North Kent Wind 1 Project

Project Description Report

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Acronyms and Abbreviations

ANSI	Area of Natural and Scientific Interest
BMPs	Best management practices
CMOH	Chief Medical Officer of Health
dBA	Decibels
EEMP	Environmental Effects Monitoring Plan
EIS	Environmental Impact Study
GHGs	Greenhouse gases
Hydro One	Hydro One Networks Inc.
IESO	Independent Electricity System Operator
km	Kilometres
kV	Kilovolts
L/day	Liters per day
LTVCA	Lower Thames Valley Conservation Authority
m	Metres
m^2	Metres squared
m/s	Metres per second
MBCA	*Migratory Birds Convention Act*
MNRF	Ontario Ministry of Natural Resources and Forestry
MOECC	Ontario Ministry of the Environment and Climate Change
MTCS	Ontario Ministry of Tourism, Culture and Sport
MW	Megawatts
NHA	Natural Heritage Assessment
North Kent Wind 1	North Kent Wind 1 LP, by its general partner, North Kent Wind 1 GP Inc.
O. Reg.	Ontario Regulation
OEB	Ontario Energy Board
Pattern Development	Pattern Renewable Holdings Canada ULC
PDR	Project Description Report
Project	North Kent Wind 1 Project
PSA	Project Study Area
REA	Renewable Energy Approval
Samsung Renewable Energy	Samsung Renewable Energy Inc.
SARA	*Species at Risk Act*
SCADA	Supervisory Control and Data Acquisition
SCRCA	St. Clair Region Conservation Authority
SFL	Sustainable Forest Licence
SRP	Spill Response Plan
SWH	Significant Wildlife Habitat

1. Introduction

1.1 Name of Applicant

In May, 2009, the Government of Ontario passed the *Green Energy and Green Economy Act* and Ontario Regulation (O. Reg.) 359/09, as amended. Under the amended O. Reg. 359/09, the North Kent Wind 1 Project (the Project) will require a Renewable Energy Approval (REA). The REA integrates previous requirements under the *Environmental Assessment Act* with provincial rules and standards under the *Environmental Protection Act*.

The North Kent Wind 1 Project is being proposed by North Kent Wind 1 LP, by its general partner, North Kent Wind 1 GP Inc. (North Kent Wind 1). North Kent Wind 1 is a joint venture limited partnership owned by affiliates of Pattern Renewable Holdings Canada ULC (Pattern Development) and Samsung Renewable Energy Inc. (Samsung Renewable Energy).

This Project has been proposed in response to the Government of Ontario's plan to integrate more renewable energy into the province's power grid. This Draft Project Description Report (PDR) has been prepared in accordance with Item 10 of Table 1 in O. Reg. 359/09, as amended (MOECC, 2013).

1.1.1 Summary of Project Description Report Requirements

The requirements for the Draft PDR defined under O. Reg. 359/09, as amended, are outlined in **Table 1-1.** Information about the requirements of the reports identified in Table 1-1 is also provided throughout this report.

Table 1-1: Adherence to Project Description Report Requirements under O. Reg. 359/09, as Amended

Requirement	Completed	Corresponding Section
Description of any energy sources to be used to generate electricity at the renewable energy generation facility.	Yes	Section 1.4
Description of the facilities, equipment or technology that will be used to convert the renewable energy source or any other energy source to electricity.	Yes	Section 2
The class of the renewable energy generation facility.	Yes	Section 1.4
Description of the activities that will be engaged in as part of the renewable energy project.	Yes	Section 3
The nameplate capacity of the renewable energy generation facility.	Yes	Section 1.4
The ownership of the land on which the Project Location is to be situated.	Yes	Section 1.3
Description of any negative environmental effects that may result from engaging in the Project.	Yes	Section 4
An unbound, well-marked, legible and reproducible map that is an appropriate size to fit on a 215 mm by 280 mm page, showing the Project location and the land within 300 m of the Project location.	Yes	Figure 1 of this Report.

This Draft PDR, along with the rest of the draft REA reports were provided to the Municipality of Chatham-Kent 90 days in advance of the second public meeting. It was also provided to Aboriginal communities, government agencies and the public for review 60 days in advance of the second public meeting. These timelines align with the distribution requirements outlined in O. Reg. 359/09, as amended, and the *Technical Guide to Renewable Energy Approvals* (MOECC, 2013).

1.2 Project Location

According to O. Reg. 359/09, as amended, the Project Location is “a part of land and all or part of any building or structure in, on, or over which a person is engaging in or proposes to engage in the project and any air space in which a person is engaging in or proposes to engage in the project”. As described therein, the Project Location boundary is the outer limit of where site preparation and construction activities will occur (i.e., disturbance areas described below) and where permanent infrastructure will be located, including the air space occupied by turbine blades.

North Kent Wind 1 is proposing to develop a wind energy project located north of the City of Chatham in the Municipality of Chatham-Kent, Ontario. The Project will be located on both public and private lands. The location of the Project was developed based on interest expressed by local landowners, municipal support for the Project, the availability of wind resources, and the availability of existing infrastructure for connection to the electrical grid.

The Project is generally bounded by Oldfield Line to the north, Bear Line Road to the west, Pioneer Line and Pine Line / Darrell Line to the south and Centre Side road and Caledonia Road to the east. The area encompassed by these boundaries is referred to as the Project Study Area (PSA). **Figure 1-1**, below, shows a map of the PSA. To see the location of the Project within Ontario, please see **Figure 1-2**.

Figure 1-1: Project Study Area

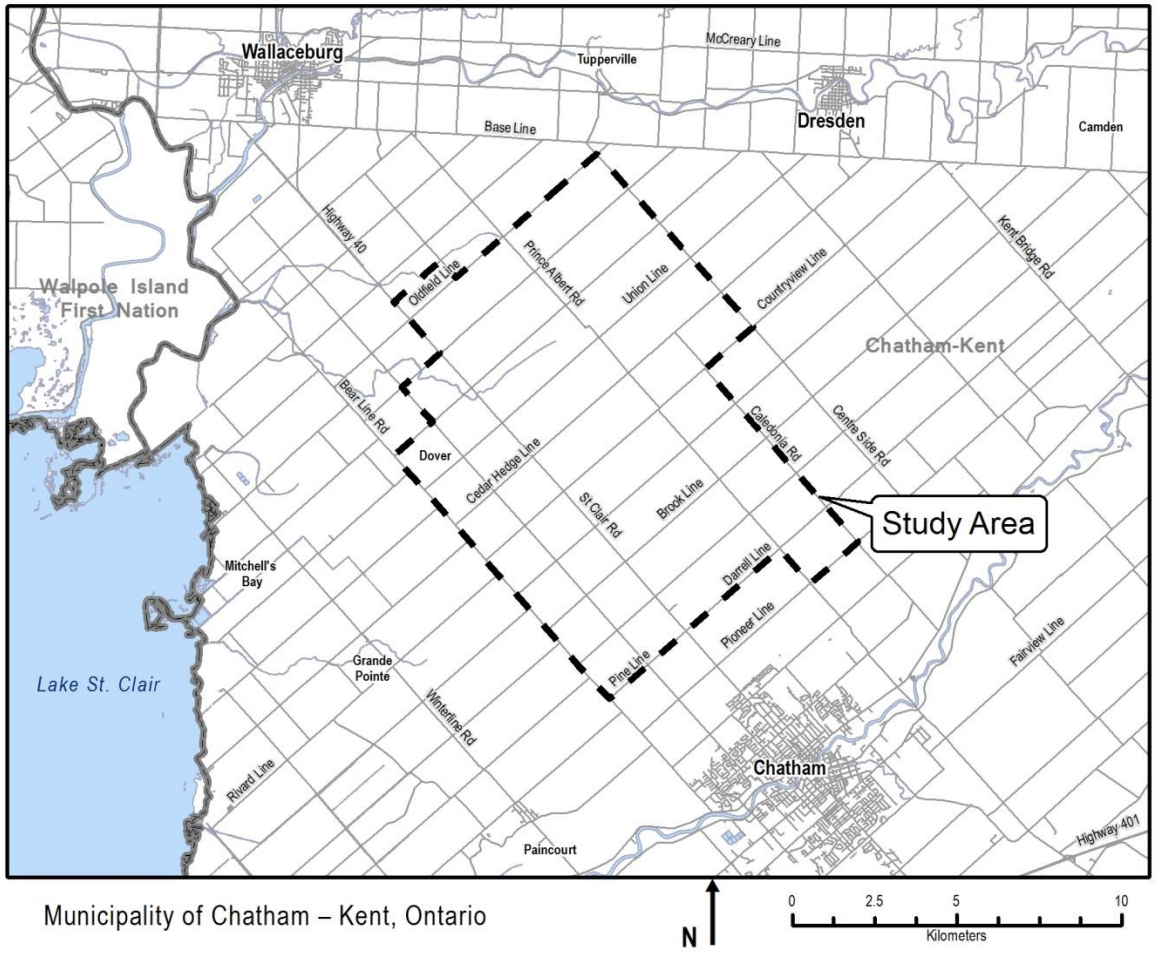
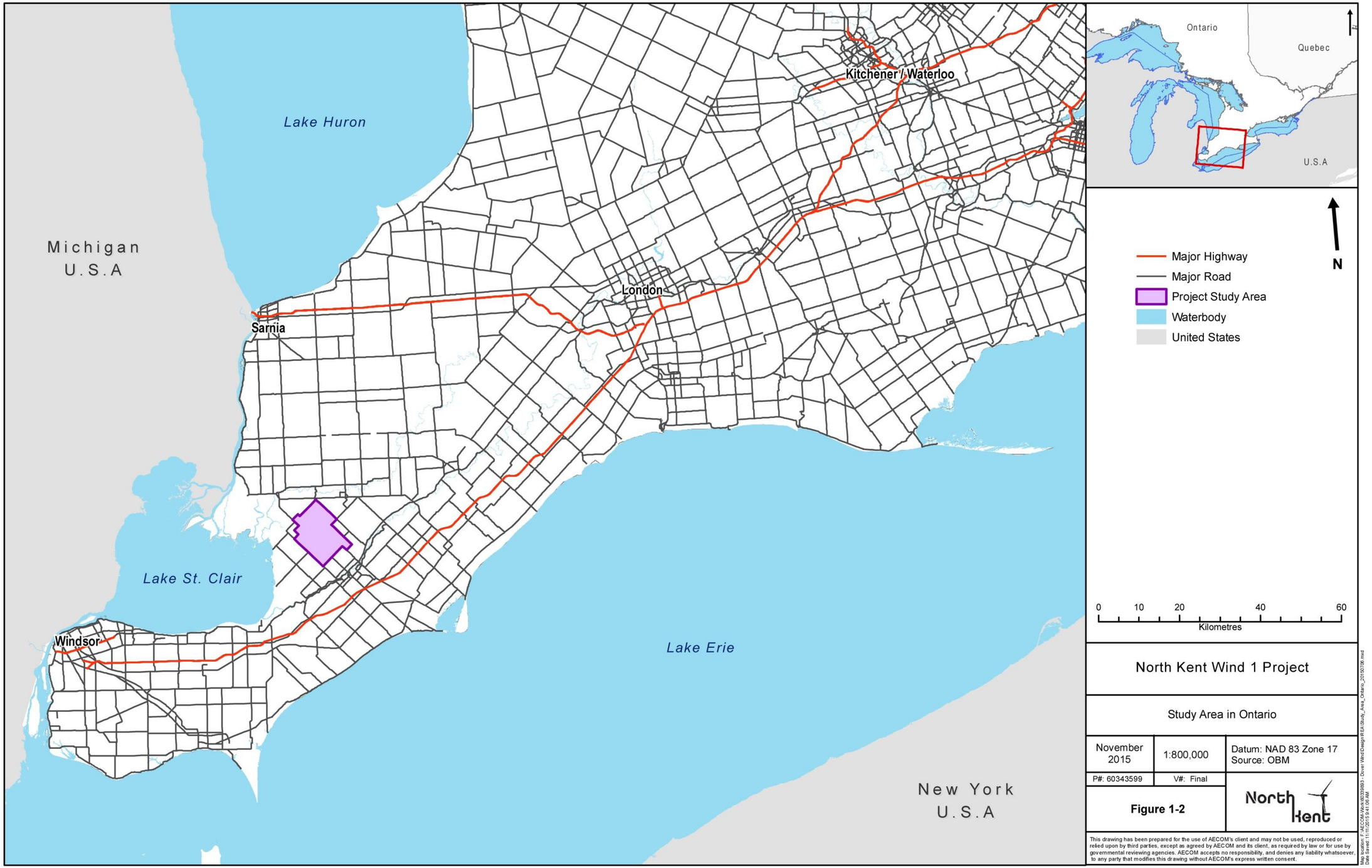


Figure 1-2: Study Area in Ontario



The PSA covers approximately 30,400 acres[1] of land that is predominantly designated for agricultural use according to the Municipality of Chatham-Kent's Official Plan (2014). The PSA also consists of fragmented areas of forest and riparian habitat associated with small creeks or farm drains. The PSA represents the area being assessed as part of the REA process. The following co-ordinates define corners of the external boundaries of the PSA:

Table 1-2: External Boundaries of the Project Study Area

Longitude	Latitude
-82.270	42.573
-82.343	42.490
-82.262	42.424
-82.171	42.468

1.3 North Kent Wind 1 Land Ownership

The Project will be located on public and privately owned land with some components (e.g., electrical collector lines) being placed along public right-of-ways. The Project is not located on Crown land. Legal descriptions of the land parcels to be used for the Project are provided in **Appendix A** of this report.

1.4 Description of Energy Source, Nameplate Capacity and Class of the Facility

The Project will use wind to generate energy through the use of commercial wind turbine technology. The proposed wind turbine technology for this Project is the Siemens SWT-3.2-113 turbine. As a note, the total number of turbines is dependent on the type(s) of turbines that will be used, the individual megawatts (MW) generation capacity of each turbine, and potential changes to the overall nameplate capacity. With a nameplate capacity of up to 100 MW, the Project is categorized as a Class 4 wind facility and will be in compliance with the requirements outlined for such facilities in O.Reg. 359/09.

A total of 46 turbine locations are being permitted for the Project and no more than 36 turbines will be constructed. It is important to note that the final number of turbines constructed depends on the nominal rating of each turbine.

A summary of key Project information is presented in **Table 1-3** below.

Table 1-3: Summary of Key Project Information[2]

General	*Project Name:*	North Kent Wind 1 Project
	Project Ownership and Operation:	North Kent Wind 1 LP
	Project Lifespan (Commercial Operation):	20 Years
	Project Nameplate Capacity:	Up to 100 Megawatts (MW)

1. *Metric units are used throughout REA reports when describing the size of Project infrastructure, except in instances describing areas of land. When describing land size, acres (imperial) will be used rather than hectares (metric) because it is the measuring unit most commonly used by the local community. It is assumed that 1 hectare of land is equal to 2.47 acres of land.*
2. *Dimensions are near approximations.*

Table 1-3: Summary of Key Project Information[2]

Project Area *(as shown in **Figure 2-1**)*	*Location of Project:*	Public and privately-owned land and public road allowances in the Municipality of Chatham-Kent
	Total Project Study Area:	30,400 acres
	Estimated Total Permanent Area of Project Location:	140 acres
Wind Turbine Generators	*Make and Model:*	Siemens SWT-3.2-113
	Total Number Permitted:	46 turbines
	Approximate Number Constructed:	36 turbines
	Nominal Turbine Power:	2.772 to 3.2 MW
	Number of Blades:	3
	Blade Length:	55 metres (m)
	Hub Height:	99.5 m
	Rotor Diameter:	113 m
	Cut-in Wind Speed:	3 to 5 metres per second (m/s)
	Cut-out Wind Speed:	32 m/s
	Rated Wind Speed:	12 to 13 m/s
	Swept Area:	10,000 metres squared (m^2)
	Foundation Dimensions:	25 m diameter
Access Roads	*Access Roads – Operations (includes shoulder, travel width and ditch):*	31 kilometres (km) x 8 to 12 m
	Access Roads – Construction (with shoulder):	31 km x 8 to 15 m
Collector Lines	*34.5 kilovolts (kV) Collector Lines in Public Right-of-way (total combined length of proposed underground and/or overhead):*	160 km x 2 to 6 m
	34.5 kV Collector Lines on Private Lands (underground):	31 km x 2 to 6 m
Other Project Structures and Facilities	*Collector Substation:*	10 acres
	Operations and Maintenance Building:	7 acres
	Interconnection Station/ Point of Interconnect:	10 acres
	Meteorological Towers:	Up to 2
	Microwave Tower:	1
Temporary Land Use *(Construction Phase)*	*Construction Staging Areas:*	10 to 15 acres
	Wind Turbine Laydown Area (each turbine):	Up to 5 acres
	Crane Pads:	0.2 acres

1.5 Contact Information

Applicant:

As noted above, North Kent Wind 1 is a joint venture limited partnership owned by affiliates of Pattern Development and Samsung Renewable Energy. The contacts for the Project are as follows:

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Project:

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Project website: www.northkentwind.com

1.6 Other Approvals and Authorizations Required

1.6.1 Provincial Permits and Authorizations

Based on the requirements of the *Green Energy and Green Economy Act*, the Project may require provincial authorizations listed in the table below.

Table 1-4: Ontario Authorizations and Permits

Permit / Authorization	Administering Agency	Rationale
Renewable Energy Approval Application - O.Reg. 359/09	Ministry of the Environment and Climate Change	Renewable energy project approval
Archaeological Clearance*	Ministry of Tourism, Culture and Sport	Archaeological and heritage resources
Public Lands Act* work permit	Ministry of Natural Resources and Forestry	Project may cross watercourses that are considered public lands
Natural Heritage Assessment*	Ministry of Natural Resources and Forestry	Natural heritage resources
Notice of Activity for Newly Listed Species and Wind Facilities Operations	Ministry of Natural Resources and Forestry	Species-at-risk and their habitats that may be affected by construction or operation of the wind project
Fill, Construction & Alteration of Waterways Development, Interference with Wetlands and Alterations to Shorelines and Watercourses – O. Reg. 169/06	Conservation Authorities (St. Clair Region Conservation Authority / Lower Thames Valley Conservation Authority)	Work within floodplains, water crossings, river or stream valleys, hazardous lands and within or adjacent to wetlands
Encroachment Permit	Ministry of Transportation	Crossing of provincial highways
Land use Permit	Ministry of Transportation	Project works undertaken within 395 m of a Ministry of Transportation controlled intersection
Commercial Access Permit	Ministry of Transportation	Ingress / egress from provincial highway
Change of Access & Heavy / Oversize Load Transportation Permit	Ministry of Transportation	Compliance with provincial highway traffic and road safety regulations
Special Vehicle Configuration Permit	Ministry of Transportation	Use of non-standard vehicles to transport large components

Permit / Authorization	Administering Agency	Rationale
Notice of Project	Ministry of Labour	Notification to the Ministry of Labour before construction begins
Leave-to-Construct	Ontario Energy Board	Development of a high-voltage transmission facility
Generator's Licence	Ontario Energy Board	Generator Operation Permit
Transmitter Licence	Ontario Energy Board	Transmission of electrical power to interconnect with provincial grid
Customer Impact Assessment	Hydro One Networks Inc.	Evaluation of potential effects to existing electrical customers
System Impact Assessment	Independent Electricity System Operator (IESO)	Potential effects of integrating the Project within provincial transmission system
Approval of Connection	Independent Electricity System Operator	Electrical interconnect with IESO regulated network
Connection Assessment	Independent Electricity System Operator	Integration of Project with IESO-controlled transmission system
Certificate of Inspection	Electrical Safety Authority	Ensure work complies with the Ontario Electrical Safety Code

*Note: * Permits covered under REA process.*

1.6.2 Municipal Permits and Authorizations

In addition to the provincial requirements listed in the table above, the Project will require a number of municipal permits and approvals. Although the list is not exhaustive, **Table 1-5** lists a number of the permits and approvals that may be required from the Municipality of Chatham-Kent prior to construction.

Table 1-5: Municipal Authorizations and Permits

Permit / Authorization	Rationale
Entrance Permit	Ingress / egress from municipal roads
Drainage Permit	Required for crossings of municipal drains
Building Permit	Compliance with Ontario Building Code
Road Occupancy Permit	Required for work in municipal road allowances
Consent / Severance Application	Required if easements over private lands are required
Road Cut Permit	May be required for access roads off of county roads or works to county roads
Supporting Information / Plans for General Engineering to Support the North Kent Wind 1 Project	Supporting information / plans that may be required by the Municipality of Chatham-Kent

1.6.3 Federal Permits and Authorizations

The Project will require a number of permits and approvals from the federal government prior to construction. **Table 1-6** lists federal authorizations and permits that may be required for the Project. These authorizations and permits will be determined through the REA process and will be obtained, if required. An environmental assessment under the *Canadian Environmental Assessment Act* is not anticipated to be required as wind projects are not on the list of designated projects under the Act (Government of Canada, 2013).

Table 1-6: Federal Authorizations and Permits

Permit Authorization	Administering Agency	Rationale
Aeronautical Obstruction Clearance	Transport Canada – Aviation Division	Required for turbine marking and lighting
Land use Clearance	NAV Canada	Required for aeronautical safety mapping and designation
Navigational Clearance	Transport Canada - Marine Division	Required if crossing a navigable watercourse
Fisheries Act	Fisheries and Oceans Canada	Required if the Project causes serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or that support such a fishery

In addition, future natural heritage field work will confirm the need for the Project to obtain an authorization or permit associated with the Species *at Risk Act* (SARA) and *Migratory Birds Convention Act* (MBCA).

2. Project Components and Ancillary Facilities

A description and listing of Project components and temporary Project components are outlined below in **Table 2-1** and **Table 2-2**, respectively.

Table 2-1: Description of Project Components

Component	Description
Wind Turbine Generators	• The Project will include commercial wind turbines, which are expected to be the Siemens SWT-3.2-113 turbine or similar turbine, with a nominal power up to 3.2 MW. The wind turbine nacelle includes the electric generator, wind direction and speed sensors and auxiliary equipment. These components are located at the top of a supporting tower and are connected to three blades and a hub via a main shaft.
Wind Turbine Foundation	• Each turbine tower is anticipated to have a concrete foundation up to approximately 25 m wide and 3 m deep. The land base of each turbine foundation will be dependent on subsurface conditions determined during geotechnical investigations. Following geotechnical investigations it may be determined that pile type foundations may be suitable for certain locations; otherwise a spread-footing type foundation will be constructed.
Pad-mounted Transformers	• A pad-mounted transformer will be located immediately adjacent to each wind turbine. This transformer 'steps-up' the electricity generated by the wind turbine to a common electrical collector line voltage (34.5 kV).
Wind Turbine Access Roads	• During construction and operation of the proposed Project, roads are required in order to access wind turbine locations. Access roads will be constructed of native materials or engineered fill and will be developed to accommodate cranes and transportation equipment used to deliver wind turbine components. Following the construction phase, roads may be reduced in size, which would allow access to turbines and associated infrastructure for maintenance and repairs.
Collector Lines	• Collector lines carry the electricity from the pad-mounted transformers to the Project collector substation (described below). The collector lines will be 34.5 kV standard utility generator lines buried on private property, where possible, from the turbines to the public road allowance. Within the public road allowance, where possible, the electrical collector lines will remain underground. Where possible, underground electrical collector lines will be installed within the access road disturbance area in order to minimize the area of disturbed land. Underground electrical collector lines will be buried at a minimum depth of approximately 1.2 m. It is anticipated that farming practices will not be affected by the underground collector lines due to the depth of the lines and location of installation being adjacent to access roads. • If aboveground electrical collector lines are required, they will be constructed on hydro pole structures that are similar to existing electrical distribution lines in the PSA. • Where two or more underground collector lines must be connected together, a junction box will be installed either below or aboveground. Junction boxes may contain equipment related to splices, junctions, cable splices and disconnect switches.
Collector Substation	• A collector substation is required to bring together all of the underground and aboveground electrical collector lines. The collected power will be transformed from the electrical collector line voltage (34.5 kV) to a transmission voltage (230 kV). • The collector substation is proposed to be located adjacent to the existing Hydro One Networks Inc. (Hydro One) transmission line on private property north of Eberts Line and east of Prince Albert Road. • The collector substation will be constructed on a raised pad or a prepared base of engineered fill. The substation will comply with the noise requirements specified in O. Reg. 359/09, as amended. • Collector substation equipment may include an isolation switch(es), circuit breaker(s), step-up power transformer(s), distribution switch-gear(s), instrument transformers, capacitor banks, communication equipment, Supervisory Control and Data Acquisition (SCADA) equipment, protection and control equipment, grounding transformers, grounding grid, revenue metering (conforming to IESO market rules), substation grounding and a control building. Substation grounding will follow the Ontario Electrical Safety Code. A secondary containment system will be installed at the site to prevent soil contamination in the event of a leak.
Microwave Tower	• A microwave tower used for communication purposes may be constructed within the substation construction disturbance area and/or the interconnection station/ point of interconnect location. If required, the microwave tower may be up to 100 m tall and will likely be installed by a single crane; soil conditions and space requirements will determine whether the tower will be steel-lattice or guyed.
Meteorological Towers	• Up to 2 permanent meteorological towers, each up to 100 m in height, are proposed to be constructed and will consist of either a monopole or lattice structure depending on soil conditions. These meteorological towers may be constructed on a concrete foundation or they may be guyed. During construction and operations of the proposed Project, access roads are required in order to access meteorological towers. The design of the roads will be consistent with the wind turbine access roads described above. • Permanent meteorological towers are an operational requirement of the IESO for all electricity market participants (this includes all generators of electricity) and allow the IESO to operate the system in a reliable and safe manner. The use of meteorological data are crucial to the safe and efficient operation of a wind project as they aid in operational decisions including the wind speed at which a turbine 'cuts-in' / 'cuts-out' and provide warning in extreme weather conditions (e.g., icing conditions) to ensure turbine shutdown occurs in advance of an extreme weather event at the turbine location.

Table 2-1: Description of Project Components

Component	Description
Interconnection Station/ Point of Interconnect (Connection to Electrical Grid)	• The interconnection plan for any wind project is subject to study, design and engineering by the IESO which manages the province's electricity grid, Hydro One Networks Inc. (Hydro One) which owns the transmission lines, the local hydro distribution company and the Ontario Energy Board (OEB), which regulates the industry through the Transmission System Code and the Distribution System Code. • The interconnection station/ point of interconnect includes the point of interconnection, which will require modifications to the existing transmission line and may include circuit breakers, isolation switches, transmission switchgear, instrumentation, grounding, metering equipment and other equipment typical of such systems.
Operations and Maintenance Building	• An operations and maintenance building will be constructed to accommodate offices, kitchen / dining facilities, washroom facilities, control facilities, storage space, maintenance work area and a parking area and will be located within the PSA. • The operations and maintenance building will be constructed on a concrete foundation. An access road to the operations and maintenance building from a municipal road will be constructed to accommodate construction equipment and on-site traffic during the operation of the Project. • The operations and maintenance building will be powered by the local distribution company, with an on-site backup power supply. It is anticipated that the power will be delivered via overhead poles installed adjacent to the access road and will terminate on a transformer pole adjacent to the operations and maintenance building. As a note, the back-up power supply will only be used during power outages when the electrical local distribution company (LDC) is unable to provide electricity to the building. The primary source of power for the Operations and Maintenance Building will be supplied by the LDC and the back-up power supply will be sized to handle the short-term and infrequent requirements for power in emergency situations.

To facilitate the construction of the proposed Project, a number of temporary construction components are required. These temporary components, described further in **Table 2-2** below, include crane pads, turbine laydown areas and a construction staging area.

Table 2-2: Description of Temporary Project Components

Component	Description
Crane Pads	• Crane pads will be constructed in tandem with wind turbine access roads. Crane pads will be located directly adjacent to wind turbine locations and within the associated construction disturbance area. The crane pad area will be approximately 0.2 acres, and will consist of a mixture of heavier granular material, native materials and engineered fill, as appropriate. • Portions of the crane pad will remain following construction for use during the operations phase for the Project for deliveries and maintenance activities. Areas not required for maintenance will be restored so that pre-existing land uses can continue. During decommissioning portions of the crane pads that are restored may be reconstructed, if required.
Wind Turbine Laydown Areas	• Laydown areas adjacent to wind turbine locations will be incorporated into the disturbance area for each turbine. Each wind turbine laydown area is approximately 5 acres and will allow for temporary turbine component storage during construction. Temporary wind turbine laydown areas will be restored following construction activities so that agricultural activities can continue.
Construction Staging Area	• A temporary construction staging area will be located within the PSA. The construction staging area will consist of compacted surface material suitable for vehicular traffic. The depth of the material required will vary and will be dependent upon conditions encountered during the time of construction. The construction staging area will primarily serve the following aspects of the Project construction: ▪ Construction equipment storage and maintenance; ▪ Laydown areas for Project components; ▪ Location of Project construction offices; ▪ Parking areas for Project staff; ▪ Portable generators; ▪ Waste disposal containers; ▪ Self-contained temporary toilet facilities; and ▪ Water and rinsing facilities. • Following Project construction, the temporary construction staging area will be restored to pre-existing conditions so that previous land use can continue. Construction offices and temporary storage of Project equipment may also occur in pre-existing areas used for commercial and industrial purposes.

3. Project Activities

The following sections outline the anticipated activities for the pre-construction, construction, operation and decommissioning phases of the Project. Further information relating to Project activities will be provided in the Construction Plan Report, the Design and Operations Report and the Decommissioning Plan Report and will be submitted as part of the Project's REA Application.

3.1 Project Schedule

The schedule below in **Table 3-1** outlines the anticipated timelines for the Project:

Table 3-1: Project Milestones

Project Milestone	Anticipated Date
Host Public Meeting #1	Summer, 2015
Complete Environmental Studies and Reporting	Summer, 2015
Host Public Meeting #2	Fall, 2015
Submit REA Application	Fall, 2015
Obtain Pre-Construction Permits	Spring / Summer, 2016
Start Construction	Summer / Fall, 2016
Commence Operations and Maintenance	Fall, 2017
Decommission Project	2037

3.2 Pre-Construction

During the pre-construction phase of the Project, primary activities include optioning of lands, preliminary engineering, geotechnical assessment and site surveys of the proposed turbine locations, procurement of turbine and substation equipment, permitting and detailed design. North Kent Wind 1 will continue to communicate and engage landowners in the development of the site plans for the Project.

The REA process is the primary approval requirement in the pre-construction phase of the Project. For the permits and authorizations listed in **Section 1.6,** North Kent Wind 1 will work directly with the respective federal, provincial and municipal authorities to ensure requirements are met. North Kent Wind 1 will also continue to work closely with Project engineers, environmental and cultural specialists, as well as local landowners and First Nation and Aboriginal communities throughout the development of the Project.

3.3 Construction

Construction of the Project is scheduled to begin in summer / fall 2016 and is planned to be completed by the fall of 2017. For detailed information regarding construction and installation activities, please refer to the Construction Plan Report, provided under a separate cover. During site preparation and construction of the proposed Project, the following key activities will be undertaken:

- Preparation of temporary work areas, including clearing and grubbing of vegetation;
- Upgrading of existing access roads and construction of new access roads;
- Site grading, as necessary;
- Preparation and establishment of construction staging areas;
- Preparation of the collector substation laydown area;
- Delivery of construction vehicles and equipment;

- Excavation and installation of wind turbine foundations;
- Installation of crane pads and turbine laydown areas;
- Erection of wind turbines;
- Installation of pad-mounted transformers;
- Installation of electrical collector lines on private lands and/or in municipal road allowances;
- Construction of collector substation;
- Installation of microwave, if required, and meteorological towers;
- Construction of an interconnection station/ point of interconnect on private lands;
- Construction of operations and maintenance building; and
- Reclamation of construction laydown and staging areas.

3.4 Operations and Maintenance

Operation of the Project is expected to begin in late 2017. The operational lifespan of the Project is approximately 20 years, unless otherwise extended. The operation of the proposed Project is anticipated to require up to 15 trained technical and administrative staff, including turbine maintenance technicians and a site supervisor. During operation of the proposed Project, on-site activities will be limited primarily to scheduled maintenance of the Project components. For information regarding design and operations activities, refer to the Design and Operations Report.

During operations and maintenance of the proposed Project, the following key activities will be undertaken:

- Preventative and unplanned maintenance of Project components;
- North Kent Wind 1 staff transport;
- Natural heritage field monitoring;
- Field monitoring to evaluate the performance of the Project components and to conduct investigations / field visits to follow-up with any complaints received by North Kent Wind 1;
- Meter calibrations;
- Remote operation of the wind turbines; and
- Grounds maintenance in the vicinity of Project components.

3.5 Decommissioning

During the Decommissioning Phase of the Project wind turbine structures will be removed to the base of the foundation and portions of the foundations will be excavated and backfilled with subsoil and topsoil to allow agricultural activities to continue. Access road removal will be dependent on the requirements and agreements in place with individual landowners. Impacted lands will be restored to a state similar to pre-existing conditions. Decommissioning procedures will be similar, but in reverse order to those carried out in the construction phase. For further information regarding decommissioning activities, refer to the Decommissioning Plan Report.

Key decommissioning activities associated with the proposed Project include:

- Disassembly and removal of wind turbine infrastructure (hubs, nacelles, blades and towers);
- Removal of pad-mounted transformers;
- Reclamation of agricultural land (at the discretion of landowners);
- Removal of all electrical collector aboveground infrastructure (at the discretion of landowners). Where the underground collector lines come to the surface, the collector lines will be cut and excavated to a minimum depth of 1.2 m below grade;
- Disconnection of the collector substation;

- Disassembly and removal of the collector substation, microwave and meteorological towers, if required, and grid connection infrastructure (foundations will be removed to a depth of approximately 1 m); and
- Disassembly and removal of the operations and maintenance building infrastructure (at the discretion of the property owner).

3.6 Waste Generation

Materials brought to the Project during construction and installation will include equipment / component packaging, scraps, fuels and lubricants. Packing frames for the wind turbine components and cabling spools will be returned to their respective vendors or will be recycled. Plastics from other containers and packaging will be disposed of through the local landfill and recycling facilities, where appropriate. Construction materials and scrap metals (e.g., copper wiring and conductor) will be removed and sold to a local scrap metal dealer, where possible. Oils, fuel and lubricants used in maintenance and operation of construction equipment will be stored temporarily in accepted containment systems and will subsequently be removed by a licensed contractor. The licensed contractor will be required to dispose of these wastes through conventional oil and hazardous waste disposal streams.

In addition, concrete wash out of empty cement trucks will adhere to applicable regulations. As a note, the washing out of cement trucks is expected to occur at various locations within the construction disturbance area. The water used for the cleaning of cement construction materials will be deposited in a concrete washout container to allow for evaporation and hardening. The water will then be disposed of at a licensed waste facility or recovered and recycled back into the cement truck. Sanitary sewage collected in portable toilets and wash stations will be transported to an off-site facility by a licensed hauler. Small amounts of spoil material from borehole drilling during geotechnical surveys may be redistributed on disturbed areas at respective drill sites. Topsoil and/or subsoil stripped from access roads and temporary storage / laydown areas may be re-used on-site, where feasible, or otherwise removed to an appropriate location.

If any grubbing of the site is required prior to construction activities, the grubbing materials (e.g., vegetation, branches and tree stumps) will be removed or remain on-site and buried within disturbance areas. As required, stockpiles will be covered following best management practices (BMPs) to prevent erosion and propagation of noxious weeds. During construction of the wind turbine foundation, collector substation and other infrastructure, excavated subsoil and topsoil will be stored in piles on-site at each temporary storage / laydown area until they are replaced during clean-up and reclamation activities. Any excess subsoil will be distributed with landowner input, and excess clean topsoil will be redistributed to adjacent lands as appropriate. If contaminated soil is encountered during the course of excavations, this soil will be disposed of in accordance with the current appropriate provincial legislation.

Disposal and recycling of materials and waste generated will require the use of flatbed and large dump trucks that are capable of transporting heavy loads. The type and number of truck trips necessary will be determined by the licensed construction contractor prior to the construction and installation of the Project. Disposal and recycling of waste will occur throughout the construction and installation of the Project since there are no plans for long-term storage of waste in the PSA.

3.7 Toxic / Hazardous Materials

Machinery used to construct, operate and dismantle Project components will require the use of oils, fuels and lubricants. In addition, waste lubricants will be recovered during the construction, operation or decommissioning of Project components, including the collector substation, wind turbine generators and operations and maintenance building. These materials will be disposed of through conventional waste-oil and hazardous waste disposal streams in a manner outlined by regulatory agencies, if required, at the time of decommissioning.

Overhead collector lines, if required, for the Project may be constructed on a wooden, steel or concrete monopole structure. If wooden monopole structures are used, these poles typically use a chemical-treated exterior. North Kent Wind 1 will discuss the recycling of wooden poles with a licensed facility, which would likely involve stripping the chemically-treated exterior, disposing of this chemically-infused wood in a landfill, and re-milling the remaining wood core for alternative end uses.

3.8 Air Emissions

During each phase of the Project, activities requiring the use of motorized vehicles (e.g., transportation of maintenance personnel to turbine sites) will have infrequent and short-term emissions of low levels of greenhouse gases (GHGs) and other compounds. These emissions will be negligible compared to normal operation of motorized vehicles in the PSA. **Section 4.4** of this Report outlines potentially negative effects to air quality relating to the Project and identifies mitigation measures proposed.

Project sound emissions will adhere to the requirements of O. Reg. 359/09, as amended. Project activities are not anticipated to generate significant odour emissions.

3.9 Sewage

During site preparation and construction, portable toilets will be used and a licensed contractor responsible for waste removal will be engaged. As well, the operations and maintenance building for the Project will include washroom facilities that will be constructed and serviced in accordance with required regulations.

Potable water will be supplied by a well (or wells) or through the municipal water system and a septic bed will be constructed for the disposal of sewage. North Kent Wind 1 will be responsible for the ensuring the septic system is properly maintained. The operations and maintenance building, septic system and water supply will be constructed and operated in accordance with all applicable (e.g., municipal and provincial) standards.

3.10 Stormwater

To effectively manage runoff during the operation of the Project, drainage channels will be constructed adjacent to access roads, as required. The decision of where to construct drainage channels will be made during the detailed design stage of the proposed Project. Potential sources of sedimentation during the operation of the proposed Project will be limited. Access roads will be gravel-based or cement stabilized with adjacent and appropriately sized drainage channels, where required. No additional sedimentation control measures are anticipated to be required during operation since sedimentation from access roads is predicted to be lower than that from agricultural fields where the roads are constructed.

A graveled area around each wind turbine foundation will receive any precipitation runoff from wind turbine towers and allow for infiltration into the ground. Runoff from the tower section of wind turbine generators is expected to be negligible compared to the existing runoff within the PSA. As this does not represent a measureable difference in runoff, no additional Stormwater Management Plans are proposed.

The Project's operations and maintenance building (location described above) will have washroom facilities that may be connected to a self-sufficient septic drain field, as deemed appropriate by the local building code, to be emptied and trucked to a sewage treatment facility, as required. No other component of the Project will generate any sewage or require any specific sewage management processes. Non-potable water will be provided by a well (or wells) and potable water supplied by the municipal water system, if possible, or brought in from off-site (e.g., water coolers, water bottles, etc.).

3.11 Water-taking Activities

Water takings for the purposes of providing dry working conditions during turbine foundation construction, collection line installation, road construction, dust suppression and general maintenance activities may be required during construction of the Project. Any water taking conducted during the construction phase or the operations phase of the Project is subject to the REA application and as such does not require a separate Permit to Take Water (PTTW).

A desktop hydrogeological assessment was completed for the purpose of providing a high level review of existing hydrogeological conditions within the PSA. The assessment identified potential groundwater taking needs of the Project during construction and operation, outlined potential effects of the Project on groundwater resources, and provided a mitigation strategy and contingency measures to negate any adverse effects. The following section provides an overview of the Hydrogeological Assessment and Effects Assessment Report for the North Kent Wind 1 Project. For further details please refer to the Hydrogeological Assessment and Effects Assessment Report in **Appendix C** of the Design and Operations Report.

3.11.1 Temporary Water Takings during Construction

During the construction phase of the Project, water may be required to support turbine infrastructure construction (i.e., dust suppression and directional drilling fluids). Water demands for these purposes are expected to have peak volumes up to 40,000 Litres per day (L/day). Actual daily demands will vary and will typically be lower in volume than the estimated peak volume. As described in the Groundwater Supply Feasibility and Effects Desktop Assessment for the Project, found in **Appendix C** of the Design and Operations Report, the proposed source of water for general construction use is a groundwater supply well located at the Operations and Maintenance (O&M) building.

A review of existing secondary source information provided by Ontario Geological Survey and from local MOECC water well records indicates surficial soils within the PSA typically are composed of sand and/or sand and gravel glaciolacustrine and alluvial deposits overlying predominantly clay soils. The granular surface materials have the potential to readily transmit groundwater and turbine foundations excavated within these materials may require significant dewatering during construction. For the purpose of maintaining dry work conditions for turbine foundation construction temporary water taking may exceed 400,000 L/day, but is dependent on the surficial material being excavated, the depth to groundwater, and other hydrogeological characteristics that may be determined during geotechnical analysis. A site-specific geotechnical investigation has not yet been completed to confirm soil and groundwater conditions at each turbine foundation location. For the purposes of this investigation, anticipated dewatering rates and potential zone of influence (ZOI) have been calculated for a typical turbine foundation excavation in coarse-textured glaciolacustrine surficial sediments and are detailed in the Hydrogeological Assessment and Effects Assessment Report (**Appendix C**).

3.11.2 Long Term Water Takings during Operation

Groundwater takings during the operations phase of the Project may be required to provide a non-potable water source for regular personnel requirements of approximately 15 full-time employees and general operational maintenance at the operations and maintenance building. If a well is required, water takings are expected to be approximately 4,500 L/day and are not expected to exceed 50,000 L/day.

4. Description of Potential Environmental Effects

The following section provides a summary of the potential environmental effects that may result from the construction, operation and decommissioning of the Project. The following assessment of potential environmental effects is preliminary and has been completed in accordance with the requirements of O. Reg. 359/09, as amended, and the *Technical Guide to Renewable Energy Approvals* (MOECC, 2013). The description of environmental effects addresses the following environmental considerations:

- Cultural Heritage (Protected Properties, Archaeological and Heritage Resources);
- Natural Heritage;
- Impacts on Surface Water and Groundwater;
- Emissions to Air, including Odour and Dust;
- Noise;
- Local Interests, Land Use and Infrastructure;
- Other Resources;
- Public Health and Safety; and
- Areas Protected under Provincial Plans and Policies.

Each subsection provides a summary of existing conditions followed by a preliminary assessment of potential environmental effects, including mitigation measures, as a result of construction, operations and decommissioning of the Project.

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. Net 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 adverse net 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 results, the identified contingency measures will then be implemented.

4.1 Cultural Heritage (Protected Properties, Archaeological and Heritage Resources)

4.1.1 Existing Conditions

Stage 1 and 2 Archaeological Assessments (Golder Associates, 2015a and Golder Associates, 2015b) were conducted to identify the presence of archaeological resources within the PSA and within the Project Location. The Stage 1 Archaeological Assessment consists of an initial desktop archaeological study within 1 km of the Project Location. The study determined there was archaeological potential for both pre-contact Aboriginal and historic Euro-Canadian sites in the PSA.

The Stage 1 Archaeological Assessment was submitted to the MTCS in the spring of 2014 and received approval on May 5, 2015. The Stage 2 Archaeological Assessments was submitted to the MTCS in the summer of 2015 for review and acceptance into the Ontario Public Register of Archaeological Reports, and received approval from MTCS on November 12, 2015.

The Stage 2 archaeological assessment of the Project Location was conducted between the spring and fall of 2015 (Golder Associates, 2015b). The assessment was conducted in accordance with the 2011 *Standards and Guidelines for Consultant Archaeologists* (MTCS, 2011). This assessment involved a combination of the pedestrian survey and test pit survey methods across portions of the study area that are proposed to be impacted by the project, including turbine locations, access roads, substation, collector lines, operations and maintenance buildings, meteorological and microwave towers, and temporary staging areas. In some cases, entire parcels of land under option were also assessed. The areas assessed cumulatively represented approximately 675 hectares of land.

The Stage 2 archaeological assessment resulted in the identification of 58 locations producing cultural material. Twenty-four of the 58 archaeological locations identified within the PSA were determined to exhibit cultural heritage value or interest and, as such, have been recommended for Stage 3 site-specific archaeological assessment.

While 24 locations were documented during the archaeological field work conducted within the North Kent Wind 1 Project only one of the 24 sites recommended for Stage 3 archaeological assessment will be impacted by construction activities and therefore will be subjected to Stage 3, and if required, Stage 4 archaeological assessments. During Stage 3 and 4 assessments, archaeological resources will be assessed and protected and potentially removed from the site. The remainder of the sites avoided by all soil disturbance activities related to the wind facility construction will not be subjected to Stage 3 archaeological assessment at this time. Details on the recommendations for each archaeological site, as well as the rationale for the recommendation pertaining to each site, are contained in Section 5.0 of the Stage 2 Archaeological Assessment Report.

A Heritage Impact Assessment (Golder Associates, 2015c) was also completed to identify heritage resources including cultural heritage features and cultural heritage landscapes of cultural heritage value or interest. All work was carried out in accordance with O. Reg. 359/09, as amended, and included assessing Project Location as well as adjacent lots to the Project Location. The report identified 14 structures greater than 40 years of age located on parcels within the Project Location. When applying the criteria set out in O. Reg. 9/06 of the Ontario Heritage Act, eight of these structures were determined to have some cultural heritage value or interest. Following the evaluation of anticipated direct and indirect impacts, according to MTCS' Ontario Heritage Toolkit: Heritage Resources in the Land Use Planning Process, no anticipated impacts to these eight structures were identified. Therefore, no further work is recommended with regard to cultural heritage features.

In relation to cultural heritage landscapes, Golder Associates concluded that the Study Area represented a single vernacular rural landscape that also contained six potential cultural heritage landscapes. Evaluation according to O. Reg. 9/06 concluded that the vernacular rural landscape did not contain cultural heritage value or interest. One cemetery was determined to have some cultural heritage value or interest as a cultural heritage landscape. Although this one property was determined to be demonstrating cultural heritage value or interest, no direct or indirect impacts are anticipated. As no cultural or heritage value or interest was determined, there are no adverse impacts anticipated to the cultural heritage landscapes.

4.1.2 Potential Effects, Mitigation Measures and Net Effects

Construction and Decommissioning

No effects to eight structures with cultural heritage value or interest are anticipated, as the Project Location was selected to avoid these features. Therefore, no mitigation measures or monitoring are proposed during construction or decommissioning phases.

Table 4-1 identifies potential effects on archaeological resources that might occur during the construction and decommissioning phases of the Project and identifies mitigation strategies and a monitoring plan.

Table 4-1: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Cultural Heritage Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Net Effects	Monitoring Plan and Contingency Measures
Disturbance or Displacement of Archaeological Resources Identified at 24 Locations through Stage 2 Assessment Due to Construction of Project Infrastructure.	• Avoid disturbance / loss of archaeological sites.	• Avoid site: ▪ To avoid the sites, install a 20 m protective buffer zone (snow fence) for those sites located within the Project Location to clearly delineate their boundaries. If required, a licensed archaeologist must confirm and document the proper placing of the fencing. ▪ No ground alteration activities will take place inside of the 20 m protective zone. "No-go" instructions will be issued to all on-site personnel involved in day-to-day activities during construction. ▪ If construction activities are required within 70 m of a site, a 50 m construction monitoring buffering zone must be established surrounding the protective zone and a licensed archaeologist must be brought in to monitor construction activities within the monitoring area. • Where sites cannot be avoided, undertake a Stage 3 archaeological assessment (and Stage 4 where required) and submit the archaeological assessment report(s) to the MTCS for review and approval. • Following a Stage 4 assessment report, construction can proceed without any further documentation or monitoring.	• By implementing appropriate mitigation measure, no significant adverse effects on archaeological resources are anticipated during the construction, installation and decommissioning of the project. ▪ *Low likelihood and limited magnitude of effect as a result.*	**Monitoring:** • Archaeological monitoring by a licensed archaeologist is proposed during construction, installation and decommissioning activities should construction activities intrude into the 50 m construction monitoring zone. • Monitoring is intended to help avoid any potential effects resulting from construction, installation or decommissioning on any archaeological locations that have been recommended for a Stage 3 or 4 assessment. **Contingency Measures:** • Should previously undocumented archaeological resources be discovered, the licensed archaeologist that discovered the archaeological resources can cease alteration of the site immediately and engage a licensed consultant archaeologist in compliance with Section 48(1) of the *Ontario Heritage Act* (Government of Ontario 1990b). • Any person discovering or having knowledge of a burial site will immediately notify the police or coroner as noted in the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33. • As deemed appropriate, First Nation and Aboriginal Communities will be contacted with regard to undocumented resources or knowledge relating to burial sites.

Operation

No effects to archaeological resources are anticipated as a result of the operational phase of the Project, as all resources will either be avoided or removed as part of a Stage 3 and Stage 4 archaeological assessment prior to construction.

No effects to eight structures with cultural heritage value or interest are anticipated, as the Project Location was selected to avoid these features. Therefore, no mitigation measures or monitoring are proposed.

4.2 Natural Heritage

The potential effects, mitigation measures, residual effects and monitoring commitments regarding Significant Natural Heritage Features (including significant wetlands, woodlands, and wildlife habitat, Life Science Areas of Natural and Scientific Interest (ANSIs) and Earth Science ANSIs) were identified and evaluated in the Natural Heritage Assessment (NHA) Environmental Impact Study (EIS) Report (NRSI, 2015) prepared based on the *Natural Heritage Assessment Guide for Renewable Energy Projects* (Ontario Ministry of Natural Resources and Forestry (MNRF), 2012) and submitted to the MNRF 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 EIS.

4.2.1 Existing Conditions

The NHA Records Review, Site Investigation and Evaluation of Significance and EIS Reports were completed in October 2015. All reporting has been completed in accordance with applicable natural heritage guidelines, including: *Natural Heritage Assessment Guide for Renewable Energy Projects, 2nd Edition* (Ontario Ministry of Natural Resources and Forestry (MNRF), 2012), *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a) and *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011b).

The following section outlines some of the existing conditions in the PSA.

4.2.1.1 Wetlands / Area of Natural and Scientific Interest (ANSIs) and Vegetation Communities

There are no provincial parks, conservation reserves, provincially significant life or earth science ANSIs or provincially significant wetlands evaluated by the MNRF within the boundaries of the PSA. Active agricultural lands dominate the PSA with limited natural habitats such as several isolated woodlands, unevaluated wetlands and meadows. Through the site investigation and evaluation of significance stages of the NHA, 13 woodlands and 5 wetlands were determined to be significant and carried forward to the EIS. Numerous Significant Wildlife Habitats (SWHs) and generalized SWHs have been identified within these natural habitats and carried forward to the EIS as well.

4.2.1.2 Birds

Several candidate SWHs for birds have been identified and delineated within the PSA during the ecological land classification (ELC) mapping exercise completed during the site investigation. After comparing site specific conditions to evaluation of significance criteria as outlined in the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015), several of these features have been determined to be generalized habitat, including waterfowl stopover and staging areas (terrestrial), colonially-nesting bird breeding habitat (trees/shrubs), marsh bird breeding habitats, and several habitats for bird species of conservation concern. The significance of the remaining features still needs to be

confirmed based on the evaluation of significance criteria as outlined in the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015). Evaluation of significance surveys that have been conducted or those proposed to be completed for the remaining bird SWH features are summarized in the table below.

Table 4-2: Evaluation of Significance Surveys for Bird Significant Wildlife Habitat Features

Bird Significant Wildlife Habitat	Type of Method	Survey Timing
Waterfowl Stopover and Staging Areas (Terrestrial)	Surveys of field conditions were conducted as part of the site investigation phase of the Project to determine the presence of seasonal flooding, as well as document the presence of waterfowl at candidate terrestrial waterfowl stopover and staging areas. Due to the large size of the Project Area, driving surveys were conducted along routes consisting of more than 100 km in length throughout the Project Area. Surveys were conducted from the roadside with a suitable vantage point of the habitat, to document abundance and species of staging waterfowl within open fields.	March to April, 2015
Colonially-Nesting Breeding Bird Habitat (Trees/Shrubs)	Point count surveys at candidate colonially-nesting bird breeding habitat, if site access is granted prior to April 2016 and candidate significant habitat is determined to be present. If site access is denied, no surveys will be conducted and the habitat will be treated as significant.	April, June, and August, 2016
Waterfowl Nesting Area	Area searches within candidate waterfowl nesting area, if site access is granted prior to April 2016 and candidate significant habitat is determined to be present. If site access is denied, no surveys will be conducted and the habitat will be treated as significant.	April, May, and June, 2016
Marsh Bird Breeding Habitat	Point count surveys at the candidate marsh bird breeding habitat.	Mid-May to early July, 2016
Bird Species of Conservation Concern	Point count surveys at candidate Eastern Wood-Pewee (*Contopus virens*) and Wood Thrush (*Hylocichla mustelina*) habitats.	June and early July, 2016

For the purpose of this submission, most candidate SWHs were treated as significant and carried over to the EIS where potential effects and appropriate mitigation measure and compensation are identified. If the significance of the SWH feature is confirmed based on the results of the evaluation of significance surveys, the mitigation measures described in the EIS will be applied to that feature.

4.2.1.3 Bats

Two candidate significant Bat Maternity Colony features (BMA-001 and BMA-002) were identified through the site investigation as part of the NHA. The significance of these features needs to be confirmed through evaluation of significance surveys based on the evaluation of significance criteria as outlined in the *Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E* (MNRF, 2015). The presence of suitable cavity trees within one of these features (BMA-001) could not be verified during the site investigation phase of the project as site access was denied. As such, no further surveys will be conducted at BMA-001, and the habitat will be treated as significant; however, in the event that site access is granted prior to June 2016, a site investigation will be conducted to verify the presence of ≥10 wildlife trees per hectare, measured at ≥25 cm diameter at breast height (dbh). Evaluation of significance surveys for BMA-002 (and BMA-001, if site access is granted) include selection of monitoring sites and bat exit surveys, which are proposed to be completed in June, 2016. For the purpose of this submission, these candidate SWHs were treated as significant and carried over to the EIS where potential effects and appropriate mitigation measures and compensation are identified. If the significance of the SWH features are confirmed based on the results of the evaluation of significance surveys, the mitigation measures described in the EIS will be applied to the features.

Bat habitat assessment surveys were undertaken from April to June, 2015 for the Project as per the MNRF's *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a) and in conjunction with any requirements of the REA NHA, and bat exit surveys will be completed in June, 2016. In addition, details of the post-construction monitoring will be provided in the Bird and Bat Environmental Effects Monitoring Plan (EEMP) to the MNRF.

4.2.2 Potential Effects, Mitigation Measures and Net Effects

The NHA EIS Report describes the potential effects, mitigation measures, and net effects of constructing, operating, and decommissioning the Project on significant natural features. A Bird and Bat EEMP describes the post-construction monitoring plan for bird and bat mortality and related mitigation and contingency measures, as well as post-construction monitoring requirements for potential operational effects to identify SWHs, in fulfillment of MNRF requirements. The findings of these reports are summarized below.

Construction and Decommissioning

Table 4-3 provides mitigation measures and net effects for potential effects related to Generalized Candidate SWH and Natural Heritage Features.

Table 4-4 provides mitigation measures and net effects for potential effects related to Significant Woodlands, Wetlands as well as Treated as Significant Wildlife Habitat.

Operations

Table 4-5 provides mitigation measures and net effects for potential effects related to Significant Wetlands, Woodlands as well as Treated as Significant Wildlife Habitat.

Where monitoring determines that the mitigation measures are not working as anticipated, contingency measures are described to address any adverse effects.

Table 4-3: Mitigation Measures and Net Effects Associated with Potential Effects to Generalized Candidate Significant Wildlife Habitat and Natural Heritage Features Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects
Sedimentation and Erosion. **Fugitive Dust Emission.** **Changes in Soil Moisture and Compaction.**	• Minimize direct impacts on vegetation communities and protect rare/sensitive habitats. • Maintain vegetated buffers, particularly within riparian zones. • Minimize the impacts of sedimentation and fugitive dust on nearby natural features. • Limit disturbances to surface water drainage patterns.	• Develop and implement a sediment and erosion control plan. • Utilize erosion control measures, such as erosion blankets, silt fencing, straw bales, etc., for construction activities within 30 m of a wetland, woodland, or water body. • Depending on site-specific conditions, such as steep topography and the presence of direct, or regular, surface water flow, the environmental monitor may consider substituting other styles of fencing for erosion fencing, when appropriate. • Maintain erosion control measures for the duration of construction or decommissioning activities as identified within the sediment and erosion control plan. • Schedule grading to avoid times of high runoff volumes wherever possible and suspend work if an excessive sediment discharge occurs, as determined by an environmental monitor, until mitigation measures have been established. • The environmental monitor will be an independent contractor with experience providing environmental recommendations on a large-scale construction site. • On site speed limits will be clearly posted, applied, and followed by construction staff. • Apply dust suppressants to unpaved areas when necessary to suppress dust, as determined by the environmental monitor. Application frequency will vary, but will be determined by site specific weather conditions, including recent precipitation, temperatures, and wind speeds. Input from the construction team may also warrant an increased frequency of dust suppression. • Re-vegetate cleared areas as soon as reasonably possible after construction activities are complete. • Install wind fences, where determined to be necessary by the on-site environmental monitor. Installation of these fences will depend on site-specific conditions, including wind speeds, topography, land cover, and the extent of surrounding natural wind breaks. • Store any stockpiled material more than 30 m from a wetland, woodland, or water body. • Minimize vehicle traffic on exposed soils during site clearing, grubbing, grading and top soil removal. • Minimize the use of impervious surfaces where possible, such as utilizing and contouring permeable surface material (i.e., gravel) to increase infiltration, and reduce surface water runoff. • Minimize paved surfaces and design roads to promote infiltration. • Maintain vegetative buffers around water bodies. • Control quantity and quality of stormwater discharge using best management practices. • Minimize grading activities to maintain existing drainage patterns as much as possible. • For roadside collector routes, keep vegetation removal (if any) to a minimum and limited to the road right-of-way. • Locate all entry and exit pits (directional drilling) a sufficient distance from the edge of natural features (i.e., woodlands, wetlands) to maintain a vertical depth of at least 1.5 m at all times below the natural features to protect the critical root zone. • Collect directional drill cuttings as they are generated and placed in a soil bin or bag for off-site disposal. • Restore and re-vegetate directional drill entry/exit pits to pre-construction conditions as soon as possible after construction.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).
Disturbance and/or Mortality to Local Wildlife.	• Minimize impacts to migratory birds and their nests. • Limit potential wildlife road mortalities.	• Schedule all construction and decommissioning activities within 30 m of generalized wildlife habitats outside of the core breeding period for migratory birds (May 1st – July 31st), wherever possible, to limit disturbance to migratory birds, or their nests. • If construction and decommissioning activities within 30 m of generalized wildlife habitats will occur during the breeding bird season (May 1st-July 31st), a biologist will conduct nest searches, where natural vegetation will be removed, to ensure there will be no impact to breeding birds. If an active bird nest is identified in the location where natural vegetation clearing is proposed, the area will be protected and no construction activities will occur until the young have fledged or until the nest is no longer active, as confirmed by a qualified biologist. • Schedule construction and decommissioning activities within 30 m of woodlands or wetlands to occur during daylight hours, wherever possible. • If construction and decommissioning activities within 30 m of woodlands or wetlands must occur outside of daylight hours, any spotlights will be directed downward and/or away from the woodland or wetland to limit potential light disturbance to breeding birds. • On site speed limits will be clearly posted, applied, and followed by construction staff.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).
Damage or Removal of Vegetation Adjacent to the Project Location.	• Minimize impacts to natural vegetation.	• Where construction activity occurs within 30 m of a naturally vegetated feature (i.e., woodland, wetland, etc.), clearly delineate the construction area with protective fencing, such as silt fencing or other barrier, to avoid accidental damage to species to be retained. • Depending on site-specific conditions, the environmental monitor may also consider substituting other demarcating types for fencing, such as staking and flagging, where it is determined that there is no apparent risk to nearby natural features. This could include instances where the natural features are at a higher elevation than the occurring construction activity when appropriate. • Document all trees (>10 cm dbh) to be removed and retained within the disturbance area limit, prior to construction. • Prune any tree limbs or roots that are accidentally damaged by construction activities using proper arboricultural techniques. • Re-vegetate cleared areas as soon as reasonably possible after construction activities are complete.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).
Soil or Water Contamination.	• Minimize impacts to natural features and wildlife habitats. • Avoid contamination of natural features or water bodies.	• Develop a spill response plan and train staff on appropriate procedures. • Keep emergency spill kits on site. • Keep contact information for the MOECC Spills Action Centre in a designated area on the construction site. • Locate all maintenance activities, vehicle refuelling or washing, as well as the storage of chemical and construction equipment more than 30 m from natural features or water bodies. • Dispose of waste material by authorized and approved off-site vendors. • Store hazardous materials in designated areas. • Develop a 'frac-out' (i.e. the escape of drilling mud and/or fluids into the environment as a result of a spill, drilling tunnel collapse or rupture of mud to the surface due to excessive pressure from an obstruction within the borehole) contingency plan and train staff on appropriate procedures during the construction phase. • Ensure directional drill depth is at an appropriate level below natural features (i.e., woodlands, wetlands, etc.) or water bodies to prevent 'frac-out'. • Locate all entry and exit pits (directional drilling) a sufficient distance from the edge of natural features (i.e., woodlands, wetlands) to maintain a vertical depth of at least 1.5 m at all times below the natural features to protect the critical root zone.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).

Table 4-3: Mitigation Measures and Net Effects Associated with Potential Effects to Generalized Candidate Significant Wildlife Habitat and Natural Heritage Features Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects
Reduced Stream Flow Rate. **Increased Water Temperature.**	• Maintain ground and surface water conditions with those near pre-construction conditions.	• Monitor rate of water pumping and timing to meet requirement of less than 50,000 L per day, and contact the MOECC if a situation arises where this cannot be met. • Control quantity and quality of water discharge using best management practices, and avoid direct discharge into wetlands or watercourses. • Restrict taking of groundwater and surface water during extreme low flow time periods.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).
Increase Surface Runoff. **Changes in Surface Water Drainage.**	• Limit disturbances to surface water drainage patterns.	• Minimize the use of impervious surfaces where possible, such as utilizing and contouring permeable surface material (i.e., gravel) to increase infiltration, and reduce surface water runoff. • Minimize paved surfaces and design roads to promote infiltration. • Maintain vegetative buffers around water bodies. • Control quantity and quality of stormwater discharge using best management practices. • Minimize grading activities to maintain existing drainage patterns as much as possible.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Accidental Vegetation Removal.	• Minimize direct impacts on vegetation communities and protect rare / sensitive habitats.	• No use of herbicides (Project related activities only) within significant woodlands during the construction and decommissioning phases. • Clearly delineate work area using erosion fencing or other barrier to avoid accidental damage to retained species. • Where construction is within 10 m of a significant woodland, erect erosion fencing, or other barrier, to correspond to the disturbance area limits. • Place the erosion fencing, or other barrier, as far away as possible from the significant woodland and no closer to the significant woodland than the dripline. • Depending on site-specific conditions, the environmental monitor may consider substituting other demarcating types for fencing, such as staking and flagging, where it is determined that there is no apparent risk to significant woodlands. This could include instances where the significant woodland is at higher elevation than the occurring construction activity. The environmental monitor will be a contractor with experience providing environmental recommendations on a large-scale construction site.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** • Undertake regular monitoring of the dripline within 10 m of construction activities for the duration of the construction and decommissioning phases of this Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of a significant woodland. • Undertake regular monitoring of the dripline to ensure the work area is clearly delineated and dripline boundaries are respected when construction is anticipated to occur within 10 to 30 m of significant woodlands, at a minimum frequency of once per month. **Contingency Measures:** • Prune any tree limbs or roots that are accidentally damaged by construction activities using proper arboricultural techniques. • Accidental damage to trees, or unexpected vegetation removal, may require re-planting of similar, native species, depending on the extent of damage incurred.
Disturbance of Local Wildlife.	• Avoid direct impacts on breeding birds and their habitats. • Minimize impacts on species that are relatively inactive at night and not accustomed to nighttime disturbances.	<u>Common Mitigation</u> • Avoid construction activities during the breeding bird period (May 1st – July 31st), wherever possible, to limit disturbance of local wildlife. • If construction activities must occur during the breeding bird period (May 1st – July 31st), a biologist will conduct nest searches in areas where natural vegetation will be removed, to ensure there will be no impact to breeding birds. If an active bird nest is identified in the location where natural vegetation clearing is proposed, the area will be protected and no construction activities will occur until the young have fledged or until the nest is no longer active, as confirmed by a qualified biologist. • Schedule construction activities within 30 m of significant woodlands to occur during daylight hours to avoid excessive sound and/or light disturbances to wildlife, wherever possible. • If construction activities within 30 m of significant woodlands must occur outside of daylight hours, spotlights will be directed downward and/or away from the woodland to limit potential light disturbance to breeding birds. • On site speed limits will be clearly posted, applied, and followed by construction staff. <u>Significant Wetlands</u> • No use of herbicides (Project related activities only) within significant wetlands during the construction and decommissioning phases.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**No monitoring or contingency plan required.**
Sedimentation and Erosion.	• Minimize impacts to natural features and associated wildlife habitats. • Minimize impacts to woodland/wetland integrity and diversity. • Maintain vegetated buffers, including riparian zones. • Minimize impacts to bat maternity colony habitats. • Avoid contamination of bat maternity colony habitat. • Minimize impacts to colonially-nesting breeding bird habitats. • Avoid contamination of colonially-nesting breeding bird habitat.	<u>Common Mitigation</u> • Implement a sediment and erosion control plan. • Install, monitor, and maintain erosion and sediment control measures (i.e., erosion fencing) around the construction area for the duration of the construction or decommissioning activities, as identified within the sediment and erosion control plan. • Erect erosion fencing, or other barrier, to correspond to the construction disturbance area limits. • Place the erosion fencing, or other barrier, as far away as possible from the significant woodland and no closer to the significant woodland than the dripline. • Depending on site-specific conditions, such as steep topography and the presence of direct, or regular, surface water flow, the environmental monitor may consider substituting other styles of fencing for erosion fencing, when appropriate.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** <u>Common Monitoring</u> • Undertake regular construction monitoring and routine inspections to ensure proper installation of erosion control measures and that proper fugitive dust control measures are in place. • Monitor sediment and erosion control measures, such as erosion fencing, check dams, and dust control measures daily in areas where work is taking place and prior to and after any storm events. • Monitor sediment and erosion control measures weekly in areas where active construction is not occurring until the construction phase is complete. • Correct silt fencing, or other applicable sediment and erosion control measures, that is not working properly. • An environmental monitor will be present when active directional drilling is occurring.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
	• Minimize impacts to significant waterfowl nesting habitat. • Avoid contamination of waterfowl nesting area habitat. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Avoid contamination of amphibian breeding habitat. • Minimize impacts to marsh bird breeding habitats. • Avoid contamination of marsh bird breeding habitat. • Minimize impacts to bird species of conservation concern habitats. • Avoid contamination of bird species of conservation concern habitat. • Minimize impacts to plant species of conservation concern. • Protect plant species of conservation concern habitat. • Avoid contamination of plant species of conservation concern habitat. • Minimize impacts to significant old growth forest.	• Utilize erosion blankets, silt fencing, straw bales, etc. for construction activities within 30 m of significant woodlands. • Store any stockpiled material more than 30 m from significant woodlands and wetlands throughout the construction and decommissioning phases. • Schedule grading to avoid times of high runoff volumes wherever possible and suspend work if an excessive sediment discharge occurs, as determined by an environmental monitor, until mitigation measures have been established. • Locate all directional drill entry and exit pits a sufficient distance from the edge of the significant woodlands to maintain a vertical depth of at least 1.5 m at all times below the natural feature to protect the critical root zone. • Collect directional drill cuttings as they are generated and placed in a soil bin or bag for off-site disposal. • Restore and re-vegetate directional drill entry/exit pits to pre-construction conditions as soon as possible after construction. • Re-vegetate areas adjacent to the natural feature as soon as possible after construction activities are complete. <u>Significant Wetlands</u> • Where the temporary construction area is proposed to be within 5 m of, but not overlapping by a method other than directional drilling, a wetland (excluding along existing municipal roads), design any permanent infrastructure (i.e., access roads) to be 5 m from the wetland edge and plant native vegetation in the 5 m buffer between the infrastructure and wetland edge as soon as reasonably possible after construction.		<u>Plant Species of Conservation Concern Monitoring</u> • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitored post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. **Contingency Measures:** <u>Common Contingency Measures</u> • Restore vegetated buffers, including riparian zones, if accidentally damaged, as soon as possible. • If deficiencies in sediment and erosion control measures are noted, the environmental monitor will notify the contract administrator and recommend remedial actions, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas. • If sedimentation and erosion control measures fail and degradation of the natural feature or habitat occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas, depending on the extent of degradation incurred. <u>Plant Species of Conservation Concern Measures</u> • If any potential changes in species populations or distribution are noted during post-construction surveys as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of changes to species population or distribution.
Fugitive Dust Emission.	• Minimize impacts to natural features and associated wildlife habitats. • Maintain vegetated buffers, including riparian zones. • Minimize impacts to bat maternity colony habitats. • Avoid contamination of bat maternity colony habitat. • Minimize impacts to colonially-nesting breeding bird habitats. • Avoid contamination of colonially-nesting breeding bird habitat. • Minimize impacts to significant waterfowl nesting habitat. • Avoid contamination of waterfowl nesting area habitat. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Minimize impacts to woodland/wetland integrity and diversity. • Minimize impacts to marsh bird breeding habitats. • Avoid contamination of marsh bird breeding habitat. • Minimize impacts to bird species of conservation concern habitats. • Avoid contamination of bird species of conservation concern habitat. • Minimize impacts to plant species of conservation concern. • Protect plant species of conservation concern habitat. • Avoid contamination of plant species of conservation concern habitat. • Minimize impacts to significant old growth forest.	<u>Common Mitigation</u> • On site speed limits will be clearly posted, applied, and followed by construction staff. • Apply dust suppressants to unpaved areas when necessary to suppress dust, as determined by the environmental monitor. Application frequency will vary, but will be determined by site specific weather conditions, including recent precipitation, temperatures, and wind speeds. Input from the construction team may also warrant an increased frequency of dust suppression. • Re-vegetate cleared areas as soon as reasonably possible after construction activities are complete. • Install wind fences, where determined to be necessary by the on-site environmental monitor. Installation of these fences will depend on site-specific conditions, including wind speeds, topography, land cover, and the extent of surrounding natural wind breaks. <u>Significant Wetlands</u> • Where the temporary construction area is proposed to be within 5 m of, but not overlapping by a method other than directional drilling, a wetland (excluding along existing municipal roads), any permanent infrastructure (i.e., access roads) will be placed 5 m from the wetland edge and native vegetation will be planted in the 5 m buffer between the infrastructure and wetland edge.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** <u>Common Monitoring</u> • Undertake regular construction monitoring and routine inspections to ensure proper installation of erosion control measures and that proper fugitive dust control measures are in place. • Monitor sediment and erosion control measures, such as erosion fencing, check dams, and dust control measures daily in areas where work is taking place and prior to and after any storm events. <u>Plant Species of Conservation Concern Monitoring</u> • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitoring post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. **Contingency Measures:** <u>Common Contingency Measures</u> • If fugitive dust control measures fail and degradation of the natural feature occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. <u>Plant Species of Conservation Concern Measures</u> • If any potential changes in species populations or distribution are noted during post-construction surveys as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of changes to species population or distribution.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Spills *(i.e., oil, gasoline, grease, and/or drilling frac-out, etc.).*	• Minimize impacts to natural features and associated wildlife habitats. • Maintain vegetated buffers, including riparian zones. • Minimize impacts to bat maternity colony habitats. • Avoid contamination of bat maternity colony habitat. • Minimize impacts to colonially-nesting breeding bird habitats. • Avoid contamination of colonially-nesting breeding bird habitat. • Minimize impacts to significant waterfowl nesting habitat. • Avoid contamination of waterfowl nesting area habitat. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Minimize impacts to woodland/wetland integrity and diversity. • Minimize impacts to marsh bird breeding habitats. • Avoid contamination of marsh bird breeding habitat. • Minimize impacts to bird species of conservation concern habitats. • Avoid contamination of bird species of conservation concern habitat. • Minimize impacts to plant species of conservation concern. • Protect plant species of conservation concern habitat. • Avoid contamination of plant species of conservation concern habitat. • Minimize impacts to significant old growth forest. • Minimize impacts to rare vegetation communities. • Protect rare vegetation communities habitat. • Avoid contamination of rare vegetation communities habitat.	• Develop a spill response plan and train staff on appropriate procedures. • Develop a 'frac-out' contingency plan and train staff on appropriate procedures during the construction phase. • Keep emergency spill kits on site. • Keep contact information for the MOECC Spills Action Centre in a designated area on the construction site. • Dispose of waste material by authorized and approved off-site vendors. • Store hazardous materials in designated areas. • Locate all maintenance activities, vehicle refuelling or washing, as well as the storage of chemical and construction equipment more than 30 m from significant features.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** <u>Common Monitoring</u> • An environmental monitor will be present when active directional drilling is occurring. <u>Plant Species of Conservation Concern Monitoring</u> • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitored post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. **Contingency Measures:** <u>Common Contingency Measures</u> • If 'frac-out' occurs, immediately implement 'frac-out' contingency plan. • In the event of a spill, notify the MOECC Spills Action Centre, immediately stop work, and ensure all efforts are made to completely remediate affected areas, especially prior to rain events. • If degradation of the natural feature occurs as a result of the spill, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. • Restore vegetated buffers, including riparian zones, if accidentally damaged, as soon as possible. <u>Plant Species of Conservation Concern Measures</u> • If any potential changes in species populations or distribution are noted during post-construction surveys as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of changes to species population or distribution.
Changes in Soil Moisture and Compaction.	• Minimize impact to soil moisture regime and vegetation species composition.	• Minimize the use of impervious surfaces where possible, such as utilizing and contouring permeable surface material (i.e., gravel) to increase infiltration, and reduce surface water runoff. • Minimize paved surfaces and design roads to promote infiltration. • Minimize vehicle traffic on exposed soils during site clearing, grubbing, grading and topsoil removal. • Clearly delineate the dripline and root zone of all trees within 10 m of construction activities with erosion fencing or other barrier.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**No monitoring or contingency plan required.**
Reduced Water Quality in Significant Wetlands (i.e., increased turbidity).	• Minimize direct impacts on vegetation communities and protect rare/sensitive habitats. • Minimize impacts to hydrological connectivity. • Minimize impacts to water quality.	• Clearly delineate work area using erosion fencing, or other barrier, to avoid accidental damage to retained wetland vegetation and to avoid impacting water quality. • Depending on site-specific conditions, such as steep topography and the presence of direct, or regular, surface water flow, the environmental monitor may consider substituting other styles of fencing for erosion fencing, when appropriate. • On site speed limits will be clearly posted, applied, and followed by construction staff. • Apply dust suppressants to unpaved areas when necessary to suppress dust, as determined by the environmental monitor. Application frequency will vary, but will be determined by site specific weather conditions, including recent precipitation, temperatures, and wind speeds. Input from the construction team may also warrant an increased frequency of dust suppression. • Re-vegetate areas adjacent to the wetland as soon as possible after construction activities are complete. • Install wind fences, where determined to be necessary by the on-site environmental monitor. Installation of these fences will depend on site-specific conditions, including wind speeds, topography, land cover, and the extent of surrounding natural wind breaks. • No use of herbicides (Project related activities only) within significant wetlands during the construction and decommissioning phases. • Where the temporary construction area is proposed to be within 5 m of, but not overlapping by a method other than directional drilling, a wetland (excluding along existing municipal roads), design any permanent infrastructure (i.e., access roads) to be 5 m from the wetland edge and plant native vegetation in the 5 m buffer between the infrastructure and wetland edge as soon as reasonably possible after construction.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated within 10 m of construction activities for the duration of the construction and decommissioning phases of the Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of a significant wetland. • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated and respected when construction is anticipated to occur within 10 to 30 m of significant wetlands, at a minimum frequency of once per month. Depending on the season and site-specific conditions, such as topography, surface water flow patterns, and the presence or absence of vegetative buffers, monitoring frequency will be increased at the discretion of the environmental monitor. **Contingency Measures:** • If sedimentation and erosion or fugitive dust control measures fail and degradation of the natural feature occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. • If negative impacts such as reduced water quality (i.e., increased turbidity), infiltration and/or groundwater discharge, as a result of construction activities, are observed, consult the MNRF to determine appropriate contingency measures.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Reduced Flood Attenuation In Significant Wetlands.	• Minimize direct impacts on vegetation communities and protect rare/sensitive habitats. • Minimize impacts to hydrological connectivity. • Minimize impacts to water quality.	• Clearly delineate work area using erosion fencing, or other barrier, to avoid accidental damage to retained wetland vegetation and to avoid impacting hydrological connectivity. • Depending on site-specific conditions, such as steep topography and the presence of direct, or regular, surface water flow, the environmental monitor may consider substituting other styles of fencing for erosion fencing, when appropriate. • Where the temporary construction area is proposed to be within 5 m of, but not overlapping by a method other than directional drilling, a wetland (excluding along existing municipal roads), design any permanent infrastructure (i.e., access roads) to be 5 m from the wetland edge and plant native vegetation in the 5 m buffer between the infrastructure and wetland edge as soon as reasonably possible after construction. • Re-vegetate cleared areas as soon as reasonably possible after construction activities are complete.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated within 10 m of construction activities for the duration of the construction and decommissioning phases of the Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of a significant wetland. • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated and respected when construction is anticipated to occur within 10 to 30 m of significant wetlands, at a minimum frequency of once per month. Depending on the season and site-specific conditions, such as topography, surface water flow patterns, and the presence or absence of vegetative buffers, monitoring frequency will be increased at the discretion of the environmental monitor. **Contingency Measures**: • If sedimentation and erosion or fugitive dust control measures fail and degradation of the natural feature occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. • If negative impacts such as reduced water quality (i.e., increased turbidity), infiltration and/or groundwater discharge, as a result of construction activities, are observed, consult the MNRF to determine appropriate contingency measures.
Reduced Infiltration and Groundwater Discharge in Significant Wetlands.	• Minimize direct impacts on vegetation communities and protect rare / sensitive habitats. • Minimize impacts to hydrological connectivity. • Minimize impacts to water quality.	• Minimize the use of impervious surfaces where possible, such as utilizing and contouring permeable surface material (i.e., gravel) to increase infiltration and reduce surface water runoff. <u>For groundwater taking (if necessary):</u> • Monitor rate of water pumping and timing to meet requirement of less than 50,000 L per day, and contact the MOECC if a situation arises where this cannot be met. • Restrict taking of groundwater and surface water during extreme low flow time periods. • Control quantity and quality of stormwater discharge using best management practices, and avoid direct discharge into wetlands or watercourses.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Monitoring:** • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated within 10 m of construction activities for the duration of the construction and decommissioning phases of the Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of a significant wetland. • Undertake regular monitoring of the wetland to ensure the work area is clearly delineated and respected when construction is anticipated to occur within 10 to 30 m of significant wetlands, at a minimum frequency of once per month. Depending on the season and site-specific conditions, such as topography, surface water flow patterns, and the presence or absence of vegetative buffers, monitoring frequency will be increased at the discretion of the environmental monitor. **Contingency Measures:** • If sedimentation and erosion or fugitive dust control measures fail and degradation of the natural feature occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. • If negative impacts such as reduced water quality (i.e., increased turbidity), infiltration and/or groundwater discharge, as a result of construction activities, are observed, consult the MNRF to determine appropriate contingency measures.
Changes in Surface Hydrology in Significant Waterfowl Nesting Areas.	• Minimize impacts to hydrological functions associated with permanent open water. • Maintain existing surface water flow patterns.	• Clearly delineate work area using erosion fencing, or other barrier, to avoid impacting hydrological functions associated with permanent open water. • Limit grading activities and changes in land contours, wherever possible. • Minimize paved surfaces and design roads to promote infiltration. • Minimize the use of impervious surfaces where possible, such as utilizing and contouring permeable surface material (i.e., gravel) to increase infiltration, and reduce surface water runoff.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** • Undertake regular monitoring of the habitat when grading activities are located within 30 m of waterfowl nesting area habitat at a minimum frequency of once per week. • Conduct post-construction behaviour surveys of this habitat for 3 years following pre-construction methods to assess the potential Project disturbance on the habitat if deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. **Contingency Measures:** • If changes in surface hydrology are noted as a result of construction, appropriate mitigation measures will implemented, which may include modifications to previous grading and/or constructed ditches depending on the extent of changes incurred.
Noise Disturbance / Avoidance Behaviour.	• Protection of bat maternity colony habitat. • Protection of colonially-nesting breeding bird habitat (tree/shrub). • Minimize disturbance to waterfowl species. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Minimize impacts to woodland/wetland integrity and diversity. • Minimize impacts to marsh bird breeding habitat. • Minimize disturbance to marsh breeding birds. • Minimize noise disturbance/avoidance behaviour of bird species of conservation concern.	<u>Common Mitigation</u> • On site speed limits will be clearly posted, applied, and followed by construction staff throughout the construction and decommissioning phases. <u>Bat Maternity Colony</u> • Schedule construction activities to occur outside of the critical roosting period (June), unless specifically required in accordance with manufacturer specifications. <u>Colonially Nesting Breeding Bird Habitat (Trees/Shrubs)</u> • Avoid scheduling construction activities during the peak breeding season (April-August), wherever possible. • If construction must occur during peak breeding season, a biologist will be present to confirm nesting birds will not be impacted by construction activities.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** <u>Bat Maternity Colony Monitoring</u> • Conduct post-construction disturbance monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. <u>Colonially Nesting Breeding Bird Habitat (Trees/Shrubs) Monitoring</u> • Conduct post-construction monitoring of this feature for three years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. <u>Waterfowl Nesting Area Monitoring</u> • Conduct post-construction behaviour surveys for 3 years following pre-construction survey methods to assess any potential changes to breeding habitats deemed significant. Full details of this monitoring will be provided within the Bird and Bat EEMP.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
		Waterfowl Nesting Area • Avoid scheduling construction activities during the peak waterfowl nesting season (April-June), if possible. • If construction must occur during peak breeding season, a biologist will be present to confirm birds will not be impacted by construction activities. Amphibian Breeding Habitat (Woodland) • Schedule construction activities to occur outside of the peak frog breeding season (April 15th-June 15th). • If construction activities must occur during the peak frog breeding season, install temporary drift fencing (erosion fencing) to help control amphibian movements around construction activity. • Schedule construction activities within 30 m during daylight hours, wherever possible, to limit potential impacts from light, noise, or vehicle interactions. • If construction activities within 30 m of significant amphibian breeding habitats must occur outside of daylight hours, spotlights will be directed downwards and/or away from the woodland to limit potential impacts to breeding amphibians. Marsh Bird Breeding Habitat • Schedule construction activities to occur outside of the peak marsh bird breeding season (mid-May to early July), wherever possible. • If construction must occur during this peak breeding season (mid-May to early July), have a biologist confirm birds will not be impacted by construction activities. Bird Species of Conservation Concern Habitat • Schedule construction activities located within 30 m of significant bird species of conservation concern habitat to occur outside of the peak breeding bird season (May 1st – July 31st), whenever possible. • If construction must occur during the breeding bird period (May 1st – July 31st), have a biologist confirm birds will not be impacted by construction activities.		Amphibian Breeding Habitat (Woodland) Monitoring • Conduct post-construction amphibian call surveys for 1 year following pre-construction survey methods to assess any potential changes in amphibian breeding populations or species distribution for all habitats deemed significant. Marsh Bird Breeding Habitat Monitoring • Conduct post-construction monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. Bird Species of Conservation Concern Habitat Monitoring • Conduct post-construction behaviour surveys of this habitat for 3 years following pre-construction survey methods to assess the potential Project disturbance on this habitat. Full details of this monitoring will be provided within the Bird and Bat EEMP. **Contingency Measures:** Bat Maternity Colony Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Colonially Nesting Breeding Bird Habitat (Trees/Shrubs) Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Waterfowl Nesting Area Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Amphibian Breeding Habitat (Woodland) Measures • If the results of the monitoring indicate a feature is no longer significant, consult the MNRF to discuss the need (if any) for additional post-construction surveys. • Given the short-term and temporary nature of increased traffic and the restriction of construction activities to daylight hours, wherever possible, the timing restriction during breeding period, the risk of increased mortality during construction is considered low. Marsh Bird Breeding Habitat Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Bird Species of Conservation Concern Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Increased Species Competition to Plant Species of Conservation Concern through Introduction of Invasive Species.	• Minimize impacts to plant species of conservation concern. • Protect plant species of conservation concern habitat. • Maintain vegetated buffers, including riparian zones. • Avoid contamination of plant species of conservation concern habitat. • Minimize impacts to rare vegetation communities. • Protect rare vegetation communities habitat. • Avoid contamination of rare vegetation communities habitat.	• Clearly delineate work area using erosion fencing, or other barrier, to minimize seed transfer into suitable habitat. The environmental monitor may also consider substituting other demarcating types for fencing, such as staking and flagging, where it is determined that there is no apparent risk to nearby significant rare vegetation communities. This could include instances where the significant rare vegetation communities are at a higher elevation than the occurring construction activity. • Depending on site-specific conditions, such as steep topography and the presence of direct, or regular, surface water flow, the environmental monitor may consider substituting other styles of fencing for erosion fencing, when appropriate. • Regularly clean vehicles and equipment. • Vehicle use will occur primarily on access roads and in agricultural habitats, where invasive and non-native vegetation species are less likely to be concentrated.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitored post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. • Undertake regular construction monitoring and routine inspections to ensure proper installation of erosion control and that proper fugitive dust control measures are in place. • Monitor sediment and erosion control measures, such as erosion fencing, check dams, and dust control measures daily in areas where work is taking place and prior to and after any storm events. • Monitor sediment and erosion control measures weekly in areas where active construction is not occurring until the construction phase is complete. • Correct silt fencing, or other applicable sediment and erosion control measures, that is not working properly. • An environmental monitor will be present when active directional drilling is occurring. **Contingency Measures:** • Restore vegetated buffers, including riparian zones, if accidentally damaged, as soon as possible. • If deficiencies in sediment and erosion control measures are noted, the environmental monitor will notify the contract administrator and recommend remedial actions, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas. • If sedimentation and erosion control measures fail and degradation of the habitat(s) occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred. • If any potential changes in species populations or distribution are noted during post-construction surveys as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of changes to species population or distribution.
Accidental Damage to Habitat, Including Tree Limbs (the Project Location is sited outside of SWH – vegetation removal is not anticipated).	• Protection of bat maternity colony habitat. • Protection of colonially-nesting breeding bird habitat (tree/shrub). • Minimize impacts to waterfowl nesting habitat. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Minimize impacts to woodland/wetland integrity and diversity. • Minimize impacts to marsh bird breeding habitat. • Minimize disturbance to marsh breeding birds. • Minimize impacts to bird species of conservation concern habitat. • Minimize direct impacts to plant species of conservation concern. • Protect plant species of conservation concern habitat. • Minimize impacts on current species composition. • Reduce the potential spread of non-native or invasive species. • Minimize direct impacts on vegetation communities and protect rare/sensitive habitats.	Common Mitigation • Clearly delineate work area using erosion fencing, or other barrier, to avoid accidental damage to potentially significant habitat trees and vegetation. • Depending on site-specific conditions, the environmental monitor may consider substituting other demarcating types for fencing, such as staking and flagging, where it is determined that there is no apparent risk to nearby natural features. This could include instances where the natural feature is at a higher elevation than the occurring construction activity. • No use of herbicides (Project related activities only) within significant features or wildlife habitats. Amphibian Breeding Habitat (Woodland) • Avoid direct impacts to specific breeding habitat (i.e., vernal pools or other aquatic habitat), or immediately surrounding woodland habitat. Plant Species Of Conservation Concern Habitat • Where construction is within 10 m of a significant plant species of conservation concern habitat, erect erosion fencing, or other barrier, to correspond to the disturbance area limits. • Place the erosion fencing, or other barrier, as far away as possible from the significant plant species of conservation concern habitat, and no closer to the significant habitat than the dripline. Old Growth Forest • Where construction is within 10 m of the old growth forest, erect erosion fencing, or other barrier, to correspond to the disturbance area limits. • Place the erosion fencing, or other barrier, as far away as possible from the old growth forest and no closer to the feature than the dripline.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWHs (NRSI, 2015a).	**Monitoring:** Bat Maternity Colony Monitoring • Conduct post-construction disturbance monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. Colonially- Nesting Breeding Bird Habitat (Trees/ Shrubs) Monitoring • Conduct post-construction disturbance monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. Waterfowl Nesting Area Habitat Monitoring • Conduct post-construction disturbance monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. Amphibian Breeding Habitat (Woodland) Monitoring • Conduct post-construction amphibian call surveys for 1 year following pre-construction survey methods to assess any potential changes in amphibian breeding populations or species distribution for all habitats deemed significant. Marsh Bird Breeding Habitat Monitoring • Conduct post-construction monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. Plant Species Of Conservation Concern Habitat Monitoring • Undertake regular monitoring of the dripline within 10 m of construction activities for the duration of the construction and decommissioning phases of this Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of a significant tree species of conservation concern habitat.

Table 4-4: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
				• Undertake regular monitoring of the dripline to ensure the work area is clearly delineated and dripline boundaries are respected when construction is anticipated to occur within 10 to 30 m of significant tree species of conservation concern habitat. • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitored post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. <u>Bird Species of Conservation Concern Habitat Monitoring</u> • Conduct post-construction behaviour surveys of this habitat for 3 years following pre-construction survey methods to assess the potential Project disturbance on this habitat. Full details of this monitoring will be provided within the Bird and Bat EEMP. <u>Old Growth Forest Monitoring</u> • Undertake regular monitoring of the dripline to ensure the work area is clearly delineated within 10 m of construction activities for the duration of the construction and decommissioning phases of this Project. This monitoring will be conducted at a minimum frequency of once per week when construction is anticipated within 10 m of the old growth forest. • Undertake regular monitoring of the dripline to ensure the work area is clearly delineated and dripline boundaries are respected when construction is anticipated to occur within 10 to 30 m of the old growth forest, at a minimum frequency of once per month. **Contingency Measures:** <u>Common Contingency Measures</u> • Prune damaged trees through implementation of proper arboricultural techniques. • Accidental damage to trees, or unexpected vegetation removal, may require re-planting of similar, native species depending on the extent of damage incurred. • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. • Restore vegetated buffers, including riparian zones, if accidentally damaged, as soon as possible. <u>Amphibian Breeding Habitat (Woodland) Measures</u> • If the results of the monitoring indicate a feature is no longer significant, consult the MNRF to discuss the need (if any) for additional post-construction surveys. <u>Plant Species Of Conservation Concern Habitat Measures</u> • Replace any plant species of conservation concern which are damaged or destroyed at a 1:1 ratio with plantings in the habitat. The success of any planted specimens will be monitored for 2 years after planting. • If degradation of the habitat(s) occurs as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred.

Table 4-5: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Operations

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Accidental Vegetation Removal	• Minimize direct impacts on vegetation communities and protect rare/sensitive habitats. • Avoid impacts to natural vegetation species, significant features, and wildlife habitats.	• No use of herbicides (Project related activities only) within significant natural features or wildlife habitats during the operational phase.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Contingency Measures:** • Accidental damage to trees, or unexpected vegetation removal, may require re-planting of similar, native species, depending on the extent of damage incurred.
Sedimentation and Erosion	• Minimize impacts to natural features and associated wildlife habitats.	• Store any stockpiled material more than 30 m from a significant natural feature during the operational phase.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Contingency Measures:** • If sedimentation and erosion control measures fail and degradation of the significant woodland, wetland or wildlife habitat occurs, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred.
Spills (i.e., oil, gasoline, grease, etc.) During the Operational Phase	• Minimize impacts to natural features and associated wildlife habitats.	• Develop a spill response plan and train staff on appropriate procedures. • Keep emergency spill kits on site. • Keep contact information for the MOECC Spills Action Centre in a designated area on the site. • Dispose of waste material by authorized and approved off-site vendors. • Store hazardous materials in designated areas. • Locate all maintenance activities, vehicle refuelling or washing, as well as storage of chemicals and equipment more than 30 m from significant habitats.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Contingency Measures:** • In the event of a spill, notify the MOECC Spills Action Centre, immediately stop work, and ensure all efforts are made to completely remediate affected areas, especially prior to rain events. • If degradation of the natural feature occurs as a result of the spill, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of degradation incurred.
Increased Vegetation Species Competition Through Introduction of Invasive Vegetation Species	• Avoid contamination of plant species of conservation concern habitat. • Avoid contamination of rare vegetation communities habitat.	• Regularly clean vehicles and equipment. • Vehicle use will occur primarily on access roads and in agricultural habitats, where invasive and non-native vegetation species are less likely to be concentrated.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Monitoring:** • Conduct post-construction monitoring in years 1, 3, and 5 of operation at a time of year when the species can be identified (refer to Table 10 of the EIS (NRSI, 2015a) for specific survey timing). Following pre-construction survey methods, one standardized area search will be conducted throughout each significant habitat. The UTM location of any individuals or clusters will be recorded and a stem count will be conducted. Specific locations of plant species of conservation concern identified during pre-construction surveys will also be monitored post-construction. The results of the surveys will be compared to the results of the pre-construction surveys to assess any potential changes in species populations or distribution. **Contingency Measures:** • If any potential changes in species populations or distribution are noted during post-construction surveys as a result of construction, appropriate contingency measures will be implemented, which may include re-establishing mitigation measures, habitat remediation, and/or seeding of permanently damaged areas depending on the extent of changes to species population or distribution. • An annual report, which documents the results of the post-construction monitoring, will be prepared following each year that post-construction monitoring occurs (i.e. following years 1, 3, and 5 of operation). The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect these habitats.
Avoidance of Habitat by Wildlife During Operations Phase.	• Protection of bat maternity colony habitat. • Protection of colonially nesting bird breeding habitat (tree/shrub). • Minimize disturbance to waterfowl species. • Minimize impacts to amphibian breeding habitat and minimize amphibian mortality. • Minimize impacts to woodland/wetland integrity and diversity. • Minimize impacts to marsh bird breeding habitat. • Minimize disturbance to marsh breeding birds. • Minimize noise disturbance/avoidance behaviour of bird species of conservation concern.	<u>Common Mitigation</u> • On site speed limits will be clearly posted, applied, and followed by Project staff throughout the operational phase. • Schedule regular maintenance activities within 30 m of significant natural features to occur during daylight hours, wherever possible, to limit potential impacts from light, noise, or vehicle interactions. • If regular maintenance activities within 30 m of significant natural features must occur outside of daylight hours, spotlights will be directed downward and/or away from the natural feature to limit potential light disturbance. <u>Bat Maternity Colony</u> • Schedule regular (non-critical) maintenance activities to occur outside of the critical roosting period (June), unless specifically required in accordance with manufacturer specifications. <u>Colonially Nesting Bird Breeding Habitat</u> • Avoid scheduling regular (non-critical) maintenance activities during peak breeding season (April-August), wherever possible. • If regular maintenance must occur during peak breeding season, a biologist will be present to confirm nesting birds will not be impacted by maintenance activities.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Monitoring:** <u>Common Monitoring</u> • Conduct post-construction mortality monitoring at this facility for a minimum of 3 years following MNRF guidelines (OMNR 2011b). <u>Bat Maternity Colony Monitoring</u> • Conduct post-construction disturbance monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. • Conduct post-construction mortality monitoring at this facility for at least 3 years following MNRF guidelines (MNRF 2011b). The turbines closest to these habitats (T28 and T31) will be included with the subsample of turbines monitored during post-construction mortality monitoring, if these habitats are confirmed to be significant. Full details of this monitoring will be provided within the Bird and Bat EEMP. <u>Colonially Nesting Bird Breeding Habitat Monitoring</u> • Conduct post-construction monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided in the Bird and Bat EEMP. <u>Waterfowl Nesting Area Monitoring</u> • Conduct post-construction behaviour surveys for 3 years following pre-construction survey methods to assess any potential changes to breeding habitats deemed significant. Full details of this monitoring will be provided within the Bird and Bat EEMP.

Table 4-5: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat Resulting from Operations

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
		Waterfowl Nesting Area • Avoid scheduling regular (non-critical) maintenance activities during the peak waterfowl nesting season (April-June), if possible. • If regular maintenance must occur during peak breeding season, a biologist will be present to confirm birds will not be impacted by maintenance activities. Marsh Bird Breeding Habitat • Schedule regular (non-critical) maintenance activities to occur outside of the peak marsh bird breeding season (mid-May to early July), wherever possible. • If regular maintenance must occur during this peak breeding season (mid-May to early July), have a biologist confirm birds will not be impacted by maintenance activities. Bird Species of Conservation Concern Habitat • Schedule regular (non-critical) maintenance activities located within 30 m of significant bird species of conservation concern habitat to occur outside of the peak breeding bird season (May 1st – July 31st), whenever possible. • If regular maintenance must occur during the breeding bird period (May 1st – July 31st), have a biologist confirm birds will not be impacted by maintenance activities.		Amphibian Breeding Habitat (Woodland) Monitoring • Conduct post-construction amphibian call surveys for 1 year following pre-construction survey methods to assess any potential changes in amphibian breeding populations or species distribution for all habitats deemed significant. Marsh Bird Breeding Habitat Monitoring • Conduct post-construction monitoring of this feature for 3 years after construction, following pre-construction methods, for all features deemed significant. Full details of this monitoring will be provided within the Bird and Bat EEMP. Bird Species of Conservation Concern Habitat Monitoring • Conduct post-construction behaviour surveys of the habitat for 3 years following pre-construction survey methods to assess the potential Project disturbance on this habitat. Full details of this monitoring will be provided within the Bird and Bat EEMP. **Contingency Measures:** Common Contingency Measures • An annual report, which documents the results of mortality monitoring, will be prepared following each year that mortality monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect these habitats. Bat Maternity Colony Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Colonially Nesting Bird Breeding Habitat Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Waterfowl Nesting Area Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Amphibian Breeding Habitat (Woodland) Measures • If the results of the monitoring indicate a feature is no longer significant consult the MNRF to discuss the need (if any) for additional post-construction surveys. Marsh Bird Breeding Habitat Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat. Bird Species of Conservation Concern Habitat Measures • An annual report, which documents the results of disturbance monitoring, will be prepared following each year that disturbance monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat.
Direct Mortalities Through Collisions with Operational Turbines.	• Minimize the mortality of bird and bat species.	• Develop a Bird and Bat EEMP in accordance with MNRF's Bats and Bat Habitats (OMNR 2011a) guidance and Birds and Bird Habitats (OMNR 2011b) guidance.	• Assuming the implementation of the planned mitigation measures, monitoring programs, and contingency plans (if necessary), there is unlikely to be any significant impacts to natural heritage features, including woodlands, wetlands, or SWH (NRSI, 2015a).	**Monitoring:** • Conduct post-construction mortality monitoring at this facility for a minimum of 3 years following MNRF guidelines (OMNR 2011a, OMNR 2011b). Full details of this monitoring will be provided in the Bird and Bat EEMP. **Contingency Measures:** • An annual report, which documents the results of mortality monitoring, will be prepared following each year that mortality monitoring occurs. The report will be submitted to MNRF and the results presented in these annual reports will be used to determine if any additional mitigation measures should be implemented during the operational phase of this Project to further protect this habitat.

4.3 Surface Water and Groundwater

4.3.1 Existing Conditions

4.3.1.1 Surface Water

According to Section 1.1 of the O. Reg. 359/09, as amended, a water body is defined as:

> *"A lake, permanent stream, intermittent stream and a seepage area but does not include:*
> *a) grassed waterways;*
> *b) temporary channels for surface drainage, such as furrows or shallow channels that can be tilled and driven through;*
> *c) rock chutes and spillways;*
> *d) roadside ditches that do not contain a permanent or intermittent stream;*
> *e) temporary ponded areas that are normally farmed;*
> *f) dugout ponds; and*
> *g) artificial bodies of water intended for storage, treatment or recirculation of runoff from animal yards, manure storage facilities and sites and outdoor confinement areas."*

There are 62 water bodies as defined by O. Reg. 359/09, as amended, identified within 120 m of Project Location through site investigations, of which 53 water bodies are overlapping with Project Infrastructure. All of these water bodies are either permanent or intermittent watercourses and designated as warmwater fisheries or intermittent drainage features (NRSI, 2015b). Four aquatic species of conservation concern were identified through the records review as potentially occurring in the PSA. These include Grass Pickerel (*Esox americanus vermiculatus*), Blackstripe Topminnow (*Fundulus notatus*), Spotted Sucker (*Minytrema melanops)* and Ghost Shiner (*Notropis buchanani*).

All water body features were documented and assessed in the Water Body Assessment and Water Body Report in accordance with O. Reg. 359/09, as amended, and the *Technical Guide to Renewable Energy Approvals* (MOECC, 2013).

4.3.1.2 Groundwater

As described in the *Technical Guide to Renewable Energy Approvals* (MOECC, 2013), an important environmental effect to consider is the potential for the Project to interfere with existing uses of a water resource.

The following section provides an overview of the Hydrogeological Assessment and Effects Assessment Report for the North Kent Wind 1 Project. For further details please refer to the Hydrogeological Assessment and Effects Assessment Report in **Appendix C** of the Design and Operations Report.

4.3.1.1 Physiography and Topography

The PSA is located within 2 distinct physiographic regions. The western, northwestern and southeastern portions of the PSA lie within the Chatham Flats, a sub-region of the St. Clair Clay Plains physiographic region, whereas the northeastern portion of the PSA is located within the Bothwell Sand Plains physiographic region (Chapman and Putnam, 1984). The Chatham Flats is described as a low relief extensive clay plain that slopes gently to the west toward Lake St. Clair. In the Municipality of Chatham-Kent, encompassing the eastern portion of the PSA, a shallow sand layer is found to overlie the predominantly clay soils (Chapman and Putnam, 1984). According to MOECC water wells records, the sand layer can be up to 5 m thick in some places.

Currently, land use across the PSA is dominated by mixture of crop cultivation and livestock agriculture, which has been made possible by the installation of dredged ditches and tile under-drains to provide satisfactory moisture conditions within the imperfectly drained soils. Chapman and Putnam (1984) classify the soils of the Bothwell Sand Plains as low-grade, with the majority of the farmland cultivated with corn and soybeans. In contrast, the soils of the Chatham flats are considered highly fertile, producing cash crops in addition to corn and soybeans. Ground surface topography within the PSA is characterized as having low relief, with minor undulations associated with local surface water features.

4.3.1.3 Geological Setting

Bedrock Geology

Across the PSA, thick successions of Upper Devonian aged Paleozoic sedimentary rocks subcrop beneath the overburden soils. The PSA is underlain by bedrock of the Kettle Point Formation, which can be described generally as a brown to black, laminated, organic-rich shale and siltstone (Armstrong, D.K., and Dodge, J.E.P., 2007).

Depth to bedrock across the PSA was assessed through a review of Drift Thickness mapping published by the OGS, as well as MOECC water well record information. Based on this review, overburden thickness within the PSA has been shown to range between approximately 10 m and 32 m, with an average thickness of about 18 m.

Overburden Geology

Thick overburden deposits consisting of both fine and coarse textured glacial sediments and fluvial deposits occur across the PSA. The PSA is situated within an abandoned lacustrine plain that consists of numerous alluvial features which were deposited in high level post-glacial and non-glacial lakes which historically occupied the Lake St. Clair basin (Kelly, 1991). Where the Thames River entered the glacial lakes, deltaic sediments of sand and gravel were deposited.

Groundwater Resources

Within the Municipality of Chatham-Kent, water for municipal supply is provided from 4 surface water facilities and 2 groundwater facilities (Chatham-Kent, 2015). There are no municipal surface water intakes and/or groundwater supply wells within the PSA. Approximately 97% of the population within the Region is served by municipal water. However, the remaining 3% depend on groundwater as the primary water supply for properties outside the municipally serviced areas (Chatham-Kent, 2015). See **Table 4-6** for a brief summary of recorded water well information in the PSA.

Table 4-6: Summary of MOECC Water Well Record Information

Primary Water Use	Number of Well Records	Well Depth (m)	Primary Well Type
Commercial/Industrial	11	11.9 to 28.7	2 Overburden, 8 Bedrock, 1 unknown
Domestic	225	4.6 to 34.7	58 overburden, 154 bedrock, 13 unknown
Irrigation/Livestock	116	10.4 to 38.1	37 overburden, 79 bedrock
Monitoring/Test Hole	6	2.4 to 18.2	6 unknown
Public/Municipal	6	22.0 to 114.0	2 overburden, 3 bedrock, 1 unknown
Not Used	64	3.4 to 37.2	15 overburden, 36 bedrock, 13 unknown
Unknown	253	7.6 to 38.1	25 overburden, 193 bedrock, 35 unknown

The location and depth of MOECC water well records gives some indication of the presence of viable groundwater resources within the PSA. Approximately 77% of the wells within the PSA obtain their source water from the bedrock aquifer. In contrast, only 23% of the MOECC water well records within the PSA were completed in overburden sediments. This differential provides further evidence that the overburden is a marginal groundwater resource locally.

4.3.2 Potential Effects, Mitigation Measures and Net Effects

4.3.2.1 Surface Water

Construction and Decommissioning

Table 4-7 identifies potential effects on surface water resources that could occur during the construction and decommissioning phases of the Project and identifies mitigation strategies and a monitoring plan.

Operations

Table 4-8 identifies potential effects on surface water resources that could occur during the operations phase of the Project and identifies mitigation strategies and a monitoring plan.

Where monitoring determines that the mitigation measures are not working as anticipated, contingency measures are described to address any adverse effects.

Table 4-7: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Surface Water Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Increased Erosion, Sedimentation, and Turbidity Resulting from Removal of Upland and Riparian Vegetation. **Excess Sediment Suspended and Carried Downstream by Stream Flow during the Installation and Removal of Temporary Structures.** **Increased Sedimentation Resulting from Dust and Debris Settling in Water Bodies, if Blasting Occurs**	• Minimize erosion, sedimentation and turbidity. • Minimize transfer of sediment downstream via stream flow.	• Remove construction debris from the site and stabilize it to prevent it from entering the nearby water bodies. • Avoid construction during high volume rain events, as determined by the Environmental Construction Monitor and significant snow melt/thaw events, where possible, and resume once soils have been stabilized or mitigation measures have been installed (i.e. heavy-duty silt fences, coir logs, or straw mats around any soil stockpiles) to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies. • Implement riparian planting after construction, as soon as weather permits, to stabilize water body banks and encourage rapid re-vegetation of disturbed soils. This will aid in preventing potential bank collapse and erosion, which, in turn, will minimize sedimentation, support fish habitat, and protect sensitive ecological functions that occur in water bodies. • If insufficient time is available in the growing season to establish vegetative cover, apply overwintering treatments such as erosion control blankets, fiber matting, rock (i.e. large, clean angular rocks) reinforcement/armoring or equivalent to contain the site over the winter period. Plant vegetative cover as soon as is feasible in the next growing season, followed by maintenance and inspection. • Monitor erosion and sediment control systems frequently for effectiveness, repairing deficient controls in a timely manner and using an adaptive management approach when deemed appropriate. • Avoid seasonally wet periods when conducting clearing, grubbing, and grading activities, where possible. • Develop a Flood Response Plan to deal with on-site flooding in order to mitigate any possible effects to the aquatic environment. • Develop an Erosion and Sediment Control Plan to minimize the potential for construction related sediment release into nearby watercourses (Erosion and Sediment Control Plan Guideline), and prepare Erosion and Sediment Control Plan condition reports as part of the monitoring and maintenance plan. • Where possible, locate blasting sites away from water bodies, use blasting mats to contain debris, and spray the surface of the blast site with water to keep dust down.	• The application of the ESC Plan and maintenance of erosion and sediment control systems will prevent impacts to water bodies from increased erosion, sedimentation, and turbidity due to the removal of upland riparian vegetation. In addition, the removal of vegetation will be localized. • The release of excess suspended sediment downstream is unlikely and may occur only during in water work. Using directional drilling methods will eliminate this impact. Performing in water work in the dry and isolating the work area will prevent increases in suspended sediment if in water work is required. • Blasting activities are highly unlikely and will be highly localized. Locating blasting sites as far away from water bodies as possible, using blasting mats to contain debris and dampening the surface to keep dust down will mitigate the effects that blasting activities may have on local water bodies.	**Monitoring:** • Monitor on-site conditions (i.e., erosion and sediment control measures, spills, flooding). • Monitor meteorological conditions from Environment Canada during construction phase. • Monitor end point of dewatering discharge for water quality and erosion (if dewatering). • Monitor by-pass channel (if applicable). • Monitor aquatic habitat at drilling locations (if drilling) (i.e. potential 'frac-out'). • Monitor surface water quality for general parameters (i.e. Total Suspended Solids (TSS)). • Monitor water levels within water bodies during groundwater dewatering.
Increase in Impervious Surfaces and Increased Surface Runoff Resulting from Clearing of Vegetation and Re-grading of Land. **Soil Compaction as a Result of Heavy Machinery and the Stockpiling of Heavy Materials (i.e., Soils) in the PSA.** **Decreased Infiltration to Key Areas (e.g. Areas of Recharge) Due to Newly Impervious Cover Leading to Interruptions to the Natural Water Cycle.**	• Minimize the increase of impervious surfaces and surface runoff. • Minimize soil compaction.	• Avoid seasonally wet periods when conducting clearing, grubbing, and grading activities, where possible. • Operate construction equipment (i.e., cranes, back hoes etc.), in a manner that minimizes disturbance to the water body banks and stays outside of the water body and bank area. • Restrict construction equipment to designated, controlled vehicle access routes to minimize the potential for soil compaction. • Avoid construction during high volume rain events, as determined by the Environmental Construction Monitor and significant snow melt/thaw events, where possible, and resume once soils have been stabilized or mitigation measures have been installed (i.e. heavy-duty silt fences, coir logs, or straw mats around any soil stockpiles) to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies.	• The increase in impervious surfaces and grading activities is minimal and highly localized. The application of the ESC Plan and maintenance of erosion and sediment control systems will mitigate the increased potential for erosion and downstream sedimentation. • The reduction of soil permeability and infiltration capacity as a result of heavy machinery and stockpiling of heavy materials is minimal, localized, and temporary in nature. Stockpiling of material and the use of heavy machinery is expected to be localized and temporary in nature. • The reduction in infiltration to key areas due to newly impervious surfaces is minimal. The use of permeable materials on access roads, parking lots, etc. will reduce the impact of decreased infiltration.	
Minor, Isolated, Short Term Dewatering of Shallow Groundwater from Excavation Areas Required when Excavation Intercepts an Area of Shallow Groundwater Table Conditions.	• Minimize short term dewatering activities when possible.	• Monitor water levels immediately before and during dewatering activities, to determine if dewatering activities are resulting in alteration of water levels within the water body. • Dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body • If discharging to a municipal storm sewer, ensure that groundwater quality meets the objectives of the municipal storm sewer by-law prior to discharge. To mitigate potential effects associated with the discharge, sample for TSS prior to discharge to ensure the water is suitable for discharge and will not result in an impact to the receiving water body. If the groundwater is not suitable for discharge, identify alternate disposal locations or carry out adequate treatment.	• The extent of dewatering will be localized and minimal. Impacts to water levels due to dewatering activities are highly unlikely. Monitoring water levels immediately before, during and after dewatering activities will help to mitigate any impacts.	
Completion of In-water Work Requiring In-stream Dewatering and the Construction of Temporary Dykes or Cofferdams.	• Minimize disruption due to in-water works.	• Schedule construction activities near water (within 30 m) to occur within the low flow period of the late summer months, where possible, to avoid or minimize impacts. • If in-water work is required (e.g. for culvert installation and or collector line installation), adhere to required timing windows confirmed through consultation with regulatory agencies, including the MNRF. • If required, perform in-water work in dry conditions, where possible. If this is not possible, short-term isolated dewatering will be required. Prior to dewatering, isolate the work area with the installation of a temporary water containment structure. The structure should form an impermeable enclosure that will prevent debris and sediment from escaping into the surrounding water body. Construct a by-pass channel to maintain flow through the water body and prevent back flooding, which could ultimately overtop the water containment structure. Additional permits may be required for in-water work.	• The extent of dewatering will be localized and minimal. Impacts to water levels due to dewatering activities are highly unlikely. Monitoring water levels immediately before, during and after dewatering activities will help to mitigate any impacts.	

Table 4-7: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Surface Water Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
		• Install an in-stream sediment filter (e.g. Siltsoxx or Filtersoxx) downstream of water containment structure, dewatering discharge should be dissipated (i.e. splash pads, sand bags, hay bales etc.) and may require splitting discharge to more than one location. • Dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body. • Prior to surface water dewatering, collect and relocate fish to a suitable location, preferably downstream and away from the construction area. This should be executed through the development of a Fish Salvage Plan and by a qualified fisheries biologist. • Dewatering discharge rates should be evaluated as to not result in erosion and sedimentation to receiving water body		
Degradation of Water Quality from Contamination by Oils, Gasoline, Grease and Other Materials (e.g. 'frac-out') Due to Accidental Spills, as a Result of the Proximity of Construction Vehicles and Machinery to Water Bodies.	• Minimize water contamination • Minimize soil contamination.	• Machinery should arrive on site in clean condition. Frequent checks and maintenance should ensure that no fluid leaks occur. Machinery must be refueled, washed, and serviced a minimum of 30 m away from all water bodies and other drainage features to prevent any deleterious substances from entering a water body. • Store fuel and other construction related materials securely away from any drainage features and locate construction staging areas 30 m away from any water body. • Develop a Spill Response Plan (SRP) prior to commencement of construction to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. Keep a spill kit on site at all times and train on-site workers in the proper use of this kit and to be fully aware of the SRP. • Remove and dispose of any waste generated from the site appropriately off-site according to provincial standards including but not limited to O.Reg102/94, O.Reg 103/94, R.R.O. 1990, Regulation 347. • Horizontal directional drilling should be executed at a depth that limits the potential impacts associated with the possibility of a 'frac-out'. A minimum depth will be provided on design drawings and will be included in discussions with the conservation authorities. • Locate drilling entry/exit shafts beyond the top of bank, at a distance that allows the minimum depth, as identified on design drawings, to be reached while below the water body. This distance should be agreed upon with regulatory agencies. • Develop and implement an emergency 'frac-out' response plan including steps to contain, monitor and clean-up in response to the event.	• Spills are highly unlikely and the application of a SRP will mitigate any potential impact to water bodies due to accidental spills. • Changes in water quality are highly unlikely and related only to spills or frac-out events. Following the SRP and locating machine fueling and maintenance activities away from water bodies will prevent contamination of water bodies.	**Monitoring:** • Monitor on-site conditions (i.e., erosion and sediment control measures, spills, flooding). • Monitor meteorological conditions from Environment Canada during Construction phase. • Identify changes to existing aquatic habitat during the pre-construction (to establish a baseline) and Construction Phases. • Monitor aquatic habitat at drilling locations (if drilling) (i.e. potential 'frac-out').
Disturbance of Flow Patterns, Increased Risk of Flooding, Erosion and Sedimentation, and Water Quality Impairment Due to Improper Containment of Stockpiles	• Minimize disturbance to local drainage patterns, and flooding • Minimize erosion and sedimentation, and water quality impairment	• Schedule construction activities near water (within 30 m) to occur within the low flow period of the late summer months, where possible, to avoid or minimize impacts. • Remove construction debris from the site and stabilize it to prevent debris from entering the nearby water bodies • Avoid construction during high volume rain events, as determined by the Environmental Construction Monitor and significant snow melt/thaw events, where possible, and resume once soils have been stabilized (i.e. heavy-duty silt fences, coir logs, or straw mats around any soil stockpiles) to avoid risk of erosion, soil compaction or the potential for sediment release into nearby water bodies. • Develop a Flood Response Plan (FRP) to deal with on-site flooding in order to mitigate any possible effects to the aquatic environment	• Stockpiles of debris will be removed from the site and stabilized according to the ESC Plan. Change in flow patterns, flooding, erosion and sedimentation are highly unlikely following the application of the ESC Plan.	**Monitoring:** • Monitor on-site conditions (i.e., erosion and sediment control measures, spills, flooding). • Monitor meteorological conditions from Environment Canada during construction phase. • Monitor surface water quality for general parameters (i.e. Total Suspended Solids (TSS)).

Table 4-8: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Surface Water Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Vegetation Control and Increased Vehicle Use: • **Degradation of water quality from contamination by oils, gasoline, grease, and other materials due to accidental spills, as a result of the proximity of construction vehicles and machinery to water bodies.** • **Increase in surface runoff resulting from clearing of vegetation, increase in impervious surfaces, and soil compaction from vehicles accessing the site, resulting in increased erosion and sedimentation.**	• Minimize erosion, sedimentation and turbidity resulting from clearing of vegetation. • Minimize water contamination. • Minimize surface water runoff resulting from clearing of vegetation.	• Develop an Erosion and Sediment Control (ESC) Plan that will minimize the potential for operations related sediment release into nearby water bodies (ESC Guidelines) • Store fuel and maintenance related materials at least 30 m away from any drainage features. • Implement a SRP to provide a detailed response system to deal with events such as the release of petroleum, oils and lubricants or other hazardous liquids and chemicals. A spill kit must also be kept on site at all times and on-site workers must be trained in the use of this kit and be fully aware of the SRP. • Confine vehicles to designated controlled access routes to minimize the potential for soil compaction.	• Spills during the operational phases are rare. The application of a SRP will mitigate any potential impact to water bodies. • The increase in impervious surfaces is minimal and highly localized. Vehicles will be confined to designated access routes. • The application of the ESC Plan and maintenance of erosion and sediment control systems will prevent impacts to water bodies from increased erosion, sedimentation, and turbidity due to the removal of upland riparian vegetation, increased impervious surfaces, and soil compaction.	**Monitoring:** • Monitor water levels immediately before, during, and after dewatering • Staff gauge readings daily during dewatering • Continuous level loggers (logged in 1 hour increments and downloaded daily during active dewatering) • Any additional monitoring identified through the construction phase

4.3.2.2 Groundwater

Construction and Decommissioning

Table 4-9 identifies potential effects on groundwater resources that could occur during the construction and decommissioning phases of the Project and describes mitigation strategies and a monitoring plan.

Operations

Table 4-10 identifies potential effects on groundwater resources that could occur during the operations phase of the Project and describes mitigation strategies and a monitoring plan.

Where monitoring determines that the mitigation measures are not working as anticipated, contingency measures are described to address any adverse effects.

Table 4-9: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Groundwater Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Temporary Reduction in Groundwater Flow to Natural Features (Water Bodies, Watercourses and Wetlands) during Groundwater Dewatering Activities Associated with Turbine Foundation Construction.	• Minimize reduction of groundwater contribution to near-by natural features.	• Direct dewatering discharge to the downgradient watercourse (following sediment and erosion control practices) to negate the potential that groundwater drawdown will decrease baseflow into streams and groundwater discharge into wetlands. • Limit duration of dewatering to as short a time frame as possible. • Implement groundwater cut-offs, where practical, to limit groundwater taking quantities.	• Reduction in groundwater quantity and quality minimized through application of mitigation measures. ▪ *Low likelihood and negligible magnitude of long term effects based on the amount of dewatering required and the duration of expected dewatering activities.*	**Monitoring and Contingency Measures:** • Should groundwater dewatering activities exceed 50,000 L/day, the following will be implemented: ▪ Inlet pump head shall be surrounded with clear stone and filter fabric. ▪ The company shall regulate the discharge at such a rate that there is no flooding in the receiving water body or dissipate the discharge so that no soil erosion is caused that impacts the receiving water body.
Temporary Reduction in Groundwater Quantity and Quality to Existing Groundwater Users (Private Water Wells) during Groundwater Dewatering Activities Associated with Turbine Foundation Construction.	• Minimize reduction of groundwater quantity and quality to existing groundwater users.	• Limit duration of dewatering to as short a time frame as possible. • Implement groundwater cut-offs, were practical, to limit groundwater taking quantities. • Maintain a setback of 120 m from known active residential groundwater supply wells (private water wells), where possible.	• Reduction in groundwater quantity and quality minimized through application of mitigation measures. ▪ *Low likelihood and negligible magnitude of long term effects based on the amount of dewatering required and the duration of expected dewatering activities.*	**Monitoring and Contingency Measures:** • Should groundwater dewatering activities exceed 50,000 L/day and a private water well becomes dry due to construction dewatering activities a temporary potable water supply will be provided to the property owner.
Contamination of Groundwater Resources Due to Accidental Spills or Releases of Contaminants (i.e., Fuel, Lubricating Oils and Other Fluids) During the Refuelling, Operation or Maintenance of Construction Equipment.	• Prevent contaminant discharge to the environment.	• Develop a SRP and train staff on procedures and protocols. • Refuel Project equipment and vehicles on spill collection pads and/or in designated areas. • Dispose of any waste material from construction activities by authorized and approved off-site vendors.	• Groundwater contamination minimized through application of mitigation measures. ▪ *Low likelihood and limited magnitude of effects on groundwater.*	**Monitoring:** • Routine inspections performed by the contractor of construction equipment for leaks and spills. **Contingency Measures:** • In the event of a spill all work will stop until the spill is cleaned up. • Notify MOECC's Spill Action Centre of any leaks or spills.

Table 4-10: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Groundwater Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Contamination of Groundwater Resources Due to Accidental Spills or Releases of Contaminants (i.e., fuel, lubricating oils and other fluids) During the Refuelling, Operation or Maintenance of Project Equipment.	• Prevent contaminant discharge to the environment.	• Develop a SRP and train staff on procedures and protocols. • Refuel Project equipment and vehicles on spill collection pads and/or in designated areas. • Dispose of any waste material from construction activities by authorized and approved off-site vendors.	• Groundwater contamination minimized through application of mitigation measures. ▪ *Low likelihood and limited magnitude of effects on groundwater.*	**Monitoring:** • Routine inspections performed by the contractor of construction equipment for leaks and spills. **Contingency Measures:** • In the event of a spill all work will stop until the spill is cleaned up. • Notify MOECC's Spill Action Centre of any leaks or spills.
Reduction in Groundwater Quantity From an Increase in Impervious Area Created by Turbine Foundations and Access Roads Resulting in Reduced Infiltration to Unconfined Aquifers *(coarse-textured lacustrine deposit).*	• Minimize the increase in impervious areas.	• Direct runoff from the constructed impervious surfaces to ground surface to prevent any decrease in infiltration and recharge. • Minimize vehicle and construction equipment traffic on exposed soils to avoid compaction and a reduction of water infiltration.	• Reduced infiltration near groundwater recharge areas minimized through application of mitigation measures. ▪ *Low likelihood and limited magnitude of effects based on surface area of turbine foundations and the primary land use of surrounding area.*	**Monitoring and Contingency Measures:** • No monitoring or contingency measures required.

4.4 Emission to Air, including Odour and Dust

4.4.1 Existing Conditions

The PSA is dominated agricultural production activities and typical farm practices, which include the use of oversized machinery that are driven in fields as well as on rural, typically gravel, roadways. Periodic odours in rural areas from activities like the spreading of manure as well as increased dust particulate are considered to be normal nuisances associated with typical agricultural practices (Ontario Ministry of Agriculture, Food, and Rural Affairs, 2005).

4.4.2 Potential Effects, Mitigation Measures and Net Effects

Construction and Decommissioning

The Project activities associated with the site preparation and construction phase and the decommissioning phase will lead to emission products, including but not limited to GHGs (e.g., methane, and carbon dioxide), nitrogen dioxide, sulphur dioxide and suspended particles from vehicles and machinery operation. The emissions levels will fluctuate through the various construction and decommissioning related activities, with access road construction / reclamation, site grading, and preparation / reclamation of staging and laydown areas having the highest potential for emissions because of increased construction or decommissioning equipment activities during this time. In general these emissions will be temporary and localized.

No emissions of odours are anticipated during construction or decommissioning activities.

Table 4-11 identifies potential effects on air quality that could occur during the construction and decommissioning phases of the Project and identifies mitigation strategies and a monitoring plan.

Table 4-11: Mitigation Measures, Net Effects and Monitoring Plan Associated with Emissions to Air Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Fugitive Dust and Vehicle Emissions *(including GHGs).*	• No persistent dust films (observable build-up) on nearby properties or vegetation. • Limited release of air emissions.	• Implement a speed limit for construction equipment and trucks on access roads. • Apply dust suppressants (e.g., water or environmental friendly dust suppressants) to unpaved areas at an environmental acceptable rate to minimize the release of dust. • Re-vegetate cleared areas as soon as possible. • Install wind fences, as required. • Limit unnecessary idling of vehicles.	• Increased dust and air emissions minimized through application of mitigation measures. ▪ *High likelihood of effects occurring; however, any dust and air emissions are short-term and localized so the magnitude of such effects will be limited.*	**Monitoring:** • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan (see Design and Operations Report). **Contingency Measures:** • Review of proposed mitigation measures. • Review of speed limit on access roads.
Reduction in Surface Water Quality as a Result of Dust Emissions.	• No persistent dust films on adjacent water bodies; no measurable change in TSS.			

Operations

During the operation of the Project, maintenance activities have the potential to cause infrequent, localized and short-term fugitive dust and emissions typical to the operation of motorized vehicles. These emissions are expected to be considerably lower in magnitude than during the construction and the decommissioning activities.
No emissions of odours are anticipated during operations.

Table 4-12 identifies potential effects on air quality that could occur during the operations phase of the Project and identifies mitigation strategies and a monitoring plan. Where monitoring determines that the mitigation measures are not working as anticipated, contingency measures are described to address any adverse effects.

Table 4-12: Mitigation Measures, Net Effects and Monitoring Plan Associated with Emissions to Air Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Fugitive Dust and Vehicle Emissions *(including GHGs).*	• No persistent dust films (observable build-up) on nearby properties, vegetation and water bodies. • Limited release of air emissions. • Minimize impacts to natural features and associated wildlife habitats.	• Implement and enforce speed limits for Project equipment and trucks. • Apply dust suppressants to unpaved areas, when necessary, to suppress dust. Application frequency will vary, but will be determined by site-specific weather conditions, including recent precipitation, temperatures and wind speeds. • Re-vegetate cleared areas as soon as reasonably possible. • Properly maintain all vehicles. • Direct project staff to limit the idling of engines, where possible.	• Emissions of contaminants from maintenance vehicles minimized through application of mitigation measures. • Dust from vehicular traffic minimized through application of mitigation measures. ▪ *Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.*	**Monitoring:** • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan. If complaints are received by a North Kent Wind operations staff member then a visual inspection will be carried out. **Contingency Measures:** • Review of proposed mitigation measures. • Review of speed limit on access roads.

4.5 Sound

4.5.1 Existing Conditions

As mentioned in the above section, land use within the PSA is primarily agricultural and exposed to existing farm practices. These practices include the operation of large agricultural machinery at off hours as well as increased traffic in the region relating to the hauling and storage of crops. Periodic increased sound associated with regular farm operations is considered to be a normal nuisance associated with typical agricultural practices (Ontario Ministry of Agriculture, Food, and Rural Affairs, 2005).

4.5.2 Potential Effects, Mitigation Measures and Net Effects

Construction and Decommissioning

The operation of heavy construction vehicles and temporary generators could also result in nuisance sound at nearby residents or businesses. Sound will be highest during land clearing and other activities that involve significant levels of material handling (e.g., aggregate laydown for access road construction and preparation for the installation of underground collector lines).

Table 4-13 identifies potential effects from nuisance sound that could occur during the construction and decommissioning phases of the Project and identifies mitigation strategies and a monitoring plan.

Operations

The operation of wind turbine generators and the collector substation will generate sound that has the potential to affect local residents. **Table 4-14** identifies potential effects from sound that could occur during the operations phase of the Project and identifies mitigation strategies and a monitoring plan.

Table 4-13: Mitigation Measures, Net Effects and Monitoring Plan Associated with Sound Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Increased Sound Due to Construction Activity.	• Adherence to Municipality of Chatham-Kent noise by-law no. 41-2004 and amendment 43-2005.	• Ensure that construction equipment is frequently maintained and kept in good working condition. • Ensure that sound emissions from construction equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations. • Schedule activities to comply with noise by-laws, where possible. • Implement construction speed limit on unpaved roads.	• High likelihood of increased sound during construction; however, the effect will be short-term, localized, and limited in magnitude.	**Monitoring:** • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan (see Design and Operations Report). **Contingency Measures:** • Repair equipment that is unable to meet noise standards. • If sound complaints are received, conduct an investigation to determine the source of the problem.

Table 4-14: Mitigation Measures, Net Effects and Monitoring Plan Associated with Sound Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Increased Sound Levels Experienced by Non-Participating Receptors Due To Turbine Operation.	• Sound at all non-participating sound receptors below 40 decibels (dBA).	Monitor and assess the need for repair of equipment, as required.	• Sound levels experienced by non-participating receptors (residents located on non-participating properties) due to turbine operation will comply with the applicable noise regulations and guidelines.	**Monitoring:** • Monitor wind turbine generator performance remotely or from the operations and maintenance building. • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan. If complaints are received by a North Kent Wind 1 operations staff member then an on-site inspection will be carried out. **Contingency Measures:** • Repair wind turbine generators that are unable to meet operational standards. • If sound complaints are received, conduct an investigation to determine the source of the problem.
Increased Sound Levels Experienced by Non-Participating Receptors Due to Substation Operation.	• Sound at all non-participating sound receptors below 40 dBA.	• Monitor and assess the need for repair of equipment, as required.	• Sound levels experienced by non-participating receptors near the substation will be below applicable noise regulations and guidelines due to setback requirements and application of mitigation measures.	**Monitoring:** • Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). **Contingency Measures:** • Repair equipment that is unable to meet operational standards. • If sound complaints are received, conduct an investigation to determine the source of the problem.

4.6 Local Interests, Land Use and Infrastructure

Local interests, land uses and infrastructure were taken into consideration during the design phase of the Project. The following section describes the results of the effects assessment for the operations phase of the Project. Effects on agricultural use, adjacent businesses and properties, roads, the local airport, and conservation areas were included in this assessment. All turbines have been sited to meet or exceed MOECC's required setbacks.

4.6.1 Existing Conditions

Land Use

The Project is located within the single tier Municipality of Chatham-Kent, Ontario. Chatham-Kent's Official Plan (2014) shows that land uses in the PSA are predominantly designated for agricultural use. Other land uses within the area include non-farm residential uses on separate lots created through severances for farm retirement lots, surplus farm dwelling lots and older estate lots that are scattered throughout the PSA in limited numbers as well as general industrial and rural industrial zones. Such zones might include small-scale manufacturing operations, farm-related businesses and contractor works yards.

There is no record of site contamination within the PSA which was confirmed through a review of the MOECC's Records of Site Condition (MOECC, n.d.).

Provincial and Local Infrastructure

As part of the REA process, North Kent Wind 1 will consult with the Municipality of Chatham-Kent and Ministry of Transportation to determine what effects the Project might have on local services and infrastructure. Such issues may include, but are not limited to, effects to underground water and wastewater infrastructure, roads and traffic, emergency management and response, and building code requirements.

Adjacent Businesses and Properties

A Property Line Setback Assessment has been prepared to address Section 53 of O. Reg. 359/09, as amended, (see **Appendix D** of the Design and Operations report). This section of the regulation requires the identification of any impacts to businesses, infrastructure, properties or land use activities resulting from a turbine location being proposed at a distance equal to or less than the hub height of the turbine (99.5 m) from an adjacent property line. 28 turbines were identified to require assessment due to their proximity to adjacent property lines. The Property Line Setback Assessment confirmed that adverse impacts to the adjacent parcels may include damage to field crops as a result of turbine failure. However, this potential impact already exists at a 99.5 m setback and is not increased by a setback reduction.

Local Airport

The Chatham-Kent Municipal Airport is located approximately 19.5 km away from the southern extent of the PSA. A Land Use Proposal Submission Form has been submitted to NAV Canada.

Telecommunication and Weather Towers

North Kent Wind 1 has provided Project notices to telecommunication companies in the area to provide details on the Project. To date, North Kent Wind 1 has not received any concerns from these companies.

The closest Environment Canada weather radar tower is located in Exeter, Ontario and such, the Project will not have any impact on the operations of the weather radar tower.

Conservation Areas

The Municipality of Chatham-Kent is situated within two Conservation Authority regions: the Lower Thames Valley Conservation Authority (LTVCA) and the St. Clair Region Conservation Authority (SCRCA). No conservation areas are located within the PSA. Consultation with the LTVCA and SCRCA will occur throughout the planning and development stages of the Project and all regulations will be followed as identified in **Section 1.6** of this report.

Local Roads and Traffic

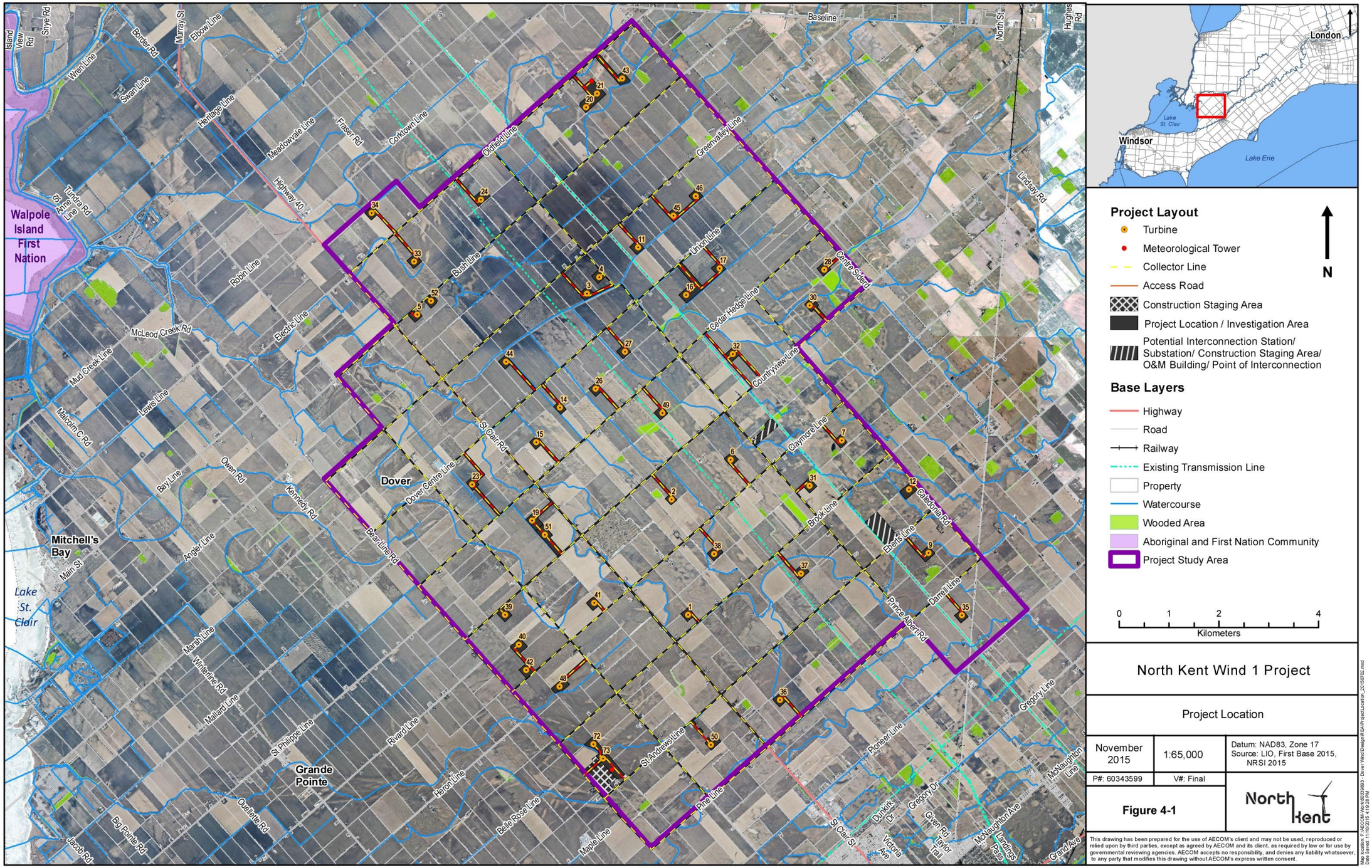
The Project Location map (**Figure 4-1**) displays existing local and provincial roads in proximity to the PSA. As part of the REA process, North Kent Wind 1 consulted with the Municipality of Chatham-Kent to determine what effects the Project might have on local services and infrastructure.

Aboriginal or Treaty Interests

To ensure aboriginal or treaty interests were considered, North Kent Wind 1 submitted the appropriate documents to the MOECC in order to receive the Aboriginal Contact List. MOECC confirmed that the following communities may have an interest in the Project:

- Aamjiwnaang First Nation;
- Bkejwanong Territory, Walpole Island First Nation;
- Caldwell First Nation;
- Chippewas of Kettle and Stony Point;
- Chippewas of the Thames First Nation;
- Oneida Nation of the Thames;
- Moravian of the Thames; and
- Munsee-Delaware Nation.

Figure 4-1: Project Location



4.6.2 Potential Effects, Mitigation Measures and Net Effects

Construction and Decommissioning

There will be a temporary loss of agricultural land during construction and installation activities as a result of temporary Project components, including crane pads, turbine laydown areas and the construction staging areas. However, these areas will be small relative to the total land area within the PSA, and these lands will be returned to a state similar to pre-existing land use after construction and installation activities are completed, unless otherwise agreed upon with the landowner. The construction of the Project will not result in the creation of access to previously inaccessible areas as the Project is located in areas already cleared for agricultural uses.

The road capacity and local traffic may also be affected during construction related activities. The delivery of construction equipment and Project infrastructure, and construction of new turbine access roads could result in a temporary increase in slower moving traffic volume on local roads. Construction related activities next to or in road easements could also result in temporary disruptions to the flow of traffic on some local roads. The changes in traffic volume are expected to be minimal and no appreciable change to traffic flow is anticipated as a result of the Project.

Table 4-15 identifies potential effects on land use and infrastructure including local roads that could occur during the construction and decommissioning phases of the Project and identifies mitigation strategies and a monitoring plan.

Operations

During the operation of the Project, the road capacity and local traffic could be affected if maintenance activities involve the replacement of a major wind turbine generator component, since specialized equipment (e.g., cranes) may be required. The delivery of specialized equipment could result in a temporary increase in slower moving traffic volumes on local roads. Any maintenance activities adjacent to or in road easements could also result in temporary disruptions to the flow of traffic on some local roads.

Table 4-16 identifies potential effects on local interests, land use and infrastructure that could occur during the operations phase of the Project and identifies mitigation strategies and a monitoring plan.

Table 4-15: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Reduction in Agricultural Land.	• No significant economic reduction in agricultural yields on lots containing Project Infrastructure.	• Minimize length of access roads where possible. • Consult with landowners to design access roads to minimize impacts to existing land use. • 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 PSA.*	**Monitoring and Contingency Measures:** • No monitoring or contingency measures required.
Damage to Local Infrastructure.	• Minimize damage to local infrastructure.	• Adhere to best practices regarding the operation of construction equipment and delivery of construction materials. • Undertake roads condition survey prior to construction and post-construction.	• Damage to local infrastructure minimized through application of mitigation measures. ▪ *Moderate likelihood and magnitude of effects occurring due to presence oversize loads during delivery of turbine components.*	**Monitoring:** • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan (see Design and Operations Report). **Contingency Measures:** • Return damaged infrastructure to original condition (or better) where appropriate.
Increased Congestion Due to Increase in Truck Traffic and Short-term Lane Closures on Local Roads during Delivery of Project Components.	• Minimize disturbances to local traffic patterns.	• Develop a traffic management plan for the construction phase and submit to the municipalities prior to construction. • Conduct a survey in conjunction with the Municipality of Chatham-Kent to determine if the roads and travel routes within the PSA are capable of accommodating the oversized vehicles and heavy loads prior to the delivery of Project components and equipment. • Notify the community in advance of construction delivery schedules and install signage to notify road users of construction activity, where appropriate.	• No significant adverse effects to local roads and traffic are anticipated during construction and installation activities following the implementation of a traffic management plan.	**Monitoring:** ▪ The construction contractor will regularly monitor and report to North Kent Wind 1 on the implementation of the traffic management plan. **Contingency Measures:** ▪ To the extent possible, use alternate component delivery routes.

Table 4-16: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Fugitive Dust and Vehicle Emissions *(including GHGs).*	• No persistent dust films (observable build-up) on nearby properties, vegetation and water bodies. • Limited release of air emissions. • Minimize impacts to natural features and associated wildlife habitats.	• Implement and enforce speed limits for Project equipment and trucks. • Apply dust suppressants to unpaved areas, when necessary, to suppress dust. Application frequency will vary, but will be determined by site-specific weather conditions, including recent precipitation, temperatures and wind speeds. • Re-vegetate cleared areas as soon as reasonably possible. • Properly maintain all vehicles. • Direct project staff to limit the idling of engines, where possible.	• Emissions of contaminants from maintenance vehicles minimized through application of mitigation measures. • Dust from vehicular traffic minimized through application of mitigation measures. ▪ *Low likelihood of occurring and limited magnitude due to limited volume of maintenance vehicles.*	**Monitoring:** • Monitor complaints through the Project operations staff contact number according to the Emergency Response and Communications Plan. If complaints are received by a North Kent Wind operations staff member then a visual inspection will be carried out. **Contingency Measures:** • Review of proposed mitigation measures. • Review of speed limit on access roads.

4.7 Other Resources

4.7.1 Existing Conditions

4.7.1.1 Landfills

MOECC's Landfill Inventory Management Ontario and Large Landfill Sites records (MOECC, 2015a and MOECC, 2015b) were used to confirm that there are no landfills within the PSA – the closest active landfill is approximately 21 km away. Therefore, no effects on landfills are anticipated.

4.7.1.2 Aggregate Resources

No aggregate pits or quarries have been identified within the PSA through review of the MNRF's Pits and Quarries Online database tool (MNRF, 2015a).

4.7.1.3 Forest Resources

Based on the MNRF's Sustainable Forest Licences (SFL) database (MNRF, 2015b), there are no SFLs within the PSA. Therefore, no effects on forest resources are anticipated.

4.7.1.4 Petroleum Resources

There are several active and non-active petroleum wells and pipelines located throughout the PSA. Currently, a Petroleum Resources Impact Study is being completed by a professional engineer licenced in Ontario. The report will identify any potential effects on oil and gas resources as well as associated mitigation measures to avoid any impacts. It is anticipated that the report will be submitted to the MNRF in winter 2016.

4.8 Public Health and Safety

4.8.1 Potential Effects

4.8.1.1 Stray Voltage

North Kent Wind 1 will ensure that the electrical design conforms and complies with relevant electrical safety standards. Project collector lines are not anticipated to share poles with existing distribution lines, thereby reducing the instances of potential stray voltage generation. Hydro One has established procedures in place to address stray voltage for off-farm and on-farm sources.

4.8.1.2 Structural Hazards

In the unlikely event of structural collapse or blade detachment, equipment will fall within a very small diameter due to the weight of the wind turbine components. Wind turbine siting for the proposed Project will meet, at a minimum, the setback distances from roads and railways (blade length plus 10 m) and non-participating residences (550 m) as outlined in O. Reg. 359/09, as amended.

A Property Line Setback Assessment (**Appendix D** of the Design and Operations report) was conducted in accordance with O. Reg. 359/09, as amended, to identify the proposed turbines located within the hub height (99.5 m) of an adjacent property line. The Report concluded that no adverse impacts are anticipated as a result of the setback reductions.

4.8.1.3 Ice Throw

Ice throw and ice shed refer to situations where during specific weather conditions, ice may form on wind turbines and may be thrown or break loose and fall to the ground (Chief Medical Office of Health (CMOH), 2010). Wind turbines for the proposed Project will be located on private property and meet, at a minimum, the setback distances from non-participating residences (550 m) and roads and railways (blade length plus 10 m) outlined in O. Reg. 359/09, as amended. During the operation of the Project, sensors located on the turbines will detect ice build-up and turbines will be shut down during unsafe operating conditions.

4.8.1.4 Low Frequency Sound, Infrasound and Vibration

Wind turbines have the potential to emit low frequency sound, infrasound and vibration. Low frequency sound commonly refers to sound at frequencies between 20 and 200 Hz; infrasound commonly refers to sound at frequencies below 20 Hz (i.e., below the threshold of human perception). Although generally considered inaudible, infrasound at high-enough sound pressure can be audible to some people (CMOH, 2010 and McCunney et al., 2014). The “Potential Heath Impacts of Wind Turbines Report” (CMOH, 2010) identified that infrasound and low frequency sound from modern wind turbines were found to be well below the level where known health effects occur (50 to 70 dB) in studies of wind turbine sound. McCunney et al. concluded that “infrasound and low-frequency sound do not present unique health risks”, and “annoyance seems more strongly related to individual characteristics than noise from turbines” (2014, pp. 108).

4.8.1.5 Electric and Magnetic Fields

Concerns surrounding electromagnetic fields (EMFs) have been raised during other REA consultation processes. EMFs are a combination of invisible electric and magnetic fields. They occur both naturally (e.g., light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF (CMOH, 2010). The generation of electrical fields from underground electrical collector lines from the Project will be shielded by line insulation and the surrounding ground but will still generate magnetic fields. Associated magnetic fields will be similar to other buried distribution lines in Ontario. The “Potential Heath Impacts of Wind Turbines Report” (CMOH, 2010) indicates that “wind turbines are not considered a significant source of EMF exposure”.

4.8.2 Potential Effects, Mitigation Measures and Net Effects

Construction and Decommissioning

Effects on public health and safety during construction have been described in **Section 4.4** (Air, Odour and Dust), **Section 4.5** (Sound), and **Section 4.6** (Local Interests, Land Use and Infrastructure).

Operations

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.

Table 4-17 identifies potential effects on public health and safety that could occur during the operations phase of the Project and identifies mitigation strategies and a monitoring plan.

Table 4-17: Mitigation Measures, Net Effects and Monitoring Plan Associated with Potential Effects to Public Health and Safety Resulting from Operations

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Impacts on Public Health and Safety from Structural Hazards and/or Ice Throw.	• No public health and safety incidents.	• Adhere to setback requirements to limit likelihood of any impacts.	• No impacts on public health and safety from structural hazards and/or ice throw due to setback requirements. ▪ *Very low likelihood and very limited magnitude of impacts (if any) on public health and safety due to setback requirements and based on existing wind facility operations.*	**Monitoring:** • 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.
Stray Voltage Effects to the Public and Livestock	• No health and safety incidents associated with stray voltage.	• Build and maintain the Project as prescribed by the Distribution System Code and the Electrical Safety Authority to minimize the risk of stray voltage. • Ensure ongoing regular maintenance and monitoring of turbines. • Ensure that all electrical design conforms and complies with relevant electrical safety standards.	• Very low likelihood and very limited magnitude of impacts (if any) on public health and safety from stray voltage due to adherence to electrical safety standards.	**Monitoring:** • Track all complaints and conduct follow-up monitoring (see Complaints Resolution Process in Emergency Response and Communications Plan). **Contingency Measures:** • No contingency measures required.

4.9 Areas Protected under Provincial Plans and Policies

The REA 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 North Kent Wind 1 Project is not proposed in an area within the jurisdiction of the plans noted above. As such, there will be no effects on these areas as a result of the Project.

5. Summary and Conclusions

Field work and data collection were undertaken to determine the potential effects of this Project during the construction, operations and maintenance and decommissioning phases. Mitigation measures to manage these potential effects have been identified and monitoring and contingency plans proposed to ensure effects are minimized.

Significant adverse effects have been avoided through careful site selection, facility layout planning and 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 is that this Project can be constructed, operated, maintained and decommissioned without any significant adverse net effects to the environment. Post-construction monitoring, including effects on wildlife such as birds and bats, will be undertaken to confirm this conclusion.

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Appendix A

Legal Descriptions

Appendix A. Legal Descriptions

Description of Parcels Identified As Part of the Project Location			Type of Agreement	Status of the Agreement
LOT 1	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 1	CON 12	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 1	CON 7	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 2	CON 11	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 2	CON 12	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 2	CON 13	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 2	CON 14	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 2	CON 5	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 3	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 3	CON 7	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 3	CON 8	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 4	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 5	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 5	CON 13	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 5	CON 6	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 5	CON 9	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 6	CON 11	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 6	CON 8	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 7	CON 7	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 7	CON 8	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 8	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	CON 11	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	CON 4	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	CON 5	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	CON 6	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 8	CON 9	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 9	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 9	CON 10	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 9	CON 11	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 9	CON 6	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 9	CON 7	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 10	CON 11	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 10	CON 13	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 11	CON 13	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 11	CON 9	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 12	CON 9	CHATHAM	Option to Lease Land	Agreement Obtained
LOT 14	BALDOON STREET WEST	DOVER	Option to Lease Land	Agreement Obtained
LOT 16	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 17	BALDOON STREET WEST	DOVER	Option to Lease Land	Agreement Obtained
LOT 18	BALDOON STREET WEST	DOVER	Option to Lease Land	Agreement Obtained
LOT 20	CON 6 EAST DIVISION	DOVER	Option to Lease Land	Agreement Obtained
LOT 20	CON 8 EAST DIVISION	DOVER	Option to Lease Land	Agreement Obtained
LOT 22	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 23	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 24	BALDOON STREET EAST	DOVER	Option to Lease Land	Agreement Obtained
LOT 24	CON 9 EAST DIVISION	DOVER	Option to Lease Land	Agreement Obtained