

**Henvey Inlet Wind LP**

# **Henvey Inlet Wind**

## **Interim Description Report – Henvey Inlet Wind Energy Centre (HIWEC)**

draft for discussion

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## Revision Log

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## List of Acronyms and Glossary

ACSR .....	Aluminum Conductor Steel Reinforced
ATK .....	Aboriginal Traditional Knowledge
AQI .....	Air Quality Index
BMPs.....	Best Management Practices
CCME.....	Canadian Council of Ministers of the Environment
CEAA .....	<i>Canadian Environmental Assessment Act</i>
COSEWIC.....	Committee on the Status of Endangered Wildlife in Canada
CSA.....	Canadian Standards Association
CWS.....	Canadian Wildlife Service
dB.....	decibels
dBA .....	decibels A-weighted
DFO.....	Fisheries and Oceans Canada
DND .....	Department of National Defence
EA .....	Environmental Assessment
EC .....	Environment Canada
EEMP .....	Environmental Effects Monitoring Plan
EIS .....	Environmental Impact Study
EMF.....	Electromagnetic Fields
ESA .....	<i>Endangered Species Act</i>
FIT .....	Feed-in-Tariff
ha .....	hectare
HIFN.....	Henvey Inlet First Nation
HIW .....	Henvey Inlet Wind
HIWEC .....	Henvey Inlet Wind Energy Centre
HONI .....	Hydro One Network Inc.
IESO.....	Independent Electricity System Operator
IWH .....	Important Wildlife Habitat
km .....	Kilometres
kV .....	Kilovolt
L/day .....	Litres per day
m .....	Metre
mm .....	Millimetres
mASL .....	Metres Above Sea Level
MBCA.....	<i>Migratory Birds Convention Act</i>
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
MW .....	Megawatt
NAV CANADA.....	Navigation Canada
NHA.....	Natural Heritage Assessment
NHIC .....	Natural Heritage Information Centre
Nigig.....	Nigig Power Corporation



O&M .....	operations and maintenance
OGSR.....	MNR's Oil, Gas & Salt Resources database
OEB.....	Ontario Energy Board
OPA.....	Ontario Power Authority
OPGW .....	Optical Ground Wire
PWQO .....	Provincial Water Quality Objectives
RABC .....	Radio Advisory Board of Canada
RCMP.....	Royal Canadian Mounted Police
ROW .....	right-of-way
SAR.....	Species at Risk
SARA .....	<i>Species at Risk Act</i>
SCADA.....	Supervisory Control and Data Acquisition
SFL.....	Sustainable Forest License
SOCC.....	Species of Conservation Concern
TS.....	Transformer Station
TSS .....	Total Suspended Solids
WTG.....	Wind Turbine Generator
ZOI .....	Zone of influence

DRAFT

# 1. Introduction and 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 is being conducted in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements.

## 1.1 Henvey Inlet Wind Energy Centre Overview

HIFN I.R. #2 is a parcel of federal Crown land on the shore of Georgian Bay at Key River (approximately 80 kilometres (km) north of Parry Sound, Ontario) held by the Crown subject to the Aboriginal title of and for the benefit of Henvey Inlet First Nation (HIFN). A small residential area comprised of HIFN Band Members is located immediately west of Highway 69 on Bekanon Road. Private, largely seasonal, cottage lot leases are located on the north side of Henvey Inlet and several HIFN Band Members have cabins within the HIWEC study area described in **Section 1.3**. Several HIFN Band Members utilize recreational lots within the HIWEC study area. The remainder of the study area is undeveloped and unpopulated.

HIFN I.R. #2 has been in active use by HIFN since pre-contact for habitation, hunting, fishing, gathering, burial, traditional use and cultural gatherings. In recent times, HIFN has used these lands for hunting, fishing, gathering, traditional use and cultural gatherings, forestry, aggregate extraction, waste management, and recreation. There have also been various proposals for commercial and economic development. HIFN requires that any future development be located to protect areas of cultural importance. The proposed HIWEC will have precedence over general uses of these lands, but otherwise these uses may continue. Overall the HIWEC footprint will be between 200 to 280 hectares (ha) within the approximately 9,233 ha that constitute HIFN I.R. #2.

The HIWEC will use wind to generate energy through the use of commercial wind turbine generator (WTG) technology. With a total nameplate capacity of 300 MW, the HIWEC is categorized as a Class 4 wind facility.

Approximately 100 to 120 WTGs are being assessed for the HIWEC with only 90 to 100 WTGs to be constructed. The HIWEC will also include pad-mounted transformers, crane pads, 34.5 kilovolts (kV) overhead and / or underground electrical collector cables, communication lines, meteorological towers, access roads, an operations and maintenance (O&M) building, an on-Reserve transmission line (up to 500 kV) within the study area, two 34.5 – up to 500 kV transformer stations (TSs), construction compounds and storage yards. It will include other ancillary facilities as required, such as a concrete batch plant(s), crusher(s), and parking areas.

HIFN has broad authority to manage and protect its Reserve lands. This authority comes from the *First Nations Land Management Act* (FNLMA), related instruments, and the HIFN Land Code. This authority includes responsibility for environmental protection and the environmental assessment of projects and physical activities on Reserve lands.

Off-Reserve there will be a new transmission line to deliver the electricity generated by the HIWEC to the Ontario electricity grid. Two potential routes are currently being considered. One route (Route A) extends east from the HIWEC study area and connects to the existing 500 kV Hydro One Networks Inc. (HONI) transmission line. Route A is approximately 20 km in length. The second route (Route B) generally follows Highway 69 and the existing 500 kV HONI corridor south to connect to HONI's 230 kV transmission line south of Parry Sound. Route B is

approximately 90 km in length. Both routes will require a new TS or switchyard to connect to the HONI 500 kV line or 230 kV line. Route A is predominantly located on Crown-owned or managed lands and Route B is a combination of Crown-owned or managed lands and private ownership.

The off-Reserve transmission line is not within the regulatory authority of HIFN powers and responsibilities set out in the FNLMA or the Land Code. The off-Reserve transmission line is undergoing an EA under Ontario Regulation 116/01. Nevertheless, HIFN seeks to ensure that this EA considers this off-Reserve electricity transmission and its effects so that HIFN may fully understand the implications of approving what is proposed on-Reserve. The off-Reserve transmission line is described in a separate document provided in **Volume B** of the Final Draft EA Report.

### 1.1.1 Summary of Description Report Requirements

The requirements for the Description 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 Description Report Requirements under HIFN EA Guidance Document**

Requirement	Completed	Corresponding Section
Description of any energy sources to be used to generate electricity	Yes	Section 1.1
Description of the facilities, equipment or technology that will be used to convert the energy source to electricity	Yes	Section 2.0
The class of the wind energy project	Yes	Section 1.1
Description of the activities that will be engaged in as part of the HIWEC	Yes	Section 3.0
The name plate capacity of the HIWEC	Yes	Section 1.1
Description of the permissions that are required to access and use the land on which the HIWEC is to be located and whether they have been obtained	Yes	Section 1.1
Description of any negative environmental effects that may result from engaging in the HIWEC	Yes	Section 4.0
An unbound, well-marked, legible and reproducible map that is an appropriate size to fit on a 215 mm by 280 mm page, showing the HIWEC location and the land within 300 m of the HIWEC location	Yes	Figure 1-1

A Draft Description Report was distributed to HIFN, the Municipality of Killarney, the Britt and Byng Inlet Local Service Board and the Ministry of Northern Development and Mines (MNDM) Sudbury District Office on January 23, 2015 in support of Public Information Centre #1 and Community Information Centre #1. Concurrently, members of the public were sent notices to indicate the locations where the Draft Description Report could be reviewed, both in person and on the HIWEC website.

This Interim Draft Description Report has been posted to the HIW website to provide information about the HIWEC to HIFN and its members, the public, government agencies and other stakeholders, as early as possible in the EA process.

## 1.2 Purpose

The province of Ontario's Long Term Energy Plan (Government of Ontario, 2013), which is predated by the Integrated Power System Plan (Government of Ontario, 2008), establishes a goal of bringing 20,000 MW of renewable energy online by 2025. As part of the effort to achieve this goal, Nigig was awarded a FIT contract to

develop a 300 MW wind energy generation centre on HIFN I.R. #2. It will be a large-scale renewable energy centre capable of providing substantial economic benefits to HIFN's local economy. It will also provide economic spin-off benefits accruing to communities outside of HIFN related to procurement, construction and operation. Renewable energy contributes to a reduced reliance on fossil fuel based power generation resulting in additional environmental benefits such as reduced greenhouse gas emissions.

### 1.3 Location and Study Area

The HIWEC study area includes the entirety of HIFN I.R. #2. 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 Bikanon 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**). 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** 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 Regulatory Framework

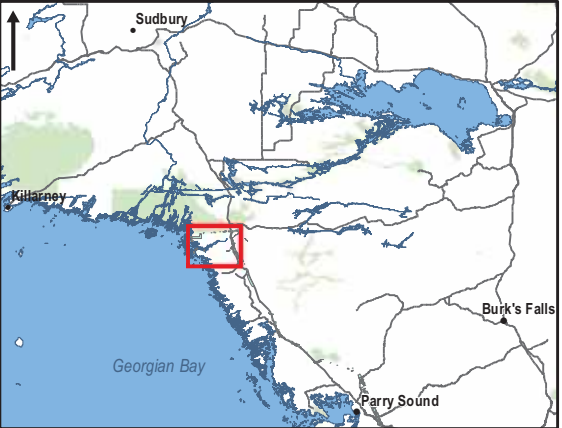
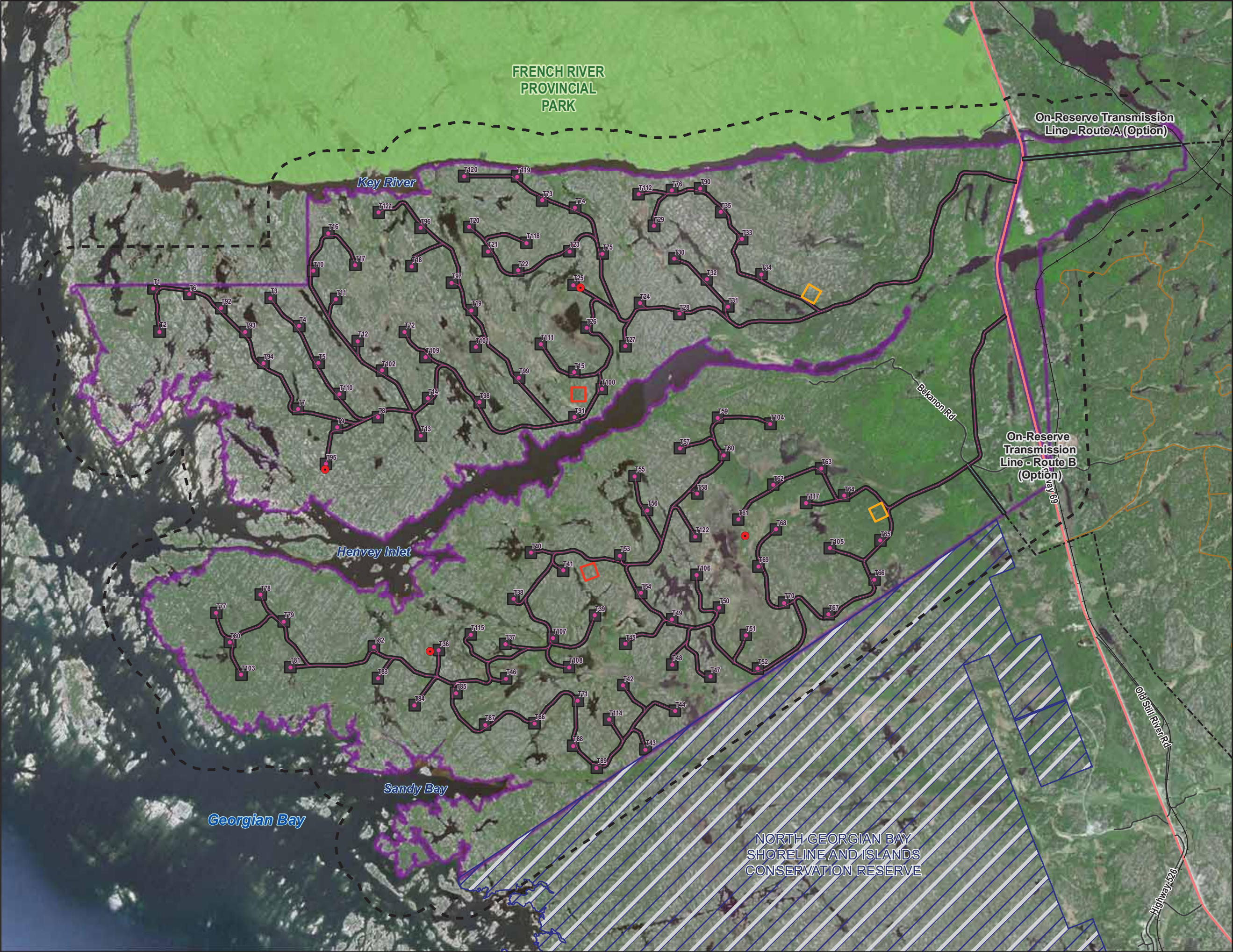
Multiple permits, licenses, and authorizations may be required to facilitate the development of the HIWEC. The ultimate applicability of all permits, licenses, and authorizations will be determined by and based upon the facility design. The following sections detail any potentially applicable regulatory approvals.

#### 1.4.1 Henvey Inlet First Nation

Pursuant to the FNLMA, the Government of Canada and HIFN have entered into agreements regarding the management of HIFN's Reserve lands, namely the Framework Agreement on Management of First Nation Land and an Individual Agreement. In 2009, HIFN adopted a formal Land Code which was amended in 2012 to apply to HIFN I.R. #2. Pursuant to these instruments, HIFN's Band Council is the decision-making authority with respect to the creation and granting of interests in lands within HIFN I.R. #2. These instruments also provide HIFN Band Council with the legislative, regulatory, and executive authority to ensure environmental management of the Reserve. This authority includes responsibility for EAs, permitting, and environmental protection for projects on HIFN lands.

HIFN has developed principles that address its overall requirements for EA and environmental protection. The principles are documented in the HIFN Environmental Stewardship Regime (HIFN 2015). The HIWEC EA must be conducted in accordance with these principles, applicable HIFN laws, and approved HIFN EA Guidance. A key principle is that "the standards for avoidance and mitigation of adverse environmental effects applicable to the Energy Centre will be at least equivalent in effect to the federal and provincial standards applicable to similar wind energy generation facilities located in Ontario, not on Reserve lands." Thus, the main body of this EA document is structured similar to typical federal EA requirements while the appendices are structured similar to typical provincial requirements.





**Legend**

- Wind Turbine Generators
- MET Towers
- Access Roads & Collector Lines
- On Reserve Transmission Line
- Off Reserve Transmission Line
- Major Roads
- Highway
- Trails
- Railways
- Construction Compounds & Laydown Yards
- Transformer Station Area
- HIWEC Location / Area of Investigation
- HIWEC Study Area
- Henvey Inlet First Nation Reserve No. 2
- Provincial Park

0 0.5 1 2  
Kilometers

**Henvey Inlet Wind Energy Centre**

Site Plan

June 2015	1:50,000	Datum: NAD 83, Zone 17 Source: Stantec, OBM, LIO
P#: 60341251	V#: 002	
<b>Figure 1-1</b>		

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The EA must be acceptable to HIFN before HIFN decides whether to issue an environmental permit for the HIWEC. If HIFN decides to issue a permit approving the HIWEC, it will use the EA to assist in developing terms and conditions of approval that may be enforced through its environmental protection laws, powers and responsibilities.

### 1.4.2 Federal

**Table 1-2** provides a list of potentially applicable permits and approvals with federal departments and agencies. Any applicable federal permits and approvals required for the HIWEC will be confirmed during the development process prior to construction. For any required federal permits, the issuing agency may be required to comply with the requirements under Section 67 of the *Canadian Environmental Assessment Act (CEAA)*, 2012.

**Table 1-2: Potentially Applicable Federal Permits and Approvals**

Permit / Approval	Approval Authority	Details
<b>Aeronautical Obstruction Clearance</b> ( <i>Lighting scheme</i> )	Transport Canada – Aviation Division	Required for WTG marking and lighting
<b>Navigation Protection Act Application for Approval</b>	Transport Canada – Marine Division	Required if crossing a navigable watercourse
<b>Explosives In Transit Permit</b> ( <i>Explosives Act</i> , 2013)	Natural Resources Canada (NRCan) - Explosives Regulatory Division	Required to transport explosives
<b>Temporary magazine license</b> (section 7(1) of the <i>Explosives Act</i> )	NRCan - Explosives Regulatory Division	Required to acquire and store certain explosives and equipment over specified quantities
<b>Permit or approvals under Species at Risk Act</b>	Environment Canada (EC)	Required if the HIWEC will destroy or remove species at risk (SAR) or critical habitat for SAR
<b>Permit to collect bird carcasses of species listed as endangered or threatened</b> ( <i>Species at Risk Act</i> )	EC	Required to collect carcasses of endangered or threatened bird species during bird mortality surveys
<b>Permit under Migratory Birds Convention Act to Collect Bird Carcasses</b>	EC-Canadian Wildlife Service (CWS)	Required to collect carcasses of bird species protected by the <i>Migratory Birds Convention Act</i> during bird mortality surveys
<b>Authorization for Watercourse Crossing</b> ( <i>Fisheries Act subsection 35(2)</i> )	Fisheries and Oceans Canada (DFO)	Potentially required if a proposed work, undertaking or activity result in serious harm to fish
<b>Aviation Safety Land Use Proposal</b>	Navigation Canada (NAV CANADA)	Required for all land use proposals near airports and air navigation infrastructure
<b>Mandatory Coordination Contacts</b>	Radio Advisory Board of Canada (RABC)	Recommended process to contact the following organizations for wind energy centres: <ul style="list-style-type: none"> <li>Industry Canada <ul style="list-style-type: none"> <li>- General Radio Frequency Database</li> <li>- Spectrum Direct</li> <li>- Broadcasting Database</li> <li>- Integrated Spectrum Observation Centre</li> </ul> </li> <li>Department of National Defence (DND) <ul style="list-style-type: none"> <li>- DND Radiocommunication Systems</li> <li>- Military Air Defence and ATC Radars</li> </ul> </li> <li>Royal Canadian Mounted Police <ul style="list-style-type: none"> <li>- Wind Farm Coordinator</li> </ul> </li> <li>Environment Canada <ul style="list-style-type: none"> <li>- Weather Radars</li> </ul> </li> <li>NAV CANADA <ul style="list-style-type: none"> <li>- Land-use Clearance</li> </ul> </li> </ul>
<b>Review of Proposal by the RCMP Mobile Communications Services</b>	Royal Canadian Mounted Police (RCMP)	Recommended review for potential signal disruptions from wind energy centres

### 1.4.3 Provincial

Because HIFN I.R. #2 is federal Crown land, the majority of provincial permits, licenses and authorizations do not apply to the HIWEC. However, there are some exceptions to this; for example, Ontario Ministry of Transportation (MTO) permits and approvals may be required within the MTO right-of-way (ROW) for Highway 69 which passes through HIFN I.R. #2. In addition, there are several requirements through the Independent Electricity System Operator (IESO) to be met for the HIWEC to connect to the provincial grid. **Table 1-3** provides a list of potentially applicable permits and approvals from provincial ministries and agencies. Any applicable provincial permits and approvals required for the HIWEC will be confirmed during the development process and in place prior to the related work element for construction or for operations, as applicable.

**Table 1-3: Potentially Applicable Provincial Permits and Approvals**

Permit / Approval	Approval Authority	Details
<b>Notice of Proposal Prohibition, Transmission or Distribution by Generators</b> (Section 80 of the <i>Ontario Energy Board Act</i> ).	Ontario Energy Board (OEB)	Notification to the OEB is required to construct a generation facility
<b>Leave to Construct</b> (Section 92 of the <i>Ontario Energy Board Act</i> )	OEB	Required for the development of a high-voltage transmission facility
<b>License to Generate Electricity</b> (Section 57 of the <i>Ontario Energy Board Act</i> )	OEB	Required to generate electricity or provide ancillary services for sale through the IESO-administered markets or directly to another person without a license
<b>License to Transmit Electricity</b>	OEB	Required for transmission of electrical power to interconnect with provincial grid
<b>Facility Registration</b>	Independent Electricity System Operator (IESO)	Registration for a physical generation facility that is connecting to the IESO-controlled grid, will participate in the IESO-administered markets or programs, or is required by a Connection Assessment to register with the IESO
<b>Connection Application</b>	HONI / IESO	The customer completes the System Impact Assessment / Customer Impact Assessment application for a generation facility and submits to both Hydro One and the IESO.
<b>Connection and Cost Recovery Agreement</b>	HONI	An agreement between HIW and HONI which includes the recovery of costs to grid operator of changes to allow connection, scope of work, costs, payment schedule etc.
<b>Certificate of Inspection and Authorization to Connect</b>	Electrical Safety Authority	Ensure work complies with Ontario Electrical Safety Code

### 1.4.4 Municipal

Because HIFN I.R. #2 is federal Crown land, municipal permits, licenses and authorizations do not apply.

## 1.5 Proponent Contact and Key Information

The following table provides key HIWEC information.

**Table 1-4: Key Information**

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



## 2. Components

The following subsections provide an overview of the various permanent and temporary HIWEC and on-Reserve transmission line components.

### 2.1 Permanent Components

#### 2.1.1 Wind Turbine Generators and Foundations

As shown on **Figure 1-1**, 100 to 120 commercial WTGs are being assessed for the HIWEC with only 90 to 100 WTGs to be constructed. The specific WTG technology is yet to be determined and will be detailed in the Final Draft EA Report. The nacelle on each WTG will be located at the top of the tower and will consist of a generator, gearbox, bearings, couplings, and auxiliary equipment. Typically, the nacelle cover is constructed from reinforced fiberglass and the blades are constructed from fiberglass along with epoxy resin. The WTG tower will be constructed from tubular steel or concrete with an approximate diameter of 5 m at the base. The tower contains an internal ladder for maintenance access.

The height of the WTG will be identified in the Final Draft EA Report; however, external lighting will be required on some of the WTGs and will be installed in accordance with the Transport Canada and NAV CANADA requirements.

Geotechnical assessments were used to determine the most suitable foundation design for each WTG. Where site specific conditions permit, rock anchors may be used to bolt the WTGs to bedrock. Alternatively, gravity spread concrete footings could be used. The foundation design will include conduits to connect to the collector system and a grounding grid consisting of copper or aluminum wire and ground rods.

The land area required for each WTG will be dependent upon the final locations of the WTGs relative to access roads, associated infrastructure, and adjacent environmental and terrain features.

#### 2.1.2 Access Roads and Crane Pads

Access roads will be constructed to support construction, operations, and decommissioning activities and to provide access to WTGs and other HIWEC infrastructure. Access roads will be designed to minimize the effects on the environment (e.g., maintaining local drainage patterns and minimizing width of disturbance). Access roads will range from 5 to 20 m wide, with additional travel clearance required to accommodate large cranes and equipment transport during construction and decommissioning. In some locations it is anticipated that rock will need to be blasted and some areas filled with crushed rock to reduce grades to allow vehicles to bring in required equipment, cranes and WTG components.

Access roads that intersect with Highway 69 will be designed in accordance with MTO standards. Applicable MTO permits will be obtained prior to construction.

Crane pads will be required to be constructed at each WTG. Typical crane pads are approximately 20 x 30 m in size. Final crane pad design will be determined based the specific requirements of the cranes used for the HIWEC. Crane pads will remain in place to support any crane activities during the operations and/or decommissioning phases of the HIWEC.

### 2.1.3 Meteorological Towers

Meteorological (Met) towers are required during the operations phase to validate the performance of the WTGs and provide meteorological data to the Independent Electrical System Operator (IESO) to support their wind forecasting activities and operation of the provincial electrical system. Met towers will be connected to the O&M building via fibre optic cables (either overhead and / or underground). Four Met towers will be utilized and their locations can be found in **Figure 1-1**. As needed, additional meteorological equipment will be used to meet IESO market requirements.

Given the rocky nature of the site, Met tower bases have and will generally be bolted to surface bedrock with guy wires and anchors for lateral support. All Met towers have and will be installed as per IESO requirements and the Canadian Standards Association (CSA) protocol for power performance measurements.

### 2.1.4 Pad-Mounted Transformers and Collector lines

A pad-mounted transformer will be located at the base of each WTG to step-up the voltage of electricity generated to the collector system voltage (e.g., 690 V to 34.5 kV). Each pad-mounted transformer will be affixed to a precast or poured in place concrete pad. Power cables entering and exiting the pad-mounted transformer will be installed underground along with a grounding grid consisting of copper or aluminum wire and grounding rods.

From each pad-mounted transformer, above or below ground 34.5 kV collector lines will carry electricity from the WTGs to the HIWEC's TSs. Fibre optic communication lines will be installed along with the collector system.

The collector lines may include overhead or below ground sections dependent on site specific conditions, however it is anticipated that the collector system will be primarily aboveground due to the rocky nature of the site. Aboveground collector lines will be constructed on standard single wooden pole structures. Collector lines will generally follow the access roads to reduce construction area and to minimize potential construction effects. Water crossings for the collector lines will likely be overhead and will be constructed according to the federal and provincial requirements.

### 2.1.5 Transformer Stations

Two TSs will be constructed on HIFN I.R. #2 to step up the 34.5 kV voltage of the collector lines to the 230 kV or 500 kV voltage of the transmission line that will transport electricity to the provincial transmission grid. One TS will be located on the north side and the other on the south side as shown in **Figure 1-1**.

The HIWEC TSs will consist primarily of power transformers, grounding transformers, 34.5 kV and up to 500 kV circuit breakers and disconnect switches, surge arrestors, instrument transformers, meters, a protection and control building, and ancillary equipment, along with associated concrete foundations to mount the equipment. The HIWEC TSs will be located on a graded area, roughly 50 m x 50 m, which will be confirmed during the detailed design phase. The HIWEC TSs will be fenced and secured to prevent unauthorized entry and maintain public safety. All non-current carrying and conducting metal components within the TS area will be connected to a grounding grid installed below finished grade.

### 2.1.6 On-Reserve Transmission Towers and Foundations

From the HIWEC TSs, a section of overhead transmission line of up to 500 kV will be constructed on HIFN I.R. #2. The transmission line will consist of Aluminum Conductor Steel Reinforced (ACSR) cable. The conductors will be attached to insulators and tower structures that will be approximately 30 to 40 m in height. An Optical Ground Wire (OPGW) will be installed on the transmission line to facilitate communications between the HIWEC and the TSs.

The towers will be steel monopole and / or wood structures directly buried, erected on concrete foundations or bolted to bedrock as appropriate for the tower location. On average, the structures will be spaced approximately 200 to 400 m apart except where site specific conditions require shorter or longer tower spans (e.g., significant changes in line direction, large waterbody crossings, or in compliance with design codes and laws).

### **2.1.7 Operations and Maintenance Building**

An O&M building will be constructed to monitor the day-to-day operations of the HIWEC and provide an area for storage of spare parts and maintenance equipment. The O&M building will require a concrete foundation and may include offices, staff parking, a workshop, parts and vehicle storage, a septic system, water well(s), a storage yard, and other ancillary facilities.

Fencing will surround the building for security purposes. Domestic water, if required, will be supplied from a water well. Wastewater will be delivered to a septic system or tank for removal off-site. A small amount of domestic solid waste (e.g., garbage, recycling, and organics) will be generated by workers during maintenance activities and will be collected and permanently disposed of at a licensed facility. Power to the O&M building will be supplied through the local distribution network with a back-up, liquid fuel-fired generator.

## **2.2 Temporary Components**

During HIWEC construction, lands will be temporarily used for: construction compounds and laydown yards; construction areas surrounding infrastructure including parking areas (e.g., WTG staging areas); concrete batch plant(s); crusher(s) and water withdrawal points. Temporary cleared areas will be minimized as much as possible and will be limited to the minimum area required to safely and efficiently support associated construction activities. Following construction, temporary areas will be restored to a safe and clean condition.

### **2.2.1 Construction Compounds & Laydown Yards**

Temporary construction compounds and laydown yards will be required to support general construction activities and for temporary storage of WTG components, electrical equipment (e.g., cable reels and pad-mounted transformers), construction materials, containers, vehicles, equipment, office trailers, concrete batch plant(s), crusher(s) and portable toilets. Typically, these areas are cleared and graded. Temporary storage of materials will conform to applicable codes, including any fuel storage which will have adequate secondary containment and bollards for impact protection. The location of the temporary construction compounds and laydown yards are shown in **Figure 1-1**.

### **2.2.2 Wind Turbine Generator Staging Areas**

A staging area will be cleared around each WTG location to support assembly of the WTGs, provide space for construction equipment, and for storage of material excavated for foundation construction. Staging areas will be cleared and leveled (with gravel or blasted rock if required) on land adjacent to the base of the WTGs. Geotextile will be used to facilitate removal of gravel following construction activities if required. WTG components will either be delivered to the construction compounds for temporary storage or directly to the staging areas for assembly. If required, portable generator sets used for WTG pre-commissioning may also be located in these areas.

### **2.2.3 Concrete Batch Plant(s)**

At least one temporary concrete batch plant will be located within a construction compound, and will produce concrete required for HIWEC construction. Site preparation for the plant will consist of clearing, grading and leveling activities. Concrete batching activities will occur in parallel with the relevant HIWEC construction activities (i.e., foundation installation).

Aggregate materials required for concrete will be obtained from local aggregate sources in the vicinity of HIFN I.R. #2.

### **2.2.4 Crusher(s)**

One or more temporary crushers will be located within a construction compound, and will crush rock from blasting activities. Blasting will be needed to remove rock for access roads. The crushed rock will then be used to fill areas needed for access roads. Site preparation for the crusher will consist of clearing, grading and levelling activities. Crushing activities will occur in parallel with the access road construction.

### **2.2.5 Parking Areas**

Parking areas for staff of HIW and its partners will be located in appropriate locations, such as construction compounds and laydown yards.

## 3. Phases, Activities and Schedule

### 3.1 Construction

Activities that may occur during the pre-construction phase include: planning and resource management, pre-construction surveys, geotechnical investigations, Met tower installation, permitting and detailed design.

The construction phase may consist of the following key activities:

- Site preparation
  - Delineation of work area and installation of erosion and sediment control measures
  - Vegetation clearing and site grading
  - Delineation and preparation of temporary work areas
- Construction of access roads and laydown areas
  - Construction of access roads as required (including blasting)
  - Installation of temporary facilities including concrete batch plant(s), crusher(s), WTG staging areas, construction compounds and laydown yards
- Transportation of equipment and materials
  - On-site delivery of construction vehicles, equipment and materials
- Foundation excavation and construction
  - Installation (includes excavation, blasting and construction as required) of WTG foundations
  - Installation (includes excavation, blasting and construction as required) of crane pads
  - Installation (includes excavation, blasting and construction as required) of pad-mounted transformers
  - Installation (includes excavation, blasting and construction as required) of TS foundations
  - Installation (includes excavation, blasting and construction as required) of O&M foundation and building
- WTG installation
  - Erection of WTGs
- Collector system and transmission line installation
  - Installation of above and / or below ground electrical collector lines
  - Installation of on-Reserve transmission infrastructure
- Installation of TSs
- Construction completion
  - Reclamation of temporary construction areas
  - Demobilization of construction works
- Power connection and commissioning

### 3.2 Operations and Maintenance

The HIWEC will be designed to operate for 30+ years; however, it is not uncommon for well-maintained facilities to extend beyond this design life. With the exception of routine and unplanned maintenance, it is expected that operation of the HIWEC will be 24 hours a day, 7 days a week. The HIWEC will be controlled and monitored remotely 24 hours a day via computer, with a team of locally based turbine technicians conducting routine maintenance and repairs. Operation is anticipated to require up to 15 trained technical and administrative staff, including WTG maintenance technicians and a site supervisor.

The operations and maintenance phase may consist of the following key activities:

- HIWEC operation
  - WTG operation
  - Meter calibrations
  - Met tower data acquisition
- WTG, collector system, road and crossing repair / maintenance
  - Preventative and unplanned maintenance of HIWEC components (includes accessing such components)
  - Maintenance of the collector system and any on-Reserve transmission lines (includes accessing such components)
  - Access road maintenance
- Environmental monitoring

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, up to four (4) Met towers up to 100 m tall will be installed for the HIWEC (three (3) have been installed and one (1) will be installed in summer 2015). 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. Nacelle-mounted meteorological data collection points will be located such that no WTG will be located further than 5 km from the nearest data collection point.

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 that is considered to be out of the normal operating range for a WTG, the WTG will be taken out of service immediately. Through the Supervisory Control and Data Acquisition (SCADA) system, the status of the WTG will be reported to the HIWEC operator. 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.

Routine preventative maintenance activities will be scheduled at approximately six month intervals with specific maintenance tasks scheduled for each interval. Scheduled maintenance activities for WTGs will include a complete inspection of the tower and 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.

WTGs are very reliable and major components are designed to operate for over 20 years. However, there is a possibility that component failure may occur despite the 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 facility 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 which was used to install the WTGs, may be required.

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. Vegetation control will be required around the collector lines and on-Reserve transmission line to prevent any damage to the lines and ensure safe operation. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw/hydro axe).



### 3.3 Decommissioning

Although the HIWEC is expected to operate for 30+ years, it could also be repowered prior to considering any decommissioning activities to extend the design life. Repowering may involve switching / upgrading gearboxes and generators, replacing WTG blades, and upgrading electrical equipment.

The decommissioning phase may include the following key activities, at the discretion of HIFN:

- Power disconnection and decommissioning of service
  - Disconnection of collector TSs
- Transportation of materials
  - On-site delivery of decommissioning vehicles and equipment
  - Removal of HIWEC components and infrastructure from site
- Disassembly and removal of collector system components
  - Disassembly and removal of collector TSs
  - Disassembly and removal of pad-mounted transformers
  - Disassembly and removal of above and / or below ground electrical collector lines
  - Disassembly and removal of on-Reserve transmission infrastructure
- WTG and / or tower disassembly and removal
  - Disassembly and removal of WTG infrastructure
  - Disassembly and removal of Met towers
- Disassembly and removal of O&M building infrastructure
- Decommissioning completion
  - Reclamation of disturbed areas (includes reclamation of access roads)
  - Grading of concrete foundations
  - Demobilization of decommissioning works

The specific schedule for decommissioning will be determined at the time it is undertaken.

### 3.4 Other Activities

#### 3.4.1 Waste Generation

The amount of waste generated by the installation, operation and decommissioning of the HIWEC is expected to be minimal. Waste materials generated during the construction phase are anticipated to include excess fill, soil, brush, scrap wood, metal, steel, plastic, packaging, grease, oil and domestic waste. Operation and maintenance will result in waste materials such as oil, grease, batteries, air filters and domestic waste. Any waste generated will be disposed of at appropriate waste facilities with an emphasis on recycling materials, whenever possible.

During construction and decommissioning, waste material will be generated by, and transported from, the HIWEC. Waste materials may include: equipment packaging, scrap materials as a by-product of construction (e.g., wood, metals, and plastics), fuels, and other lubricants. These materials will be removed from the site for reuse, recycling, and/or disposal at approved off-site facilities.

Waste oils will be generated during operation and maintenance activities. Waste oils may be temporarily stored onsite at designated locations designed and maintained in accordance with applicable legislation. Waste materials will be removed from the site and disposed of or recycled at approved off-site facilities. There will be no on-site disposal of waste.

### 3.4.2 Toxic/Hazardous Materials

Typically, there is little material that could be classified as toxic or hazardous that is used in constructing and operating a wind farm. Toxic or hazardous materials used during the construction and operations phases include oils, fuel and lubricants that will be used in vehicles and construction/maintenance equipment. Only minor amounts of these materials will be generated and the small quantities will be disposed of at approved off-site waste facilities.

### 3.4.3 Sewage

During the construction phase, portable toilets will be used and a licensed contractor will be responsible for waste removal. The O&M building for the HIWEC will include bathroom facilities that will be constructed and serviced in accordance with federal and provincial regulations. Wastewater will be delivered to a septic system or tank for removal off-site.

### 3.4.4 Stormwater

All site grading that has the potential to impact stormwater runoff will be done in accordance with best management practices (BMPs). Effective stormwater controls will be employed during construction and decommissioning of the HIWEC.

### 3.4.5 Water-taking Activities

Installation of WTG foundations could require dewatering (also termed “water-taking” activity) in some locations due to an inflow of groundwater into the excavation. Dewatering has the potential to interrupt the natural quantity or flow of groundwater to a natural feature (watercourses, wetlands, other features with seasonal inundation). Where dewatering is required, the pumped groundwater may be directed to a nearby natural feature where available and in some cases may be directed over land. In addition, pumping of groundwater from foundation excavations and subsequent release to a natural feature has the potential to introduce sediment to the feature in which appropriate erosion and sedimentation control measures will be installed. If discharged to a watercourse, it has the potential to change watercourse hydrology and water temperature.

Water taking will likely be required during construction to control dust along access roads and for batching of concrete. Water extraction points will be identified at surface water sources with sufficient capacity to provide water.

## 3.5 Schedule

Table 3-1 below outlines the anticipated timelines for the development of the HIWEC:

**Table 3-1: HIWEC Milestones**

HIWEC Milestone	Anticipated Date
Host Public Information Centre #1	February, 2015
Complete Interim Draft EA Reports	June, 2015
Host Public Information Centre #2	July, 2015
Submit Final Draft EA Report to HIFN	August, 2015
Permit Decision by HIFN	December, 2015
Obtain Pre-Construction Permits	March, 2016
Start Construction	May, 2016
Commence Operations and Maintenance	January, 2018



## 4. Description of Potential Environmental Effects

This section provides a summary of the potential environmental effects that may result from the construction, operation and decommissioning of the HIWEC. The assessment of potential environmental effects has been completed in accordance with the HIFN EA Guidance document and it addresses 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 assessment of potential environmental effects, including preliminary proposed mitigation measures, as a result of construction, operations and decommissioning 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 will be confirmed based on site conditions identified through field investigations occurring during the spring and summer of 2015. In the subsequent Draft Description Report of the Final Draft EA Report, net effects, which are those effects that remain following the application of proposed mitigation measures and monitoring commitments, will then be determined based on professional judgment as well as previous project experience. Where possible, the importance of residual adverse effects will be described based on the following:

**Magnitude** ..... the size or degree of the effect compared against baseline conditions; and

**Likelihood** ..... the probability that the effect will occur.

Finally, monitoring commitments will be identified in the subsequent Draft Description Report of the Final Draft EA Report. They are intended to verify that the proposed mitigation measures achieve performance objectives. Should the monitoring during the construction and operation of the HIWEC reveal that the proposed mitigation measures are not achieving the intended results; the identified contingency measures will then be implemented.

### 4.1 Cultural Heritage and Archaeology

#### 4.1.1 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 existing social, cultural or economic features or conditions that have 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 4.6**. In order to fully understand the potential effects of the proposed HIWEC on built heritage and cultural heritage landscapes, a preliminary Heritage Assessment was completed to identify heritage resources including cultural heritage and heritage landscapes of cultural value or interest. The preliminary Heritage Assessment included research on the land use history of the HIWEC study area, cultural heritage features, cultural heritage landscapes and protected properties.

During the preliminary review of cultural heritage resources for the HIWEC, no designated or listed heritage properties and / or structures were identified within the HIWEC study area. Additionally, no historical plaques, National Historic sites, registered cemeteries, or unregistered cemeteries were identified. However, a number of First Nation burial sites, traditional hunting sites, areas of special importance, and sacred sites were identified through a confidential traditional knowledge and land use study provided by HIFN. Five 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.

Although the results of this preliminary study have identified a number of cultural heritage resources for consideration, there remains the potential for additional properties or features with heritage significance to be identified within the HIWEC study area during the formal heritage assessment process to be documented in the Final Draft EA Report.

During Stage 1 and 2 archaeological assessments, the potential presence of archaeological sites / resources are determined and the effects of the proposed undertaking on archaeological sites or material are evaluated. During the Stage 1 assessment, areas of archaeological potential were identified using desktop sources in the HIWEC study area.

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 use, early transportation routes, identified burial grounds, previous settlements and areas identified by the community as being of heritage 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 the archaeological potential. 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 1 Archaeological Assessment Report will be provided in the Final Draft EA Report.

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 will involve 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 if required, and recommendation for further work will be presented in a Stage 2 Archaeological Assessment Report.

## **4.1.2 Potential Effects and Proposed Mitigation Measures**

### **4.1.2.1 Construction and Decommissioning**

**Table 4-1** identifies potential effects on cultural heritage and archaeological resources that might occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

**Table 4-1: Proposed Mitigation Measures Associated with Potential Effects to Cultural Heritage and Archaeological Resources Resulting from Construction and Decommissioning**

Potential Effects	Performance Objectives	Proposed Mitigation Measures
<b>Disturbance or Displacement of Cultural Heritage and Archaeological Resources Due to Construction / Decommissioning of HIWEC Infrastructure.</b>	<ul style="list-style-type: none"> <li>Avoid disturbance / loss of cultural heritage and archaeological resources.</li> </ul>	<ul style="list-style-type: none"> <li>HIWEC components are to be sited to avoid Nishshing Aki and any other cultural heritage or archaeological resource located on HIFN I.R. #2.</li> <li>Should any components of the HIWEC be placed on or adjacent to any potential archaeological resources, Stage 3 and 4 Archaeological Assessments will be completed to document the site and remove any artifacts. All artifacts are the property of HIFN.</li> <li>Pictograph and associated cultural heritage landscapes are to be protected during construction / decommissioning.</li> <li>Should artifacts be found during the construction or decommissioning of the HIWEC, all work in the vicinity of the discovery will be halted until the site can be investigated and cleared by a licensed archaeologist. All artifacts are the property of HIFN.</li> <li>If human remains are found, HIFN will be notified immediately. Prior to construction, the protocol to be followed should human remains be found will be determined in consultation with HIFN and documented. Under the direction of HIFN, the Ontario Provincial Police, or local police, will be notified.</li> </ul>

#### 4.1.2.2 Operations

No effects to cultural heritage or archaeological resources are anticipated as a result of the operational phase, as HIWEC components have been sited to avoid any features. Therefore, no mitigation measures are proposed.

## 4.2 Natural Heritage

### 4.2.1 Existing Conditions

#### 4.2.1.1 Wetlands and Vegetation Communities

The HIWEC study area is located in the Ecoregion 5E (Georgian Bay Ecoregion) which is situated in south-central Ontario on the Canadian Shield and comprises 7,447,869 ha. It extends from Lake Superior in the west to the Quebec border in the east (Crins *et al.*, 2009). The majority (32%) of the Ecoregion is dominated by mixed forest. Deciduous forest covers 22%, followed by coniferous forest (12%) and sparse forest (11%). Dominant trees represent a mixture of Great Lakes- St. Lawrence forest species and Boreal forest species, including Eastern White pine (*Pinus strobus*), Red Pine (*Pinus resinosa*), Eastern Hemlock (*Tsuga canadensis*), Black Spruce (*Picea mariana*), White Spruce (*Picea glauca*), Balsam Fir (*Abies balsamea*), Jack Pine (*Pinus banksiana*), Tamarack (*Larix laricina*), Yellow Birch (*Betula allegheniensis*), Sugar Maple (*Acer saccharum*) and other hardwoods (Crins *et al.*, 2009).

Based on the background review, the following Rare Vegetation Communities were identified as potentially occurring within the HIWEC study area:

- *Shallow Atlantic Coastal Marshes*
- *Cliffs and Talus Slopes*
- *Precambrian Rock Barrens*
- *Old-growth or Mature Forests*
- *Bogs*
- *Rare Forests (Red Spruce, Jack Pine and White Oak)*

Past surveys completed by Stantec identified several wetland communities in the HIWEC study area including coniferous swamps (SWC), deciduous swamps (SWD), fens including treed, shrub and open (FET, FES and FEO), meadow and shallow marshes (MAM and MAS), coastal marshes and fens, and coastal shallow waters (AECOM, 2015).

#### 4.2.1.2 Birds

The following bird habitats (including birds listed under the *Migratory Birds Convention Act, 1994 (MBCA)*) were identified as potentially occurring in the HIWEC study area through the background review:

- *Waterfowl Stopover and Staging Areas (Aquatic)*
- *Shorebird Migratory Stopover Areas (Shorebird Staging)*
- *Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)*
- *Colonially-Nesting Bird Breeding Habitat (Trees/Shrubs)*
- *Colonially-Nesting Bird Breeding Habitat (Ground)*
- *Waterfowl Nesting Areas*
- *Bald Eagle and Osprey Nesting, Foraging and Perching Habitat*
- *Woodland Raptor Nesting Habitat*
- *Mast Producing Areas*
- *Marsh Bird Breeding Habitat*

The presence, boundaries and characteristics of these Important Wildlife Habitats (IWH)<sup>1</sup> within the HIWEC study area will be determined during the field studies scheduled in the spring and summer 2015.

#### 4.2.1.3 Mammals

The following mammal habitats were identified as potentially occurring in the HIWEC study area through the background review:

- *Bat Hibernacula*
- *Bat Maternity Colonies*
- *Deer Yarding Areas*
- *Aquatic Feeding Habitat*
- *Mineral Licks*
- *Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf*
- *Mast Producing Areas*
- *Deer Movement Corridors*
- *Furbearer Movement Corridors*

The presence, boundaries and characteristics of these IWH within the HIWEC study area will be determined during the field studies scheduled in the spring and summer 2015.

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1. **Important Wildlife Habitat (IWH):** A wildlife habitat that is ecologically important in terms of features, functions, representation or amount and contributing to the quality and diversity of an identifiable geographic area or Natural Heritage System.

#### 4.2.1.4 Amphibians

The following amphibian habitats were identified as potentially occurring in the HIWEC study area through the background review:

- *Amphibian Breeding Habitat (Woodland)*
- *Amphibian Breeding Habitat (Wetland)*
- *Amphibian Corridors*

The presence, boundaries and characteristics of these IWH within the HIWEC study area will be determined during the field studies scheduled in the spring and summer 2015.

#### 4.2.1.5 Reptiles

The following reptile habitats were identified as potentially occurring in the HIWEC study area through the background review:

- *Turtle Wintering Areas*
- *Reptile Hibernacula*
- *Turtle and Lizard Nesting Areas*

The presence, boundaries and characteristics of these IWH within the HIWEC study area will be determined during the field studies scheduled in the spring and summer 2015.

#### 4.2.1.6 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 as part of the background review. SOCC for the HIWEC study area 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 18 SOCC were identified as occurring or having the potential to occur within the HIWEC study area based on the background review. These are summarized in **Table 4-2**. Of these, 15 species were recorded within the HIWEC study area either by LGL or Stantec in 2011 and 2013, respectively. LGL 2012 data is currently being compiled and will be presented in the Final Draft EA Report.

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 previous field studies completed by LGL and Stantec.

**Table 4-2: SOCC Potentially Occurring in the HIWEC Study Area**

Common Name	Scientific Name	S-rank <sup>1</sup>	ESA Status <sup>2</sup>	COSEWIC Status <sup>3</sup>	SARA Status <sup>4</sup>	Observed in 2011	Observed in 2013
<b>Bird Species (9)</b>							
Bald Eagle	<i>Haliaeetus leucocephalus</i>	S2	SC	NAR	NAR	Yes	Yes
Black Tern	<i>Chlidonias niger</i>	S3	SC	NAR	NAR	No	Yes
Caspian Tern	<i>Sterna caspia</i>	S3	NAR	NAR	NAR	No	Yes
Eastern Wood-Pewee	<i>Contopus virens</i>	S4	SC	SC	No Status (No Schedule)	No	Yes
Peregrine Falcon	<i>Falco peregrinus</i>	S3	SC	SC	SC (Schedule 1)	No	No
Prairie Warbler	<i>Setophaga discolor</i>	S3	NAR	NAR	NAR	No	Yes
Rusty Blackbird	<i>Euphagus carolinus</i>	S4	NAR	SC	SC (Schedule 1)	No	Yes
Wood Thrush	<i>Hylocichla mustelina</i>	S4	SC	THR	No Status (No Schedule)	No	Yes
Yellow Rail	<i>Coturnicops noveboracensis</i>	S4	SC	SC	SC (Schedule 1)	No	Yes
<b>Insect Species (3)</b>							
Horned Clubtail	<i>Argomphus cornutus</i>	S3	-	-	-	No	Yes
Monarch	<i>Danaus plexippus</i>	S2	SC	SC	SC (Schedule 1)	No	Yes
Mottled Darner	<i>Aeshna clepsydra</i>	S3	-	-	-	No	Yes
<b>Mammal Species (1)</b>							
Eastern Wolf	<i>Canis lupus lycaon</i>	S4	SC	SC	SC (Schedule 1)	No	Yes
<b>Reptile Species (5)</b>							
Common Five-lined Skink (Southern Shield population)	<i>Plestiodon fasciatus pop. 2</i>	S3	SC	SC	SC (Schedule 1)	Yes	Yes
Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	S3	SC	SC	SC (Schedule 1)	No	No
Milksnake	<i>Lampropeltis triangulum</i>	S3	SC	SC	SC (Schedule 1)	No	Yes
Northern Map Turtle	<i>Graptemys geographica</i>	S3	SC	SC	SC (Schedule 1)	No	No
Snapping Turtle	<i>Chelydra serpentina</i>	S3	SC	SC	SC (Schedule 1)	Yes	Yes

#### 4.2.1.7 Species at Risk

Species protected under the federal *Species at Risk Act, 2002 (SARA)* and provincial *Endangered Species Act, 2007 (ESA)* are addressed in the following sections.

Species listed as Endangered or Threatened under Schedule 1 of the *SARA* are protected on HIFN I.R. #2. A total of 16 federally protected species, including five (5) Endangered species and 11 Threatened, were identified as occurring or having the potential to occur within the HIWEC study area based on the background review. Of these, ten (10) species were recorded within the HIWEC study area either by LGL or Stantec in 2011 and 2013, respectively. These species are listed in **Table 4-3**.



**Table 4-3: Federal Terrestrial Species at Risk Potentially Occurring in the HIWEC Study Area**

Common Name	Scientific Name	S-rank <sup>1</sup>	ESA Status <sup>2</sup>	COSEWIC Status <sup>3</sup>	SARA Status <sup>4</sup>	Observed in 2011	Observed in 2013
<b>Amphibian Species (1)</b>							
Western Chorus Frog (Great Lakes / St. Lawrence - Canadian Shield Population)	<i>Pseudacris triseriata</i> pop. 1	S3	NAR	THR	THR (Schedule 1)	Yes	Possibly but not confirmed
<b>Bird Species (6)</b>							
Canada Warbler	<i>Cardellina pusilla</i>	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Common Nighthawk	<i>Chordeiles minor</i>	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	S4	SC	THR	THR (Schedule 1)	No	No
Least Bittern	<i>Ixobrychus exilis</i>	S4	THR	THR	THR (Schedule 1)	No	No
Olive-sided Flycatcher	<i>Contopus borealis</i>	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Whip-poor-will	<i>Caprimulgus vociferus</i>	S4	THR	THR	THR (Schedule 1)	Yes	Yes
<b>Mammal Species (3)</b>							
Little Brown Bat	<i>Myotis lucifugus</i>	S4	END	END	END (Schedule 1)	No	No
Northern Myotis Bat	<i>Myotis septentrionalis</i>	S4	END	END	END (Schedule 1)	No	No
Tri-coloured Bat	<i>Perimyotis subflavus</i>	S3?	END	END	END (Schedule 1)	No	No
<b>Reptile Species (6)</b>							
Blanding's Turtle	<i>Emydoidea blandingii</i>	S3	THR	THR	THR (Schedule 1)	Yes	Yes
Eastern Foxsnake (Georgian Bay population)	<i>Pantherophis gloydi</i> pop. 1	S3	THR	END	END (Schedule 1)	Yes	Yes
Eastern Hog-nosed Snake	<i>Heterodon platirhinos</i>	S3	THR	THR	THR (Schedule 1)	No	No
Eastern Musk Turtle	<i>Sternotherus odoratus</i>	S3	SC	SC <sup>5</sup>	THR (Schedule 1)	Yes	No
Massasauga Rattlesnake (Great Lakes / St. Lawrence population)	<i>Sistrurus catenatus</i> pop. 1	S3	THR	Non-Active	THR (Schedule 1)	Yes	Yes
Spotted Turtle	<i>Clemmys guttata</i>	S3	END	END	END (Schedule 1)	Yes	Yes

#### Notes for Tables 4-2-4-3

- <sup>1</sup>**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 to 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.

- <sup>2</sup> **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.
- <sup>3</sup> **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.
- <sup>4</sup> **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>

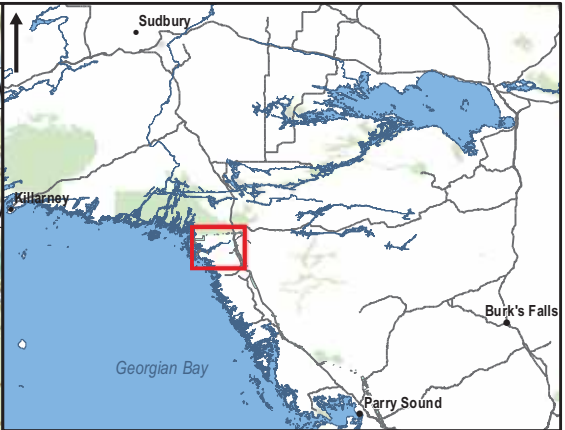
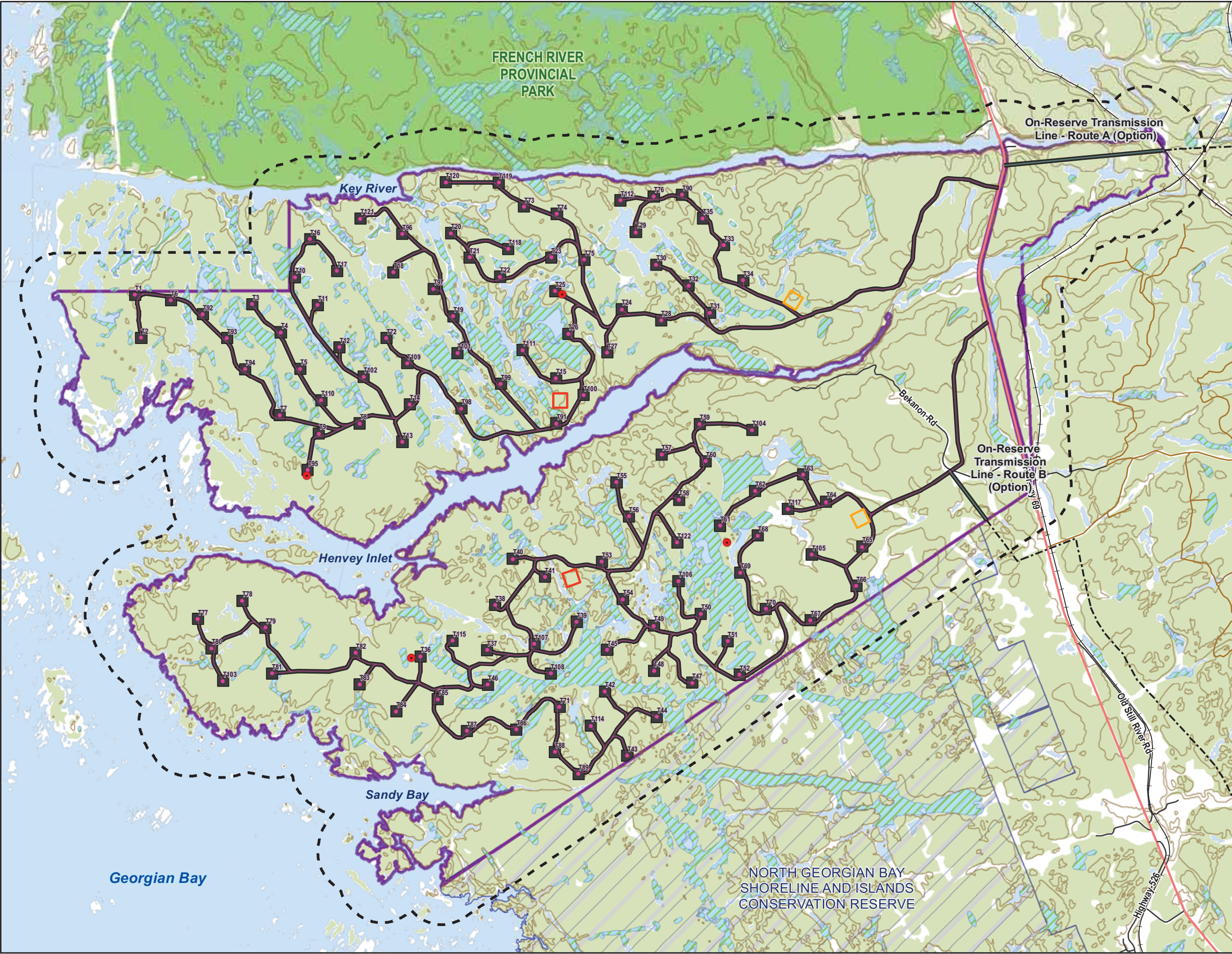
These species may require permits and / or authorization administered by Environment Canada – Canadian Wildlife Services (EC-CWS) if the proposed HIWEC activities are likely to contravene the general or critical habitat prohibition provisions (to be determined in consultation with EC-CWS).

No federally protected aquatic species were identified within the HIWEC study area.

## 4.2.2 Potential Effects and Proposed Mitigation Measures

The Natural Heritage Assessment (NHA) Environmental Impact Study (EIS) Report describes the potential effects, proposed mitigation measures, and net effects of constructing, operating, and decommissioning the HIWEC on important natural features. An Environmental Effects Monitoring Plan (EEMP) describes the post-construction monitoring plan for bird and bat mortality and related proposed mitigation and contingency measures, as well as post-construction monitoring requirements for potential operational effects to identify IWH. The findings of these reports are summarized below; key natural heritage features are provided in site plan **Figure 4-1**. The NHA also identifies the potential impacts and associated proposed mitigation measures related to SAR. The NHA EIS and EEMP will be provided in the Final Draft EA Report.





**Legend**

- Wind Turbine Generators
- MET Towers
- Access Roads & Collector Lines
- On Reserve Transmission Line
- Off Reserve Transmission Line
- Railways
- Major Roads
- Highway
- Trails
- Construction Compounds & Laydown Yards
- Transformer Station Area
- HIWEC Location / Area of Investigation
- HIWEC Study Area
- Henvey Inlet First Nation Reserve No. 2
- Provincial Park

**Natural Heritage Features**

- Contours (5 m)
- Waterbodies
- Wetlands
- Conservation Reserve
- Wooded Areas

00.512

Kilometers

**Henvey Inlet Wind Energy Centre**

**Site Plan & Natural Heritage Features**

June 2015	1:50,000	Datum: NAD 83, Zone 17 Source: Stantec, OBM, LIO
P#: 60341251	V#: 002	
<b>Figure 4-1</b>		

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#### 4.2.2.1 Generalized Candidate Important Wildlife Habitat

**Table 4-4** describes the proposed mitigation measures associated with potential effects to Generalized Candidate IWH resulting from construction and decommissioning.

**Table 4-5** describes the proposed mitigation measures associated with potential effects to Generalized Candidate IWH resulting from operations.

#### 4.2.2.2 Important Wildlife Habitat

Proposed mitigation measures associated with potential effects to IWH resulting from construction, decommissioning and operations will be provided in the subsequent Draft Description Report of the Final Draft EA Report.

#### 4.2.2.3 Important Wetlands<sup>2</sup>

**Table 4-6** describes the proposed mitigation measures and monitoring plan associated with potential effects to Important Wetlands resulting from construction and decommissioning.

**Table 4-7** describes the proposed mitigation measures and monitoring plan associated with potential effects to Important Wetlands resulting from operations.

#### 4.2.2.4 Important Woodlands<sup>3</sup>

**Table 4-8** describes the proposed mitigation measures and monitoring plan associated with potential effects to Important Woodlands resulting from construction and decommissioning.

**Table 4-9** describes the proposed mitigation measures and monitoring plan associated with potential effects to Important Woodlands resulting from operations.

#### 4.2.2.5 Species at Risk

Proposed mitigation measures associated with potential effects to Species at Risk resulting from construction, decommissioning and operations will be provided in the subsequent Draft Description Report of the Final Draft EA Report.

- 
2. **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.
  3. **Important Woodland:** Treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield, 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 4-4: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures
<ul style="list-style-type: none"><li>Increased erosion and sedimentation into woodlands, wetlands and other natural features resulting from construction activity.</li><li>Removal / disturbance of topsoil and increased soil compaction from manoeuvring of heavy machinery, excavation, backfilling, and other construction activity.</li></ul>	<ul style="list-style-type: none"><li>Minimize erosion and sedimentation from clearing, grubbing, excavation, backfilling and stockpiling.</li><li>Minimize removal / disturbance of topsoil and minimize soil compaction</li></ul>	<ul style="list-style-type: none"><li>Develop and implement an erosion and sediment control plan.</li><li>Utilize erosion blankets, sediment control fencing, straw bale etc. for construction activities in areas where there is erosion and sedimentation potential near a wetland, woodland or waterbody.</li><li>In areas where bedrock is exposed at surface or trenching and securing of erosion control fencing is not possible, sediment logs (compost filter sock) may be utilized.</li><li>Maintain sediment and erosion control measures for the duration of construction/decommissioning activity.</li><li>Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings.</li><li>Store stockpiled material at least 30 m from a wetland, woodland or waterbody.</li><li>Monitoring by the contractor to ensure erosion and sedimentation control measures are in good repair and properly functioning prior to conducting daily work and re-install or repair as required prior to commencing daily construction activities.</li><li>Minimize the size of cleared areas to limit the area of exposed soil.</li><li>Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure.</li><li>Divert access road runoff through drainage ditches directed into vegetated areas or through environmental protection measures (such as sediment traps, rock flow check dams, sediment barriers etc.) to ensure that exposed soils or road materials are not transported into watercourses or wetlands. Ditches &gt;5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity.</li><li>Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion.</li><li>Soil stockpiles to be graded by mechanical means to compact the soil and limit the erosion. Tracks of machinery should be perpendicular to the slope of the pile to reduce the flow velocity of rainfall over the stockpile.</li><li>Identify rock structures and sensitive soils through geotechnical studies. If any areas of concern are identified, design modifications (e.g., minor layout shifts) may be implemented (as required) to minimize potential erosion, settlement, slope instability, foundation failure or rock fall hazards as a result of construction.</li><li>Keep all equipment within identified work areas to minimize disturbance of adjacent soils.</li><li>Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction.</li><li>Minimize vehicle traffic on exposed soils, avoid compacting or other hardening of natural ground surface, and avoid the movement of heavy machinery on areas with sensitive slopes.</li></ul>
<ul style="list-style-type: none"><li>Disturbance and/or mortality to terrestrial wildlife, including barriers to wildlife movement and active bird nests.</li></ul>	<ul style="list-style-type: none"><li>Minimize disturbance and/or mortality to terrestrial wildlife.</li></ul>	<ul style="list-style-type: none"><li>Time vegetation removal to avoid breeding season for migratory birds, April 1 to July 31. If this is not possible, active nest surveys will be undertaken by a qualified Biologist prior to vegetation removal.</li><li>Post restricted speed limits to avoid terrestrial wildlife mortality due collision with vehicles.</li><li>Train workers on procedures when encountering wildlife to avoid disturbance and mortality.</li></ul>
<ul style="list-style-type: none"><li>Loss of natural vegetation and wildlife habitat due to construction.</li></ul>	<ul style="list-style-type: none"><li>Minimize vegetation removal to the extent possible.</li></ul>	<ul style="list-style-type: none"><li>Required vegetation removal cannot be mitigated but removal should be minimized to the extent possible.</li><li>Ensure that no vegetation removal or damage occurs outside of the construction disturbance area.</li></ul>
<ul style="list-style-type: none"><li>Damage to adjacent vegetation while operating equipment.</li></ul>	<ul style="list-style-type: none"><li>Minimize disturbance to/loss of wildlife habitat and vegetation.</li></ul>	<ul style="list-style-type: none"><li>Delineate work areas.</li><li>Keep vegetation removal to a minimum to the extent possible.</li><li>Where excavation for construction of access roads, WTGs or collection lines is conducted within the rooting zone of trees (e.g., within 5 m of the dripline), implement proper root pruning measures to protect tree roots.</li></ul>
<ul style="list-style-type: none"><li>Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.</li></ul>	<ul style="list-style-type: none"><li>Minimize soil or water contamination.</li></ul>	<ul style="list-style-type: none"><li>Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent IWH features and train staff on associated procedures. This plan will include, for example:<ul style="list-style-type: none"><li>Spill control and containment equipment/materials shall be readily available in all work areas.</li><li>Protocols for access to additional spill clean-up materials if needed.</li><li>Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards.</li><li>Proper training of operational staff on associated emergency response plan and spill clean-up procedures.</li><li>Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li><li>Spills to be cleaned up immediately, with contaminated soils removed to a licenced disposal site, if required.</li><li>Materials contained in spill clean-up kits are restocked as necessary.</li><li>Any soil encountered during excavation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to be analyzed to determine its quality in order to identify the appropriate disposal method.</li><li>Reporting procedures.</li><li>Emergency contact and project management phone numbers.</li><li>Verification of clean-up.</li></ul></li><li>Apply the following general mitigation measures to avoid soil or water contamination:<ul style="list-style-type: none"><li>Ensure machinery is maintained free of fluid leaks.</li><li>Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies.</li><li>Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies.</li></ul></li><li>The use of concrete in construction to be completed in accordance with relevant provincial guidelines and standards.</li><li>Waste management to be completed in accordance with relevant federal and provincial guidelines and standards.</li><li>Vegetation management will be done using mechanical techniques rather than herbicides.</li></ul>
<ul style="list-style-type: none"><li>Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting from changes in land contours.</li></ul>	<ul style="list-style-type: none"><li>Minimize changes in surface water drainage patterns and obstruction of lateral flows in surface water to wetlands.</li></ul>	<ul style="list-style-type: none"><li>Ensure BMPs are used to maintain current drainage patterns, including:<ul style="list-style-type: none"><li>Minimize paved surfaces and design roads to promote infiltration.</li><li>Limit changes in land contours.</li></ul></li><li>Ensure roadway culverts are designed and installed to maintain existing drainage patterns.</li><li>Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (e.g., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion which can change land contours.</li></ul>
<ul style="list-style-type: none"><li>Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).</li></ul>	<ul style="list-style-type: none"><li>Minimize disturbance to wildlife.</li></ul>	<ul style="list-style-type: none"><li>Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li><li>Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting, including:<ul style="list-style-type: none"><li>Follow proper drilling, explosive handling and loading procedures;</li><li>Implement safe handling and storage procedures for soluble substances used for blasting;</li><li>Use blasting mats over top of holes to minimize scattering of blast debris around the area;</li><li>Reduce blasting footprint to the extent possible;</li><li>Avoid blasting during sensitive life stages breeding season for migratory birds, April 1 to July 31 wherever possible;</li><li>Ensure wildlife (e.g., birds flying over) is not in the blasting zone prior to detonation. If wildlife is encountered in the blasting zone, postpone detonation until the wildlife has vacated the area;</li><li>Avoid blasting in water;</li><li>Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products; and</li><li>Remove all blasting debris and other associated equipment / products from the blast area.</li></ul></li></ul>

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Operations

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures
▪ No effects on Generalized Candidate IWH during operation.	▪ None required.	▪ None required.

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

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures
<b>Construction activities within 120 m of an Important Wetland</b>	▪ Accidental intrusion into Important Wetlands resulting in damage to wetland form or function.	▪ Avoid accidental intrusion into Important Wetlands.	▪ Where construction activities occur within 30 m of an Important Wetland, install and maintain construction fencing (or similar delineation device) to clearly define the construction disturbance area and prevent accidental damage to vegetation. ▪ Construction fencing will be removed at the end of the construction period for re-use.
	▪ Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	▪ Prevent soil or water contamination.	▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent wetland features and train staff on associated procedures. ▪ Apply the following general mitigation measures to avoid soil 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 natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies. ▪ Also refer to "Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling" in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.
	▪ Increased dust accumulation on peripheral wetland vegetation, causing damage to wetland plants.	▪ Minimize dust accumulation on peripheral vegetation.	▪ Use water as a dust suppressant along areas where construction activities are located within 5 m of an Important Wetland.
	▪ Changes in surface water drainage patterns resulting in effects to soil moisture and species composition of vegetation.	▪ Minimize effects to soil moisture and species composition of vegetation.	▪ Where construction activities occur within 30 m of an Important Wetland, ensure BMPs are used to maintain current existing drainage patterns, including: ▪ Limit changes in land contours to the maximum extent possible. ▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns. ▪ Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion.
	▪ Increased erosion and sedimentation resulting from clearing and grubbing, excavation, backfilling and stockpiling.	▪ Minimize erosion and sedimentation from clearing, grubbing, excavation, backfilling and stockpiling.	▪ Install and maintain sediment and erosion controls such as silt fence barriers, rock flow check dams, compost filter socks or approved alternative along the edge of the construction disturbance area if within 30 m of an Important Wetland to minimize potential sediment loading to the feature. ▪ Also refer to "Increased erosion and sedimentation into woodlands, wetlands and other natural features resulting from construction activity" and "Soil compaction resulting from construction activity" in the <b>Generalized Candidate IWH Table</b> for additional proposed mitigation measures.
<b>Construction activities within an Important Wetland</b>	<b>Construction/ Decommissioning</b> ▪ Permanent loss of Important Wetland features.	▪ Minimize amount of wetland vegetation removal. ▪ Minimize disturbance to Important Wetlands.	▪ Site project infrastructure outside of Important Wetlands to the extent possible. ▪ Delineate construction areas. ▪ Avoid excavation/filling of Important Wetlands for access road construction to the extent possible. ▪ Where excavation of an Important Wetland cannot be avoided, clearly delineate the boundaries of the construction disturbance area to minimize vegetation removal and prevent accidental intrusion into adjacent Important Wetland areas. ▪ Schedule construction in Important Wetlands to occur outside of the amphibian breeding season (April 1 to June 30). ▪ Schedule vegetation removal within Important Wetlands to occur outside of the breeding bird season (April 1 to July 31). If this is not possible, active nest surveys will be undertaken by a qualified Biologist prior to vegetation removal. ▪ Fell trees toward the construction disturbance area to reduce damage to adjacent vegetation being retained. ▪ Re-vegetate all temporary construction / decommissioning areas using native stock as soon as possible and within 1 year of the completion of the construction / decommissioning phase. Wetland restoration will utilize suitable native species where feasible.

Table 4-7: Proposed Mitigation Measures Associated with Potential Effects to Important Wetlands Resulting from Operations

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures
<b>Construction activities within 120 m of an Important Wetland</b>	▪ Risk of soil or water contamination from oil, gas, etc. during maintenance activities within 30 m of Important Wetlands.	▪ No on-site contamination of soil, groundwater or surface water.	▪ Develop and implement a Spills Prevention and Response Plan outlining steps to prevent and contain any chemical spills during maintenance activities to avoid contamination of adjacent Important Wetland features and train operational staff on associated procedures. ▪ Apply the following general mitigation measures to avoid soil 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 natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies. Also refer to "Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling" in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.

Table 4-8: Proposed Mitigation Measures Associated with Potential Effects to Important Woodlands Resulting from Construction and Decommissioning

Important Woodland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures
Construction activities within 120 m of an Important Woodland	▪ Accidental intrusion into Important Woodlands resulting in damage to trees.	▪ Avoid accidental intrusion into Important Woodlands.	▪ Delineate work areas. ▪ Where construction activities occur within 30 m of an Important Woodland, install and maintain orange construction fencing (or similar delineation device) to clearly define the construction disturbance area and prevent accidental damage to vegetation. ▪ Where soil conditions permit, install orange construction fencing using metal T-bars in deep soils and traffic barrel cones or other suitable alternatives where shallow soils or rock barrens are present. ▪ Fell trees toward the construction disturbance area to reduce damage to adjacent vegetation being retained.
	▪ Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	▪ Prevent soil or water contamination.	▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent Important Woodland features and train staff on associated procedures. ▪ Apply the following general mitigation measures to avoid soil 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 natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies. ▪ Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.
	▪ Changes in surface water drainage patterns resulting in effects to soil moisture and species composition of vegetation.	▪ Minimize effects to soil moisture and species composition of vegetation.	▪ Where construction activities occur within 30 m of an Important Woodland, ensure BMPs are used to maintain current drainage patterns, including: ▪ Limit changes in land contours to the maximum extent possible. ▪ Minimize paved surfaces and design roads to promote infiltration. ▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns. ▪ Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion.
	▪ Increased erosion and sedimentation resulting from clearing and grubbing, excavation, backfilling and stockpiling.	▪ Minimize erosion and sedimentation from clearing, grubbing, excavation, backfilling and stockpiling.	▪ Install and maintain sediment and erosion controls such as silt fence barriers, rock flow check dams, compost filter socks or approved alternative along the edge of the construction disturbance area if within 30 m of an Important Woodland to minimize potential sediment loading to the feature. ▪ Also refer to “Increased erosion and sedimentation into woodlands, wetlands and other natural features resulting from construction activity” and “Soil compaction resulting from construction activity” in the <b>Generalized Candidate IWH Table</b> for additional proposed mitigation measures.
Construction activities within an Important Woodland	<b>Construction/ Decommissioning</b> ▪ Permanent loss of forest cover in Important Woodland features.	▪ Minimize loss of forest cover in Important Woodland features. ▪ Minimize disturbance to Important Woodlands.	▪ Site project infrastructure outside of Important Woodlands to the extent possible. ▪ Delineate work areas. ▪ Minimize vegetation removal in Important Woodlands to the extent possible. ▪ Where construction within an Important Woodland cannot be avoided, clearly delineate the boundaries of the construction disturbance area to minimize vegetation removal and prevent accidental intrusion into adjacent Important Woodland areas. ▪ Schedule vegetation removal within Important Woodlands outside of the breeding bird season (April 1 to July 31). If this is not possible, active nest surveys will be undertaken by a qualified Biologist prior to vegetation removal. ▪ Fell trees toward the construction disturbance area to reduce damage to adjacent vegetation being retained. ▪ Re-vegetate all temporary construction/decommissioning areas using native stock within 1 year of the completion of the construction/decommissioning phase. Woodland restoration will utilize suitable native species where feasible.

Table 4-9: Proposed Mitigation Measures Associated with Potential Effects to Important Woodlands Resulting from Operations

Important Woodland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures
Construction activities within 120 m of an Important Woodland	▪ Risk of soil or water contamination from oil, gas, etc. during maintenance activities within 30 m of Important Woodlands.	▪ No off-site contamination of soil, groundwater or surface water.	▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemical spills during maintenance activities to avoid contamination of adjacent woodland features and train operational staff on associated procedures. ▪ Apply the following general mitigation measures to avoid soil 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 natural features (wetlands, woodlands and wildlife habitats) or waterbodies. ▪ Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies. ▪ Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.



## 4.3 Surface and Groundwater

### 4.3.1 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 will be documented and assessed in the Draft Water Assessment and Waterbody Report of the Final Draft EA Report in accordance with the HIFN EA Guidance.

### 4.3.2 Groundwater Existing Conditions

#### 4.3.2.1 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 shores 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.

#### 4.3.2.2 Geological Setting

##### 4.3.2.2.1 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).

##### 4.3.2.2.2 Overburden Geology

Very little overburden is present within the HIWEC study area. Exposed, polished 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.

##### 4.3.2.2.3 Groundwater Resources

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 MOECC Water Well Database.

Results are shown in **Figure 4-2**, 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 HIFN I.R. #2. 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 4-10**, 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 4-10: 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

### 4.3.3 Potential Effects and Proposed Mitigation Measures

#### 4.3.3.1 Surface Water

##### 4.3.3.1.1 Construction and Decommissioning

**Table 4-11** identifies potential effects on surface water resources that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

##### 4.3.3.1.2 Operations

**Table 4-12** identifies potential effects on surface water resources that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies.





**Legend**

- Wind Turbine Generators
- MET Towers
- Access Roads & Collector Lines
- On Reserve Transmission Line
- Off Reserve Transmission Line
- Construction Compounds & Laydown Yards
- Transformer Station Area
- HIWEC Location / Area of Investigation
- HIWEC Study Area
- Henvey Inlet First Nation Reserve No. 2
- Provincial Park

**Socio-Economic Features**

- Buildings
- Road & Rail Setback (60 m)
- Property Boundary Setback (80 m)
- Noise Receptor Setback (550 m)
- Municipalities
- Private Land
- MNRF Crown Land


**MOECC Water Wells**

- Unknown / Not Used
- Commerical
- Domestic
- Existing Monitoring / Test Hole
- Municipal
- Public

0 0.5 1 2  
Kilometers

**Henvey Inlet Wind Energy Centre**

**Site Plan & Socio-Economic Features**

June 2015	1:55,000	Datum: NAD 83, Zone 17 Source: Stantec, OBM, LIO
P#: 60341251	V#: 002	
<b>Figure 4-2</b>		

This drawing has been prepared for the use of AECOM's client and may not be used, reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM's express written consent.



Table 4-11: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<ul style="list-style-type: none"><li>• <b>Adverse Impacts to Surface Water Quality from Erosion and Sedimentation resulting from Construction Activities (including blasting)</b></li><li>• <b>Disturbance of Aquatic Biota (Fish, Invertebrates) and Aquatic Habitat During Water Crossing Installation and Removal (Due to in Water Work, Alteration of Channel Bed, Banks and Riparian Area, due to Erosion and Sedimentation)</b></li><li>• <b>Disturbance of Aquatic Biota (Fish Invertebrates) and Aquatic Habitat During Collector / Transmission line Installation and Removal (Due to in Water Work, Alteration of Channel Bed, Banks and Riparian Area, due to Erosion and Sedimentation)</b></li></ul>	<ul style="list-style-type: none"><li>• Minimize erosion and sedimentation.</li></ul>	<ul style="list-style-type: none"><li>▪ Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li><li>▪ Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (Also refer to “Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).” in the <b>Generalized Candidate IWH Table</b> for a list of proposed blasting BMPs)</li><li>▪ Implement sediment and erosion control measures prior to construction and maintain such measures until re-vegetation of disturbed areas is complete.</li><li>▪ Minimize removal of riparian vegetation to the greatest extent possible (maintaining riparian shrubs).</li><li>▪ Stabilize and store stockpiled materials (topsoil, grubbed materials) above the high water mark and 30 m away from waterbodies. Transmission poles or other structures will be placed above the normal high water mark.</li><li>▪ 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., swamp mats).</li><li>▪ Operate heavy equipment from outside the watercourse to minimize disturbance to the watercourse banks.</li><li>▪ Whenever possible, operate machinery on land above the high water mark or on ice, in a manner that minimizes disturbance to the banks and bed of the waterbody.</li><li>▪ Use temporary crossing structures or other practices to cross streams or waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds.</li><li>▪ Time in-water work to avoid sensitive reproductive periods for fish species.</li><li>▪ If streams are flowing during watercourse crossing structure installation, use appropriate work site isolation techniques (e.g., dam and pump, bypass channel, partial coffer damming) to minimize impacts on aquatic environment. If work sites are isolated during construction, fish are to be salvaged from isolated area and transferred to undisturbed habitat downstream of the work site.</li><li>▪ Phase crossing structure removal so no fording of watercourses is required following structure removal (i.e., the last activity as the road is being decommissioned).</li><li>▪ Screen all hoses drawing water from a watercourse to prevent potential entrainment of fish and other species.</li><li>▪ Ensure an additional supply of erosion and sediment control materials are readily available on the site.</li><li>▪ Place only clean materials free of fine particulate matter in the water for temporary construction measures (e.g., coffer dams to be constructed of ‘pea gravel’ bags / metre bags, geotextile fabric, sheet pile or other clean material).</li><li>▪ Design culverts installed at waterbodies supporting direct fish habitat to facilitate fish passage.</li><li>▪ Also refer to “Increased erosion and sedimentation into woodlands, wetlands and other natural features resulting from construction activity” and “Soil compaction resulting from construction activity” in the <b>Generalized Candidate IWH Table</b> for additional proposed mitigation measures.</li></ul>
<ul style="list-style-type: none"><li>• <b>Adverse Impacts on Surface Water Quality Aquatic Biota (Fish, Invertebrates) and Aquatic Habitat Due to Accidents and/or Spills including Fuels, Lubricants and Concrete Washing</b></li></ul>	<ul style="list-style-type: none"><li>• Prevent contaminant discharge to the environment.</li></ul>	<ul style="list-style-type: none"><li>▪ 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.</li><li>▪ Apply the following general mitigation measures to avoid soil or water contamination:<ul style="list-style-type: none"><li>▪ Ensure machinery is maintained free of fluid leaks.</li><li>▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies.</li><li>▪ Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies.</li></ul></li><li>▪ Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.</li></ul>
<ul style="list-style-type: none"><li>• <b>Adverse Impacts to Surface Water Quality and Quantity Due to Dewatering Discharge</b></li></ul>	<ul style="list-style-type: none"><li>• Minimize impacts to water quality.</li></ul>	<ul style="list-style-type: none"><li>▪ Develop and implement a construction dewatering discharge plan describing appropriate areas and methods for discharge based on consultation with HIFN.</li><li>▪ Direct dewatering discharge to nearby watercourses and / or wetlands to act as natural attenuators and supplement baseflow. If dewatering of excavations is required, mitigation could include splash pads and discharge diffusers or similar measures (if required and as appropriate) at discharge locations to ensure that erosion of surface soils into surface waterbodies does not occur.</li><li>▪ If dewatering of excavations is required and is expected to exceed 50,000 L/day, discharge water shall be sampled daily during the days the water is discharged and tested for suspended sediments. If the increase in suspended sediments is greater than 25 mg/L, the Contractor shall implement appropriate measures (e.g., geosock or similar device) to mitigate these impacts.</li><li>▪ Should groundwater taking exceed 50,000 L/day from a WTG foundation, follow an environmental monitoring program to include visual monitoring of surface water quality and quantity monitoring of natural features reliant on groundwater contribution within the predicted zone of influence (ZOI).</li><li>▪ Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers.</li><li>▪ Apply measures for managing water flowing onto the construction site, as well as water being pumped / diverted from the construction site such that sediment is filtered out prior to the water entering a waterbody, wetland or sensitive natural environment features.</li><li>▪ Discharge water through energy dissipation and filtration systems (filter bag, sediment basin), as required, sufficient to control the volume of water and ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks.</li><li>▪ Discharge water shall not be directed to a watercourse or waterbody that has potential to flood as a result of the added input of water caused by direct dewatering discharge.</li><li>▪ The company shall not discharge turbid water to a watercourse and will comply with protocols in the Canadian Council of Ministers of the Environment (CCME) “Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter”, which includes requirements for measuring suspended sediments, and the Provincial Water Quality Objectives (PWQO).</li><li>▪ In the event that water taking occurs, and the point of discharge to a waterbody is within the predicted ZOI from a waterbody, follow a surface water monitoring program, including water level, stream flow and suspended sediments measurements.</li><li>▪ Where feasible, leave a layer of low cover vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids.</li><li>▪ No direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable provincial approvals.</li><li>▪ Ensure that any overland discharge complies with mitigation for erosion and sedimentation included in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b>.</li><li>▪ Provide appropriate treatment and perform water quality sampling of discharge water prior to release to the waterbody to ensure water quality meets PWQO for protection of aquatic habitat.</li><li>▪ Remove non-biodegradable erosion and sediment control materials once site is stabilized.</li></ul>
<ul style="list-style-type: none"><li>• <b>Alterations to Local Drainage Patterns Due to Loss of Vegetation, Changes in Surficial Topography and Changes in Surficial Soils in Disturbed Construction Areas Including Along Access Roads</b></li></ul>	<ul style="list-style-type: none"><li>• Minimize vegetation removal near waterbodies.</li></ul>	<ul style="list-style-type: none"><li>▪ Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings.</li><li>▪ Install erosion and sediment controls for construction activities near watercourses prior to construction start.</li><li>▪ Where construction activities occur within 30 m of a waterbody, ensure BMPs are used to maintain current existing drainage patterns, including:<ul style="list-style-type: none"><li>▪ Limit changes in land contours to the maximum extent possible.</li><li>▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns.</li><li>▪ Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion.</li></ul></li></ul>
<ul style="list-style-type: none"><li>• <b>Disturbance to Fish and Fish Habitat or Mortality of Fish Due to Construction Blasting and/or Vibration (includes disturbance to or mortality of fish eggs or larvae)</b></li></ul>	<ul style="list-style-type: none"><li>• Minimize impacts of blasting and vibration.</li></ul>	<ul style="list-style-type: none"><li>▪ Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li><li>▪ Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (Also refer to “Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).” in the <b>Generalized Candidate IWH Table</b> for a list of proposed blasting BMPs)</li></ul>

Table 4-12: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Operations

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<ul style="list-style-type: none"><li>Adverse Impacts on Surface Water Quality, Aquatic Biota and Habitat Due to Contaminant Spills, Dust and Emissions from Maintenance Vehicles and Equipment</li></ul>	<ul style="list-style-type: none"><li>Prevent contaminant discharge to the environment.</li></ul>	<ul style="list-style-type: none"><li>Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemical spills during maintenance activities to avoid contamination of adjacent waterbodies and train operational staff on associated procedures.</li><li>Apply the following general mitigation measures to avoid soil or water contamination:<ul style="list-style-type: none"><li>Ensure machinery is maintained free of fluid leaks.</li><li>Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies.</li><li>Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies.</li></ul></li><li>Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.</li><li>Conduct access road maintenance (e.g., grading, addition of coarse surficial material) as required to maintain adequate road conditions. This will assist in minimizing dust generation.</li><li>Restrict vehicle traffic to posted speed limits.</li><li>Spray water as a dust suppressant to be used as necessary.</li><li>Minimize vehicle traffic on exposed soil.</li><li>Investigate complaints related to dust and emissions and address to the extent possible.</li><li>Run vehicles and equipment only when necessary (limit idling).</li><li>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.</li></ul>
<ul style="list-style-type: none"><li>Obstruction of Lateral Flows and Fish Passage in Waterbodies Due to Design of Culverts and Debris Build-Up at Water Crossings</li></ul>	<ul style="list-style-type: none"><li>Minimize lateral flow obstructions.</li></ul>	<ul style="list-style-type: none"><li>Design culverts to accommodate high flows of the watercourse.</li><li>Inspect culverts during routine maintenance activities for buildup of debris and remove debris as necessary to maintain flows and allow fish passage.</li></ul>

#### 4.3.3.2 Groundwater

##### 4.3.3.2.1 Construction and Decommissioning

**Table 4-13** identifies potential effects on groundwater resources that could occur during the construction and decommissioning phases of the HIWEC and describes proposed mitigation strategies.

##### 4.3.3.2.2 Operations

**Table 4-14** identifies potential effects on groundwater resources that could occur during the operations phase of the HIWEC and describes proposed mitigation strategies.

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Table 4-13: Proposed Mitigation Measures Associated with Potential Effects to Groundwater Resulting from Construction and Decommissioning

Potential Effect	Performance Objective	Proposed Mitigation Strategy
• <b>Reduction in Groundwater Quantity Resulting in Decreases in Baseflow of Watercourses, Groundwater Discharge to Wetlands, Yield of Private Water Wells, and Groundwater Flow Patterns, as a Result of Construction Dewatering Activities</b>	• Minimize impacts to groundwater quantity.	<ul style="list-style-type: none"><li>• Conduct a baseline hydrogeological investigation to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction.</li><li>• Conduct a detailed door-to-door water well survey to identify existing groundwater use. Prepare and follow a water well monitoring program to include water level and water quality monitoring of existing private water wells within 500 m of any identified groundwater taking location. Early detection of impacts to well yield to be mitigated by the supply of a potable water supply provided and maintained by the contractor until well yield returns to baseline conditions.</li><li>• If dewatering of excavations is required and is expected to exceed 50,000 L/day, discharge water shall be sampled daily during the days the water is discharged and tested for suspended sediments. If the increase in suspended sediments is greater than 25 mg/L, the Contractor shall implement appropriate measures (e.g., geosock or similar device) to mitigate these impacts.</li><li>• The company shall not discharge turbid water to a watercourse and will comply with protocols in the Canadian Council of Ministers of the Environment (CCME) “Canadian Water Quality Guidelines for the Protection of Aquatic Life: Total Particulate Matter”, which includes requirements for measuring suspended sediments, and the Provincial Water Quality Objectives (PWQO).</li><li>• Should groundwater taking exceed 50,000 L/day from a WTG foundation, follow an environmental monitoring program to include visual monitoring of surface water quality and quantity monitoring of natural features reliant on groundwater contribution within the predicted ZOI.</li><li>• Limit duration of dewatering to as short a time frame as possible.</li><li>• Limit water taking quantities by implementing targeted groundwater cut-offs where possible.</li></ul>
• <b>Changes in Groundwater Quality (Turbidity) Due to Agitation of the Subsurface During Construction Blasting and Potential Release of Soluble Substances Used During Blasting</b>	• Minimize impacts to groundwater quality.	<ul style="list-style-type: none"><li>• Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li><li>• Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (Also refer to “Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).” in the <b>Generalized Candidate IWH Table</b> for a list of proposed blasting BMPs)</li></ul>
• <b>Physical Damage to Groundwater Supply Wells from Construction Blasting and/or Vibration</b>	• Minimize impacts of blasting and vibration.	<ul style="list-style-type: none"><li>• Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting (Also refer to “Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).” in the <b>Generalized Candidate IWH Table</b> for a list of proposed blasting BMPs)</li><li>• Conduct blasting in accordance with applicable federal and provincial guidelines, including the completion of a well survey for all water wells likely to be affected by blasting and those within a minimum of 1,000 m of the location where such activities occur.</li><li>• Conduct pile driving in accordance with applicable federal and provincial guidelines, including the completion of a well survey for all water wells likely to be affected by pile driving operations and those within a minimum of 1,000 m of the location where such activities occur.</li></ul>
• <b>Reduction in Groundwater Quality Due to Release of Construction Dewatering Discharge in Areas of Substantial Groundwater Recharge</b>	• Minimize construction dewatering discharge to areas of substantial groundwater recharge.	<ul style="list-style-type: none"><li>• Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system.</li><li>• If dewatering of excavations is required, mitigation could include splash pads and discharge diffusers or similar measures (if required and as appropriate) at discharge locations to ensure that erosion of surface soils into surface waterbodies does not occur.</li></ul>
• <b>Groundwater Contamination Due to Contaminant Spills, Vehicle and Machinery Operation, and Concrete Truck Rinsing</b>	• Prevent contaminant discharge to the environment.	<ul style="list-style-type: none"><li>• 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.</li><li>• Apply the following general mitigation measures to avoid soil or water contamination:<ul style="list-style-type: none"><li>• Ensure machinery is maintained free of fluid leaks.</li><li>• Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies.</li><li>• Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies.</li></ul></li><li>• Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.</li></ul>
• <b>Reduction in Groundwater Recharge Quantities Due to Increases in Impervious Surfaces</b>	• Minimize the increase in impervious areas.	<ul style="list-style-type: none"><li>• Minimize paved surfaces and design roads to promote groundwater infiltration.</li><li>• Implement groundwater infiltration techniques to the maximum extent possible. Examples include:<ul style="list-style-type: none"><li>• releasing water to vegetated areas;</li><li>• ditches should not be lined with an impermeable material (i.e., clay); and,</li><li>• groundwater should remain on site and not disposed of offsite (unless contaminated).</li></ul></li><li>• Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system.</li></ul>

Table 4-14: Proposed Mitigation Measures Associated with Potential Effects to Groundwater Resulting from Operations

Potential Effect	Performance Objective	Proposed Mitigation Strategy
• <b>Contamination of Groundwater as a Result of Spills During Operation</b>	• Prevent contaminant discharge to the environment.	<ul style="list-style-type: none"><li>• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemical spills during maintenance activities to avoid contamination of adjacent waterbodies and train operational staff on associated procedures.</li><li>• Apply the following general mitigation measures to avoid soil or water contamination:<ul style="list-style-type: none"><li>• Ensure machinery is maintained free of fluid leaks.</li><li>• Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from natural features (wetlands, woodlands and wildlife habitats) or waterbodies.</li><li>• Store any stockpiled materials at least 30 m away from an IWH, wetlands, woodlands, wildlife habitats, or waterbodies.</li></ul></li><li>• Also refer to “Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling” in the <b>Generalized Candidate IWH Construction and Decommissioning Table</b> for additional proposed mitigation measures.</li><li>• Locate O&amp;M Building outside of groundwater vulnerable areas (i.e., existing private water wells).</li></ul>
• <b>Minor 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</b>	<ul style="list-style-type: none"><li>• Minimize the increase in impervious areas.</li><li>• Limit disturbances to surface water drainage patterns.</li></ul>	<ul style="list-style-type: none"><li>• Mitigation measures to increase groundwater infiltration will be applied during the design and construction phase and are included in the <b>Groundwater Construction and Decommissioning Table</b>.</li></ul>

## 4.4 Air, Odour and Dust

### 4.4.1 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).

### 4.4.2 Potential Effects and Proposed Mitigation Measures

#### 4.4.2.1 Construction and Decommissioning

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

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

**Table 4-15** identifies potential effects on air quality that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

#### 4.4.2.2 Operations

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 4-16** identifies potential effects on air quality that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies.



**Table 4-15: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Construction and Decommissioning**

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<b>Generation of Dust Causing Potential Effects to the Natural Environment, Community Members and Workforce</b>	<ul style="list-style-type: none"> <li>No persistent dust films (observable build-up) on nearby properties or vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>Cover soil stockpiles if exposed for prolonged periods, as necessary.</li> <li>Cover dump trucks transporting soil / excavated material, as necessary.</li> <li>Restrict vehicle traffic to posted speed limits.</li> <li>Spray water as a dust suppressant to be used on access roads as necessary.</li> </ul>
<b>Vehicle / Equipment Emissions</b>	<ul style="list-style-type: none"> <li>Limited release of air emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize clearing of vegetation, maintain windbreaks and restore disturbed areas as soon as possible to minimize duration of soil exposure which will limit potential for dust generation.</li> <li>Minimize vehicle traffic on exposed soil.</li> <li>Equip vehicles with effective muffler and exhaust systems.</li> <li>Investigate complaints related to dust and emissions and address to the extent possible.</li> <li>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.</li> <li>Avoid unnecessary idling of engines.</li> <li>Ensure that construction equipment is frequently maintained and kept in good working condition.</li> </ul>
<b>Reduction in Surface Water Quality as a Result of Dust Emissions</b>	<ul style="list-style-type: none"> <li>No persistent dust films on adjacent waterbodies; no measurable change in TSS.</li> </ul>	

**Table 4-16: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
<b>Generation of Dust Causing Potential Effects to the Natural Environment, Community Members and Workforce</b>	<ul style="list-style-type: none"> <li>No persistent dust films (observable build-up) on nearby properties, vegetation, and waterbodies.</li> </ul>	<ul style="list-style-type: none"> <li>Restrict vehicle traffic to posted speed limits.</li> <li>Spray water as a dust suppressant to be used on access roads as necessary.</li> <li>Avoid unnecessary idling of engines.</li> <li>Minimize clearing of vegetation, maintain windbreaks and restore disturbed areas as soon as possible to minimize duration of soil exposure which will limit potential for dust generation.</li> </ul>
<b>Vehicle / Equipment Emissions</b>	<ul style="list-style-type: none"> <li>Limited release of air emissions.</li> </ul>	<ul style="list-style-type: none"> <li>Investigate complaints related to dust and emissions and address to the extent possible.</li> <li>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.</li> <li>Equip vehicles with effective muffler and exhaust systems.</li> <li>Ensure that construction equipment is frequently maintained and kept in good working condition.</li> </ul>

## 4.5 Noise

### 4.5.1 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.).



## 4.5.2 Potential Effects and Proposed Mitigation Measures

### 4.5.2.1 Construction and Decommissioning

The operation of heavy construction vehicles and temporary generators could result in nuisance noise at nearby residents or businesses. Noise will be loudest during land clearing and other activities that involve significant levels of material handling (e.g., aggregate laydown for access road construction, rock crushing, concrete batching, blasting, pile driving, equipment usage (e.g. during turbine erection) and preparation for the installation of any underground collector lines).

**Table 4-17** identifies potential effects from nuisance noise that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

**Table 4-17: Proposed Mitigation Measures Associated with Noise Resulting from Construction and Decommissioning**

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<b>Increased Noise Due to Construction and Decommissioning Activity</b>	<ul style="list-style-type: none"> <li>Minimize noise levels and adhere to HIFN and other applicable noise by-laws or requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Equip vehicles with effective muffler and exhaust systems.</li> <li>Avoid unnecessary idling of engines.</li> <li>Ensure that construction equipment is frequently maintained and kept in good working condition.</li> <li>Ensure that noise emissions from construction equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations.</li> <li>Conduct noise compliance checks of construction equipment.</li> <li>Implement construction speed limit on unpaved roads.</li> <li>Schedule activities to comply with noise by-laws, where possible. Seek by-law exemptions if the proposed construction activities will not be in compliance with HIFN or other local noise by-laws.</li> <li>Undertake pile driving and blasting operations in accordance with applicable federal and provincial guidelines.</li> <li>If it is determined that there is a need to further reduce noise effects during construction (e.g., if complaints arise), consider additional source noise mitigation (i.e., optimizing silencer / muffler / enclosure performance).</li> <li>Complaints about noise will be logged and addressed in accordance with <b>Section 5.3</b> of the Design and Operations Report.</li> </ul>

### 4.5.2.2 Operations

The operation of WTGs and the TSs will generate noise that has the potential to affect local residents. **Table 4-18** identifies potential effects from noise that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies.

**Table 4-18: Proposed Mitigation Measures Associated with Noise Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
<b>Increased Noise Levels at Receptors Due To WTG Operation.</b>	<ul style="list-style-type: none"> <li>Noise at all non-participating noise receptors below 40 decibels (dBA).</li> </ul>	<ul style="list-style-type: none"> <li>Complaints about noise will be logged and addressed in accordance with <b>Section 5.3</b> of the Design and Operations Report.</li> </ul>

**Table 4-18: Proposed Mitigation Measures Associated with Noise Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
<b>Increased Noise Levels at Receptors Due to TS Operation.</b>	<ul style="list-style-type: none"> <li>Noise at all non-participating noise receptors below 40 dBA.</li> </ul>	<ul style="list-style-type: none"> <li>Complaints about noise will be logged and addressed in accordance with <b>Section 5.3</b> of the Design and Operations Report.</li> </ul>
<b>Increased Noise Due to Maintenance Vehicles and Equipment.</b>	<ul style="list-style-type: none"> <li>Minimize noise levels and adhere to HIFN and other applicable noise by-laws,</li> </ul>	<ul style="list-style-type: none"> <li>Equip vehicles with effective muffler and exhaust systems.</li> <li>Avoid unnecessary idling of engines.</li> <li>Ensure that maintenance equipment is frequently maintained and kept in good working condition.</li> <li>Ensure that noise emissions from maintenance equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations.</li> <li>Conduct noise compliance checks of maintenance equipment.</li> <li>Implement operation speed limit on unpaved roads.</li> <li>Schedule maintenance activities to comply with noise by-laws, where possible. Seek by-law exemptions if operations and maintenance works will not be in compliance with HIFN or other local noise by-laws.</li> <li>Complaints about noise will be logged and addressed in accordance with <b>Section 5.3</b> of the Design and Operations Report.</li> </ul>

## 4.6 Local Interests, Land Use and Infrastructure

### 4.6.1 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.

#### 4.6.1.1 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.

- **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. 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 should be avoided by development.
- **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 SAR, 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.

#### 4.6.1.2 Nishshing Aki

As described previously, Nishshing Aki are defined as existing social, cultural or economic features or conditions that have 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.

#### 4.6.1.3 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).

#### 4.6.1.4 Adjacent Properties

Property line setbacks are to be assessed in the subsequent Draft Design and Operations Report of the Final Draft EA Report, in accordance with the HIFN EA Guidance document. This requires mapping and a description of 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.

#### 4.6.1.5 Local Infrastructure, Roads and Traffic

The HIWEC site plan (**Figure 1-1**) 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 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).

#### 4.6.1.6 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 television stations broadcasting in the vicinity of the HIWEC study area. Digital television signals are not impacted by WTGs or transmission infrastructure and therefore it will be confirmed through consultation whether those five stations have converted or plan to convert to digital technology. No FM or AM broadcast stations have been identified within proximity of proposed WTGs that would impact broadcast signals (YRH, 2011). An Environment Canada 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.

#### 4.6.1.7 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**.

#### 4.6.1.8 Visual Landscape

The visual and aesthetic importance of Georgian Bay and the HIWEC study area is reflected by the numerous artist and photography groups 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 20<sup>th</sup> 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 hikers and boaters. In addition, HIFN Council through their Nishshing Aki has identified social and cultural features that their members value and that must be protected. As part of this EA, visual renderings will be developed to provide an anticipated representation of the WTGs in the visual landscape. This will include photographing key site lines and natural landscapes within the HIWEC study area and rendering proposed WTGs and HIWEC components as they will be seen once constructed.

## 4.6.2 Potential Effects and Proposed Mitigation Measures

### 4.6.2.1 Construction and Decommissioning

There will be a temporary loss of traditional Anishinabek land and traditional land use during construction and installation activities as a result of temporary HIWEC components, including crane pads, WTG staging areas, construction compounds and laydown yards. However, these areas will be small relative to the total land area within the HIWEC study area. Any areas temporarily disturbed for construction will be returned to pre-existing conditions after construction and installation activities are complete, unless otherwise agreed upon with HIFN. The construction of the HIWEC may result in the creation of access to previously inaccessible areas through vegetation removal and the creation of corridors for access roads and the collector / transmission system.

The road capacity and local traffic on Highway 69 may also be affected during construction and decommissioning related activities. The delivery of construction equipment and HIWEC infrastructure, and construction of new access roads could result in a temporary increase in slower moving traffic on Highway 69. The changes in traffic volume are expected to be minimal and no appreciable change to traffic flow is anticipated as a result of the HIWEC.

**Table 4-19** identifies potential effects on HIFN interests, local interests, land use and infrastructure including local roads that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

### 4.6.2.2 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 4-20** identifies potential effects on local interests, land use and infrastructure that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies.

**Table 4-19: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Construction and Decommissioning**

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<b>Decline in Traditional Lands, Species or Resources Available for HIFN Harvesting Activities (Such as Lands Used for Hunting, Trapping, Fishing and Gathering)</b>	<ul style="list-style-type: none"> <li>Minimal decline in traditional land uses.</li> </ul>	<ul style="list-style-type: none"> <li>Optimize siting of all HIWEC components based on feedback from the community through Aboriginal Traditional Knowledge (ATK) and constraint discussions.</li> <li>Recover merchantable timber for use by HIFN.</li> <li>Make wood cleared available to HIFN members for use as firewood or for traditional uses (i.e., cedar for ceremonial purposes).</li> <li>Maintain ongoing communication with Bekanon Road residents and other HIFN members on HIFN I.R. #2 about construction timelines.</li> </ul>
<b>Decline in Availability of Country Foods (Traditional Foods) or Medicinal Plants Harvested or Grown for Subsistence or Traditional Healing Purposes</b>	<ul style="list-style-type: none"> <li>Minimal decline in availability of country foods and medicinal plants.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize clearing widths for access roads and WTG foundations to the area necessary for safe construction and operation of the HIWEC.</li> <li>Complete site reclamation of temporarily disturbed areas immediately following construction.</li> <li>Mitigation measures proposed in <b>Section 4.2</b> to minimize disturbance to wildlife, resource use and recreational use will serve to further reduce impacts to HIFN traditional use activities.</li> </ul>
<b>Decline in Spiritual, Ceremonial, or Cultural Sites</b>	<ul style="list-style-type: none"> <li>Minimal decline in spiritual, ceremonial or cultural sites.</li> </ul>	<ul style="list-style-type: none"> <li>Engage with HIFN staff to ensure exchange of information during planning, design and construction.</li> <li>Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.</li> </ul>
<b>Impacts to Nishshing Aki identified by HIFN</b>	<ul style="list-style-type: none"> <li>No impact on Nishshing Aki.</li> </ul>	<ul style="list-style-type: none"> <li>All project components have been sited away from Nishshing Aki. However, regular monitoring will occur to ensure that no construction workers or equipment enter these areas.</li> <li>Engage with HIFN staff to ensure exchange of information during planning, design and construction.</li> <li>Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.</li> </ul>
<b>Impacts on Lands Subject to Land Claims</b>	<ul style="list-style-type: none"> <li>Minimal impact on lands subject to land claims.</li> </ul>	<ul style="list-style-type: none"> <li>The HIWEC site was selected to avoid areas associated with the HIFN claim regarding alleged illegal appropriation of land for the James Bay Railway.</li> <li>Continue to avoid areas subject to current or potential land claims through ongoing discussion with HIFN.</li> </ul>
<b>Potential for Off-Reserve Impacts to Aboriginal Traditional Rights or Interests Due to the HIWEC</b>	<ul style="list-style-type: none"> <li>Minimal off-Reserve impacts to Aboriginal traditional rights or interests.</li> </ul>	<ul style="list-style-type: none"> <li>The HIWEC is proposed entirely on HIFN I.R. #2 within the jurisdiction of HIFN. The community has jurisdiction over land use planning within its territories as part of its authority under the First Nations Land Management Land Code.</li> <li>Mitigation measures proposed in <b>Section 4.2</b> to minimize disturbance to wildlife, resource use and recreational use will serve to further reduce impacts to traditional use activities, both on and off-Reserve.</li> </ul>
<b>Potential Impacts to Navigable Waterways Used by Aboriginal Groups</b>	<ul style="list-style-type: none"> <li>Minimal impacts to navigable waterways used by Anishinabek groups.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid impeding access to the Key River, Henvey Inlet, or Georgian Bay which are traditional navigable waterways.</li> <li>Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.</li> <li>Should potential adverse impacts arise as part of ongoing monitoring; HIW will work with the potentially impacted group to develop a response for avoidance or mitigation as required.</li> <li>HIFN involvement will ensure that the HIWEC respects Aboriginal and treaty rights of HIFN members, many of which are in common with other neighbouring Anishinabek communities.</li> </ul>



**Table 4-19: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Construction and Decommissioning**

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
<b>Damage to Highway 69</b>	<ul style="list-style-type: none"> <li>Minimize damage to Highway 69.</li> </ul>	<ul style="list-style-type: none"> <li>Adhere to BMPs regarding the operation of construction equipment and delivery of construction materials.</li> </ul>
<b>Increased Congestion Due to Increase in Truck Traffic Crossing Bekanon Road</b>	<ul style="list-style-type: none"> <li>Minimize disturbances to local traffic patterns.</li> </ul>	<ul style="list-style-type: none"> <li>Develop a traffic management plan for the construction phase.</li> <li>Conduct a survey in conjunction with HIFN to determine if the roads and travel routes within the HIWEC study area are capable of accommodating the oversized vehicles and heavy loads prior to the delivery of HIWEC components and equipment.</li> <li>Notify the community in advance of construction delivery schedules and install signage to notify road users of construction activity, where appropriate.</li> <li>Prohibit construction vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road</li> </ul>

**Table 4-20: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
<b>Potential Impacts from HIWEC Operations to Lands Available for Traditional Use by Anishinabek People Within the HIWEC Study Area</b>	<ul style="list-style-type: none"> <li>Minimal impact to traditional Anishinabek lands.</li> </ul>	<ul style="list-style-type: none"> <li>Engage HIFN to ensure exchange of information during operation.</li> <li>Ensure maintenance staff work within pre-determined work areas.</li> <li>Maintain vegetation growth around access roads and WTG foundations.</li> <li>Provide continued site access for authorized persons or a group, which includes HIFN members who use the area for traditional purposes.</li> </ul>
<b>Decline in Availability of Country Foods (Traditional Foods) and Medicinal Plants Harvested or Grown For Subsistence or Medical Purposes</b>	<ul style="list-style-type: none"> <li>Minimal decline in availability of country foods and medicinal plants.</li> </ul>	<ul style="list-style-type: none"> <li>Mitigation measures proposed in <b>Section 4.2</b> to minimize disturbance to wildlife, resource use and recreational use will serve to further reduce impacts to traditional use activities, both on and off-reserve.</li> <li>Develop a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding traditional uses allowed on the site during operations, i.e., a firearms and / or hunting policy.</li> </ul>
<b>Decline in Spiritual, Ceremonial, or Cultural Sites</b>	<ul style="list-style-type: none"> <li>Minimal decline in spiritual, ceremonial or cultural sites.</li> </ul>	<ul style="list-style-type: none"> <li>Engage with HIFN staff to ensure exchange of information during maintenance and operation activities.</li> <li>Avoid areas identified by HIFN for spiritual, ceremonial or cultural practices during operational monitoring activities.</li> <li>The HIWEC was selected to avoid or minimize disturbance to areas associated with Aboriginal values important to the community.</li> </ul>
<b>Impacts to Nishshing Aki identified by HIFN</b>	<ul style="list-style-type: none"> <li>No impact on Nishshing Aki.</li> </ul>	<ul style="list-style-type: none"> <li>Impacts to Nishshing Aki during operations are not anticipated and therefore, no proposed mitigation is required.</li> </ul>
<b>Potential For Off-Reserve Impacts to Aboriginal Traditional Rights or Interests Due to the HIWEC</b>	<ul style="list-style-type: none"> <li>Minimal off-Reserve impacts to Aboriginal traditional rights or interests.</li> </ul>	<ul style="list-style-type: none"> <li>The HIWEC is proposed entirely on HIFN I.R. #2 within the jurisdiction of HIFN. The community has jurisdiction over land use planning within its territories as part of its authority under the First Nations Land Management Land Code.</li> <li>Mitigation measures proposed in <b>Section 4.2</b> to minimize disturbance to wildlife, resource use and recreational use will serve to further reduce impacts to traditional use activities, both on and off-Reserve.</li> </ul>
<b>Potential Impacts to Navigable Waterways Used By Anishinabek Groups</b>	<ul style="list-style-type: none"> <li>Minimal impacts to navigable waterways used by Anishinabek groups.</li> </ul>	<ul style="list-style-type: none"> <li>Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.</li> <li>Should potential adverse impacts arise as part of ongoing monitoring, HIW will work with the potentially impacted group to develop avoidance or mitigation as required.</li> <li>HIFN involvement will ensure that the HIWEC respects Aboriginal and treaty rights of HIFN members, many of which are in common with other neighbouring Anishinabek communities.</li> </ul>
<b>Access to Trails and Traditional Resource Areas</b>	<ul style="list-style-type: none"> <li>Minimal impacts to access of trails and traditional resource areas.</li> </ul>	<ul style="list-style-type: none"> <li>Engage with HIFN staff to ensure exchange of information during maintenance and operation activities.</li> <li>Optimize siting of all HIWEC operation phase work to avoid trails and other resource areas based on feedback from the community.</li> </ul>

**Table 4-20: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
<b>Negative Impact Due to Visual Change Within the Vicinity of the HIWEC</b>	<ul style="list-style-type: none"> <li>Minimize visual change within vicinity of the HIWEC.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize vegetation clearing for the operation of the HIWEC.</li> <li>Limit WTG markings to manufacturer / company markings / logos.</li> </ul>
<b>Negative Impact to the Night Sky Over the Vicinity of the HIWEC</b>	<ul style="list-style-type: none"> <li>Minimize light emissions from WTGs.</li> </ul>	<ul style="list-style-type: none"> <li>Use red obstruction lighting of 1800 candelas with the beam angle adjusted to minimize lighting observed from ground level.</li> <li>Avoid daytime or white obstruction lighting.</li> <li>Ensure that all lights will flash simultaneously.</li> <li>Design the lighting system such that WTGs within the perimeter of the HIWEC would not be required to be lit if they are within 900 m of a lit WTG, and if they are not the highest WTG in terms of elevation.</li> </ul>
<b>Temporary Change in the Flow of Local Traffic Resulting from Maintenance Activities</b>	<ul style="list-style-type: none"> <li>Minimize disturbance to local traffic patterns.</li> </ul>	<ul style="list-style-type: none"> <li>Obtain appropriate road occupancy and traffic permits from provincial agencies prior to undertaking maintenance activities, if required.</li> <li>Notify the HIFN community about major HIWEC maintenance activities.</li> </ul>

## 4.7 Public Health and Safety

### 4.7.1 Existing Conditions

#### 4.7.1.1 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 the Design and Operations Report for more information regarding the emergency response and communications plan.

#### 4.7.1.2 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.

As discussed in **Section 4.6.1.4**, property line setbacks are to be assessed in the subsequent Draft Design and Operations Report of the Final Draft EA Report, in accordance with the HIFN EA Guidance document. This requires mapping and a description of 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.

#### 4.7.1.3 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.

#### 4.7.1.4 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 Hertz (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 Health 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 have not been considered in the effects assessment.

#### 4.7.1.5 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 Health Impacts of Wind Turbines Report” (CMOH, 2010) indicates that “wind turbines are not considered a significant source of EMF exposure”. Thus, EMFs have not been considered in the effects assessment.

## 4.7.2 Potential Effects and Proposed Mitigation Measures

### 4.7.2.1 Construction and Decommissioning

Public health and safety concerns as described in **Section 4.7.1** are not anticipated during construction and decommissioning.

### 4.7.2.2 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 4.7.1**.

**Table 4-21** identifies potential effects on public health and safety that could occur during the operation phase of the HIWEC and identifies proposed mitigation strategies and a monitoring plan.

**Table 4-21: Proposed Mitigation Measures Associated with Potential Effects to Public Health and Safety Resulting from Operations**

Potential Effect	Performance Objective	Proposed Mitigation Strategy
Impacts on Public Health and Safety from Structural Hazards, and/or Ice Throw.	<ul style="list-style-type: none"> <li>No public health and safety incidents.</li> </ul>	<ul style="list-style-type: none"> <li>Adhere to setback requirements to limit likelihood of any impacts.</li> </ul>
Stray Voltage Effects to the Public and Wildlife	<ul style="list-style-type: none"> <li>No health and safety incidents associated with stray voltage.</li> </ul>	<ul style="list-style-type: none"> <li>Build and maintain the HIWEC as prescribed by the Distribution System Code and the Electrical Safety Authority to minimize the risk of stray voltage.</li> <li>Ensure ongoing regular maintenance and monitoring of WTGs.</li> <li>Ensure that all electrical design conforms and complies with relevant electrical safety standards.</li> </ul>

## 4.8 Other Resources

### 4.8.1 Existing Conditions

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

#### 4.8.1.1 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.



#### 4.8.1.2 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.

#### 4.8.1.3 Forest Resources

Based on the MNRF's Sustainable Forest Licences (SFL) database (MNRF, 2014), 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.

#### 4.8.1.4 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.

### 4.9 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.

## 5. References

- AECOM, 2015:  
Draft Henvey Inlet Wind Energy Centre (HIWEC) Natural Heritage Assessment: Records Review Report.  
Prepared for Henvey Inlet Wind L.P. March 2015.
- Anishinabek Nation (Union of Ontario Indians), 2015:  
Lands and Resources Program. Accessed March 12, 2015 from: <http://www.anishinabek.ca/>
- Bright, E.G., 1989:  
Geology of the Whitestone Lake Area, District of Parry Sound. Ontario Geological Survey, Open File Report 5697, 184 pp., 6 figures, 13 tables, 21 photos, and map P.3095 in back pocket.
- Chapman, L.J. and D.F. Putnam, 1984:  
The Physiography of Southern Ontario. Ontario Geological Survey, Special Volume 2, 270p. Accompanied by Map P.2715 (coloured), scale 1:600 000.
- Chief Medical Officer of Health (CMOH), 2010:  
The Potential Health Impact of Wind Turbines. May 2010.
- Culshaw, N.G., D. Corrigan, J.W.F. Ketchum, P. Wallace and N. Wodicka, 2004a:  
Precambrian geology, Key Harbour area. Ontario Geological Survey, Preliminary Map P 3548, scale 1:50,000.
- Culshaw, N.G., D. Corrigan, J.W.F. Ketchum, P. Wallace and N. Wodicka, 2004b:  
Precambrian geology, Naiscoot area. Ontario Geological Survey, Preliminary Map P 3549, scale 1:50,000.
- Davidson, A. and W.C. Morgan, 1981:  
Preliminary Notes on the Geology of East of Georgian Bay, Grenville Structural Province, Ontario. *In*: Current Research, Part A, Geological Survey of Canada, Paper 81-1A, p. 291-298.
- Henvey Inlet First Nation, 2013:  
Traditional Land Use Study Related to Proposed Four Lane Highway 69. May 2013. Confidential.
- Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurry, 1998:  
Ecological Land Classification for Southern Ontario: First Approximation and its Application. Ontario Ministry of Natural Resources, Southcentral Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02.
- Mollard, D.G., 1981:  
Southern Ontario Engineering Geology Terrain Study, Data Base Map, Byng Inlet. Ontario Geological Survey, Map 5500, Scale 1: 100,000.
- Neegan Burnside Limited, 2011:  
Nigig Power Corp/Henvey Inlet Wind Project Preliminary Environmental Constraints Analysis Report.  
Prepared for IPR-GDF- SUEZ NA.
- Ontario Ministry of Environment and Climate Change (MOECC), 2010:  
What is the Air Quality Index?. Accessed February 2015. Available:  
[http://www.airqualityontario.com/science/aqi\\_description.php](http://www.airqualityontario.com/science/aqi_description.php)
- Ontario Ministry of Environment and Climate Change (MOECC). 2014a:  
Large landfill sites. Accessed May 2015. Available: <http://www.ontario.ca/environment-and-energy/map-large-landfill-sites>

- Ontario Ministry of Environment and Climate Change (MOECC), 2014b:  
Parry Sound: AQI for 2014. Accessed February 2015. Available:  
[http://www.airqualityontario.com/reports/aqisearch.php?stationid=49005&show\\_day=0&start\\_year=2014&submitter=Get+AQI+Readings](http://www.airqualityontario.com/reports/aqisearch.php?stationid=49005&show_day=0&start_year=2014&submitter=Get+AQI+Readings)
- Ontario Ministry of Natural Resources and Forestry (MNRF), 1984a:  
Habitat Management Guidelines for Bats of Ontario. Accessed on March 2015. Available:  
<https://dr6j45jk9xcmk.cloudfront.net/documents/2790/guide-bats.pdf>
- Ontario Ministry of Natural Resources and Forestry (MNRF), 1984b:  
Habitat Management Guidelines for the Protection of Heronries in Ontario. Accessed on March 2015.  
Available: <https://dr6j45jk9xcmk.cloudfront.net/documents/2798/guide-heronries.pdf>
- Ontario Ministry of Natural Resources and Forestry (MNRF), 1987:  
Bald Eagle Habitat Management Guidelines. Accessed on March 2015. Available:  
<https://dr6j45jk9xcmk.cloudfront.net/documents/2789/guide-bald-eagle.pdf>
- Ontario Ministry of Natural Resources and Forestry (MNRF), 2012:  
Significant Wildlife Habitat Ecoregion 5E Criterion Schedule. DRAFT February 2012. 46 pp.
- Ontario Ministry of Natural Resources and Forestry (MNRF), 2014:  
White-nose Syndrome in Bats. Accessed on March 2015. Available: <https://www.ontario.ca/environment-and-energy/white-nose-syndrome-bats>
- Ontario Ministry of Natural Resources and Forestry (MNRF), 2015a:  
Find pits and quarries. Accessed May 2015. Available: <http://www.ontario.ca/environment-and-energy/find-pits-and-quarries>
- Ontario Ministry of Natural Resources and Forestry (MNRF), 2015b:  
Make-a-Map: Natural Heritage Areas Online Tool. Available:  
<http://www.gisoeapp.lrc.gov.on.ca/web/MNR/NHLUPS/NaturalHeritage/Viewer/Viewer.html>. Accessed on February 19, 2015.
- Ontario Geological Survey (OGS), 2003:  
Surficial Geology of Southern Ontario. Ontario Geological Survey, MRD128.
- Ontario Oil, Gas & Salt Resources Library (OGSR), 2011:  
Well Location Maps. Accessed May 2015. Available: [www.ogsrlibrary.com](http://www.ogsrlibrary.com)
- U.S. Fish & Wildlife Service (FWS), no date available:  
The Effects of Noise on Wildlife. Accessed March 2015. Available:  
<http://www.fws.gov/windenergy/docs/Noise.pdf>
- Watt, W.R. and M.C. Caceres, 1999:  
Managing for snags in the boreal forests of northeastern Ontario. Ontario Ministry of Natural Resources.  
Northeast Sci. Info. Tech. Note TN-016. 20 pp.
- Westwind Forest Stewardship Inc., 2009:  
Forest Management Plan. Accessed May 2015. Available: <http://www.westwindforest.ca/fmp.html>
- Yves R. Hamel et Associés Inc. (YRH), 2011:  
Deployment of the Henvey Inlet Wind Farm Project: Preliminary Impact Study Identification of  
Telecommunication Systems. September, 2011.