



NextEra Energy Canada, ULC

Design and Operations Report – East Durham Wind Energy Centre

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Glossary of Terms

GE.....	General Electric
GIS.....	Geographical Information Systems
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
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 Project.....	East Durham Wind Energy Centre
ULC.....	Unlimited Liability Corporation
UTM.....	Universal Transverse Mercator

1. Introduction

East Durham Wind, Inc., a wholly owned subsidiary of NextEra Energy Canada, ULC (NextEra), is proposing to construct a wind energy project in the Municipality of West Grey, Grey County, Ontario. The Project will be referred to as the East Durham Wind Energy Centre (the “Project”) and will be located on private lands east of the Community of Durham and west of the Village of Priceville. The wind turbine technology proposed for this Project is the GE 1.6-100 model wind turbine. With a total maximum nameplate capacity of up to 23 MW, the Project is categorized as a Class 4 facility. Although NextEra has identified 16 locations for wind turbine siting, up to a total of 14 turbines are proposed to be constructed for the Project.

This *Design and Operations Report* was prepared in accordance with the requirements of the REA process 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* defined 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
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

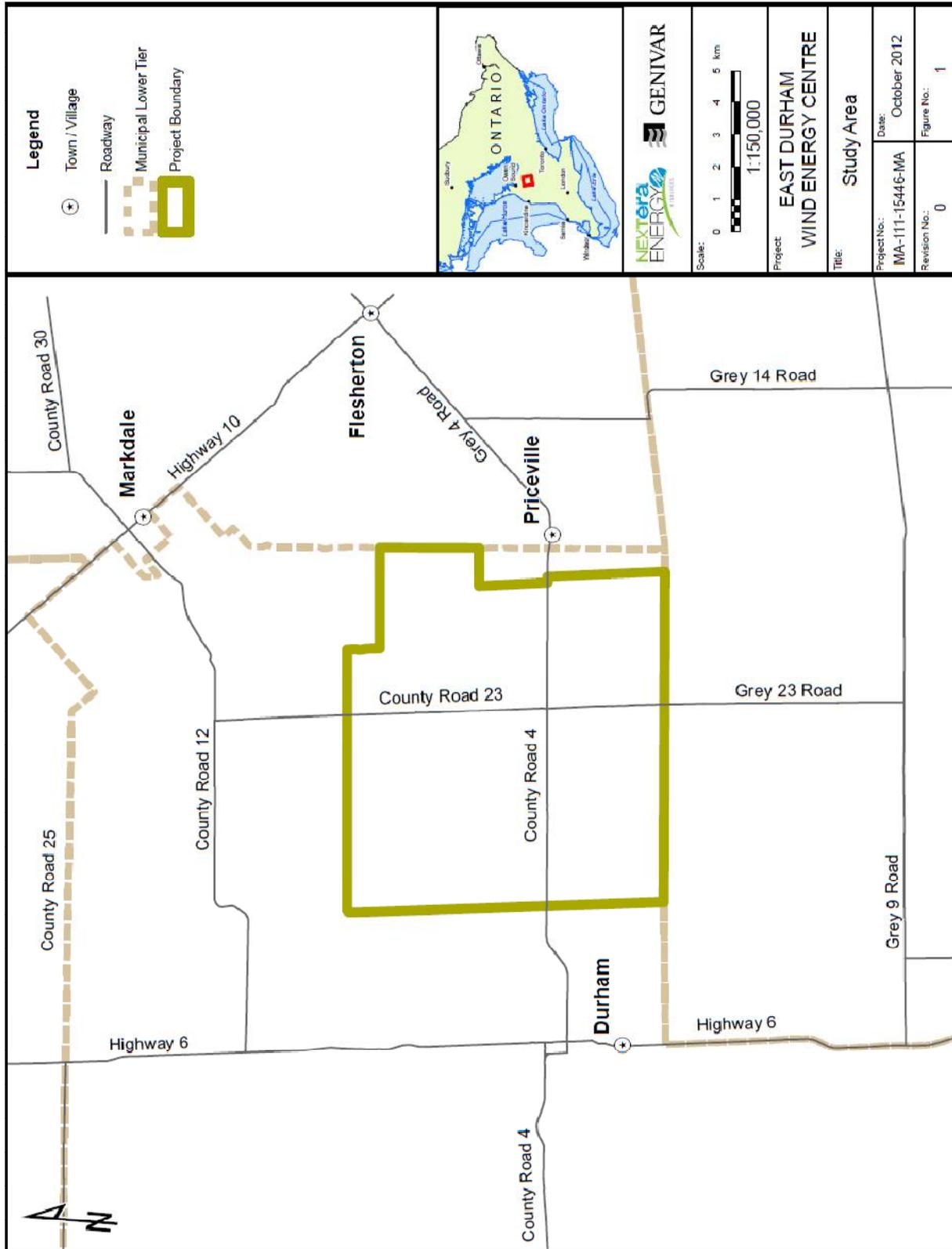
1.2 The Proponent

The Project will be owned and operated by East Durham 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 100 wind energy projects in North America. Wind farms 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 390 Bay St, Suite 1720 Toronto, ON M5H 2Y2 Phone: 1-877-257-7330 Email: EastDurham.Wind@NextEraEnergy.com Website: www.NextEraEnergyCanada.com	Patricia Becker, MES Project Manager (Energy) GENIVAR Inc. 5 th Floor, 600 Cochrane Drive Markham, Ontario, L3R 5K3 Phone: 905-713-2837 Email: pat.becker@genivar.com

Figure 1-1 Study Area in Ontario



1.3 Project Study Area

The proposed Project is located in the Municipality of West Grey, east of the Community of Durham and west of Village of Priceville within Grey County. The Project Study Area consists of the area being studied for the wind farm components (Wind Energy Centre Study Area). The Wind Energy Centre Study Area is generally bounded by:

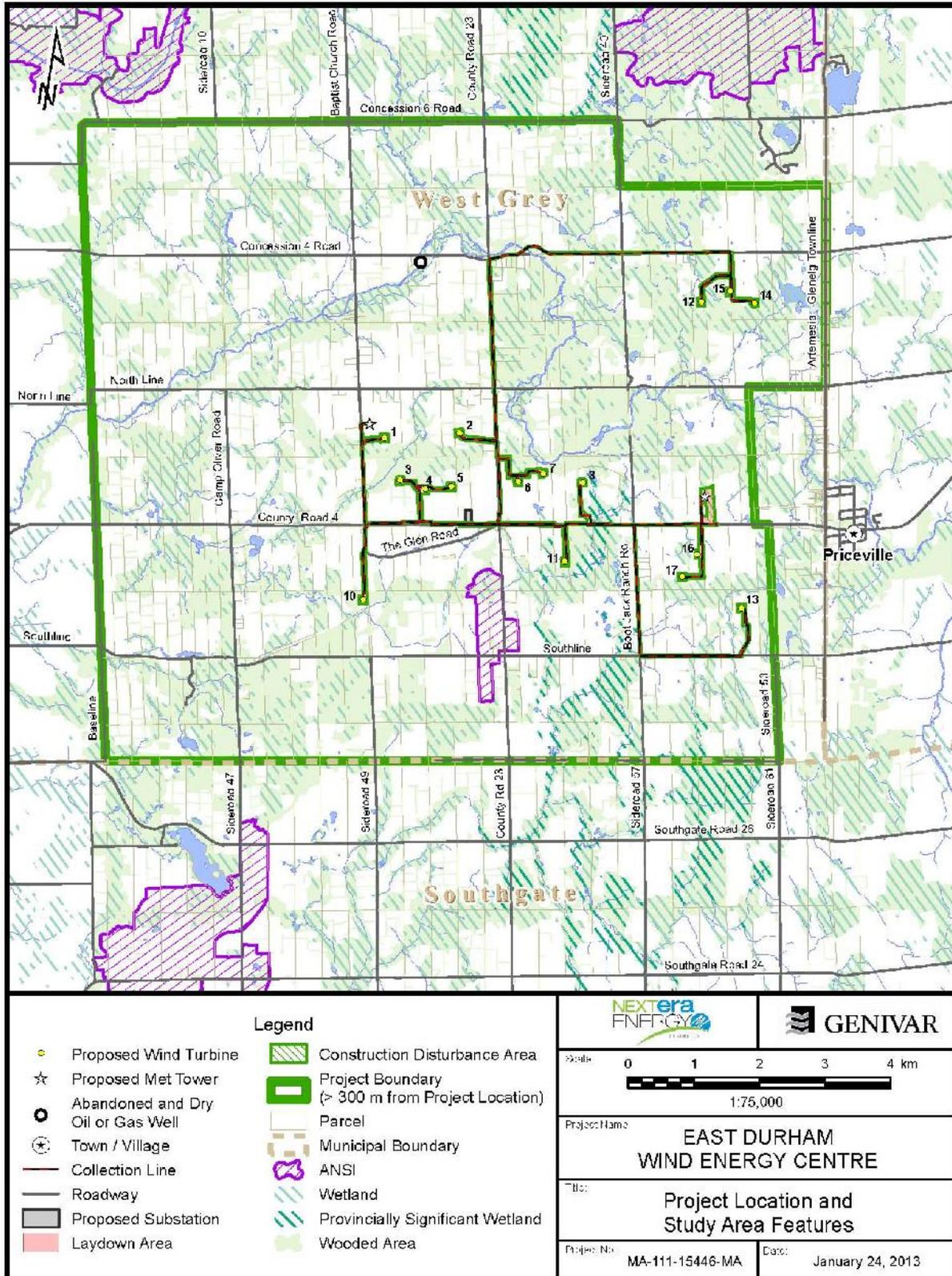
- Concession Road 6 to the north
- Sideroad 40, Townline Artemesia-Glenelg and Sideroad 50 to the east
- The West Grey – Southgate municipal boundary to the south
- Baseline to the west

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 (corners) of the Project Study Area, as shown in **Figure 1-2**:

Study Area Corner	Easting NAD83 UTM17	Northing NAD83 UTM17
Northwest	517446	4898788
Northeast	528740	4899612
Southeast	529409	4890833
Southwest	519266	4889235

Figure 1-2 Project Location and Study Area Features



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”. As described therein, the Project Location boundary is the outer limit of where 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 **Figure 2-1** and includes the major components of the Project listed below:

- Up to 16 GE model wind turbines (14 turbines are 1.6-100 models (1.62 MW), Turbine 6 is a 1.34-100 model (1.34 MW) and Turbine 2 is 1.39-100 model (1.39 MW); 16 wind turbine generator locations and pad mounted step-up transformers are proposed for permitting, though a maximum of 14 turbines and associated pad mounted step-up transformers will ultimately be constructed;
- Turbine laydown and storage areas (including temporary staging areas, crane pads and turnaround areas surrounding each wind turbine);
- Construction laydown area (including staging areas for construction materials, construction trailers and associated facilities and a temporary electrical service line to provide power to the construction trailers);
- Approximately 28.3 km of 34.5 kV underground electrical collection lines and ancillary equipment (e.g., above ground electrical junction boxes) to connect the turbines to the proposed transformer substation;
- Pad mounted 690 V/ 34.5 kV step up transformers located at or near the base of each turbine;
- A transformer substation to connect to the Hydro One distribution system;
- Overhead 44 kV line to connect the transformer substation to the Hydro One electrical grid;
- Approximately 13.8 km of turbine access roads;
- An operations and maintenance building (located outside the project location – shared use of land and building approved and currently operational for the Conestogo Wind Energy Centre); and
- One to two meteorological towers.

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 and turbine turnaround areas and construction of access roads and electrical collection system. 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 including: wind turbines, access roads, the electrical collection system, the proposed transformer substation and temporary laydown/storage areas.
- Figure 1-2 above and further detailed Figures showing the location of Project components in relation to surrounding natural heritage and water body features such as: wetlands, woodlots, streams, and Areas of

Natural and Scientific Interest, in addition to water wells identified in MOE’s database are provided in detail in the **Appendix C - Natural Heritage Assessment Reports**. This figure also demonstrates compliance with the 120 m setback distance for natural heritage features, measured from the boundary of the Project Location, the 30 m setback distance for water bodies, measured from the Project Location boundary for turbines, and highlights significant natural heritage features that are within those setback distances.

- The Project components in relation to surrounding socio-economic features such as: property boundaries, roads, petroleum resources, and noise receptors are included in the Noise Study Report. This figure also identifies the setback distances between these features and the Project components. Note that noise compliance is addressed in **Appendix D – Noise Study Report**.

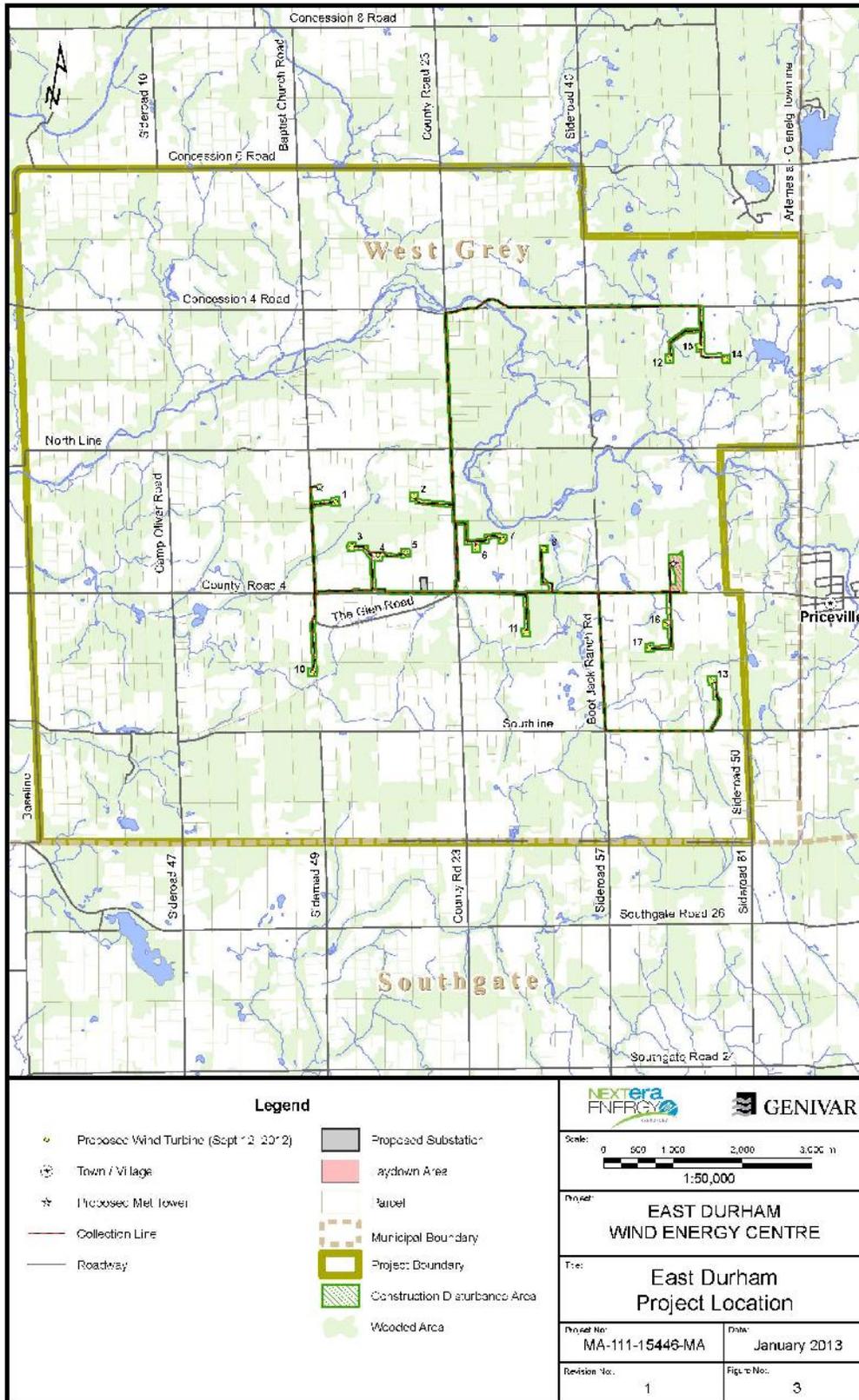
The exercise of siting infrastructure is an iterative process that involves balancing the wind resource with environmental, socio-economic and engineering constraints including the preferences of individual landowners, while at the same time adhering to the setback distances prescribed by the Province and outlined in O. Reg. 359/09. Optimum turbine siting on individual properties was also determined in consultation with the landowner. 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 D**, along with the location of all noise receptors.

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.

Figure 2-1 Project Location



3. Facility Design Plan

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

3.1 Wind Turbine Specifications

The wind turbine technology proposed for this Project is the GE 1.6-100 model with 14 turbines that are 1.6-100 (1.62 MW), Turbine 6 is 1.34-100 (1.34 MW) and Turbine 2 is 1.39-100 (1.39 MW) for a total maximum nameplate capacity of up to 23 MW.

The wind 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 m²; each blade is connected to the main shaft via the hub. 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).

The following table provides a description of the GE 1.6-100 MW model wind turbine that will be used for the Project.

Summary of Technical Specifications

Specification	Turbine	Turbine	Turbine
Make	General Electric	General Electric	General Electric
Model	1.34-100	1.39-100	1.6-100
Name Plate Capacity	1.34 MW	1.39 MW	1.62 MW
Hub Height	80 m	80 m	80 m
Rotor Diameter	100 m	100 m	100 m
Minimum Rotational Speed	9.75 rpm	9.75 rpm	9.75 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 8 hectares (22 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.

3.3 Access Roads

On-site access roads to each turbine will be constructed to provide an access point to the properties for equipment 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).

3.4 Electrical System

The electrical collection system from each turbine to the step-up transformer station will be buried on private property adjacent to the turbine access roads, where feasible; otherwise, the collection lines will be buried in the municipal right-of-ways. The location of the underground cables and ancillary equipment (e.g., above ground electrical junction boxes) to connect the turbines to the proposed transformer station and access roads was determined in consultation with the landowners and also respect the setback requirements defined.

A 44 kV electrical line will connect the transformer substation to the existing Hydro One 44 kV line (which is located on the south side of Grey Road 4). This electrical line will extend from the substation A-frame pull-off structure to the 44 kV line located along the south side of the municipal road right-of-way. This will include a number of poles on the south side of Grey Road 4 that the conductor strings across Grey Road 4.

Temporary power (for electrical service to the construction trailers) will likely come from the corner of the substation, where the distribution line crosses Grey Road 4. It is likely that 11 m high wood poles will be constructed for the temporary power.

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.

3.5 Transformer Substation

The electricity collected via the 34.5 kV underground collection lines will converge at the transformer substation where it will be stepped up from 34.5 kV to 44 kV. A 44 kV electrical line (approximately 300 m in length) will connect the transformer to the Hydro One distribution system using standard poles within the municipal road right-of-way (as described above in sub-section 1.5.3). Above ground electrical junction boxes will be used to connect the turbines to the proposed transformer station. An electrical service line will be connected to the local distribution lines in order to provide electrical power to the substation control housing.

Requiring approximately two hectares in size, the East Durham transformer substation will either be located on privately held lands through a lease agreement or on land purchased by East Durham Wind, Inc. The substation equipment will include an isolation switch, a circuit breaker, a step-up power transformer (34.5 to 44 kV), switch gear, instrument transformers, grounding and metering equipment. All substation grounding equipment will meet the Ontario Electrical Safety Code. The substation will be surrounded by a chain link fence with a locked gate to permit authorized entry and required signage.

A secondary containment system will be installed to capture any leaks from the transformer. Water in the containment system will be visually inspected for any evidence of oil (as oil would float to the top). If oil is present, a tank truck will be brought to site to pump the water/oil mix into it. The water/oil mix will then be disposed of off-site at a licensed facility. If no oil is detected in the water, the water will be pumped out to an adjacent swale and then allowed to infiltrate into the ground.

3.6 Operations and Maintenance Building

An operations building will be located outside of the project study area and will have the purpose of monitoring the day-to-day operations of the wind energy centre and supporting maintenance efforts. The East Durham Wind Energy Centre plans to use the land and building for the Operations and Maintenance building that has already been

permitted and is operational under a separate REA for the Conestogo Wind Energy Centre. This shared use of the building will have low use (approximately 2 people) and will not change or result in additional mitigation measures being required.

3.7 Permanent Meteorological Towers

One to two permanent meteorological towers will be installed at the Project. These are typically up to 80 m in height and use either a monopole or lattice structure with support guy wires. No significant soil or vegetation disturbance is anticipated. The use of meteorological data is 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 icing conditions; and
- Turbine shut down during extreme weather events.

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. The decision on whether to construct one or two meteorological towers will be based on IESO requirements.

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 two to three people who will work out of the Operations and Maintenance Building. The East Durham Wind Energy Centre plans to use the land and building for the Operations and Maintenance building that was already permitted under a separate REA and is now operational for the Conestogo Wind Energy Centre... This shared use of the building will have low use (approximately 2 people) and will not change or result in additional mitigation measures being required.

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 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 involves removing the turbine from service and having two to three wind 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 is cleaned up. All surplus lubricants and grease-soaked rags are 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 certain component failures 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, will need to be rebuilt to carry out repairs to a damaged turbine. Typically only a small percentage of turbines will 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.

4.5 Waste Management

Waste generated during the operations phase will be removed 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 East Durham 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 Ministry of the Environment, the Municipality of West Grey and Grey County.

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

5.1 Emergency Response

NextEra Energy Resources, LLC, 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
- 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.
- A NextEra representative will then contact the Ministry of the Environment, including the Spills Action Centre, if required, in accordance with Sections 15 and 92 of the Environmental Protection Act and the local municipality/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, if requested; 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 made to minimize these potential effects. The potential effects described below are also presented in Section 3 of the PDR.

For each potential negative 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 were identified, they are intended to verify that the mitigation measures achieve performance objectives. Should the monitoring reveal that the mitigation measures are not achieving the intended result, the identified contingency measures would then be implemented.

6.1 Cultural Heritage

Archaeological Assessment

The Stage 1 was conducted by Archaeological Services Inc. and was completed in 2009 and revised in December 2010. The Stage 1 was submitted to MTCS on December 23, 2010 and a letter of concurrence on the recommendation to conduct Stage 2 archaeological assessments was received on January 14, 2011 from MTCS.

The Stage 2 archaeological assessment was conducted by Golder Associates Ltd. between May and December 2012. The goal of the Stage 2 archaeological assessment was to determine whether any archaeological resources existed within the Project Location that would be impacted by the construction of the turbines or any related Project infrastructure.

Golder first performed an initial field condition check within the Project Location to assess the visibility of the land parcels and the archaeological field work required. Once all ploughed agricultural fields associated with the proposed Project Location were deemed to have at least 80% ground visibility and had been sufficiently weathered pedestrian surveys were undertaken. The proposed Project Location on these fields was assessed by archaeologists spaced at 5 metre intervals scanning the ground surface for any exposed artifacts that could serve as evidence of human activity anywhere from 10,000 years ago until the late 19th century A.D.

Portions of the Project Location that could not be ploughed, such as in a woodlot, were test pitted by archaeologists spaced at five metre intervals. Archaeologists dug 30 centimetre in diameter test pits into the subsoil (usually a depth of 15 to 25 centimetres) every five metres apart and screened all soil through six millimetre hardware mesh to recover any artifacts .

Finally any areas deemed to be poorly drained, steeply sloped or disturbed by recent construction and therefore of low archaeological potential were photo documented as part of the Stage 2 archaeological assessment.

During the course of this field work three archaeological sites were documented (during the pedestrian survey; no sites were documented during the test pit survey). A sample of artifacts from each site was collected and subsequently analyzed. The three sites were determined to be 19th century historic Euro-Canadian sites that have been recommended for subsequent Stage 3 archaeological assessment prior to construction.

The substation location and associated access road change was proposed late in 2012 and the new locations required completion of a Stage 2 Archaeological Assessment to confirm whether archaeological material or sites were present. In addition, it was proposed in late 2012 that the electrical collection line crossing of the Saugeen River on Concession 4 may need to consist of one overhead line. These two modifications required a Stage 2 archaeological assessment on the additional lands. This was conducted in September 28, 2012 (related to substation location change) and November 20, 2012 (related to the Saugeen River crossing on Concession 4). Following completion of the Stage 2 archaeological assessment it was found that no archaeological material or sites were identified and no further archaeological assessment was required for either of these areas.

The findings and all Stage 2 archaeological field work have been documented in the Stage 2 Archaeological Assessment report and the Stage 2 Archaeological Assessment Additional Lands report. The Stage 2 Archaeological Assessment Reports were submitted to MTCS for review and acceptance into the Ontario Public Register of Archaeological Reports. Sign-off on the Stage 2 work was received on December 20, 2012 for the additional lands and on January 22, 2013 for the original Stage 2 and these letters confirmed that: (1) the Ministry was satisfied with the recommendations in the reports; and, (2) the fieldwork and reporting for the archaeological assessment was consistent with the Standards and Guidelines for Consultant Archaeologists (2011).

Cultural Heritage Assessment

A Cultural Heritage Assessment was completed to address built heritage and cultural heritage landscape resources related to the Euro-Canadian land use in the area dating prior to 1970. Fieldwork was conducted on August 22 and 23 and on several days in early September 2012. Landscape features and built features were evaluated using the criteria for determining cultural heritage value or interest, from the Ontario Heritage Act, Ontario Regulation 9/06. The Ontario Heritage Act, its Regulations and the Ontario Heritage Toolkit were consulted for this project, in addition to O. Reg. 359/09 of the Environmental Protection Act.

There are no properties or buildings designated as heritage properties/protected properties, nor are any properties within the project area currently recognized for their heritage or cultural value by the Municipality of West Grey, or the Ontario Heritage Trust. None of the properties are, or have ever been, on any heritage list.

As part of the assessment, 181 built features were considered, along with 28 landscape features. Of these, 49 features (42 built and 7 landscape) were screened as having potential cultural heritage value or interest using the criteria in Regulation 9/06 of the Ontario Heritage Act.

The impacts of the project on the landscape features will be very limited. The location of the turbines is a minimum of 500 metres away from any of the landscape features and the impact will be minimal. The access roads will not have any impact on any of the identified features. The electrical collection lines will be buried and will have no impact on the identified landscapes.

The McKechnie Cemetery is located on property adjacent to the proposed location of the laydown area and the second proposed meteorological tower. Since the laydown area will only be utilized during the construction phase and then will be removed, any impacts will only be short term. Although the meteorological tower (if constructed) is located on the lot adjacent to the McKechnie Cemetery, it is sufficiently far from the cemetery that it will have little or no impact.

The impact of the proposed project on the built heritage features will also be very limited. The location of the turbines is a minimum of 400 metres away from any of the built features and in most cases substantially more. The impact will be minimal. The electrical collection lines will be buried and will have no impact on the identified built heritage features. Overall there are no built heritage features that will be impacted by the development of the East Durham Wind Energy Centre.

There is one mitigation measure that is recommended. The laydown area is adjacent to the McKechnie Cemetery and will be in operation during the construction phase. It is recommended that after construction is completed and the laydown area is no longer required, that the area be returned to its pre-construction condition or better. There are no further recommendations with respect to the heritage impact assessment of the proposed project.

This report was submitted to the MTCS for review on September 19, 2012 and the report amended on December 4, 2012 (to incorporate modification of the substation location). Sign-off from the Ministry regarding confirmation on whether the report is satisfactory and concurrence with the recommendations was received on December 18, 2012.

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

Effects to natural heritage features; including significant wetlands, woodlots, wildlife habitat, and valleylands are identified in the Natural Heritage Assessment Report which was prepared based on the *Natural Heritage Assessment Guide for Renewable Energy Projects*. The potential effects, mitigation measures, net effects and monitoring commitments regarding the natural heritage features, in addition to birds and bats, are evaluated in the Natural Heritage Assessment Report and the Environmental Effects Monitoring Plan and were submitted to the Ontario Ministry of Natural Resources (MNR) for review and sign-off. Sign-off from the MNR confirming whether the report is satisfactory is anticipated by November 2012.

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. 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	Results of Site Investigation
Wetlands	The following eleven wetland units or wetland complexes were treated as significant and carried forward to the EIS: <ul style="list-style-type: none"> • WE-01, WE-02, WE-03, WE-04, WE-05, WE-06, WE-07, WE-08, WE-09, WE-12 and WE-13.
Woodlands	The following four woodlands were determined to be significant or treated as significant and therefore carried forward to the EIS: <ul style="list-style-type: none"> • WO-02, WO-03, WO-04 and WO-05.
Valleylands	The following seven valleyland features were determined to be significant and therefore carried forward to the EIS: <ul style="list-style-type: none"> • VA-01, VA-02, VA-03, VA-04, VA-05, VA-06 and VA-07.
Significant Wildlife Habitat	<p>The following candidate significant wildlife habitats were confirmed within the 120 m Area of Investigation and within 120 m of qualifying project infrastructure, and were therefore carried forward to the EIS.</p> <p>Features evaluated and determined to be significant:</p> <ul style="list-style-type: none"> • Three Turtle Wintering Areas (WH-TW-01, WH-TW-04 and WH-TW-05); • Three Bat Maternity Colony (WH-BMA-005, WH-BMA-006 and WH-BMA-007); • One Deer Yarding Area (WH-DYA-01); • Four Amphibian Woodland Breeding Habitats (SWH-ABWO-01, SWH-ABWO-02, SWH-ABWO-03, SWH-ABWO-04); • One Marsh Bird Breeding (WH-MBB-12); • One Waterfowl Nesting Area (WH-WN-08) • Three Habitat for Species of Special Concern (Snapping Turtle and Generalized Significant Wildlife Habitat); • One Colonial Nesting Breeding Bird Habitat – tree/shrub (WH-CNTS-13); and • One Amphibian Wetland Breeding Habitat (WH-ABWE-01). <p>The following types of habitat were addressed as Generalized Significant Wildlife Habitat and were treated as significant and carried forward to the EIS:</p> <ul style="list-style-type: none"> • Milksnake; • Waterfowl Stopover and Staging (aquatic); • Colonial-Nesting Bird Breeding Habitat (ground); • Colonial Nesting Bird Breeding Habitat (tree/shrub); • Seeps and Springs; • Amphibian Breeding Habitat (wetlands); • Shrub/Early Successional Bird Breeding Habitat/Declining Guild Shrubland Birds; • Terrestrial Cray fish; • Deer Movement Corridors; • Bald Eagle and Osprey Nesting, Foraging and Perching Habitat; and • Turtle Nesting Areas.

6.2.1 Potential Effects

Potential effects from operational and maintenance activities on Significant Wildlife Habitat, Significant Woodlands, Significant Valleylands, and Provincially Significant Wetlands are included in the table.

The potential effects, performance objectives, mitigation measures, residual effects, and the monitoring plan associated with potential effects to natural heritage features are described in **Table 6-2** below.

Table 6-2: Summary of Potential Negative Effects and Proposed Mitigation Measures for Significant Features

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
Wetland WE-01 WE-02 WE-03 WE-04 WE-05 WE-06 WE-07 WE-08 WE-09 WE-12 WE-13	Operation of Turbines, Access Roads, Overhead electrical and Underground Collection (applies to all wetlands where these components are within 120m).	<ol style="list-style-type: none"> Soil/water contamination resulting from accidental spills. 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. Potential introduction of invasive species into Significant Wetlands communities resulting from access road operation and maintenance. Incidental mortality/roadkill of amphibians from operational vehicle movement and disturbance from routine maintenance. No potential negative effects anticipated from operation of underground collection. 	<ol style="list-style-type: none"> Develop and implement an emergency spills plan outlining steps to contain any chemicals and avoid contamination of adjacent wetland features. 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 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. 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. Only apply herbicides (if required) when wind speeds are low and no significant precipitation is expected (does not apply 	<ol style="list-style-type: none"> Monitoring: <ul style="list-style-type: none"> Conduct regular site inspections and monitoring of turbines by a designated on-site Environmental Monitor. Implement contingency measures in the event of a spill. Contingency Measures: <ul style="list-style-type: none"> In the event of a spill, immediately stop all work until the spill is cleaned up; <ul style="list-style-type: none"> Install a spill collection pad for refuelling and maintenance; Notify MOE's Spills Action Centre of any leaks or spills; Assess and remediate affected soils and water by using spill kit kept on site; For spills near wetlands, analyze water samples for general chemistry (e.g., temperature, pH, dissolved oxygen, and conductivity), suspended solids, turbidity, nutrients and total metals (e.g., copper, iron, zinc and aluminum). 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 <ul style="list-style-type: none"> Monitor daily to ensure proper cleanup is completed. Monitoring: <ul style="list-style-type: none"> Monitor twice per year for two years to confirm survival of seed mix. Contingency Measures: <ul style="list-style-type: none"> Should seed mix and/or plantings

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
Woodland 2 WO-02 Woodland 3 WO-03 Woodland 4 WO-04 Woodland 5 WO-05	Operation of Turbines, Access Roads, Overhead transmission and Underground Collection (applies to all woodlands where these components are within 120m).	<ol style="list-style-type: none"> Disturbance to woodlot function as habitat for local and resident wildlife (non-SWH function); Soil/water contamination resulting from accidental spills 	<p>to agricultural practices).</p> <p>Only use herbicides (if required) approved for use adjacent to water bodies, riparian buffers, or woodland edges (does not apply to agricultural practices).</p> <p>3. Maintain low speed limits of vehicles on access roads.</p> <p>Advise operations staff to avoid driving roads or undertaking maintenance activities in proximity to these features at night between April 1st and June 30th, and any rainy nights from spring to early autumn, wherever possible.</p>	<p>not survive, additional seeding and/or plantings will be undertaken.</p>
<p>Where removal of forest is proposed: Monitoring (may extend into operational phase):</p> <ul style="list-style-type: none"> Conduct post-planting inspection of planted compensation area to determine success of establishment (may be undertaken by partner organization). <p>Contingency Measures:</p> <ul style="list-style-type: none"> 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). If new edge is not establishing for any number of reasons, conduct silvicultural intervention including but not limited to: fill planting, cleaning, re-planting or thinning. 				

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
Valleyland VA -01 VA -02 VA -03 VA -04 VA -05 VA-06 VA-07	Operation of Turbines, Access Roads, and Underground Collection (applies to all valleylands where these components are within 120m).	<ol style="list-style-type: none"> Soil/water contamination resulting from accidental spills; 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. 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. 	<p>practices).</p> <ol style="list-style-type: none"> Develop a spill response plan outlining steps to contain any spills during maintenance activities to avoid contamination of valleyland 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. 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). 	<p>Performance Objectives, Monitoring and Contingency Plans</p> <p>Monitoring:</p> <ul style="list-style-type: none"> Implement contingency measures in the event of a spill. <p>Contingency Measures:</p> <ul style="list-style-type: none"> In the event of a spill, immediately stop all work until the spill is cleaned up; <ul style="list-style-type: none"> Install a spill collection pad for refuelling and maintenance; Notify MOE's Spills Action Centre of any leaks or spills; Assess and remediate affected soils and water by using spill kit kept on site; For spills near wetlands, analyze water samples for general chemistry (e.g., temperature, pH, dissolved oxygen, and conductivity), suspended solids, turbidity, nutrients and total metals (e.g., copper, iron, zinc and aluminum). Monitor daily to ensure proper cleanup is completed.

Table 6-3: Summary of Potential Negative Effects and Proposed Mitigation Measures for Significant Wildlife Habitat

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
Wildlife WH –TW-01 WH –TW-04 WH –TW-05 Turtle Wintering	Operation and maintenance of Turbine 8. Operation of electrical collection within the road right of way.	Operation • Possible mortality of turtles moving between over-wintering ponds and other areas due to maintenance adjacent to Turtle Over-wintering Habitat; • Attraction of turtles to new road edges.	Operation • Education of operations staff to be aware during maintenance activities in proximity to this feature in May, June, September or October. • Maintain low speed limits of vehicles near over-wintering pond. • Ensure materials used for roadway construction do not attract turtles to road edges.	Operation Monitoring: No additional monitoring recommended.
Wildlife WH –DYA-01 Deer Yarding Area	Operation of collection line.	Operation • No impacts are anticipated during the operational phase. Should service or maintenance require replacement of collection lines, Construction/Decommissioning impacts/mitigation would apply.	Operation No additional mitigation is proposed.	Operation Monitoring: No additional monitoring or contingency measures required.
Wildlife SWH – ABWO-01 SWH- ABWO-02 SWH- ABWO-03 SWH – ABWO-04 Amphibian Woodland Breeding	Operation of Turbines 6, 7 and 8 and the associated electrical collection route. Operation of Turbine 17. Operation of Turbines 12 and 14.	Operation: • Disturbance from lighting; • Incidental mortality/roadkill from operational vehicle movement; • Disturbance from routine maintenance.	Operation: • Ensure lighting is directional and/or directed away from breeding habitat; • Ensure speed limits for maintenance vehicles are posted and adhered to; • Advise operations staff to avoid driving roads or undertaking maintenance activities in proximity to these features at night between April 1 st and June 30 th , and any rainy nights from spring to early autumn, wherever possible. • Maintain low speed limits of vehicles on access roads.	Operation Monitoring: • Where access roads are installed within 30m of amphibian breeding (woodland) habitat, but not within the feature itself, one year of post construction monitoring to be completed in the form of a presence/absence habitat use survey using the Marsh Monitoring Protocol (aural surveys). Where a reduction of 50% to the species/individuals is observed contingency measures as they relate to the operational phase of the access road will be implemented in consultation with MNR. • Where vegetation removals are proposed, monitoring for two years to ensure effective restoration of new

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
Wildlife WH-WN-08 Waterfowl Nesting	Operation of Turbine 11	<p>Operation</p> <ul style="list-style-type: none"> • Potential for collision with turbine during operation; • Avoidance/Disturbance from lights, sound, routine maintenance to turbine and/or road. 	<p>Operation</p> <ul style="list-style-type: none"> • Utilize a lighting scheme that will minimize bird (or bat) collisions. • Perform maintenance operations outside of sensitive breeding periods for waterfowl. 	<p>habitat edge and effective stabilization of soils.</p> <p>Contingency measures:</p> <ul style="list-style-type: none"> • Consult MNR for contingency measure where amphibian species/individuals decline by 50% compared to pre-construction results. • Replace failed plantings and institute controls of invasive species, if required. • Where compensation plantings are proposed, monitoring for two years to ensure effective establishment of compensation plantings. <p>Operation Monitoring:</p> <ul style="list-style-type: none"> • A 3 year Post-construction bird/bat monitoring program to be completed as per MNR guidance document (Bird and Bird Habitats Guidelines for Windpower Projects Appendix B) to include Turbine 11 in subsample for monitoring. • Implement contingency mitigation measures if mortality thresholds are exceeded based on results of post-construction monitoring as described in the EEMP.
Wildlife WH-MBB-12 Marsh Bird Breeding	Operation of Turbine 8.	<p>Operation</p> <ul style="list-style-type: none"> • Potential for collision with turbine during operation; • Disturbance from lights, sound, routine maintenance to turbine/and or road. 	<p>Operation</p> <ul style="list-style-type: none"> • Utilize a lighting scheme that will minimize bird (or bat) collisions. • Perform maintenance operations outside of sensitive breeding periods for herons (May 1 to July 31, or as determined through consultation with MNR) 	<p>Operation Monitoring:</p> <ul style="list-style-type: none"> • A 3-year post-construction bird/bat monitoring program to be completed as per MNR guidance document. • Implement contingency mitigation measures if mortality thresholds are exceeded based on results of post-construction monitoring.
Wildlife WH-	Operation of	Operation	Operation	Operation

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
ABWE-01 Amphibian Wetland Breeding Habitat	access road.	<ul style="list-style-type: none"> Disturbance from lighting; Incidental mortality/roadkill from operational vehicle movement; Disturbance from routine maintenance. 	<ul style="list-style-type: none"> Ensure lighting is directional and/or directed away from breeding habitat; Ensure speed limits (30km/h) for maintenance vehicles are posted and adhered to; Advise operations staff to avoid driving roads or undertaking maintenance activities 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 low speed limits of vehicles on access roads (30km/h). Movement corridors from woodland to wetland will be maintained if identified as present. 	<p>Monitoring:</p> <ul style="list-style-type: none"> Where access roads are installed within 30m of amphibian breeding (wetland) habitat, but not within the feature itself, one year of post construction monitoring to be completed in the form of a presence/absence habitat use survey using the Marsh Monitoring Protocol (aural surveys). Where a reduction of 50% to the species/individuals is observed contingency measures as they relate to the operational phase of the access road will be implemented. <p>Contingency measures:</p> <ul style="list-style-type: none"> Consult MNR for contingency measure where amphibian species/individuals decline by 50% compared to pre-construction results. <p>Monitoring:</p> <ul style="list-style-type: none"> Where vegetation removals are proposed, monitoring of vegetation for two years to ensure effective restoration of new habitat edge and effective stabilization of soils. <p>Contingency measures:</p> <ul style="list-style-type: none"> Replace failed plantings and institute controls of invasive species, if required.
Wildlife WH-CNTS-	Operation of Access road	<p>Operation</p> <ul style="list-style-type: none"> Impacts not anticipated above 	<p>Operation</p> <p>Not applicable</p>	<p>Operation</p> <p>Not applicable</p>

Feature ID	Project Phase & Activity within 120m of the Feature	Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
13 (Colonial Nesting Bird Breeding Habitat)		and beyond what is existing use of roadway by residents of the property		
Wildlife WH-SSC-ST-01 WH-SSC-ST-02 WH-SSC-ST-03 Species of Special Concern – Snapping Turtle	Operation of Turbine 8 and access road. Operation of collection line within the road right of way.	<p>Operation</p> <ul style="list-style-type: none"> Possible mortality of turtles moving between over-wintering ponds and other areas due to maintenance adjacent to Turtle Over-wintering Habitat. 	<p>Operation</p> <ul style="list-style-type: none"> Education of operations staff to be aware during maintenance activities in proximity to this feature in May, June, September or October. Maintain speed limits of vehicles near over-wintering pond. 	<p>Operation Monitoring:</p> <p>No additional monitoring or contingency measures required.</p>

Table 6-4: Mitigation Measures, Residual Effects and Monitoring Plan: Significant Features

Potential Effect	Performance Objectives	Mitigation Strategy	Residual Effects	Monitoring Plan and Contingency Measures
<p>Mortality and/or disturbance to Birds/Bats during operation of turbines.</p>	<ul style="list-style-type: none"> Minimize bird/bat mortality and/or disturbance resulting from turbine operation. 	<ul style="list-style-type: none"> Turbine locations have been chosen to minimize turbine-wildlife interactions. Utilize a lighting scheme on turbines that will minimize bird/bat collisions while still fulfilling Transport Canada requirements. Coordination of turbine shut down for maintenance with periods of high bird/bat activity. 	<ul style="list-style-type: none"> Mitigation is proposed to minimize risk of bird/bat collision with turbines. Monitoring during operation of turbines as outlined in <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNR, 2011) and <i>Bats and Bat Habitats: Guidelines for Wind Power Projects</i> (MNR, 2011) will determine significance of residual effects. 	<ul style="list-style-type: none"> Develop and implement a monitoring program for bird and bat mortality consistent with <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNR, December 2011) and <i>Bats and Bat Habitats: Guidelines for Wind Power Projects</i> (MNR, July 2011) to be conducted for three (3) years after the project has become operational. 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. A suitable sub-set (at least 1/3) of turbines will be searched approximately every 3 days (twice weekly) for bat and bird mortalities from May 1st to October 31st, and continue monthly for raptors until November 30. Turbines 10 and 11 to be included in the sub-set of turbines to be searched during post-construction bat mortality monitoring, in order to assess the impact of these turbines on treated as significant bat habitats (BMA-005 and BMA-006). Turbines 8 and 11 to be included in the sub-set of turbines to be searched during post-construction bird mortality monitoring, in order to assess the impact of these turbines on significant bird habitats (WH-MBB-12 and WH-WN-08). Searcher efficiency and carcass removal trials will be conducted in accordance with provincial guidelines for both bats and birds. <p>Contingency Measures:</p> <ul style="list-style-type: none"> Institute changes to turbine operation if bird/bat mortality thresholds are reached (e.g. feathering and blade speed reduction). 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.

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* and are described below.

6.3.1 Surface Water

Water features were first identified through the use of available background information for the Project Area as provided by agencies (MNR, MOE, Saugeen Valley Conservation Authority), municipalities (County of Grey, Municipality of West Grey), and available GIS data (NRVIS, LIO). Features were field verified during Site Investigation; as well, any new features fitting the definition of a water body under the Regulation were documented. Records Review indicated that many water features within the Saugeen Watershed occurred within 120m of the Project Location.

In all, more than 50 features were studied; however, a number of the features first identified in Records Review were found to counter the definition of a water body as indicated in O. Reg. 359/09 during Site Investigation surveys. For example, several dugout ponds and temporary drainage channels were identified within agricultural lands; in these cases the features were dropped from further study and addressed solely within the East Durham Wind Energy Centre Natural Heritage Assessment. The water features identified included ponds, small headwater streams, the Saugeen River and its tributaries, and seepage areas. The project location was not within 120m of a lake or 300m of a Lake Trout lake.

The bulk of the pond features identified were determined through Site Investigation to be natural features in the form of vernal pools and wetlands, or dugout ponds created for agricultural or recreational use. As this group did not meet the definition of a water body as defined by the Regulation, these features were assessed solely within the East Durham Wind Energy Centre Natural Heritage Assessment where potential impacts associated with the Project and proposed mitigation were also addressed through the Environmental Impact Study. All other features within 120m of the Project Location determined to be water features with an open water component and not dominated by hydrophytic plant communities were assessed and included in the WBR. Consideration of the distance to project components and water quality/water quantity function of the ponds identified as water features determined this group to be of moderate sensitivity to impacts resulting from Project activities. Ponds determined to comply with the O. Reg. 359/09 definition of a water body and within 120m of the project location were included in the Water Body Report where potential negative impacts and proposed mitigation for the phases of construction, operation and decommissioning were outlined.

The small headwater streams documented within 120m of the Project Location were generally warmwater systems characterized by either intermittent/perennial or permanent flow. Some of the features identified in Records Review were found to be tilled through and under active agricultural use, such that they did not meet the criteria for further assessment or inclusion in the WBR. The largest system within the study area was the Saugeen River; although it was classified in Records Review as a coldwater system by MNR, temperature data collected within 120m of the project location where a crossing is proposed for an underground electrical collection line suggested the river through that area is more characteristic of a cool water system. The next largest stream feature identified was Durham Creek, a coldwater tributary of the Saugeen River documented within 120m of an underground electrical collection line proposed along Baptist Church Road. The most sensitive stream features documented within 120m of the Project Location were the main channels of the Saugeen River and Durham Creek; and no in-water works are proposed for either water body. Several other smaller tributaries of the Saugeen were documented as crossing existing roads where an underground electrical collection line is proposed within the road right of way. All streams determined to comply with the O. Reg. 359/09 definition of a water body and within 120m of the project location were

addressed in the Water Body Report where potential negative impacts and proposed mitigation for the phases of construction, operation and decommissioning are outlined.

A combination of the Ecological Land Classification (ELC) data collected as part of the Natural Heritage Assessment (NHA) and the Site Investigation results for water assessments was used to identify seepage areas that met the definition outlined in O. Reg. 359/09. A total of 6 seepage areas were identified to be within 120m of the Project Location. Of these, 3 were located within 120m of underground electrical collection lines proposed within existing road right of ways, 2 were within 120m of access roads and associated underground electrical collection line, and 1 was within 120m of the construction disturbance limits for a turbine including the associated access roads and underground electrical collection line. None of the seepage areas identified was within 30m of a proposed turbine or transformer substation. Seepage areas determined to be within 120m of the project location were included in the Water Body Report where potential negative impacts and proposed mitigation for the phases of construction, operation and decommissioning were outlined.

In compliance with O.Reg. 359/09, a Water Body Report 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 and associated methodology, please refer to the Water Assessment and Water Body Report.

6.3.1.1 *Potential Effects*

Potential effects from operational and maintenance activities are described in **Table 6-5**.

6.3.2 Groundwater

A desktop study will be conducted to identify potential effects to the groundwater from the proposed turbine layout. Materials used include MOE Water Well Records, geological descriptions from the Ontario Geological Survey (OGS), air photos and GIS, as well as the turbine layout for the Project site and turbine construction details.

6.3.2.1 *Potential Effects*

Potential effects from operational and maintenance activities include:

- Increase in impervious surfaces from 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.
- 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 6-5** below.

Table 6-5: Summary of Potential Negative Effects and Proposed Mitigation Measures for Water Body Features

Potential Negative Effects to the Feature	Mitigation Measures	Performance Objectives, Monitoring and Contingency Plans
<p>Operation of Turbine and associated Access Roads and Underground Collection (where underground collection coincides with access roads)</p> <p>Soil / water contamination by oils, gasoline, grease and other materials (e.g., turbine lubricant oil from maintenance vehicles) resulting from turbine operation and maintenance.</p>	<p>Control soil / water contamination through Best Management Practices.</p> <p>Ensure machinery arrives on site in a clean, washed condition and is maintained free of fluid leaks.</p> <p>Develop a spill response plan outlining steps to contain any spills during maintenance activities to avoid contamination of water body features. Train staff on associated procedures and maintain emergency spill kits on site.</p> <p>Dispose of any waste material from maintenance activities by authorized and approved off-site vendors.</p> <p>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.</p> <p>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.</p> <p>Store any stockpiled materials away from natural features to prevent deleterious substances from inadvertently discharging to the environment.</p> <p>Minimize land contour changes.</p>	<p>Monitoring:</p> <ul style="list-style-type: none"> Conduct regular site inspections and monitoring of turbines by a designated on-site Environmental Monitor(s). <p>Contingency Measures:</p> <ul style="list-style-type: none"> 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.
<p>Changes to surface water drainage patterns resulting from turbine and access road construction causing change in streamflow.</p>	<p>No watercourses within 30m of turbines and associated underground collection and access roads; therefore, impacts/mitigation/ monitoring will occur as part of the prescriptions for the significant natural features as identified in the Natural Heritage Assessment prepared for the East Durham Wind Energy Centre (LGL, 2012).</p>	<p>No additional monitoring of contingency measures proposed beyond what is prescribed in the Natural Heritage Assessment prepared for the East Durham Wind Energy Centre (LGL, 2012).</p>
<p>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.</p>	<p>A minimum setback of 30m is adhered to for all water bodies.</p> <p>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).</p> <p>Direct runoff from the constructed impervious surfaces to ground surface to prevent any decrease in infiltration and recharge.</p>	<p>No additional monitoring or contingency measures required beyond those stated above.</p>
<p>Operation of Underground Electrical Collection Lines No negative impacts to water bodies and 30m of surrounding land are anticipated through the operational phase of underground electrical collection lines.</p>		

Note: no water bodies are located within 120m of the proposed substation.

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 (CO₂, methane).
- Dust as a result of vehicle traffic over gravel roads and/or cleared areas.

No effects from the emission of odour are anticipated.

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

Table 6-6 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.	<ul style="list-style-type: none"> • Limit impact of maintenance vehicles on local air quality. 	<ul style="list-style-type: none"> • Ensure all engines (vehicles and generators) meet emission requirements specified by the MOE and MTO. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Limit dust production from maintenance vehicles. 	<ul style="list-style-type: none"> • Limit speed of maintenance vehicles to minimize dust generation. 	<ul style="list-style-type: none"> • Dust from vehicular traffic minimized through application of mitigation measures. • Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles. 	<ul style="list-style-type: none"> • 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 was conducted to identify these effects; the study and its results are presented in **Appendix D**.

Noise modelling conducted for the Noise Study Report determined that the Project layout is in compliance with all of the requirements outlined in *O. Reg. 359/09*, and the MOE "Noise Guidelines for Wind Farms (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.). 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 the cumulative noise effects of the Project and other existing wind farm projects within 5 km were modelled. This assessment also considered any wind farms which have not yet been constructed but have a published site plan. Following consultation with MOE and area municipalities, it was determined that there are no wind farms planned or existing within 5 km of the 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 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 6-7 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.	<ul style="list-style-type: none"> • Limit noise levels to <40 dBA at non-participating receptors. 	<ul style="list-style-type: none"> • Adhere to noise setbacks. • Repair equipment in a timely manner. 	<ul style="list-style-type: none"> • Noise levels experienced by receptors (residents located on non-leased properties) due to turbine operation will be below 40 dBA . 	<ul style="list-style-type: none"> • Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). • Contingency Measures <ul style="list-style-type: none"> ▪ 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.	<ul style="list-style-type: none"> • Limit noise level to < 40 dBA at non-participating receptors. 	<ul style="list-style-type: none"> • Adhere to noise setbacks (greater than 550 m). • Repair equipment in a timely manner. • Install a 5 m high noise barrier around the transformer substation to comply with MOE noise limits. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 metres of the 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 West Grey include cash crops (e.g., soybeans, corn and wheat), hay, hobby farming, maple syrup production, woodlots and livestock farming. Other land uses include non-farm residential uses on separate lots created through severances for home building lots, surplus farm dwelling lots and older estate lots, which are scattered throughout the Study Area in limited numbers.

Recreational land uses within the Project Study Area include fishing on the Saugeen River system, which flows throughout the project area, and the region also hosts an active hunting community for deer and fowl. Areas within the Study Area are used by residents for camping, religious retreats and winter sports, such as snowmobiling, cross-country skiing, and snowshoeing. Although there are not many organized public recreation resources within in the Project Study Area a number of hiking trails, canoe routes, and conservation areas exist in the vicinity, such as, the Durham Conservation Area, Moss Lake Conservation Area, Saugeen Conservation Areas, Saugeen Canoe Route, Beaver Valley Bruce Trail and the Flesherton Walking Village Initiative.

The Project will provide an increased municipal tax base for the Municipality of West Grey, 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.

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.
- Damage to crops or trees due to turbine malfunction or failure associated with 5 turbines that are located within 80 metres of neighbouring property lines (refer to **Appendix G - Property Line Setback Assessment Report**).

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).
- 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 6-8 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.	<ul style="list-style-type: none"> • Minimize reduction of farmland. 	<ul style="list-style-type: none"> • Minimize length of access roads where possible. • Consult with landowners to place infrastructure so as to minimize impacts to farming practices. • Compensate landowners on Project Location as per land lease agreement. • Limit road width during operations to 6 m. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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.	<ul style="list-style-type: none"> • Limit aesthetic impact of turbines where possible. 	<ul style="list-style-type: none"> • Adhere to setback requirements. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • No monitoring or contingency measures required.
Stray voltage effects to livestock.	<ul style="list-style-type: none"> • Minimize effects of stray voltage on livestock. 	<ul style="list-style-type: none"> • Build and maintain Project as prescribed by the Distribution System Code and the Electrical Safety Authority to minimize the risk of stray voltage. 	<ul style="list-style-type: none"> • Stray voltage effects to livestock. • Low likelihood and limited magnitude expected based on existing wind farm operations. 	<ul style="list-style-type: none"> • 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 5 turbines located within 80 metres of neighbouring property lines	<ul style="list-style-type: none"> • Minimize damage to crops or trees due to turbine malfunction or failure. 	<ul style="list-style-type: none"> • Ensure ongoing regular maintenance and monitoring of turbines. • Implement shutdown mechanisms and protocols in extreme weather instances to prevent damage to wind turbines. 	<ul style="list-style-type: none"> • Damage to crops or trees minimized through mitigation measures • No likelihood of effect as a result of mitigation strategy. 	<ul style="list-style-type: none"> • No monitoring or contingency measures required.

6.7 Other Resources

There are authorized aggregate resources located within the Project Study Area. There are no landfill or forest resources located within the Project Location. There is a closed landfill site on the west side of Baptist Church Road south of North Line, approximately 50 m from the proposed collection line and approximately 400 m from the nearest proposed turbine to the landfill property boundary. There is no project infrastructure located within 75 m of a petroleum resource.

6.7.1 Potential Effects

No effects on aggregate resources are anticipated as a result of the operation of the Project due to the distance between the project and these resources. In addition, there are no effects on landfills or forest resources or petroleum wells as none are present within the Project Location.

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 6-7** below.

Table 6-9 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.	<ul style="list-style-type: none"> • No public health and safety incidents. 	<ul style="list-style-type: none"> • Adhere to setback requirements to limit likelihood of any impacts. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 proposed East Durham 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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