Henvey Inlet Wind LP

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Henvey Inlet Wind Energy Centre

Design and Operations Report

Final Draft

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Henvey Inlet Wind Energy Centre – Design and Operations Report – Final Draft

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Project Number:

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Date:

September 2015

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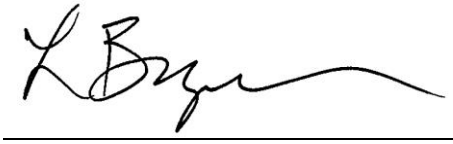
AECOM: 2012-01-06

AECOM Signatures

Report Prepared By:



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List of Acronyms and Glossary

AADT ..... Annual Average Daily Traffic
AQI ..... Air Quality Index
BMPs ..... Best Management Practices
CMOH ..... Chief Medical Officer of Health
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
CWS ..... Canadian Wildlife Service
dB ..... Decibels
dBA ..... Decibels A-weighted
EA ..... Environmental Assessment
EC ..... Environment Canada
EEMP ..... Environmental Effects Monitoring Plan
EIS ..... Environmental Impact Study
EMF ..... Electromagnetic Fields
ESA ..... *Endangered Species Act*
FIT ..... Feed-in-Tariff
ha ..... Hectare
HIFN ..... Henvey Inlet First Nation

HIFN I.R. #2 ..... Henvey Inlet First Nation Reserve #2
HIW ..... Henvey Inlet Wind
HIWEC ..... Henvey Inlet Wind Energy Centre
Hz ..... Hertz
IEC ..... International Electrotechnical Commission
IESO ..... Independent Electricity System Operator
IWH ..... Important Wildlife Habitat
km ..... Kilometres
kV ..... Kilovolt
L/day ..... Litres per day
m ..... Metre
m^2 ..... Metre squared
m/s ..... Metre per second
mASL ..... Metres Above Sea Level
MBCA ..... *Migratory Birds Convention Act*
MNDM ..... Ontario Ministry of Northern Development and Mines
MNRF ..... Ontario Ministry of Natural Resources and Forestry
MOECC ..... Ontario Ministry of the Environment and Climate Change
MTO ..... Ontario Ministry of Transportation
MSDS ..... Material Safety Data Sheet
MVA ..... Mega Volt Ampere
MW ..... Megawatt
NHA ..... Natural Heritage Assessment
NHIC ..... Natural Heritage Information Centre
Nigig ..... Nigig Power Corporation
O&M building ..... Operations and Maintenance building
OGSR ..... MNRF's Oil, Gas & Salt Resources database
OWES ..... Ontario Wetland Evaluation System
OPA ..... Ontario Power Authority
PIW ..... Provincially Important Wetland
ROW ..... Right-of-way
SARA ..... *Species at Risk Act*
SCADA ..... Supervisory Control and Data Acquisition
SFL ..... Sustainable Forest License
SOCC ..... Species of Conservation Concern
SODAR ..... Sonic Detection and Ranging
TS ..... Transformer Station
UNESCO ..... United Nations Education, Scientific, and Cultural Organization
WTG ..... Wind Turbine Generator

1. Introduction and Overview

1.1 Henvey Inlet Wind Energy Centre Overview

Nigig Power Corporation (Nigig) received a Feed-in-Tariff (FIT) Contract from the Ontario Power Authority (OPA) in 2011 for a 300 megawatt (MW) wind energy generation centre. Henvey Inlet Wind LP (HIW), a limited partnership between Pattern Renewable Holdings Canada ULC and Nigig Power Corporation, is proposing to develop the Henvey Inlet Wind Energy Centre (HIWEC), a 300 MW facility on Henvey Inlet First Nation Reserve No. 2 (HIFN I.R. #2). AECOM Canada Ltd. (AECOM) was retained by HIW to prepare an Environmental Assessment (EA) for the proposed HIWEC. The EA was conducted in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements.

1.2 Summary of Design and Operations Report Requirements

The requirements for the Design and Operations Report defined in the HIFN EA Guidance document are outlined in **Table 1-1** along with where information about those requirements can be found in this report.

Table 1-1: Adherence to Design and Operations Report Requirements under HIFN EA Guidance Document

Requirement	Completed	Corresponding Section
Site Plan	Yes	**Section 2.0**
Facility Design Plan	Yes	**Section 3.0**
Facility Operations Plan	Yes	**Section 4.0**
Environmental Effects Monitoring Plan (EEMP)	Yes	**Section 6.0**
Emergency Response and Communications Plan	Yes	**Section 5.0**
Summary of Archaeological Assessment Report(s)	Yes	**Section 6.1**
Summary of Heritage Assessment Report (includes Protected Properties Report)	Yes	**Section 6.1**

The Interim Draft Design and Operations Report was posted to the HIW website on June 24, 2015 to provide information about HIWEC to HIFN and its members, the public, government agencies and other stakeholders, as early as possible in the EA process. In addition, this Final Draft Design and Operations report has been posted to the HIW website to provide all stakeholders with a copy of what is being reviewed by HIFN's Band Council and further information that was collected since the Interim Draft.

1.3 Location and Study Area

The HIWEC study area includes the entirety of HIFN I.R. #2 plus a 550 metre (m) buffer extending beyond the HIFN I.R. #2 boundary. HIFN I.R. #2 is bounded on the north by the Key River, Georgian Bay to the west, Highway 69 to the east with some HIFN I.R. #2 property located on the east side of Highway 69. The southern boundary runs from Sandy Bay on the southwest corner in a north easterly direction to Highway 69 south of Bekanon Road. The geographic location is along the eastern shore of Georgian Bay, south of French River Provincial Park and directly north of North Georgian Bay Shoreline and Islands Conservation Reserve (**Figure 1-1**). HIFN I.R. #2 is part of the Georgian Bay Biosphere Reserve which encompasses 347,000 hectares (ha) of land stretching 300 kilometres (km) from Port Severn to the French River and is designated as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Biosphere Reserve (Georgian Bay Biosphere, 2015). Highway 69 is a major north-south highway connecting Highway 400 north of Parry Sound with the City of Greater Sudbury at Highway 17.

Generally, the HIWEC study area has shallow soils, with many rocky outcrops forming longitudinal ridges running on a northwest to southeast axis, and is divided roughly in half by the Henvey Inlet waterbody. Numerous wetland pockets are located between the ridges and across the study area, with upland regions supporting forested areas of poplar and jack pine. **Section 6** provides a more detailed description of the existing environmental conditions within the study area. The study area for the HIWEC also includes lands off-Reserve that are within the area that may experience increased noise levels from the HIWEC. All HIWEC components will be located within the HIWEC study area as shown in the preliminary site plan provided as **Figure 1-1**.

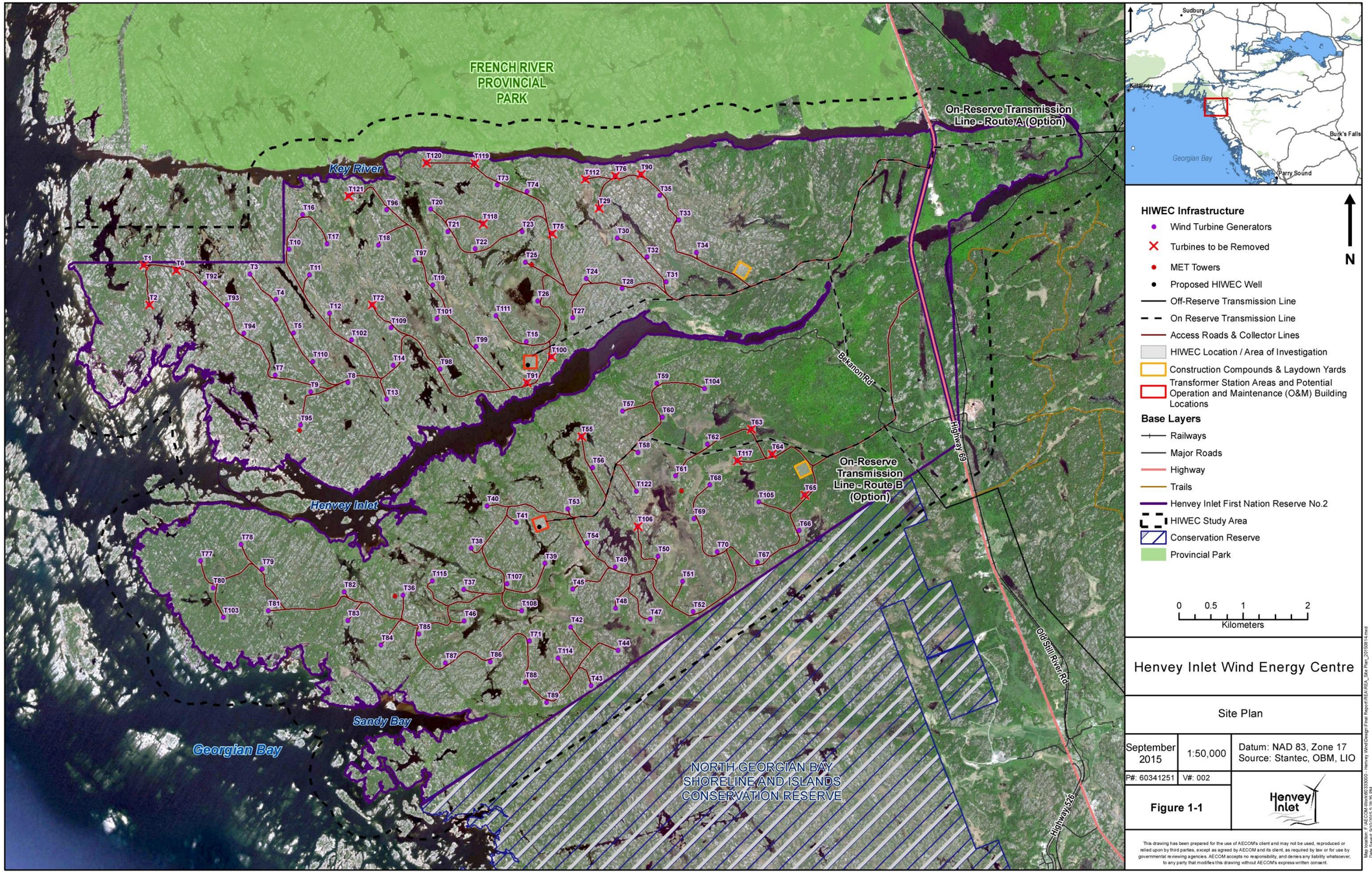
1.4 Proponent Contact and Key Information

The following table provides key HIWEC information.

Table 1-2: Key Information

Proponent:	The HIWEC is being developed by HIW. HIW is a limited partnership between Nigig Power Corporation, a company wholly owned by HIFN, and Pattern Renewable Holdings Canada ULC.	
HIWEC Location:	HIFN I.R. #2	
Energy Source:	Wind energy. No supplementary fuel sources will be used to generate electricity.	
Contracted Nameplate Capacity:	300 MW	
Website:	www.henveyinletwind.com	
Email:	info@henveyinletwind.com	
Telephone:	(705) 857-5265	
Proponent Contact Information:	**Ken Noble** President Nigig Power Corporation (Nigig) a company wholly owned by HIFN 295 Pickerel River Road Pickerel, ON P0G 1J0	**Kim Sachtleben** Project Director Pattern Renewable Holdings Canada ULC 355 Adelaide Street West Suite 100 Toronto, Ontario M5V 1S2
Consultant Contact Information:	**Kyle Hunt** Project Manager AECOM 105 Commerce Valley Drive West Markham, ON L3T 7W3	**Marc Rose** Project Director AECOM 105 Commerce Valley Drive West Markham, ON L3T 7W3

Figure 1-1: Site Plan



2. Site Plan

The Site Plan provides graphic and text descriptions of the HIWEC components, cultural and heritage features, natural heritage features, waterbodies and noise receptors.

2.1 HIWEC Components

This section provides an overview of and describes the location of the HIWEC components. The following site plan information as per the HIFN EA Guidance document is shown in **Figure 1-1**, **Figure 2-1**, **Figure 2-2**, and **Figure 2-3**:

- HIWEC components;
- Buildings, structures, roads, utility corridors, right-of-ways (ROWs) and easements within 300 m of HIWEC components;
- Groundwater and surface water supplies used at the HIWEC;
- Components from which contaminants are discharged into the air;
- Works for the collection, transmission, treatment, and disposal of sewage;
- Noise receptors;
- The distance between the base of each wind turbine generator (WTG) and the nearest noise receptor;
- Location of natural heritage features and waterbodies within 120 m of HIWEC components;
- Topographical contours, surface water drainage, and any protected heritage properties, heritage resources, archaeological resources, waterbodies, and important natural features;
- The distance between the base of any WTGs and any public road ROWs or railway ROWs that are within a distance equivalent to the length of any blades of the WTG plus 10 m;
- The distance between the base of any WTGs and all legal boundaries of the parcel of land on which the WTG is constructed, installed or expanded within a distance equivalent to the height of the WTG, excluding the length of any blades;
- Land uses within 120 m of HIWEC components; and
- Property lines within the HIWEC study area.

Key HIWEC components listed in **Table 2-1** are shown on **Figure 1-1**. A description of the HIWEC components is provided in **Section 3** as well as in the Description Report and the Construction Plan Report.

Table 2-1: Temporary Construction and Operation Components

Permanent HIWEC Components	Temporary HIWEC Components
• WTGs • WTG Foundations • Access Roads and Crane Pads • Meteorological Towers (Met Towers) • Pad-mounted Transformers and Collector Lines • Transformer Stations (TSs) • On-Reserve Transmission Lines • Operations and Maintenance (O&M) Building	• Crane Pads • Construction Compounds and Laydown Yards • WTG Staging Areas • Concrete Batch Plant(s) • Crusher(s)

One hundred and twenty WTGs are currently being assessed for the HIWEC with up to 91 WTGs to be constructed. To date, 20 of the 120 WTG locations have been identified for removal based on technical and environmental studies completed and comments received from HIFN members and the public. The HIWEC was designed to adhere to regulatory setback requirements and to consider potential impacts to local environmental features.

Figure 2-1: Site Plan & Natural Heritage Features

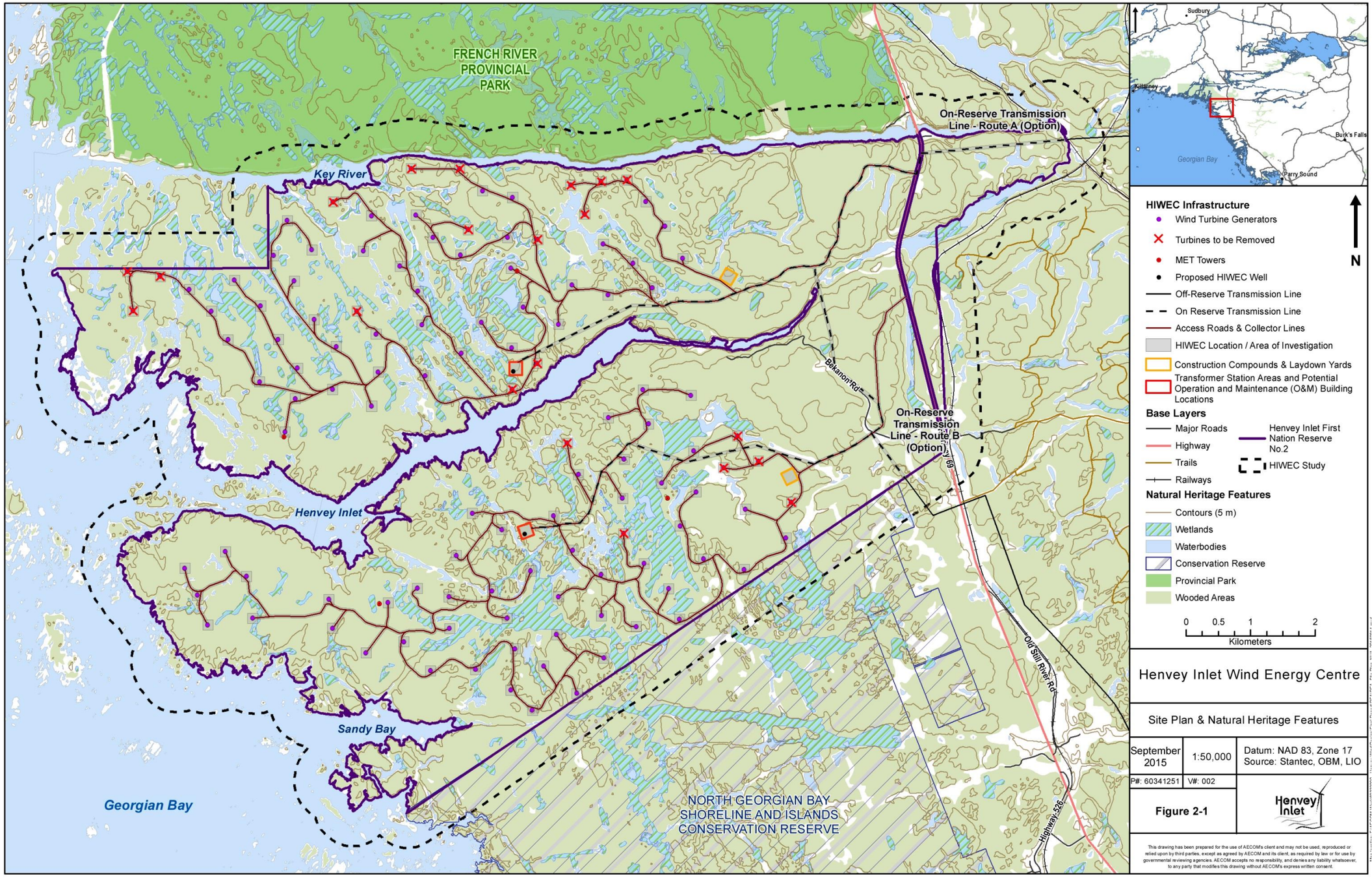


Figure 2-2: Site Plan & Socio-economic Features

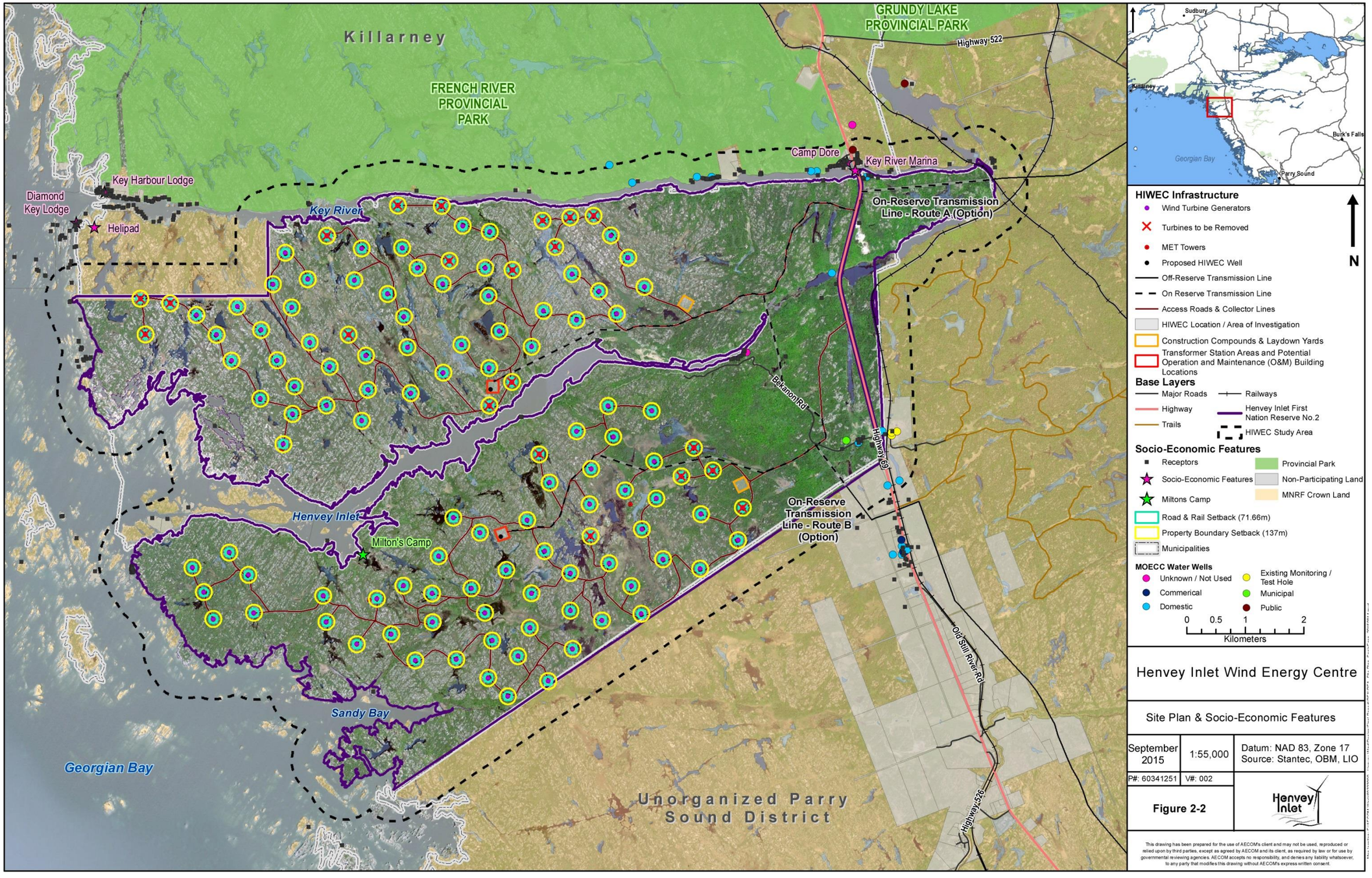
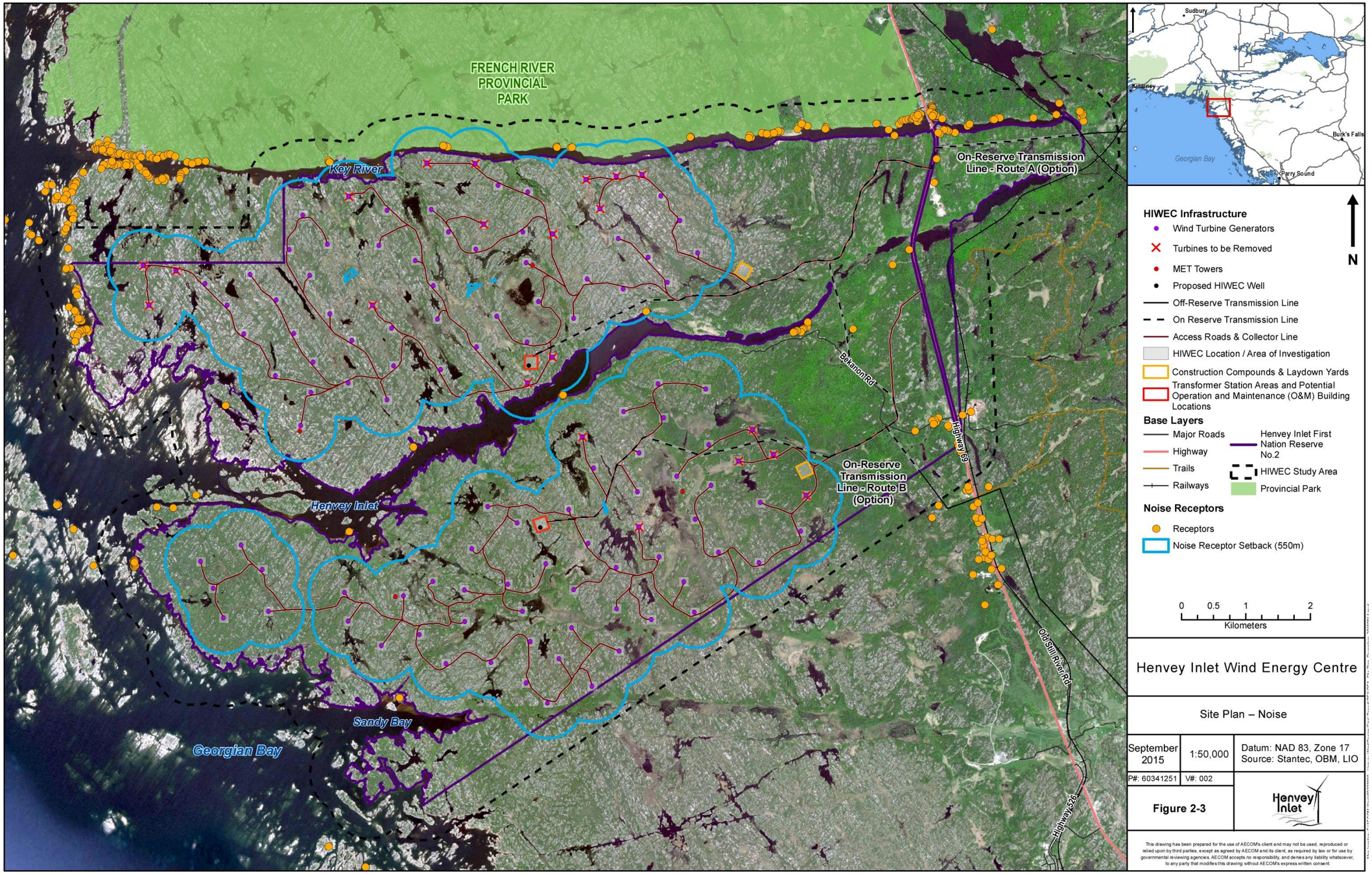


Figure 2-3: Site Plan Noise



2.2 Cultural Heritage Resources

The precise location of archaeological resources and First Nation heritage resources is sensitive information and, therefore, is not depicted on the Site Plan figures. In addition, the Heritage Assessment Report for the HIWEC concluded that no protected properties are located within the HIWEC study area and, therefore, are not depicted on the Site Plan figures.

Additional information about the results of cultural heritage and archaeological resources can be found in the Stage 1 Archaeological Assessment Report, Stage 2 Archaeological Assessment Report and the Heritage Assessment Report, provided in **Appendices K1, K2** and **L** of **Volume A**, respectively.

2.3 Natural Heritage Features

Natural heritage features that were identified within the HIWEC study area in the Natural Heritage Assessment (NHA) reports are shown on **Figure 2-1**. Additional information on natural heritage features can be found in the NHA Report, provided in **Appendix F** of **Volume A**.

2.4 Waterbodies

Figure 2-1 includes all waterbodies within the HIWEC study area that have been identified through site investigation, a comprehensive records review of available material and agency consultation. Additional information on waterbodies from site-specific field studies, including confirmation of potential waterbodies and identification of new features not identified in the records review, is included in the Water Assessment and Waterbody Report, provided in **Appendix H** of **Volume A**.

2.5 Noise Receptors

Noise receptors in the HIWEC study area are shown on **Figure 2-3**. A Noise Study Report was completed for the HIWEC in accordance with the HIFN EA Guidance document and is provided in **Appendix M** of **Volume A**.

3. Facility Design Plan

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

3.1 Wind Turbine Generator Technical Specifications

The HIWEC will use wind to generate energy through the use of commercial WTG technology. The proposed WTG technology for the HIWEC is expected to be a Vestas V126-3.3 MW Turbine. One hundred and twenty WTGs are currently being assessed for the HIWEC with up to 91 WTGs to be constructed. It is important to note that the total number of WTGs will depend on the nominal rating of each WTG.

Each WTG 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 WTG is secured in place by a concrete foundation (approximately 2.5 m deep). Selected WTG specifications are presented in **Table 3-1** below 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

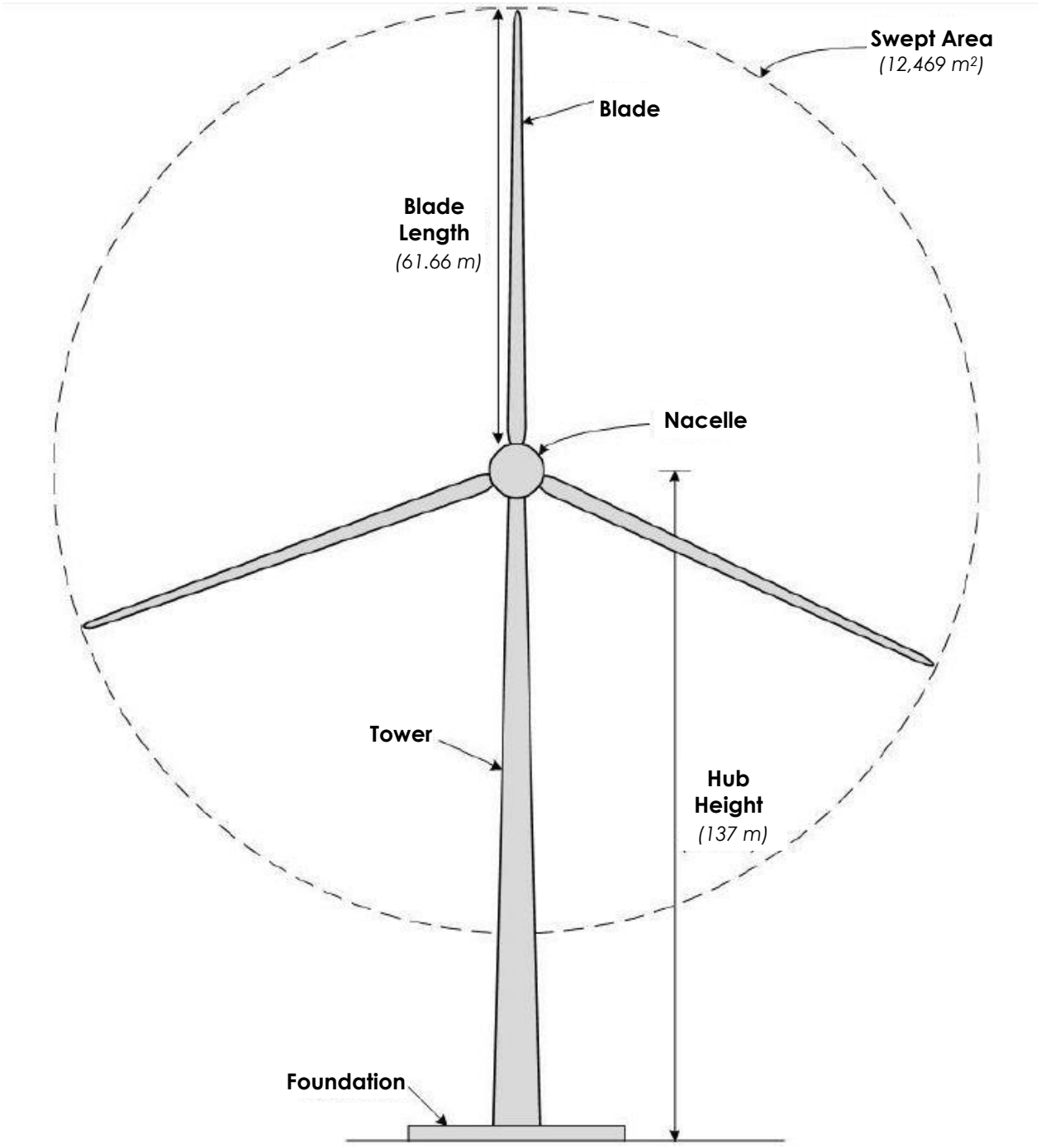
WTG Attribute	Specification
Make and Model	Vestas V126-3.3 MW
Nominal Power	3.3 MW
Hub Height (above grade)	Max. 137 m
Rotor Diameter	126 m
Number of Blades	three (3)
Blade Length	61.66 m
Swept Area	12,469 m^2
Cut-in Wind Speed	3 metres per second (m/s)
Cut-out Wind Speed	22.5 m/s
Rated Wind Speed	11-12 m/s

3.2 Construction Compounds, Laydown Yards and Wind Turbine Generator Staging Areas

Two (2) temporary construction compound and laydown yards will be constructed for the purpose of staging and storing equipment during the construction phase. Temporary electrical service lines will be connected to the local distribution line for the purpose of providing electrical power to the construction offices. Activities on this site will include materials storage, equipment refuelling and construction offices. The areas will be approximately 4 to 6 ha in size.

Approximately 0.6 ha around each WTG will be established for the laydown and assembly of the WTG components.

Figure 3-1: Basic WTG Specifications



3.3 Access Roads

Access roads will be constructed to allow access to WTG sites during the construction, installation, operation and maintenance of the HIWEC (please see the Construction Plan Report for additional information). Access roads will be constructed of crushed gravel and native materials or engineered fill. The access roads with shoulders will be up to 20 m wide during construction in order to accommodate cranes and transportation equipment used to deliver WTG components.

Access road locations have been determined through constraint mapping and constructability exercises and consultation with HIFN. In addition, as required, all roads associated with the HIWEC will be designed to minimize road and soil erosion as well as adequate stormwater runoff and drainage.

3.4 Operations and Maintenance Building

An O&M building will be constructed to accommodate offices, mess facilities, control facilities, storage space, maintenance work area, and a parking area. An area of approximately 2.8 ha will be required for these facilities. The O&M building will be within the HIWEC study area as shown on **Figure 1-1**. Only one (1) O&M building will be constructed on one (1) of the two (2) locations shown on **Figure 1-1**, to be selected prior to the construction phase.

The O&M building will be constructed on a concrete foundation. An access road to the O&M building will be constructed to accommodate construction equipment and on-site traffic during the operation of the HIWEC. The O&M building plan detail for the HIWEC is provided in **Figure 3-2**.

The O&M building will be powered by the local distribution company or via the HIWEC TSs, with an on-site backup power supply. The power will be delivered via overhead poles installed adjacent to the access road and will terminate on a transformer pole adjacent to the O&M building. A cable will then connect the transformer pole to the building electrical service.

3.5 Meteorological Towers

Met towers are an operational requirement of the Independent Electricity System Operator (IESO) for all electricity market participants (this includes all generators of electricity) and allow the IESO to operate the system reliably and safely. The use of meteorological data is key to the safe and efficient operation of a wind energy centre. Some operational decisions made using meteorological data include:

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

There are four (4) Met towers currently installed. Met towers are typically up to 100 m in height. Access roads have been constructed to access Met tower locations. As needed, additional meteorological equipment will be used to meet IESO market requirements.

3.6 Wind Turbine Generator Foundations

WTG foundation design will be finalized following the completion of site-specific geotechnical investigations. Geotechnical investigations will include sampling and testing boreholes at the WTG locations in the HIWEC study area. Testing in a laboratory will be completed to determine the design requirements of the WTG and associated electrical equipment foundations based on the soil and rock properties. The expected footprint of the WTG foundation excavation is 0.04 ha with an excavated depth of up to 2.5 m. A typical WTG layout for the HIWEC is provided in **Figure 3-3**.

Figure 3-2: O&M Building Plan Detail

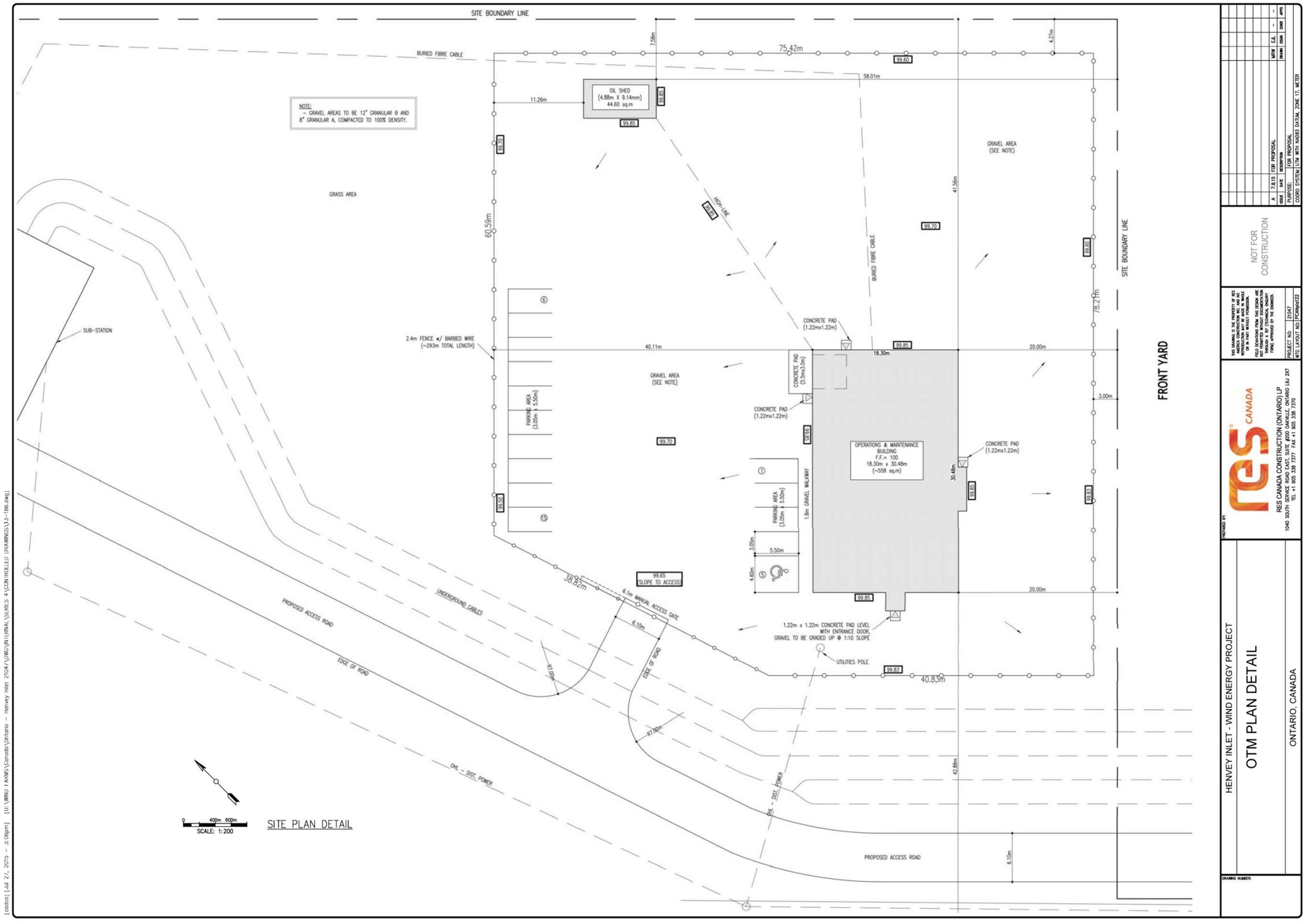
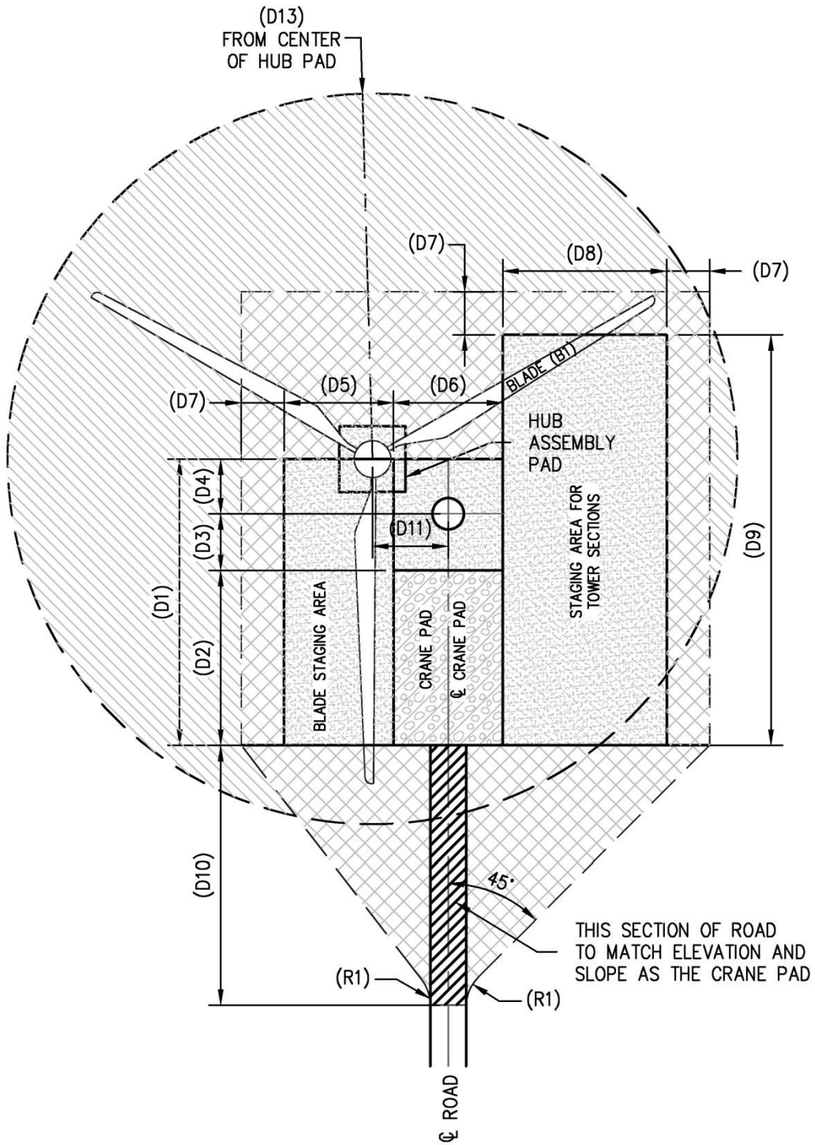


Figure 3-3: Typical WTG Layout



(T1)	12"	0.3m
(B1)	161'	49.1m
(D1)	132'	40.2m
(D2)	80'	24.4m
(D3)	26'	7.9m
(D4)	26'	7.9m
(D5)	50'	15.2m
(D6)	50'	15.2m
(D7)	5'	1.5m
(D8)	75'	22.9m
(D9)	187'	57.0m
(D10)	119'	36.3m
(D11)	35'	10.7m
(D13)	169	51.5m

NOTES:

1. TURBINE DOOR SHOULD ALWAYS BE DOWNWIND.
2. CRANE PAD SHALL DRAIN AWAY FROM TURBINE WITH A MAX. SLOPE OF 1%.
3. DIMENSIONS AND ARRANGEMENT SHOWN ARE FOR ILLUSTRATIVE PURPOSES AND ARE SUBJECT TO CHANGE BASED ON SITE CONDITIONS.
4. ADJUST PADS AND LAYDOWN AREAS FOR SITE CONDITIONS. CLEAR VEGETATION ADJACENT TO SITE FOR TURBINE ASSEMBLY AND LAYDOWN AREAS AS SHOWN.
5. RELATIVE DISTANCE BETWEEN ROAD AND TURBINE MAY VARY DEPENDING ON SITE CONDITIONS.
6. REFER TO ROAD SECTIONS DETAIL SHEET FOR GENERAL GRADING NOTES.
7. TOPSOIL UNDERCUT DEPTH DEPENDS ON SITE CONDITIONS. FOR CRANEPAD UNDERCUT EXISTING TOP SOIL DOWN TO NATIVE SOIL AND AN ADDITIONAL 3". FOR AREAS WITH DEEP TOPSOIL (I.E. > 8") CUT TO NATIVE SOIL ONLY.
8. ALL SUB-GRADE SURFACES SHALL BE PROOF-ROLLED TO DETECT SOFT AREAS.
9. WHERE REQUIRED THE TOPSOIL IS TO BE STRIPPED TO THE LEVEL OF A SUITABLE FORMATION, EXCAVATED MATERIAL IS TO BE STOCKPILED ON SITE IN DESIGNATED AREAS AS SPECIFIED BY RES.
10. IF ROTOR ASSEMBLY OCCURS ON THE GROUND, IT REQUIRES A CLEARED AREA FOR THE HUB INCLUDING BLADES WITH A MAXIMUM GRADIENT OF 1:20 OR 5%.
11. CRANE PAD AND STAGING AREAS SHOULD PROVIDE A MINIMUM 4,200 PSF BEARING PRESSURE.
12. MAXIMUM GRADIENT/SLOPE OF STAGING AREAS SHOULD BE APPROXIMATELY 2%.
13. STAGING AREAS AREA COMPACTED NATIVE MATERIAL ONLY. NO GRAVEL OR ROAD BASE PLANNED FOR THESE AREAS.
14. FOR EROSION CONTROL AND CONSTRUCTION ENTRANCE DETAIL, PLEASE REFER TO SWPPP DOCUMENTS PREPARED UNDER SEPARATE COVER.

LEGEND:

- (T1) MIN. COMPACTED THICKNESS OF GRAVEL ON CRANE PADS (TYP). CRANES TO USE TIMBER MATS FOR ALL HEAVY LIFTS. (SEE CRANE PAD DETAIL)
- COMPACTED SUBGRADE
- AREA TO BE CLEARED AND LEVELED FOR CRANE PAD
- AREA TO BE GRUBBED AND CLEARED

1 DETAIL: TYPICAL CRANE PAD ARRANGEMENT-END

Scale: N.T.S.

RES AMERICA CONSTRUCTION INC.
11101 W 120TH AVE, SUITE 400 BROOMFIELD, CO 80021
TELEPHONE: (303) 439-4200, FAX: (303) 439-4299

DRAWING NUMBER: CP2

[kcurry] [Aug 06, 2015 - 12:55pm] [T:\CAD\standard details\01-Site Details\CP2.dwg]

3.7 Pad-mounted Transformers

Located immediately adjacent to each WTG will be a pad-mounted transformer that will 'step-up' the voltage of the electricity generated by the WTG to a common collector line voltage (34.5 kilovolt) (kV). It is anticipated that the pad-mounted 3-phase 60 hertz (Hz) transformers will be rated to between 3 to 3.5 mega volt ampere (MVA) and will meet all HIWEC siting requirements. The transformers will have an approximate footprint of 6 m^2.

3.8 Electrical Collector Lines

Collector lines carry the electricity from the pad-mounted transformers to either an adjacent WTG that is connected in parallel, or to a junction box or overhead switch that is connected to several other WTGs within the same electrical circuit. The junction box or overhead switch can contain equipment related to junctions, cable splices and disconnect switches. From the junction box or overhead switch, the electrical power is then carried to the TSs.

The collector lines for the HIWEC 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 sizing of the underground and overhead collector cables will vary based on the collector system loading. The collector lines used for the HIWEC will be suitable for direct burial or overhead on poles and sized according to the HIWEC configuration to minimize voltage drops between WTGs and the TSs. Where possible, underground collector lines will be installed within the access road ROW to minimize the area of disturbed land. Underground collector lines will be buried at a depth of approximately 1 m. Overhead collector lines will be constructed on wood, steel or concrete monopoles. Fibre optic cabling will also be buried adjacent to the collector lines or mounted on pole structures that will connect each WTG 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 Transformer Stations

TSs are required to bring together the collector lines and transform the voltage from 34.5 kV to a transmission voltage of 230 kV. The TSs will be located within the HIWEC study area. The TSs may include isolation switches, circuit breakers, step-up power transformers, distribution switch-gear capacitor banks, instrument transformers, communication / microwave equipment, SCADA equipment, protection and control equipment, grounding equipment, revenue metering (conforming to IESO market rules), lightning and surge arrestors, station grounding and a control building. TS grounding will follow all applicable electrical safety standards. All equipment installed at the TSs will be connected to the grounding grid and the TSs will be fenced to control access. A typical TS layout for the HIWEC is provided in **Figure 3-4**.

All protection and control equipment shall be designed in accordance with the Ontario Energy Board's Transmission System Code requirements.

Secondary containment will be installed around the step-up transformer in each of the TSs to catch any leaked or spilled oil. Secondary containment systems typically consist of a leak proof concrete or plastic basin at the base of the transformers sloped towards an outlet / oil control device. The basin will have sufficient capacity to manage a leak from the transformer equivalent to the volume of transformer oil and lubricants. The capacity will also provide for minimum 24 hour duration, 50 year storm. The basin may be filled with crushed gravel pending final design parameters. The containment system may also include an oil detection system, sump, oil / grit separator, etc.

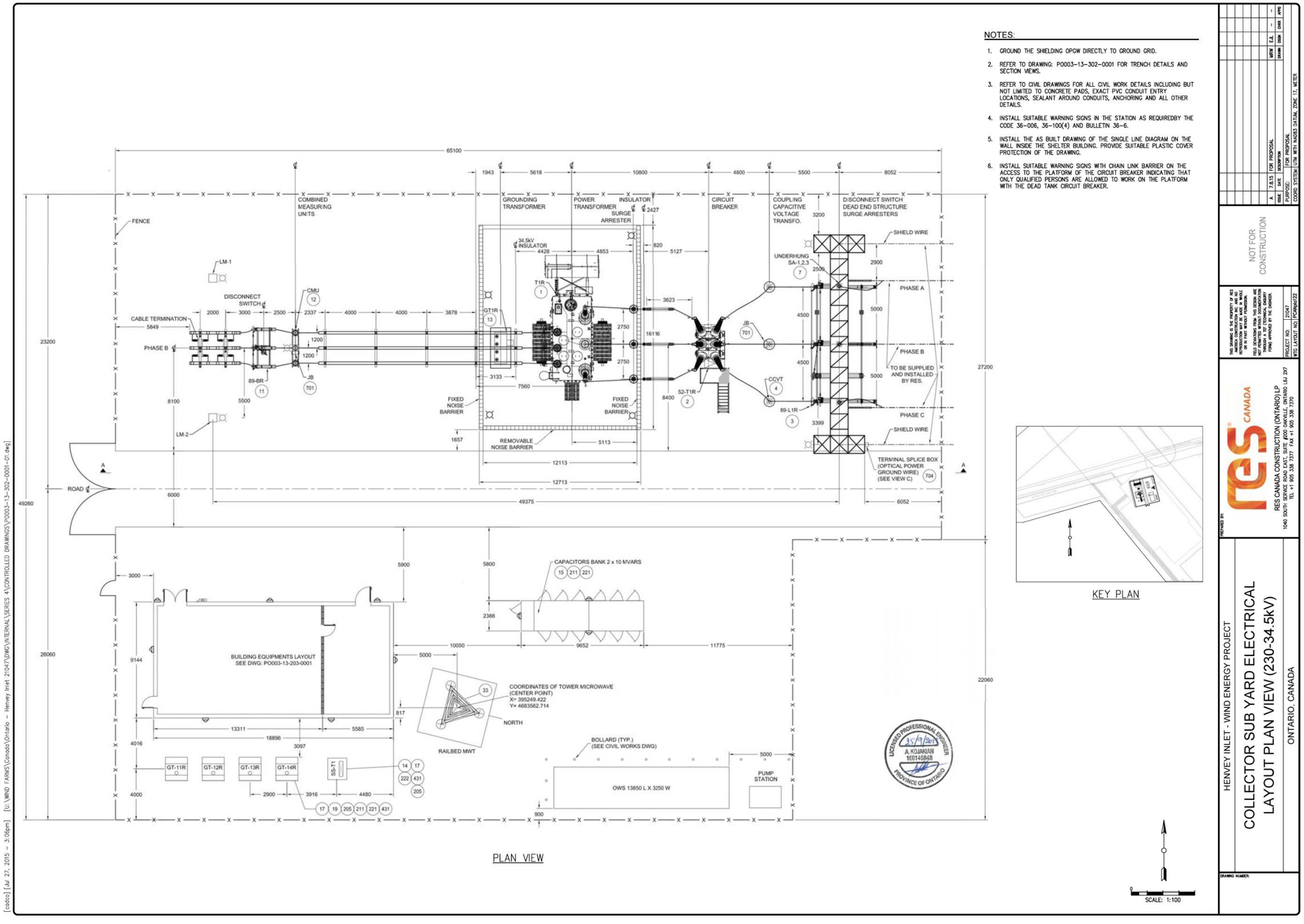
The design of the secondary containment system will be completed by a Professional Engineer licensed in Ontario and will meet applicable regulatory requirements.

Should a spill occur from the TS during operations, the Spill Prevention and Response Plan developed by HIW will be implemented. This Plan will be developed to include methods to prevent, stop, report and remediate a spill. In addition to the equipment and processes listed above additional procedures will be implemented. As a standard operation procedure each containment area will be inspected after any rain in order to allow any rainwater out. If any sheen is detected by the operation, appropriate collection and disposal methods will be implemented prior to allowing any rainwater out to the containment area. Should a spill occur and contaminants enter the natural environment, generally, HIW will clean up the contaminated material and dispose of it in accordance with federal and/or provincial requirements. HIW will replace the material accordingly.

3.10 Transmission Line

An on-Reserve 230 kV transmission line from the HIWEC TSs within HIFN I.R. #2 will be mounted on new poles. The poles will be made of wood, concrete or steel. The Transmission Line off-Reserve to the provincial grid is subject to Ontario Regulation 116/01 and is being assessed under this process which can be found in the **Volume B –** HIW Transmission Line Environmental Review Report.

Figure 3-4: Typical TS Layout



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 Generator Operation

The proposed HIWEC will be in operation for 30 years, and is anticipated to require up to 15 trained technical and administrative staff, including WTG maintenance technicians and a site supervisor. During the operation of the proposed HIWEC, on-site activities will be limited primarily to scheduled maintenance of the HIWEC components. Additional on-site activities during the operation of the proposed HIWEC will include:

- Equipment Maintenance: Heavy trucks or mobile cranes used for maintenance activities will require periodic servicing and repair. Where possible equipment maintenance will be completed at the O&M building; however, if necessary some equipment may require servicing at WTG locations;
- HIWEC Staff Transport: Daily to weekly travel of technical staff between the O&M building and WTG locations using light trucks;
- Natural Heritage Field Monitoring: Operational monitoring to natural heritage features will be conducted intermittently for approximately three (3) years;
- Field monitoring may also be required to evaluate the performance of HIWEC components. Communication plans are outlined in **Section 5** and additional details on monitoring plans and contingency measures related to noise from WTGs are provided in **Section 6**; and
- Maintenance activities related to WTGs are discussed in **Section 4.3**.

The safe operation of the proposed HIWEC 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 WTG functioning is essential to reduce unplanned outage events and duration by detecting early changes to WTG performance. To provide accurate on-site monitoring of climatic conditions, four (4) Met towers up to 100 m tall have been installed for the HIWEC ((**Figure 1-1**). An additional Sonic Detection and Ranging (SODAR) unit has also been installed adjacent to one Met tower to supplement meteorological data collected from the tower. **Section 6** provides additional details on the monitoring of meteorological data during the operation of the proposed HIWEC.

If temperature and humidity conditions result in ice formation on WTG blades, sensors installed on each WTG 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 WTG, it will be taken out of service immediately. Through the SCADA system the status of the WTG will be reported to the HIWEC operator. **Sections 4.2.1** and **4.2.2** contain additional details on WTG operation and monitoring during winter conditions, high wind events and in the event of lightning strikes.

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

4.2 Meteorological Data

Monitoring of meteorological data from Met towers at an operations centre will allow staff to adapt WTG operation during climatic events that may include high winds and lightning strikes. Details of how the WTGs are able to respond to meteorological conditions are described in the sections below.

4.2.1 Extreme Weather Conditions

The selected WTGs are designed to operate above wind speeds of three metres per second (m/s). However, at wind speeds of greater than 22.5 m/s, the blades of the WTGs will feather out of the wind and the yaw system on the nacelle will rotate the WTG out of the prevailing wind direction. The WTGs are also equipped with a secondary safety braking mechanism, mounted on the high-speed shaft connecting the gearbox to the generator. The secondary braking mechanism will activate in the event that there are operational difficulties with the WTG blade pitching and yaw controls.

4.2.2 Lightning Strikes

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

4.3 HIWEC Maintenance

4.3.1 Routine Wind Turbine Generator Maintenance

Routine preventative maintenance activities will be scheduled at approximately six (6) month intervals with specific maintenance tasks scheduled for each interval by a team of up to three (3) technicians. The WTGs 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 WTG maintenance such as cleaning and replacing any worn parts will be completed in accordance with manufacturer specifications.

Scheduled maintenance activities for WTGs 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 WTGs the area in the vicinity of the WTGs 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 approved disposal and / or recycling facility according to applicable 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 HIWEC (please refer to the Construction Plan Report, **Appendix B** of **Volume A**, for more information).

Periodic maintenance of HIWEC infrastructure will be required over the life of the HIWEC. 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 HIWEC.

4.3.2 Unplanned Wind Turbine Generator Maintenance

WTGs 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 WTGs fleet-wide. Most commonly, the failure of small components such as switches, fans or sensors will take the WTG out of service until the faulty component is replaced. These repairs can usually be carried out by a single crew visiting the WTG for several hours.

Events involving the replacement of a major component such as a gearbox or rotor are rare. If they do occur, the use of large equipment, sometimes as large as that used to install the WTGs, may be required. Typically only a small percentage of WTGs would need to be accessed with large equipment during their operating life.

4.3.3 Electrical System Maintenance

The collector lines and TSs will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for aboveground infrastructure and protective relay maintenance of the TSs, in addition to monitoring of the secondary containment systems for traces of oil. Finally, vegetation control will be required around the collector lines and on-Reserve transmission line, 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 Henvey Inlet Wind Energy Centre Operational Features

4.4.1 Water Taking and Supply

A desktop hydrogeological assessment has been completed for the purpose of providing a high level review of existing hydrogeological conditions within the HIWEC study area, describing potential groundwater taking needs of the HIWEC during construction and operation, outlining potential effects of the HIWEC on groundwater resources and providing a mitigation strategy and contingency measures that negate these adverse effects (refer to **Appendix J** of **Volume A**).

Groundwater taking during the operations phase of the HIWEC may be required to provide a non-potable water source to operational staff, as well as for general maintenance activities at the O&M 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 (residents) 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 energy centre does not generate a large amount of waste. Oil and filters used in gearboxes and hydraulic systems will need to be changed approximately once every five (5) years, as per manufacturer specifications. Lubricants required for WTGs include gear oil, hydraulic oil, selected grease (main bearing, blade bearing, cardan shaft, yaw bearing and generator) and open gear grease (yaw-gear) and will be changed approximately two (2) times per year. All surplus lubricating oils, grease, rags, batteries and filters will be removed and disposed of at an approved disposal and/or recycling facility. Household wastes (e.g., cardboard, plastics, etc.) generated at the O&M building will either be recycled or disposed of at a local facility.

The amount of oil and grease stored on-site will depend on the availability of disposal vehicles, transportation schedules and the service cycle. Used oil will be stored in a designated area of the O&M building, and picked up by certified contractor with the appropriate manifests in place. There will be no permanent storage of waste on HIFN I.R. #2 during operations.

4.4.3 Stormwater Management / Erosion and Sediment Control

To effectively manage runoff during the operation of the HIWEC, 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 HIWEC. Potential sources of sedimentation during the operation of the proposed HIWEC will be limited to unpaved access roads. These access roads will be gravel-based. No additional sedimentation control measures are anticipated to be required during operation since sedimentation from these roads is predicted to be lower than during construction.

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

4.4.4 Sewage Management

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

Potable water will be supplied by a well(s) and a septic bed or tank will be constructed for the disposal of sewage. It is HIW's responsibility to ensure proper maintenance of the septic system or tank. The O&M building, septic system or tank and water supply will be constructed and operated in accordance with all applicable standards.

4.4.5 Air Emissions

During each phase of the HIWEC, activities requiring the use of motorized vehicles (e.g., transportation of maintenance personnel to WTG sites) will have infrequent and short-term emissions of low levels of greenhouse gases and other compounds. These emissions will likely be negligible compared to normal operation of motorized vehicles in the HIWEC study area and will be temporary in nature. **Section 6** of this Report outlines potentially negative effects to air quality relating to the HIWEC and identifies proposed mitigation measures.

HIWEC noise emissions during operation activities were assessed in the Noise Study Report, provided in **Appendix M** of **Volume A**.

HIWEC activities are not anticipated to generate any odour emissions.

5. Emergency Response and Communications

This section was prepared in accordance with HIFN EA Guidance requirements to define an avenue for ongoing communication throughout the construction, operation and decommissioning phases of the HIWEC. This will ensure that members of the HIFN community, other Aboriginal communities, local municipalities and other stakeholders are kept apprised of pertinent activities, in addition to any emergencies in the unlikely event that one should occur. The following sections outline HIW'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 HIWEC, an up-to-date Emergency Response and Communication Plan (the Plan) will be prepared and maintained by the contractor at the construction trailers during construction and decommissioning and then at the O&M building for operations. The Plan will contain current contact information for emergency responders, including local police and fire departments, and will outline communication protocols should an emergency situation arise. The HIWEC Emergency Response and Communication Plan will also 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;
- Reporting requirements; and
- Weather-related emergency procedures.

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

- The person observing the emergency will contact first responders immediately via 911; and
- If the emergency is a spill, a HIWEC representative will then contact the Regional Director of Environment Canada's Ontario Region, if required, in accordance with Section 102 of the *Canadian Environmental Protection Act* and the local municipalities / response personnel.

Depending on the nature of the incident, HIW in consultation with HIFN, will notify the community. The Plan will be maintained on-site and updated when required.

5.2 Non-Emergency Communications

HIFN's Band Council, local residents and regulatory permit holders may be notified through mailings of updates on HIWEC 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 HIWEC;
- Maintenance activities that are considered outside of routine maintenance (e.g., WTG disassembly or replacement of collector lines);
- Commencement of decommissioning activities for the HIWEC; and
- Any additional information about the HIWEC that HIW considers to be of interest HIFN's Band Council, local residents and regulatory permit holders.

When advanced notification of HIWEC activities is feasible, letter communications will identify in detail the activity being carried out, anticipated schedule of the activity, and contact information for 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 submitting any concerns and / or complaints.

5.3 Complaints Resolution Process

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

- Community members are to provide any concerns they have through the HIW email address and / or phone number.
- Should any complaints arise throughout the course of the construction, operation and decommissioning phases, a HIW representative will contact the complainant to understand the issue and address as appropriate. A complaint record will be established and will 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.

6. Description of Potential Environmental Effects and Proposed Mitigation Measures

This section provides a summary of the potential environmental effects that may result from the daily function of the HIWEC. The potential effects and proposed mitigation measures described below are also presented in **Section 4** of the Description Report (**Appendix A** of **Volume A**). The identification of potential environmental effects has been completed in accordance with the HIFN EA Guidance document and it includes the following environmental considerations:

- Cultural Heritage and Archaeology;
- Natural Heritage;
- Surface and Groundwater;
- Air, Odour and Dust;
- Noise;
- Local Interests, Land Use and Infrastructure;
- Public Health and Safety;
- Other Resources; and
- Areas Protected under Provincial Plans and Policies.

Each subsection provides a summary of existing conditions followed by an identification of potential environmental effects as a result of operation of the HIWEC. For each potential effect, performance objectives were developed to describe a desired outcome of proposed mitigation. Next, mitigation measures were proposed to achieve the performance objectives. The proposed mitigation measures that are described in this section are based on site conditions identified through field investigations which occurred during the spring and summer of 2015. Residual effects, which are those effects that remain following the application of proposed mitigation measures and monitoring commitments were then determined. The significance of adverse residual effects was assessed based on professional judgement as well as previous experience on similar projects. Adverse residual environmental effects were characterized and their significance evaluated in **Section 6** of the Final Draft EA Report of **Volume A**.

Finally, monitoring commitments have been identified and are intended to verify that the proposed mitigation measures achieve performance objectives. Proposed monitoring and follow-up plans are provided in **Section 8** of the Final Draft EA Report **Volume A**. Should the monitoring during the operation of the HIWEC reveal that the proposed mitigation measures are not achieving the intended results; the identified contingency measures will then be implemented.

6.1 Cultural Heritage and Archaeology

6.1.1 Existing Conditions

During the site planning process for the HIWEC, HIFN identified areas of cultural significance, including areas of past settlement as well as current settlements, and excluded them from the HIWEC study area. These areas of cultural significance are known as Nishshing Aki, specifically defined as an existing social or cultural feature or condition that has been identified by HIFN or designated as valued by HIFN with community input as provided in the Land Code. Nishshing Aki are discussed further in **Section 6.6**. In order to fully understand the potential effects of the proposed HIWEC on built heritage and cultural heritage landscapes, a Heritage Assessment was completed to identify heritage resources including cultural heritage and heritage landscapes of cultural value or interest. The Heritage Assessment included research on the land use history of the HIWEC study area, cultural heritage features, cultural heritage landscapes and protected properties and is provided in **Appendix L** of **Volume A**.

The Cultural Heritage Assessment confirmed that no listed, designated or otherwise recognized heritage features are present within the HIWEC study area or on properties abutting the study area. Additionally, there are no

historical plaques, cemeteries, national historic sites, or properties protected by Ontario Heritage Trust Easement. A property survey was undertaken to evaluate built heritage and cultural heritage landscapes present in the study area, and an inventory was created to identify and evaluate potential heritage resources.

Through a windshield survey, 20 structures that were determined to be more than 40 years old and having potential cultural heritage value or interest were identified. These structures include ten (10) cottages, eight (8) residences, and two (2) outbuildings. The cottages, residences and one (1) of the outbuildings are considered typical of the area and it was determined that they did not have cultural heritage value or interest. The remaining structure, Milton's Camp, was identified as being of cultural heritage importance.

Landscapes present in the HIWEC study area include typical transportation corridors and cottage areas, as well as areas identified, but not mapped, that have heritage significance to the HIFN community. The Nishshing Aki is considered to have cultural heritage value or interest in accordance to the criteria set out in the Historic Sites and Monuments Board of Canada's *Criteria for Evaluating Subjects of Potential National Historic Significance* (Canadian Government, 2008).

Five (5) archaeological sites were also identified within and around the HIWEC study area. Due to the sensitivity of this information, the locations and details of these sacred, heritage, and archaeological sites will not be disclosed. In relation to cultural heritage landscapes, the entirety of the HIWEC study area lands has been identified as an important First Nation Cultural Landscape.

The Stage 1 archaeological assessment determined that there are areas within the HIWEC study area that have the potential to retain archaeological resources. Features that contribute to archaeological potential within the HIWEC study area include the presence of natural environmental features consistent with pre-contact land use, early transportation routes, identified burial grounds, previous settlements and areas identified by the community as being of cultural significance. In addition to watercourses, historic transportation routes, early settlements, early industry, well-drained soil and proximity to archaeological features, areas that could support pictograph or quarry sites are also considered to contribute to archaeological potential. The Stage 1 Archaeological Assessment Report is provided as **Appendix K1** of **Volume A**.

Areas of archaeological potential that may be impacted by the construction of the HIWEC infrastructure must be subject to additional Stage 2 archaeological field investigation prior to any development activities. The Stage 2 archaeological assessment involves the physical survey of all areas with archaeological potential to determine if any archaeological resources are present within the HIWEC study area and will identify which areas are free of archaeological concerns. The Stage 2 investigation involved the standard test pit assessment of the area to be impacted where soil overburden permits, as well as visual inspection of any exposed ground surfaces. The results of the field investigation, as well as proposed mitigation measures, and recommendation for further work are presented in the Stage 2 Archaeological Assessment Report, identified as **Appendix K2** of **Volume A**.

6.1.2 Potential Effects and Proposed Mitigation Measures

Table 6-1 identifies potential effects on cultural heritage and archaeological resources that might occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Cultural Heritage and Archaeological Resources Resulting from Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Potential effects on archaeological resources • Potential impact unknown archaeological resources during maintenance.	• Avoid disturbance / loss of cultural heritage and archaeological resources.	• Should any archaeological sites or material be identified during operations, all maintenance activities must stop until an Archaeologist can evaluate the situation and carry out any required assessment to preserve the archaeological information. Maintenance activities will not re-commence until any negative impacts to archaeological resources are mitigated either through fully excavating any archaeological sites and removing them from the ground, or by adjusting infrastructure placement to avoid archaeological sites. • In addition, a contingency plan for discovery of unknown archaeological sites during operations will be prepared and implemented as part of an Environmental Protection Plan.	*No residual effects.* • No effects to archaeological resources provided the resources are mitigated through excavation or avoidance.
Potential direct and indirect effects on cultural heritage features • Potential to impact cultural heritage features during maintenance activities.		• Infrastructure will be sited to avoid direct and indirect effects to cultural heritage resources. • In addition, a contingency plan for discovery of unknown cultural heritage features during operations will be prepared and implemented as part of an Environmental Protection Plan.	*No residual effects.* • No effects to cultural heritage resources provided the infrastructure is sited to avoid direct and indirect effects.
Potential effects on cultural landscapes • Potential to impact cultural landscapes during maintenance activities.		• The HIWEC study area does not lie within a cultural landscape.	*No residual effects.* • No effects to cultural landscapes within the HIWEC

6.2 Natural Heritage

6.2.1 Existing Conditions

The following types of natural heritage features were reviewed and analyzed in the Natural Heritage Assessment (refer to **Appendix F** of **Volume A**):

- Provincial Parks;
- Conservation Reserves;
- Wetlands;
- Woodlands;
- Important Wildlife Habitats (IWH), including habitats of Species of Conservation Concern; and
- Areas of Natural and Scientific Interest (ANSIs).

There are no Provincial Parks, Woodlands or Areas of Natural and Scientific Interest (ANSIs) located within 120 m of the proposed HIWEC location (refer to **Appendix F1** of **Volume A**).

6.2.1.1 Conservation Reserves

The North Georgian Bay Shoreline and Islands Conservation Reserve is located within the HIWEC study area, and within 19 m of a proposed WTG, along the south side of the HIFN I.R. #2 lands (MNRF, 2014a). This conservation reserve stretches along the coastline and inland environments that support numerous wetlands and wildlife habitat, including habitats for the Massasauga Rattlesnake and Caspian Tern (MNRF, 2006).

6.2.1.2 Wetlands

A total of four (4) unevaluated wetland features were identified within 120 m of the HIWEC location through the baseline field studies completed between 2011 and 2015. Of these, four (4) unevaluated wetland features are overlapped by the HIWEC location and were evaluated through the Ontario Wetland Evaluation System (OWES) (MNRF, 2014b). Based on these evaluations, all four (4) wetland features were confirmed to be Provincially Important Wetlands (refer to **Appendix F3** of **Volume A**).

6.2.1.3 Important Wildlife Habitat

6.2.1.3.1 Rare Vegetation Communities

The following Rare Vegetation Communities were either confirmed to occur or identified as potentially occurring within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Cliffs and Talus Slopes*
- *Precambrian Rock Barrens*
- *Sand Barrens*
- *Old-growth Forest*
- *Bogs*

The following Rare Vegetation Communities were determined not to occur within the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Beach / Beach Ridge / Bar / Sand Dunes*
- *Shallow Atlantic Coastal Marshes*
- *Alvar*
- *Savannah*
- *Tall-grass Prairie*
- *Rare Forests (Red Spruce and White Oak)*

6.2.1.3.2 Birds

The following bird habitats (including birds listed under the *MBCA*) were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Waterfowl Nesting Areas*
- *Bald Eagle and Osprey Nesting, Foraging and Perching Habitat*
- *Woodland Raptor Nesting Habitat*
- *Mast Producing Areas*
- *Marsh Bird Breeding Habitat*

The following bird habitats (including birds listed under the *MBCA*) have been determined not to occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Waterfowl Stopover and Staging Areas (Terrestrial)*
- *Waterfowl Stopover and Staging Areas (Aquatic)*
- *Shorebird Migratory Stopover Areas*
- *Raptor Wintering Areas*
- *Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)*
- *Colonially-Nesting Bird Breeding Habitat (Trees / Shrubs)*
- *Colonially-Nesting Bird Breeding Habitat (Ground)*
- *Open Country Bird Breeding Habitat*
- *Shrub / Early Successional Bird Breeding Habitat*

6.2.1.3.3 Mammals

The following mammal habitats were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Bat Hibernacula*
- *Bat Maternity Colonies*
- *Deer Yarding Areas*
- *Seeps and Springs*
- *Aquatic Feeding Habitat*
- *Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf*
- *Mast Producing Areas*

The following mammal habitats have been determined not to occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Mineral Licks*
- *Cervid Movement Corridors*
- *Furbearer Movement Corridors*

6.2.1.3.4 Reptiles and Amphibians

The following reptile and amphibian habitats were identified as potentially occurring in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Turtle Wintering Areas*
- *Reptile Hibernacula*
- *Turtle and Lizard Nesting Areas*
- *Amphibian Breeding Habitat (Woodland and Wetland)*

The following reptile and amphibian habitats were determined not occur in the HIWEC study area through the baseline field studies completed between 2011 and 2015:

- *Amphibian Corridors*

6.2.1.3.5 Species of Conservation Concern

Bird, mammal, amphibian and reptile Species of Conservation Concern (SOCC) with the potential to occur within the HIWEC study area were identified through the background review. For the purpose of this EA, SOCC are defined as follows:

- Provincially rare species ranked by the Natural Heritage Information Centre (NHIC) as S1 (critically imperiled), S2 (imperiled) or S3 (vulnerable) in the province of Ontario but not listed as Endangered or Threatened under Schedule 1 of the federal *Species at Risk Act, 2002* (*SARA*) or the provincial *Endangered Species Act, 2007* (*ESA*);
- Species listed as Special Concern under Schedule 1 of *SARA*;
- Species evaluated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Special Concern, Threatened or Endangered but not listed as Endangered or Threatened under Schedule 1 of *SARA* or the *ESA*; and
- Species listed as Special Concern under the *ESA*.

A total of 23 SOCC were identified through the Records Review (refer to **Appendix F1** of **Volume A**) as having records within the HIWEC study area and / or surrounding area. Of these, 18 SOCC were identified as occurring or having the potential to occur within the HIWEC study area based on the background review and are summarized in **Table 6-2**. The observation year(s) of these species across all baseline field studies conducted between 2011 and 2015 are also summarized in **Table 6-2**.

Although Long-tailed Duck, Lapland Longspur, Great Black-backed Gull, Rusty Blackbird and Red-necked Grebe were recorded in 2011, 2012 and / or 2013, these are considered to be migrant species as their breeding ranges are not located in the vicinity of the HIWEC study area. Breeding habitat for these species is considered unlikely to be present in the HIWEC study area and therefore these species are not included in **Table 6-2**.

No plant SOCC were identified as having the potential to occur within the HIWEC study area through the background review, and none were identified during the field studies completed between 2011 and 2015.

Table 6-2: SOCC Occurring or Potentially Occurring in the HIWEC Study Area

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Bird Species (8)									
Bald Eagle	*Haliaeetus leucocephalus*	S2	SC	NAR	NAR	Yes	Yes	Yes	Yes
Black Tern	*Chlidonias niger*	S3	SC	NAR	NAR	No	Yes	No	No
Caspian Tern	*Sterna caspia*	S3	NAR	NAR	NAR	Yes	Yes	No	Yes
Eastern Wood-Pewee	*Contopus virens*	S4	SC	SC	No Status (No Schedule)	No	Yes	No	Yes
Peregrine Falcon	*Falco peregrinus*	S3	SC	SC	SC (Schedule 1)	Yes	No	No	Yes
Prairie Warbler	*Setophaga discolor*	S3	NAR	NAR	NAR	No	Yes	No	No
Wood Thrush	*Hylocichla mustelina*	S4	SC	THR	No Status (No Schedule)	Yes	Yes	No	Yes
Yellow Rail	*Coturnicops noveboracensis*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	No
Insect Species (4)									
Horned Clubtail	*Arigomphus cornutus*	S3	-	-	-	No	Yes	No	No
Monarch	*Danaus plexippus*	S2	SC	SC	SC (Schedule 1)	No	Yes	No	No
Mottled Darner	*Aeshna clepsydra*	S3	-	-	-	No	Yes	No	No

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Pine Imperial Moth	*Eacles imperialis pini*	S3?	-	-	-	No	Yes	No	No
Mammal Species (1)									
Eastern Wolf	*Canis lupus lycaon*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	Not confirmed
Reptile Species (5)									
Common Five-lined Skink (Southern Shield population)	*Plestiodon fasciatus pop. 2*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Milksnake	*Lampropeltis triangulum*	S3	SC	SC	SC (Schedule 1)	No	Yes	No	No
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Snapping Turtle	*Chelydra serpentina*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes

[1] ***S-rank:*** *The Natural Heritage provincial ranking system (provincial S-rank) is used by the MNRF Natural Heritage Information Centre (NHIC) to set protection priorities for rare species and natural communities. Definitions are as follows:*

- *S1 Extremely rare in Ontario; usually five (5) or fewer occurrences in the province or very few remaining individuals; often especially vulnerable to extirpation.*
- *S2 Very rare in Ontario; usually between five (5) and 20 occurrences in the province or with many individuals in fewer occurrences; often susceptible to extirpation.*
- *S3 Rare to uncommon in Ontario; usually between 20 and 100 occurrences in the province; may have fewer occurrences, but with a large number of individuals in some populations; may be susceptible to large-scale disturbances. Most species with an S3 rank are assigned to the watch list, unless they have a relatively high global rank.*
- *S4 Common and apparently secure in Ontario; usually with more than 100 occurrences in the province.*
- *S5 Very common and demonstrably secure in Ontario.*
- *SH Possibly Extirpated (Historical). Species or community occurred historically in the nation or state/province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years.*
- *S#S# A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community.*
- *S#? Rank uncertain.*

[2] ***ESA Status:*** *The Endangered Species Act 2007 (ESA) protects species listed as Threatened and Endangered on the Species at Risk in Ontario (SARO) List on provincial and private land. The Minister lists species on the SARO list based on recommendations from the Committee on the Status of Species at Risk in Ontario (COSSARO), which evaluates the conservation status of species occurring in Ontario. The following are the categories of at risk:*

- ***END*** *(Endangered) - A species facing imminent extinction or extirpation in Ontario.*
- ***THR*** *(Threatened) - Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.*
- ***SC*** *(Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.*
- ***NAR*** *(Not at Risk) - A species that has been evaluated and found to be not at risk.*

[3] ***COSEWIC Status:*** *Committee on the Status of Endangered Wildlife in Canada (COSEWIC) evaluates a federal status ranking for all species that it assesses. Rankings include the following:*

- ***END*** *(Endangered) - A species facing imminent extirpation or extinction throughout its range.*
- ***THR*** *(Threatened) - A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction*
- ***SC*** *(Special Concern) - A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.*
- ***NAR*** *(Not at Risk) - A species that has been evaluated and found to be not at risk.*

[4] ***SARA Status***: *The Species at Risk Act (SARA) protects Species at Risk designated as Endangered, Threatened and Extirpated listed under Schedule 1, including their habitats on federal land. Schedule 1 of SARA is the official list of wildlife species at risk in Canada and includes species listed as Extirpated, Endangered, Threatened and of Special Concern. Once a species is listed on Schedule 1, they receive protection and recovery measures that are required to be developed and implemented under SARA. Species that were designated at risk by COSEWIC before SARA need to be reassessed based on the new criteria of the Act before they can be listed under Schedule 1. These species that are waiting to be listed under Schedule 1 do not receive official protection under SARA. Once the species on other schedules (2 and 3) have been reassessed, the other schedules are eliminated and the species is either listed under Schedule 1 or is not listed under the Act.*

The following are definitions of the SARA status rankings assigned to each species.

END (Schedule 1) – These species are listed as Endangered under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
THR (Schedule 1) – These species are listed as Threatened under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
SC (Schedule 1) *– These species are listed as Special Concern under Schedule 1 of SARA and receive management initiatives under SARA to prevent them from becoming endangered and threatened.*

No Status (No schedule) *– These species are evaluated and designated by COSEWIC but are not listed under Schedule 1 and therefore do not receive protection under SARA.*
NAR (Not at Risk)*– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Not Applicable (N/A) *– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Source: Government of Canada, 2009: Frequently Asked Questions: What are the SARA schedules? Accessed on February 2015. Available: http://www.dfo-mpo.gc.ca/species-especes/faq/faq-eng.htm

Potentially suitable habitats for the following SOCC were identified in the HIWEC study area through the field studies completed in 2014 and 2015 (refer to **Appendix F2** of **Volume A**):

- Black Tern;
- Eastern Wood-pewee;
- Prairie Warbler;
- Wood Thrush;
- Yellow Rail;
- Horned Clubtail;
- Mottled Darner;
- Pine imperial Moth;
- Eastern Wolf;
- Common Five-lined Skink;
- Eastern Ribbonsnake;
- Milksnake;
- Northern Map Turtle; and
- Snapping Turtle.

6.2.2 Potential Effects and Proposed Mitigation Measures

The NHA Environmental Impact Study (EIS) Report (**Appendix F4** of **Volume A**) describes the potential effects, proposed mitigation measures, and net effects of constructing, operating, and decommissioning the HIWEC on natural heritage features including Conservation Reserves, Important Wetlands and Important Wildlife Habitat. The Environmental Effects Monitoring Plan (EEMP) (**Appendix G** of **Volume A**) describes the post-construction monitoring plan for birds and bats including mortality and disturbance effects monitoring, and related proposed mitigation and contingency measures. These reports are summarized below; key natural heritage features are mapped in the NHA Site Investigation Report (refer to **Appendix F2** of **Volume A**).

6.2.2.1 Important Wildlife Habitat

6.2.2.1.1 Generalized Candidate Important Wildlife Habitat

No negative environmental effects on these features are anticipated during the operational phase of the HIWEC.

6.2.2.1.2 Important Wildlife Habitat

Table 6-3 describes potential effects to IWH resulting from operations and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are generally described in **Section 6** and **Section 8** (of the Final Draft EA Report), **Appendix F4** and **Appendix G** of **Volume A**.

6.2.2.2 Important Wetlands[1]

Table 6-4 describes potential effects to Important Wetlands resulting from operations and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** (of the Final Draft EA Report), **Appendix F4** and **Appendix G** of **Volume A**.

1. ***Important Wetland:*** *Land such as a swamp, marsh, bog or fen, other than land that is being used for agricultural purposes and no longer exhibits wetland characteristics, that (a) is seasonally or permanently covered by shallow water or has the water table close to or at the surface, and (b) has hydric soils and vegetation dominated by hydrophytic or water-tolerant plants, and that has been determined to be important using applicable evaluation criteria or procedures established or accepted by the Ministry of Natural Resources and Forestry.*

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Bat Hibernacula[2]			
Change in mortality risk • Possible mortality of swarming bats resulting from operating WTGs. *Change in behaviour* • Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise.	• Minimize risk of WTG related mortality. • Minimize disturbance to bat hibernacula.	• Utilize a lighting scheme that will minimize potential risks for bat collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011b). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect on change in behaviour* • Effects on the behaviour of bats can be minimized provided recommended mitigation is implemented; however, some bats may exhibit altered feeding behaviour. *Residual effect for change in mortality risk* • Increase in mortality risk to bats can be minimized provided recommended mitigation is implemented; however, some mortality of bats is anticipated as a result of collisions with WTGs.
Bat Maternity Colonies			
Change in mortality risk • Possible mortality of bats resulting from operating WTGs. *Change in behaviour* • Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise. *Change in mortality risk* • Bat mortality resulting from removal of cavity trees during routine maintenance of access roads, collector lines or transmission line.	• Minimize risk of WTG related mortality. • Minimize disturbance to bat maternity colonies. • Avoid bat mortality from vegetation removal during maintenance activities.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • If suitable cavity trees must be removed during the bat roosting season (April 30 to September 1), each cavity tree will be searched for signs of maternity roosts by a qualified Biologist prior to removal. If an active maternity roost is found, removal activities will be scheduled after the bat roosting season (April 30 to September 1). • If any suitable hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011b).	*Residual effect on change in behaviour* • Effects on the behaviour of bats can be minimized provided recommended mitigation is implemented; however, some bats may exhibit altered feeding behaviour. *Residual effect for change in mortality risk* • Increase in mortality risk to bats can be minimized provided recommended mitigation is implemented; however, some mortality of bats is anticipated as a result of collisions with WTGs.
Turtle Wintering Areas[1]			
Change in behaviour • Disturbance to turtles within wintering areas, or moving between turtle wintering areas and other areas. *Change in mortality risk* • Risk of road mortality to turtles moving between turtle wintering areas and other areas.	• Minimize disturbance to turtles. • Avoid turtle mortality on access roads.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high turtle activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, and under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan, will be developed and include: ▪ In the case a turtle is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest turtle trauma centre. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site.	*Residual effect on change in behaviour* • Effects on the behaviour of turtles can be minimized provided recommended mitigation is implemented; however, some turtles may alter nest site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to turtles can be minimized provided recommended mitigation is implemented; however, isolated mortality of turtles may occur as a result of vehicular traffic on access roads and maintenance activities.
Reptile Hibernacula[1]			
Change in mortality risk • Possible snake mortality from vehicles using access roads. *Change in behaviour* • Disturbance of hibernating snakes caused by routine maintenance activities.	• Minimize snake mortality on access road. • Minimize disturbance to reptile hibernacula.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan will be developed and include: ▪ In the case a snake is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre. • In the rare instance a snake is encountered and must be relocated, a qualified Biologist / Handler will be contacted to move the snake a safe distance away in appropriate habitat. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site.	*Residual effect on change in behaviour* • Effects on the behaviour of snakes can be minimized provided recommended mitigation is implemented; however, some snakes may alter basking site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to snakes can be

2. *Feature(s) assumed to be important for the purpose of this NHA. The importance of this / these feature(s) will be confirmed through the analysis of pre-construction evaluation of importance survey data. If this / these feature(s) is / are confirmed not to be important, the mitigation measures and monitoring commitments described herein will not be applied.*

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
			minimized provided recommended mitigation is implemented; however, isolated mortality of snakes may occur as a result of vehicular traffic on access roads and maintenance activities.
Deer Yarding Areas			
Change in mortality risk • Possible mortality of deer moving in / out of deer yarding areas.	• Avoid mortality of deer.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.	*No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Cliffs and Talus Slopes			
• No effects on cliffs and talus slopes anticipated during operation.	• None required.	• None required.	*No residual effect*
Precambrian Rock Barrens			
Sand Barrens			
Habitat change • Disturbance and / or degradation of sand barrens during maintenance of the transmission line or access roads.	• Minimize disturbance and / or degradation of sand barrens during maintenance activities.	• Avoid the use of heavy machinery within sand barrens during maintenance activities to the extent possible. • Pesticides will not be used to maintain vegetation within sand barrens.	*No residual effect* • Habitat change can be mitigated provided recommended mitigation is implemented.
Old-growth Forest1			
Change in species diversity *Change in community diversity* • Introduction and / or spread of invasive species in old-growth forest.	• Prevent the establishment and / or spread of invasive species in old-growth forest.	• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist. • Vegetation trimming will be limited to within areas that have been cleared during construction.	Residual effect for change in species diversity • Effects of invasive species introductions on species diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in species diversity may occur. *Residual effect for change in community diversity* • Effects of invasive species introductions on community diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in community diversity may occur.
Bogs			
Refer to **Table 6-6** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Important Wetlands.			
Waterfowl Nesting Areas1			
Change in behaviour • Disturbance and / or displacement of waterfowl in nesting habitat during operation. *Change in mortality risk* • Possible mortality of waterfowl resulting from operating WTGs. *Change in mortality risk* *Change in behaviour* • Possible mortality or disturbance to nesting waterfowl resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of waterfowl from nesting habitat. • Minimize risk of WTG related waterfowl mortality. • Avoid mortality and minimize disturbance to nesting waterfowl during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the MBCA and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring	*Residual effect for change in behaviour* • Effects on the behaviour of waterfowl can be minimized provided recommended mitigation is implemented; however, some waterfowl may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to waterfowl can be minimized provided recommended mitigation is implemented; however, some mortality of waterfowl as a result of collisions with WTGs may occur.

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		program consistent with Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (EC-CWS, 2007a), Wind Turbines and Birds A Guidance Document for Environmental Assessment (EC-CWS, 2007b) as well as Birds and Bird Habitats: Guidelines for Wind Power Projects (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat			
Change in behaviour • Disturbance and / or displacement of Osprey during operation. *Change in mortality risk* • Possible mortality of Osprey from operating WTGs. *Change in mortality risk* • Possible mortality of Osprey resulting from collisions with the transmission line.	• Minimize disturbance and / or displacement of Osprey. • Minimize risk of Osprey mortality from of WTGs, collector lines or the transmission line.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring. • Bird diverters / anti-perching devices should be considered in areas of Osprey nests along the on-Reserve transmission line to minimize potential collisions.	*Residual effect for change in behaviour* • Effects on the behaviour of Osprey can be minimized provided recommended mitigation is implemented; however, Osprey may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to Osprey can be minimized provided recommended mitigation is implemented; however, isolated mortality of Osprey as a result of collisions with WTGs may occur.
Woodland Raptor Nesting Habitat[1]			
Change in behaviour • Disturbance and / or displacement of nesting raptors during operation. *Change in mortality risk* • Possible mortality of raptors from operating WTGs. *Change in mortality risk* • Possible mortality of raptors resulting from collisions with the transmission line.	• Minimize disturbance and / or displacement of nesting raptors. • Minimize risk of raptor mortality from of WTGs, collector lines or the transmission line.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring. • Bird diverters / anti-perching devices should be considered in areas of confirmed raptor nests along the on-Reserve transmission line to minimize potential collisions.	*Residual effect for change in behaviour* • Effects on the behaviour of raptors can be minimized provided recommended mitigation is implemented; however, some raptors may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to raptors can be minimized provided recommended mitigation is implemented; however, some mortality of raptors as a result of collisions with WTGs is anticipated.
Turtle and Lizard Nesting Areas			
Change in behaviour • Disturbance to turtles within nesting areas, or moving between turtle nesting areas and other areas. *Change in mortality risk* • Risk of road mortality to turtles moving between turtle nesting areas and other areas. *Habitat change* • Disturbance and / or degradation of turtle nesting habitat during maintenance of the transmission line.	• Minimize disturbance to turtles. • Avoid turtle mortality on access roads. • Minimize disturbance and / or degradation of turtle nesting habitat during maintenance activities.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high turtle activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 30; GBBR, n.d.). • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site. • Avoid the use of heavy machinery within the sand barren community associated with turtle nesting feature TLN-001 during maintenance activities to the extent possible. • Pesticides will not be used to maintain vegetation within the sand barren community associated with turtle nesting feature TLN-001.	*Residual effect on change in behaviour* • Effects on the behaviour of turtles and lizards can be minimized provided recommended mitigation is implemented; however, some turtles may alter nest site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to turtles and lizards can be minimized provided recommended mitigation is implemented; however, isolated mortality of turtles may occur as a result of vehicular traffic on access roads and maintenance activities. *No residual effect* • Habitat change can be mitigated provided recommended mitigation is implemented.
Seeps and Springs			
Refer to **Table 6-6** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Surface Water features.			

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Aquatic Feeding Habitat			
Change in mortality risk • Possible mortality of moose or deer moving between aquatic feeding habitats and other areas.	• Avoid mortality of moose or deer.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.	*No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf			
• No effects on denning sites during operation.	• None required.	• None required.	*No residual effect*
Amphibian Breeding Habitat (Woodland and Wetland)			
Change in behaviour • Disturbance to amphibians within breeding areas, or moving between breeding areas and other areas. *Change in mortality risk* • Risk of road mortality to amphibians moving between breeding areas and other areas.	• Minimize disturbance to amphibians. • Avoid amphibian mortality on access roads.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high amphibian activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid maintenance of culverts where in-water works are required within amphibian breeding habitats during the amphibian breeding season (April 1 to June 30) to the extent possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site.	*Residual effect on change in behaviour* • Effects on the behaviour of amphibians due to disturbance can be minimized provided recommended mitigation is implemented; however, amphibians may alter movement patterns or breeding site selection. *Residual effect on change in mortality risk* • Increased mortality risk to amphibians can be minimized provided recommended mitigation is implemented; however, isolated amphibian mortality may occur.
Mast Producing Areas			
• No effects on mast producing areas anticipated during operation.	• None required.	• None required.	*No residual effect*
Marsh Bird Breeding Habitat[1]			
• Disturbance and / or displacement of marsh breeding birds during operation. • Possible mortality of marsh breeding birds resulting from operating WTGs. • Possible mortality or disturbance to marsh breeding birds resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of marsh breeding birds. • Minimize risk of WTG related marsh breeding bird mortality. • Avoid mortality and minimize disturbance to marsh breeding birds during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of marsh breeding birds can be minimized provided recommended mitigation is implemented; however, some marsh breeding birds may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to marsh breeding birds can be minimized provided recommended mitigation is implemented; however, some mortality of marsh breeding birds as a result of collisions with WTGs may occur.
Habitat for Avian SOCC (Black Tern, Yellow Rail)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Marsh Bird Breeding Habitat** as described above.			

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)[1]			
• Disturbance and / or displacement of avian SOCC during operation. • Possible mortality of avian SOCC resulting from operating WTGs. • Possible mortality or disturbance to avian SOCC resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of avian SOCC. • Minimize risk of WTG related avian SOCC mortality. • Avoid mortality and minimize disturbance to avian SOCC during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of bird SOCC can be minimized provided recommended mitigation is implemented; however, some bird SOCC may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to bird SOCC can be minimized provided recommended mitigation is implemented; however, some mortality of bird SOCC as a result of collisions with WTGs may occur.
Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)[1]			
• Disturbance and / or displacement of avian SOCC during operation. • Possible mortality of avian SOCC resulting from operating WTGs. • Possible mortality or disturbance to avian SOCC resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of avian SOCC. • Minimize risk of WTG related avian SOCC mortality. • Avoid mortality and minimize disturbance to avian SOCC during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of bird SOCC can be minimized provided recommended mitigation is implemented; however, some bird SOCC may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to bird SOCC can be minimized provided recommended mitigation is implemented; however, some mortality of bird SOCC as a result of collisions with WTGs may occur.
Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)[1]			
• Disturbance and / or displacement of avian SOCC during operation. • Possible mortality of avian SOCC resulting from operating WTGs. • Possible mortality or disturbance to avian SOCC resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of avian SOCC. • Minimize risk of WTG related avian SOCC mortality. • Avoid mortality and minimize disturbance to avian SOCC during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of bird SOCC can be minimized provided recommended mitigation is implemented; however, some bird SOCC may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to bird SOCC can be minimized provided recommended mitigation is implemented; however, some mortality of bird SOCC as a result of collisions with WTGs may occur.

Table 6-3: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Habitat for Insect SOCC (Horned Clubtail, Mottled Darner)			
• Refer to **Table 6-4** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Important Wetlands.			
Habitat for Insect SOCC (Pine Imperial Moth)			
• This species is relatively common across the Canadian Shield (Dave Beadle, personal communication, September 3, 2015) and its habitat is not limiting within the HIWEC study area. Therefore, no mitigation, monitoring or contingency measures are required during the operations phase.			
Habitat for Mammal SOCC (Eastern Wolf)			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf** as described above.			
Habitat for Turtle and Lizard SOCC (Common Five-lined Skink, Northern Map Turtle, Snapping Turtle)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Turtle Wintering Areas** and **Turtle and Lizard Nesting Areas** as described above.			
Habitat for Snake SOCC (Eastern Ribbonsnake, Milksnake)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Reptile Hibernacula** as described above.			

Table 6-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wetlands Resulting from Operations

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Change in species diversity, Change in community diversity Change in wetland quantity and function • Introduction of invasive species.	• Prevent the introduction and spread of invasive species.	• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist. • Vegetation trimming will be limited to within areas that have been previously cleared during construction.	*Residual effect for change in species diversity* • Effects of invasive species introductions on species diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in species diversity may occur. *Residual effect for change in community diversity* • Effects of invasive species introductions on community diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in community diversity may occur. *Residual effect for change in wetland quantity and function* • Effects of invasive species introductions on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, temporary changes in wetland quantity or function may occur.
Change in wetland quantity and function • Risk of accidental soil or water contamination from oil, gas, etc. during maintenance activities.	• No on-site contamination of soil, groundwater or surface water.	• Refer to mitigation measures for *"Reduction in soil quality due to accidental release of contaminants during operation, etc."* in **Table 6-7.**	*No residual effects.* • Changes in wetland quantity and function can be mitigated provided a Spill Prevention and Response Plan is developed and implemented.

6.2.2.3 Conservation Reserves

No operations activities will take place inside the North Georgian Bay Shoreline and Islands Conservation Reserve. Taking into consideration the close proximity of the North Georgian Bay Shoreline and Islands Conservation Reserve to the HIWEC location, and the similar ecological characteristics of this feature compared to other locations within 120 m of the HIWEC location, the mitigation measures presented in **Tables 6-3** and **6-4** will be used and are considered sufficient to address potential negative environmental effects of operation of the HIWEC on the North Georgian Bay Shoreline and Islands Conservation Reserve.

6.3 Surface and Groundwater

6.3.1 Surface Water Existing Conditions

Based on air photo imagery, topographic mapping, background review and field observation, inland waterbodies throughout the HIWEC study area consist mainly of an extensive network of wetlands. Extensive bedrock throughout the landscape plus the abundance of beaver (*Castor canadensis*) activity facilitated the creation of numerous bogs, fens, open-water ponds and shallow marshes. Flowing streams were present inland; however, more so in closer proximity to the outlets to the main watercourses bordering the HIWEC study area. Inland watercourses and wetlands within the HIWEC study area are tributaries to one of the following: the Key River which runs along the northern boundary of the HIWEC study area, Henvey Inlet, or the eastern shoreline of Georgian Bay.

All waterbody features are documented and assessed in the Water Assessment and Waterbody Report (**Appendix H** of **Volume A**) in accordance with the HIFN EA Guidance.

6.3.2 Groundwater Existing Conditions

6.3.2.1 Physiography and Topography

The HIWEC study area lies within the Georgian Bay Fringe physiographic region, as defined by Chapman and Putnam (1984). The Georgian Bay Fringe is characterized by a gentle plain that inclines gradually from the shoreline of Georgian Bay to the Algonquin Highlands, the region that runs approximately north-south along its eastern boundary. Ground elevations within the HIWEC study area generally decline in a southwest direction from a topographic high of approximately 213 m Above Sea Level (mASL) in the southeast portion of the HIWEC study area to a low of about 169 mASL in the northeast and along the shoreline of Georgian Bay.

6.3.2.2 Geological Setting

6.3.2.2.1 Bedrock Geology

The HIWEC study area is located within the Britt Domain of the Central Gneiss Belt which occupies the eastern shoreline of Georgian Bay north of Parry Sound. The Britt Domain is characterized by a complex of highly deformed layered, migmatitic gneisses of granitic to granodioritic composition that range from pinkish-grey to greyish white in colour and exhibit strong foliation (Bright, 1989).

6.3.2.2.2 Overburden Geology

Very little overburden is present within the HIWEC study area. Exposed, frequently weathered and fractured bedrock accounts for much of the surficial geology, with the remainder being characterized by organic deposits which accumulated in low-lying areas and bedrock valleys as well as a bedrock-drift complex consisting of a thin,

discontinuous veneer of glaciolacustrine sand and/or gravel, isolated occurrences of ice-contact stratified sands and gravels, and of loose, stony glacial till (OGS, 2003). Where present, the thickness of the overburden generally is less than about 1 m, however, with slightly thicker accumulations of up to 3 m being found in bedrock hollows, topographic lows, and on the lee-side of bedrock knobs in relation to the direction of glacial ice-flow.

6.3.2.2.3 Water Well Survey

An inventory of private water wells (i.e., domestic, commercial, industrial, etc.) was performed within a radius of approximately 1,000 m from the HIFN I.R. #2 boundary, by means of searching the Ministry of Environment and Climate Change (MOECC) Water Well Database. The northern limit of the water well survey area was truncated at the Key River as this feature would serve as a hydrogeological divide between the HIFN I.R. #2 boundary and those lands to the north. Results are shown in **Figure 6-1**, along with the primary use of each well. A total of 28 water well records were found located within the 1,000 m search area radius, of which only six (6) are located within the HIFN I.R. #2 boundary. A review of the water well records indicates that the majority (88%) of wells are completed in bedrock and range in depth between about 3.1 and 79.2 m. Two (2) of the located wells are reported to be completed in overburden material (sand) and are located on the north side of Key River, outside of the HIWEC study area.

As shown in **Table 6-5**, available well records indicate that 61% of groundwater use within the 1,000 m search area radius is for domestic purposes, followed by commercial use (11%), and public and municipal supply use (11%). Approximately 18% of MOECC water well records specified the primary use as ‘Not Used’ or ‘Monitoring and Test Hole’, which indicates those wells are not used as a groundwater supply.

Table 6-5: Summary of MOECC Water Well Records

Primary Well Use	Number
Commercial	3
Domestic	17
Monitoring and Test Hole	3
Municipal	1
Not Used	2
Public	2
Total	**28**

6.3.3 Potential Effects and Proposed Mitigation Measures

6.3.3.1 Surface Water

Table 6-6 identifies potential effects on surface water resources that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

6.3.3.2 Groundwater, Soils and Terrain

Table 6-7 describes potential effects on groundwater resources, soils and terrain that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Figure 6-1: Surficial Geology

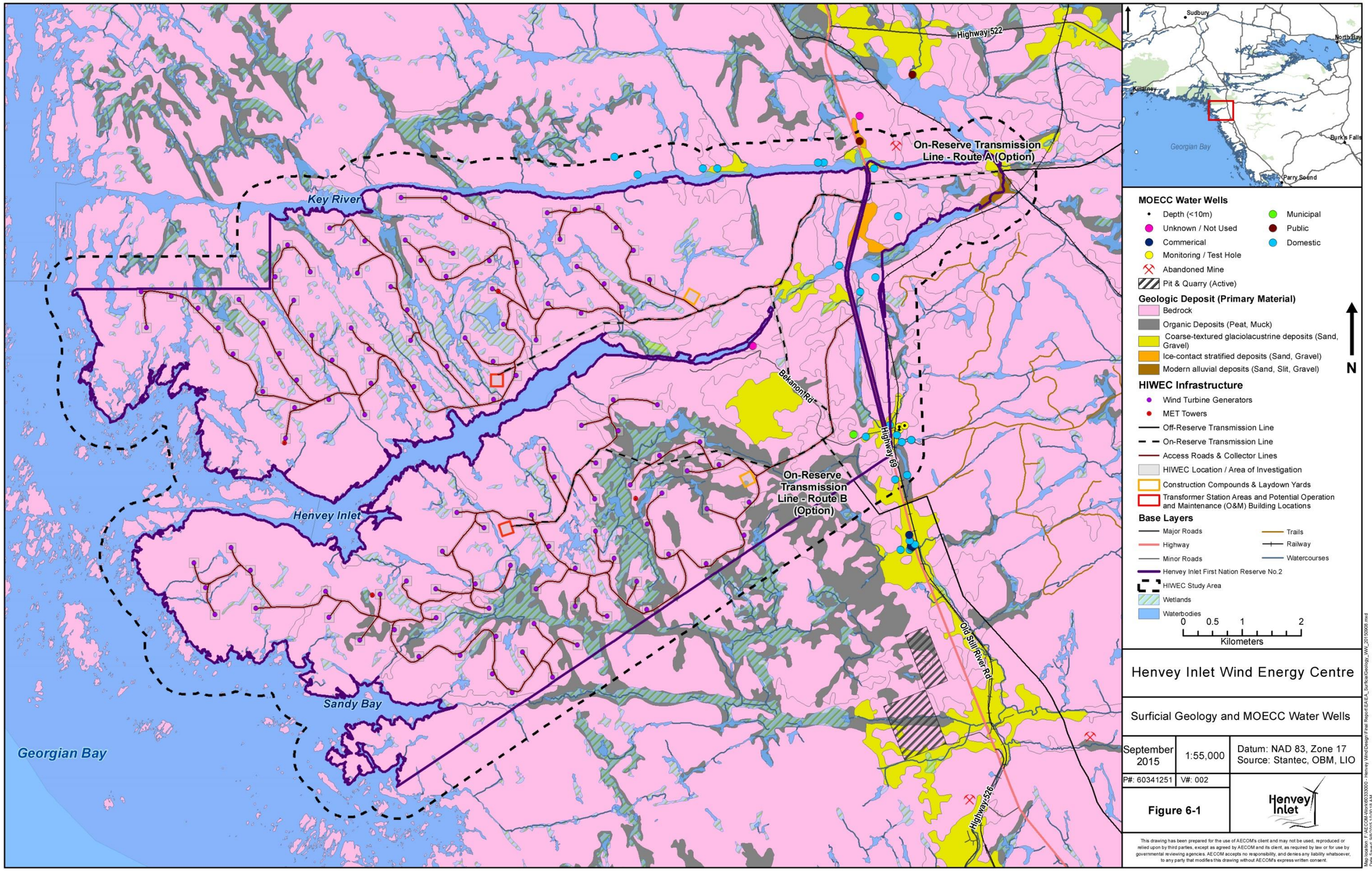


Table 6-6: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to surface water quality • Potential effects on surface water quality due to contaminant spills, dust and emissions from maintenance vehicles and equipment and maintenance/repair of water crossings.	• Prevent contaminant discharge to the environment. • Minimize lateral flow obstructions.	• **Equipment Use** ▪ In order to avoid compacting or hardening of natural ground surface, and to avoid movement of machinery on sensitive slopes, restrict equipment to designated controlled vehicle access routes and to within identified work areas. ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands and waterbodies. ▪ Use and maintain emission control devices on motorized equipment (as provided by the manufacturer of the equipment) to minimize the emissions so that they remain within industry standards. Heavy equipment and machinery to be used within operating specifications. ▪ Run vehicles and equipment only when necessary (i.e., limit idling). • **Water Quality** ▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. ▪ Turbid water shall not be discharged to a waterbody or wetland. ▪ Vegetation management will be done using mechanical techniques rather than herbicides. ▪ Whenever possible, operate machinery from outside the waterbody and on land above the high water mark or on ice in a manner that minimizes disturbance to the banks and bed of the waterbody. ▪ Limit machinery fording (if required) to only the amount necessary and only outside of sensitive time periods and upon consultation with a qualified environmental monitor. If repeated fording of the watercourse is required, construct a temporary crossing structure (e.g., jersey bridge, swamp mats). ▪ Dust will be suppressed using water as a suppressant, if required.	*Residual effect on surface water quality* • Effects on surface water quality can be minimized provided a Spill Prevention and Response Plan is developed and implemented.

Table 6-7: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to groundwater quantity • Reduction in groundwater recharge quantities due to increases in impervious surfaces (e.g., WTG foundations, access roads and buildings) and changes to infiltration and surface runoff patterns.	• Minimize the increase in impervious areas. • Limit disturbances to surface water drainage patterns.	• Minimize paved surfaces and design roads to promote groundwater infiltration. • Implement groundwater infiltration techniques to the maximum extent possible. Examples include: ▪ releasing water to vegetated areas; ▪ lining ditches with permeable material (rather than clay, for example); and, ▪ groundwater should remain on site and not disposed of off-site (unless contaminated). • Where possible, direct groundwater discharge water to natural infiltration systems.	*Residual effect on groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces and changes to infiltration and surface runoff patterns would be minimized following implementation of mitigation measures; however, the creation of impervious surface (i.e., paved parking lots, compressed gravel roads, WTG foundations and buildings) is not completely avoidable and therefore some reduction in groundwater recharge may remain.
Changes to groundwater quality • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation.	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil and/or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands, woodlands and or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and/or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Also refer to mitigation measures for “Reduction in soil quality due accidental release of contaminants during operation, etc.” for additional proposed mitigation measures.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation during operation would be minimized through the implementation of a Spill Prevention and Response Plan and other mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.
Changes to soil quality • Reduction in soil quality due to accidental release of contaminants.	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: ▪ Protocols for access to spill control and containment equipment/materials (e.g., ensure that spill control and containment equipment/materials are readily available on site and additional spill clean-up materials will be available if needed, restock materials contained in spill clean-up kits as necessary). ▪ Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards). ▪ MSDS which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site. ▪ Training requirements for operational staff on associated emergency response plan and spill clean-up procedures. ▪ Protocols for cleaning up spills (i.e., clean up spills as soon as possible, with contaminated soils removed to a licenced disposal site, if required; analyze any soil encountered during operation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to determine its quality in order to identify the appropriate disposal method). ▪ Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and HIWEC management phone numbers. • Apply the following general mitigation measures to avoid soil contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and/or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and/or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. ▪ All potentially hazardous materials to be stored in containment sites within the O&M building, within berms where possible. ▪ Keep ROW for access roads, collector lines /on-Reserve transmission lines and WTGs clear of garbage and debris.	*Residual effect on soil quality* • Reduction in soil quality due to accidental release of contaminants during operation would be minimized following implementation of mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.

6.4 Air, Odour and Dust

6.4.1 Existing Conditions

The MOECC Air Quality Index (AQI) is an indicator of air quality in Ontario, based on air pollutants that are known to have adverse effects on human health and the environment; these include ozone, fine particulate matter, nitrogen dioxide, carbon monoxide, sulphur dioxide and total reduced sulphur compounds. MOECC developed the following categories for AQI readings:

- below 16 is categorized as very good;
- 16 to 31 is good;
- 32 to 49 is moderate but there may be some adverse effects on very sensitive people;
- 50 to 99 is poor and may have adverse effects on sensitive human and animal populations and may cause significant damage to vegetation and property; and
- above 99 is categorized as very poor and may have adverse effects on a large proportion of those exposed (MOECC, 2010).

The Parry Sound AQI monitoring station is the closest station to the HIWEC study area, located approximately 70 km southwest. The 2014 daily data from this station shows an average AQI of 22.38 (good) with a standard deviation of 6.10. The lowest recorded AQI in 2014 was 7 (very good) on September 30 and October 16 and the highest recorded AQI was 45 (moderate) on May 26 (MOECC, 2014b).

6.4.2 Potential Effects and Proposed Mitigation Measures

During the operation of the HIWEC, maintenance activities have the potential to cause infrequent, localized and short-term fugitive dust and emissions typical to the operation of motorized vehicles. These emissions are expected to be considerably lower in magnitude than during the construction and the decommissioning activities.

No emissions of odours are anticipated during operations.

Table 6-8 describes potential effects on air quality that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Table 6-8: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Vehicle and equipment emissions contributing to a reduction in local air quality	• Minimize emissions from vehicles and equipment.	• Equip vehicles with effective exhaust systems. • Avoid unnecessary idling of engines. • Ensure that maintenance equipment is frequently maintained and kept in good working condition.	*No residual effects*
• Dust generation from maintenance vehicle access contributing to a reduction in local air quality	• Minimize dust generation from vehicle use.	• Implement speed limit of 30 km/hr on all access roads. • Conduct dust suppression (i.e., spraying water on access roads and work areas) during dry conditions to minimize dust generation. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*No residual effects*

6.5 Noise

6.5.1 Existing Conditions

The HIWEC study area is a largely natural landscape with relatively few anthropogenic noise sources. The eastern portion of the study area is adjacent to Highway 69 so existing sound levels in that area are influenced by highway traffic. The HIWEC study area includes several permanent and seasonal residential areas (homes, cottages and lodges) where existing sound levels are primarily associated with residential activities, boat travel along Henvey Inlet and the Key River and natural sounds (weather, wildlife, rustling vegetation, etc.). A Noise Impact Study has been completed for the HIWEC and is included in **Appendix M** of **Volume A**.

6.5.2 Potential Effects and Proposed Mitigation Measures

The operation of WTGs and the TSs will generate noise that has the potential to affect local residents. **Table 6-9** describes potential effects from nuisance noise that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A.**

6.6 Local Interests, Land Use and Infrastructure

6.6.1 Existing Conditions

Local interests, land uses and infrastructure were taken into consideration during the design phase of the HIWEC. All WTGs have been sited to meet or exceed setbacks required by the HIFN EA Guidance document.

6.6.1.1 Traditional Anishinabek Land Uses and Resources

HIFN prepared the *Traditional Land Use Study Related to Proposed Four Lane Highway 69* in 2013. Community members and groups were interviewed to provide information on historic and current land uses within the community's traditional territory.

Due to the confidential nature of sensitive community information, a general summary is provided without identifying specific locations.

- **Food Sources:** The community traditional land use study covered topics including hunting, fishing, trapping, gathering as well as cultural practices, all of which occur within its traditional territory.
  - The community historically consumed much more fish than large game as fishing was far easier than hunting larger game.
  - Gathering for food included various species of naturally occurring berries.
  - Squash and corn were planted as a food source.
- **Animal behaviours:** Members identified locations on-Reserve that are particularly important for their traditional way of life, including fish spawning areas and deer crossing locations.
- **Gathering (Ceremonial):** Items gathered for their cultural and spiritual value includes types of bark and plants added to teas or as part of smudging ceremonies. Sweet grass is of particular importance to the community.

Table 6-9: Proposed Mitigation Measures Associated with Noise Resulting from Operation

Potential Effect	Performance Objective	Proposed Mitigation Strategy	Residual Effects
• Disturbance to current land users from noise associated with maintenance activity.	• Minimize the generation of noise from maintenance activities.	• Limit maintenance activities to daylight hours. • Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about maintenance timelines and activities. • Equip vehicles with effective muffler and exhaust systems. • Avoid unnecessary idling of engines. • Ensure that maintenance equipment is frequently maintained and kept in good working condition. • Ensure that noise emissions from maintenance equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations. • Implement construction speed limit of 30 km/hr on all access roads. • Undertake pile driving and blasting operations in accordance with applicable federal and provincial guidelines. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land users* • Noise associated with maintenance activity will be very infrequent and is not expected to affect nearby receptors; however some noise may be experienced at nearby receptors.
• Disturbance to current land users resulting from noise from WTG operation.	• Minimize noise levels and adhere to HIFN and other applicable noise by-laws.	• Noise levels from WTGs at all non-participating receptors will comply with regulatory requirements for similar projects in Ontario.	*Residual effect on land users* • Some WTG operation noise may be heard at nearby receptors but will remain below provincial standards (see **Appendix M** for detailed operational noise assessment).
• Disturbance to local residents, cottagers and businesses due to noise from noise associated with maintenance activity.	• Minimize the generation of noise from maintenance activities.	• Mitigation for disturbance to local residents, cottagers and businesses due to noise from WTG and TS operation and maintenance is considered as described above.	*Residual effect on local residents, cottagers and businesses* • Disturbance to local residents, cottagers and businesses can be partially mitigated by complying with regulatory noise emission standards and standard practices for operation and maintenance noise effects; however some disturbance will remain.
• Disturbance to local residents, cottagers, businesses, overnight accommodations and recreational activities resulting from noise from WTG operation.	• Minimize noise levels and adhere to HIFN and other applicable noise by-laws.	• Noise emissions from WTGs at all non-participating receptors will comply with regulatory requirements for similar projects in Ontario.	*Residual effect on local residents, cottagers and businesses* • Some WTG operational noise may be heard at nearby receptors but will remain below provincial standards (see **Appendix M** for detailed operational noise assessment) .
• Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from maintenance vehicles and equipment.	• Minimize the generation of noise from maintenance activities.	• Mitigation for avoidance of overnight accommodations and recreational activities due to noise from operation and maintenance is considered as described above.	*Residual effect on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near HIWEC is not anticipated. Any disturbance can be partially mitigated by complying with regulatory noise emission standards for similar projects and standard practices for operation and maintenance noise effects; however some disturbance may remain.
• Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from WTG and TS operation .	• Minimize noise levels and adhere to HIFN and other applicable noise by-laws.	• Mitigation for avoidance of overnight accommodations and recreational activities due to noise from WTG and TS operation and maintenance is considered as described above.	*Residual effect on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near HIWEC is not anticipated. Any disturbance can be partially mitigated by complying with regulatory noise emission standards for similar projects and standard practices for operation and maintenance noise effects; however some disturbance may remain.

- **Travel routes**: These routes typically corresponded with access provided by rivers. These travel routes were identified as having economic, historical and cultural significance. Some built trails such as railway right of ways or other existing trails were also important to the community.
- **Landmarks:** The traditional land use study also mapped built infrastructure or features on the land such as former hotels or camps, beach sites, or local landmarks that are important for the community's sense of place.
- **Species at Risk:** The community has raised concerns about Species at Risk, including the Blanding's Turtle.
- **Water:** Surface water and groundwater are important to the community. Water has important linkages to travel, drinking water, and cultural uses (HIFN, 2013).

The *Traditional Land Use Study Related to Proposed Four Lane Highway 69* provided to the assessment team is used internally, and in discussion with HIFN Chief and Council and the community, to avoid and/or mitigate potential impacts to sites where necessary. These areas will be considered as part of the EA, along with consultation with elders and other community members.

6.6.1.2 Nishshing Aki

As described previously, Nishshing Aki is defined as an existing social or cultural feature or condition that has been identified by HIFN or designated as valued by HIFN with community input as provided in the Land Code. These include sacred sites, burial grounds and old settlements. A general summary of Nishshing Aki identified through the *Traditional Land Use Study Related to Proposed Four Lane Highway 69* is provided below.

- **Settlements:** The site of a historic village for the community was identified within Reserve lands, as well as former cabin and camp locations. These locations are typically associated with rivers and waterbodies that cross the community's traditional territory. Inland areas were not used for settlements, but rather were for hunting, trapping, gathering traditional medicines, and making syrup.
- **Sacred locations:** These refer to areas such as grave sites. The locations of these areas are particularly sensitive for community members. Many of these locations are not to be shared with individuals outside of the community.
  - The study identified burial locations, ceremonial locations (such as sweat lodges), and other sacred areas which will be avoided by development.

6.6.1.3 Current Anishinabek Land Use

HIFN's Land Code governs current land usage within the community, including the lands proposed to be used for the HIWEC. Lands selected for use for the HIWEC are based on knowledge gathered within the community, supported by environmental and technical siting studies to minimize effects on the land and can feasibly be constructed.

As part of the Robinson Huron treaty, community members have maintained their Aboriginal rights to hunt, fish and continue their traditional land uses, both on-Reserve as well as off-Reserve. These traditional land uses continue to the present day, and the Land Code seeks to protect ongoing opportunities to perform these functions.

The Union of Ontario Indians (the Anishinabek Nation) has a Trapping Harmonization agreement with the Federal and Provincial government in which it allows the organization to manage Aboriginal trapping activities on-Reserve (Anishinabek Nation, 2015).

6.6.1.4 Adjacent Properties

A Property Line Setback Assessment has been prepared in accordance with the HIFN EA Guidance document and is provided in **Attachment A**. This requires the identification of any impacts to businesses, infrastructure, properties or land use activities resulting from a WTG location being proposed at a distance equal to or less than the maximum hub height of the turbine (137 m) from an adjacent property line. Six (6) WTGs (i.e., WTGs 1, 6, 10, 43, 52 and 119) were identified to require assessment due to their proximity to the HIFN I.R. #2 boundary. WTGs 1, 6 and 119 were removed from the HIWEC layout and will no longer be constructed. The Property Line Setback Assessment confirmed that adverse impacts to the adjacent parcels may include damage vegetation and wildlife habitat in the unlikely event of WTG failure. However, this potential impact already exists at a 137 m setback and is not increased by a setback reduction.

6.6.1.5 Local Infrastructure, Roads and Traffic

The HIWEC Site Plan (**Figure 2-2**) displays existing local and provincial roads in proximity to the HIWEC study area. HIFN I.R. #2 is accessible from Highway 69 and Highway 522, both of which are provincially maintained highways with Highway 69 being part of the Trans-Canada Highway. Within the HIWEC study area, Highway 69 is a paved, two (2) lane highway with passing lanes alternating between the Northbound and Southbound lanes. As of 2010, the annual average daily traffic (AADT) volume for the section of Highway 69 from Highway 526 to Highway 522 is 6,900 (MTO, 2010). Through the Northern Highways Program 2013 - 2017, the Ministry of Northern Development and Mines (MNDM) and the Ministry of Transportation Ontario (MTO) have planned to widen the highway to four (4) lanes, with construction occurring in segments along the route between Sudbury and Parry Sound (MNDM, 2013).

6.6.1.6 Telecommunication and Weather Towers

HIW has provided notices to telecommunication companies in the area and agencies operating telecommunication systems in the province to provide details on the HIWEC. To date, HIW has received confirmation from the Canadian Department of National Defence, the Royal Canadian Mounted Police, and Ontario Ministry of Government Services that the operation of their radio communication systems will not be impacted by the HIWEC.

There are five (5) television stations broadcasting in the vicinity of the HIWEC study area. Four (4) of the five (5) stations have converted to digital television signals which are not impacted by WTGs or transmission infrastructure. It was confirmed that one (1) television station which has service contours overlapping the HIWEC study area is still using analog signals. No FM or AM broadcast stations have been identified within proximity of proposed WTGs that could impact broadcast signals (Yves R. Hamel et Associés Inc., 2011). An EC weather radar tower is located approximately 6.5 km from the HIWEC study area. HIW will continue to engage with EC to identify and mitigate any impact on the operations of the weather radar tower.

6.6.1.7 Other Aboriginal Interests

The HIWEC is proposed entirely on HIFN I.R. #2 and, as such, no other Aboriginal interests are anticipated. Off-Reserve areas may be subject to other Aboriginal interests based on their traditional territories and any potential impacts to other Aboriginal interests are discussed in **Volume B** – HIW Transmission Line Environmental Review Report.

6.6.1.8 Visual Landscape

The visual and aesthetic importance of Georgian Bay and the HIWEC study area is reflected by the numerous artists and photographers who have captured the landscape along Georgian Bay, and the local celebration of the Canadian iconic Group of Seven which frequently captured the area's scenic landscapes in their paintings at the beginning of the 20th century. Most of the tourism based businesses within the HIWEC study area and along Georgian Bay and Key River such as resorts, lodges and marinas, heavily rely on the natural landscapes to attract vacationers, hikers and boaters

6.6.2 Potential Effects and Proposed Mitigation Measures

6.6.2.1 Operations

During the operation of the HIWEC, Highway 69 capacity and traffic could be affected in the area of the HIWEC entrance if the replacement of a major WTG component (e.g., gear box or rotor) is needed, since specialized equipment (e.g., cranes) may be required. The delivery of specialized equipment could result in a temporary increase in slower moving traffic volumes on Highway 69 while turning onto the HIWEC entrance.

Table 6-10 describes potential effects on local interests, land use and infrastructure that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A.**

6.7 Public Health and Safety

6.7.1 Existing Conditions

6.7.1.1 Stray Voltage

HIW will ensure that the electrical design conforms and complies with relevant electrical safety standards. Further, the HIWEC collector lines are not anticipated to share poles with existing distribution lines, thereby reducing the instances of potential stray voltage generation. Refer to **Section 5** of this Report for more information regarding the Emergency Response and Communications Plan.

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 WTG components. WTG siting for the proposed HIWEC will meet (at a minimum) the setback distances from non-participating residences (550 m) as required by the HIFN EA Guidance document. The nearest WTG to houses located along Bekanon Road will be sited approximately 2 km away.

6.7.1.3 Ice Throw

Ice throw and ice shed refer to situations where during specific weather conditions, ice may form on WTGs and may be thrown or break loose and fall to the ground (Chief Medical Officer of Health (CMOH, 2010). WTGs for the proposed HIWEC meet (at a minimum) the setback distances from non-participating residences (550 m) required by the HIFN EA Guidance document. The nearest WTG to houses located along Bekanon Road will be sited approximately 2 km away. During the operation of the HIWEC, sensors located on the WTGs will be able to detect ice build-up and WTGs will be shut down during unsafe operating conditions.

Table 6-10: Proposed Mitigation Measures Associated With Potential Effects To Local Interests, Land Use And Infrastructure Resulting From Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species.	• Minimal impact to traditional Anishinabek lands. • Minimal decline in availability of country foods and medicinal plants. • Minimal decline in spiritual, ceremonial or cultural sites. • No impact on Nishshing Aki. • Minimal off-Reserve impacts to Aboriginal traditional rights or interests. • Minimal impacts to navigable waterways used by Anishinabek groups.	• Develop a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding Aboriginal traditional uses allowed on the site during operations, (e.g., a firearms and / or hunting policy). • Ensure maintenance activity is limited to pre-determined work areas. • Mitigation measures proposed in under the **Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Resulting from Operations Table 6-3** to minimize disturbance to wildlife will serve to further reduce impacts to HIFN traditional use activities.	*No residual effects.* • Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering will be confined to WTG locations (approximately 173.1 ha or 1.4% of the HIWEC study area) are temporary and will be available after decommissioning. Development of a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding traditional uses will minimize potential effects.
• Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence/cottage owners on HIFN I.R. #2.	• Minimal impacts to access of trails and traditional resource areas.	• Develop access plans for authorized users during the operations phase. • Maintain ongoing communication with authorized users of HIFN I.R. #2 and other affected adjacent land users about maintenance activities and associated access limitations. • Maintain existing access to primary use areas including Henvey Inlet throughout operations. • Access limitations will be confined to active maintenance areas. Work restricted areas to be clearly marked.	*No residual effects.* • Reduced access to lands within and adjacent to HIFN I.R. #2 for recreation is not anticipated as access to primary recreation and tourism areas such as Henvey Inlet, will not be restricted.
• Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs.	• Minimize light emissions from WTGs.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations in areas along the Key River, Henvey Inlet and Georgian Bay have been removed as only up to 91 locations will be constructed. • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of turbines to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • Turbine lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effect on local residents, cottagers and businesses* • Changes to the visual landscape for local residents, cottagers and businesses will be partially mitigated by applying minimum setbacks from waterbodies, minimizing lighting requirements and reducing the overall layout from 120 to up to 91 turbines. However, there will be some residual effect as turbines will continue to be visible from various vantage points within and adjacent to the HIWEC study area.
• Avoidance of overnight accommodations and recreational activities near the HIWEC from changes to the visual landscape.	• Minimize visual change within vicinity of the HIWEC.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations along the Key River and Georgian Bay have been removed as only up to 91 locations will be constructed. • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of turbines to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • Turbine lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effects on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near the HIWEC due to changes to the visual landscape during operations is not anticipated, but difficult to predict; some avoidance by people who do not like the appearance of wind turbines is possible. Changes to the visual landscape will be minimized by applying minimum setbacks from waterbodies and reducing the overall layout from 120 to 87-91 turbines; however turbines will be visible from various vantage points within and adjacent to the HIWEC study area.
• Increase in truck traffic where the south access road crosses Bekanon Road	• Minimize disturbance to local traffic patterns.	• Prohibit maintenance vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road.	*Residual effect on traffic near south access road* • Construction vehicles will not be permitted to travel along Bekanon Road so minimal residual traffic effects may occur intermittently throughout the operations and maintenance period.

6.7.1.4 Low Frequency Sound, Infrasound and Vibration

WTGs 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). The "Potential Heath Impacts of Wind Turbines Report" (CMOH, 2010) identified that infrasound and low frequency sound from modern WTGs were found to be well below the level where known health effects occur (50 to 70 dB) in studies of WTG noise. Thus, low frequency sound, infrasound and vibration were not considered in the effects assessment.

6.7.1.5 Electric and Magnetic Fields

Concerns surrounding electromagnetic fields (EMFs) have been raised during consultation processes for other wind energy centres. EMFs are a combination of invisible electric and magnetic fields. They occur both naturally (e.g., light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF (CMOH, 2010). The generation of electrical fields from any underground electrical collector lines from the HIWEC 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". Thus, EMFs were not considered in the effects assessment.

6.7.2 Potential Effects and Proposed Mitigation Measures

6.7.2.1 Operations

To minimize or avoid effects on public health and safety, the WTGs are sited according to setback distances as required by the HIFN EA Guidance document and as described in **Section 6.7.1**.

Table 6-11 describes potential effects on public health and safety that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects.

Table 6-11: Proposed Mitigation Measures Associated with Potential Effects to Public Health and Safety Resulting from Operations

Potential Effect	Performance Objective	Proposed Mitigation Strategy	Residual Effects
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 residual Effects* • Impacts on public health and safety from structural hazards, and/or ice throw can be mitigated provided recommended mitigation is implemented.
Stray voltage effects to the public and wildlife.	• No health and safety incidents associated with stray voltage.	• Build and maintain the HIWEC 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 WTGs. • Ensure that all electrical design conforms and complies with relevant electrical safety standards.	*No residual Effects* • Stray voltage effects to the public and wildlife can be mitigated provided recommended mitigation is implemented.

6.8 Other Resources

6.8.1 Existing Conditions

A search for landfills, aggregate resources, forest resources and petroleum resources was undertaken based upon data from HIFN, MOECC and MNRF.

6.8.1.1 Landfills

MOECC's Landfill Inventory Management Ontario and Large Landfill Sites records (MOECC, 2014a) were used to confirm that there are no landfills within the HIWEC study area – the closest active landfill being approximately 72 km away. Therefore, no effects on landfills are anticipated.

6.8.1.2 Aggregate Resources

Information from MNRF (2015a) was used to confirm that there are no authorized aggregate resources within the HIWEC study area – the closest aggregate resource being approximately 2.14 km away. Therefore, no effects on aggregate resources are anticipated. A final location of the source of the required aggregate will be determined prior to construction, however it is planned that aggregate materials required for concrete will be obtained from local aggregate sources in the vicinity of HIFN I.R. #2.

6.8.1.3 Forest Resources

Based on the MNRF's Sustainable Forest Licences (SFL) database (MNRF, 2014b), there is one SFL within the HIWEC study area, held by the non-profit organization Westwind Forest Stewardship Inc. (Westwind). This SFL does not include jurisdiction of any forest resources within the boundaries of HIFN I.R. #2. Under the SFL, Westwind maintains the French-Severn Forest which encompasses approximately 885,000 ha of public land bordering Georgian Bay to the west, Algonquin Park to the east, the French and Severn Rivers to the north and south. Westwind developed the 2009-2019 French-Severn Forest Management Plan which is required to operate in a Crown forest and acts as a strategy to maintain a healthy and productive forest (Westwind Forestry Management, 2009). No effects on this SFL are anticipated as it is outside the footprint of the facility.

6.8.1.4 Petroleum Resources

Based on MNRF's Oil, Gas & Salt Resources (OGSR) library (OGSR, 2011), there are no petroleum wells within the HIWEC study area or within 75 m of HIWEC components. Therefore, no effects on petroleum resources are anticipated.

6.9 Areas Protected under Provincial Plans and Policies

The HIFN EA Guidance document requires a determination as to whether the HIWEC 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 HIWEC 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 HIWEC.

6.10 Environmental Effects Monitoring Plan

Monitoring commitments have been identified and are intended to verify that the proposed mitigation measures achieve performance objectives identified above. Proposed monitoring and follow-up plans are provided in **Section 8** of the Final Draft EA Report of **Volume A**. Should the monitoring during the operation of the HIWEC reveal that the proposed mitigation measures are not achieving the intended results; the identified contingency measures will then be implemented. Further details on the Environmental Effects Monitoring Plan can be found in **Appendix G** of **Volume A**.

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Attachment A

Henvey Inlet Wind Energy Centre – Property Line Setback Assessment – Final Draft

Henvey Inlet Wind LP

Henvey Inlet Wind

Henvey Inlet Wind Energy Centre – Property Line Setback Assessment – Final Draft

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AECOM: 2012-01-06

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List of Acronyms and Glossary

EA ..... Environmental Assessment
FIT ..... Feed-in-Tariff
ha ..... hectare
HIFN ..... Henvey Inlet First Nation
HIFN I.R. #2 ..... Henvey Inlet First Nation Reserve No. 2
HIW ..... Henvey Inlet Wind
HIWEC ..... Henvey Inlet Wind Energy Centre
km ..... Kilometres
kV ..... Kilovolt
m ..... Ministry of Natural Resources and Foresty
MW ..... Megawatt
Nigig ..... Nigig Power Corporation
O&M ..... operations and maintenance
OPA ..... Ontario Power Authority
TS ..... Transformer Station
UNESCO ..... United Nations Education, Scientific, and Cultural Organization
WTG ..... Wind Turbine Generator

1. Introduction

1.1 Project Description

Nigig Power Corporation (Nigig) received a Feed-in-Tariff (FIT) Contract from the Ontario Power Authority (OPA) in 2011 for a 300 megawatt (MW) wind energy generation centre. Henvey Inlet Wind LP (HIW), a limited partnership between Pattern Renewable Holdings Canada ULC and Nigig Power Corporation, is proposing to develop the Henvey Inlet Wind Energy Centre (HIWEC), a 300 MW facility on Henvey Inlet First Nation Reserve No. 2 (HIFN I.R. #2). AECOM Canada Ltd. (AECOM) was retained by HIW to prepare an Environmental Assessment (EA) for the proposed HIWEC. The EA was conducted in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements.

1.2 Purpose

The Property Line Setback Assessment was prepared to identify any impacts to business, infrastructure, properties or land use activities resulting from a WTG location being proposed at a distance equal to or less than the hub height of the WTG (maximum of 137 metres (m)) from an adjacent property line or legal boundary.

This Report has been prepared to assess proposed WTG locations for the HIWEC that do not meet the minimum setback from neighbouring land parcels that are not participating in the HIWEC. This setback is equal to the height of the WTG hub and is measured from the centre of base of the WTG to the boundaries of the parcel of land on which the WTG is constructed (i.e., the boundary of an adjacent, non-participating parcel of land)

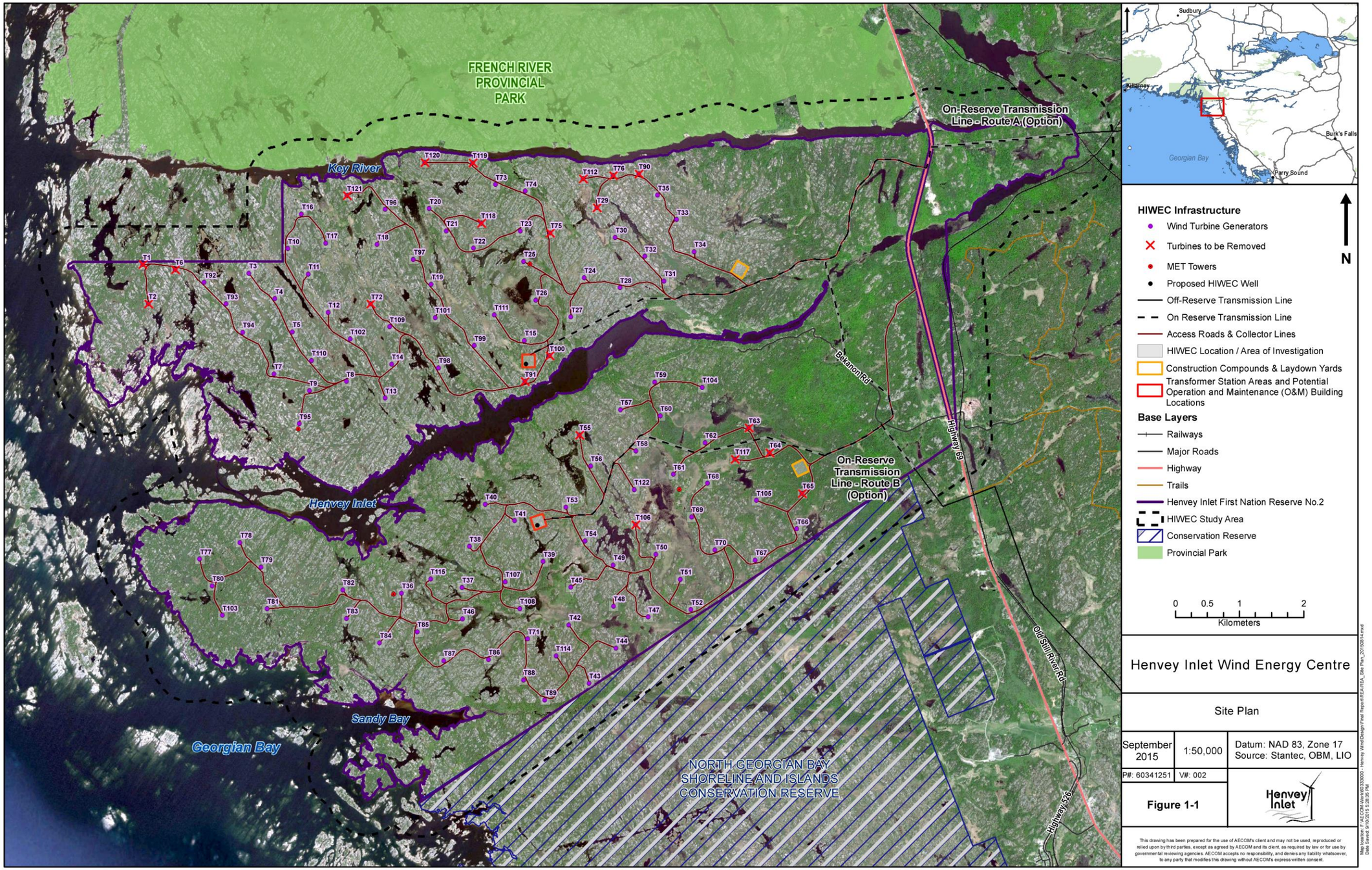
AECOM analyzed six (6) WTGs within the HIWEC to evaluate any anticipated impacts to businesses, infrastructure, properties and land use activities and, where required, present mitigation measures to address any potential adverse impacts.

1.3 Location and Study Area

The HIWEC study area includes the entirety of HIFN I.R. #2 plus a 550 m buffer extending beyond the HIFN I.R. #2 boundary. HIFN I.R. #2 is bounded on the north by the Key River, Georgian Bay to the west, Highway 69 to the east with some HIFN I.R. #2 property located on the east side of Highway 69. The southern boundary runs from Sandy Bay on the southwest corner in a north easterly direction to Highway 69 south of Bekanon Road. The geographic location is along the eastern shore of Georgian Bay, south of French River Provincial Park and directly north of North Georgian Bay Shoreline and Islands Conservation Reserve (**Figure 1-1**). HIFN I.R. #2 is part of the Georgian Bay Biosphere Reserve which encompasses 347,000 ha of land stretching 300 km from Port Severn to the French River and is designated as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) Biosphere Reserve (Georgian Bay Biosphere, 2015). Highway 69 is a major north-south highway connecting Highway 400 north of Parry Sound with the City of Greater Sudbury at Highway 17.

Generally, the HIWEC study area has shallow soils, with many rocky outcrops forming longitudinal ridges running on a northwest to southeast axis, and is divided roughly in half by the Henvey Inlet waterbody. Numerous wetland pockets are located between the ridges and across the study area, with upland regions supporting forested areas of poplar and jack pine. Section 4 of the Description Report provides a more detailed description of the existing environmental conditions within the study area. The study area for the HIWEC also includes lands off-Reserve that are within the area that may experience increased noise levels from the HIWEC. All HIWEC components will be located within the HIWEC study area as shown in the preliminary site plan provided as **Figure 1-1**.

Figure 1-1: Site Plan



1.4 Setbacks

The EA was conducted in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements. The requirements for property setbacks in the HIFN EA Guidance document includes a "description, map, or diagram of the distance between the base of any wind turbines and all legal boundaries of the parcel of land on which the wind turbine is constructed, installed, or expanded within a distance equivalent to the height of the wind turbine, excluding the length of any blades". In addition, the typical setback requirements for Class 4 wind facilities in Ontario is that no person shall construct, install or expand a WTG as part of a Class 4 wind facility unless one of the following two scenarios is true:

1. The neighbouring parcel of land is owned by the developer or the developer has an agreement with the neighbouring land owner to permit the WTG closer than the required setback.
2. The distance between the centre of the base of the WTG and all boundaries of the parcel of land on which it is constructed is equivalent to, at a minimum, the length of any blades plus 10 metres; and
    a. The developer provides a written assessment demonstrating that the proposed WTG location will not result in adverse impacts on nearby business, infrastructure, properties or land use activities and describes any preventative measures to address the possibility of such adverse impacts.

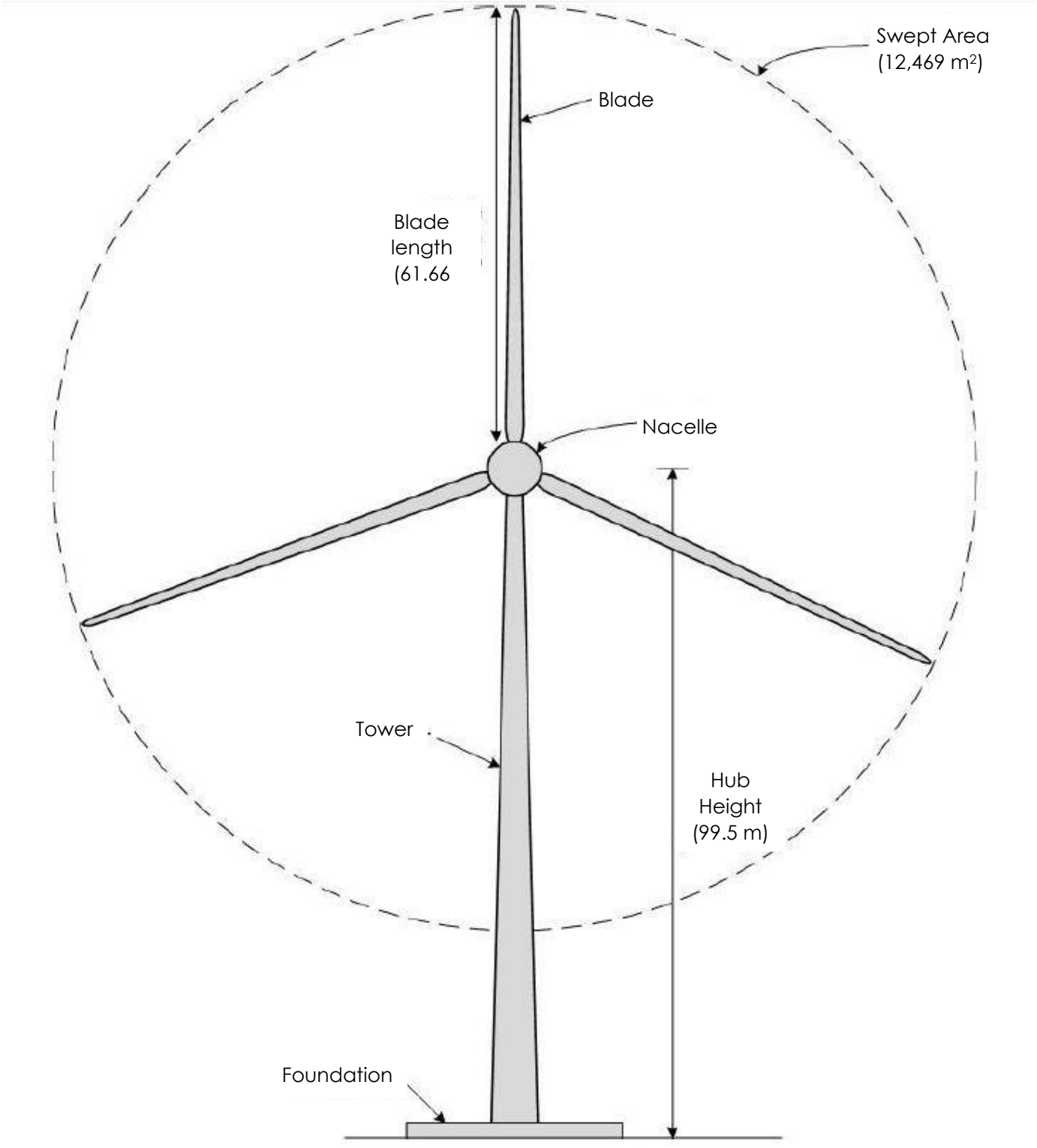
1.5 Key Wind Turbine Generator Information

The following table provides key WTG information.

Table 1. Summary of Key Wind Turbine Generator Information

Wind Turbine Generators	
Make and Model	Vestas V126-3.3 MW
Approximate Number Constructed	Up to 91
Nominal WTG Power	3.3 MW
Number of Blades	3
Blade Length	61.66 m
Hub Height	Max. 137 m
Rotor Diameter	126 m
Cut-in Wind Speed	3 metres per second (m/s)
Cut-out Wind Speed	22.5 m/s
Rated Wind Speed	12 m/s
Swept Area	12,469 metres squared (m^2)
Foundation Dimensions	0.08 ha x 2.5 m deep

Figure 1-2: Basic Wind Turbine Generator Specifications



2. Analysis

This report identifies WTGs that were sited less than 138 m from a legal boundary through desktop analysis. It also provides: an analysis of surrounding land uses; identification of potential impacts on surrounding land uses; and applicable mitigation measures for such impacts. Although the proposed WTG hub height is a maximum 137 m, the analysis includes an additional 1 m beyond the typical requirements to account for any potential errors with Geographical Information System (GIS) mapping and data. A detailed description of the methodology for this analysis is provided below:

1. **Desktop analysis of setback distances** – AECOM used GIS base layers provided by HIW to identify the distance in metres (m) between the base of the WTGs and all legal boundaries. Based on a WTG hub height of 137 m, AECOM conducted an assessment of all WTGs located within 138 m of a legal boundary (WTGs 1, 6, 10, 43, 52 and 119).
2. **Analysis of surrounding land uses** – AECOM conducted a review of the MNRF Land Use Policy and aerial photography to confirm the land use characteristics of land parcels adjacent to the legal boundaries for assessed WTGs.
3. **Identifying potential impacts on surrounding land uses and mitigation measures** – AECOM reviewed the potential impacts to surrounding land uses as a result of WTG operation at a distance less than 137 m from adjacent legal boundaries. Where potential impacts are identified, the report recommends measures to mitigate such impacts. The following sections provide a summary of the potential impacts and mitigation measures for the assessed WTGs.

2.1 Description

The WTGs assessed in this report are located between 43.78 m to 128.92 m from non-participating land parcels as depicted in **Table 2** below and **Appendix A** (Wind Turbine Generator Maps). The adjacent lands for all of the assessed WTGs are entirely Crown Land, the majority of which are designated as Enhanced Management Areas. Land use on the adjacent Crown Land to the assessed WTGs is restricted to limited recreational uses and mostly focuses on the protection of sensitive ecosystems (MNRF, 2007).

Table 2. Summary of Assessed Wind Turbine Generators

WTG ID	UTM Coordinates		Distance to Nearest boundary of HIFN I.R. #2 (m)	Direction of Nearest Boundary	Neighbouring Land Parcel[1]	MNRF Crown Land Use Policy[2]
	X	Y				
WTG1	521464	5080041	43.78	North	MNRF Crown Land	Enhanced Management Area
WTG6	521973.31	5079961.37	124.61	North	MNRF Crown Land	Enhanced Management Area
WTG10	528421	5073536	85.27	West	MNRF Crown Land	Enhanced Management Area
WTG43	528428.9	5073515.3	85.72	Southeast	MNRF Crown Land	Conservation Reserve
WTG52	530020	5074662	128.96	Southeast	MNRF Crown Land	Conservation Reserve
WTG119	526610.73	5081625.23	109.17	North	MNRF Crown Land (river bed)	Key River Bed / Provincial Park

Note: 1, 2 Source: MNRF, 2014

2.2 Potential Effects

Adverse impacts to the adjacent properties from the reduced setbacks may include damage to vegetation and wildlife habitat in the unlikely event of WTG failure. However, this unlikely potential impact already exists at a 137 m setback and is not increased by any of the reduced setbacks listed in **Table 2**.

2.3 Mitigation Measures and Net Effects

Potential adverse impacts to adjacent properties would be mitigated by applying standard preventative measures that follow best management practices such as:

- certification of the WTG design by professional engineers;
- regular maintenance and monitoring of the WTG; and,
- WTG shutdown protocols during extreme weather.

Applying these preventative measures would address any potential adverse impacts resulting from a setback distance less than the WTG's maximum hub height of 137 m.

3. Conclusion

WTGs 1, 6 and 119 are dropped form the HIWEC layout and will no longer be constructed. Therefore, there are no WTGs that are sited less than 71.66 m (blade length + 10 m) from an adjacent property or within 120 m of a waterbody. Based on the analysis of the remaining three (3) WTGs requiring justification for the reduced property line setback (WTGs 10, 43 and 52), there are no anticipated adverse impacts for the reduced setbacks once the standard preventative measures based on best management practices have been applied.

4. References

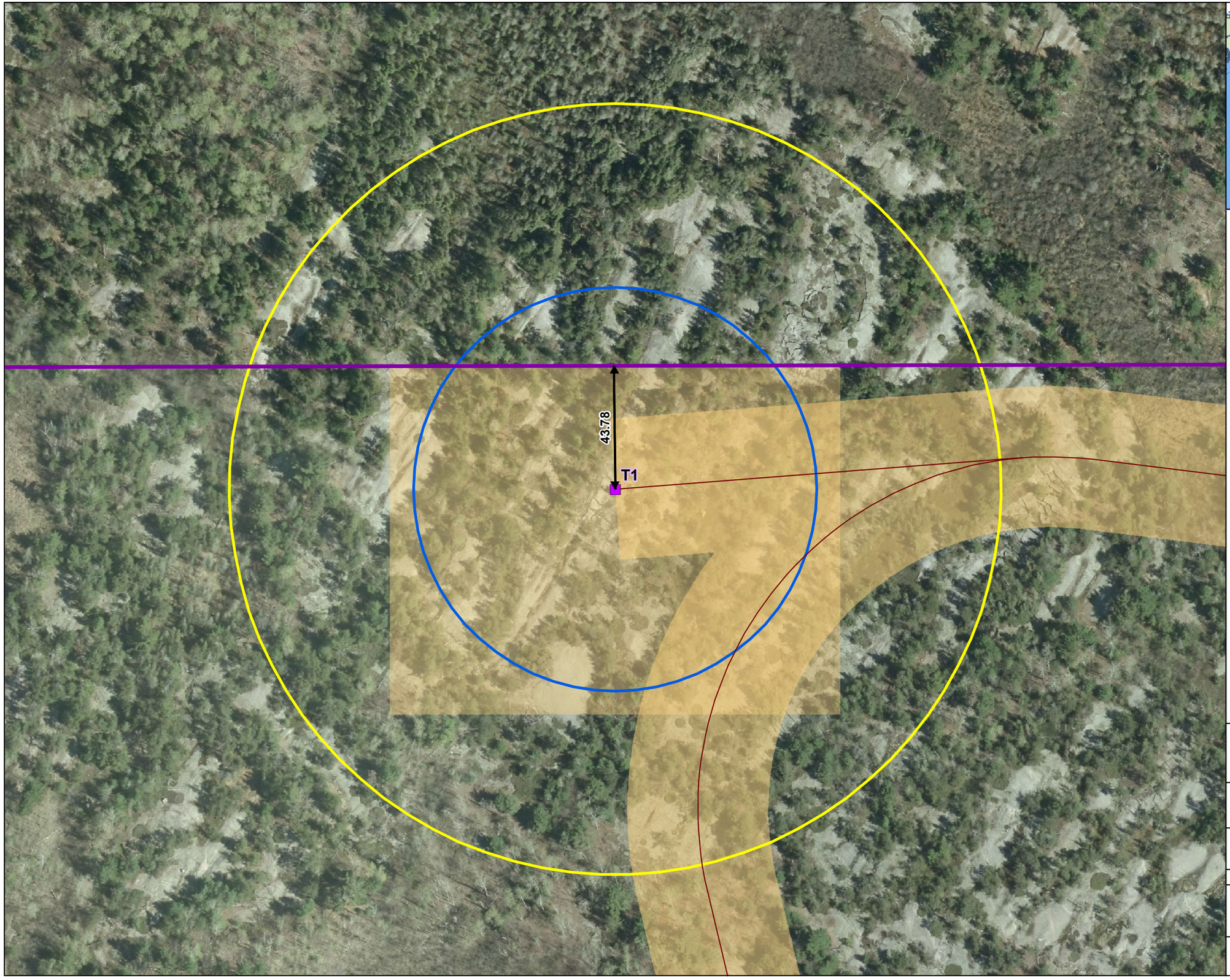
Georgian Bay Biosphere Reserve, 2015:
Our Biosphere. Available: http://www.gbbr.ca/about-us/gbbr/. Accessed February 19, 2015.

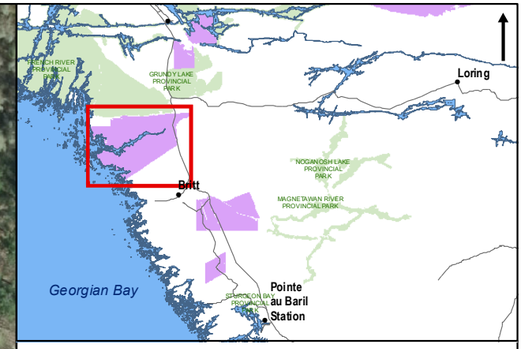
Ontario Ministry of Natural Resources and Forestry, (MNRF). 2014:
Crown Land Use Policy Atlas. Queens Printer for Ontario: February, 2014.

Ontario Ministry of Natural Resources and Forestry, (MNRF). 2007:
Crown Land Use Policy Atlas: E39g-2: Great Lakes Coastal Areas – Parry Sound North. Queens Printer for Ontario: February, 2007.

Appendix A

Wind Turbine Generator Maps





Legend

N

Distance to Nearest Non-Participating Property

Minimum Setback Requirement 71.66m (Blade Length + 10m)

Setback Reporting Requirement 137m (Hub Height)

HIWEC Infrastructure

Wind Turbine Generators

Access Roads & Collector Lines

HIWEC Location / Area of Investigation

Base Layers

Henvey Inlet First Nation Reserve No 2.

0 20 40 80

Meters

Henvey Inlet Wind Energy Centre

Property Line Setback Assessment

July 2015	1:1,300	Datum: NAD 83 Zone 17 Source: LIO
P#:	V#:	

Figure 1

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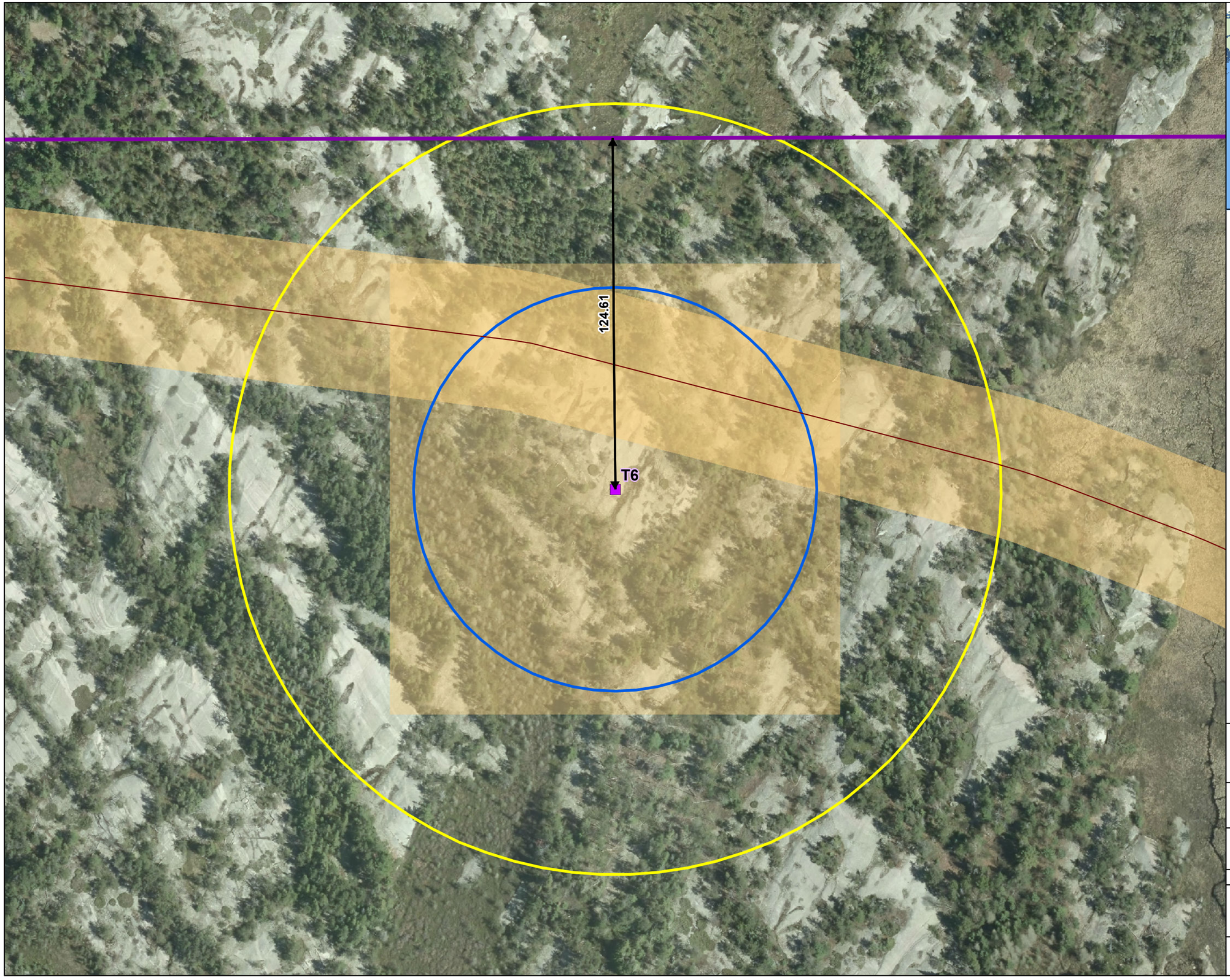

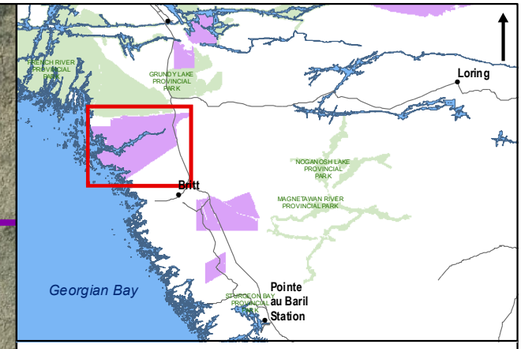

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Legend

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- Setback Reporting Requirement 137m (Hub Height)

HIWEC Infrastructure

- Wind Turbine Generators
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- HIWEC Location / Area of Investigation

Base Layers

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0 20 40 80
Meters

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Property Line Setback Assessment

July 2015	1:1,300	Datum: NAD 83 Zone 17 Source: LIO
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Figure 2

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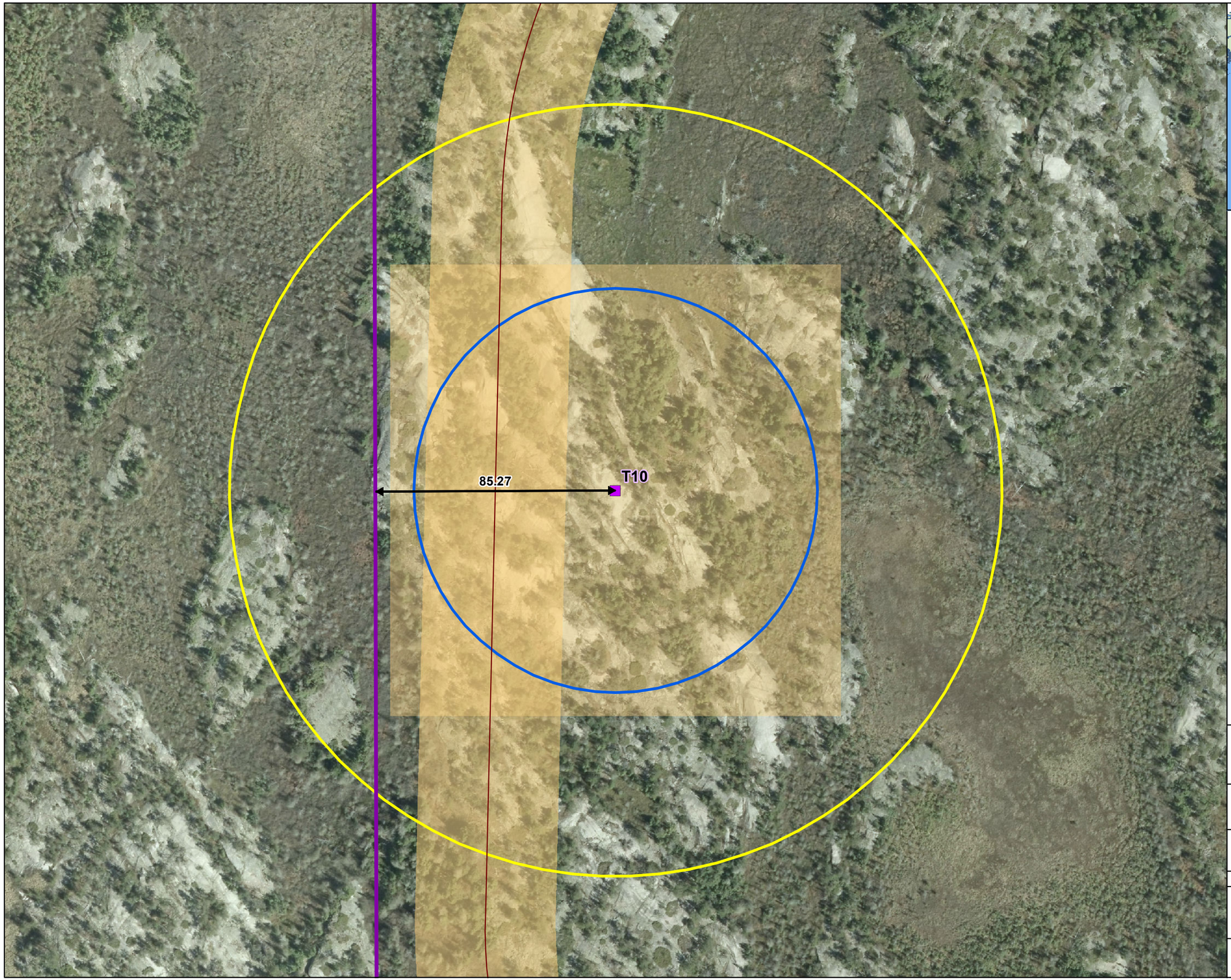

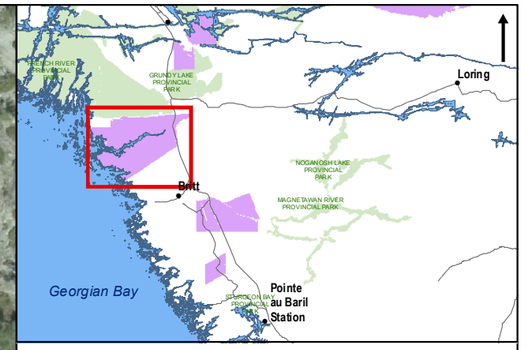

Legend

N

Distance to Nearest Non-Participating Property

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HIWEC Infrastructure

Wind Turbine Generators

Access Roads & Collector Lines

HIWEC Location / Area of Investigation

Base Layers

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0 20 40 80

Meters

Henvey Inlet Wind Energy Centre

Property Line Setback Assessment

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P#:	V#:	

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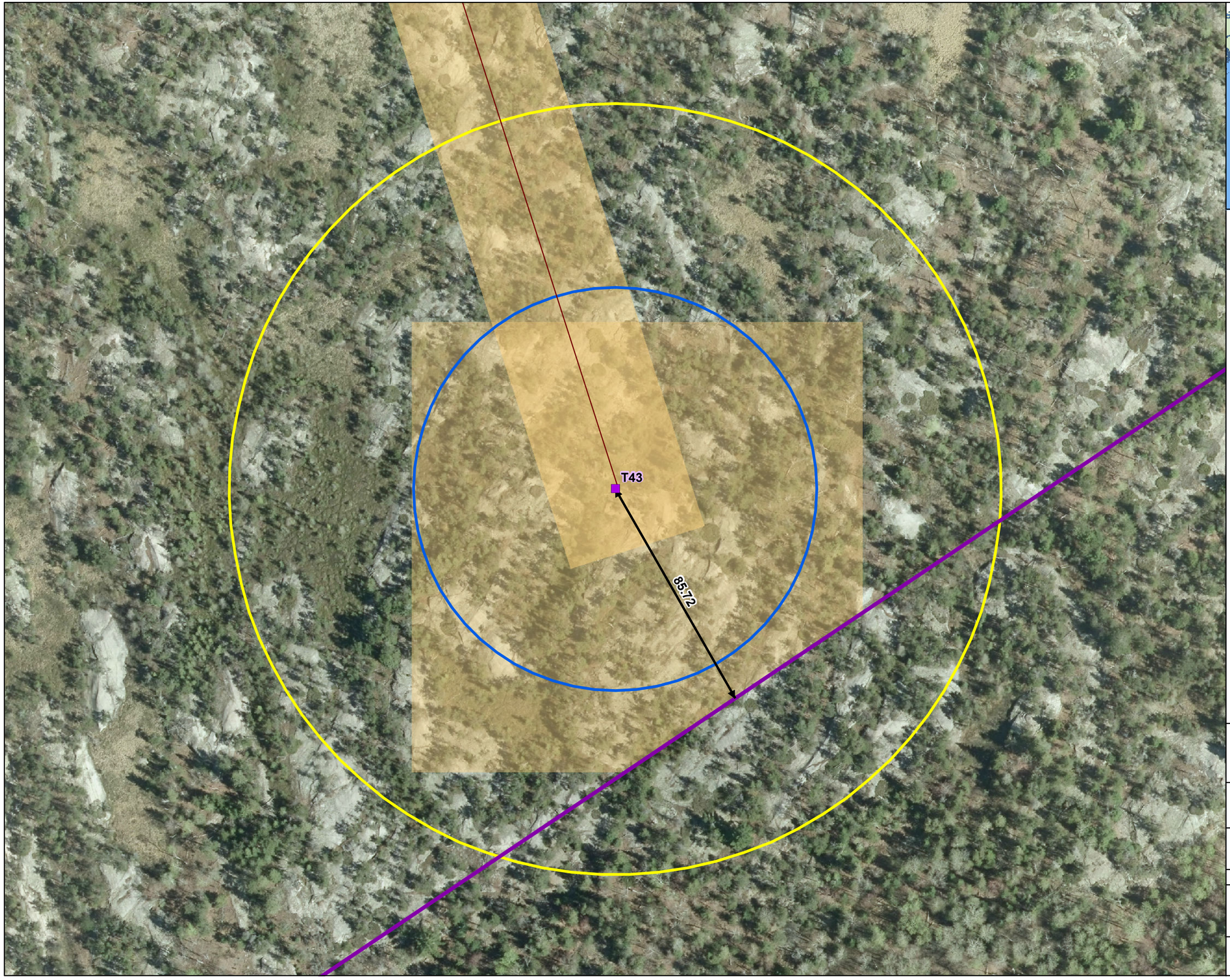

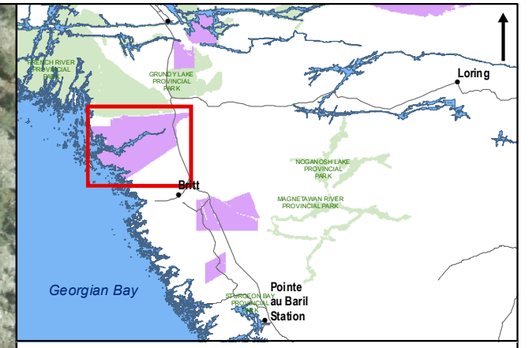

N

Legend

- Distance to Nearest Non-Participating Property
- Minimum Setback Requirement 71.66m (Blade Length + 10m)
- Setback Reporting Requirement 137m (Hub Height)

HIWEC Infrastructure

- Wind Turbine Generators
- Access Roads & Collector Lines
- HIWEC Location / Area of Investigation

Base Layers

- Henvey Inlet First Nation Reserve No 2.

0 20 40 80
Meters

Henvey Inlet Wind Energy Centre

Property Line Setback Assessment

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P#:	V#:	

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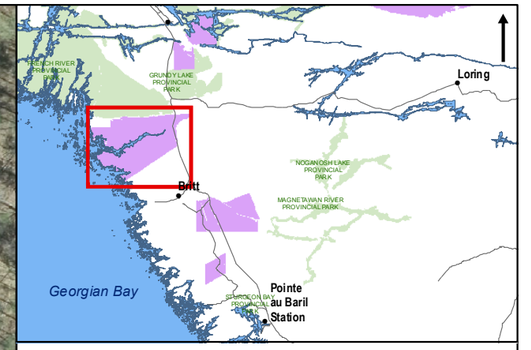

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0 20 40 80
Meters

Henvey Inlet Wind Energy Centre

Property Line Setback Assessment

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P#:	V#:	

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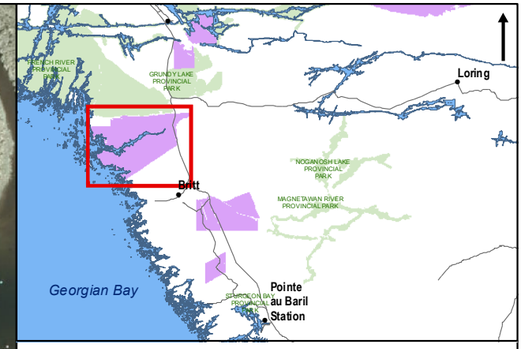

N

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Figure 6

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