natural heritage information in the vicinity of the transmission line route is provided in the Natural Heritage Assessment reports.

The location of the Wind Energy Centre Study Area was defined early in the planning process for the proposed wind energy facility, based on the availability of wind resources, approximate area required for the proposed Project, and availability of existing infrastructure for connection to the electrical grid. The Project Study Area was used to facilitate information collection and Records Review.

1.2 Contact Information

1.2.1 Project Proponent

The Project proponent is Bornish Wind LP, a developer of wind energy. The primary contact for Bornish Wind LP for this Project is:

Adam Camp
NextEra Energy Canada, ULC
North Service Road, Suite 205
Burlington, ON L7L 6W6
Phone 1-877-257-7330
Fax 905-335-5731
www.canadianwindproposals.com
Bornish.Wind@NextEraEnergy.com

1.2.2 Project Consultant

GL Garrad Hassan Canada, Inc., a member of the GL Group and part of the GL Garrad Hassan brand, (hereafter referred to as "GL GH"), has been retained to lead the REA Process for the Adelaide Wind Energy Centre.

The Environmental and Permitting Services team of GL GH has completed mandates throughout Canada, the United States and in many other parts of the world. These mandates include permitting management, permit applications, environmental impact assessment, and various environmental studies for more than 15,000 MW of wind and solar-PV projects.

GL GH's environmental team is composed of over 20 environmental professionals, including environmental impact specialists, planners, GIS, technicians and engineers.

GL GH has no equity stake in any device or project. This rule of operation is central to its philosophy, distinguishing it from many other players and underscoring its independence.
GL GH's contact information is as follows:

Nancy O'Blenes
GL Garrad Hassan Canada, Inc.
19 Carmody Lane
Uxbridge, ON L9P 1A5
Tel.: (416) 801-6822
nancy.oblenes@gl-garradhassan.com

Further information about GL GH can be found at: www.gl-garradhassan.com.

1.3 Overview of Project Components

The Project will include the following components, all of which have been clearly depicted in the site plans in Site Plan. It should be noted that the components are describe in more detail in the following Facility Design Plan Section below.

- Wind turbines – Forty-five GE 1.6-100 (1.62 MW) turbines mounted on a steel reinforced concrete foundation and equipped with a transformer, located outside the base of the tower are proposed to be installed for the Project. The Wind Turbine Technical Specifications Report is found in Appendix B.
- Meteorological towers (temporary and permanent) – Two 80-100 m meteorological towers, lattice type or monopole mounted on small concrete pad and supported by a number of guy wires.
- Access roads and crane pads. Access roads to each wind turbine will lead to crane pad constructed of the same material as the access roads.
- Electrical collector system, substation, switchyard and transmission line – Energy generated by the Project will be collected via 34.5-kV underground cabling directed to a substation that will step-up the voltage from 34.5 kV to 115 kV. A project-owned 115-kV transmission line will then link to an adjacent, proponent-owned switchyard and from there will connect to a Hydro One 500 kV transmission line via a second proponent-owned substation that will step-up the voltage to 500 kV.
- Operations and maintenance building – A maintenance building of approximately 30 m by 15 m will be located within the fenced area of the substation. Potable water will be supplied by a well or through the municipal water system and if required, a septic bed will be constructed for the disposal of sewage.
- Water crossings – Water crossings will be required for some access roads and electrical cables. Water crossings are described in detail in the Water Assessment and Water Body Report.
- Laydown and storage areas (including temporary staging areas) – A temporary laydown and storage area of approximately 4 ha will be constructed on privately owned land for the purpose of staging and storing equipment during the construction phase. In addition, a 122 m square area around each wind turbine will be established for the laydown and assembly of the wind turbine components

2 DESCRIPTION OF CONSTRUCTION AND INSTALLATION ACTIVITIES

The Project Location, situated within the broader Project Study Area, is defined as per O. Reg. 359/09 as "*...a part of land and all or part of any building or structure in, on or over which a person is engaging in or proposes to engage in the project and any air space in which a person is engaging in or proposes to engage in the project*". As described therein, the Project Location boundary is the outer limit of where site preparation and construction activities will occur (i.e., Disturbance Areas described below) and where permanent infrastructure will be located, including the air space occupied by turbine blades.

Disturbance Areas have been identified surrounding various Project components, which are depicted on the Project Location figure by the item "Project Location" in the legend. These denote areas where temporary disturbance during the construction phase may occur as a result of: temporary project component laydown and storage areas, crane pad construction and turbine turnaround areas. With the exception of the project components described above, no permanent infrastructure is proposed within these areas. Following construction activities, the land will be returned to pre-construction conditions.

Construction of the Project will meet or exceed all local regulations and standards (i.e. Ontario Electric Safety Code, Ontario Building Code, etc.). The proposed turbines and associated infrastructure are presented in Appendix B.

2.1 Surveying and Geotechnical Study Activities

Surveys will be required for the micrositing of the turbines, crane pads, access roads, electrical lines and the substation. Crews will drive light trucks to reach sites primarily using existing roads. They will then survey the site on foot and mark the locations using stakes. For the wind farm site, the surveys will typically take one to two days per turbine location.

Existing buried infrastructure located on public property will be identified using the Ontario One Call service and buried infrastructure located on private property will be identified by private contractors prior to construction or geotechnical sampling and updated throughout construction, as required.

Geotechnical sampling will be required for turbine foundation locations. Typically a truck-mounted drill rig visits the sampling locations, drills the borehole and collects geotechnical information. This operation typically uses two operators and requires one to two hours per turbine location.

Any archaeological sites, as identified during the Archaeological Assessment, will be clearly marked in the field. All personnel working on or entering the construction area will be instructed to avoid these areas.

This activity can be summarized as follows:

- Equipment required: At a minimum, trucks, a truck-mounted drill rig, and possibly a track-mounted drill rig.
- Materials brought on site: None. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.

- Timing: These activities will take place prior to construction and are not season-dependent. Preference is to complete this activity in the winter to minimize crop disruption. This operation typically uses two operators and requires one to two hours per site.
- Material generated: Some drill cuttings (composed of soil) will be generated and will be disposed of on site by scattering in the vicinity of the borehole.

2.2 Construction of Access Roads

Access roads will be constructed to transport equipment to the construction sites. Typically the access roads will be 11 m wide during the construction phase to accommodate the large cranes (with an additional 2 m clearance on each side for travel), and afterwards reduced to 6 m wide during the operating phase. Access roads for each turbine will vary in length according to its location.

The construction of the access roads will typically require clearing and grubbing of any vegetation, excavation of the topsoil layer and adding a layer of compacted material to a typical depth of 300 to 600 mm, depending upon site specific geotechnical conditions. Clean granular material (typically "A" or "B" gravel) will be brought to the site as needed and will not be stockpiled on site. The topsoil will be kept and re-used on site. New culverts may be required to maintain drainage in ditches at junctions with roadways and will be constructed to support the construction equipment and delivery trucks. The location of proposed water crossings will be summarized in the water assessment. The exact culvert details, installation details and erosion control measures will be determined in conjunction with the St. Clair Region and Ausable Bayfield Conservation Authorities as part of its permitting process; however the culverts are proposed to be open bottom and are proposed to be left in place following the operation phase, in consultation with the landowner.

Temporary crane paths will also be constructed; these will be 11 m wide and constructed in a manner similar to the other roads described above.

The access road to each turbine will typically require one to three days for construction. Depending on the length of the access roads, construction may require approximately 25 truckloads of gravel.

Municipal and provincial roads will also be used for transporting equipment, and minor modifications may be required to some of the existing roads (e.g. widening the turning radius) to accommodate oversized loads. Any road damages will be repaired.

This activity can be summarized as follows:

- Equipment required: At a minimum, trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers.
- Materials brought on site: Granular material for road construction and steel culverts. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This activity will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending

on the amount of rainfall. The access road to each turbine will typically require one to three days of construction.

- Material generated: Once the construction activities have been completed, the granular base will be removed and distributed to the landowners, if desired, or removed from the site and disposed of in an approved and appropriate manner. The disturbed area will have its topsoil replaced from stockpiled material and will be reseeded in consultation with the landowner.

2.3 Construction Temporary Storage Area

A 4 ha (10 acre) site will be constructed for the temporary storage of construction material. Following clearing and grubbing of any vegetation, which is expected to be minimal given the site's agricultural setting, the topsoil at the construction laydown area will be removed and approximately 600 mm of clean compacted crushed gravel will be imported as needed. The excavated topsoil will be kept on site and re-used once the construction phase is over (e.g. Redistributed throughout the Temporary Laydown Area), and as part of the site reclamation strategy. Construction activities are expected to last approximately one week and will require 100 loads of gravel, and a crew of six persons.

This activity can be summarized as follows:

- Equipment required: At a minimum, trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers.
- Materials brought on site: Granular material as required to maintain a stable base. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on the amount of rainfall.
- Material generated: Some topsoil will be need to be stripped; however, it will be kept on site and re-used at the end of the construction phase as part of the reclamation strategy.

2.4 Crane Pads and Laydown Areas

At each turbine site a crane pad as well as laydown area will be prepared.

In order to provide sufficient area for the laydown of the wind turbine components and their assembly, a 122 m by 122 m square around the wind turbine site must be cleared, grubbed, leveled, and made accessible during the construction phase. The topsoil is typically removed and some material may need to be added depending upon site-specific geotechnical conditions. Where the site laydown areas are close to watercourses, erosion control measures will be implemented, as described below in Section 3.

Crane pads will be constructed at the same time as the access roads and will be located adjacent to the turbine locations. The crane pads will typically measure 15 m by 35 m. The topsoil at the crane pad will be removed and approximately 600 mm of clean compacted crushed gravel will be imported as needed. The excavated topsoil will be re-used on site, as feasible, as part of the site reclamation strategy.

Once turbine erection is complete, the temporary laydown areas will be restored to their prior use, namely by re-using the salvaged topsoil and agricultural debris; crane pads will be reduced to the width of an access road to maintain access to turbines during operations; the other areas previously covered by the crane pads will be restored to prior use, namely by re-distributing the salvaged topsoil and other agricultural debris.

Construction equipment typically includes trucks, graders, and bulldozers. The construction crew is anticipated to comprise four to six persons and construction activities are expected to last approximately one to two days per turbine.

This activity can be summarized as follows:

- Equipment Required: At a minimum, trucks, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers.
- Materials brought on site: granular material as required to maintain a stable base. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on the amount of rainfall.
- Material generated: Some topsoil will be need to be stripped; however, it will be kept on site and re-used at the end of the construction phase as part of the reclamation strategy.

2.5 Delivery of Project Components

Project components will be delivered by truck and trailer throughout the construction phase and stored at the temporary laydown areas surrounding each turbine. A traffic management plan will be developed using MTO Book 7 standards and will be provided to Middlesex County. Alternative traffic routes will be prepared to address traffic congestion, as needed.

2.6 Turbine Foundations

A backhoe will be used to excavate an area approximately 3 m deep and measuring roughly 20 m x 20 m with the material being stockpiled for future backfilling. Stockpiled material will have topsoil and subsoil separated out and surplus excavated material, excluding topsoil, will be removed from the site for disposal in an approved manner. The foundation, with an approximate footprint of 400 m^2, will be constructed of a wooden frame, poured concrete and reinforced with steel rebar to provide strength. The construction timeframe for turbine foundations is three to four days, excluding curing time. After construction the foundation will be backfilled and the surface will be landscaped for drainage. The only surface evidence of the foundation will be a small protrusion of concrete to which the tower is attached; as such land can be cultivated to within a few metres of the turbine.

Typical construction equipment, on a per-turbine basis, will include:

- Excavator for removing material;

- Flatbed trucks (four to six) for delivery of rebar, turbine mounting assembly and forms;
- Track-mounted crane or rough terrain forklift for unloading and placement of rebar and forms;
- Concrete trucks for delivery of concrete (30-40 loads);
- Construction trucks (three to four vehicles with multiple visits); and,
- Dozer, loader and trucks to backfill and compact foundation and remove surplus excavated materials.

This activity can be summarized as follows:

- Materials brought on site: Concrete, rebar and wood. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on the amount of rainfall.
- Material generated: Some wood waste will be generated from the wood used to construct the foundations. This will be removed from the site and recycled. Spent welding rods may also be generated which will be disposed of as hazardous waste by a licensed contractor. Excavated subsoil will be removed from the site and disposed of in an appropriate manner.

2.7 Wind Turbine Assembly and Installation

Turbine components will arrive on site using flatbed and other trucks and will be temporarily stored on-site in the immediate vicinity of the base prior to assembly. Typically, two cranes will be used to install the turbines. The larger crane is usually a crawler type with a capacity of 400 tonnes or larger, and is used for the higher lifts.

Clearing and grubbing will be required for the erection area. The erection cranes and crew will follow the foundation crew and erect the wind turbines once the foundations are completed and the concrete has set. This will typically be achieved in five lifts (three for the towers, one for the nacelle and one for the rotor) over a period of two to three days. The lower tower sections may be installed several days before the upper tower sections and the turbine to optimize the installation sequence. The lower tower section will also include electrical and communications equipment. Total turbine assembly and installation will typically require four to five days for each turbine. Fifteen to twenty persons may be required at the site during the turbine installation; they will be transported using light duty vehicles.

The larger track-mounted crane can move from turbine site to turbine site; however, it will need to be disassembled to transport it along roadways and to mobilize/demobilize it to and from the Project site.

Following commissioning, the surrounding area will be returned to its original use.

This activity can be summarized as follows:

- Equipment Required: At a minimum, trucks, two cranes, graders, and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers.

- Materials brought on site: Towers, nacelles, blades and hub. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on weather conditions. Total assembly time will be four to five days per turbine.
- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on-site. Both streams of waste will be removed by a licensed sub-contractor. Spent welding rods may also be generated, which will be disposed of as hazardous waste by a licensed contractor. Packing frames for the turbine components will be returned to the turbine vendor.

2.8 Electrical Collector System

The electrical collector system will consist of pad-mounted transformers, underground cabling for use on private property, and a buried collection system running along road rights-of-way. These components are described below.

- Pad Mount Transformers: A concrete transformer pad, approximately 2.2 m by 2.5 m in size, will be installed at each turbine at the same time as the turbine base installation. The construction will consist of excavation, soil storage, installation of the buried electrical grounding grid, installation of the concrete pad, installation of the transformer, and electrical connections. Transformer installation and cabling between the turbine and transformer is expected to take three days per turbine. Equipment will include flatbed trucks to transport the equipment to site, and a track-mounted crane will likely be used for the installation. These activities will likely require four to six trucks, a workforce of two persons per vehicle per day, and will last between four to six days.
- Collection Lines: Cables and fibre-optic lines (for communications) will be buried from each turbine to the step-up transformer station and will be located under or alongside the access roads where feasible. The excavated soil will be stored temporarily and then reused as backfill. Power conductors will be approximately 0.9 m below grade and the location will be marked. Farming practices will not be affected by the underground cabling due to the depth of the cables and location of the cable beneath the access roads. Equipment will include trenchers or diggers (depending on soil type) and construction will require a crew of six persons. The construction timeframe is dependent upon the required length of the lines.
- Horizontal Directional Drilling: Electrical cables may need to be installed using horizontal directional drilling to minimize effects to woodlots or watercourses. Erosion control devices will be installed at the drill location and drill cuttings will be collected and removed from the site for disposal in an approved and appropriate manner. An entrance and exit pit is excavated on either side of the feature to be bored under. The directional drilling equipment is set up at the entrance pit and a drill bit attached to rod segments is advanced until it reaches the exit pit. A slurry of bentonite and/or polymer mixed with water is injected into the hole while drilling to help stabilize the bore hole and reduce friction. Once the drill bit has reached the exit pit the drill bit is removed and a "reamer" is attached and pulled back through the hole to enlarge the bore by 120-150%. The electrical cable will then be installed through the hole. Equipment will include a directional drilling rig and two to three support trucks to carry drilling rods, drilling supplies, and cable.

This activity can be summarized as follows:

- Materials brought on site: Electrical cabling. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment, and the polymer used for directional drilling. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on weather conditions.
- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on site. Both streams of waste will be removed by a licensed sub-contractor.

2.9 115 kV Transmission Line

A 115 kV transmission line will link the Project's substation to the adjacent switchyard which will collect power from this Project as well as NextEra's Adelaide and Jericho Wind Energy Centres. The transmission line will travel east along Elginfield and Nairn Roads within the municipal rights-of-way to an existing Hydro One 500 kV transmission line. It is anticipated that the transmission line will be mounted on existing hydro poles or on new hydro poles. The local utility company may require NextEra to erect additional poles, or replace undersized poles, in order to accommodate the transmission line. The poles are proposed to be constructed of wood, concrete or steel and will be between 18 and 30 m tall.

Holes are typically augured in the ground using a truck mounted auger device. The poles are then inserted using special cranes to a typical depth of 1 to 2 m below grade. The poles are then "dressed" (made ready to accept conductors) using a boom truck. Typically, one crew will install the poles and one crew will dress them. Approximately six construction vehicles (including trucks and a pole loader) and a crew of 12-15 people are anticipated for construction of the transmission lines. Twelve to sixteen poles can be installed and dressed in one day. Once the poles are in place and dressed, cables are strung in place using boom trucks and special cable reel trucks. Finally, any pre-existing poles that are no longer in use are removed. Some packing-material waste may be generated. All recyclable materials will be separated from non-recyclable materials and both streams will be removed from the site and disposed of at an approved and license facility.

The interconnection plan for any wind energy centre is subject to study, design and engineering by the Integrated Electricity System Operator which manages the province's electricity grid, Hydro One which owns the transmission lines, the local distribution company and the Ontario Energy Board, which regulates the industry through the Transmission System Code and the Distribution System Code.

Equipment will include, at a minimum, a truck mounted crane, flatbed trailers and a truck mounted auger. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.

2.10 Substations and Switchyard

Having a total footprint of approximately 2-3 ha in size, the electrical substation for the Project will be located on privately-held lands through a lease or purchase arrangement. The substation equipment will include an isolation switch, a circuit breaker, a step-up power transformer, transmission switch gear, instrument transformers, and grounding and metering equipment. Substation grounding will meet the Ontario Electrical Safety Code.

As explained above, a 115 kV transmission line will be built to connect the Project to a Hydro One 500 kV line, which will run from the Project's substation to a switchyard located adjacent to the Project substation, and then run east to the point of interconnection. The substation at the point of interconnection will have a total footprint of approximately 2-3 ha in size and will be located on a privately-held land, through a lease or purchase arrangement, adjacent to the 500 kV line.

The switchyard will be located beside the Project substation and will be approximately 2-3 ha in size. The switchyard will also be located on privately held lands through a lease or purchase arrangement. The switchyard will include switches, breakers, electrical bus work, instrument transformers, grounding, metering equipment, control house and steel structures supporting incoming and outgoing transmission line circuits. Switchyard grounding will meet the Ontario Electrical Safety Code.

The substation and switchyard areas will be gravelled with clean material imported to the site on an as-needed basis and sloped to facilitate drainage. A secondary containment system will be installed around the transformer in the event of an oil leak to prevent any soil contamination.

Construction is expected to last approximately four months. During construction of the substation, topsoil and subsoils will be stripped and stockpiled separately. Stripped topsoil and subsoil will be replaced in the temporary storage facility area and topsoil stripped from the substation area will be distributed on other Project properties. Construction crew will consist of approximately 25-40 persons.

Both streams of waste will be removed by a licensed sub-contractor.

This activity can be summarized as follows:

- Equipment Required: Small trenchers, a small crane, forklifts, and concrete trucks and a bulldozer. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers.
- Materials brought on site: gravel, an isolation switch, a circuit breaker, a step-up power transformer (34.5 to 44 kV) switch gear, instrument transformers, grounding and metering equipment, insulators, transformer oil and electrical cabling. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment and transformer oil. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on weather conditions.
- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on site. Both streams of waste will be removed by a licensed sub-contractor.

2.11 Operations Building

An operations building, approximately 30 m by 15 m in size, will be assembled on privately-held lands or an existing suitable structure will be purchased. It will be used to monitor the day-to-day operations of the Project and to support maintenance efforts. A small parking lot will be constructed to accommodate staff vehicles. Prior to the construction phase, a Stormwater Pollution Prevention Study will be conducted to address any potential effects associated with stormwater runoff.

Potable water will be supplied by a well or through the municipal water system and if required, a septic bed will be constructed for the disposal of sewage. The septic bed will be constructed to the minimum size required for the size of the operation and maintenance building. Both will be constructed in accordance with applicable municipal and provincial standards. Construction of the operations building may take up to three months to complete. It is anticipated that construction activities will require approximately 10-15 persons.

This activity can be summarized as follows:

- Equipment Required: At a minimum, forklifts, concrete trucks and smaller crew trucks.
- Materials brought on site: a pre-fabricated building structure. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall, depending on weather conditions.
- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on site. Both streams of waste will be removed by a licensed sub-contractor.

2.12 Permanent Meteorological Towers

Permanent meteorological towers may be installed at the Project. These masts typically measure up to 80 m in height and use either a monopole or lattice structure installed using a drill truck. The towers will be erected using winches and secured with three guy wires attached to anchors or a small monopole foundation. No significant soil or vegetation disturbance is anticipated. Construction of the meteorological tower will take approximately two days and require a crew of six persons.

This activity can be summarized as follows:

- Equipment Required: A drill truck and winches for tower erection will be required.
- Materials brought on site: monopole type or lattice meteorological tower, guy wires and anchors.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather and will take approximately 2 days. If necessary, this activity can be completed in the spring or fall, depending on weather conditions.

- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on site. Both streams of waste will be removed by a licensed sub-contractor.

2.13 Clean-up and Reclamation Strategy

Site clean-up will occur throughout the construction phase and site reclamation will occur after construction has been completed. Waste and debris generated during the construction activities and not reusable on site as part of the reclamation strategy will be collected and disposed of at an approved facility. All reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for reuse/recycling. During construction, industry best practices for spill prevention will be utilized. In the unlikely event of a minor spill, the latter will be cleaned up immediately and any impacted soils will be removed from site and disposed of at an approved and appropriate facility; details on emergency response is provide in the Emergency Response Plan as part of the Design and Operations Report for this Project. At the conclusion of construction vehicles and construction equipment will be removed from the site.

Stripped soil will be replaced and re-contoured in the construction areas and disturbed areas will be re-seeded, as appropriate. Erosion control equipment will be removed once inspections have determined that the threat of erosion has diminished to the original land use level or lower. High-voltage warning signs will be installed at the transformer substation and elsewhere, as appropriate.

2.14 Turbine Commissioning

Turbine commissioning will occur once the wind turbines and substation are fully installed and Hydro One is ready to accept grid interconnection. The commissioning activities will consist of testing and inspection of electrical, mechanical, and communications systems.

Temporary portable generator sets may be used to electrically commission the turbines prior to connection to the grid. The generators are required for approximately one day per turbine. The generators are supplied with a Certificate of Approval to the owners. Following the commissioning phase, the portable generators will be removed from the site and returned to the owners.

This activity can be summarized as follows:

- Equipment Required: Support trucks which will be driven to the construction site.
- Materials brought on site: Gearbox oil, lubricating grease, two temporary portable generators. The only chemicals required for this phase are oils, gasoline, and grease used to operate construction equipment and portable generators, gearbox oil, and lubricants. Fuel-handling will be conducted in compliance with the mitigation measures outlined below in Section 3.
- Timing: This will preferentially be completed in late spring or summer to take advantage of typically drier weather. If necessary, this activity can be completed in the spring or fall or winter depending on weather conditions.
- Material generated: Some packing material waste will be generated. The recyclable material will be separated from the non-recyclable material on site. Both streams of waste will be removed by a licensed sub-contractor.

2.15 Timing and Operational Plans of Proposed Construction and Installation Activities

Commencement of the construction phase is anticipated to occur in approximately late summer/early fall 2013. In any scenario, construction is expected to be completed within 6 to 7 months and will lead to the commissioning of the Project.

Construction activities will commence once all necessary permits have been obtained and weather conditions are conducive to construction. Table 2-1 outlines the duration of each activity and approximate order of construction activities for the proposed Project.

Table 2-1: Duration of construction activities

Activity		Timing of Activity	Duration
Surveying		Prior to construction – preferably in winter	< 1 day per turbine location
Geotechnical Sampling		Prior to construction – preferably in winter	1-2 hours per turbine location
Land Clearing and Construction of Access Roads		Late spring or summer – preferably during drier months	1-3 days per access road to each turbine
Temporary Crane Paths		Late spring or summer – preferably during drier months	1-2 days
Installation of Culverts		Late spring or summer – preferably during drier months	1-2 days per culvert
Construction Laydown Area		Late spring or summer – preferably during drier months	1 week
Turbine Site and Crane Pad Construction		Late spring or summer – preferably during drier months	2-4 days per turbine location
Delivery of Equipment		Throughout construction phase as needed, and in compliance with Traffic Management Plan	As needed throughout construction phase
Turbine Foundations		Late spring or summer – preferably during drier months	3-4 days (excluding curing)
Wind Turbine Assembly and Installation		Late spring or summer – preferably during drier months	4-5 days per turbine location
Electrical Collector System	Pad Mount Transformers	Late spring or summer – preferably during drier months	4-6 days
	Collection Lines	Late spring or summer – preferably during drier months	Dependent upon the required length of the lines; however, between 4-8 km of collector lines can be installed per week.
Transformer Substation		Late spring or summer – preferably during drier months	15 – 20 weeks
Transmission line		Late spring or summer – preferably during drier months	11-12 weeks
Operations Building		Late spring or summer – preferably during drier months	Eight weeks
Clean-up and Reclamation		Following turbine construction	Will be conducted as site is constructed.
Turbine Commissioning		Late spring or summer – preferably during drier months	One to three days

The planned start of construction of the Project is summer/early fall 2013, with testing and commissioning planned for winter/early spring 2014. Testing and commissioning will occur over the last

few weeks of construction according to ESA and Hydro One requirements and under their supervision. This schedule assumption was also used to prepare this environmental assessment.

2.16 Temporary Uses of Land

Construction of the Project will require temporary crane paths and laydown areas. These areas will be reclaimed for the duration of the operational phase.

Similarly, the decommissioning phase will require the same temporary areas. After all Project components are removed, all areas affected by the Project will be reclaimed as described in Section 2.13.

2.17 Temporary Water Takings

Water takings, if required, will be conducted as proposed by the Water Body and Water Assessment reports included as part of the completed REA Application.

3 ENVIRONMENTAL EFFECTS MONITORING PLAN

This section presents a summary of potential effects, mitigation measures and residual effects associated with project-environment interactions during the construction phase and operations phase of the Project. For the sake of completeness, construction phase effects are also discussed and presented here, but are also found in the Construction Plan Report.

More detailed discussions relating to natural heritage impacts, archaeological and heritage impacts, noise impacts, land use impacts and water body impacts are found in the Natural Heritage Assessment reports, Archaeological Assessment Reports, Heritage Report, Noise Impact Assessment, Property Setback Assessment and Water Body Report, part of the complete REA Application package.

3.1 Methodological Approach

As requested under REA, potential effects from the construction, installation and operation and of the wind farm have to be assessed while considering applicable mitigation and compensation measures. In order to assess *residual* effects from a Project (i.e. after considering mitigation/compensation measures), GL GH uses residual effect definitions from the Canadian Environmental Assessment Agency. A residual effect "level" and "significance" is then applied, as shown in Table 3-1 below.

Table 3-1: Levels of residual effects and significance of effect

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

Depending on the outcome of the effects assessment, follow-up and/or monitoring programs could be proposed in order to further investigate the potential effects, or verify the significance of the effect following commissioning.

3.1.1 Construction

Table 3-2: Potential negative effects and mitigation measures – Construction

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
Cultural Heritage (Protected Properties, Archaeological and Heritage Resources				
Disturbance or displacement of archaeological resources by any ground disturbance activity.	Avoid disturbance/loss of archaeological sites.	Conduct Archaeological Assessment and apply recommended avoidance measures and other measures from licensed archaeologist or MTCS to project design. Details of the Archaeological Assessment can be found in the reports on this subject as part of the complete REA application package.	The Archaeological Assessment was undertaken as per MTCS guidelines and this Project has received confirmation from the MTCS. The likelihood and magnitude of this residual effect is considered non significant.	Immediate notification of the Archaeologist and the Ministry of Tourism, Culture and Sport (MTCS) In the event archaeological resources are found. Apply monitoring measures as recommended by the MTCS.
Natural Heritage				
Direct vegetation removal – significant woodlands, wetlands and valleylands.	Minimize direct impacts on significant vegetation communities.	Clearly delineate work area within 30 m of significant natural features or wildlife habitats using erosion fencing, or similar barrier, to avoid accidental damage to species to be retained. Directional drilling will occur at a depth of 4-5' below surface to avoid impacts on critical root zones. Any vegetation removal required along roadside collector lines or transmission lines should be minimized and occur completely within the road right of way. Any tree limbs or roots that are accidentally damaged by construction activities within significant woodlands or valleylands will be pruned using proper arboricultural techniques. No vegetation removal will occur in rare	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR. The likelihood and magnitude of this residual effect is considered non significant.	Monitor the success of any re-vegetated areas three (3) times during the first year, and once in each of the next 2 years. Any unsuccessful plantings noted on (or before) assessment within the 2nd year will be re-planted.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		plant communities, sensitive landforms or significant wetlands. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.		
Disturbance of local wildlife- significant woodlands, wetlands and valleylands.	Minimize disturbance of local wildlife.	Horizontal directional drill entry/exit pits should be located at least 30m from any significant natural feature. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Sedimentation and erosion - significant woodlands, wetlands and valleylands.	Maintain or restore vegetated buffers, including riparian zones.	Implement a sediment and erosion control plan within 30 m of a significant natural feature or wildlife habitat. Install, monitor, and maintain erosion and sediment control measures (i.e. silt fences) around the construction areas within 30 m of a significant natural feature or wildlife habitat. Collect drill cutting as they are generated and place in a soil bin or bag for off-site disposal. Minimize vehicle traffic on exposed soils, and limit heavy machinery traffic on sensitive slopes. Re-vegetate temporary access roads, crane paths and drill entry/exit pits, that are in non-agricultural habitat, to pre-construction conditions as soon as possible Details of the Natural Heritage Assessment	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		can be found in the reports on this subject as part of the complete REA application package.		
Spills (i.e. oil, gasoline, grease, etc.) - significant woodlands, wetlands and valleylands.	Avoid contamination of significant natural features.	All maintenance activities, vehicle refueling or washing, and chemical storage will be located more than 30 m from any significant natural feature or wildlife habitat. Develop a spill response plan and train staff on appropriate procedures. Keep emergency spill kits on site. Dispose of waste material by authorized and approved offsite vendors. Any stockpiled material will be stored more than 30m of a wetland, woodland, or water body. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures. Develop a spill response plan and train staff on appropriate procedures. Keep emergency spill kits on site.
Changes in soil moisture and compaction - significant woodlands, wetlands and valleylands.	Minimise impact to soil moisture regime and vegetation species composition.	Implement infiltration techniques to the maximum extent possible. Minimize paved surfaces and design roads to promote infiltration. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Disturbance and/or mortality to local wildlife.	Minimize impact to local wildlife.	Avoid construction or decommissioning activities that are within non-agricultural habitats, during sensitive time periods (i.e. breeding bird season) wherever possible. Conduct nest searches if vegetation removal will occur during the breeding bird season	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		(May1-July 31) Clearly post construction speed limits Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.	effect is considered non significant.	
Changes to surface water hydrology - significant woodlands, wetlands and valleylands.	Maintain existing surface water flow patterns.	Keep changes in land contours to a minimum. Maintain streams and timing and quantity of flow. Minimize grading activities to maintain existing drainage patterns where possible. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application package.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Direct vegetation removal – bat habitats.	Protection of bat roosting habitat.	Clearly delineate work area using erosion fencing, or similar barrier within 30 m of significant bat habitat, to avoid accidental damage to potentially significant bat roosting trees. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Disturbance of local wildlife-significant bat habitats.	Avoid disturbance of locally roosting bat species. Determine if local bat populations are adversely impacted by the	Impacts are expected to be minimal and temporary in nature, no specific mitigation measures have been determined necessary. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	Conduct post-construction acoustic monitoring of this feature for 3 years after construction, following pre-construction methods.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
	presence of operational turbines.			
Direct vegetation removal – significant amphibian breeding habitats,	Minimise impacts on significant amphibian breeding habitats.	If evaluated to be significant, clearly delineate work areas within 30 m of significant amphibian habitat using erosion fencing, or similar barrier, to avoid accidental vegetation damage to woodland edges. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Disturbance of local wildlife- significant amphibian breeding habitats.	Minimise disturbance of local wildlife habitat. Determine if amphibian populations or species abundance are being impacted by Project components.	Impacts are expected to be minimal and temporary in nature, no specific mitigation measures have been determined necessary. Details of the Natural Heritage Assessment can be found in the reports on this subject as part of the complete REA application.	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	If evaluated to be significant, conduct post-construction amphibian call surveys to assess any potential changes in amphibian breeding populations or species distribution.
Direct mortality of dispersing amphibians along access roads	Determine if amphibian populations are being impacted by increased traffic associated with permanent access roads	If evaluated to be significant post speed limits along construction access roads, and maintain signage during the operational phase of the Project. Where a significant amphibian movement corridor is identified during pre-construction surveys an appropriately sized culvert will be installed to enable continued movement of amphibians. Details of the Natural Heritage Assessment can be found in the reports on this subject as	The Natural Heritage Assessment was undertaken as per MNR guidelines and this Project has received confirmation from the MNR The likelihood and magnitude of this residual effect is considered non significant.	If evaluated to be significant, conduct post-construction visual assessments of access roads to look for amphibian mortalities.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		part of the complete REA application.		
Water Bodies				
Alteration of local drainage patterns	Minimise impacts on local drainage patterns	Design to maintain existing surface water drainage patterns and functions (including project layout, grading, storm water management facilities and structure designs) Utilize existing roads and road crossing structures where possible Crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures. Newly impervious surfaces should consider use of permeable material. Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Fish habitat alteration/loss	Limit fish habitat alteration/loss	Consideration of design layout to minimize number of crossings. Consider layout distances to water body features and sensitivity of those features. Crossing locations should be selected as to avoid key habitat features (i.e. refuge pool) and cross the feature within a straight reach of the channel as to avoid meanders etc. and cross perpendicular where possible. Crossing structures should be designed to reduce loss and alterations of habitat where possible (i.e. reduces affected area by cutting back from grading limit to road and install headwall, open bottom culvert etc.).	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		Crossing structure should be properly sized and positioned appropriately (angle and embedded) as to avoid erosion issues and creation of potential fish barriers. Crossing structures should be sized appropriately according to municipal engineering standards as to not result in alterations in stream hydrology, scouring or flooding crossing structures. Crossing structure type should be determined in consultation with agency and municipality staff and should consider sensitivity of the water body and location of crossing. Implement trenchless (i.e. directional drilling) technology at crossings where possible. Any loss to the productive capacity of a watercourse must be compensated for under the *Fisheries Act*. Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.		
Erosion and sedimentation	Minimize impacts of erosion and sedimentation on water bodies	Implement trenchless (i.e. drilling) technology at crossings where possible. Minimize potential for soil compaction (see Soil Compaction). Controlled vehicle and machinery access routes, keep away from water bodies where possible. Schedule clearing, grubbing and grading activities to avoid times of very high runoff	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		volumes, wherever possible. Implement Flood Response Plan if on-site flooding occurs. Implement Erosion and Sediment Control Plan. Stabilize banks as soon as possible after construction disturbance (i.e. plantings, rock etc.), if insufficient time is available in the growing season to establish vegetative cover, an overwintering treatment such as erosion control blankets, fiber matting etc. should be applied to contain the site over the winter period. Minimize disturbance by keeping construction equipment outside and away from water bodies wherever possible. Work in dry conditions (i.e. low flow period) or isolate in-water work area using good engineering practices and dewatering techniques. Install silt fencing in-water downstream of dewatering activities. Dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body. Dewatering discharge should be dissipated (i.e. sand bags, hay bales etc.) and may require to be split to more than one location Implement Stormwater Management Plan Details of the Water Body Assessment can be found in the reports on this subject as		

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		part of the complete REA application		
Water Quality Impairment	Minimize any negative impacts to water quality	Implement Erosion and Sediment Control Plan. Implement Spill Response Plan. Keep machinery clean and refuel well away from any water body (>30 m). Fuel and other construction related chemical stored securely away from water bodies (>30 m). Any discharges to a water body must meet MOE Policy 2 standards (at or better water quality that than of the receiving water body). Adequately treat any discharge water prior to discharge as to meet MOE policy 2 standards (i.e. filer bags). Implement Stormwater Management Plan. Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.
Temporary disruption of fish habitat (in-water work)	Limit disruption of fish habitat	Restrict construction during sensitive timing windows, as indicated by local OMNR. Work in the dry (i.e. low flow) or isolate work area using good engineering practices or by working in dry conditions using accepted methods to bypass flows. Machinery should be operated in a manner That minimizes disturbance to the banks and bed of the watercourse. Stabilize banks as soon as possible after construction disturbance (i.e. plantings, rock	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		etc). Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.		
Water Level Alteration	Minimize alteration of water level	Dewatering ZOI and rates should be determined prior to dewatering and assessed for impact on affected water bodies. Implement Water Level Response Plan, trigger criteria to be determined in consultation with OMNR. Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.
Soil Compaction	Minimise the amount of soil compaction.	Controlled vehicle access routes. Staging areas should be located away from water bodies (i.e. 30 m). Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Debris entering a water body	Limit the amount of debris entering water bodies	Construction debris should be stabilized (i.e. tarps) away from water bodies (i.e. 30 m). Refuse and other material should be appropriately disposed of off-site. Staging areas should be located away from water bodies (i.e. 30 m). Drilling shafts should be located away from water bodies (i.e. 30 m).	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	Environmental supervision during construction as part of a routine inspection program will be implemented to ensure adherence to the prescribed mitigation measures.

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.		
Drilling Frac-out	Reduce the potential for drilling frac-out.	Conduct appropriate geotechnical studies as to ensure directional drilling is appropriate at that location and will not result in a 'frac-out'. Develop emergency contingency plan in the unlikely event of a 'frac-out' when drilling below a water body, this plan will deal with issues associated with water level alteration, water quality and erosion & sedimentation. Details of the Water Body Assessment can be found in the reports on this subject as part of the complete REA application.	The Water Body Assessment was undertaken as per MOE guidelines and this Project is expected to receive approval from the MOE. The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures and best management practices are applied.
Emissions to Air, including Odour and Dust				
Reduction in air quality due to CAC emissions and dust.	Minimise deterioration of air quality.	Ensure proper operation and maintenance of vehicles and machinery to limit noise, CAC emissions and leaks. Use water or water-based dust suppressant to control dust on unpaved roads. Implement speed limits on unpaved roads. Minimize vehicular traffic on exposed soils and stabilize high traffic areas with clean gravel surface layer or other suitable cover material. Minimize mud tracking by construction vehicles along access routes and areas outside of the immediate work site, and ensuring timely cleanup of any tracked mud, dirt and debris. Cover or otherwise containing loose construction materials that have potential to release airborne particulates during	The likelihood and magnitude of this residual effect is considered non significant.	Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in emergency Response and Communications Plan)

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
		transport, installation or removal.		
Noise				
Increase in noise levels in Project Study Area	Minimise noise increases for inhabited areas	Ensure proper operation and maintenance of vehicles and machinery to limit noise, CAC emissions and leaks. Implement speed limits on unpaved roads. Construction equipment will be kept in good condition and will not exceed the noise emissions as specified in MOE publication NPC-115.	The likelihood and magnitude of this residual effect is considered non significant.	Faulty equipment resulting in increased noise levels are to be repaired in a timely fashion. Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in emergency Response and Communications Plan)
Local and Provincial Interests, Land, Use and Infrastructure				
Increased traffic and noise in Project Study Area.	Minimise disturbance to local community and achieve zero human safety incident. Receive limited complaints	Ensure proper operation and maintenance of vehicles and machinery to limit noise, CAC emissions and leaks. Implement Communications Plan namely by informing local communities of construction schedule, use of signs and communicating truck routes.	The likelihood and magnitude of this residual effect is considered non significant.	Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan).
Reduction in usable agricultural land.	Minimise reduction in useable agricultural land.	Minimize length of access roads (most agricultural use only affected during construction) where possible.	The likelihood and magnitude of this residual effect is considered non significant.	The magnitude of the residual effect is considered non significant therefore no monitoring or contingency is required provided the recommended mitigation/compensation measures are applied.
Increased congestion due to increase in truck	Minimise disturbance to	Notify the community in advance of construction delivery schedules and	The likelihood and magnitude of this residual	Track all complaints and conduct follow-up monitoring (see Complaints Resolution

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
traffic and short-term lane closures on local roads during delivery of Project components.	local community and achieve zero human safety incident.	installing signage to notify road users of construction activity. If required by municipal authorities develop a traffic management plan for the construction phase and submit to the Municipalities prior to construction and communicate truck routes.	effect is considered non significant.	Process in Emergency Response and Communications Plan).
Damage to local infrastructure.	Minimise damage to local infrastructure.	Adhere to the best practices regarding the operation of construction equipment and delivery of construction materials. If required by municipal authorities, undertake roads condition survey prior to construction and post-construction.	The likelihood and magnitude of this residual effect is considered non significant.	Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). If required by local authorities, return damaged infrastructure to original condition (or better) where appropriate.
Areas Protected under Provincial Plans and Policies				
N/A				
Public Health and Safety				
Effects on public health and safety during construction have been described above under Emissions to air, including Odour and Dust, Noise and Local and Provincial Interests Land Use and Infrastructure.				
Other Resources				
The presence of petroleum wells have	No negative effects on	As part of the Approval and Permitting Requirements Document and as per the	N/A	N/A

Potential Effect	Performance Objective	Mitigation/Compensation Measures	Residual Effect	Monitoring / Contingency
been identified through consultation with the OGSR database to be within 75 m of project infrastructure	petroleum resources or the renewable energy project	Ontario Ministry of Natural Resources (MNR) "Template for Renewable Energy Projects: Setbacks from Petroleum Operations" a site validation of all petroleum wells and facilities identified by the OGSR Library to be within 75 m of the Project location was conducted and confirmed that there are NO petroleum wells or facilities existing within 75 m of the Project location. Notice of the findings has been reported to the Aylmer District MNR.		

4 REFERENCES

[1] Ontario Regulation 359/09, made under the Environmental Protection Act, Renewable Energy Approvals under Part 1.0 of the Act.

[2] Ontario Regulation 521/10, made under the Environmental Protection Act, Renewable Energy Approvals under Part 1.0 of the Act.

[3] Technical Guide to Renewable Energy Approvals, Ontario Ministry of the Environment, July 2011.

[4] Ministry of Tourism, Culture and Sport, Standards and Guidelines for Consultant Archaeologists, 2011.

APPENDIX A SITE PLAN