NextEra Energy Canada, ULC

Draft Design and Operations Report – Goshen Wind Energy Centre

Prepared by:

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60155032

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Glossary of Terms

EIS .....Environmental Impact Study
GE.....General Electric
GIS.....Geographical Information Systems
HVA.....Highly Vulnerable Aquifer
kV.....Kilovolt
LLC .....Limited Liability Company
MNR .....Ontario Ministry of Natural Resources
MOE .....Ontario Ministry of the Environment
MSDS.....Material Safety Data Sheets
MTCS.....Ontario Ministry of Tourism, Culture and Sport
MTO .....Ontario Ministry of Transportation
MW.....Megawatt
OGS .....Ontario Geological Survey
O. Reg. 359/09.....Ontario Regulation 359/09
O. Reg. 9/06.....Ontario Regulation 9/06
PDR .....Project Description Report
PSW .....Provincially Significant Wetland
REA.....Renewable Energy Approval
SCADA.....Supervisory Control and Data Acquisition
SGRA.....Significant Groundwater Recharge Area
TC .....Transport Canada
The Plan.....Emergency Response and Communication Plan
The Project.....Goshen Wind Energy Centre
ULC.....Unlimited Liability Corporation
UTM .....Universal Transverse Mercator

1. Introduction

Goshen Wind, Inc., a wholly owned subsidiary of NextEra Energy Canada, ULC (NextEra) is proposing to construct a wind energy centre project in Bluewater and South Huron, Huron County, Ontario (**Figure 1-1**). The Project will be referred to as the Goshen Wind Energy Centre (the "Project") and will be located on private lands in the vicinity of the shoreline of Lake Huron. The wind turbine technology proposed for the Project is the GE 1.6-100 Wind Turbine and the GE 1.56-100 Wind Turbine. Although NextEra is seeking a Renewable Energy Approval (REA) for up to 72 wind turbines, only 63 will be constructed for the Project.

This Design and Operations Report was prepared in accordance with the requirements outlined in *Ontario Regulation 359/09* (*O. Reg. 359/09*) and the Technical Guide to Renewable Energy Approvals (Ontario Ministry of the Environment (MOE), 2011).

The following sections outline the site plan, the design of the facility and equipment to be used, how the facility will be operated, and how effects will be monitored and emergencies managed.

1.1 Summary of Design and Operations Report Requirements

The requirements for the Design and Operations Report under *O. Reg. 359/09* are provided in the following table (**Table 1-1**) in addition to the corresponding report section.

Table 1-1 Adherence to Design and Operations Plan Report Requirements

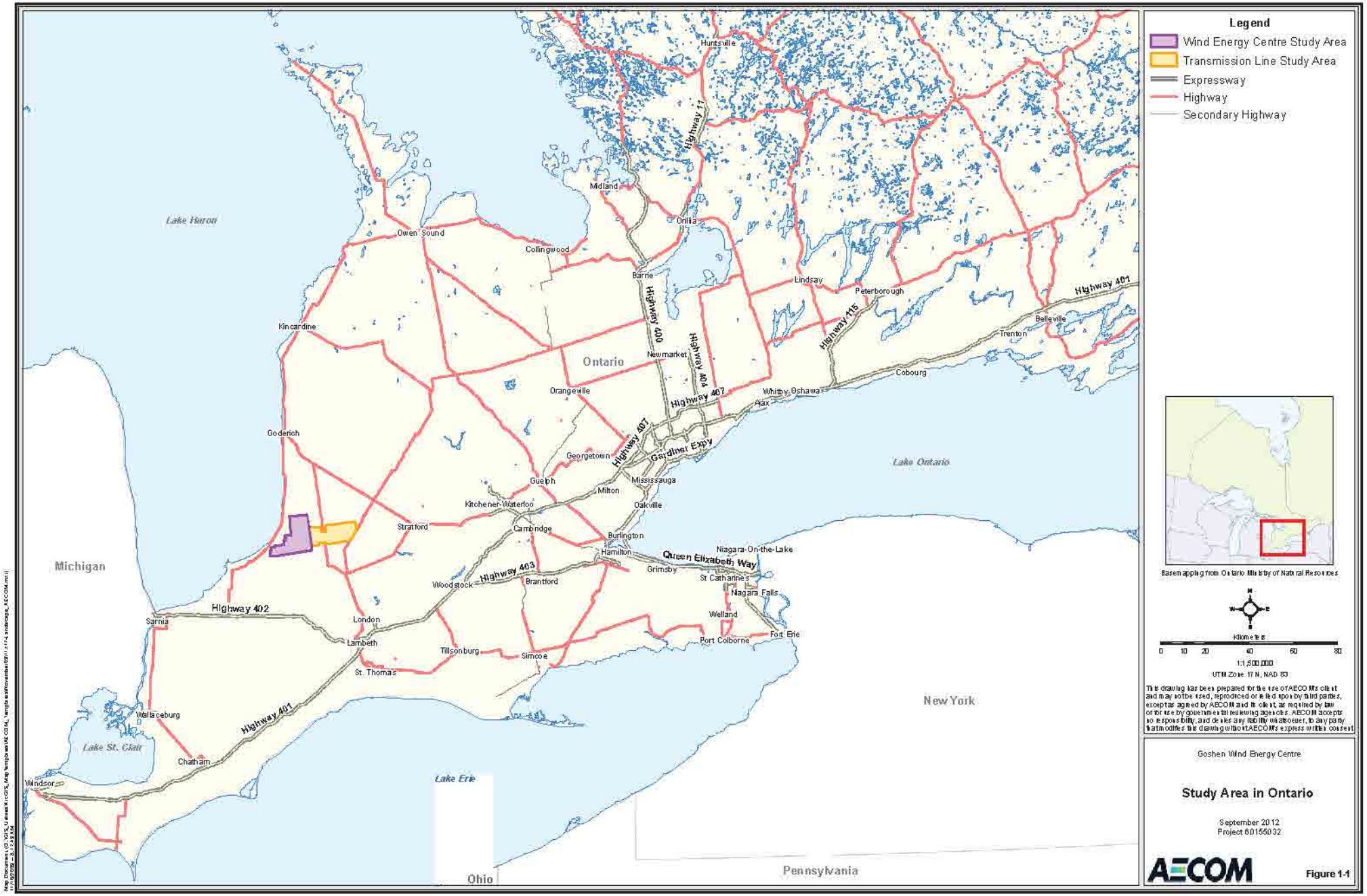
Requirement	Completed	Corresponding Section
Site Plan	Yes	Section 2, Appendix B
Facility Design Plan	Yes	Section 3
Facility Operations Plan	Yes	Section 4
Emergency Response and Communications Plan	Yes	Section 5
Environmental Effects Monitoring Plan	Yes	Section 6

1.2 The Proponent

The Project will be owned and operated by Goshen Wind, Inc., a subsidiary of NextEra. NextEra's parent company is NextEra Energy Resources, LLC, a global leader in wind energy generation with a current operating portfolio of over 85 wind energy projects in North America. In Canada, wind energy centres currently owned and operated by NextEra Energy Canada include: Mount Copper and Mount Miller, (both 54 megawatts (MW)) located in Murdochville, Quebec; Pubnico Point, (31 MW) located near Yarmouth, Nova Scotia; and Ghost Pine (82 MW), located in Kneehill County, Alberta.

The primary contacts for the Project are as follows:

Project Proponent	Project Consultant
Derek Dudek Community Relations Consultant NextEra Energy Canada, ULC 5500 North Service Road, Suite 205 Burlington, Ontario, L7L 6W6 Phone: 1-877-257-7330 Email: Goshen.Wind@NextEraEnergy.com Website: www.NextEraEnergyCanada.com	Marc Rose Senior Environmental Planner AECOM 300-300 Town Centre Blvd. Markham, Ontario, L3R 5Z6 Phone: 905-477-8400 x388 Email: marc.rose@aecom.com



Goshen Wind Energy Centre

Study Area in Ontario

September 2012
Project 60155032

AECOM

Figure 1-1

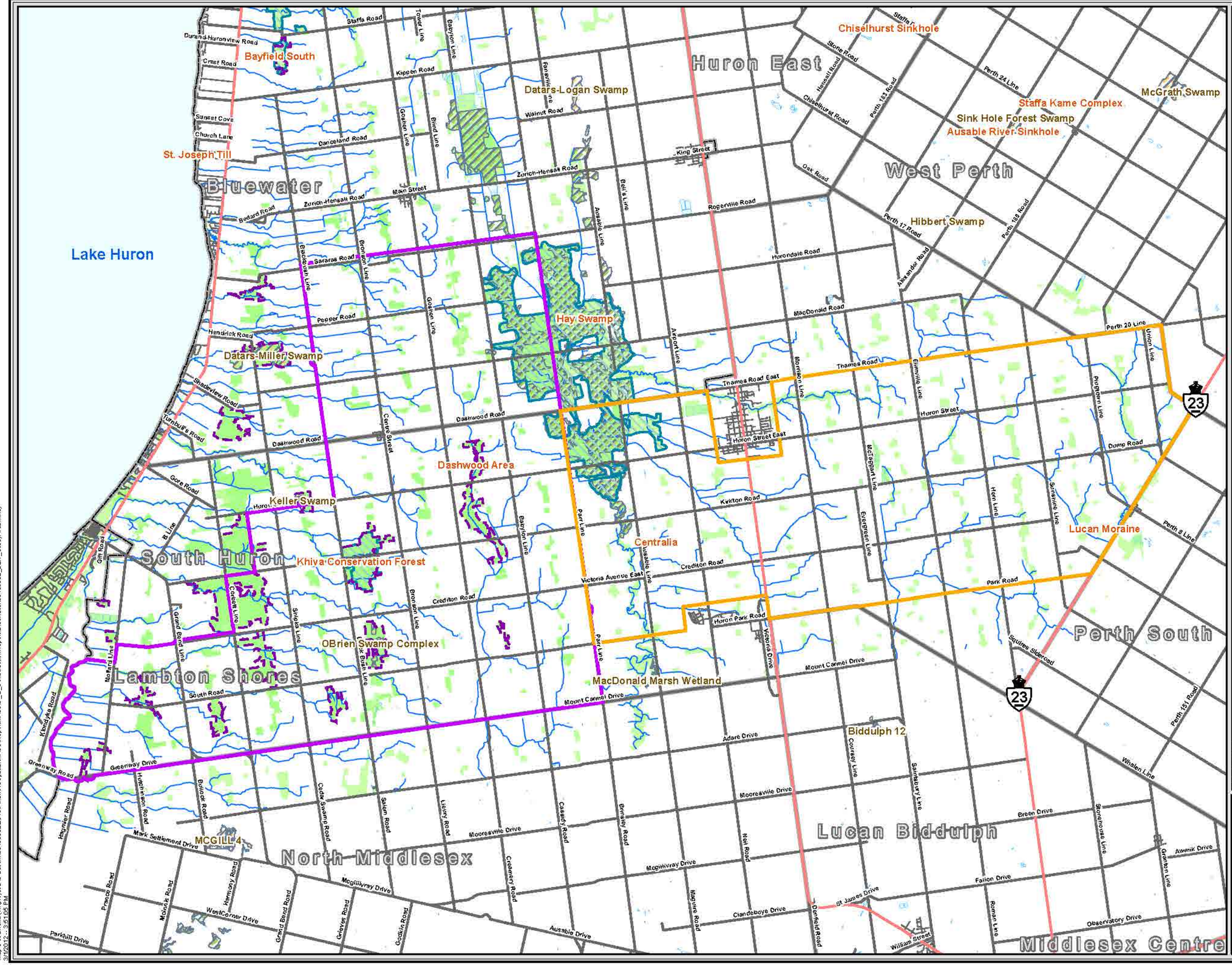
1.3 Project Study Area

The proposed Project is located in Huron County, within the Municipalities of Bluewater and South Huron. The Project Study Area consists of the areas being studied for the wind farm components (Wind Energy Centre Study Area), as well as for the interconnection route (i.e., the area being studied for transmission lines to connect the Project to the electrical grid) (Transmission Line Study Area) (**Figure 1-2**). The Wind Energy Centre Study Area is generally bounded by Klondyke Road to the west, Rogerville Road to the north, Parr Line to the east, and Mount Carmel Drive to the south, in the Municipalities of Bluewater and South Huron. The Transmission Line Study Area is located to the east of the Wind Energy Centre Study Area, and is generally bounded by Parr Line to the west, Thames Road to the north, Perth 164 Road to the east, and Park Road to the south, extending into the Municipality of South Huron.

The location of the Project 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.

The following co-ordinates define the external boundaries of the Project Study Area:

Longitude	Latitude
-81.6753290	43.4155312
-81.3011931	43.3810955
-81.3303330	43.3036317
-81.7743607	43.2379854



Legend

- Wind Energy Centre Study Area
- Transmission Line Study Area
- Municipal Division

Natural Features

- Natural Features (ABCA)
- Provincially Significant Life Science ANSI
- Regionally Significant Life Science ANSI
- Regionally Signficant Candidate Life Science ANSI
- Regionally Signficant Candidate Earth Science ANSI
- Provincially Significant Wetland
- Locally Significant Wetland
- ESA (ABCA)
- Waterbody
- Cartographic Wetland

Basemapping from Ontario Ministry of Natural Resources

N W E S

Kilometers

0 1.5 3 6

1:125,000

UTM Zone 17N, NAD 83

Goshen Wind Energy Centre

Project Study Area

September 2012
Project 60155032

AECOM

Figure 1-2

Map Document: (N:\projects\0 aecom\60155032\20103F inal\GIS\Spatial\MXD's\Report\MXDs\0_G_ConstructionReport\Bluewater\60155032_BLW_Studyarea.mxd)
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2. Site Plan

The Site Plan, presented in this section, details the location of facility components, natural features, noise receptors, required setbacks and lands within 300 m of the Project Location.

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*" (Government of Ontario, 2009). 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 is located, including the air space occupied by turbine blades.

The proposed Project Location is shown on **Figures 2-1, 2-2 and 2-3** in **Appendix B**, and includes the components of the Project listed below:

- Up to 71 GE 1.6-100 Wind Turbine generator locations and pad mounted step-up transformers and one GE 1.56-100 Wind Turbine generator location and pad mounted step-up transformer (however, only 63 turbines will be constructed);
- Laydown and storage areas (including temporary staging areas, crane pads and turnaround areas surrounding each wind turbine);
- Temporary electrical service line for the purpose of providing power to the construction trailers located at the laydown area;
- A transformer substation;
- Underground 34.5 kV electrical collection lines to connect the turbines to the transformer substation and other ancillary equipment such as above-ground junction boxes;
- 115 kV transmission line to run from the transformer substation to a breaker switch station which will connect the electricity generated by the project to the existing Hydro One 115 kV transmission line;
- Turbine access roads;
- Three permanent meteorological towers; and
- An operations and maintenance building including an electrical service line connected to the local distribution service.

Disturbance Areas have been identified surrounding various Project components; these 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, turbine turnaround areas, and construction of access roads and electrical collection system. 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.

The above mentioned Project components are depicted in the Project Location figures described below:

- **Figure 2-1**: shows the locations of Project components and associated disturbance areas including: wind turbines, access roads, the electrical collection system, 115 kV transmission line, the Operations and Maintenance Building, the transformer substation and breaker switch station, and temporary laydown/storage areas. This figure also shows topographical land contours and surface water drainage for all land within 120 m of the Project Location.

- **Figure 2-2**: shows the location of Project components and associated disturbance areas in relation to surrounding natural heritage and water body features such as: wetlands, woodlands, streams, and Areas of Natural and Scientific Interest, in addition to water wells identified in MOE's database. This figure also illustrates compliance with the 120 m setback distance for natural heritage features, measured from the boundary of the Project Location, and highlights significant natural heritage features that are within those setback distances.
- **Figure 2-3**: shows the location of Project components and associated disturbance areas in relation to surrounding socio-economic features such as: property boundaries, roads and railway right-of-ways, petroleum resources, landfills, aggregate resources and noise receptors. This figure also identifies the setback distances between these features and the Project components. Note that noise compliance is assessed in **Appendix A – Noise Study Report** (AECOM, 2012).

The exercise of siting infrastructure is an iterative process that involves balancing the wind resource with environmental, socio-economic and engineering constraints, including the preferences of individual landowners, while at the same time adhering to the setback distances prescribed by the Province and outlined in *O. Reg. 359/09*. Note that this Site Plan was designed to comply with the setback distances prescribed in *O. Reg. 359/09* and outlined in the following table (**Table 2-1**). Universal Transverse Mercator (UTM) co-ordinates of turbines and the transformer substation are provided in **Appendix B**, along with the location of all noise receptors shown in **Figure 2-3**.

Table 2-1 Ontario Regulation 359/09 Setback Distances

Setback	Distance (metres (m))	Details
Noise Receptors	550*	To be measured from the centre of a turbine's base to a noise receptor.
Property Line	Hub height (80)	Setback can be reduced to blade length plus 10 m (60 m total) measured from the centre of the turbine's base to the nearest property boundary if a Property Line Setback Assessment Report demonstrates that siting turbines closer will not cause adverse effects.
Roads and Railway	Blade length plus 10 m	Blade length plus 10 m (60 m total) measured from the centre of the turbine's base to the boundary of the right-of-way.
Significant Natural Heritage Features	120	Measured from the project location boundary to the nearest point of the natural features. Project components may be sited closer than the prescribed setback if an Environmental Impact Study is prepared.
Water Bodies	120	Measured from the average annual high water mark of a lake, or permanent / intermittent stream (Project components may be sited closer than 120 m if a Water Body Report is prepared - note that turbines and transformers may not be sited closer than 30 m to these features).
Petroleum Resources	75	Setback may be reduced with the submission of a Petroleum Engineer's Report to the MNR.

*Note: * Setback does not apply to noise receptors on land owned by a proponent of a wind energy facility or by a person who has entered into an agreement to permit all or part of the facility on their lands.*


Legend
Wind Energy Centre Study Area
Goshen Transmission Line Study Area
120 m Area of Investigation
Municipal Division
Roads
Freeway
Expressway / Highway
Major Road
Local Road
Natural Features
Watercourse (ABCA, UTRCA)
Watercourse (MNR)
Waterbody
Cartographic Wetland
Contour (5 m)
Woodlot
Project Location
GE Turbine
Permanent Meterological Tower
Access Road
Collection Line
Transmission Line
Disturbance Area
Breaker Switch Station
Transformer Substation
Temporary Laydown Area
Lake Huron
Basemapping from Ontario Ministry of Natural Resources
Metres
0 500 1,000 1,500 2,000
1:50,000
UTM Zone 17N, NAD 83
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Goshen Wind Energy Centre
Project Location
August 2012
Project 60155032
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Figure 2-1

Legend

- Wind Energy Centre Study Area
- Transmission Line Study Area
- Municipal Division
- Freeway
- Expressway / Highway
- Major Road
- Local Road
- Ramp
- MOE Waterwell
- Permanent Meterological Tower

Project Location

- GE Turbine
- Transmission Line
- Collection Line
- Access Road
- Disturbance Area
- 120 m Area of Investigation
- Breaker Switch Station
- Transformer Substation

- Provincial.ANSI, Earth Science
- Regional.ANSI, Life Science
- Regional.Candidate ANSI, Earth Science
- Regional.Candidate ANSI, Life Science
- Locally Significant Wetland
- Provincial Significant Wetland
- Watercourse
- Waterbody
- Cartographic Wetland
- Wooded Area

Basemapping from Ontario Ministry of Natural Resources

Metres
0 250 500 1,000 1,500 2,000
1:50,000
UTM Zone 17N, NAD 83

Goshen Wind Energy Centre

Project Location and Natural Heritage Features

September 2012
Project 60155032

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Figure 2-2


Legend
Wind Energy Centre Study Area
Transmission Line Study Area
Municipal Division
Parcel Boundary
120 m Area of Investigation
Setback Distances
60 m Road/Rail Buffer
80 m Property Boundary Buffer
550 m Noise Receptor Buffer
500 m Substation Footprint Buffer
75 m Petroleum Resources Buffer
2 km Boundary from Project Location
Other Resources
Petroleum Well
Authorized Aggregate Site
Open Landfill
Closed Landfill
Roads
Expressway / Highway
Major Road
Local Road
Receptors
Participating Receptor
Non-participating Receptor
Vacant Lot Participating Receptor
Vacant Lot Non-participating Receptor
Project Location
GE Turbine
Permanent Meterological Tower
Access Road
Collection Line
Transmission Line
Disturbance Area
Breaker Switch Station
Transformer Substation
Temporary Laydown Area
Natural Features
Watercourse
Waterbody
Wetland Area
Woodlots
Basemapping from Ontario Ministry of Natural Resources
Metres
0 250500 1,000 1,500 2,000
1:50,000
UTM Zone 17N, NAD 83
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Goshen Wind Energy Centre
Project Location and Socio-Economic Features
September 2012
Project 60155032
AECOM
Figure 2-3

3. Facility Design Plan

The following section provides a summary of the Facility Design Plan.

3.1 Wind Turbine Specifications

With a total nameplate capacity of 102 MW, the Project is categorized as a Class 4 facility under *O. Reg. 359/09*. Although NextEra is seeking an REA for up to 72 wind turbines, only 63 are proposed to be constructed for the Project.

The wind turbine technology proposed for this Project is the GE 1.6-100 Wind Turbine and GE 1.56-100 Wind Turbine (one turbine only). The turbines are 3-bladed, upwind, horizontal-axis wind turbines that are state of the art technology. The turbines have a 100 m rotor diameter with a swept area of 7,854 m; each blade is connected to the main shaft via the hub. The turbine is mounted on an 80 m tubular steel tower which contains an internal ladder provided for maintenance access. The turbine will be constructed on a foundation that is approximately 400 m^2. The foundation consists of poured concrete and steel rebar to provide added strength.

The nacelle houses the main components of the wind turbine such as the rotor shaft, gear box, couplings, control panel, bearing brackets and the generator. The nacelle is equipped with sound-proofing, is ventilated and the interior is illuminated with electric lights. Some of the wind turbines will have external lighting in accordance with the requirements of Transport Canada (TC).

Table 3-1 below provides a summary of the turbine specifications. Please refer to the Wind Turbine Specifications Report (AECOM, 2012) for more detailed information on the wind turbines proposed for the Project.

Table 3-1 Summary of Technical Specifications

Specification	GE 1.6-100 Wind Turbine	GE 1.56 Wind Turbine
Make	General Electric	General Electric
Model	1.6-100	1.56-100
Name Plate Capacity	1.62 MW	1.56 MW
Hub Height	80 m	80 m
Rotor Diameter	100 m	100 m
Minimum Rotational Speed	9.75 rpm	9.75 rpm
Maximum Rotational Speed	15.33 rpm	16.2 rpm

3.2 Laydown and Storage Areas

A temporary laydown and storage area will be constructed on privately owned land for the purpose of staging and storing equipment during the construction phase. Activities on this site will include materials storage, equipment refuelling, and construction offices. The area will be approximately 4 hectares (10 acres) in area. In addition, a 122 m by 122 m square around each wind turbine will be established for the laydown and assembly of the wind turbine components. The construction trailers will receive electrical power through a temporary electrical service line connected to the local distribution line.

3.3 Collection Lines

The system that connects each turbine to the transformer substation will consist of 34.5 kV electrical collection lines that will be buried 1 m below grade on private property adjacent to the turbine access roads, where feasible. In some locations, the collection lines will be buried within the municipal road right-of-way. Above ground electrical junction boxes will be used to connect sections of underground collection lines.

3.4 Transformer Substation and Breaker Switch Station

Approximately two to three hectares in size, the transformer substation will either be located on privately held lands through a lease agreement or on land purchased by Goshen Wind, Inc. The electricity collected via the 34.5 kV underground collection lines will converge at the transformer substation where the electricity will be "stepped-up" to 115 kV for transmission and then routed to a breaker switch station. The breaker switch station will occupy less than 0.4 hectares (1 acre) of land and is the connection point with the existing Hydro One 115 kV transmission line. The substation equipment will include an isolation switch, a circuit breaker, a step-up transformer, transmission switch gear, instrument transformers, grounding and metering equipment. All substation grounding equipment will meet the Ontario Electrical Safety Code. The substation will be connected to the existing electrical distribution line to supply power for the control housing lighting and equipment.

3.5 Electrical Transmission

A 115 kV electrical transmission line from the step-up transformer substation to the connection point with the Provincial electricity grid is proposed to be located on private property, or within existing road right-of-ways. It is anticipated that the transmission line will be mounted on new transmission line poles. The poles are proposed to be constructed of wood, concrete or steel and will be between 18 and 30 m tall.

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.

3.6 Access Roads

On-site access roads to each turbine will be constructed to provide an access point to the properties for equipment transport during the construction phase and for maintenance activities during operation. 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 may be reduced in width at the landowner's request following construction. Roads will be wider where they intersect with existing municipal roads to accommodate the turning radii needed for wind turbine component delivery.

3.7 Operations and Maintenance Building

An operations building, approximately 30 m by 15 m in size, will be constructed on privately held lands or an existing suitable structure will be purchased/leased for the purpose of monitoring the day-to-day operations of the wind energy centre and supporting 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 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. It is the Project owner's responsibility to ensure proper maintenance of the septic system. The operations and maintenance building, septic system and water supply will be constructed in accordance with applicable municipal and provincial standards.

3.8 Permanent Meteorological Towers

Permanent meteorological towers are an operational requirement of the Independent Electricity System Operator (IESO) as an electricity market participant (this includes all generators of electricity) and allow the IESO to operate the system reliably and safely.

Three permanent meteorological towers will be installed at the Project. The towers will be connected to the project via buried electrical and communication cables. The towers are typically up to 80 m in height. No significant soil or vegetation disturbance is anticipated. The use of meteorological data are key to the safe and efficient operation of a wind energy centre. Some operational decisions made using meteorological data include:

- Cut-in wind speed;
- Cut-out wind speed;
- Turbine shut down during potential icing conditions; and,
- Turbine shut down during extreme weather events.

4. Facility Operations Plan

The following section describes the Facility Operations Plan; including daily operations activities and routine/ unplanned maintenance activities.

4.1 Wind Turbine Operation

The wind energy centre will require full time technical and administrative staff to maintain and operate the facility. The primary workers will be wind technicians (i.e., technicians who carry out maintenance on the turbines) along with a site supervisor. The Project will be operated by a staff of five to eight people who will work out of the operations and maintenance building.

The wind turbines will be operating (i.e., in "Run" mode and generating electricity) when the wind speed is within the operating range for the turbine and there are no component malfunctions. Each turbine has a comprehensive control system that monitors the subsystems within the turbine and the local wind conditions to determine whether the conditions are suitable for operation. If an event occurs which is considered to be outside the normal operating range of the turbine (such as low hydraulic pressures, unusual vibrations or high generator temperatures), the wind turbine will immediately take itself out of service and report the condition to the Operations Centre, located in the operations and maintenance building. A communication line connects each turbine to the Operations Centre, which closely monitors and, as required, controls the operation of each turbine. 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 co-ordinated for safe, secure and reliable operation. The wind turbine will also report to NextEra's Central Operations Facility during non-working hours.

4.2 Routine Turbine Maintenance

Routine preventative maintenance activities will be scheduled at six month intervals with specific maintenance tasks scheduled for each interval. Maintenance will be done by removing the turbine from service and having two to three technicians climb the tower to spend a full day carrying out maintenance activities.

Consumables such as the various greases used to keep the mechanical components operating and oil filters for gearboxes and hydraulic systems will be used for routine maintenance tasks. Following all maintenance work on the turbine, the area will be cleaned up. All surplus lubricants and grease-soaked rags will be removed and disposed of as required by applicable regulations. All maintenance activities will adhere to the same spill prevention protocols undertaken during the construction phase.

4.3 Unplanned Turbine Maintenance

Modern wind turbines are very reliable and the major components are designed to operate for approximately 30 years. However, there is a possibility that component failure may occur despite the high reliability of the turbines fleet-wide. Most commonly, the failure of small components such as switches, fans, or sensors will take the turbine out of service until the faulty component is replaced. These repairs can usually be carried out by a single crew visiting the turbine for several hours.

Events involving the replacement of a major component such as a gearbox or rotor are rare. If they do occur, the use of large equipment, sometimes as large as that used to install the turbines, may be required.

It is possible that an access road, built for construction and returned to farmland when the construction phase is completed, would need to be rebuilt to carry out repairs to a damaged turbine. Typically only a small percentage of turbines would need to be accessed with large equipment during their operating life.

4.4 Electrical System Maintenance

The collector lines and substation will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for above-ground infrastructure and protective relay maintenance of the substation, in addition to monitoring of the secondary containment system for traces of oil. Finally, vegetation control will be required around the transmission line to prevent any damage to the line and ensure safe operation. Any vegetation that has the potential to grow to more than 4.3 m above grade will be cleared. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw / hydro axe).

4.5 Waste Management

Waste generated during the operations phase will be removed from the operations and maintenance building by a licensed operator and disposed of at an approved facility. Any lubricants or oils resulting from turbine maintenance will be drummed on site and disposed of in accordance with applicable Provincial regulations. All reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for reuse/recycling. The spill prevention protocols followed during construction will continue to be observed throughout the facility's operations and maintenance activities.

5. Emergency Response and Communication Plan

This Emergency Response and Communication Plan (the Plan) for the Goshen Wind Energy Centre was prepared in accordance with the requirements of *O. Reg. 359/09*. The purpose of the Plan is to define an avenue for ongoing communication throughout the construction, operation and decommissioning phases of the Project. This will ensure that members of the community, Aboriginal communities, local municipalities and government Ministries are kept apprised of pertinent Project activities, in addition to any emergencies in the unlikely event that one should occur. The Emergency Response and Communication Plan will also be filed with the MOE, the Municipalities of Bluewater and South Huron, and Huron County.

The following sections outline NextEra's communication commitments in relation to emergency response, ongoing communication and complaint management.

5.1 Emergency Response

NextEra Energy Resources, the parent company of NextEra, maintains standard Emergency Action Plans for all of its operating facilities. Throughout the construction, operation and decommissioning phases of the Project, an up-to-date Emergency Action Plan will be maintained in the Project office at the Operations and Maintenance Building. The Emergency Action Plan will contain current contact information for emergency responders, including local police and fire departments, and will outline the chain of communication between on-site employees, NextEra, emergency contacts, the local community and other pertinent stakeholders in the event that an emergency situation should arise. NextEra's Emergency Action Plans typically include the following information:

- Designation of facility emergency co-ordinators;
- Process description for responding to emergencies;
- Objectives for emergency response and communication;
- Local emergency response contact phone numbers;
- Regulatory references;
- Required health and safety training for employees;
- Facility information, including exact location;
- Facility emergency procedures;
- Immediate site evacuation procedures and routes;
- Delayed site evacuation procedures;
- Process for documenting personnel injuries/serious health conditions;
- Fire response plan;
- Process for documenting chemical/oil spills and releases;
- Material Safety Data Sheets (MSDS) for all chemicals used in construction and maintenance; and
- Weather-related emergency procedures.

The Emergency Action Plan's communication protocol will be finalized in consultation with the local municipalities and will include the following steps:

- The person observing the emergency will contact first responders immediately via a 911 operator, as required by the site Emergency Action Plan; and
- A NextEra representative will then contact the MOE, including the Spills Action Centre, if required, in accordance with Sections 15 and 92 of the Environmental Protection Act and the local municipalities / response personnel.

Depending on the level of risk associated with the incident, local community members will be notified at the discretion of NextEra. Employees will be trained on the Emergency Action Plan's procedures and the Plan will be

maintained on-site and updated when required to ensure it contains current information throughout the construction, operation and decommissioning phases of the Project.

5.2 Ongoing (Non-Emergency) Communication

NextEra will maintain communication with the local municipalities, members of the community and Aboriginal communities, where appropriate, throughout the construction, operation and decommissioning phases of the Project.

Broad community relations activities are seen as essential to the implementation of a successful project. To this end, the following activities will be undertaken:

a) On-site tours with community leaders, local media and other interested parties during construction; and
b) Installation of construction signage notifying community members of construction activity.

In addition, letters will be mailed to pertinent stakeholders to inform them of:

- The commencement of construction activities;
- The commencement of decommissioning activities; and
- Any other activities that NextEra would like to share with the local community.

A project email address and phone number will be maintained and monitored by the operations manager and will be used to respond to stakeholder questions and/or complaints. Contact information for the operations manager will be provided on all notifications.

5.3 Complaints Resolution Process

NextEra acknowledges that some members of the community may have concerns regarding construction activities and long-term wind farm operations. To resolve disputes in a collaborative manner, NextEra will follow the complaints resolution process described below.

- Should any complaints arise throughout the course of the construction, operation and decommissioning phases, a NextEra representative will contact the complainant within 24 hours of receiving the complaint to understand and seek a resolution. NextEra will notify the local MOE district office of the complaint and prepare / file an initial Complaint Record and include the following:
  a) name, address and phone number of the complainant;
  b) date and time of the complaint;
  c) details of the complaint;
  d) follow-up action to be taken; and
  e) steps taken to prevent the situation from occurring in the future, where applicable;
- If the complaint cannot be resolved through a phone call, a face-to-face meeting may be scheduled with the complainant;
- An updated Complaint Record will be maintained to describe the proposed resolution of the complaint, where applicable; and
- Complaint Records will be maintained at the Project office in the Operations and Maintenance Building and will be made available to MOE field inspection staff should a request be made.

The Construction Manager will be responsible for the implementation of the complaints resolution process during the construction phase and the Operations Manager will take on this responsibility during the operations phase.

6. Environmental Effects Monitoring Plan

This section describes potential effects associated with the daily function of the Project in addition to mitigation measures and monitoring commitments that will be implemented to minimize these potential effects. The potential effects described below are also presented in Section 3 of the PDR (AECOM, 2012).

For each potential effect, performance objectives were developed to describe a desired outcome of mitigation. Next, mitigation measures were proposed to achieve the performance objectives.

Residual effects, which are those effects that remain following the application of mitigation measures and monitoring commitments, were then assessed based on professional judgment as well as previous Project experience. Where possible, the significance of residual adverse effects has been described based on the following:

Magnitude.... the size or degree of the effect compared against baseline conditions; and
Likelihood.... the probability that the effect will occur.

Finally, where monitoring commitments have been identified, they are intended to verify that the mitigation measures achieve performance objectives. Should the monitoring during the construction and operation of the Project reveal that the mitigation measures are not achieving the intended result, the identified contingency measures will then be implemented.

6.1 Cultural Heritage

Stage 1 and 2 Archaeological Assessments (Golder, 2012) were conducted and factored into the overall Project layout. The Stage 1 Archaeological Assessment consists of an initial desktop archaeological study and site visit and was carried out in the summer 2010 and updated in spring 2012. This assessment determined that there are known archaeological resources within the Project Study Area (**Figure 1-2**), in addition to properties with the potential to contain archaeological resources.

In 2011 and 2012, pedestrian surveys were conducted within the Project Study Area in support of the Stage 2 Archaeological Assessment, according to the 2011 *Standards and Guidelines for Consultant Archaeologists* issued by the Ontario Ministry of Tourism, Culture and Sport (MTCS) (Government of Ontario, 2011). A total of 61 archaeological sites were identified and 28 sites have been recommended for further Stage 3 archaeological assessment.

A Cultural Heritage Assessment (Golder, 2012) was also completed to identify built heritage and cultural heritage landscape resources related to the Euro-Canadian land use in the area dating prior to 1970. All work was carried out in accordance with the *Ontario Heritage Act*, the *Provincial Policy Statement*, and the *Environmental Assessment Act*. The report identified 98 structures (55 houses and 43 barns or barn complexes) as greater than 40 years old within the Project Study Area and as having general historical interest contributing to the character of the vernacular rural landscape. When applying the criteria set out in *Ontario Regulation 9/06*, 71 of these structures (35 houses and 36 barns) were determined to have cultural heritage value or interest. Following the evaluation of anticipated impacts, both direct and indirect, according to *InfoSheet #5* (Government of Ontario, 2006), no anticipated impacts were identified. As there are no anticipated impacts to the cultural heritage features, no further work is recommended.

6.1.1 Potential Effects

No effects to protected properties, archaeological resources or heritage resources are anticipated as a result of the operational phase of the Project. Therefore, no mitigation measures or monitoring are proposed.

6.2 Natural Heritage

The potential effects, mitigation measures, residual effects and monitoring commitments regarding the natural heritage features (including significant wetlands, woodlands, valleylands, and wildlife habitat) were identified and evaluated in the Natural Heritage Assessment Report and Environmental Effects Monitoring Plan (AECOM, 2012) prepared based on the *Natural Heritage Assessment Guide for Renewable Energy Projects* (Government of Ontario, 2010) and submitted to the Ontario Ministry of Natural Resources (MNR) for review and sign-off.

Following the completion of the Records Review and Site Investigation for all natural heritage features located within 120 m of the Project Location, an Evaluation of Significance was conducted to identify any features that required an Environmental Impact Study (EIS). Below is a description of the significant natural heritage features located within 120 m of the Project Location for which an EIS was conducted.

Table 6-1 Summary of Natural Features Carried Forward to the Environmental Impact Study

Feature	Natural Features Carried Forward to EIS
Wetlands	14 wetland units or wetland complexes were treated as significant and included in the EIS.
Woodlands	65 woodlands were determined to be significant or treated as significant and therefore included in the EIS.
Valleylands	One valleyland feature was determined to be significant and therefore included in the EIS.
Significant Wildlife Habitat	The following significant wildlife habitats were confirmed or treated as significant within the 120 m Area of Investigation and within 120 m of qualifying project infrastructure, and were therefore included in the EIS. • Bat maternity colonies; • Amphibian woodland breeding habitat; • Habitat for plant species of conservation concern (multiple); • Habitat for bird species of conservation concern (Red-headed Woodpecker); • Waterfowl (Tundra Swan) stopover and staging areas; • Reptile hibernacula; • Turtle over-wintering habitat; and • Habitat for Insect Species of Conservation Concern (Azure Bluet).
	The following candidate significant wildlife habitats were identified within the 120 m Area of Investigation however not within 120 m of qualifying project infrastructure, and were therefore included in the EIS as *Generalized Candidate Significant Wildlife Habitat*: • Colonial-nesting Bird Breeding Habitat (Tree/Shrub); • Waterfowl nesting areas; • Reptile hibernacula; • Bat maternity colonies; • Amphibian woodland breeding habitat; • Amphibian wetland breeding habitat; • Rare vegetation communities; • Habitat for area sensitive species: interior forest breeding birds; • Mature forest stands (numerous); • Turtle nesting habitat; • Turtle overwintering habitat; • Woodland raptor nesting habitat; • Seeps and springs; and • Habitats of species of conservation concern (numerous).

6.2.1 Potential Effects

The performance objectives, mitigation measures, residual effects, and the monitoring plan associated with potential effects to Significant Natural Heritage Features are described in **Table 6-2** below. Note that the measures described below, although specific to locations identified above, are not designed on a site-by-site basis. The mitigation measures must be designed and implemented based on individual site conditions and will be developed as sites are developed in more detail.

Potential effects from operational and maintenance activities on Natural Heritage Resources include:

- Soil / water contamination by oils, gasoline, grease and other materials (e.g., turbine lubricant and maintenance personnel) resulting from:
  - turbine operation and maintenance near Significant Wetland Features;
  - substation operation and maintenance near a Significant Wetland Feature;
  - transmission line maintenance within a Significant Valleyland Feature;
- Changes in surface water drainage patterns resulting in effects to soil moisture and species composition of vegetation from access road operation and maintenance at:
  - Significant Wetland Features;
  - Significant Woodland Features;
  - A Significant Valleyland Feature;
- Introduction of invasive species into wetland communities resulting from access road operation and maintenance near Significant Wetland Features;
- Loss of forest cover through vegetation clearing in significant woodlands due to construction of the transmission line within Significant Woodland Features;
- Clearing of vegetation for maintenance of the transmission line, resulting in accidental damage to woodlands and disturbance to wildlife within Significant Woodland Features;
- Disturbance to vegetation as result of spraying of herbicide for maintenance of the transmission line at Significant Woodland Features;
- Avoidance by Tundra Swans of staging and stopover habitat during migration due to proximity of turbines to Waterfowl Stopover and Staging Habitat Features;
- Disturbance to Tundra Swan stopover and staging habitat due to increased vehicular traffic on access roads near Waterfowl Stopover and Staging Habitat Features;
- Bats may be disturbed by noise resulting from turbine operation near Bat Maternity Colony Features;
- Bats may display avoidance behaviour due to lighting resulting from turbine operation near Bat Maternity Colony Features;
- Removal of cavity trees as a result of vegetation removal for the transmission line within Bat Maternity Colony Features;
- Risk of disturbance to breeding Red-Headed Woodpecker habitat resulting from transmission line maintenance within a Red-Headed Woodpecker Habitat Feature;
- Removal of vegetation resulting in habitat damage from clearing for the transmission line within:
  - Azure Bluet Habitat Feature;
  - Turtle Over-Wintering Habitat Feature;
  - Amphibian Woodland Breeding Habitat Features;
  - Red-headed Woodpecker Habitat Feature;

- Risk of mortality to turtles moving between over-wintering ponds and other areas resulting from:
  - access road operation and maintenance near Turtle Over-wintering Habitat Features;
  - transmission line maintenance within a Turtle Over-wintering Habitat Feature;
- Risk of mortality / disturbance to breeding amphibians or amphibians moving between breeding pools and home range resulting from:
  - access road operation and maintenance near an Amphibian Woodland Breeding Habitat Features;
  - access road operation and maintenance near an Amphibian Movement Corridor Feature;
  - transmission line maintenance within Amphibian Woodland Breeding Habitat Features;
- Increased erosion and sedimentation to Amphibian Woodland Breeding Habitat Features, Azure Bluet Habitat Feature, and a Turtle Over-wintering Habitat Feature resulting from transmission line maintenance activities including vegetation removal;
- Risk of disturbance and/or mortality of amphibians from herbicide spraying along transmission line within Amphibian Woodland Breeding Habitat Features; and
- Risk of mortality to reptiles from vehicles resulting from access road operation and maintenance near a Reptile Hibernaculum Feature

In addition to effects on significant bird or bat habitats identified in the Natural Heritage Assessment, direct bird or bat mortality may occur at all proposed turbine locations.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Significant Wildlife Habitat				
Risk of bird collisions with turbines (Project-wide). **Risk of bat collisions with turbines (Project-wide).**	• Minimize disturbance and/or mortality to wildlife.	• Implement contingency mitigation measures if mortality thresholds are exceeded based on the results of post-construction monitoring. Operational mitigation techniques for birds, which would be applied at times of the year when mortality risks to the affected bird species are particularly high (e.g., migration) may include: ▪ Periodic shut-down of select turbines ▪ Blade feathering • Mitigation techniques for bats may include: ▪ Changing the wind turbine cut-in speed to 5.5 m/s ▪ Feathering of blades when wind speeds are below 5.5 m/s ▪ Co-ordinating turbine shut-down for maintenance with periods of high bat activity (specifically in June during the breeding season when bat maternity colony habitats are occupied) and/or mortality. • Utilize a lighting scheme that will minimize risk to bird or bat collisions, while fulfilling Transport Canada requirements.	• Significance of residual effects will be determined based on the results of post-construction monitoring. • Risk of bird collisions with turbine minimized through mitigation. • Risk of bat collisions with turbine minimized through mitigation.	• Develop and implement a monitoring program for bird and bat mortality consistent with *Birds and Bird Habitats*: Guidelines *for Wind Power Projects* (MNR, 2010) and *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNR, 2011) including: ▪ Mortality surveys; ▪ Carcass removal trials; ▪ Searcher efficiency trials. • Conduct monitoring during the core season for bird activity and bat activity (May 1-October 31) for the first three years of operation. Mortality surveys should be conducted at each monitored turbine twice per week (at least 30% of turbines) and raptor mortality surveys should be continued once per week in November. • Monitor all turbines within the Project Location once during the survey period for evidence of raptor mortalities. • Conduct subsequent monitoring for two years at individual turbines (and unmonitored turbines in close proximity) where significant bird or raptor annual mortality is identified. • Conduct effectiveness monitoring at individual turbines for three years where mitigation has been implemented. • The findings of the bird and bat mortality monitoring programs will be reported back to MNR on an annual basis for the first 3 years of operation. • **Contingency Measures:** ▪ Institute changes to turbine operation if mortality thresholds are exceeded (see mitigation strategy in this table).
Soil / water contamination by oils, gasoline, grease and other materials (e.g., turbine lubricant, maintenance personnel) resulting from turbine operation and maintenance, substation operation and maintenance, or transmission line maintenance.	• No off-site contamination of soil or no contamination of groundwater or surface water.	• Control soil / water contamination through Best Management Practices. • Ensure machinery arrives on site in a clean, washed condition and is maintained free of fluid leaks. • Develop a spill response plan outlining steps to contain any spills during maintenance activities to avoid contamination of valleyland and wetland features. Train staff on associated procedures and maintain emergency spill kits on site. • Dispose of any waste material from maintenance activities by authorized and approved off-site vendors.	• Soil / water contamination will be minimized through the application of mitigation measures. • Low likelihood and limited magnitude of effects on surface water and groundwater as a result.	• Conduct regular site inspections and monitoring of turbines by a designated on-site Environmental Monitor(s). • **Contingency Measures:** ▪ Notify MOE's Spills Action Centre of any spills. ▪ Assess and remediate affected soils and water. • In the event that a spill occurs, the details of the spill will be reported back to MOE, including a description of any assessment and remediation undertaken.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
		• Site maintenance, vehicle washing and refuelling stations where contaminants are handled at least 30 m away from natural features including water bodies and significant woodlands, wetlands, and wildlife habitat. • Implement vehicle and equipment cleaning procedures and practices to minimize or eliminate the discharge of pollutants from vehicle / equipment cleaning operations to watercourses or natural areas. • Store any stockpiled materials away from natural features to prevent deleterious substances from inadvertently discharging to the environment. • Only apply herbicides (if required) when wind speeds are low and no significant precipitation is expected (does not apply to agricultural practices). • Only use herbicides (if required) approved for use adjacent to water bodies, riparian buffers, or woodland edges (does not apply to agricultural practices).		
Changes in surface water drainage patterns resulting in effects to soil moisture and species composition of vegetation from access road operation and maintenance.	• No effects to soil moisture and species composition of vegetation. • Minimize changes in surface water drainage patterns.	• Implement infiltration techniques to the maximum extent possible. • Minimize paved surfaces and design roads to promote infiltration.	• Effects to soil moisture and species composition of vegetation minimized through application of mitigation measures. • Low likelihood and limited magnitude of effects as a result.	• Inspect locations within 30 m of wetlands following completion of access roads to ensure no grade changes. • **Contingency Measures:** ▪ If surface water drainage alterations are detected, undertake corrective measures to restore drainage pattern.
Potential introduction of invasive species into Significant Wetlands communities resulting from access road operation and maintenance.	• Minimize species invasion into wetland communities.	• A restoration plan should be implemented to re-vegetate the 5 m buffer between the turbine and wetland. This should include the 1 year application of an approved herbicide to eradicate invasive species followed by the cultivation and seeding of the area with a native seed mix as well as the planting of native shrubs along the edge consistent with existing wetland vegetation composition.	• Introduction of invasive species avoided or minimized through the application of mitigation measures. • Low likelihood and limited magnitude of effect as a result.	• Monitor twice per year for two years to confirm survival of seed mix. • **Contingency Measures:** ▪ Should seed mix and/or plantings not survive, additional seeding and/or plantings will be undertaken.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Loss of forest cover (up to 2.8 ha) through vegetation clearing in Significant Woodlands due to transmission line establishment.	• No loss of forest cover over time.	• Establish an area of forest equal in area to the cleared area (up to 2.8 ha; to be determine d through a post-construction site inspection) through tree planting and management (e.g., in partnership with a local Conservation Authority). Details of the afforestation plan will be provided to MNR in a Compensation Plan.	• Clearing of vegetation will occur for the transmission line. • Loss of forest cover minimized through afforestation over time. • Moderate residual effects.	• Conduct post-planting inventory of planted are to determine success of establishment (may be undertaken by partner organization). • **Contingency Measures:** ▪ If plantation is not establishing for any number of reasons, conduct silvicultural intervention including, but not limited to: fill planting, cleaning, re-planting or thinning (may be undertaken by partner organization).
Clearing of vegetation for maintenance of the transmission line, resulting in accidental damage to Significant Woodlands.	• Minimize accidental damage to significant woodlands.	• Perform vegetation clearing outside of the breeding bird season (May 1st to July 31st). Undertake active nest surveys if vegetation removal must take place during this period. • Clearly stake area to be cleared. • Limit size of machines to minimize soil compaction.	• Minimal effects to significant woodlands during maintenance.	• Removal of tree limbs on adjacent trees being retained should be carried out under supervision of an Arborist or Forester.
Disturbance to vegetation in Significant Woodlands as a result of spraying herbicide along transmission line.	• Minimize disturbance to vegetation.	• Minimize aerial extent of herbicide spraying along transmission line. • Only apply herbicides when wind speeds are low and no significant precipitation is expected (does not apply to agricultural practices).	• Operational effects considered negligible.	• As appropriate, and following the schedule for the application of herbicides, a certified Arborist or Forester should be present on site during the application of herbicides along transmission line. • No contingency measures required. •
Avoidance by Tundra Swans of stopover and staging habitats during migration due to proximity of turbines.	• Minimize disturbance or disruption to Tundra Swan stopover and staging habitats.	• Implement contingency mitigation measures if disturbance effects are detected through post-construction monitoring. Mitigation techniques for Tundra Swans may include: ▪ Temporary shut-down of select turbines during migration period (typically early to late March); ▪ If necessary, work with MNR to develop other appropriate mitigation measures.	• Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years of post-construction Tundra Swan monitoring at Features, including: ▪ Conduct surveys on three occasions approximately one week apart during the peak migratory period, which typically occurs in March but can range from mid-February to mid-April. ▪ Conduct surveys between sunrise and noon, and under calm, clear weather conditions, to the extent possible. ▪ One survey station will be placed per 0.5 km of candidate Tundra Swan stopover and staging habitat and be monitored for approximately 15 minutes. ▪ All observed waterfowl will be recorded along with their approximate location, age and behavior. • The findings of the Tundra Swan monitoring programs will be reported back to MNR on an annual basis for the first 3 years of operation. **Contingency Measures:** ▪ Institute changes to turbine operation if disturbance effects are detected through post-construction monitoring (see mitigation strategy in this table).

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Disturbance to Tundra Swan stopover and staging habitats due to increased vehicular traffic on access roads.	• Minimize disturbance or disruption to Tundra Swan stopover and staging habitats.	• Avoid using access roads adjacent to Tundra Swan stopover and staging habitats during migration period (typically early to late March), to the extent possible.	• Disturbance effects minimized through mitigation measures. • Operational effects minor (i.e., no or limited disturbance expected).	• No additional monitoring or contingency measures required.
Bats may be disturbed by noise from operation of turbines.	• Protect bat roosting habitat.	• Implement mitigation when disturbance effects are detected through post-construction monitoring (refer to mitigation measures for bat collisions with turbines above).	• Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years of post-construction acoustic monitoring for Feature BMC-757 according to protocol described for pre-construction survey (as described in March 2010 Draft version of *Bats and Bat Habitats: Guidelines for Wind Power Projects*) including: ▪ Through the night acoustic monitoring stations to be positioned within 10 m of the potential roost. ▪ Survey same stations as pre-construction survey. ▪ Visual monitoring to be conducted at dusk in June. ▪ Acoustic monitoring to begin at dusk and continue for 5 hours, for up to 10 nights, or until roost is confirmed. ▪ Monitoring to occur between June 1 and June 30. • Conduct 1 year of post-construction acoustic monitoring for Features BMC-189, BMC-229, BMC-326, and BMC-342 according to protocol described for pre-construction survey, as described in the March 2010 Draft version of *Bats and Bat Habitats: Guidelines for Wind Power Projects* (see above). • If the first year of post-construction monitoring indicates that this Feature may no longer be significant, an additional 2 years of post-construction monitoring will occur following pre-construction methods. • If a significant habitat is still significant after the first year of post-construction monitoring, no further monitoring will occur as the habitat will be considered to be unaffected. • Conduct 1 year of post-construction acoustic monitoring for Features BMC-235, BMC-242, BMC-249, BMC-267, BMC-282, BMC-352, BMC-358 and BMC-372 (if deemed to be significant) according to protocol described for pre-construction survey (as described in July 2011 version of *Bats and Bat Habitats: Guidelines for Wind Power Projects*) including: ▪ Conduct monitoring of roost trees through exit surveys through June. ▪ Conduct active visual and acoustic monitoring at the cavity opening or crevice from 30 minutes before dusk until 60 minutes after dusk in June.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
				• If this first year of post-construction monitoring indicates that a Feature may no longer be significant, an additional 2 years of post-construction monitoring will occur following pre-construction methods to determine if a change may represent normal variation in population or if the project has had an effect. • If a significant habitat is still significant after the first year of post-construction monitoring, no further monitoring will occur as the habitat will be considered to be unaffected. The findings of all acoustic monitoring programs will be reported back to MNR on an annual basis for the first 3 years of operation. • **Contingency Measures:** ▪ Institute changes to turbine operation if disturbance effects are detected through post-construction monitoring (see mitigation strategy in this table). ▪ Consultation with MNR to determine additional contingency measures if necessary.
Bats may display avoidance behaviour caused by turbine lighting.	• Protect bat roosting habitat.	• Propose a lighting scheme that will minimize potential disturbance to bats while fulfilling Transport Canada requirements.	• Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years of post-construction acoustic monitoring for Feature BMC-757 according to protocol described for pre-construction survey (as described in March 2010 Draft version of *Bats and Bat Habitats: Guidelines for Wind Power Projects*) including: ▪ Through the night acoustic monitoring stations to be positioned within 10 m of the potential roost. ▪ Survey same stations as pre-construction survey. ▪ Visual monitoring to be conducted at dusk in June. ▪ Acoustic monitoring to begin at dusk and continue for 5 hours, for up to 10 nights, or until roost is confirmed. ▪ Monitoring to occur between June 1 and June 30. • Conduct 1 year of post-construction acoustic monitoring for Features BMC-189, BMC-229, BMC-326, and BMC-342 according to protocol described for pre-construction survey, as described in the March 2010 Draft version of *Bats and Bat Habitats: Guidelines for Wind Power Projects* (see above). • If the first year of post-construction monitoring indicates that this Feature may no longer be significant, an additional 2 years of post-construction monitoring will occur following pre-

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
				construction methods to determine if a change may represent normal variation in population or if the project has had an effect. • If a significant habitat is still significant after the first year of post-construction monitoring, no further monitoring will occur as the habitat will be considered to be unaffected. • Conduct 1 year of post-construction acoustic monitoring for Features BMC-235, BMC-242, BMC-249, BMC-267, BMC-282, BMC-352, BMC-358 and BMC-372 (if deemed to be significant) according to protocol described for pre-construction survey (as described in July 2011 version of *Bats and Bat Habitats: Guidelines for Wind Power Projects*) including: ▪ Conduct monitoring of roost trees through exit surveys through June. ▪ Conduct active visual and acoustic monitoring at the cavity opening or crevice from 30 minutes before dusk until 60 minutes after dusk in June. • If this first year of post-construction monitoring indicates that a Feature may no longer be significant, an additional 2 years of post-construction monitoring will occur following pre-construction methods to determine if a change may represent normal variation in population or if the project has had an effect. • If a significant habitat is still significant after the first year of post-construction monitoring, no further monitoring will occur as the habitat will be considered to be unaffected. • The findings of all acoustic monitoring programs will be reported back to MNR on an annual basis for the first 3 years of operation. • **Contingency Measures:** ▪ Institute changes to turbine operation if disturbance effects are detected through post-construction monitoring (see mitigation strategy in this table). ▪ Consultation with MNR to determine additional contingency measures if necessary.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Removal of confirmed significant cavity trees or other suitable, but not studied, cavity trees in Bat Maternity Colony Features as a result of vegetation removal for the transmission line.	• Protection of bat roosting habitat.	• For each suitable cavity tree to be removed, a bat house will be installed in the closest suitable woodland habitat (the remainder of the woodland for each of the affected habitats). • Details of bat box construction and placement will be provided to MNR for approval prior to installation. • If a significant maternity colony must be removed, timing, location, and bat house design will be of utmost importance for the colony to successfully re-establish, and will be discussed with the MNR.	• Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years of post-construction acoustic monitoring of all remaining cavity trees for Features BMC-648 and BMC-720 (if deemed to be significant) according to protocol described for pre-construction survey (as described in July 2011 version of *Bats and Bat Habitats: Guidelines for Wind Power Projects*) including: ▪ Conduct monitoring of roost trees through exit surveys through June. ▪ Conduct active visual and acoustic monitoring at the cavity opening or crevice from 30 minutes before dusk until 60 minutes after dusk in June. • Conduct post-construction visual monitoring of any bat boxes installed for 3 years after construction, to determine the success of the implemented mitigation measures. • The findings of all acoustic monitoring programs will be reported back to MNR on an annual basis for the first 3 years of operation. • **Contingency Measures:** ▪ If a permanent and significant disturbance has been noted within these Features, the MNR will be contacted to determine whether additional mitigation measures will be needed.
Red-Headed Woodpecker Breeding Habitat may be disturbed by routine maintenance of the transmission line corridor.	• No displacement of breeding Red-Headed Woodpeckers from habitat. • No destruction of nesting habitat.	• Perform maintenance operations such as vegetation clearing outside the breeding season of May 1st to July 31st. • Implement contingency mitigation measures (as per consultation with MNR) if disturbance effects are detected through post-construction monitoring.	• If routine maintenance operations such as vegetation trimming and clearing are conducted outside the breeding season of May 1st to July 31st there should be minimal residual effects from maintenance of the transmission line. • Nesting in utility poles has been recorded for Red-Headed Woodpecker, thus there is a possibility that the poles could provide future nesting habitat.	• Supervision of vegetation removal by a qualified Biologist to ensure no destruction of nesting habitat. • No additional monitoring or contingency measures required if timing window is applied.
Removal of vegetation within Red-Headed Woodpecker Breeding Habitat resulting from clearing for the transmission line.	• No displacement of breeding Red-headed Woodpeckers from habitat. • No destruction of nesting habitat.	• Implement contingency mitigation measures (as per consultation with MNR) if disturbance effects are detected through post-construction monitoring.	• Some permanent vegetation removal within the woodland containing the Red-Headed Woodpecker nesting site will occur. • Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years of post-construction monitoring for Feature SCB-03, according to protocol described for pre-construction surveys following the *Forest Bird Monitoring Protocol* including: ▪ Point counts within the woodlot on three separate visits during the period of May 15 – July 10. ▪ Conduct monitoring and evaluation of Red-Headed Woodpecker nest site to measure the use of the nesting location, and the success of breeding efforts. ▪ Examine utility poles for signs of nesting by Red-Headed Woodpecker.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
				• The findings of post-construction monitoring will be reported back to MNR on an annual basis for the first 3 years of operation. **Contingency Measures** ▪ If significant declines or disappearance of species is detected, determine whether likely to have been caused by the project. If so, corrective measures will be taken, to be determined through consultation with MNR. Habitat compensation or restoration measures will be described in a Compensation Plan, to be submitted to MNR.
Removal of vegetation within Azure Bluet Habitat and Turtle Over-wintering Habitat resulting from clearing for the transmission line.	• Minimize disturbance to Azure Bluet habitat and turtle over-wintering habitat. • No destruction of pond.	• Implement contingency mitigation measures (as per consultation with MNR) if disturbance effects are detected through construction monitoring.	• Clearing of vegetation will occur for the transmission line. • Disruption to Azure Bluet habitat and turtle over-wintering habitat avoided or minimized through mitigation measures applied during construction. • Moderate residual effects.	• If negative effects to the pond are detected through construction monitoring, corrective measures will be taken, to be determined through consultation with MNR. These habitat compensation or restoration measures will be described in a Compensation Plan, to be submitted to MNR.
Removal of vegetation within Amphibian Woodland Breeding Habitats resulting from clearing for the transmission line.	• Minimize disturbance to amphibian breeding habitat. • No destruction of breeding pond.	• Implement contingency mitigation measures (as per consultation with MNR) if disturbance effects are detected through post-construction monitoring.	• Some permanent vegetation removal within woodlands containing amphibian breeding habitat will occur. Breeding habitat should remain undisturbed. • Significance of residual effects will be determined based on the results of post-construction monitoring.	• Conduct 3 years post-construction amphibian call surveys (frogs and toads) and egg mass or adult surveys (salamanders) to assess any potential changes in amphibian breeding populations or species distribution (if Features deemed to be significant), including: ▪ Call surveys at each Feature three times between April 1st and June 30th, as per the *Marsh Monitoring Protocol*. Conduct surveys between one half-hour after sunset and 2:00 am and, to the extent possible, on nights that are clear, cloudy, damp, foggy, or have light rain and minimum night air temperatures of 5°C (41°F), 10°C (50°F) and 14°C (57°F) for each of the three respective survey periods. Complete a 3-minute listening survey at each station. ▪ Conduct surveys to target non-vocalizing amphibians (i.e., salamanders) using one of the following three protocols: o Nocturnal survey for adult salamanders in late March to early April; o Surveys for salamander egg masses on two occasions in March and April; o Surveys for larval salamanders in May or June. • The findings of post-construction monitoring will be reported back to MNR on an annual basis for the first 3 years of operation.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
				Contingency Measures ▪ If significant declines or disappearance of species is detected, determine whether likely to have been caused by the project. If so, corrective measures will be taken, to be determined through consultation with MNR. Habitat compensation or restoration measures will be described in a Compensation Plan, to be submitted to MNR.
Possible mortality of turtles moving between over-wintering ponds and other areas due to access road operation and maintenance near Turtle Over-wintering Habitats.	• Minimize turtle mortality along access roads.	• Maintain wildlife crossing signs and limit speed of vehicles near over-wintering ponds.	• Risk of turtle mortality reduced through mitigation measures. • Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.	• No monitoring or contingency measures required.
Possible mortality of turtles moving between over-wintering ponds and other areas due to transmission maintenance within Turtle Over-wintering Habitat.	• Minimize turtle mortality along transmission line.	• Advise operations staff to avoid maintenance activities in proximity to this feature in May, June, September or October. • Fence area as far from pond and as close to transmission line as possible during maintenance activities. • Maintain wildlife crossing signs and limit speed of vehicles near over-wintering pond.	• Risk of turtle mortality reduced through mitigation measures. • Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.	• No monitoring or contingency measures required.
Increased erosion and sedimentation to Amphibian Woodland Breeding Habitat, Azure Bluet Habitat and Turtle Over-wintering Habitat resulting from vegetation removal for maintenance of the transmission line.	• Minimize disturbance to pond.	• Fence area as far from pond and as close to transmission line as possible. • Install sediment and erosion control fencing at fenced area location before commencing maintenance activities and maintain in place until disturbed areas are stabilized and re-vegetated.	• Erosion and sedimentation mitigated through sediment and erosion control fencing. • Operational maintenance effects temporary and minor.	• Monitor on-site conditions (i.e., erosion and sediment control, spills, flooding, etc.) where construction occurs within 30 m of a feature on the following basis: ▪ Weekly during active construction periods; ▪ Prior to, during and post forecasted large rainfall events (>20 millimetres in 24 hours) or significant snowmelt events (i.e., spring freshet); ▪ Daily during extended rain or snowmelt periods; ▪ Monthly during inactive construction periods, where the site is left alone for 30 days or longer. • In the event that a spill / flooding occurs, the details of the event will be reported back to MOE, including a description of any assessment and remediation undertaken. • **Contingency Measures:** ▪ Suspend work if excessive flows of sediment discharges occur until additional mitigation measures are in place.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Mortality to amphibians moving between breeding pools and home range resulting from access road operation and maintenance.	• Minimize amphibian mortality along access roads.	• Advise operations staff to avoid driving roads in proximity to these features at night between April 1st and June 30th, and any rainy nights from spring to early autumn, wherever possible. • Maintain wildlife crossing signs and limit speed of vehicles near crossings.	• Risk of amphibian mortality reduced through mitigation measures. • Low likelihood of mortality due to infrequent use of access roads by maintenance vehicles.	• Conduct 3 years post-construction amphibian call surveys (frogs and toads) and egg mass or adult surveys (salamanders) to assess any potential changes in amphibian breeding populations or species distribution (if Features deemed to be significant), including: ▪ Call surveys at each Feature three times between April 1st and June 30th, as per the *Marsh Monitoring Protocol*. Conduct surveys between one half-hour after sunset and 2:00 am and, to the extent possible, on nights that are clear, cloudy, damp, foggy, or have light rain and minimum night air temperatures of 5°C (41°F), 10°C (50°F) and 14°C (57°F) for each of the three respective survey periods. Complete a 3-minute listening survey at each station. ▪ Conduct surveys to target non-vocalizing amphibians (i.e., salamanders) using one of the following three protocols: o Nocturnal survey for adult salamanders in late March to early April; o Surveys for salamander egg masses on two occasions in March and April; o Surveys for larval salamanders in May or June. • The findings of post-construction monitoring will be reported back to MNR on an annual basis for the first 3 years of operation. **Contingency Measures** ▪ If significant declines or disappearance of species is detected, determine whether likely to have been caused by the project. If so, corrective measures will be taken, to be determined through consultation with MNR. Habitat compensation or restoration measures will be described in a Compensation Plan, to be submitted to MNR.
Breeding amphibians may be disturbed by routine maintenance of the transmission line corridor.	• Minimize disturbance due to maintenance activities.	• Advise operations staff to avoid maintenance activities in proximity to these features between April 1st and June 30th (for significant frog breeding habitats), or between March 15th and April 30th (for significant salamander breeding habitats) and any rainy nights from spring to early autumn.	• Risk of disturbance reduced through mitigation measures. • Low likelihood of occurring and limited magnitude of residual effects.	• No additional monitoring or contingency measures required.

Table 6-2 Mitigation Measures, Residual Effects and Monitoring Plan: Natural Heritage Resources

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Risk of disturbance to and/or mortality of amphibians from herbicide spraying along transmission line.	• Minimize disturbance and/or mortality from herbicide spraying.	• Minimize aerial extent of herbicide spraying along transmission line. • Only apply herbicides when wind speeds are low and no significant precipitation is expected. • Maintain 10 m buffer to pond where no herbicides area applied.	• Risk of amphibian mortality or disturbance reduced through mitigation measures. • Low likelihood and limited magnitude of residual effects as a result.	• No additional monitoring or contingency measures required.
Possible reptile mortality from vehicles using access road.	• Minimize snake mortality along access road.	• Erect long term drift fence between edge of habitat and road if hibernaculum determined to be large (>25 snakes). • Advise operations staff to take extra care while driving near Feature RH-01.	• Risk of snake mortality minimized through the application of mitigation measures. • Low likelihood of occurring and limited magnitude (i.e., no or limited mortality) due to limited volume of maintenance vehicles.	• Conduct reptile hibernaculum survey annually for 2 years post-construction to assess any potential changes in snake populations or species composition using protocol described for pre-construction survey (if Feature deemed to be significant), including: ▪ Examination of rock piles and vicinity on three occasions between mid-April and mid-May. ▪ Identify species and count individuals. • The findings of the reptile hibernaculum monitoring programs will be reported back to MNR on an annual basis for the first 2 years of operation. • **Contingency Measures:** ▪ If significant declines or disappearance of species is detected, determine whether likely to have been caused by the project. If so, corrective measures will be taken, to be determined through consultation with MNR.

6.3 Surface Water and Groundwater

Potential effects to surface water and groundwater resulting from locating a Project component within the prescribed setbacks to water bodies are evaluated in the Water Assessment and Water Body Report (AECOM, 2012) and described below.

6.3.1 Surface Water

Following the Records Review and Site Investigation, 83 water bodies were identified. The Project Location was found to be within the prescribed setback distance for all identified water bodies. To aid in the assessment of water bodies and to focus mitigation measures, information was collected during site investigations that incorporated water quality, flow, aquatic habitat and riparian features in order to provide some understanding on the system's resiliency. Based on a sensitivity ranking conducted by AECOM, 1 water body was classified as high sensitivity (*i.e.*, not very resilient to environmental change); 45 water bodies were moderate; and 37 water bodies were low. This assessment concluded that the majority of the watercourses are fairly resilient to environmental perturbations. In general, water quality throughout the Study Area was heavily influenced by agriculture, as evidenced by tile drain runoffs, high suspended solids and turbidity of the water, as well as algae growth in some of the channels.

In compliance with *O. Reg. 359/09*, a Water Assessment and Water Body Report (AECOM, 2012) was prepared to assess negative environmental effects, identify mitigation measures and describe monitoring commitments to address any effects. For a detailed account of this assessment, please refer to the Water Assessment and Water Body Report (AECOM, 2012).

6.3.1.1 Potential Effects

Potential effects from operational and maintenance activities include:

- Soil / water contamination by oils, gasoline, grease and other materials (e.g., turbine lubricant and maintenance activities, use of access roads) at the turbines, transmission line, road crossings, substation and breaker switch station and laydown areas, and meteorological towers;
- Increase in impervious surfaces from the presence of turbine foundation and access roads, resulting in increased water temperatures, increased surface runoff and stream peak flows, and reduced infiltration, base flows and upwelling; and
- Obstruction of lateral flows in watercourses and other waterbodies due to the design of culverts and debris build-up at water crossings.

6.3.2 Groundwater and Geology

A desktop study was conducted to identify potential effects to the groundwater from the proposed turbine and transmission line layouts. Materials used included MOE Water Well Records, geological descriptions from the Ontario Geological Survey (OGS), air photos and GIS, as well as the turbine and transmission line layouts and construction details for the Project Study Area. The predominant overburden material throughout the Project Study Area is the St. Joseph Till, which is characterized by glaciolacustrine-derived silty to clayey till (OGS, 2003). The St. Joseph Till has a high clay content which likely restricts infiltration and groundwater movement. Therefore shallow groundwater transport is likely either through the weathered overburden flowing west toward Lake Huron or is vertical along fractures until it reaches a flow path at depth.

The surface topography is influenced by the Wyoming Moraine, producing the typical hummocky/rolling topography of this area. Groundwater recharge areas within the Project Study Area are restricted to the small patches of highly permeable beach ridge and glacial outwash deposits found running north-south in the centre of the Project Study Area (OGS, 2003). The largest north-south sand and gravel (glacial outwash) deposit has been designated as both a Significant Groundwater Recharge Area (SGRA) and a Highly Vulnerable Aquifer (HVA) by the Government of Ontario. The northwest corner of the Project Study Area has been identified as part of the Intake Protection Zone for the Lake Huron Primary Water Supply System.

6.3.2.1 Potential Effects

Potential effects from operational and maintenance activities include:

- Increase in impervious surfaces from the presence of turbine foundations overlaying high permeability surficial materials (such as: sands, gravels and silty sands) and access roads, resulting in reduced infiltration to groundwater; and
- Groundwater contamination by oil, gasoline, grease or other material from construction activities.

The mitigation measures, residual effects, and the monitoring plan associated with these effects to surface water and groundwater are described in **Table 6-3** below.

Table 6-3 Mitigation Measures, Residual Effects and Monitoring Plan: Surface Water and Groundwater

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Increase in impervious surfaces from presence of turbine foundation and access roads, resulting in increased water temperatures, increased surface runoff and stream peak flows, and reduced infiltration, base flows and upwelling.	• No changes to surface water quality or quantity.	• Adhere to all setback requirements from watercourses. • Control quantity and quality of stormwater discharge using best management practices, and implement infiltration techniques to the extent possible (e.g., use of a permeable surface for access roads).	• Increase in impervious surfaces and subsequent changes to surface water quality or quantity minimized due to setback requirements and through application of mitigation measures. • Low likelihood and limited magnitude of effect due to small increase in impervious surfaces within entire Project Study Area.	• No monitoring or contingency measures required.
Soil / water contamination by oils, gasoline, grease and other materials (e.g., turbine lubricant and maintenance activities, use of access roads).	• No off-site contamination of soil and no contamination of groundwater or surface water.	• Control soil / water contamination through best management practices. • Ensure machinery arrives on site in a clean, washed condition and is to be maintained free of fluid leaks. • Develop a spill response plan and train staff on associated procedures and maintain emergency spill kits on site. • Site maintenance, vehicle washing and refuelling stations where contaminants are handled at least 30 m away from natural features including water bodies and significant woodlands, wetlands, and wildlife habitat. • Implement vehicle and equipment cleaning procedures and practices to minimize or eliminate the discharge of pollutants from vehicle/ equipment cleaning operations to watercourses or natural areas. • Store any stockpiled materials away from natural features to prevent deleterious substances from inadvertently discharging to the environment. • Dispose of any waste material from maintenance activities by authorized and approved off-site vendors.	• Soil / water contamination will be minimized through application of mitigation measures. • Low likelihood and limited magnitude of effects on surface water and groundwater as a result.	• Conduct regular site inspections and monitoring of turbines by a designated on-site Environmental Monitor(s). • Contingency Measures ▪ Notify MOE's Spills Action Centre of any spills. ▪ Assess and remediate affected soils and water. • In the event that a spill occurs, the details of the spill will be reported back to MOE, including a description of any assessment and remediation undertaken.
Obstruction of lateral flows in watercourses and other waterbodies due to design of culverts and debris build-up at water crossings.	• No obstructions of lateral flows.	• Design culverts to accommodate high flows of the watercourse. • Inspect culverts during routine maintenance activities for buildup of debris.	• Obstruction of lateral flows in watercourses and other waterbodies will be avoided through culvert design and maintenance activities. • No likelihood of effect occurring.	• No monitoring or contingency measures required.

6.4 Emissions to Air

Emissions to air are more likely to be effects experienced during construction activities rather than during the operation of the Project. Wind turbines do not generate any emissions and instead such environmental effects are likely to be limited to emissions from maintenance vehicles.

6.4.1 Potential Effects

Potential effects from operational and maintenance activities include:

- Emissions of contaminants from maintenance vehicles and portable generator sets, including but not limited to, nitrogen dioxide, sulphur dioxide, suspended particulates, emission of greenhouses gases (carbon dioxide, methane); and
- Dust as a result of vehicle traffic over gravel roads and/or cleared areas.

No odour emissions are anticipated.

The mitigation measures, residual effects, and the monitoring plan associated with air emissions are described in **Table 6-4** below.

Table 6-4 Mitigation Measures, Residual Effects and Monitoring Plan: Emissions to Air

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Emissions of contaminants from maintenance vehicles.	• Limit impact of maintenance vehicles on local air quality.	• Ensure all engines (vehicles and generators) meet emission requirements specified by the MOE and Ontario Ministry of Transportation (MTO).	• Emissions of contaminants from maintenance vehicles minimized through application of mitigation measures. • Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). • No contingency measures required.
Dust as a result of vehicle traffic over gravel roads and/or cleared areas.	• Limit dust production from maintenance vehicles.	• Limit speed of maintenance vehicles to minimize dust generation.	• Dust from vehicular traffic minimized through application of mitigation measures. • Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). • No contingency measures required.

6.5 Noise

Wind energy projects have the potential to generate environmental noise which under certain circumstances may represent an annoyance to some surrounding residents. A Noise Study Report (AECOM, 2012) was conducted to identify these effects; the study and its results are presented in **Appendix A** of this Report.

Noise modelling conducted for the Noise Study Report (AECOM, 2012) determined that the Project layout is in compliance with all of the requirements outlined in *O. Reg. 359/09*, and the *Noise Guidelines for Wind Farms* (MOE, 2008). These regulations set out a minimum 550 m setback from non-participating noise receptors (i.e., residents, hospitals, schools, daycares, places of worship, etc.). The MOE has based the regulatory approach to noise on a

40dBA outdoor night time noise limit. This setback also applies to the future use of vacant land, where that land is zoned to allow for the construction of potential receptors (e.g., residential). Participating land owners (i.e., someone who has entered into an agreement to permit all or part of the facility on their land) are not considered noise receptors for the purposes of determining noise setbacks.

As part of the Noise Study Report (AECOM, 2012) the cumulative noise effects of the Project and existing wind turbines within 5 km were modelled. This assessment also considered any wind farms which have not yet been constructed but have a crystallized site plan. Following consultation with MOE and area municipalities, it was determined that one existing wind farm is located within 5 km of the Project; the Zurich Wind Farm operated by Magnum Wind Energy. This is a single 0.8 MW turbine located to the west of Zurich near Bronson Line and Zurich-Hensall Road (see **Figure 2-3**). Turbines within NextEra's Bluewater Wind Energy Centre are more than 5 km from the turbines included in this Project.

6.5.1 Potential Effects

Potential effects from operational and maintenance activities include:

- An increase in noise levels due to the aerodynamic noise generated from wind turbine blades, and mechanical noise associated with each turbine and from the transformer located at the substation. Specifically, the noise modelling results show that the noise levels for all non-participating receptors are below 40 dBA.

The mitigation measures, residual effects, and the monitoring plan associated with noise are described in **Table 6-5** below.

Table 6-5 Mitigation Measures, Residual Effects and Monitoring Plan: Noise

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Increased noise levels experienced by receptors (residents located on non-leased properties) due to turbine operation.	• Limit noise levels to <40 dBA at non-participating receptors.	• Adhere to noise setbacks. • Repair equipment in a timely manner.	• Noise levels experienced by receptors (residents located on non-leased properties) due to turbine operation will be below 40 dBA.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). • Contingency Measures ▪ Repair damaged turbine component. ▪ Operate turbines that are out of compliance in noise-reduced mode.
Increased noise levels experienced by receptors (residents located on non-leased properties) due to substation operation.	• Limit noise level to < 40 dBA at non-participating receptors.	• Adhere to noise setbacks (greater than 1,000 m). • Repair equipment in a timely manner. • Install a 5 m high noise barrier around the transformer substation to comply with MOE noise limits.	• Noise levels experienced by receptors near the substation will be below 40 dBA due to setback requirements and application of mitigation measures. • High likelihood but limited magnitude of effects as a result.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). • No contingency measures required.

6.6 Local Interests, Land Use and Infrastructure

Land uses within 300 m of the Project Study Area were identified through the REA planning process and in consultation with the local municipalities, Ontario Ministry of Transportation (MTO) and local landowners. The following section describes the results of the effects assessment for the operations phase of the Project.

6.6.1 Existing Land Uses and Infrastructure

Common agricultural land uses in northern Lambton County and southern Huron County are cash crops (e.g., soybeans, corn and wheat) and livestock farming. Other land uses include non-farm residential uses on separate lots created through severances for farm retirement lots, surplus farm dwelling lots and older estate lots, which are scattered throughout the Project Study Area in limited numbers.

The Morrison Dam Conservation Area is located just to the east of the Wind Energy Centre Study Area and is within the Transmission Line Study Area. Activities within the Conservation Area include canoeing, fishing, hiking and cross-country skiing, while the area also includes hardwood and pine forests for trail walking.

The Project will provide an increased municipal tax base for the Municipalities of Bluewater and South Huron, increased number of employment opportunities (especially during the construction stage) and the generation of clean, renewable electricity from wind power. The operation of the wind energy centre will also provide annual economic benefits through royalties to landowners and an initial and continuing need for supplies and services in the local and regional rural economies.

A Parcel Boundary Setback Reduction Analysis (IBI Group, 2012) has been prepared to identify locations where turbines are sited within 80 m of neighbouring property lines. This is provided in **Appendix C**.

6.6.1.1 Potential Effects

Potential effects from operational and maintenance activities include:

- A minor reduction in usable farmland as a single turbine, together with its access road, will take up on average only 1.0 to 1.5% of a typical 40 hectare farm parcel;
- Reduction in aesthetic quality of landscape which may affect the use and enjoyment of private property and recreational amenities; and
- Damage to crops or trees due to turbine malfunction or failure associated with 16 turbines that are located within 80 m of neighbouring property lines (refer to **Appendix C**).

6.6.2 Stray Voltage and Effects to Livestock

NextEra has designed the Project to minimize the risk of stray voltage to consumers and to ensure the Project is built and maintained within acceptable levels as prescribed by the Distribution System Code and the Electrical Safety Authority.

Most cases of stray voltage occur when there is either:

- Improper grounding of on-site equipment (in which case it is an issue with on-site wiring); or
- A change in current patterns on the distribution line, from generation or load, which exposes a pre-existing condition (in which case it is an issue with the distribution utility, not with the generator or load).

The turbines are therefore not the root of the problem, but like any change to the system, may expose faults in that system. All types of generation (wind generation using wind turbines included) must fully comply with utility requirements to ensure that the electricity they supply is compliant with grid standards.

6.6.2.1 Potential Effects

Potential effects from operational and maintenance activities include:

- Mild electric shocks to livestock, which may cause behavioural changes, and changes in production performance.

At a voltage difference above about 10 volts, people may detect a tingle. This is not a health hazard to humans.

The mitigation measures, residual effects, and the monitoring plan associated with potential land use impacts are described in **Table 6-6** below.

Table 6-6 Mitigation Measures, Residual Effects and Monitoring Plan Local Interests, Land Use and Infrastructure

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Minor reduction in usable agricultural land.	• Minimize reduction of farmland.	• Minimize length of access roads where possible. • Consult with landowners to design access roads to minimize impacts to agricultural practices. • Compensate landowners on Project Location as per land lease agreement.	• Minor reduction in usable agricultural land. • High likelihood of effect, however limited magnitude due to size of overall footprint within the entire Project Study Area.	• No monitoring or contingency measures required.
Reduction in aesthetic quality of landscape which may affect the use and enjoyment of private property and recreational amenities.	• Limit aesthetic impact of turbines where possible.	• Adhere to setback requirements.	• Reduction in aesthetic quality of landscape which may affect the use and enjoyment of private property and recreational amenities. • Likelihood and magnitude dependent on perception of residents and visitors to presence of turbines.	• No monitoring or contingency measures required.
Stray voltage effects to livestock.	• Minimize effects of stray voltage on livestock.	• Build and maintain the Project as prescribed by the Distribution System Code and the Electrical Safety Authority to minimize the risk of stray voltage. • Point of interconnection is part of the transmission system, not the distribution system thus reducing potential to impact any customers.	• Stray voltage effects to livestock. • Low likelihood and limited magnitude expected based on existing wind farm operations.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan. • No contingency measures required.
Damage to crops or trees due to turbine malfunction or failure associated with 16 turbines located within 80 m of neighbouring property lines	• Minimize damage to crops or trees due to turbine malfunction or failure.	• Ensure ongoing regular maintenance and monitoring of turbines. • Implement shutdown mechanisms and protocols in extreme weather instances to prevent damage to wind turbines.	• Damage to crops or trees minimized through mitigation measures. • No likelihood of effect as a result of mitigation strategy.	• No monitoring or contingency measures required.

6.7 Other Resources

A search for landfills, aggregate resources, forest resources and petroleum resources was undertaken based upon data from the Huron County online GIS database (Huron County, 2011) and from the MNR's Oil, Gas & Salt Resources (OGSR) library (Ontario Oil, Gas & Salt Resource Library, 2011).

6.7.1 Landfills

There are five closed landfills within the Project Study Area, all of which are municipally-owned. The Stephen landfill (South Huron) is located within the Wind Energy Centre Study Area approximately 550 m south of the collection line between Turbines 42 and 78. Due to the distance between the landfill and Project infrastructure, operations are not anticipated to have an effect upon the closed landfill. The Usborne landfill (South Huron) is located within the Transmission Line Study Area, directly south of the breaker switch station and across the other side of Dump Road. Operations are not anticipated to have an effect upon the closed landfill because there is sufficient separation between the landfill and the Project infrastructure due to the presence of the road.

There is also an unidentified closed landfill located adjacent to the southern boundary of the Transmission Line Study Area to the west of Ausable Line (1.2 km from the closest Project infrastructure) and two closed landfills located on Centre Street, south of Dashwood Road (1.3 km from the closest Project infrastructure) and on Ausable Line south of Kirkton Road (395 m from the closest Project infrastructure). These closed landfills are not located within close proximity to any Project infrastructure. As a result, no operations-related effects on the closed landfills are anticipated.

There is one open landfill located within the Wind Energy Centre Study Area, the municipally-owned Hay landfill (Bluewater), which is approximately 70 m from the closest Project infrastructure (collection line between Turbines 4 and 5). This landfill is small, and although relatively close to Project infrastructure, appears to have sufficient buffer (greater than 30 m) within the property boundary. As a result, operations are not anticipated to have an effect on the open landfill. The municipally-owned Exeter landfill (South Huron), which is currently open, is located adjacent to the northern boundary of the Transmission Line Study Area near Ausable Line, outside of the Project Study Area and is not in close proximity to any Project infrastructure (2.8 km away). As such, no effects from operations are anticipated.

6.7.2 Aggregate Resources

Table 6-7 and **Figure 2-3** show that there are seven authorized aggregate resources located within the Project Study Area. None of these resources are located within close proximity to Project infrastructure.

Table 6-7 Aggregate Resources

Owner	Area (ha)	Licence Class	Status	Distance to Closest Project Infrastructure
McCann Construction Inc.	40.47	Class A > 20000 tonnes	Active	330 m
Prout Farms	90.60	Class A > 20000 tonnes	Active	1.2 km
Jennison Construction Ltd.	11.24	Class A > 20000 tonnes	Surrendered	2.2 km
Scott, Alan E.	47.50	Class A > 20000 tonnes	Surrendered	370 m
McCann Redi-Mix Inc.	8.78	Class A > 20000 tonnes	Active	7 km
The Municipality of South Huron	16.13	Class A > 20000 tonnes	Surrendered	1 km
Taylor, Jeffrey	23.76	Class A > 20000 tonnes	Active	1.2 km

There are also three pits or quarries located within the Project Study Area. One of the three is located approximately 50 m east of the collection line between Turbines 14 and 15. However, this pit/quarry is relatively small and operations related activities are not anticipated to have an effect on this resource. Another pit/quarry is located approximately 380 m east of the breaker switch station, adjacent to the eastern boundary of the Transmission Line Study Area. It is not anticipated to experience any effects from operations. The remaining pit/quarry of the three identified is located approximately 530 m north of the access road between Turbines 7 and 10, close to the northern boundary of the Wind Energy Centre Study Area. Again, operations are not anticipated to have an effect on this resource due to the distance from Project infrastructure.

6.7.3 Forest Resources

Based on the MNR's Sustainable Forest Licences (SFL) database (Ontario Ministry of Natural Resources, 2012), there are no SFLs within the Project Study Area.

6.7.4 Petroleum Resources

- One petroleum resource was identified within 75 m of Project infrastructure. Specifically, the access road and collection line between Turbines 54 and 84 is approximately 60 m from a petroleum resource.

There are no oil and gas companies operating pipelines within the Project Study Area.

6.7.5 Potential Effects

No effects on open or closed landfills, aggregate resources, forest resources or petroleum wells are anticipated as a result of the construction phase of the Project due to the distance between the Project and these resources. An Engineer's Report will be submitted to the MNR prior to construction to confirm that there are no effects on the one petroleum resource located within 75 m of Project infrastructure.

6.8 Public Health and Safety

To minimize or avoid effects on public health and safety, the turbines are sited according to setback distances outlined in *O.Reg. 359/09* and as described above. Effects relating to noise are described in Section 6.5.

6.8.1 Potential Effects

Potential effects from operational and maintenance activities include:

- Ice formation on turbine blades resulting in ice shed;
- Shadow flicker causing disturbance at nearby residences and businesses. Shadow flicker occurs when, at precise latitude, wind direction, and height of the sun, rotating wind turbine blades cast shadows upon stationary objects.

The mitigation measures, residual effects, and the monitoring plan associated with public health and safety are described in **Table 6-8** below.

Table 6-8 Mitigation Measures, Residual Effects and Monitoring Plan: Public Health and Safety

Potential Effect	Performance Objective	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
Impacts on public health and safety from ice shed and/or shadow flicker.	• No public health and safety incidents.	• Adhere to setback requirements to limit likelihood of any impacts.	• No impacts on public health and safety from ice shed and/or shadow flicker due to setback requirements. • Low likelihood and limited magnitude expected based on existing wind farm operations.	• Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). Contingency Measures • Suspend operations during icing conditions to minimize the risk of ice shed.

6.9 Areas Protected Under Provincial Plans and Policies

The REA regulation requires a determination as to whether the Project is being proposed in any of the following protected or plan areas:

- Protected Countryside or Natural Heritage Systems in the Greenbelt Plan;
- Oak Ridges Moraine Conservation Plan Areas;
- Niagara Escarpment Plan Area; or
- Lake Simcoe Watershed Plan Area.

The Goshen Wind Energy Centre is not proposed in any of these protected or plan areas. As such, there will be no effects on these areas as a result of the Project.

7. Summary and Conclusions

Significant adverse effects have been avoided through careful site selection, facility layout planning and strict adherence to all regulatory requirements. All turbines, access roads and ancillary facilities have been sited with landowner consultation to minimize the impact to current agricultural operations.

The overall conclusion of this Design and Operations Report is that this Project can be operated without any significant adverse residual effects. Post-construction monitoring related to effects on wildlife, including birds and bats, will be undertaken to confirm this conclusion.

8. References

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