North Kent Wind 1 Project

Design and Operations Report

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Prepared for:

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60343599

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Acronyms and Abbreviations

ANSI	Area of Natural Scientific Interest
BMPs	Best management practices
CMOH	Chief Medical Officer of Health
dBA	Decibels
ERCP	Emergency Response and Communication Plan
EEMP	Environmental Effects Monitoring Plan
EIS	Environmental Impact Study
EMF	Electromagnetic field
GHGs	Greenhouse gases
Hydro One	Hydro One Networks Inc.
Hz	Hertz
IEC	International Electrotechnical Commission
IESO	Independent Electricity System Operator
km	Kilometres
kV	Kilovolts
L/day	Litres per Day
LTVCA	Lower Thames Valley Conservation Authority
m	Metres
m^2	Metres squared
m/s	Metres per second
MNRF	Ontario Ministry of Natural Resources and Forestry
MOECC	Ontario Ministry of the Environment and Climate Change
MSDS	Material Safety Data Sheets
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.
NRSI	Natural Resource Solutions Inc.
OEB	Ontario Energy Board
O. Reg.	Ontario Regulation
Pattern Development	Pattern Renewable Holdings Canada ULC
PDR	Project Description Report
POI	Point of Interconnection
Project	North Kent Wind 1 Project
PSA	Project Study Area
REA	Renewable Energy Approval
Samsung Renewable Energy	Samsung Renewable Energy Inc.
SFL	Sustainable Forest Licences
SCADA	Supervisory Control and Data Acquisition
SCRCA	St. Clair Region Conservation Authority
SRP	Spill Response Plan
SWH	Significant Wildlife Habitat
UTM	Universal Transverse Mercator

1. Introduction

The North Kent Wind 1 Project (the 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 Design and Operations Report was prepared in accordance with the requirements of the Renewable Energy Approval (REA) process outlined in Ontario Regulation (O. Reg.) 359/09, as amended, and the Technical Guide to Renewable Energy Approvals (Ontario Ministry of the Environment and Climate Change (MOECC), 2012; MOECC 2013).

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

1.1 Summary of Design and Operations Report Requirements

The requirements for the Design and Operations Report as defined under O. Reg. 359/09, as amended, and where those requirements are addressed in this report are provided in the following table (**Table 1-1**).

Table 1-1: Adherence to Design and Operations Plan Report Requirements under O. Reg. 359/09, as Amended

Requirement	Completed	Corresponding Section
Site Plan	Yes	**Section 2**
Facility Design Plan	Yes	**Section 3**
Facility Operations Plan	Yes	**Section 4**
Emergency Response and Communications Plan	Yes	**Section 5**
Environmental Effects Monitoring Plan (EEMP)	Yes	**Section 6**

This Design and Operations Report was provided to 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 The Proponent

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 website: www.northkentwind.com

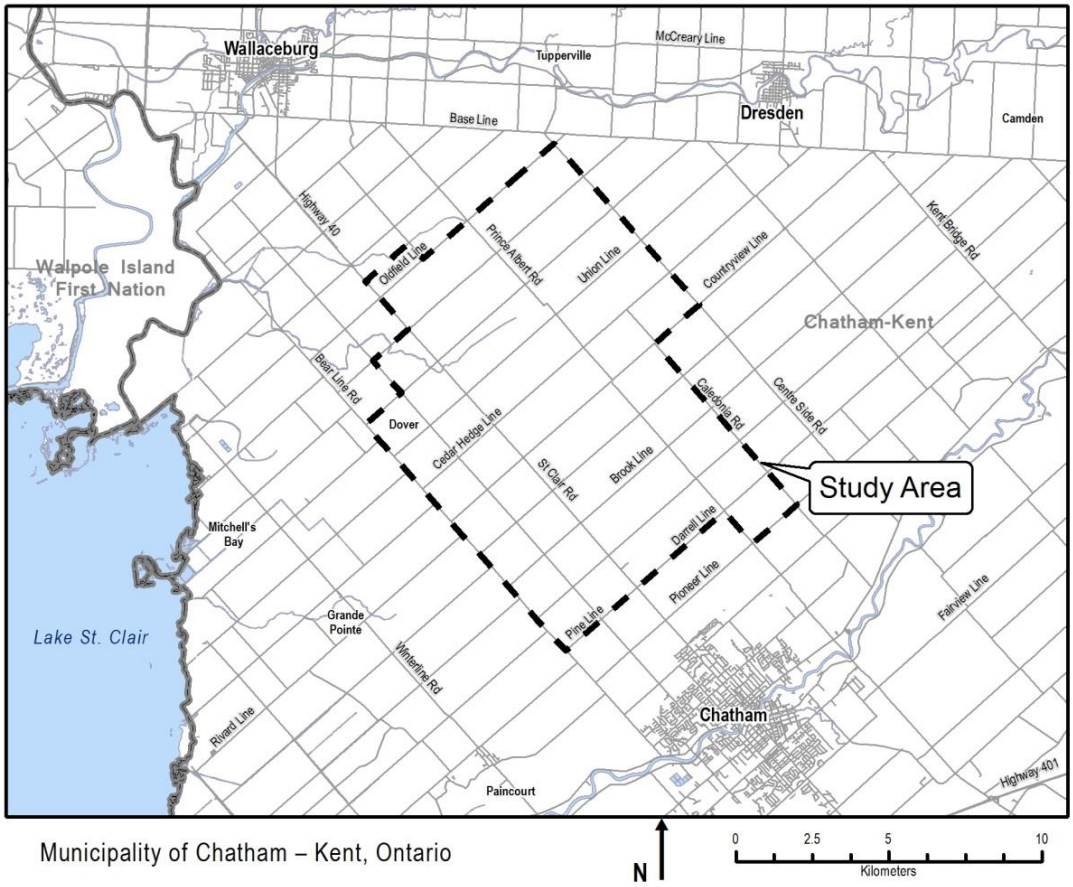
1.3 Project Location

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.

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.

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



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:

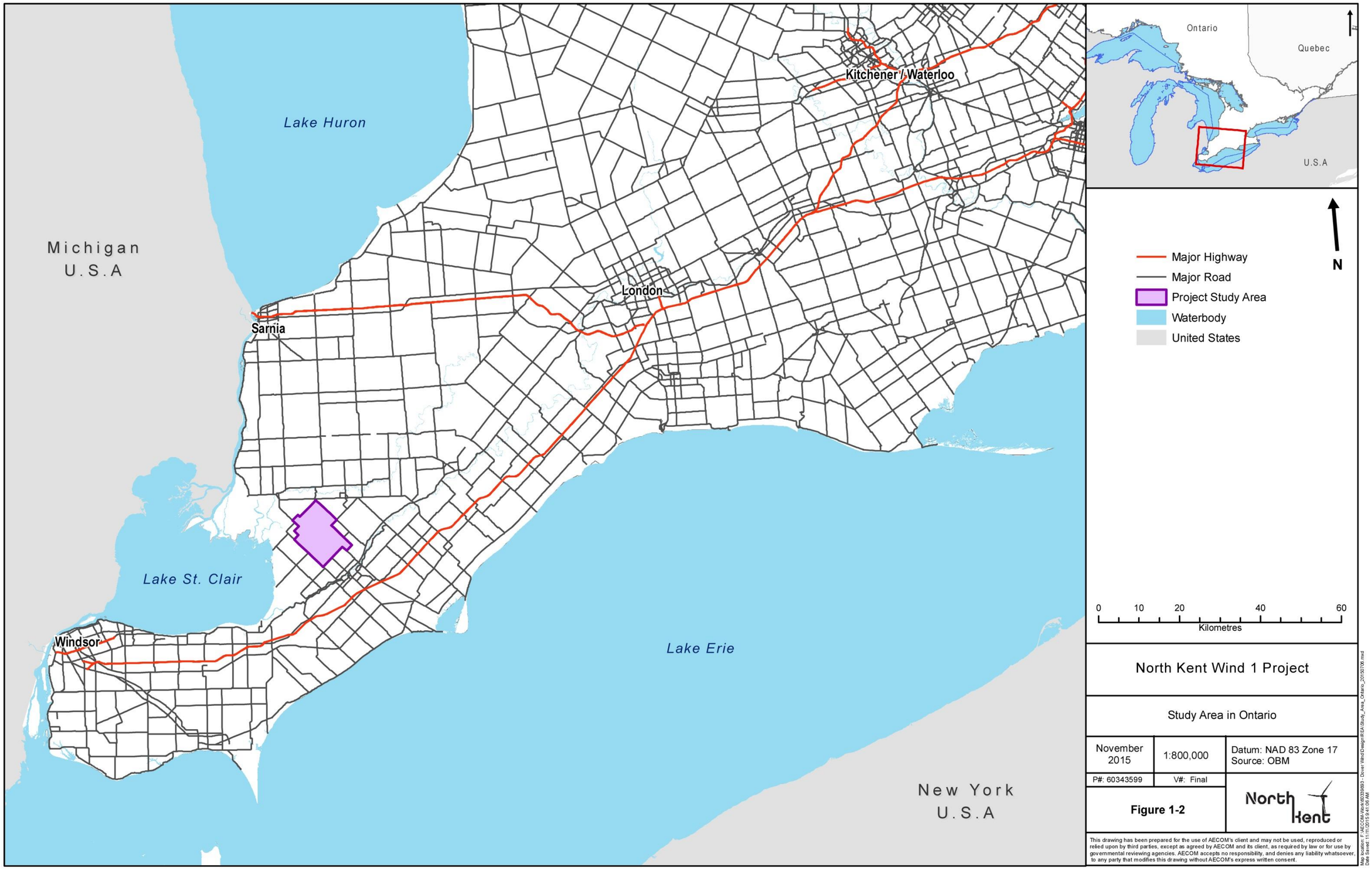
Table 1-2: External Boundaries of the Project Study Area

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

The Project will be located primarily on 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 the Project Description Report (PDR).

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.*

Figure 1-2: Study Area in Ontario



1.4 Summary of Key Project Information

A summary of key Project information is presented in the table 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)
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 Interconnection:	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

2. Dimensions are near approximations.

2. Site Plan

North Kent Wind 1 considered a variety of factors when siting wind turbines and other Project infrastructure as part of the planning stage for the Project. Mapping produced by AECOM, Golder Associates, Natural Resource Solutions Inc. (NRSI) and DNV GL was used to ensure all regulatory setbacks were adhered to. The mapping included natural environment (terrestrial and aquatic), geological, archaeological, socio-economic and land use factors. As the Project evolved, the following considerations influenced the design of the Project layout:

- Meteorological conditions and wind resources;
- Lands within in the PSA and under lease agreement with North Kent Wind 1;
- Landowner preferences and minimizing changes to existing land use and function;
- Comments and suggestions obtained through public, municipal, Aboriginal and First Nation communities and other stakeholder consultation;
- Site access;
- Minimizing the length of collector lines and access roads;
- Results from archaeological, built heritage and sound assessments;
- Proximity and predicted effects to significant natural heritage features;
- Minimizing watercourse crossings by access roads and collector lines;
- Determining a suitable point of interconnection (POI); and
- Potential electricity production of individual turbines within the Project.

Investigation Areas have been identified surrounding various Project components, which are depicted on **Figure 2-1** as the “Project Location / Investigation Area”. The Project Location figure identifies the location of wind turbines, access roads, electrical collector system, collector substation, operations and maintenance building and interconnection station/ point of interconnect. The figure also illustrates areas where temporary disturbance may occur as a result of construction of the Project, including crane pads, wind turbine laydown areas and construction staging areas.

2.1 Site Plan Content

This section provides an overview of and describes the location of the Project components. **Figure 2-1**, **Figure 2-2**, **Figure 2-3 (a-d)** and **Figure 2-4** provides the following information:

- Project Location;
- Temporary construction areas;
- Buildings, structures, roads, utility corridors, rights-of-way and easements within 300 m of the Project Location;
- Property boundary lines within the PSA;
- Location of natural heritage features and water bodies within 120 m of the Project Location;
- Topographical contours, surface water drainage and land uses within 120 m of the Project Location; and
- Sound receptors.

Visual representation of setback distances from the Project Location to property boundaries, roads and railways, and sound receptors are shown on and **Figures 2-3 (a-d)**.

Figure 2-1: Project Location

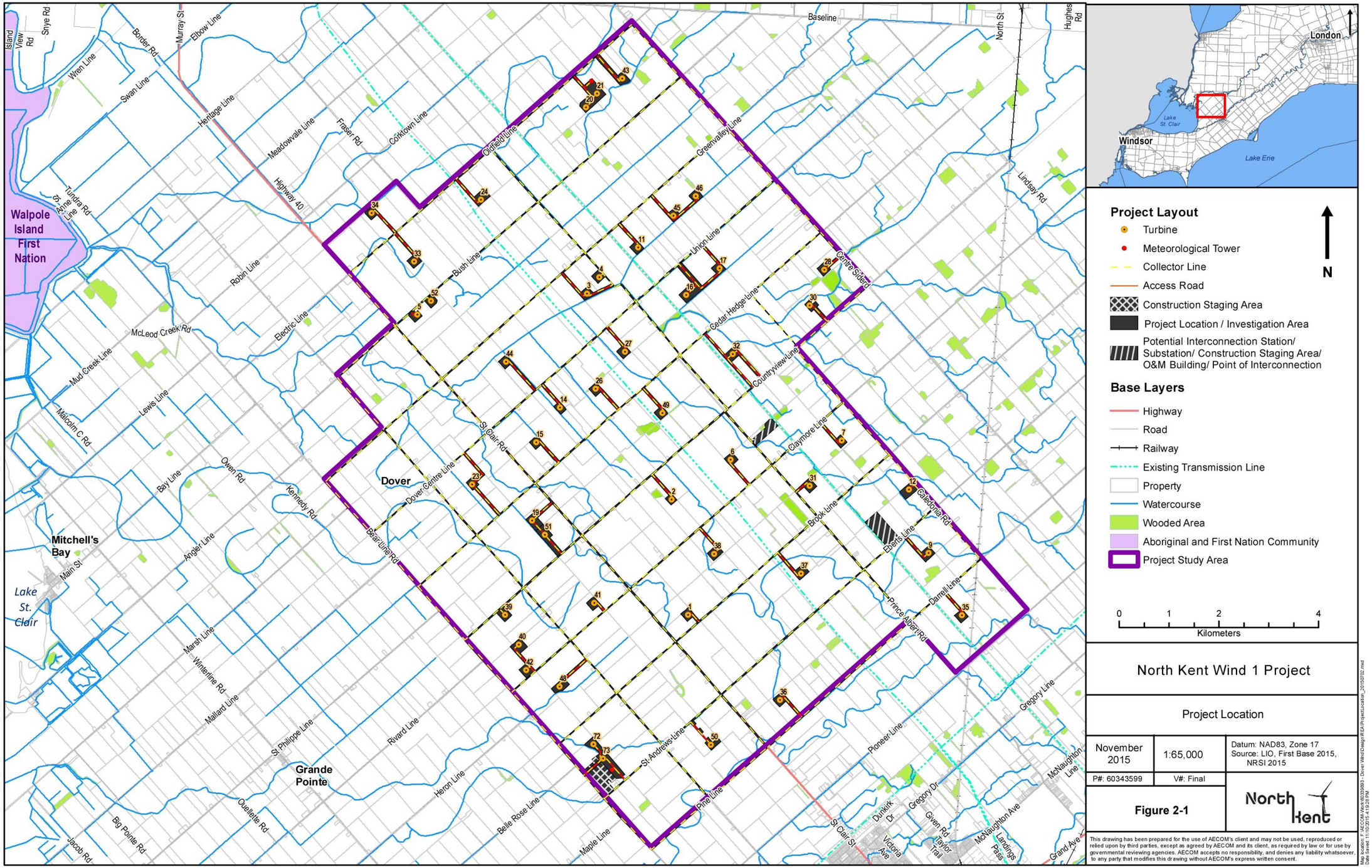


Figure 2-2: Project Location and Natural Heritage Features

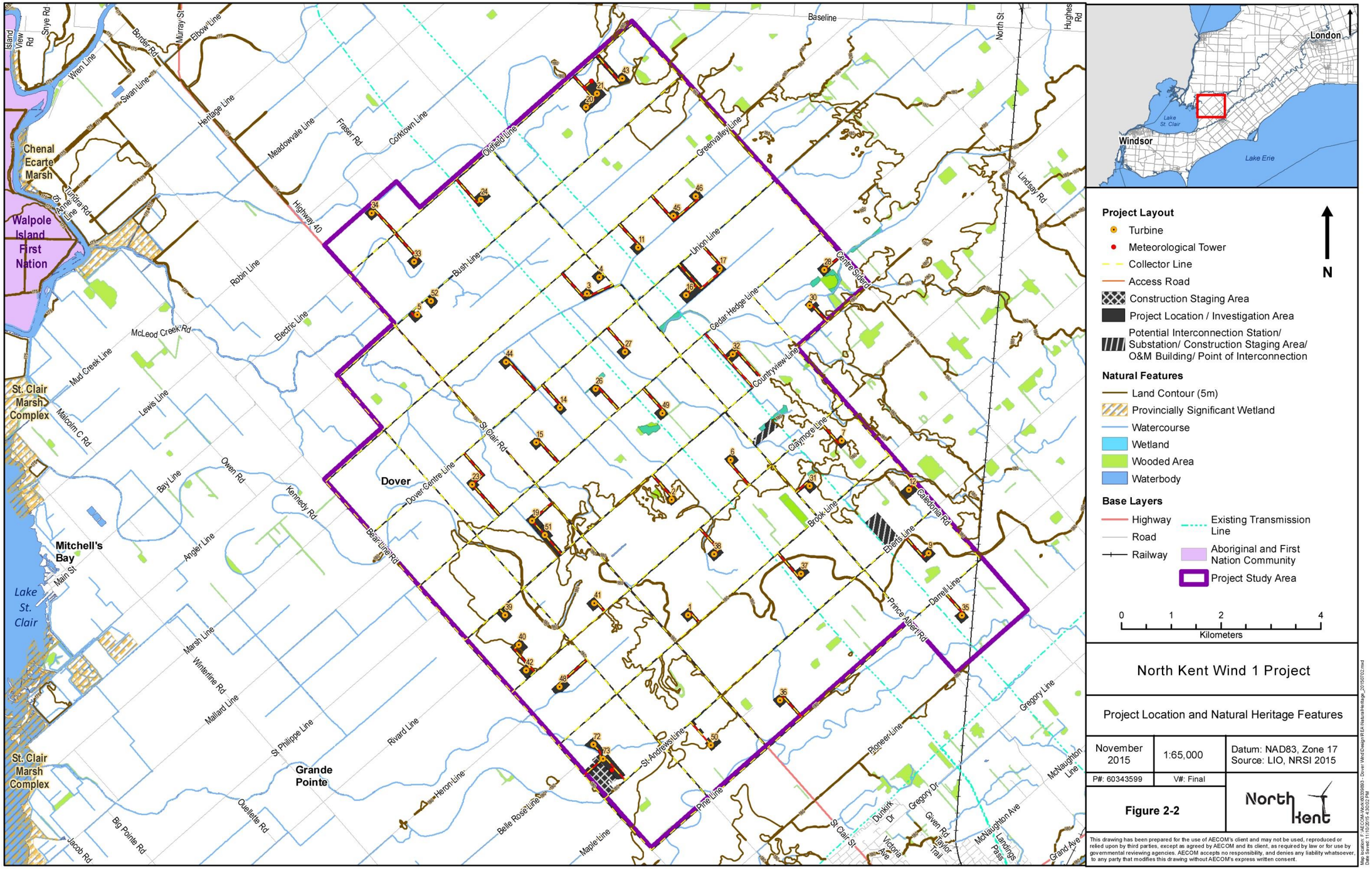
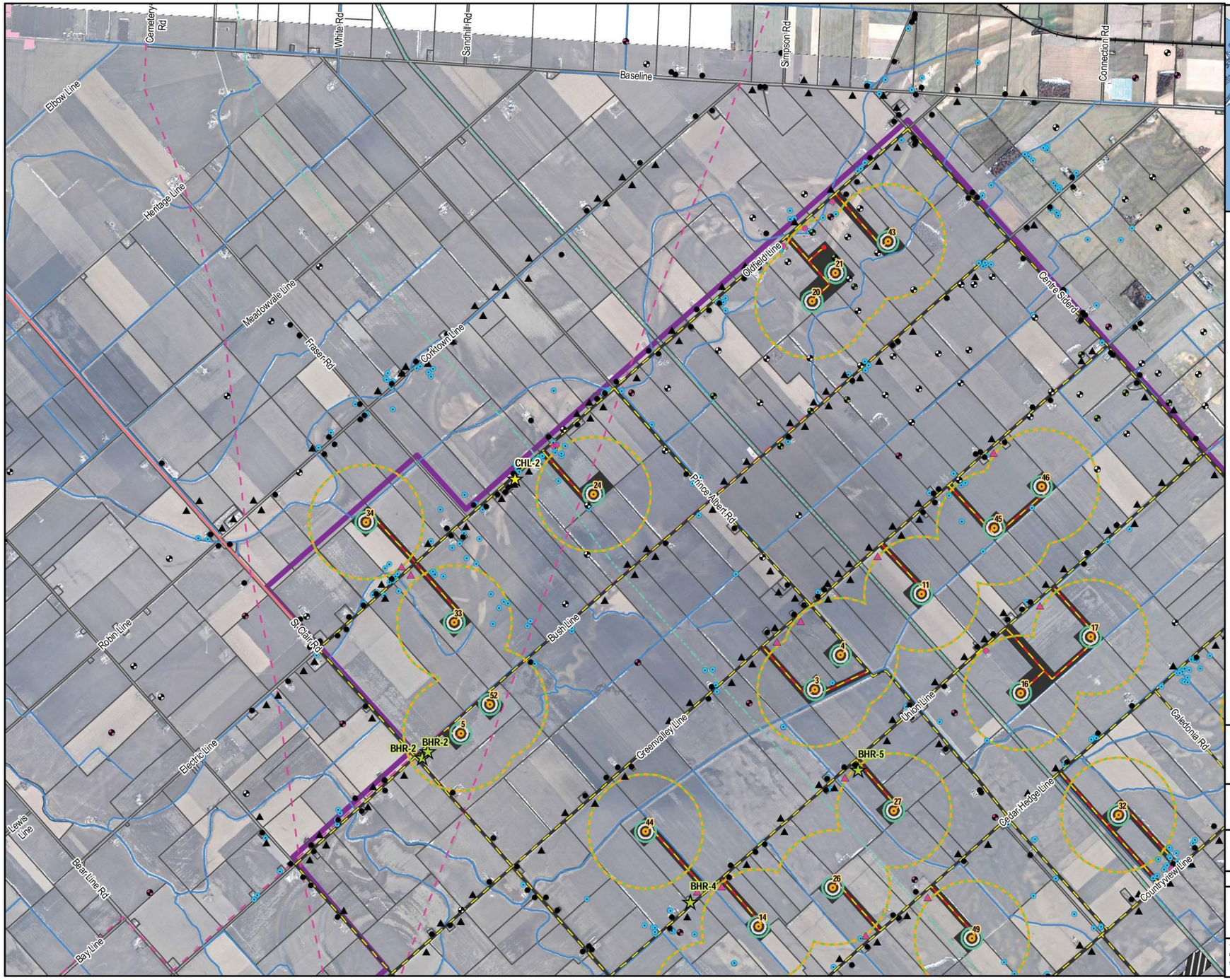
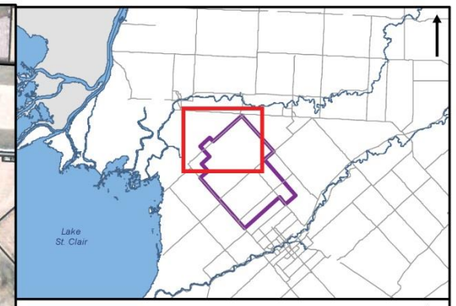


Figure 2-3a: Project Location and Socio-economic Features





Noise Receptors Within 2km of Turbines

Existing Receptors
- Participating
- Non-Participating

Vacant Lot Receptors
- Participating
- Non-Participating

Other Resources
- Abandoned Well (2015)
- Active Well Petroleum Well (2015)
- Suspended Petroleum Well (2015)
- Unknown Petroleum Well (2015)
- Water Well (MOECC, 2015)
- Cultural-Landscapes Heritage
- Built Heritage Resource

Setback Distances
- Road and Railway Setback (66m)
- Property Boundary Setback (99.5m)
- Noise Receptor Setback (550m)

Project Layout
- Turbine
- Meteorological Tower
- Collector Line
- Access Road
- Construction Staging Area
- Project Location / Investigation Area
- Potential Interconnection Station/ Substation/ Construction Staging Area/ O&M Building/ Point of Interconnection

Base Layers
- Highway
- Road
- Existing Transmission Line
- Existing Pipeline
- Railway
- Property
- Built-up Area
- Watercourse
- Project Study Area

0 0.5 1 2
Kilometers

N

North Kent Wind 1 Project

Project Location and Socio-economic Features

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Figure 2-3a

North Kent

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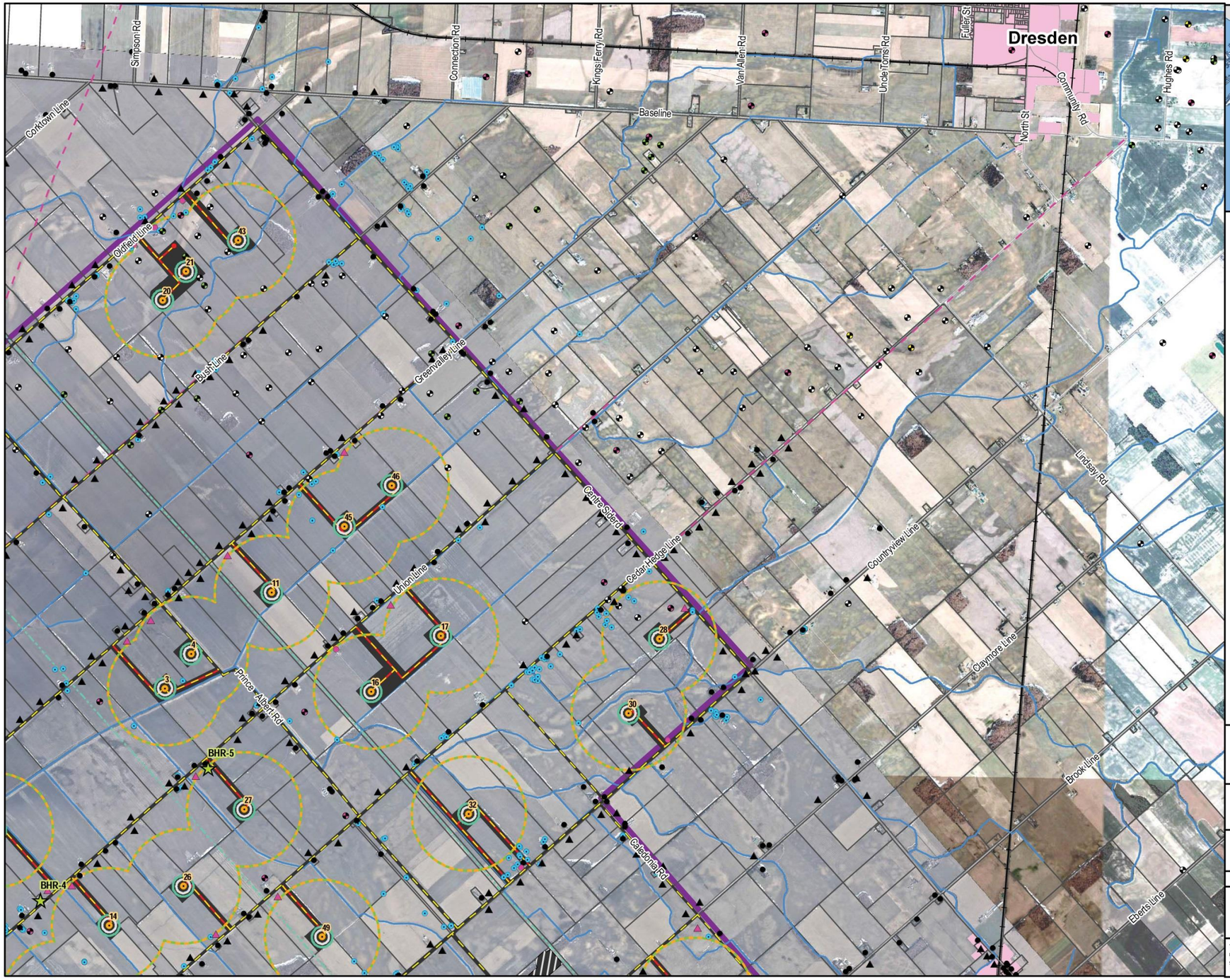
Figure 2-3b: Project Location and Socio-economic Features



North Kent Wind 1 Project

Project Location and Socio-economic Features

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Figure 2-3b

North Kent

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Figure 2-3c: Project Location and Socio-economic Features

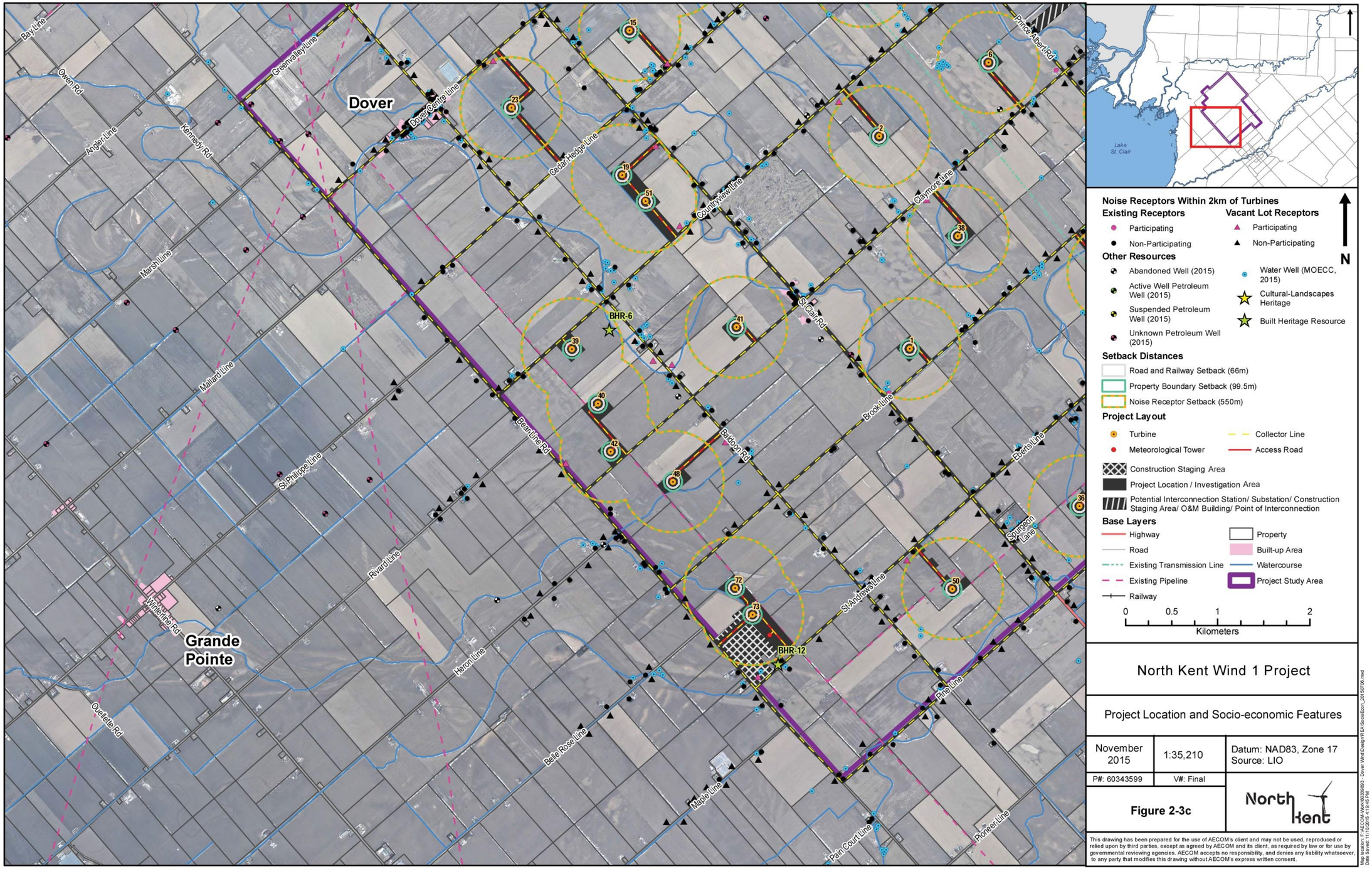


Figure 2-3d: Project Location and Socio-economic Features

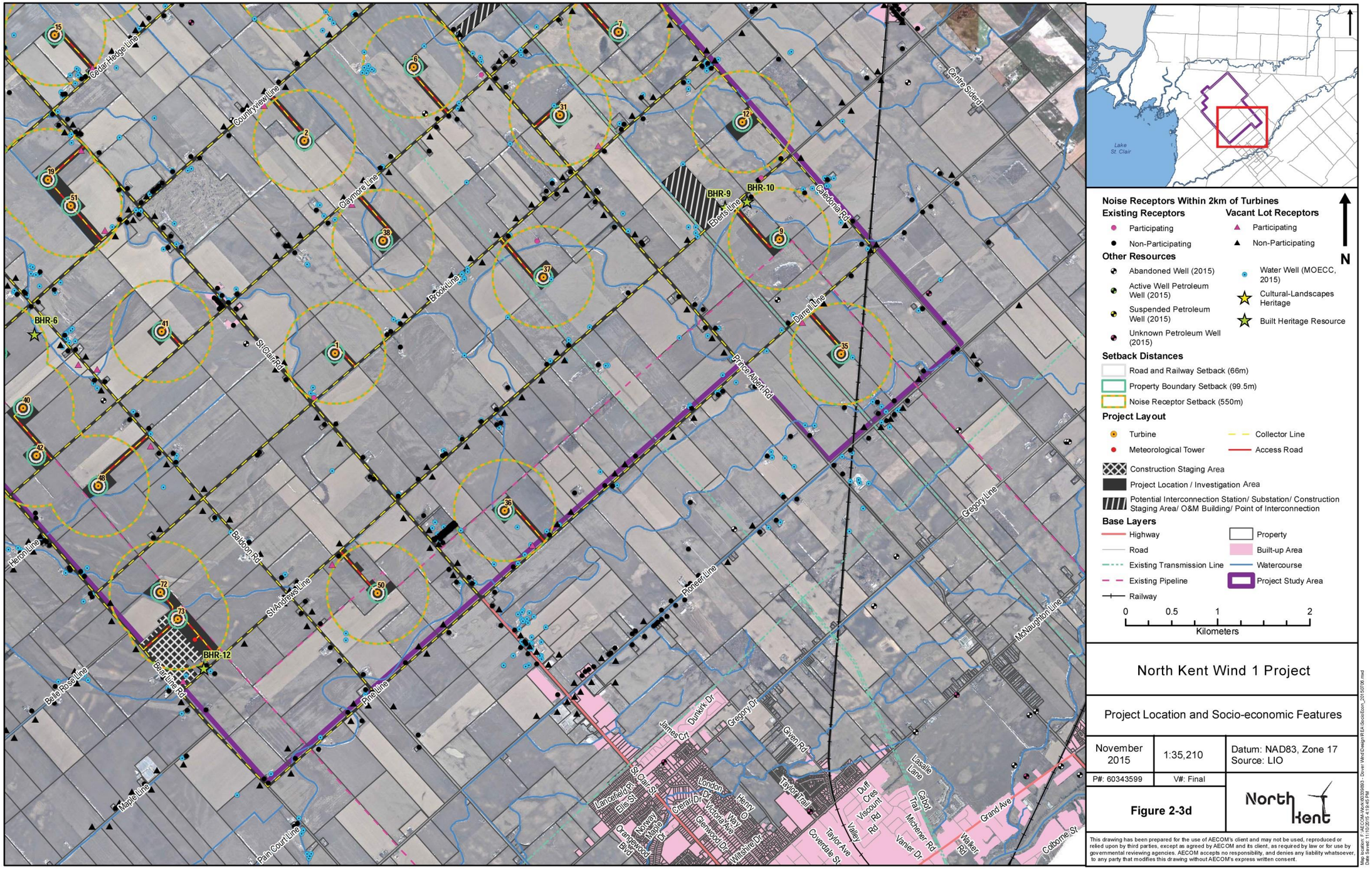
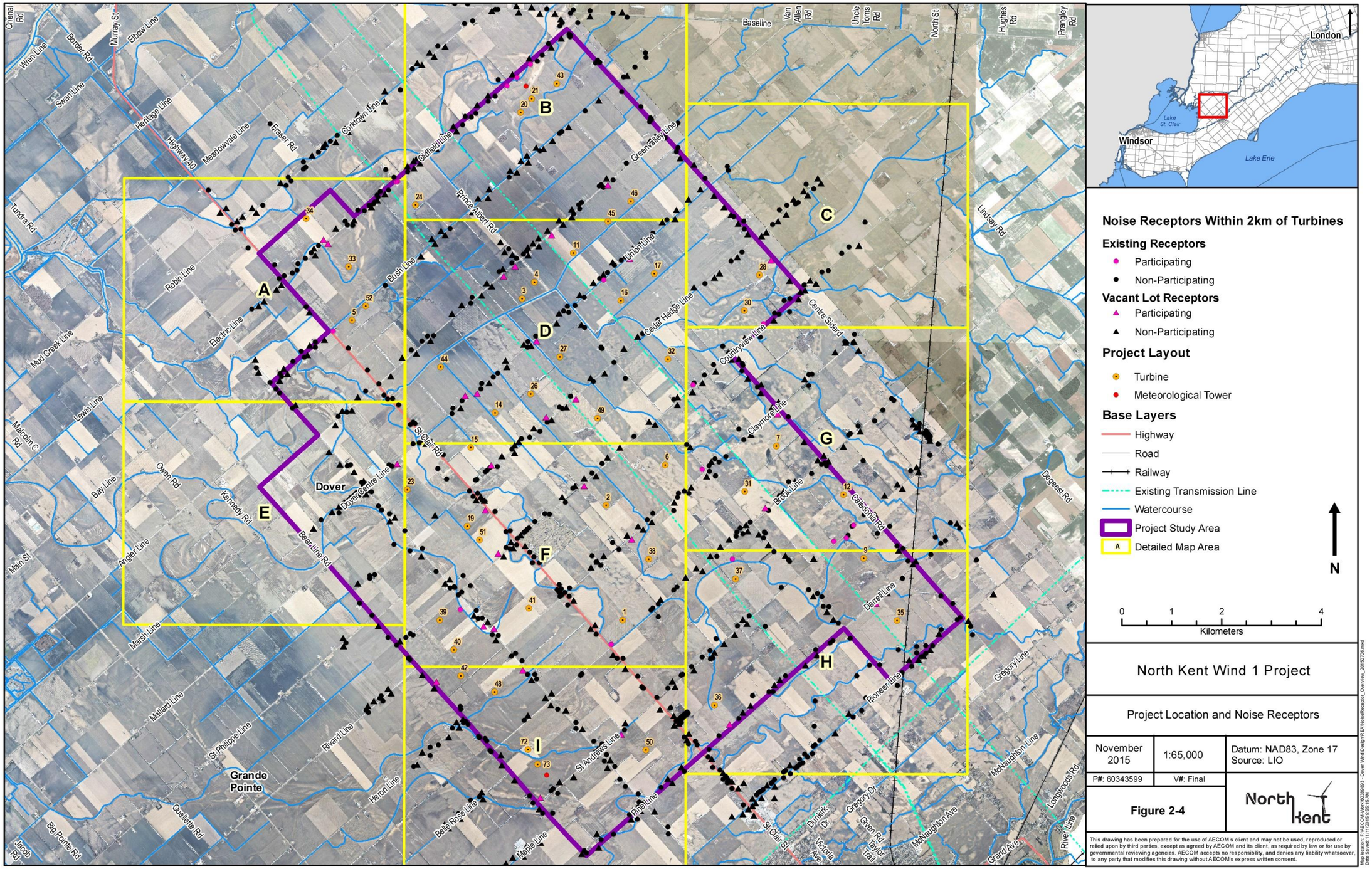


Figure 2-4: Project Location and Sound Receptors



The Project Location shown on **Figure 2-1** identifies the areas that will be used for the Project components listed below in **Table 2-1**. A description of the Project components included in the final design of the Project is provided below. Some Project components (e.g., crane pads) listed in **Table 2-1** are not all explicitly delineated on the Site Plan figure; however, the footprint of all temporary Project components are encompassed within the Project Location.

Table 2-1: Temporary Construction Project Components and Operation Project Components

Temporary Construction Project Components	Operation Project Components
▪ Crane Pads ▪ Wind Turbine Laydown Areas ▪ Construction Staging Areas	▪ Wind Turbine Generators ▪ Wind Turbine Foundation ▪ Pad-mounted Transformers ▪ Access Roads ▪ Collector Lines ▪ Collector Substation ▪ Microwave Tower ▪ Meteorological Towers ▪ Interconnection Station/ Point of Interconnection ▪ Operations and Maintenance Building

The Project was designed to adhere to regulatory setback requirements and to consider potential impacts to local environmental features. Setback distance requirements are shown in **Table 2-2**.

Table 2-2: Sources of Setback Distances from Project Components

Feature		Source
Cultural / Natural Features and Water Bodies	Archaeological and Heritage Sites	Ministry of Tourism Culture and Sport
	Significant Wildlife Habitat (SWH)	O. Reg. 359/09, as amended Ministry of Natural Resources and Forestry
	Significant Woodlands	O. Reg. 359/09, as amended Ministry of Natural Resources and Forestry
	Provincial Parks, Conservation Reserves, Provincially Significant Areas of Natural and Scientific Interest (Life Science)	O. Reg. 359/09, as amended Ministry of Natural Resources and Forestry
	Provincially Significant Areas of Natural and Scientific Interest (Earth Science)	O. Reg. 359/09, as amended Ministry of Natural Resources and Forestry
	Water Bodies	O. Reg. 359/09, as amended
	Provincially Significant Wetlands	O. Reg. 359/09, as amended Ministry of Natural Resources and Forestry
	Development, Interference with Wetlands and Alterations to Shorelines and Watercourses Regulation (St. Clair Region Conservation Authority (SCRCA) / Lower Thames Valley Conservation Authority (LTVCA))	O. Reg.169/06
Sound Receptors	Non-participating (including vacant lots)	O. Reg. 359/09, as amended
Infrastructure and Municipal Planning	Ministry of Transportation Highway	O. Reg. 359/09, as amended
	County and Municipal Roads	O. Reg. 359/09, as amended

2.2 Cultural Heritage Resources

The precise location of archaeological resources is sensitive information and, therefore, is not depicted on the attached Site Plan figure. The Heritage Impact Assessment 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 cultural heritage value or interest with no anticipated impacts to these eight structures being identified. In addition, it was 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. Although one property was determined to have cultural heritage value or interest, no direct or indirect impacts are anticipated. One cultural heritage landscape was determined to have cultural or heritage value or interest however, there are no adverse impacts anticipated to the cultural heritage landscapes. Please refer to **Figure 2-3 (a-d)** for a depiction of the heritage properties.

Additional information about the results of cultural heritage and archaeological resources can be found in the Stage 1 and 2 Archaeological Assessment Reports (Golder Associates, 2015a and Golder Associates, 2015b) and Heritage Assessment Report (Golder Associates, 2015c), which were all submitted for review and approved by the Ontario Ministry of Tourism, Culture and Sport (MTCS).

2.3 Natural Heritage Features

Natural heritage features within 120 m of the Project Location are shown on **Figure 2-2**. Detailed information on natural heritage features, including a detailed Project site investigation of site-specific natural heritage features and wildlife habitats, can be found in the Site Investigations Report (NRSI, 2015a) which was submitted to the Ontario Ministry of Natural Resources and Forestry (MNRF) for review and approval.

2.4 Water Bodies

Figure 2-2 includes the location water bodies within 120 m of the Project Location. Additional information on water bodies from site-specific field studies, including confirmation of potential water bodies and identification of new features not identified in the records review, can be found in the Water Body Report (NRSI, 2015b).

2.5 Sound Receptors

Sound receptors in the PSA are shown on **Figures 2-3 (a-d)**. **Figure 2-4** provides an overview of detailed sound receptor maps which are included in **Appendix A.** A Noise Impact Assessment has been completed for the Project in accordance with O. Reg. 359/09, as amended, and the *Technical Guide to Renewable Energy Approvals* (MOECC, 2013). Please refer to the Noise Impact Assessment (**Appendix B**) for more information. Included in the Noise Impact Assessment are Universal Transverse Mercator (UTM) co-ordinates of all receptors assessed for the Project and of all turbines associated with the Project and other nearby projects.

3. Facility Design Plan

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

3.1 Wind Turbine Technical Specifications

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. With a total 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.

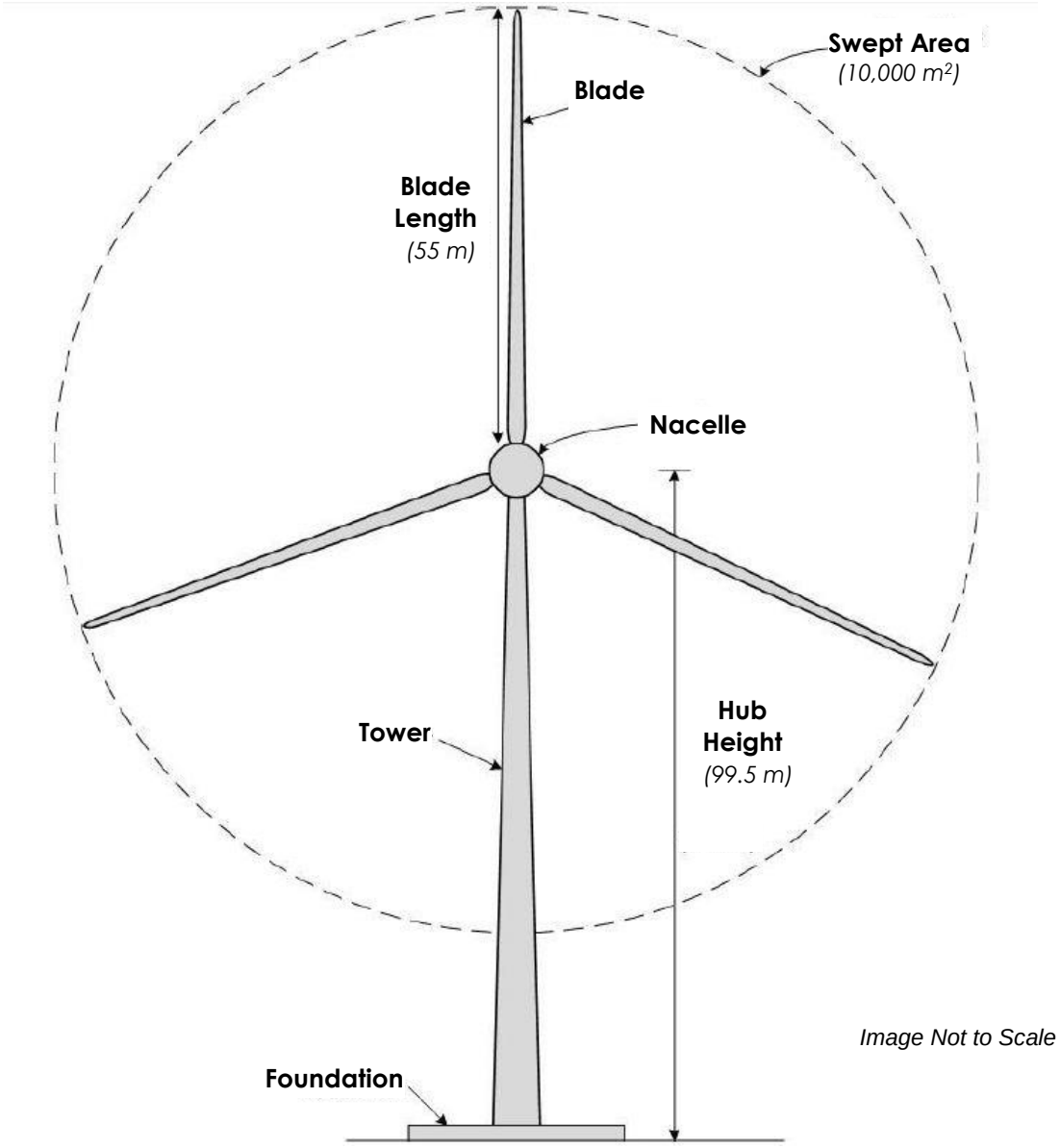
Up to 46 turbine locations are currently being assessed for the Project. It is important to note that the total number of turbines will depend on the nominal power rating of each turbine.

Each wind turbine generator consists of three major components: tower, nacelle (including the electric generator, wind direction and speed sensors and auxiliary equipment) and a three-blade rotor. The tower section of the wind turbine generator is secured in place by a concrete foundation (approximately 3 m deep). Selected wind turbine generator specifications are presented in **Table 3-1** and shown in **Figure 3-1**. More detailed specifications are provided in the Wind Turbine Specifications Report.

Table 3-1: Summary of Wind Turbine Technical Specifications

Wind Turbine Attribute	Specification
Make and Model	Siemens SWT-3.2-113 or similar
Nominal Power	2.772 to 3.2 MW
Hub Height (above grade)	99.5 m
Rotor Diameter	113 m
Number of Blades	3
Blade Length	55 m
Swept Area	10,000 m^2
Cut-in Wind Speed	3 to 5 m/s
Cut-out Wind Speed	32 m/s
Rated Wind Speed	12 to 13 m/s

Figure 3-1: Basic Wind Turbine Specifications



3.2 Construction Staging Area

A temporary construction staging area will be built on privately owned land for the purpose of storing and staging equipment during the construction phase. A temporary electrical service line will be connected to the local distribution line to provide electrical power to the construction offices. Activities occurring on this site will include materials storage and equipment refuelling and the laydown and storage areas will house the construction offices. The area will be approximately 10 to 15 acres in size.

Up to approximately 5 acres around each wind turbine may be established for the laydown and assembly of the wind turbine components.

3.3 Access Roads

Access roads will be constructed to allow access to wind turbine sites during the construction, installation, operation and maintenance of the Project (please see Construction Plan Report for additional information). Access roads may be constructed of native materials or engineered fill. A geotextile or cement stabilized soil will also be used where necessary. The access roads with shoulders will be up to 15 m wide during construction in order to accommodate cranes and transportation equipment used to deliver wind turbine components.

Following construction and installation activities, roads may be reduced to 8 to 12 m wide, including shoulder, road surface and ditch. The roads will allow access to turbines and associated infrastructure for maintenance and repairs during the operation of the proposed Project.

Where possible, access roads will follow property boundaries and will be located in such a way to minimize disturbance to agricultural operations and limit the number of watercourse crossings. Access road locations have been determined through constraint mapping exercises and consultation with landowners. In addition, as required, all roads associated with the Project will be designed to minimize road and soil erosion and allow for stormwater runoff and drainage.

3.4 Operations and Maintenance Building

During the operations phase, an operations and maintenance building will be constructed to accommodate offices, mess facilities, control facilities, storage space, maintenance work area and a parking area. The operations and maintenance building will be within the Project Location.

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. The power will be delivered underground or via overhead poles installed adjacent to the access road and will terminate on a transformer pole adjacent to the operations and maintenance building. An underground cable will then connect the transformer pole to the building electrical service.

3.5 Permanent Meteorological Towers

Permanent meteorological towers are an operational requirement of the Independent Electricity System Operator (IESO) as an electricity market participant (this includes all generators of electricity) and allow the IESO to operate the system reliably and safely. The use of meteorological data is essential to the safe and efficient operation of a wind project.

Meteorological towers are typically up to 100 m in height. Access roads may be constructed to access tower locations and the site may be surrounded by a chain link fence.

3.6 Wind Turbine Foundations

Wind turbine foundation design will be finalized following the completion of site-specific geotechnical investigations. Geotechnical investigations will include sampling and testing boreholes at the wind turbine locations in the PSA.

Testing in a laboratory will be completed to determine if soil properties meet the design requirements of the wind turbine and associated electrical equipment foundations. The expected dimensions of the wind turbine foundation excavation are 0.2 acres with an excavated depth of up to approximately 3 m.

Options under consideration for the wind turbine foundation design are a spread-footing foundation and a pile foundation. Depending on outcomes of the geotechnical investigations, some wind turbine foundations may require steel piles, formwork and rebar to be installed in order to support the foundation.

3.7 Pad-mounted Transformer(s)

Located immediately adjacent to each wind turbine generator will be a pad-mounted transformer that will 'step-up' the voltage of the electricity generated by the wind turbine to a common collector line voltage (34.5 kV). The pad-mounted 3-phase 60 hertz (Hz) transformers will meet all Project siting requirements. The transformers will have an approximate footprint of approximately 6 m^2.

3.8 Electrical Collector Lines

Collector lines carry the electricity from the pad-mounted transformers to either an adjacent wind turbine generator that is connected in parallel, or to a junction box that is connected to several other wind turbine generators that are within the same electrical circuit. The junction box can contain equipment related to junctions, cable splices and disconnect switches. From the junction box, the electrical power is then carried to the collector substation.

The collector lines for the Project will be aboveground, underground or a combination of both as required. The collector lines will be designed in accordance with the Canadian Electrical Safety Association. The electrical collector system will consist of pad-mounted transformers, pad-mounted disconnect switches, fiber optic cables, fiber optic junction boxes and underground collector lines installed along turbine access roads on private property and a buried or above ground collection system running along municipal and provincial road right-of-ways. The sizing of the underground or overhead collector lines will vary based on the collector system loading. The collector lines used for the Project will be suitable for direct burial or overhead on poles and sized according to the Project configuration to minimize voltage drops between wind turbine generators and the collector substation. Where possible, underground collector lines will be installed on private property, within the access road construction area in order to minimize the area of disturbed land. Underground collector lines will be buried at a minimum depth of 1.2 m. If it is determined that overhead collector lines are required, they will be constructed on a structure similar to existing electrical distribution lines within the PSA. Fibre optic cabling will also be buried adjacent to the collector lines or mounted on pole structures that will connect each wind turbine generator to the Supervisory Control and Data Acquisition (SCADA) system. The collector lines will also use grounding conductors that will be sized to meet electrical and safety requirements.

3.9 Collector Substation

A collector substation is required to bring together the collector lines and transform the voltage from 34.5 kV to a transmission voltage of 230 kV. The collector substation will comply with the requirements of O. Reg. 359/09, as amended. 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 may include isolation switch(es), circuit breaker(s), step-up power transformer(s), distribution switch-gear(s), capacitor banks, instrument transformers, communication / microwave equipment, SCADA equipment, protection and control equipment, grounding equipment, revenue metering (conforming to IESO market rules), substation grounding and a control building. The substation will comply with the noise requirements of O. Reg. 359/09,

as amended, which may require the use of an acoustic barrier. Collector substation grounding will follow all applicable electrical safety standards and a fence will be installed to control access. All equipment installed at the collector substation will be connected to the grounding grid. The transformer foundation will be approximately 50 m^2 and have a depth of approximately 2 m.

A secondary concrete containment system will be installed around the collector substation transformer(s) and connected to the drainage system through an oil water separator that will be buried below grade. Containment around the transformer(s) at the substation will include an enclosure (conservator, tank, etc.) as well as a containment pit system. The containment system will have a freeboard of 0.25 m terminating approximately 0.30 m above grade, and an impervious floor, stoned filled and walls of reinforced concrete with impervious plastic liners and sloped floors leading to an oil control device. Drainage from the transformer(s) pit would be removed by either manually or automatically operating a sump pump to discharge the liquid. In either case, an oil sensor would be mounted on the pump to detect any oil/grease in the liquid. If oil/grease is detected, the liquid would be removed from site via a licensed waste hauler and the source of the leakage would be identified. If no oil/grease is detected in the liquid, discharge would be collected via the collection system.

Since the collector substation will have a granular base, rainwater will percolate into the gravel and ground; as such stormwater issues are not anticipated.

In the unlikely event they occur, any spills will be handled in accordance with the MOECC's Spills and Discharges Reporting Protocol as required under Sections 15 and 92 of the Ontario Environmental Protection Act. In order to prevent spills, the following measures will be put in place during construction and operation of the Project:

- Store fuel and other maintenance related materials securely away from any drainage features.
- Implement a Spill Response Plan (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.
- Keep a spill kit on site at all times and train on-site workers in the use of this kit and the SRP.
- Refuel Project equipment and vehicles on spill collection pads and/or in designated areas.
- Dispose of any waste material by authorized and approved off-site vendors.

3.10 Interconnection Station/ Point of Interconnect

The point of interconnection may 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.

The interconnection plan for the Project is subject to study, design and engineering by: (a) the IESO which manages the province's electricity grid; (b) Hydro One; and (c) the Ontario Energy Board (OEB), which regulates the industry through the Transmission System Code and the Distribution System Code.

4. Facility Operations Plan

The following section describes the Facility Operations Plan including daily operations activities, routine / unplanned maintenance activities and key process features including: water taking, waste management, stormwater management / erosion and sediment control, sewage management and air emissions.

4.1 Wind Turbine Operation

The proposed Project is scheduled to be in commercial operation for 20 years and is anticipated to require up to 15 trained technical and administrative staff, including turbine maintenance technicians and a site supervisor. During the operation of the proposed Project, on-site activities will be limited primarily to scheduled maintenance of the Project components. Additional on-site activities during the operation of the proposed Project will include:

Equipment Maintenance:..... Heavy trucks or mobile cranes used during maintenance activities will require periodic servicing and repair. Where possible, equipment maintenance will be completed at the operations and maintenance building; however, if necessary some equipment may require servicing at wind turbine locations. Maintenance activities related to wind turbine generators are discussed in **Section 4.3.**

North Kent Wind 1 Staff Transport:..... Daily and weekly travel of technical staff between the operations and maintenance building and wind turbine locations using light trucks;

Natural Heritage Field Monitoring: ..... Operational monitoring of direct impacts to birds and bats will be conducted for a minimum of three years, following the methods and approach detailed in the Birds and Bird Habitats: Guidelines for Wind Power Project (MNRF, 2011a) and the Bats and Bat Habitats: Guidelines for Wind Power Projects (MNRF, 2011b); and

Additional Field Monitoring: ..... Additional monitoring may also be required to evaluate the performance of Project components. Additional details on monitoring plans and contingency measures related to sound from wind turbine generators are provided in **Section 6.5** and communication plans are outlined in **Section 5**.

The safe operation of the proposed Project will involve the real-time collection of a series of operations parameters, including: wind speed, wind direction, air temperature, atmospheric pressure and electrical parameters. This real-time monitoring of wind turbine functioning is essential to reduce the frequency and duration of unplanned outage events by detecting early changes to wind turbine performance. To provide accurate on-site monitoring of climatic conditions, up to two meteorological towers, or equivalent, up to 100 m tall will be installed for the Project (**Figure 2-1**). Nacelle-mounted meteorological data collection points will be located such that no turbine will be located further than 5 km from the nearest data collection point. **Section 6** provides additional details on the monitoring of meteorological data during the operation of the proposed Project.

If temperature and humidity conditions result in ice formation on wind turbine blades, sensors installed on each wind turbine will detect ice build-up by monitoring vibrations, imbalances and generation efficiency. If an event occurs which is considered to be out of the normal operating range for a wind turbine, it will be taken out of service

immediately. Through the SCADA system the status of the turbine will be reported to the Project operator. **Sections 4.2.1** and **4.2.2** contain additional detail on wind turbine generator operation and monitoring during winter conditions, high wind events and in the event of lightning strikes.

Wind turbines that have been shut down will not be re-started until a site visit has been conducted to inspect the turbine and an investigation is completed that deems the turbine safe. Operational logs will be kept by technical staff that will document Project operations (including wind turbine shutdowns) and communications with the public and agencies.

4.2 Meteorological Data

Monitoring of meteorological data at an operations centre will allow staff to adapt wind turbine operation during climatic events that may include high winds and lightning strikes. Details of how the Siemens SWT-3.2-113 wind turbine generators are able to respond to meteorological conditions are described in the sections below.

4.2.1 Extreme Weather Conditions

The Siemens SWT-3.2-113 wind turbine generators are designed to operate above wind speeds of 3 m/s. However, at wind speeds of greater than 32 m/s, the wind turbine blades will feather out of the wind and the yaw system on the nacelle will rotate the wind turbine out of the prevailing wind direction. The wind turbine generators are also equipped with a secondary safety braking mechanism. The secondary braking mechanism will activate in the unlikely event that there are operational difficulties with the wind turbine blade pitching and yaw controls.

4.2.2 Lightning Strikes

The wind turbine generators are equipped with lightning safeguards which protect the wind turbines from the tip of the blades to the foundation. The safeguards enable the lightning current to by-pass all vital wind turbine components within the blade, nacelle and tower, limiting the potential for damage. An additional safeguard installed in each wind turbine includes a shielding system around the control units and processors that are located within the nacelle. The lightning safeguards for Project wind turbine generator are designed according to International Electrotechnical Commission (IEC) 61400 – “Lightning Protection Level I”.

4.3 Project Maintenance

4.3.1 Routine Turbine Maintenance

Routine preventative maintenance activities will be scheduled at approximately six month intervals with specific maintenance tasks scheduled for each interval by a team of up to three technicians. The wind turbine generators do not require any fuel to generate electricity; however, oil and oil filters as well as hydraulic fluid are necessary for operation. Oil and filters will require changing and general wind turbine maintenance such as cleaning and replacing any worn parts will be completed in accordance with manufacturer specifications.

Scheduled maintenance activities for wind turbine generators will include a complete inspection of the tower, components, functionality testing, replacement of any worn parts and lubrication of moving parts. Following all maintenance work on wind turbine generators the area in the vicinity of the wind turbines will be thoroughly cleaned to ensure continued safe operation. All surplus lubricating oils, grease, rags, batteries and filters will be removed and disposed of at an MOECC-approved disposal and/or recycling facility according to regulatory requirements. All maintenance activities will adhere to the same waste disposal and spill prevention industry best management

practices (BMPs) that will be carried out during construction activities for the proposed Project (please refer to the Construction Plan Report for more information).

Periodic maintenance of project infrastructure will be required over the life of the Project. If overhead collector lines are used, they will require ongoing condition assessment and vegetation control, as required. Access roads and any watercourse crossings will also be monitored to ensure they remain in compliance over the life of the Project.

4.3.2 Unplanned Turbine Maintenance

Wind turbines are very reliable and the major components are designed to operate for over 20 years. However, there is a possibility that component failure may occur despite the high reliability of the turbines fleet-wide. Most commonly, the failure of small components such as switches, fans or sensors will take the turbine out of service until the faulty component is replaced. These repairs can usually be carried out by a single crew visiting the turbine for several hours.

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

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

4.3.3 Electrical System Maintenance

The collector lines, junction boxes and substation will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for aboveground infrastructure and protective relay maintenance of the substation, in addition to monitoring of the secondary containment system for traces of oil. Finally, vegetation control will be required around aboveground collector lines, if installed on poles, to prevent any damage to the lines and ensure safe operation. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw / hydro axe).

4.4 Key Project Operational Features

4.4.1 Water Taking and Supply

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 this Report.

4.4.1.1 Description of Groundwater Takings

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 Litres per Day (L/day) and are not expected to exceed 50,000 L/day.

A Groundwater Supply Feasibility and Effects Desktop Assessment (**Appendix C**) was performed to evaluate the feasibility of meeting water supply demands with a groundwater well during operation of the Project. The report also assessed the potential effects to local groundwater users (landowners) and existing ecological features. Results of this assessment indicate that during operation of the Project, non-potable groundwater use will be limited to regular personnel requirements of approximately 15 full-time employees and general operational maintenance at the operations and maintenance building. Water takings are expected to be approximately 4,500 L/day and are not expected to exceed 50,000 L/day.

Adverse effects on local groundwater users (landowners) and natural ecological features are not known to occur from the operation of groundwater supply wells at such low rates. Therefore, no adverse environmental impacts are expected to occur during operation of the proposed groundwater supply well(s).

4.4.2 Waste Management

The operation of a wind project does not generate a large amount of waste. Oil and filters used in turbine components and hydraulic systems will need to be changed approximately once every five years, as per manufacturer specifications. Lubricants required for wind turbines include hydraulic oil, selected grease (main bearing, blade bearing, drive shaft, yaw bearing and generator) and open gear grease (yaw-gear). All surplus lubricating oils, grease, rags, batteries and filters will be removed and disposed of at a Ministry of Environment and Climate Change (MOECC) approved disposal and/or recycling facility according to provincial and municipal requirements. Household wastes (e.g., cardboard, plastics, etc.) generated at the operations and maintenance building will either be recycled or disposed of at a local facility. The estimated maximum daily quantity of waste generated will be approximately 80 litres.

The amount of oil and grease stored on-site will depend on availability of disposal vehicles, transportation schedules and the service cycle. Used oil will be stored in a designated area of the operations and maintenance building and picked up by certified contractor with the appropriate manifests in place. There will be no permanent storage of waste at any project facility during operations.

4.4.3 Stormwater Management / Erosion and Sediment Control

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.).

4.4.4 Sewage Management

The operations and maintenance building for the Project will include washroom facilities suitable for approximately 15 staff and 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.

4.4.5 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 6.4** 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.

5. Emergency Response and Communication Plan

This Emergency Response and Communication Plan (ERCP) for the Project was prepared in accordance with the requirements of O. Reg. 359/09, as amended. The purpose of the ERCP is to define an avenue for ongoing communication throughout the construction, operations and decommissioning phases of the Project. This will ensure that members of the community, Aboriginal and First Nation communities, local municipalities and stakeholders are kept apprised of pertinent Project activities, in addition to any emergencies in the unlikely event that one should occur. The following sections outline North Kent Wind 1's communication commitments in relation to emergency response, ongoing communication and complaint management.

5.1 Emergency Response

Throughout the construction, operation and decommissioning phases of the Project, an up-to-date ERCP will be maintained at the operations and maintenance building. The ERCP will contain current contact information for emergency responders including local police and fire departments and will outline communication protocols should an emergency situation should arise. North Kent Wind 1's ERCP will include the following information:

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

The ERCP's communication protocol will include the following steps:

- The person observing the emergency will contact first responders immediately via 911, as stipulated in the site ERCP; and
- A Project representative will then contact the MOECC, including the Spills Action Centre, if required, in accordance with Sections 15 and 92 of the *Environmental Protection Act* and the local municipalities / response personnel.

Depending on the nature of the incident, local community members will be notified at the discretion of North Kent Wind 1 employees trained on the ERCP's procedures. The ERCP will be maintained on-site and updated as required.

5.2 Non-Emergency Communications

Regulatory agencies, staff and Council from the Municipality of Chatham-Kent and local residents may be notified through mailings of updates on Project activities and changes to procedures. Examples of non-emergency communications that may be communicated through mailings include:

- Commencement of construction and installation activities for the Project;
- Maintenance activities that are considered outside of routine maintenance (e.g., wind turbine generator disassembly or replacement of collector lines);
- Commencement of decommissioning activities for the Project; and
- Any additional information about the Project that North Kent Wind 1 considers of interest to regulatory agencies, staff and Council from the Municipality of Chatham-Kent, or local residents.

When advanced notification of Project activities is feasible, letter communications will identify in detail the activity being carried out, anticipated schedule of the activity and contact information for obtaining additional information or submitting any concerns and/or complaints. If notification is required after an unanticipated event, the letter will describe the event, mitigation strategies to prevent future occurrences and contact information for obtaining additional information or submitting any concerns and/or complaints.

5.3 Complaints Resolution Process

North Kent Wind 1 acknowledges that some members of the community may have concerns regarding construction activities and long-term facility operations. To address concerns in a collaborative manner, North Kent Wind 1 will follow the complaints resolution process described below.

- Should any complaints arise throughout the course of the construction, operation or decommissioning phases, a Project representative will contact the complainant to understand the issue and address the complaint, as appropriate. When required, a Project representative will notify the MOECC of the complaint and prepare / file an initial Complaint Record and include the following:
    a) Name, address and phone number of the complainant;
    b) Date and time of the complaint;
    c) Details of the complaint;
    d) Follow-up action to be taken; and
    e) Steps taken to prevent the situation from occurring in the future, where applicable.
- An updated Complaint Record will be maintained to describe the proposed resolution of the complaint, where applicable.
- Complaint Records will be maintained at the Project office in the operations and maintenance building and will be made available to the MOECC field inspection staff should a request be made.

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

6. Environmental Effects Monitoring Plan

The following section describes potential effects associated with the daily function of the Project. The potential effects described below are also presented in **Section 4** of the PDR.

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.

The monitoring plan laid out in this section addresses the following environmental considerations:

- Cultural Heritage;
- Natural Heritage;
- Water Resources;
- Sound;
- Air Quality; and
- Local Interests, Land Use, Infrastructure and Resources.

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

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 2 archaeological assessment of the Project Location was conducted between spring and fall of 2015 (Golder Associates, 2015). The assessment was conducted in accordance with the 2011 *Standards and Guidelines for Consultant Archaeologists* (Ontario Ministry of Tourism, Culture and Sport (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. 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.

6.1.1 Potential Effects

No effects to archaeological resources are anticipated as a result of the operational phase of the Project.
No effects to the 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.

6.2 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 NHA Environmental Impact Study (EIS) Report (NRSI, 2015a) prepared based on the *Natural Heritage Assessment Guide for Renewable Energy Projects* (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.

Table 6-1 documents the significant and treated as significant natural heritage features located within 120 m of the Project Location for which an EIS was conducted.

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

Feature	Natural Features Carried Forward to the EIS
Wetlands	**5 wetlands were determined to be significant and therefore carried forward to the EIS. These include the following wetlands**: WET-001, WET-002, WET-004, WET-005, WET-006.
Woodlands	**13 woodlands were determined to be significant and therefore carried forward to the EIS. These include the following woodlands:** WOD-001, WOD-002, WOD-003, WOD-004, WOD-005, WOD-006, WOD-007, WOD-008, WOD-009, WOD-011, WOD-012, WOD-016, WOD-017.
Significant Wildlife Habitat (SWH)	The following features were treated as SWH and carried forward to the EIS with a commitment to complete pre-construction surveys (mitigation measures described in the EIS will be applied to these features if they are confirmed as significant based on the results of the pre-construction surveys): • Bat Maternity Colony • Colonially-Nesting Breeding Bird Habitat (Trees/Shrubs) • Old Growth Forest • Other Rare Vegetation Communities Habitat • Waterfowl Nesting Area • Amphibian Breeding Habitat (Woodland) • Marsh Bird Breeding Habitat • Eastern Wood-Pewee Habitat • Wood Thrush Habitat • Numerous Plant Special Concern and Rare Wildlife Species Habitats, including: ▪ Prairie Milkweed Habitat ▪ Black Gum Habitat ▪ Cup-Plant Habitat ▪ Pawpaw Habitat ▪ Northern Fogfruit Habitat ▪ Riddell's Goldenrod Habitat ▪ Muskingum Sedge Habitat ▪ Shumard Oak Habitat ▪ Southern Slender Ladies' Tresses Habitat ▪ Rigid Sedge Habitat ▪ Gray-headed Prairie Coneflower Habitat ▪ Wing-stem Habitat ▪ Round-Fruited Panic Grass Habitat ▪ Climbing Prairie Rose Habitat ▪ Giant Ironweed Habitat ▪ Blue Ash Habitat ▪ Lizard's Tail Habitat ▪ Virginia Culver's-root Habitat ▪ Swamp Rose-mallow Habitat ▪ Wild Senna Habitat ▪ Cream Violet Habitat The following features were carried forward to the EIS as Generalized SWH[3]: • Waterfowl Stopover and Staging Areas (Terrestrial) • Bat Maternity Colonies • Turtle Wintering Areas • Snake Hibernaculum • Colonially – Nesting Bird Breeding Habitat (Tree/Shrubs) • Amphibian Breeding Habitat (Woodland) • Marsh Bird Breeding Habitat • Terrestrial Crayfish • Grasshopper Sparrow • Common Nighthawk • Eastern Wood-Pewee • Wood Thrush • Red-headed Woodpecker • Numerous Plant Special Concern and Rare Wildlife Species Habitats, including: ▪ Pawpaw ▪ American Lotus ▪ Wild Senna ▪ Muskingum Sedge ▪ Black Gum ▪ Cup-Plant ▪ Rigid Sedge ▪ Northern Fogfruit ▪ Southern Slender Ladies' Tresses ▪ Hoary Tick-trefoil ▪ Shumard Oak ▪ Wing-stem ▪ Round-Fruited Panic Grass ▪ Gray-headed Prairie Coneflower ▪ Giant Ironweed ▪ Blue Ash ▪ Climbing Prairie Rose ▪ Virginia Culver's-root ▪ Swamp Rose-mallow ▪ Lizard's Tail ▪ Cream Violet • Numerous Insect Special Concern and Rare Wildlife Habitats, including: ▪ Blue-ringed Dancer ▪ Blue-tipped Dancer ▪ Variegated Meadowhawk
Provincially Significant Life Science ANSIs	There are no Provincially Significant Life or Earth Science ANSIs identified within 120 m of Project Location.

6.2.1 Potential Effects

Table 6-2 provides mitigation measures and net effects for potential effects related to Significant Woodlands, Wetlands as well as Treated as Significant Wildlife Habitat.

3. Generalized Candidate Significant Wildlife Habitats (SWH) are determined based on the criteria outlined in Appendix D of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNRF, 2012a). Therein, candidate SWH that are located within 120 m of Project Location but do not require to be individually identified due to their proximity to specific types of Project infrastructure as specified in Appendix D and are also not overlapped by other Project infrastructure are treated as Generalized Candidate SWH.

Table 6-2: Mitigation Measures, Net Effects and Monitoring Plan: Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat

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	<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 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. • Conduct post-construction mortality monitoring at this facility for at least three 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.

Table 6-2: Mitigation Measures, Net Effects and Monitoring Plan: Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
	disturbance/avoidance behaviour of bird species of conservation concern.	<u>Waterfowl Nesting Area</u> • 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. <u>Marsh Bird Breeding Habitat</u> • 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. <u>Bird Species of Conservation Concern Habitat</u> • 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.		<u>Waterfowl Nesting Area Monitoring</u> • Conduct post-construction behaviour surveys for three 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. <u>Amphibian Breeding Habitat (Woodland) Monitoring</u> • 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. <u>Marsh 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 within the Bird and Bat EEMP. <u>Bird Species of Conservation Concern Habitat Monitoring</u> • 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:** <u>Common Contingency Measures</u> • 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. <u>Bat Maternity Colony Measures</u> • 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. <u>Colonially Nesting Bird Breeding Habitat Measures</u> • 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. <u>Waterfowl Nesting Area Measures</u> • 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. <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>Marsh Bird Breeding Habitat Measures</u> • 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. <u>Bird Species of Conservation Concern Habitat Measures</u> • 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 6-2: Mitigation Measures, Net Effects and Monitoring Plan: Significant Wetlands and Woodlands and Treated as Significant Wildlife Habitat

Potential Effect	Performance Objectives	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
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.

6.3 Surface Water and Groundwater

Potential effects to surface water resulting from locating a Project component within the prescribed setbacks to water bodies are evaluated in the Water Body Assessment and Water Body Report (NRSI, 2015b) and described below. Similarly, the potential effects to groundwater are evaluated in the Hydrogeological Assessment and Effects Assessment Report (**Appendix C**).

6.3.1 Water Bodies

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."*

Following the Records Review and Site Investigation, 62 water bodies were identified within 120 m of the Project Location. Of the 62 water bodies identified, 53 are overlapping with Project infrastructure while the remaining water bodies are located within 120 m of the Project Location. All of these water bodies are either permanent or intermittent watercourses, and are designated as warmwater fisheries or intermittent drainage features (NRSI, 2015b).

6.3.1.1 Potential Effects

During the operational phase of the Project, it is anticipated that impacts to water bodies will be limited and associated with increased traffic access within the PSA as well as ongoing maintenance activities. This includes a risk of contaminant spills and erosion and sedimentation from maintenance activities (i.e., removal of vegetation). Contaminant spills, erosion and sedimentation result in the degradation of surface water quality within receiving water bodies.

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

6.3.2 Groundwater

6.3.2.1 Potential Effects

Potential adverse effects on local groundwater users (landowners) and natural ecological features are not known to occur from the operation of groundwater supply wells operating at such low rates (4,500 L/day). Therefore, no adverse environmental impacts are expected to occur during operation of the proposed groundwater supply well(s) at the operations and maintenance building.

Potential effects, mitigation measures, residual effects and a monitoring plan associated with groundwater, other than from the operation of the groundwater supply well at the operations and maintenance building, are described in **Table 6-4**.

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

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 Plan that will minimize the potential for operations related sediment release into nearby water bodies (ESC Guideline). • Store fuel and maintenance related materials at least 30m 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.

Table 6-4: Mitigation Measures, Net Effects and Monitoring Plan: Groundwater

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.

6.4 Air, Odour and Dust

During the operation of the proposed Project, maintenance activities have the potential to cause infrequent, localized and short-term fugitive dust and vehicle emissions. It should be noted that these emissions are expected to be considerably lower in magnitude than during construction, installation and decommissioning activities. No emissions of odours are anticipated.

6.4.1 Potential Effects

The potential effects, mitigation measures, net effects and the monitoring plan associated with air emissions are described in **Table 6-5** below.

Table 6-5: Mitigation Measures, Net Effects and Monitoring Plan: Air and Dust

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.

6.5 Sound

The operation of wind turbine generators and the collector substation will generate sound that has the potential to affect local residents. A Noise Impact Assessment was prepared to confirm the sound levels associated with operating the turbines and the substation; the study and its results are presented in **Appendix B** of this Report.

Sound modelling conducted for the Noise Impact Assessment determined that the Project layout is in compliance with all of the requirements outlined in O. Reg. 359/09, as amended, and the *Noise Guidelines for Wind Farms* (MOECC, 2008). These regulations set out a minimum 550 m setback between wind turbines and non-participating sound receptors (i.e., residents, hospitals, schools, daycares, places of worship, etc.). It also outlines a 500 m setback between the substation and non-participating sound receptors. The MOECC has based the regulatory approach to sound on a 40 decibels (dBA) outdoor night time sound limit. This setback also applies to the future use of vacant land where that land is zoned to allow for the construction of potential receptors (e.g., residential). Participating land owners (i.e., a landowner with proposed project infrastructure located on their property) are not considered sound receptors for the purpose of determining sound setbacks.

As part of the Noise Impact Assessment the cumulative sound effects of the Project and existing wind turbines within 5 km were modelled. This assessment also considered any wind facilities which have not yet been constructed but have a crystallized site plan. Following consultation with MOECC and area municipalities, it was determined that there are other existing or proposed turbines within 5 km of the Project, which include:

- Lake St. Clair East Wind Farm; and
- Marsh Line Wind Farm.

6.5.1 Potential Effects

The potential effects, mitigation measures, net effects and the monitoring plan associated with sound are described in **Table 6-6** below.

Table 6-6: Mitigation Measures, Net Effects and Monitoring Plan: Sound

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 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 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 sound 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.

6.6 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.

Agricultural Use

There are no impacts to agricultural land during operations as the facility design supports farming practices occurring directly adjacent to the Project Location.

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**). 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 in the unlikely event of a turbine failure. However, this potential impact already exists at a 99.5 m setback and is not increased by a setback reduction.

Local Roads and Traffic

During the operation of the Project, the road capacity and local traffic could be affected if maintenance activities require the replacement of a major wind turbine generator component (e.g., rotor), since specialized equipment (e.g., cranes) may be required. The delivery of specialized equipment could result in a temporary increase in slower moving traffic 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.

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.

6.6.1 Potential Effects

The potential effects, mitigation measures, net effects and the monitoring plan associated with potential effects on local interests, land use and infrastructure are described in **Table 6-7** below.

Table 6-7: Mitigation Measures, Net Effects and Monitoring Plan: Land Use and Infrastructure

Potential Effect	Performance Objective	Mitigation Strategy	Net Effects	Monitoring Plan and Contingency Measures
Temporary Change in the Flow of Local Traffic Resulting from Maintenance Activities.	• Minimize disturbance to local traffic patterns.	• Obtain appropriate road occupancy and traffic permits from provincial and municipal agencies prior to undertaking maintenance activities, if required. • Notify the community about major Project maintenance activities.	• Changes in traffic flow during the operation of the Project are expected to be limited to periods when major Project maintenance activities are required. ▪ *Low likelihood of effect and limited magnitude due to size of overall footprint within the entire PSA.*	**Monitoring:** • Monitoring complaints through a Project operations staff contact number according to the Emergency Response and Communications Plan. **Contingency Measures:** • To the extent possible, use alternate maintenance equipment and/or component delivery routes.

6.7 Public Health and Safety

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

6.7.1 Potential Effects

6.7.1.1 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.

6.7.1.2 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**) 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.

6.7.1.3 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 Officer 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.

6.7.1.4 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).

6.7.1.5 Electric and Magnetic Fields

Electromagnetic fields (EMF)s 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".

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

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

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.

6.8 Other Resources

6.8.1 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 active landfills within the PSA – the closest active landfill is approximately 21 km away. Therefore, no effects on landfills are anticipated.

6.8.2 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).

6.8.3 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.

6.8.4 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.

Currently North Kent Wind 1 is engaged in ongoing discussions with oil and gas companies holding resources within the PSA. Additional details on these discussions are provided in the Consultation Report.

6.9 Areas Protected Under Provincial Plans and Policies

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

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

The 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.

7. Summary and Conclusions

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

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