Henvey Inlet Wind LP

Henvey Inlet Wind

Interim Construction Plan Report – Henvey Inlet Wind Energy Centre (HIWEC)

draft for discussion

Prepared by:

AECOM
105 Commerce Valley Drive West, Floor 7 905 886 7022 tel
Markham, ON, Canada L3T 7W3 905 886 9494 fax
www.aecom.com

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60341251

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AECOM: 2012-01-06

Distribution List

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0	1	Posted to HIW website for public viewing

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
01	LB	June 24, 2015	Interim Draft

AECOM Signatures

Report Prepared By:

Leanna Burgess, C.E.T.
Environmental Planner

Jake Murray, B.U.R.Pl
Environmental Planner

Report Reviewed By:

Kyle Hunt, M.E.Des.
Senior Planner

Marc Rose, MES, MCIP, RPP
Senior Environmental Planner

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List of Acronyms and Glossary

BMPs.....Best Management Practices
CEC.....Canadian Electrical Code
EA .....Environmental Assessment
H&S Plan.....Health and Safety Plan
ha .....hectare
HIFN.....Henvey Inlet First Nation
HIW .....Henvey Inlet Wind
HIWEC .....Henvey Inlet Wind Energy Centre
HONI .....Hydro One Network Inc.
km .....Kilometres
L/day .....Litres per day
m .....Metre
m^2.....Metres squared
m^3.....Metres cubed
Met tower .....Meteorological tower
MOECC.....Ontario Ministry of the Environment and Climate Change
MSDS.....Material Safety Data Sheet
MW.....Megawatt
NHA.....Natural Heritage Assessment
O&M .....operations and maintenance
SCADA.....Supervisory Control and Data Acquisition
TS.....Transformer Station
WTG.....Wind Turbine Generator

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 Summary of Construction Plan Report Requirements

The requirements for the Construction Plan 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 Construction Plan Report Requirements under HIFN EA Guidance Document

Requirement	Completed	Corresponding Section
Details of construction or installation activities	Yes	**Section 3.0**
The location and timing of any construction or installation activities for the duration of the construction or installation	Yes	**Section 3.0**
Any negative environmental effects that may result from construction or installation activities	Yes	**Section 4.0**
Mitigation measures in respect of any negative environmental effects	Yes	**Section 4.0**

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

1.2 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 Bekanon Road. The geographic location is along the eastern shore of Georgian Bay, south of French River Provincial Park and directly north of North Georgian Bay Shoreline and Islands Conservation Reserve (**Figure 1-1**). 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**.

FRENCH RIVER PROVINCIAL PARK

Key River

Henvey Inlet

Sandy Bay

Georgian Bay

NORTH GEORGIAN BAY SHORELINE AND ISLANDS CONSERVATION RESERVE

On-Reserve Transmission Line - Route A (Option)

On-Reserve Transmission Line - Route B (Option)

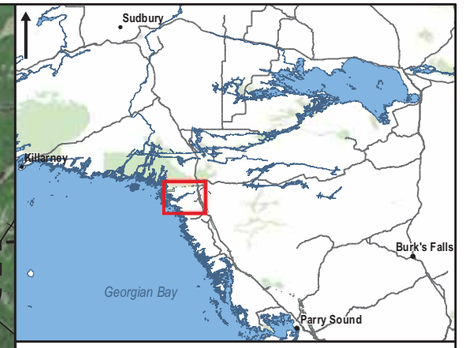
Bekanon Rd

Highway 69

Old Still River Rd

Highway 526

T0 T1 T2 T3 T4 T5 T6 T7 T8 T9 T10 T11 T12 T13 T14 T15 T16 T17 T18 T19 T20 T21 T22 T23 T24 T25 T26 T27 T28 T29 T30 T31 T32 T33 T34 T35 T36 T37 T38 T39 T40 T41 T42 T43 T44 T45 T46 T47 T48 T49 T50 T51 T52 T53 T54 T55 T56 T57 T58 T59 T60 T61 T62 T63 T64 T65 T66 T67 T68 T69 T70 T71 T72 T73 T74 T75 T76 T77 T78 T79 T80 T81 T82 T83 T84 T85 T86 T87 T88 T89 T90 T91 T92 T93 T94 T95 T96 T97 T98 T99 T100 T101 T102 T103 T104 T105 T106 T107 T108 T109 T110 T111 T112 T114 T115 T117 T118 T119 T120 T121 T122



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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	

Figure 1-1

Map location: F:\AECOM-Work\60333000 - Henvey Wind\Design\Baseline Report (Feb 2015)\REA\REA_Site Plan.mxd
Date Saved: 6/23/2015 4:16:40 PM

1.3 Proponent Contact and Key Information

The following table provides key HIWEC information.

Table 1-2: Key Information

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

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. Description of Construction and Installation Activities

The following sections provide the following information for construction and installation activities:

- Timing and duration;
- Materials brought on-site;
- Construction equipment used; and
- Explanation of how the components will be constructed.

3.1 Timing of Construction and Installation Activities

Subject to the receipt of the necessary permits and approvals, site work for the HIWEC is expected to begin in May 2016 and last for approximately 18 months. Construction and installation activities will generally occur at times of day when other vehicles and machinery would normally be in operation within the HIWEC study area, unless circumstances require otherwise. **Table 3-1** presents the anticipated construction schedule and approximate order of construction activities for the proposed HIWEC.

Table 3-1: Construction Schedule

Activity		Estimated Start Date	Estimated Duration
Site Preparations and Land Clearing		May 2016	8 weeks
Access Road Construction		May 2016	1 year
Construction of Compounds and Laydown Yards		May 2016	8 weeks
Wind Turbine Generator (WTG) Site and Crane Pad Construction		June 2016	1 year
WTG Foundations Construction		June 2016	1 year
TS Construction		June 2016	1 year
Delivery of Equipment		April 2017	6 – 8 months
WTG Assembly and Installation		April 2017	1 year
Electrical Collector System Construction	*Pad-Mounted Transformers*	April 2017	6 – 8 months
	Collector Lines	June 2016	1 year
Operations and Maintenance (O&M) Building Construction		April 2017	6 – 8 months
WTG Testing and Commissioning		January 2018	18 months
Clean-up and Site Reclamation		September 2017	1 year

3.2 Pre-construction Activities

3.2.1 Surveying, Geotechnical Sampling Activities and Meteorological Towers Installation

Prior to construction, a registered Ontario Land Surveyor (or equivalent) will survey all access roads, collector lines, WTG locations, and all other foundations and work locations, as appropriate. Equipment used for surveying will likely include a small number of light duty trucks and all-terrain vehicles.

Existing buried infrastructure located on public and private property will be identified using the Ontario One Call service and updated throughout construction, as required.

Geotechnical sampling will be required for a sample set of WTG foundation locations. Typically, a track-mounted drill rig visits the sampling locations, drills the borehole and collects geotechnical information for laboratory testing and analysis. Information collected will include details of soil compaction, grain size, resistivity, soil pH, and depth. This operation typically uses two operators and requires one to two days per WTG location depending on rock content.

Equipment will include, at a minimum, trucks, a track mounted drill rig, and possibly a truck-mounted drill rig. The trucks will be driven to the site via existing provincial and local roads and local trails. No materials will be brought on-site for these activities and any waste generated would be comprised of drill cuttings (soil and rock) which will be scattered in the vicinity of the boreholes. The chemicals required for this phase will include oils, gasoline and grease used to operate the equipment.

Three Met towers have been erected and one additional tower will be erected during the summer of 2015 using cranes and secured with guy wires tied off to anchors or a monopole foundation. Access roads may be constructed to access Met tower locations. The towers have and will be connected to the HIWEC power and communication infrastructure. Construction of Met towers take approximately two (2) days and require a crew of approximately six (6) people.

3.3 Construction Activities

In general, all work crews will drive automobiles (typically light trucks) to reach the HIWEC study area and used them within the HIWEC. Various truck and trailer configurations will be used to transport specialized equipment (e.g., tracked bulldozers, excavators, loaders, dump trucks, compactors and graders) to the HIWEC study area. Construction equipment, fuel and lubricants will be delivered to construction compounds and laydown yards by large truck and trailer combinations.

3.3.1 Site Preparation, Land Clearing and Blasting

The construction of the access roads, WTG foundations / crane pads, TSs and construction compounds and laydown yards will typically require clearing and grubbing of any vegetation including removal of trees and shrubs, excavation of the topsoil layer (if any) and adding a layer of compacted material, as required. Prior to construction, soil from these areas will be stripped and stockpiled for re-use on-site after construction is completed. Trees that are removed will be stockpiled for use by the community and shrubs will be mulched and spread on site to assist with reclamation activities.

Where necessary, areas will need to be blasted in order to yield a level surface, for, in particular, large equipment such as cranes. Blasting will follow required standards and best management practices (BMPs) to maintain safety. Blasted material will be crushed and used in areas where fill is required.

3.3.2 Construction of Access Roads

Access roads will be constructed to transport equipment to the construction sites. The construction of the access roads will result in disturbance areas approximately 5 m to 20 m wide. The access roads will be sited within this area of disturbance in consultation with HIFN and taking into consideration potential environmental effects. These roads will be sited to limit the number of watercourse crossings. As necessary, culverts will be constructed to maintain existing site drainage.

The access road to each WTG will typically require one week of construction time. Depending on the length of the access roads as well as road and site conditions, construction may require multiple trucks of gravel or crushed rock. **Table 3-2** provides details on the dimensions and materials required for access road construction.

Table 3-2: Description of Access Road Dimensions and Materials Required for Construction

Access Road Description		Measurement	Estimated Quantity Required (up to)
Roadbed Depth	*Granular Base Material*[1]	0.50 to 0.75 m	300,000 metres cubed (m^3)
	Crushed Gravel	0.10 to 0.20 m	80,000 m^3
	Total	0.10 to 0.95 m	440,000 m^3
Permanent Road Width[2]		8 to 12 m	--
Road Length		50 km	--

Notes: 1. Used only as required where surface bedrock does not exist
2. This width includes shoulder and travel width

New culverts may be required to maintain drainage where access roads encounter low areas and watercourse crossings and these will be constructed to support the construction equipment and delivery trucks. The details of culverts and their installation in addition to erosion control measures will be determined based on BMPs. The disturbed area will have the topsoil replaced from stockpiled material and will be reseeded.

The construction crew is anticipated to require approximately six people and the timeline for constructing an access road to a turbine is expected to take between two and four days to complete, depending on the length of the road and site conditions. Equipment will include, at a minimum, trucks, graders, excavators, drills and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the proposed mitigation measures outlined in **Section 4**.

3.3.3 Construction of Wind Turbine Generator Staging Areas

A site of approximately 0.6 hectares (ha) will be constructed for the temporary storage of construction material (i.e., no WTG components) at each WTG. Following clearing and grubbing of any vegetation, the topsoil at the temporary staging area will be removed and a layer of clean compacted crushed gravel will be imported as needed. The excavated topsoil will be re-used on-site, where feasible. Following the construction phase, the gravel will be removed from the site or re-used. The stockpiled topsoil will then be redistributed throughout the temporary laydown area.

For this activity, the construction crew is anticipated to require approximately six people and construction activities are expected to last for approximately two weeks. Equipment will include, at a minimum, trucks, graders, excavators and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.4 Construction of Crane Pads

Crane pads will be constructed and are necessary to support the cranes that assemble the WTGs. The crane pads will be located adjacent to the base of the WTG. Depending on the specifications of the WTG manufacturer, bulldozers will remove topsoil and subsoil. Crane pads will be made up of a varying mixture of granular base material and crushed gravel depending on site specific conditions and required bearing capacity. The crane pad dimensions will be approximately 0.08 ha or approximately 20 x 30 m. The excavated topsoil will be re-used on-site as feasible.

Construction of the crane pads are expected to last for approximately two to four days at each WTG. Equipment will include, at a minimum, trucks, graders, excavators and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**. Crane pads will remain in place to support any HIWEC activities during the operations and / or decommissioning phases.

3.3.5 Construction of Wind Turbine Generator Foundations

A determination of a final WTG foundation design will be based on results of site-specific geotechnical assessments. Based on site specific conditions that will be determined from geotechnical assessments, blasting may be required during WTG foundation excavation. It is anticipated that rock anchor foundations will be utilized.

For typical foundations, the expected dimensions of the WTG foundation excavation are 0.08 ha with an excavated depth of up to 2.5 m. Stockpiled material will have topsoil and subsoil separated out and surplus excavated material may be removed from the site for disposal in an approved manner. The foundation will be constructed of poured concrete and reinforced with steel rebar to provide strength. The construction timeframe for WTG foundations is approximately four to seven days, excluding curing time.

After construction, the foundation will be backfilled and the surface will be landscaped for drainage. Any wood-waste generated will be removed from the site and recycled.

Equipment required for the construction and installation of WTG foundations will include light-duty trucks, tracked bulldozers, excavators, loaders, dump trucks, compactors, graders, concrete trucks, concrete pump trucks, boom truck or crane and water trucks. An estimated 50 concrete truck loads will be required for each WTG foundation. The trucks, crane and graders will be driven to the site and the bulldozers will be transported via trailers. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.6 Delivery of Equipment

Equipment will be delivered by truck and trailer throughout the construction phase and stored at the WTG staging areas and / or construction compounds and laydown yards, as appropriate. Each WTG site will include required infrastructure to accommodate delivery of oversized loads (e.g., WTG components).

3.3.7 Construction Compounds and Laydown Yards

Up to four potential construction compounds and laydown yards will be located within the HIWEC study area. One or more of these locations will be used as a site for the placement of construction trailers. A temporary electrical service line will be connected from the existing distribution line for the purpose of providing power to the construction trailers.

Topsoil and subsoil will be stripped and stockpiled on-site and the construction compounds and laydown yards will be constructed of compacted surface material suitable for vehicular traffic and equipment / component storage. The depth of the graveled areas will vary and will be dependent on conditions encountered during the time of construction. Following construction, the temporary construction compounds and laydown yards will be restored to pre-existing conditions unless parts of those areas are used permanent components (e.g., TSs). The temporary electrical service line and poles will be removed unless required for service during operations.

Equipment required to prepare the construction compounds and laydown yards will include trucks, excavators, bulldozers, graders and compaction equipment. The construction compounds and laydown yards will take approximately four to six weeks to prepare. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.8 Wind Turbine Generator Assembly and Installation

WTG components will arrive on-site using various truck and trailer configurations and other trucks and will be temporarily stored on-site in the immediate vicinity of the base prior to assembly. WTGs will be assembled on-site by qualified installers. Multiple cranes will be used to install the WTGs.

Cranes and crews will erect the WTGs once the foundations are completed and the concrete has cured. This will typically be in seven to ten lifts (five for the tower sections, one for the nacelle and one to four for the rotor) over a period of three to five days depending on environmental conditions (i.e., high wind conditions would delay installation). The lower tower sections may be installed several days before the upper tower sections and the WTG to optimize installation sequence. The lower tower section will also include electrical and communications equipment.

Following the erection of the WTG tower, the nacelle will be lifted into place by the heavy-lift crane. The WTG rotor, which consists of three blades and the hub, will be lifted into place by a combination of two cranes. One smaller crane will stabilize the rotor as the larger crane does the heavy lifting. In some circumstances, a single blade and hub lifting technique may be utilized where space or high wind constraints prevent the rotor from being lifted in one piece. Installation may require 15 to 20 people at the site. Upon completion, packing frames for the WTG components will be returned to the WTG vendor.

Equipment for WTG assembly and installation will include, at a minimum, trucks, two cranes, graders, forklifts, man lifts and bulldozers. The trucks and graders will be driven to the site and the bulldozers will be transported via trailers. The larger track mounted crane can move between WTG sites; however, it may need to be disassembled to move it along roadways and from the HIWEC study area. Alternatively, cranes may be moved between WTG sites without disassembly along access roads. In such instances, no additional infrastructure is required to support the crane movement. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.9 Construction of the Electrical Collector System

The electrical collector system will consist of pad-mounted transformers, underground and overhead cabling. The construction activities associated with these components are described below.

3.3.9.1 Pad-Mounted Transformers

A concrete transformer pad, approximately 6 m^2 in size, will be installed adjacent to each WTG at the same time as the WTG base installation. The construction will consist of excavation, soil storage, installation of the buried electrical grounding grid, installation of the concrete pad, installation of the transformer and electrical connections.

Pad-mounted transformer installation and cabling between the WTG and transformer is expected to take three days per WTG. Equipment will include various truck and trailer configurations to transport the equipment to site, and a truck-mounted crane for the installation. These activities will likely require up to six trucks, and a work force of approximately two people per vehicle per day. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.9.2 Collector Lines

Cables will carry electricity from each WTG to the TSs. Similarly, fibre optics lines will be installed to allow for communications between the WTGs and the TSs. The collector lines may be a combination of underground and overhead lines, however it is anticipated that the collector lines will be predominantly overhead.

Overhead collector lines will require installation of wood, steel or concrete monopoles to a depth of approximately 5 to 6 m. Conductors will be strung from pole to pole in a manner similar to local electrical distribution circuits, and will be spaced approximately 45 to 60 m apart. The overhead collector lines will converge at the TSs.

Underground collector lines will be installed in a trench approximately 1 m deep and / or in conduits. Where two or more underground collector lines must be connected together, a junction box or an overhead switch will be installed either below or aboveground. Junction boxes and overhead switches may contain equipment related to splices, junctions, cable splices and disconnect switches.

Equipment required for overhead collector line installation will include utility bucket trucks, auguring trucks (or excavators), blasting equipment, pole trailers, reel stand vehicles, an excavator, conductor puller vehicles and tensioner vehicles. Equipment required for underground collector line installation will include excavators, dozers, dump trucks, and compaction equipment. Installation of the collector lines may require crews of approximately six people. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.10 Construction of the Transformer Stations

Each TS will be constructed on an area of approximately 4 ha. Blasting may occur to create a level surface and the TSs will be constructed on a raised pad. Existing vegetation will be stripped along with topsoil, which will be stockpiled separately from stripped subsoil. Stockpiled soil will be used during site restoration after construction activities are completed.

Each pour-in-place concrete foundation for the TS will be approximately 50 m^2 and have a depth of approximately 2 m. Other construction activities include installation of the ground grid (prior to pouring the foundation), grounding system, electrical equipment, and Supervisory Control and Data Acquisition (SCADA) and communication equipment. The switchgear and protection and control equipment will be housed in a waterproof building. In addition, the outdoor electrical cabinets (e.g., transformer control cabinet) will also be waterproofed. The electrical equipment that will be installed outdoors includes the transformers, circuit breakers, metering for protection and control, lightning and surge arrestors and revenue metering. The TS areas will then be covered with crushed stone, fenced and appropriate signage put in place for safety and security purposes.

A secondary concrete containment system will be installed around the transformers and connected to the drainage system through an oil / water separator that will be buried below grade.

The TSs will follow the Canadian Electrical Code (CEC) for grounding, which will consist of a below grade grid of copper cable that will be interconnected to TSs equipment with a fence and locked gate for controlling access.

Equipment required for the construction and installation of the TSs will include flatbed trucks, tracked bulldozers, dump trucks, excavators, blasting equipment, compaction equipment, concrete trucks, concrete pump trucks, water trucks and a crane. Construction of the TS facilities may take up to 12 months. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.11 Installation of the On-Reserve Transmission Line

Transmission line poles may be installed by augur or mounted on concrete pier foundations. Where auguring is required, a truck or track mounted auger device will be used. The poles will then be inserted using special cranes to a typical depth of 2 to 3 m below grade. The poles are typically “dressed” (made ready to accept conductors) on the ground prior to installation. If required, guy wires may be used to anchor a pole in place. At times when guy wires cannot be used, but are needed, steel poles may be mounted on concrete pier foundations. Approximately six construction vehicles (including trucks and a pole loader) and a crew of approximately 12 to 15 people are anticipated for construction of any on-Reserve transmission lines. Once the poles are in place and dressed, cables will be strung in place using boom trucks and special cable reel trucks.

Equipment will include, at a minimum, a truck mounted crane, a drill rig, blasting equipment, flatbed trailers and a truck mounted auger. The only chemicals required for this phase are oils, gasoline and grease used to operate construction equipment. A lubricant is likely to be used when the cables are pulled in through the conduit. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.12 Construction of the Operations and Maintenance Building

The O&M building will be a structure constructed on a concrete foundation with a footprint of approximately 1 ha. A gravelled vehicle and parts storage area will be located around the perimeter of the O&M building that will be contained by a chain link fence. An access road to the building will be constructed to accommodate construction equipment and on-site traffic during the operation of the proposed HIWEC.

The O&M building will be powered by the local distribution company or via the HIWEC TSs and will terminate on a transformer adjacent to the building.

Construction of an O&M building may take up to six months to complete and will require a crew of approximately 15 people. Equipment will include, at a minimum, forklifts, concrete trucks and smaller crew trucks. The chemicals required for this phase will include oils, gasoline and grease used to operate construction equipment. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.3.13 Site Clean-up and Reclamation

Site clean-up will occur throughout the construction phase and site reclamation will occur after construction has been completed. Waste and debris generated during the construction activities will be collected by a licensed operator and disposed of at an approved facility. All reasonable efforts will be made to minimize waste generated and to recycle materials including returning packaging material to suppliers for re-use / recycling, where possible.

Temporary components (WTG staging areas, construction compounds and laydown yards) will be restored by replacing and re-contouring stripped soil to return the land to previous conditions as necessary. Erosion control equipment will be removed once inspections have determined that the threat of erosion has diminished to the original land use level or lower. High voltage warning signs will be installed at the TSs and elsewhere, as appropriate. At the conclusion of construction, vehicles and construction equipment will be removed from the site.

3.4 Wind Turbine Generator Commissioning

Testing and commissioning of the WTGs will be performed prior to HIWEC connection to the Hydro One Network Inc. (HONI) grid. The commissioning activities will consist of testing and inspection of electrical, mechanical and communications systems for system continuity, reliability and performance.

Temporary portable generator sets may be used to electrically commission the WTGs prior to connection to the grid. Following the commissioning phase, the portable generators will be removed from the site. Equipment will include support trucks which will be driven to the construction site. The only chemicals required for this phase are oils, gasoline, lubricants and grease used to operate construction equipment and portable generators and the WTG gearboxes. Fuel handling will be conducted in compliance with the mitigation measures proposed in **Section 4**.

3.5 Temporary Uses of Land

Construction and installation activities will utilize temporary staging areas, construction compounds and laydown yards. Lands used for these purposes will be converted from their current state to one appropriate for their use prior to construction. Soil management will be incorporated into the creation and use of these areas to facilitate site reclamation, and all temporary work spaces will be converted back to their previous land use after the completion of the construction and installation phase. Temporary areas will be reclaimed approximately two years from initial construction disturbance or sooner.

3.6 Temporary Water Takings

Groundwater takings for the purposes of providing dry working conditions during WTG foundation construction, collector line installation and access road construction, as well as providing water for concrete batching, dust suppression and general maintenance activities may be required during construction of the HIWEC.

A desktop hydrogeological assessment will be completed for the purpose of providing a high level review of existing hydrogeological conditions within the HIWEC study area, describing potential groundwater taking needs of the HIWEC during construction and operation, outlining potential effects of the HIWEC on groundwater resources and providing a mitigation strategy and contingency measures that negate these adverse effects. The subsequent Draft Construction Plan Report of the Final Draft EA Report will provide an overview of the Hydrogeological Assessment and Effects Assessment Report for the HIWEC; the full report will be provided in an appendix to the subsequent Draft Design and Operations Report of the Final Draft EA Report.

During the construction phase of the HIWEC, water may be required to support WTG infrastructure construction (i.e., dust suppression and concrete batching). Water demands for these purposes are expected to have peak volumes up to 40,000 L/day. Actual daily demands will vary and will typically be lower in volume than the estimated peak volume.

A review of existing secondary source information provided by the Ontario Geological Survey and from local MOECC water well records indicates that groundwater takings for the purpose of WTG foundation construction is expected to exceed 50,000 L/day at some locations. The majority of the HIWEC study area is underlain by weathered crystalline bedrock that has potential to readily transmit groundwater. Within the southern and western portions of the HIWEC study area the groundwater table is expected to be high and may be encountered during WTG foundation construction. Therefore, WTG foundations excavated in this material are anticipated to require significant dewatering during construction. Groundwater taking quantities and predicted zones of influence is dependent on the surficial material being excavated, the depth to groundwater, and other hydrogeological characteristics that may be determined during geotechnical analysis. Further refinement of anticipated dewatering rates and predicted zones of influence will be calculated when geotechnical information becomes available.

3.7 Materials / Waste Generation and Transportation

Materials and waste that will be brought to the HIWEC during construction and installation will include equipment / component packaging, scraps, fuels and lubricants. Packing frames for the WTG components and cabling spools

will be returned to their respective vendors or will be recycled. Plastics from other containers and packaging will be disposed of through the local landfill and recycling facilities, where appropriate. Construction materials and scrap metals (e.g., copper wiring and conductor) will be removed and sold to a local scrap metal dealer. Spent welding rods used in construction will be disposed of as hazardous waste by a licensed contractor. Oils, fuel and lubricants used in maintenance and operation of construction equipment will be stored temporarily in accepted containment systems and will subsequently be removed by a licensed contractor. The licensed contractor will be required to dispose of these wastes through approved waste-oil and hazardous waste disposal streams.

Materials and waste will also be generated as a result of construction and installation activities. Cleaning of concrete trucks will occur at designated areas, located greater than 30 m from water features. Sanitary sewage collected in portable toilets and wash stations will be transported to an off-site facility by a licensed hauler. Small amounts of spoil material (soil and rock) from borehole drilling during geotechnical surveys may be redistributed on disturbed areas at respective drill sites. Topsoil and/or subsoil stripped from access roads, WTG staging areas, construction compounds and laydown yards may be re-used on-site, where feasible, or otherwise removed to an appropriate location. Some packing-material waste may also be generated from construction. All recyclable materials will be separated from non-recyclable materials and both streams will be removed from the site and disposed of at an approved and licenced facility.

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

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

3.8 Air Emissions

During each phase of the HIWEC, activities requiring the use of motorized vehicles (e.g., transportation of maintenance personnel to WTG sites) will have infrequent and short-term emissions of low levels of greenhouse gases and other compounds. These emissions are likely to be negligible compared to normal operation of motorized vehicles in the HIWEC study area and will be temporary in nature. **Section 4** of this Report outlines potential negative effects to air quality relating to the HIWEC and identifies mitigation measures proposed.

HIWEC noise emissions during construction activities have been assessed in **Section 4**.

HIWEC activities are not anticipated to generate any odour emissions.

3.9 Emergency Response and Communications

The Emergency Response and Communications Plan is described in **Section 5.1** of the Design and Operations Report and will be prepared by the contractor prior to construction. The Emergency Response and

Communications Plan is to be used in the event of an emergency and includes contact information for regulators and emergency responders, including local police and fire departments. All identified stakeholders will be notified should the emergency include any potential major impact to the health and safety of local residents or the environment.

3.10 Health and Safety Plan

HIW and its construction contractor will institute a Health and Safety Plan (H&S Plan) during the construction period. A detailed H&S Plan will be developed and the construction workforce will be made aware of the Plan. The purpose of this Plan is to ensure a safe work environment for all. A typical H&S Plan may include, but is not limited to:

- H&S Team identification, roles and contact numbers
- Emergency contacts
- H&S protocols for specific incidents
- Health and safety education and training
- Health and safety monitoring
- Documentation of Material Safety Data Sheets (MSDS) sheets
- Incident reporting protocol
- Prevention implementation
- Daily tailgate meetings
- Wildlife interactions
- Environmental conditions (heat and cold)
- Daily, weekly and monthly reporting

HIW and its construction contractor will maintain a database of Incident Reporting. The Incident Reporting will document all activities resulting in incapacity to work for at least one full workday beyond the day on which the incident occurred. Records will also be maintained noting the total number of days of absence from work as a direct result of the incident.

4. Description of Environmental Effects and Proposed Mitigation Measures

This section describes the potential environmental effects that may result from the construction and installation of the HIWEC. The potential effects described below are also presented in **Section 4** of the Description Report. The assessment of potential environmental effects from construction and decommissioning 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, Dust;
- Noise; and
- Local Interests, Land Use and Infrastructure.

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 Construction Plan 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 Construction Plan 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 of the HIWEC reveal that the proposed mitigation measures are not achieving the intended results; the identified contingency measures will then be implemented.

Baseline information on the existing natural environment can be found in the Natural Heritage Assessment (NHA) Report, Water Assessment and Waterbody Report, Stage 1 Archaeological Assessment Reports, and the Cultural Heritage Assessment Report, to be provided in the Final Draft EA Report.

The following sections describe construction-specific potential effects and proposed mitigation measures that may result from construction / installation activities within the HIWEC study area.

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
Disturbance or Displacement of Cultural Heritage and Archaeological Resources Due to Construction / Decommissioning of HIWEC Infrastructure.	• Avoid disturbance / loss of cultural heritage and archaeological resources.	• HIWEC components are to be sited to avoid Nishshing Aki and any other cultural heritage or archaeological resource located on HIFN I.R. #2. • 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. • Pictograph and associated cultural heritage landscapes are to be protected during construction / decommissioning. • 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. • 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.

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)[1] 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.

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[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observed in 2011	Observed in 2013
Bird Species (9)							
Bald Eagle	*Haliaeetus leucocephalus*	S2	SC	NAR	NAR	Yes	Yes
Black Tern	*Chlidonias niger*	S3	SC	NAR	NAR	No	Yes
Caspian Tern	*Sterna caspia*	S3	NAR	NAR	NAR	No	Yes
Eastern Wood-Pewee	*Contopus virens*	S4	SC	SC	No Status (No Schedule)	No	Yes
Peregrine Falcon	*Falco peregrinus*	S3	SC	SC	SC (Schedule 1)	No	No
Prairie Warbler	*Setophaga discolor*	S3	NAR	NAR	NAR	No	Yes
Rusty Blackbird	*Euphagus carolinus*	S4	NAR	SC	SC (Schedule 1)	No	Yes
Wood Thrush	*Hylocichla mustelina*	S4	SC	THR	No Status (No Schedule)	No	Yes
Yellow Rail	*Coturnicops noveboracensis*	S4	SC	SC	SC (Schedule 1)	No	Yes
Insect Species (3)							
Horned Clubtail	*Arigomphus cornutus*	S3	-	-	-	No	Yes
Monarch	Danaus plexippus	S2	SC	SC	SC (Schedule 1)	No	Yes
Mottled Darner	*Aeshna clepsydra*	S3	-	-	-	No	Yes
Mammal Species (1)							
Eastern Wolf	*Canis lupus lycaon*	S4	SC	SC	SC (Schedule 1)	No	Yes
Reptile Species (5)							
Common Five-lined Skink (Southern Shield population)	*Plestiodon fasciatus pop. 2*	S3	SC	SC	SC (Schedule 1)	Yes	Yes
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SC	SC	SC (Schedule 1)	No	No
Milksnake	*Lampropeltis triangulum*	S3	SC	SC	SC (Schedule 1)	No	Yes
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC (Schedule 1)	No	No
Snapping Turtle	*Chelydra serpentina*	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[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observed in 2011	Observed in 2013
Amphibian Species (1)							
Western Chorus Frog (Great Lakes / St. Lawrence - Canadian Shield Population)	*Pseudacris triseriata pop. 1*	S3	NAR	THR	THR (Schedule 1)	Yes	Possibly but not confirmed
Bird Species (6)							
Canada Warbler	*Cardellina pusilla*	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Common Nighthawk	*Chordeiles minor*	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Golden-winged Warbler	*Vermivora chrysoptera*	S4	SC	THR	THR (Schedule 1)	No	No
Least Bittern	*Ixobrychus exilis*	S4	THR	THR	THR (Schedule 1)	No	No
Olive-sided Flycatcher	*Contopus borealis*	S4	SC	THR	THR (Schedule 1)	Yes	Yes
Whip-poor-will	*Caprimulgus vociferus*	S4	THR	THR	THR (Schedule 1)	Yes	Yes
Mammal Species (3)							
Little Brown Bat	*Myotis lucifugus*	S4	END	END	END (Schedule 1)	No	No
Northern Myotis Bat	*Myotis septentrionalis*	S4	END	END	END (Schedule 1)	No	No
Tri-coloured Bat	*Perimyotis subflavus*	S3?	END	END	END (Schedule 1)	No	No
Reptile Species (6)							
Blanding's Turtle	*Emydoidea blandingii*	S3	THR	THR	THR (Schedule 1)	Yes	Yes
Eastern Foxsnake (Georgian Bay population)	*Pantherophis gloydi pop. 1*	S3	THR	END	END (Schedule 1)	Yes	Yes
Eastern Hog-nosed Snake	*Heterodon platirhinos*	S3	THR	THR	THR (Schedule 1)	No	No
Eastern Musk Turtle	*Sternotherus odoratus*	S3	SC	SC[5]	THR (Schedule 1)	Yes	No
Massasauga Rattlesnake (Great Lakes / St. Lawrence population)	*Sistrurus catenatus pop. 1*	S3	THR	Non-Active	THR (Schedule 1)	Yes	Yes
Spotted Turtle	*Clemmys guttata*	S3	END	END	END (Schedule 1)	Yes	Yes

Notes for Tables 4-2-4-3

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

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

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

END *(Endangered) - A species facing imminent extinction or extirpation in Ontario.*

THR *(Threatened) - Any native species that, on the basis of the best available scientific evidence, is at risk of becoming endangered throughout all or a significant portion of its Ontario range if the limiting factors are not reversed.*

SC *(Special Concern) – A species that may become threatened or endangered due to a combination of biological characteristics and identified threats.*

NAR *(Not at Risk) - A species that has been evaluated and found to be not at risk.*

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

END *(Endangered) - A species facing imminent extirpation or extinction throughout its range.*

THR *(Threatened) - A species likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction*

SC *(Special Concern) - A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events, but does not include an extirpated, endangered or threatened species.*

NAR *(Not at Risk) - A species that has been evaluated and found to be not at risk.*

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

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

END (Schedule 1) – These species are listed as Endangered under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.

THR (Schedule 1) – These species are listed as Threatened under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.

SC (Schedule 1) *– These species are listed as Special Concern under Schedule 1 of SARA and receive management initiatives under SARA to prevent them from becoming endangered and threatened.*

No Status (No schedule) *– These species are evaluated and designated by COSEWIC but are not listed under Schedule 1 and therefore do not receive protection under SARA.*

NAR (Not at Risk)*– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*

Not Applicable (N/A) *– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*

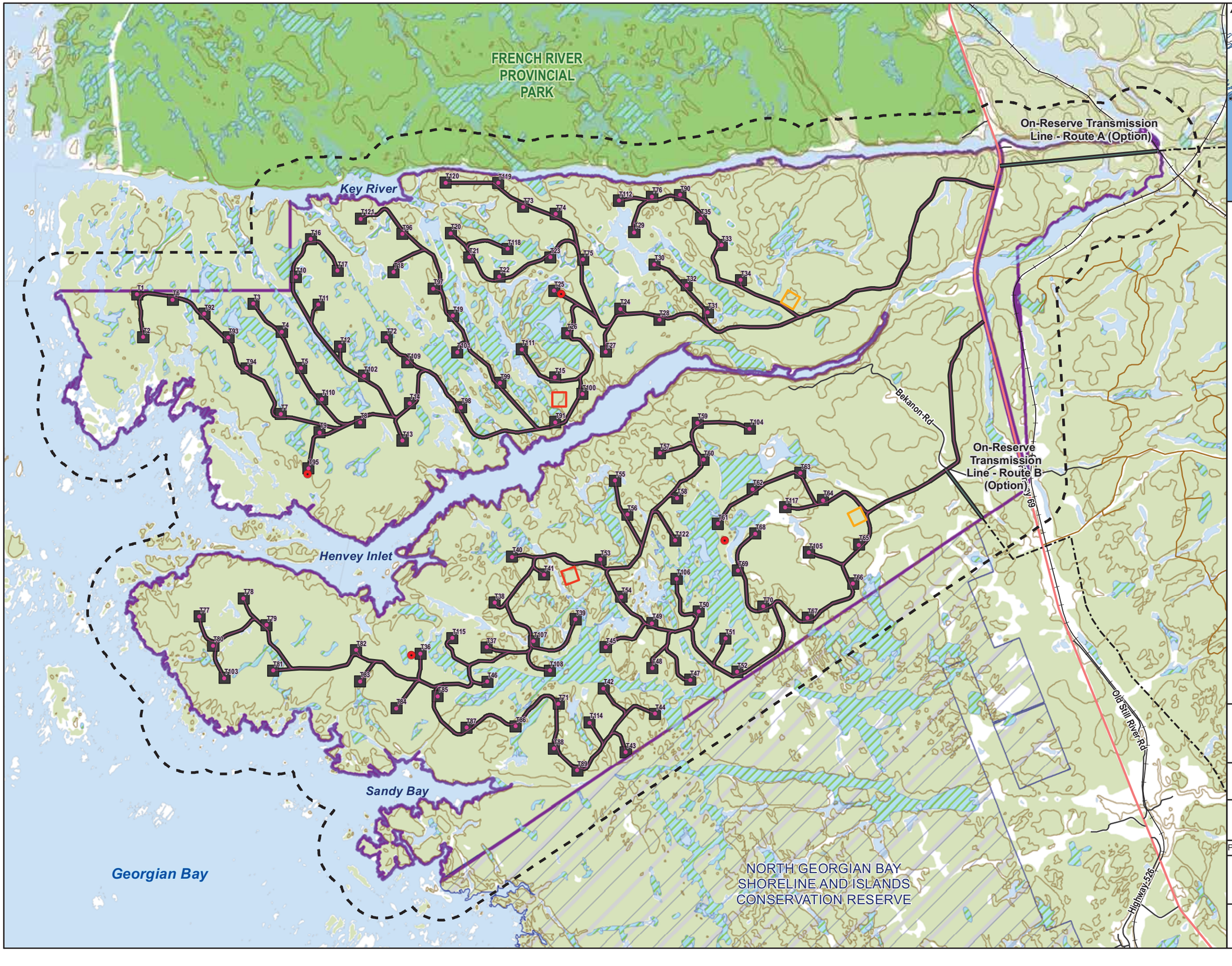
Source: Government of Canada, 2009: Frequently Asked Questions: What are the SARA schedules? Accessed on February 2015. Available: http://www.dfo-mpo.gc.ca/species-especes/faq/faq-eng.htm

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.



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	

Figure 4-1

Map location: F:\AECOM-Work\60333000 - Henvey Wind\Design\Baseline Report (Feb 2015)\REA\REA_Site Plan_NHA.mxd
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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.

4.2.2.2 Important Wildlife Habitat

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

4.2.2.3 Important Wetlands[2]

Table 4-5 describes the proposed mitigation measures and monitoring plan associated with potential effects to Important Wetlands resulting from construction and decommissioning.

4.2.2.4 Important Woodlands[3]

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

4.2.2.5 Species at Risk

Proposed mitigation measures associated with potential effects to Species at Risk resulting from construction and decommissioning will be provided in the subsequent Draft Construction Plan 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
• Increased erosion and sedimentation into woodlands, wetlands and other natural features resulting from construction activity. • Removal / disturbance of topsoil and increased soil compaction from manoeuvring of heavy machinery, excavation, backfilling, and other construction activity.	• Minimize erosion and sedimentation from clearing, grubbing, excavation, backfilling and stockpiling. • Minimize removal / disturbance of topsoil and minimize soil compaction	• Develop and implement an erosion and sediment control plan. • 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. • 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. • Maintain sediment and erosion control measures for the duration of construction/decommissioning activity. • Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings. • Store stockpiled material at least 30 m from a wetland, woodland or waterbody. • 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. • Minimize the size of cleared areas to limit the area of exposed soil. • 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. • 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 >5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity. • Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion. • 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. • 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. • Keep all equipment within identified work areas to minimize disturbance of adjacent soils. • Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction. • 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.
• Disturbance and/or mortality to terrestrial wildlife, including barriers to wildlife movement and active bird nests.	• Minimize disturbance and/or mortality to terrestrial wildlife.	• 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. • Post restricted speed limits to avoid terrestrial wildlife mortality due collision with vehicles. • Train workers on procedures when encountering wildlife to avoid disturbance and mortality.
• Loss of natural vegetation and wildlife habitat due to construction.	• Minimize vegetation removal to the extent possible.	• Required vegetation removal cannot be mitigated but removal should be minimized to the extent possible. • Ensure that no vegetation removal or damage occurs outside of the construction disturbance area.
• Damage to adjacent vegetation while operating equipment.	• Minimize disturbance to/loss of wildlife habitat and vegetation.	• Delineate work areas. • Keep vegetation removal to a minimum to the extent possible. • 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.
• Soil or water contamination by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	• Minimize 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 IWH features and train staff on associated procedures. This plan will include, for example: ▪ Spill control and containment equipment/materials shall be readily available in all work areas. ▪ Protocols for access to additional spill clean-up materials if needed. ▪ Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards. ▪ Proper training of operational staff on associated emergency response plan and spill clean-up procedures. ▪ 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. ▪ Spills to be cleaned up immediately, with contaminated soils removed to a licenced disposal site, if required. ▪ Materials contained in spill clean-up kits are restocked as necessary. ▪ 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. ▪ Reporting procedures. ▪ Emergency contact and project management phone numbers. ▪ Verification of clean-up. • 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. • The use of concrete in construction to be completed in accordance with relevant provincial guidelines and standards. • Waste management to be completed in accordance with relevant federal and provincial guidelines and standards. • Vegetation management will be done using mechanical techniques rather than herbicides.
• Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting from changes in land contours.	• Minimize changes in surface water drainage patterns and obstruction of lateral flows in surface water to wetlands.	• Ensure BMPs are used to maintain current drainage patterns, including: ▪ Minimize paved surfaces and design roads to promote infiltration. ▪ Limit changes in land contours. ▪ 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 (e.g., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion which can change land contours.
• Disturbance to wildlife due to construction noise and vibration from sub-surface excavation activities (e.g., blasting).	• Minimize disturbance to wildlife.	• Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise and vibration from blasting, including: ▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for soluble substances used for blasting; ▪ Use blasting mats over top of holes to minimize scattering of blast debris around the area; ▪ Reduce blasting footprint to the extent possible; ▪ Avoid blasting during sensitive life stages breeding season for migratory birds, April 1 to July 31 wherever possible; ▪ 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; ▪ Avoid blasting in water; ▪ Do not use ammonium nitrate based explosives in or near water due to the production of toxic by-products; and ▪ Remove all blasting debris and other associated equipment / products from the blast area.

Table 4-5: 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
Construction activities within 120 m of an Important Wetland	• 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 **Generalized Candidate IWH Construction and Decommissioning Table** 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 **Generalized Candidate IWH Table** for additional proposed mitigation measures.
Construction activities within an Important Wetland	**Construction/ Decommissioning** • 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 4-6: 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 **Generalized Candidate IWH Construction and Decommissioning Table** 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 **Generalized Candidate IWH Table** for additional proposed mitigation measures.
Construction activities within an Important Woodland	**Construction/ Decommissioning** • 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.

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 4-7**, 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 4-7: Summary of MOECC Water Well Records

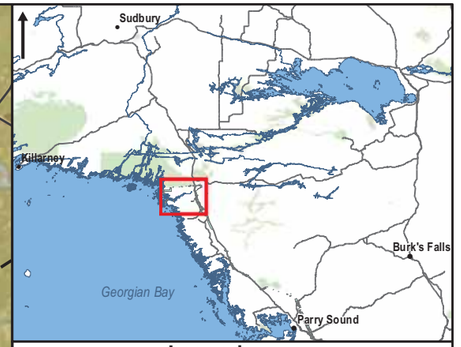
Primary Well Use	Number
Commercial	3
Domestic	17
Monitoring and Test Hole	3
Municipal	1
Not Used	2
Public	2
Total	**28**

4.3.3 Potential Effects and Proposed Mitigation Measures

4.3.3.1 Surface Water

4.3.3.1.1 Construction and Decommissioning

Table 4-8 identifies potential effects on surface water resources that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.



Legend

- Wind Turbine Generators
- MET Towers
- Access Roads & Collector Lines
- Railways
- Major Roads
- Highway
- Trails
- 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

N

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	

Figure 4-2

Map location: F:\AECOM\Work\60333000 - Henvey Wind\Design\Baseline Report (Feb 2015)\REA\REA_Site Plan_SocioEcon.mxd
Date Saved: 6/23/2015 4:19:26 PM

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

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
• **Adverse Impacts to Surface Water Quality from Erosion and Sedimentation resulting from Construction Activities (including blasting)** • **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)** • **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)**	• Minimize erosion and sedimentation.	• Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • 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 **Generalized Candidate IWH Construction and Decommissioning Table** for a list of proposed blasting BMPs) • Implement sediment and erosion control measures prior to construction and maintain such measures until re-vegetation of disturbed areas is complete. • Minimize removal of riparian vegetation to the greatest extent possible (maintaining riparian shrubs). • 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. • 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). • Operate heavy equipment from outside the watercourse to minimize disturbance to the watercourse banks. • 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. • 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. • Time in-water work to avoid sensitive reproductive periods for fish species. • 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. • 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). • Screen all hoses drawing water from a watercourse to prevent potential entrainment of fish and other species. • Ensure an additional supply of erosion and sediment control materials are readily available on the site. • 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). • Design culverts installed at waterbodies supporting direct fish habitat to facilitate fish passage. • 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 **Generalized Candidate IWH Construction and Decommissioning Table** for additional proposed mitigation measures.
• **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**	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil 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 **Generalized Candidate IWH Construction and Decommissioning Table** for additional proposed mitigation measures.
• **Adverse Impacts to Surface Water Quality and Quantity Due to Dewatering Discharge**	• Minimize impacts to water quality.	• Develop and implement a construction dewatering discharge plan describing appropriate areas and methods for discharge based on consultation with HIFN. • 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. • 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. • 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). • Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers. • 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. • 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. • 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. • 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). • 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. • 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. • 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. • Ensure that any overland discharge complies with mitigation for erosion and sedimentation included in the **Generalized Candidate IWH Construction and Decommissioning Table**. • 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. • Remove non-biodegradable erosion and sediment control materials once site is stabilized.
• **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**	• Minimize vegetation removal near waterbodies.	• Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings. • Install erosion and sediment controls for construction activities near watercourses prior to construction start. • Where construction activities occur within 30 m of a waterbody, 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.
• **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)**	• Minimize impacts of blasting and vibration.	• Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • 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 **Generalized Candidate IWH Construction and Decommissioning Table** for a list of proposed blasting BMPs)

4.3.3.2 Groundwater

4.3.3.2.1 Construction and Decommissioning

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

Table 4-9: Proposed Mitigation Measures Associated with Potential Effects to Groundwater Resulting from Construction and Decommissioning

Potential Effect	Performance Objective	Proposed Mitigation Strategy
• **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**	• Minimize impacts to groundwater quantity.	• Conduct a baseline hydrogeological investigation to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. • 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. • 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. • 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). • 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. • Limit duration of dewatering to as short a time frame as possible. • Limit water taking quantities by implementing targeted groundwater cut-offs where possible.
• **Changes in Groundwater Quality (Turbidity) Due to Agitation of the Subsurface During Construction Blasting and Potential Release of Soluble Substances Used During Blasting**	• Minimize impacts to groundwater quality.	• Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • 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 **Generalized Candidate IWH Construction and Decommissioning Table** for a list of proposed blasting BMPs)
• **Physical Damage to Groundwater Supply Wells from Construction Blasting and/or Vibration**	• Minimize impacts of blasting and vibration.	• 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 **Generalized Candidate IWH Construction and Decommissioning Table** for a list of proposed blasting BMPs) • 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. • 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.
• **Reduction in Groundwater Quality Due to Release of Construction Dewatering Discharge in Areas of Substantial Groundwater Recharge**	• Minimize construction dewatering discharge to areas of substantial groundwater recharge.	• Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system. • 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.
• **Groundwater Contamination Due to Contaminant Spills, Vehicle and Machinery Operation, and Concrete Truck Rinsing**	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil 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 **Generalized Candidate IWH Construction and Decommissioning Table** for additional proposed mitigation measures.
• **Reduction in Groundwater Recharge Quantities Due to Increases in Impervious Surfaces**	• Minimize the increase in impervious areas.	• Minimize paved surfaces and design roads to promote groundwater infiltration. • Implement groundwater infiltration techniques to the maximum extent possible. Examples include: ▪ releasing water to vegetated areas; ▪ ditches should not be lined with an impermeable material (i.e., clay); and, ▪ groundwater should remain on site and not disposed of offsite (unless contaminated). • Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system.

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 HWIEC 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 4-10 identifies potential effects on air quality that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

Table 4-10: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
Generation of Dust Causing Potential Effects to the Natural Environment, Community Members and Workforce	• No persistent dust films (observable build-up) on nearby properties or vegetation.	• Cover soil stockpiles if exposed for prolonged periods, as necessary. • Cover dump trucks transporting soil / excavated material, as necessary. • Restrict vehicle traffic to posted speed limits. • Spray water as a dust suppressant to be used on access roads as necessary. • 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. • Minimize vehicle traffic on exposed soil. • Equip vehicles with effective muffler and exhaust systems. • Investigate complaints related to dust and emissions and address to the extent possible. • 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. • Avoid unnecessary idling of engines. • Ensure that construction equipment is frequently maintained and kept in good working condition.
Vehicle / Equipment Emissions	• Limited release of air emissions.	
Reduction in Surface Water Quality as a Result of Dust Emissions	• No persistent dust films on adjacent waterbodies; no measurable change in TSS.	

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.). Potential Effects and Proposed Mitigation Measures

4.5.1.1 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 4-11 identifies potential effects from nuisance noise that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies.

Table 4-11: Proposed Mitigation Measures Associated with Noise Resulting from Construction and Decommissioning

Potential Effect	Performance Objectives	Proposed Mitigation Strategy
Increased Noise Due to Construction and Decommissioning Activity	• Minimize noise levels and adhere to HIFN and other applicable noise by-laws or requirements.	• Equip vehicles with effective muffler and exhaust systems. • Avoid unnecessary idling of engines. • Ensure that construction equipment is frequently maintained and kept in good working condition. • Ensure that noise emissions from construction equipment not exceed guidelines specified in MOECC publication NPC-115 and manufacturer recommendations. • Conduct noise compliance checks of construction equipment. • Implement construction speed limit on unpaved roads. • 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. • Undertake pile driving and blasting operations in accordance with applicable federal and provincial guidelines. • 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). • Complaints about noise will be logged and addressed in accordance with **Section 5.3** of the Design and Operations Report.

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 4-2**) displays existing local and provincial roads in proximity to the HIWEC study area. HIFN I.R. #2 is accessible from Highway 69 and Highway 522, both of which are provincially maintained highways with Highway 69 being part of the Trans-Canada Highway. Within the HIWEC study area, Highway 69 is a paved, two (2) lane highway with passing lanes alternating between the Northbound and Southbound lanes. As of 2010, the annual average daily traffic (AADT) volume for the section of Highway 69 from Highway 526 to Highway 522 is 6,900 (MTO, 2010). Through the Northern Highways Program 2013 - 2017, the Ministry of Northern Development and Mines (MNDM) and 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 20th century. Most of the tourism based businesses within the HIWEC study area and along Georgian Bay and Key River such as resorts, lodges and marinas, heavily rely on the natural landscapes to attract 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 4-12 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.

Table 4-12: 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
Decline in Traditional Lands, Species or Resources Available for HIFN Harvesting Activities (Such as Lands Used for Hunting, Trapping, Fishing and Gathering)	• Minimal decline in traditional land uses.	• Optimize siting of all HIWEC components based on feedback from the community through Aboriginal Traditional Knowledge (ATK) and constraint discussions. • Recover merchantable timber for use by HIFN. • Make wood cleared available to HIFN members for use as firewood or for traditional uses (i.e., cedar for ceremonial purposes). • Maintain ongoing communication with Bekanon Road residents and other HIFN members on HIFN I.R. #2 about construction timelines.
Decline in Availability of Country Foods (Traditional Foods) or Medicinal Plants Harvested or Grown for Subsistence or Traditional Healing Purposes	• Minimal decline in availability of country foods and medicinal plants.	• Minimize clearing widths for access roads and WTG foundations to the area necessary for safe construction and operation of the HIWEC. • Complete site reclamation of temporarily disturbed areas immediately following construction. • Mitigation measures proposed in **Section 4.2** to minimize disturbance to wildlife, resource use and recreational use will serve to further reduce impacts to HIFN traditional use activities.
Decline in Spiritual, Ceremonial, or Cultural Sites	• Minimal decline in spiritual, ceremonial or cultural sites.	• Engage with HIFN staff to ensure exchange of information during planning, design and construction. • Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.

Table 4-12: 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
Impacts to Nishshing Aki identified by HIFN	• No impact on Nishshing Aki.	• 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. • Engage with HIFN staff to ensure exchange of information during planning, design and construction. • Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions.
Impacts on Lands Subject to Land Claims	• Minimal impact on lands subject to land claims.	• The HIWEC site was selected to avoid areas associated with the HIFN claim regarding alleged illegal appropriation of land for the James Bay Railway. • Continue to avoid areas subject to current or potential land claims through ongoing discussion with HIFN.
Potential for Off-Reserve Impacts to Aboriginal Traditional Rights or Interests Due to the HIWEC	• Minimal off-Reserve impacts to Aboriginal traditional rights or interests.	• 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. • Mitigation measures proposed in **Section 4.2** 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. • Avoid impeding access to the Key River, Henvey Inlet, or Georgian Bay which are traditional navigable waterways. • Optimize siting of all HIWEC components based on feedback from the community through ATK and constraints discussions. • 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. • 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.
Potential Impacts to Navigable Waterways Used by Aboriginal Groups	• Minimal impacts to navigable waterways used by Anishinabek groups.	
Damage to Highway 69	• Minimize damage to Highway 69.	• Adhere to BMPs regarding the operation of construction equipment and delivery of construction materials.
Increased Congestion Due to Increase in Truck Traffic Crossing Bekanon Road	• Minimize disturbances to local traffic patterns.	• Develop a traffic management plan for the construction phase. • 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. • Notify the community in advance of construction delivery schedules and install signage to notify road users of construction activity, where appropriate. • Prohibit construction vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road

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