Henvey Inlet Wind LP

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Henvey Inlet Wind Energy Centre

Construction Plan Report

Final Draft

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

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

Project Number:

60341251

Date:

September 2015

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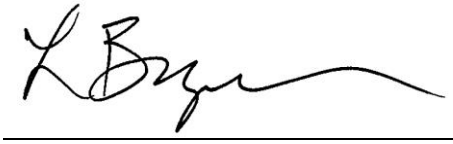
AECOM: 2012-01-06

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 Environmental Planner

Marc Rose, MES, MCIP, RPP
Senior Environmental Planner

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AADT..... Annual Average Daily Traffic
ACSR ..... Aluminum Conductor Steel Reinforced
ATK ..... Aboriginal Traditional Knowledge
AQI ..... Air Quality Index
BMPs..... Best Management Practices
CCME..... Canadian Council of Ministers of the Environment
CEC..... Canadian Electrical Code
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
CSA..... Canadian Standards Association
CWS..... Canadian Wildlife Service
EA ..... Environmental Assessment
EC ..... Environment Canada
EEMP ..... Environmental Effects Monitoring Plan
EIS ..... Environmental Impact Study
ESA ..... Endangered Species Act
FIT..... Feed-in-Tariff
GIS ..... Geographical Information System
H&S Plan..... Health and Safety Plan
ha ..... Hectare
HIFN..... Henvey Inlet First Nation
HIFN I.R. #2 ..... Henvey Inlet First Nation Reserve No. 2
HIW ..... Henvey Inlet Wind
HIWEC ..... Henvey Inlet Wind Energy Centre
HONI ..... Hydro One Network Inc.
IESO..... Independent Electricity System Operator
IWH ..... Important Wildlife Habitat
km ..... Kilometres
km/hr ..... Kilometres per hour
kV ..... Kilovolt
L/day ..... Litres per day
m ..... Metre
m^2 ..... Metres squared
mASL ..... Metres Above Sea Level
MBCA..... Migratory Birds Convention Act
Met ..... Meteorological Tower
Mm ..... Millimetre
MNDM ..... Ontario Ministry of Northern Development and Mines
MNRF..... Ontario Ministry of Natural Resources and Forestry
MOECC..... Ontario Ministry of the Environment and Climate Change
MSDS..... Material Safety Data Sheets
MTO ..... Ontario Ministry of Transportation
MW..... Megawatt
NAV CANADA..... Navigation Canada
NHA..... Natural Heritage Assessment

NHIC ..... Natural Heritage Information Centre
Nigig ..... Nigig Power Corporation
O.Reg. ..... Ontario Regulation
O&M building..... Operations and Maintenance building
OGSR..... MNRF's Oil, Gas & Salt Resources database
OPA..... Ontario Power Authority
OPGW..... Optical Ground Wire
OPSS ..... Ontario Provincial Standard Specification
pH..... Measurement of acidity or alkalinity
PWQO..... Provincial Water Quality Objectives
SAR..... Species at Risk
SARA ..... Species at Risk Act
SCADA..... Supervisory Control and Data Acquisition
SOCC..... Species of Conservation Concern
TS..... Transformer Station
TSA ..... Transformer Station Area
TSS ..... Total Suspended Solids
UNESCO..... United Nations Education, Scientific, and Cultural Organization
WTG..... Wind Turbine Generator
ZOI ..... Zone of influence

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 was 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**

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

1.2 Location and Study Area

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

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

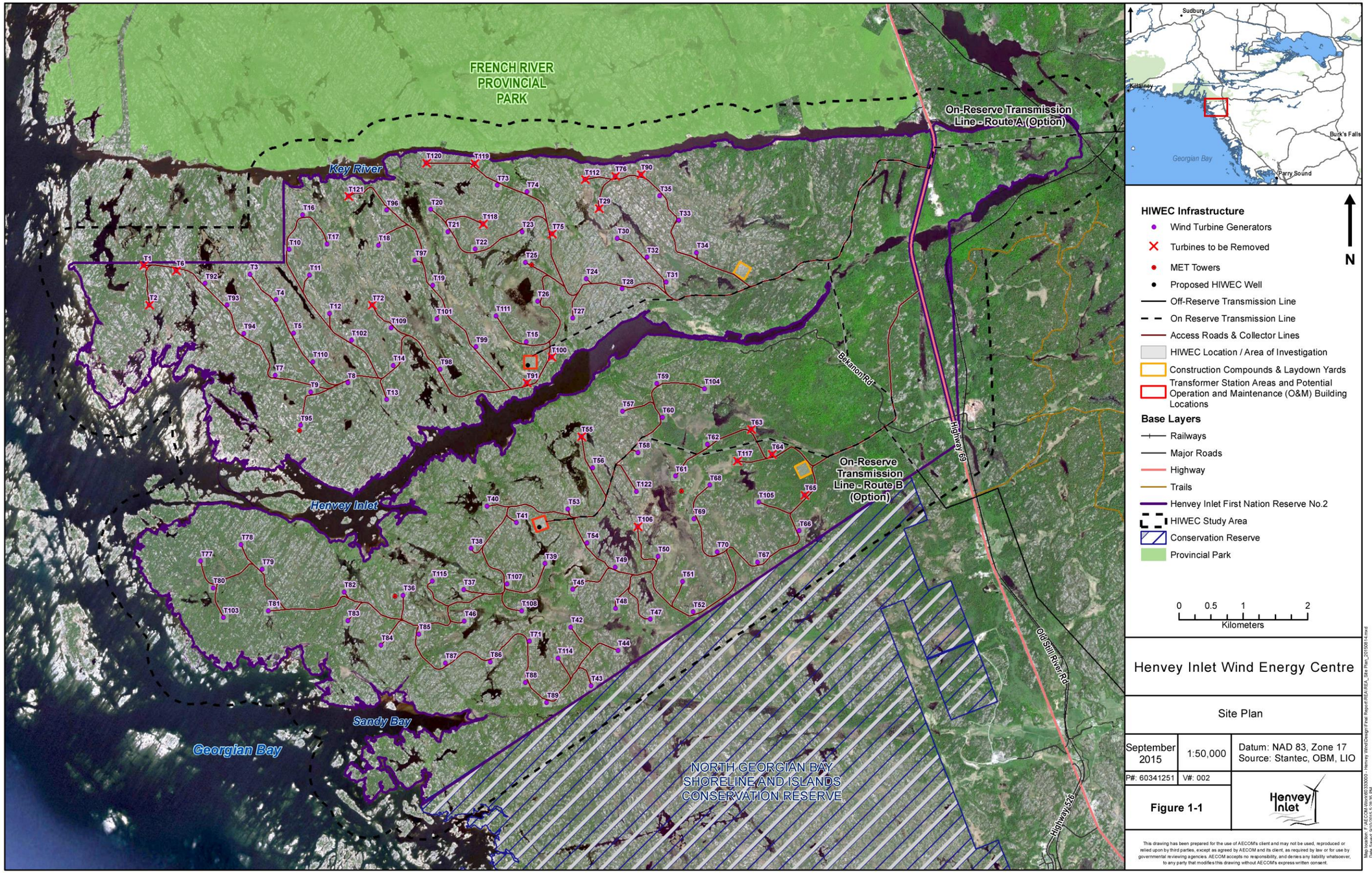
1.3 Proponent Contact and Key Information

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 HIFN 295 Pickerel River Road Pickerel, ON P0G 1J0	**Kim Sachtleben** Project Director Pattern Renewable Holdings Canada ULC 355 Adelaide Street West Suite 100 Toronto, Ontario M5V 1S2
Consultant Contact Information:	**Kyle Hunt** Project Manager AECOM 105 Commerce Valley Drive West Markham, ON L3T 7W3	**Marc Rose** Project Director AECOM 105 Commerce Valley Drive West Markham, ON L3T 7W3

Figure 1-1: Site Plan



2. 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**, 120 commercial WTGs are being assessed for the HIWEC with up to 91 WTGs to be constructed. To date, 20 of the 120 WTG locations have been identified for removal based on technical and environmental studies completed and comments received from HIFN members and the public.

The selected WTG technology is the Vestas V126-3.3 MW Turbine, with a nominal power of 3.3 MW. The WTGs are an upwind, horizontal axis unit, with three rotor blades (roughly 61.66 m in length) and a maximum hub height of up to 137 m. 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 maximum height of the WTG from base to the blade tip is approximately 200 m. 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 will be 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.

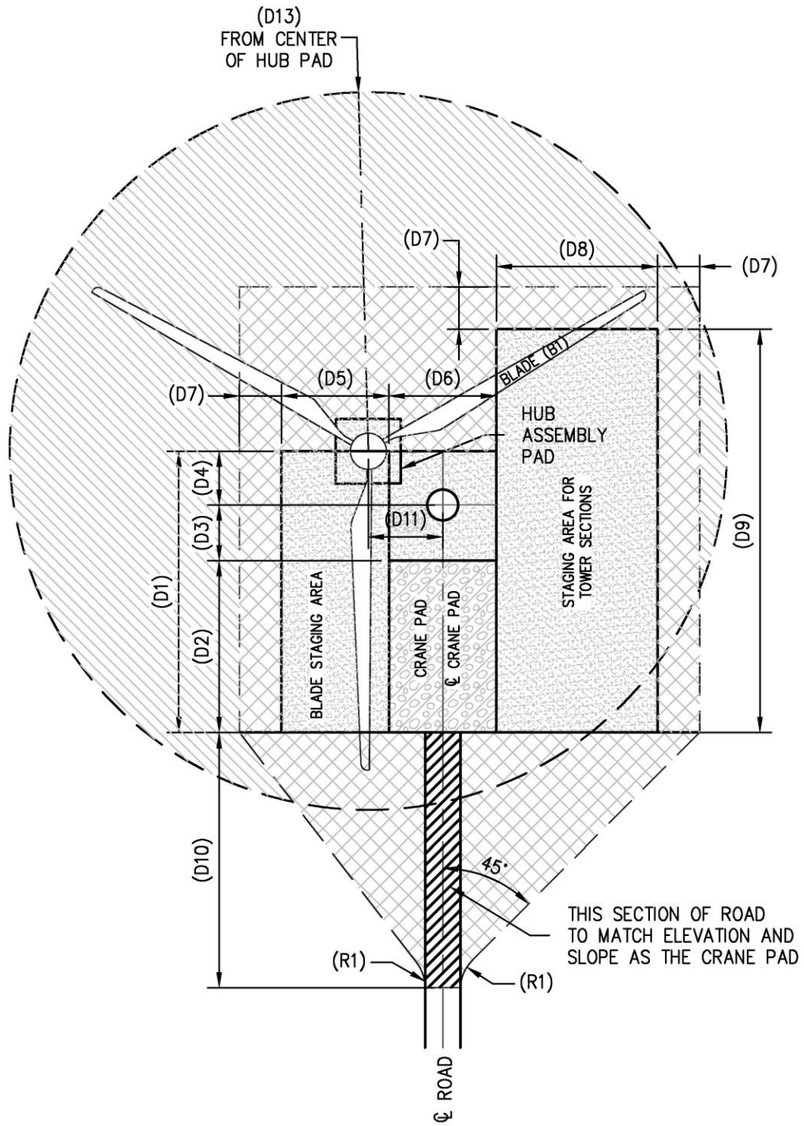
The land area required for each WTG will be dependent upon the final locations of the WTGs relative to access roads, associated infrastructure, and adjacent environmental and terrain features. A typical WTG layout for the HIWEC is provided in **Figure 2-1**.

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 use crushed gravel and range from 5 to 15 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.

Figure 2-1: Typical WTG Layout



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

NOTES:

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

LEGEND:

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

1 DETAIL: TYPICAL CRANE PAD ARRANGEMENT-END

Scale: N.T.S.

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

DRAWING NUMBER: CP2

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

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 are bolted to surface bedrock with guy wires and anchors for lateral support. All Met towers have been 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.

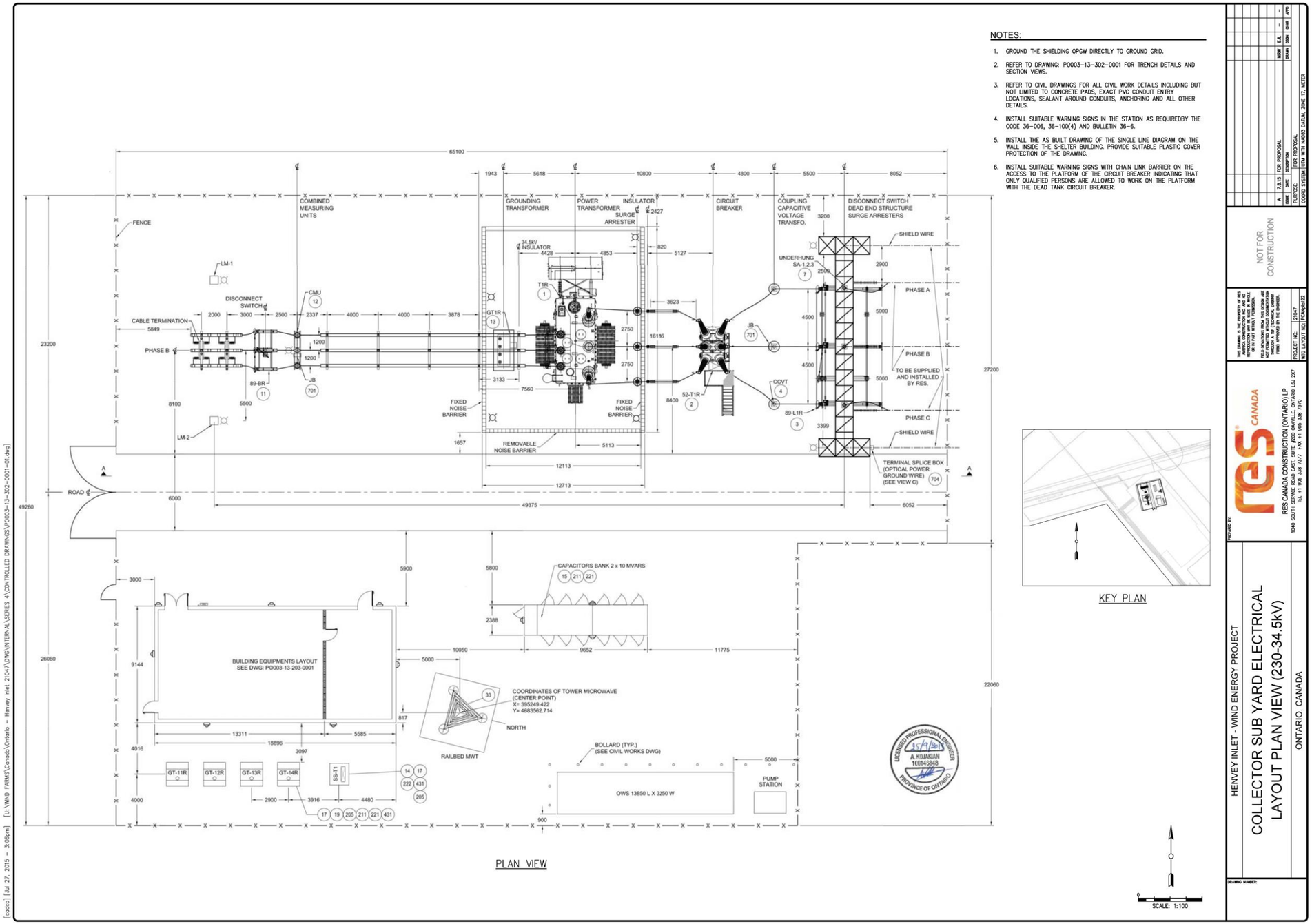
The collector lines may include overhead or below ground sections dependent on site specific conditions, however it is anticipated that the collector system will be primarily aboveground due to the rocky nature of the site. Aboveground collector lines will be constructed on standard single wooden pole 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 (2) 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 voltage of the Transmission Line that will transport electricity to the provincial transmission grid. One (1) 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 230 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. A typical TS layout for the HIWEC is provided in **Figure 2-2**.

Figure 2-2: Typical TS Layout



2.1.6 On-Reserve Transmission Towers and Foundations

From the HIWEC TSs, a section of overhead transmission line of 230 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. A typical O&M building plan detail for the HIWEC is provided in **Figure 2-3**.

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.

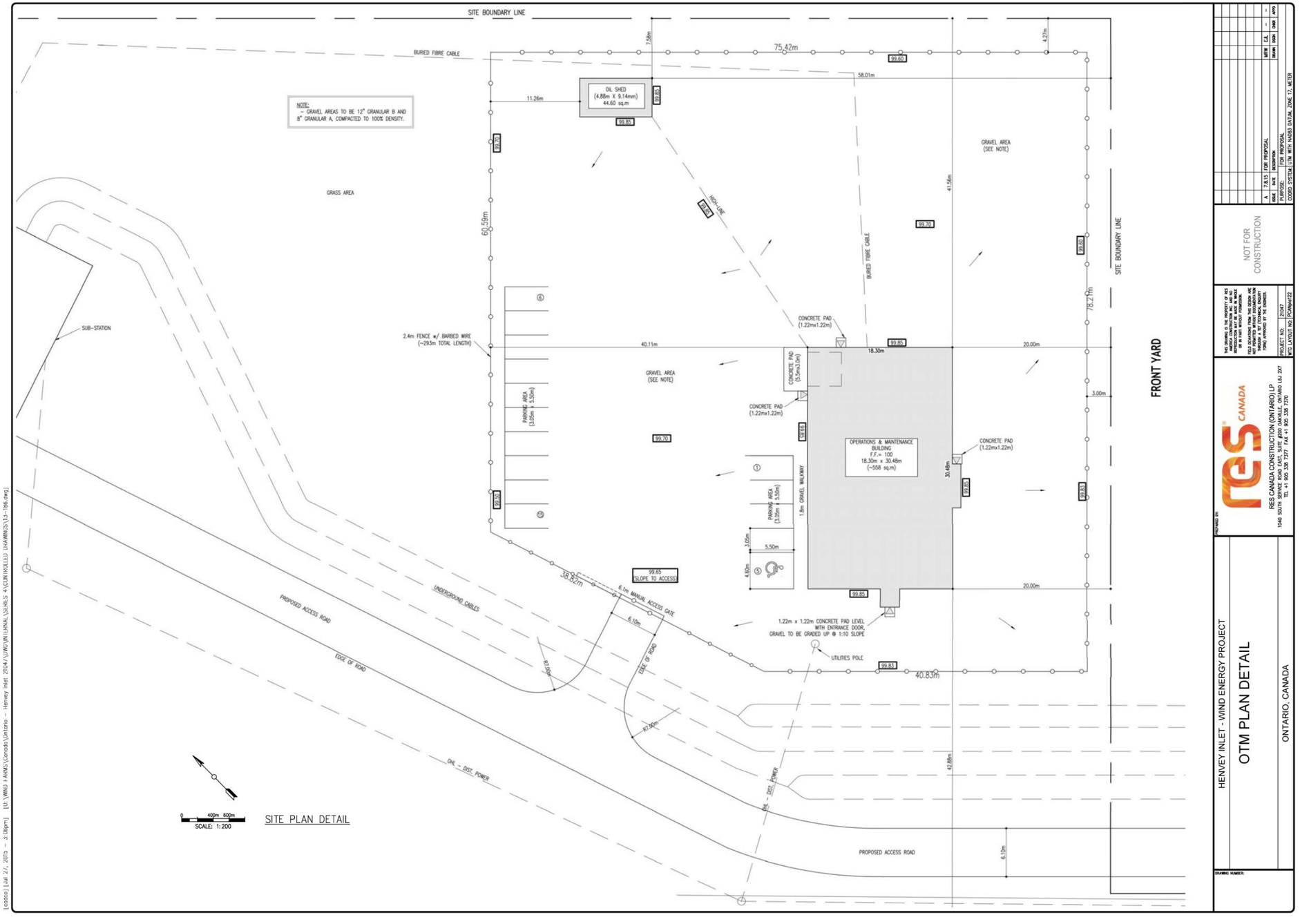
2.2.1 Construction Compounds & Laydown Yards

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.

Figure 2-3: Typical O&M Building Plan Detail



2.2.3 Concrete Batch Plant(s)

At least one temporary concrete batch plant will be located within a construction compound and laydown yard, and will produce concrete required for HIWEC construction. A typical concrete batch plant for a wind energy centre of this size would produce around 100 to 150 cubic yards per hour. 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 (1) or more temporary crushers will be located within a construction compound and laydown yard, 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. Rock crushing requirements for the HIWEC may vary between 150 to 500 tons per hour depending on the scope for the crusher and the type of crusher selected for construction. 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		February 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.

Four Met towers have been erected using cranes and secured with guy wires tied off to anchors or a monopole foundation. Access roads have been constructed to access Met tower locations. The towers are connected to the HIWEC power and communication infrastructure. Construction of Met towers typically required approximately two (2) days and 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 use 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 15 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		94.6 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 (6) 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 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 (6) people and construction activities are expected to last for approximately two (2) 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 0.04 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 (7) 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 (1) 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 (6) 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 (5) for the tower sections, one for the nacelle and one to four for the rotor) over a period of three to five (5) 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 (3) blades and the hub, will be lifted into place by a combination of two cranes. One (1) 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 (1) 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 (2) 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 (2) 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 (6) 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 (6) 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 (6) 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 and surface water 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.

To identify potential effects from construction or operation of the HIWEC on groundwater quality, quantity or movement, a hydrogeological assessment was conducted to:

- Assess potential water-taking requirements during the construction phase;
- Assess the potential for WTG foundations and any associated buried services to alter or change shallow groundwater flow patterns and the potential impact on local wells, or ecological features (wetlands or streams); and
- Assess long-term water-taking requirements during the operation phase.

3.6.1 Construction Operation Water Takings

Water-taking requirements during the construction phase may include dust suppression and drilling fluids. Water requirements for the purpose of dust suppression are expected to have peak water demands up to 40,000 L/day. The proposed source of water for dust suppression may be a local surface water intake, excluding federally regulated waters (Georgian Bay, Henvey Inlet and Key River) or one or more new groundwater supply well(s) located at the Transformer Station Area (TSA) and the O&M building. Water may be required during drilling operations to facilitate the installation of rock anchors as part of the WTG foundation construction. At the time the EA Report was prepared, construction methodologies and WTG construction sequencing had not been finalized. Estimates for water requirements for the construction of WTG foundations have been estimated based on the assumption that ten (10) WTG foundations will be constructed simultaneously, with three (3) drill rigs operating at each location. Approximately 4,000 L of water will be required to facilitate one (1) rock anchor installation, resulting in a daily water requirement for the HIWEC of approximately 120,000 L/day. Actual daily demands will vary based on day-to-day operations and will typically be lower in volume than the estimated peak volume. The proposed source of water for general construction use will be one or more future groundwater supply well(s) located at the TSA and the O&M building.

3.6.2 Groundwater Dewatering Requirements

Review of existing secondary source information provided by the Ontario Geological Survey and through the analysis of local MOECC water well records indicates that groundwater takings for the purpose of WTG foundation dewatering is expected to occur at WTG locations where the water table is expected to be less than 4 m from ground surface. Comparing groundwater elevation and ground surface elevation by means of a GIS mapping technique the approximate depth to the water table within the HIWEC study area was determined. WTGs located in areas where the water table is less than 4 m from ground surface is expected to require groundwater taking during the construction of the WTG foundation to maintain a dry working environment. Based on these results, it is anticipated that 68 WTG locations are located in areas where the groundwater table is anticipated to be less than 4 m below ground surface. A complete list of WTGs with potential groundwater taking requirements is presented in **Appendix J** of **Volume A**.

3.6.3 Long Term Water Takings and Operation Considerations

During operation of the HIWEC, full time employees will work in the O&M building. Non-potable water taking during operation will be limited to regular personnel requirements, which are expected to be approximately 4,500 L/day and are not expected to exceed 50,000 L/day. Facilities that will provide this non-potable water will require the construction of one or more new well(s) at the O&M building.

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 (1) 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 provides a summary of the potential environmental effects that may result from the construction of the HIWEC. The identification of potential environmental effects has been completed in accordance with the HIFN EA Guidance document and it includes the following environmental considerations:

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

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

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

4.1 Cultural Heritage and Archaeology

4.1.1 Existing Conditions

During the site planning process for the HIWEC, HIFN identified areas of cultural significance, including areas of past settlement as well as current settlements, and excluded them from the HIWEC study area. These areas of cultural significance are known as Nishshing Aki, specifically defined as an existing social or cultural feature or condition that has been identified by HIFN or designated as valued by HIFN with community input as provided in the Land Code. Nishshing Aki are discussed further in **Section 4.6**. In order to fully understand the potential effects of the proposed HIWEC on built heritage and cultural heritage landscapes, a Heritage Assessment was completed to identify heritage resources including cultural heritage and heritage landscapes of cultural value or interest. The Heritage Assessment included research on the land use history of the HIWEC study area, cultural heritage features, cultural heritage landscapes and protected properties and is provided in **Appendix L** of **Volume A**.

The Cultural Heritage Assessment confirmed that no listed designated or otherwise recognized heritage features are present within the HIWEC study area or on properties abutting the study area. Additionally, there are no historical plaques, cemeteries, national historic sites, or properties protected by Ontario Heritage Trust Easement.

A property survey was undertaken to evaluate built heritage and cultural heritage landscapes present in the study area, and an inventory was created to identify and evaluate potential heritage resources.

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

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

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

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

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

4.1.2 Potential Effects and Proposed Mitigation Measures

Table 4-1 identifies potential effects on cultural heritage and archaeological resources that might occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

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

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Potential effects on archaeological resources • Potential to impact archaeological resources during excavation activities.	• Avoid disturbance / loss of cultural heritage and archaeological resources.	• If unanticipated archaeological resources are uncovered during construction all activities must stop until an archaeologist can evaluate the situation and carry out any required assessment to preserve the archaeological information. Construction activities will not re-commence until any negative impacts to archaeological resources are mitigated either through fully excavating any archaeological sites and removing them from the ground, or by adjusting infrastructure placement to avoid archaeological sites. No archaeological resource will leave the site as it is the property of HIFN.	*No residual effects.* • No effects to archaeological resources provided the resources are mitigated through excavation or avoidance.
Potential direct and indirect effects on cultural heritage features • Potential to impact cultural heritage features during construction activities		• Site HIWEC infrastructure to avoid cultural heritage features. • If unanticipated cultural heritage features are discovered during construction all activities must stop until an archaeologist can evaluate the situation and carry out any required assessments. Construction activities will not re-commence until any negative impacts are mitigated.	*No residual effects.* • No effects to cultural heritage features provided the HIWEC infrastructure is sited to avoid features.

4.2 Natural Heritage

4.2.1 Existing Conditions

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

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

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

4.2.1.1 Conservation Reserves

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

4.2.1.2 Wetlands

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

4.2.1.3 Important Wildlife Habitat

4.2.1.3.1 Rare Vegetation Communities

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

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

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

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

4.2.1.3.2 Birds

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

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

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

- *Waterfowl Stopover and Staging Areas (Terrestrial)*
- *Waterfowl Stopover and Staging Areas (Aquatic)*
- *Shorebird Migratory Stopover Areas*
- *Raptor Wintering Areas*
- *Colonially-Nesting Bird Breeding Habitat (Bank and Cliff)*

- *Colonially-Nesting Bird Breeding Habitat (Trees / Shrubs)*
- *Colonially-Nesting Bird Breeding Habitat (Ground)*
- *Open Country Bird Breeding Habitat*
- *Shrub / Early Successional Bird Breeding Habitat*

4.2.1.3.3 Mammals

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

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

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

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

4.2.1.3.4 Reptiles and Amphibians

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

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

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

- *Amphibian Corridors*

4.2.1.3.5 Species of Conservation Concern

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

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

- Species listed as Special Concern under Schedule 1 of *SARA*;
- Species evaluated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Special Concern, Threatened or Endangered but not listed as Endangered or Threatened under Schedule 1 of *SARA* or the *ESA*; and
- Species listed as Special Concern under the *ESA*.

A total of 23 SOCC were identified through the Records Review (refer to **Appendix F1** of **Volume A**) as having records within the HIWEC study area and / or surrounding area. Of these, 18 SOCC were identified as occurring or having the potential to occur within the HIWEC study area based on the background review and are summarized in **Table 4-2**. The observation year(s) of these species across all baseline field studies conducted between 2011 and 2015 are also summarized in **Table 4-2**.

Although Long-tailed Duck, Lapland Longspur, Great Black-backed Gull, Rusty Blackbird and Red-necked Grebe were recorded in 2011, 2012 and / or 2013, these are considered to be migrant species as their breeding ranges are not located in the vicinity of the HIWEC study area. Breeding habitat for these species is considered unlikely to be present in the HIWEC study area and therefore these species are not included in **Table 4-2**.

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

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

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Bird Species (8)									
Bald Eagle	*Haliaeetus leucocephalus*	S2	SC	NAR	NAR	Yes	Yes	Yes	Yes
Black Tern	*Chlidonias niger*	S3	SC	NAR	NAR	No	Yes	No	No
Caspian Tern	*Sterna caspia*	S3	NAR	NAR	NAR	Yes	Yes	No	Yes
Eastern Wood-Pewee	*Contopus virens*	S4	SC	SC	No Status (No Schedule)	No	Yes	No	Yes
Peregrine Falcon	*Falco peregrinus*	S3	SC	SC	SC (Schedule 1)	Yes	No	No	Yes
Prairie Warbler	*Setophaga discolor*	S3	NAR	NAR	NAR	No	Yes	No	No
Wood Thrush	*Hylocichla mustelina*	S4	SC	THR	No Status (No Schedule)	Yes	Yes	No	Yes
Yellow Rail	*Coturnicops noveboracensis*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	No
Insect Species (4)									
Horned Clubtail	*Arigomphus cornutus*	S3	-	-	-	No	Yes	No	No
Monarch	Danaus plexippus	S2	SC	SC	SC (Schedule 1)	No	Yes	No	No
Mottled Darner	*Aeshna clepsydra*	S3	-	-	-	No	Yes	No	No
Pine Imperial Moth	*Eacles imperialis pini*	S3?	-	-	-	No	Yes	No	No
Mammal Species (1)									
Eastern Wolf	*Canis lupus lycaon*	S4	SC	SC	SC (Schedule 1)	No	Yes	No	Not confirmed
Reptile Species (5)									
Common Five-lined Skink (Southern Shield population)	*Plestiodon fasciatus pop. 2*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes

Common Name	Scientific Name	S-rank[1]	ESA Status[2]	COSEWIC Status[3]	SARA Status[4]	Observation Year			
						2011 / 2012	2013	2014	2015
Eastern Ribbonsnake	*Thamnophis sauritus*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Milksnake	*Lampropeltis triangulum*	S3	SC	SC	SC (Schedule 1)	No	Yes	No	No
Northern Map Turtle	*Graptemys geographica*	S3	SC	SC	SC (Schedule 1)	No	No	No	No
Snapping Turtle	*Chelydra serpentina*	S3	SC	SC	SC (Schedule 1)	Yes	Yes	No	Yes

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

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

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

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

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

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

[4] ***SARA Status***: *The Species at Risk Act (SARA) protects Species at Risk designated as Endangered, Threatened and Extirpated listed under Schedule 1, including their habitats on federal land. Schedule 1 of SARA is the official list of wildlife species at risk in Canada and includes species listed as Extirpated, Endangered, Threatened and of Special Concern. Once a species is listed on Schedule 1, they receive protection and recovery measures that are required to be developed and implemented under SARA. Species that were designated at risk by COSEWIC before SARA need to be reassessed based on the new criteria of the Act before they can be listed under Schedule 1. These species that are waiting to be listed under Schedule 1 do not receive official protection under SARA. Once the species on other schedules (2 and 3) have been reassessed, the other schedules are eliminated and the species is either listed under Schedule 1 or is not listed under the Act.*
The following are definitions of the SARA status rankings assigned to each species.
END (Schedule 1) – These species are listed as Endangered under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
THR (Schedule 1) – These species are listed as Threatened under Schedule 1 of SARA and receive species and habitat protection under SARA, as well as recovery strategies and action plans.
SC (Schedule 1) *– These species are listed as Special Concern under Schedule 1 of SARA and receive management initiatives under SARA to prevent them from becoming endangered and threatened.*
No Status (No schedule) *– These species are evaluated and designated by COSEWIC but are not listed under Schedule 1 and therefore do not receive protection under SARA.*
NAR (Not at Risk)*– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Not Applicable (N/A) *– These species have either been assessed by COSEWIC as Not at Risk or there is not enough sufficient data to assess the status ranking of the species and therefore these are not listed on Schedule 1 nor do they receive protection under SARA.*
Source: Government of Canada, 2009: Frequently Asked Questions: What are the SARA schedules? Accessed on February 2015. Available: http://www.dfo-mpo.gc.ca/species-especes/faq/faq-eng.htm

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

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

4.2.2 Potential Effects and Proposed Mitigation Measures

The NHA Environmental Impact Study (EIS) Report (**Appendix F4** of **Volume A**) describes the potential effects, proposed mitigation measures, and net effects of constructing, operating, and decommissioning the HIWEC on natural heritage features including Conservation Reserves, Important Wetlands and Important Wildlife Habitat. The Environmental Effects Monitoring Plan (EEMP) (**Appendix G** of **Volume A**) describes the post-construction monitoring plan for birds and bats, including mortality and disturbance effects monitoring, and related proposed mitigation and contingency measures. These are summarized below; key natural heritage features are mapped in **Figure 4-1** and in more detail in the NHA Site Investigation Report (refer to **Appendix F2** of **Volume A**).

4.2.2.1 Important Wildlife Habitat

4.2.2.1.1 Generalized Candidate Important Wildlife Habitat

Table 4-3 describes potential effects to Generalized Candidate IWH resulting from construction and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** (of the Final Draft EA Report), **Appendix F4** and **Appendix G** of **Volume A**.

4.2.2.1.2 Important Wildlife Habitat

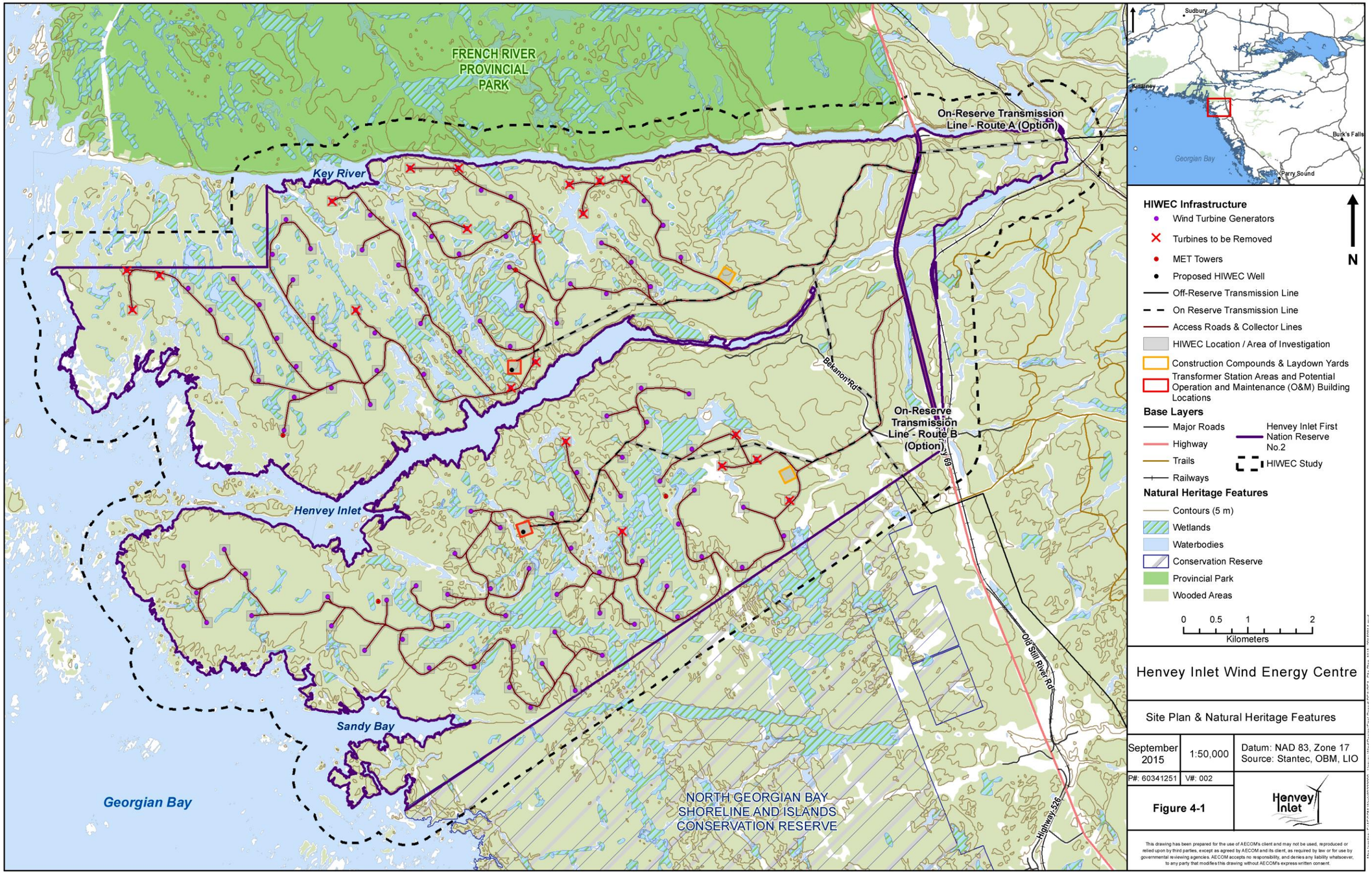
Table 4-4 describes potential effects to IWH resulting from construction and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are generally described in **Section 6** and **Section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

4.2.2.2 Important Wetlands[1]

Table 4-5 describes potential effects to Important Wetlands resulting from construction and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** (of the Final Draft EA Report), **Appendix F4** and **Appendix G** of **Volume A**.

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

Figure 4-1: Site Plan and Natural Heritage Features



4.2.2.3 Conservation Reserves

No construction activities will take place inside the North Georgian Bay Shoreline and Islands Conservation Reserve. Taking into consideration the close proximity of the North Georgian Bay Shoreline and Islands Conservation Reserve to the HIWEC location, and the similar ecological characteristics of this feature compared to other locations within 120 m of the HIWEC location, the mitigation measures presented in **Tables 4-3, 4-4, 4-5** will be used and are considered sufficient to address potential negative environmental effects of construction, operation and decommissioning of the HIWEC on the North Georgian Bay Shoreline and Islands Conservation Reserve.

Table 4-3: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Habitat change • Loss and fragmentation of wildlife habitat due to construction.	• Minimize loss and fragmentation of wildlife habitat to the extent possible.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Where construction activities occur within 30 m of an IWH, install and maintain construction fencing (or similar delineation device) to clearly define the construction disturbance area and prevent accidental damage to vegetation. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained where feasible.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, some wildlife habitat will be removed as a result of construction of the HIWEC.
Habitat change *Change in mortality risk* *Change in behaviour* • Disturbance to wildlife due to construction activities, including noise and vibration from sub-surface excavation activities (e.g., blasting).	• Minimize disturbance to wildlife.	• Reduce blasting footprint to the extent possible and undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Provide suitable blasting timing windows to be included in a Blasting Plan. The Blasting Plan will include standard BMPs to minimize extent of habitat change, mortality risk and adverse noise and vibration from blasting: ▪ Complete pre-blasting searches of wildlife by a qualified Biologist, and adjust activities accordingly if wildlife are encountered (i.e., delay blasting activities, relocate wildlife, etc.); ▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for all materials, including soluble substances used for blasting; ▪ Use blasting mats over top of holes to minimize scattering of blast debris around the area; ▪ 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; and ▪ Remove all blasting debris and other associated equipment / products from the blast area. • Within 200 m of an active Eastern Wolf den, vegetation clearing and blasting will be limited to the greatest extent possible from April 1 to June 30. ▪ For any vegetation removal or blasting that will occur within 200 m of an active Eastern Wolf den between April 1 and June 30, a qualified Biologist will ensure that no Eastern Wolf pups are actively using the denning site through the use of motion sensor cameras. ▪ If Eastern Wolf pups are confirmed, or suspected, to be present within the den, no vegetation removal or blasting will be permitted within 200 m of the denning site until June 30 or when a qualified Biologist confirms the pups are mobile, whichever is first. • Construction staff will be notified of the location of the active den to ensure that they are aware of its location and species awareness training will be delivered regarding steps to be taken if the species is encountered.	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of construction activities such as blasting. *Residual effect on change in behaviour* • Effects on the behaviour of wildlife can be minimized provided recommended mitigation is implemented; however, some wildlife may to exhibit avoidance behaviour during construction activities such as blasting.
Change in mortality risk *Change in behaviour* • Disturbance and possible mortality to terrestrial wildlife due to vegetation clearing.	• Minimize disturbance and avoid mortality of wildlife.	• If vegetation must be removed during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the *MBCA*: ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28 as per EC's Nesting Calendar for Zone C3 (EC, 2014b). ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014b) and Universal Transverse Mercator (UTM) co-ordinates will be taken. • Within those areas that provide confirmed and / or likely turtle nesting habitat (i.e., within sandy habitats, shorelines, or wetlands where turtle nesting activity has been observed or suitable habitat is within an area with concentrated turtle observations) and that are identified to be cleared of vegetation: ▪ Construction will avoid nesting areas where possible; ▪ In areas are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.); ▪ In the rare case where construction initially avoided and area and exclusionary fencing had not been installed prior to the turtle nesting period, a qualified Biologist will complete area searches immediately prior to construction to identify any potential nesting areas and nesting activity during the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.); ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context, which will be confirmed by a qualified Biologist. The nest itself should never be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked and UTM co-ordinates will be taken; and ▪ Once the Biologist has cleared the area, install turtle appropriate exclusionary fencing during construction / decommissioning within areas of concentrated turtle activity to limit road and construction-related mortality. • Stockpile areas placed prior to June 30 (turtle egg laying period; GBBR, n.d.) will be assessed by a qualified Biologist to determine if they are suitable turtle nesting habitat, and exclusionary fencing will be installed where necessary. Stockpiles place after June 30 do not require assessment or installation of exclusionary fencing as this is after the typical period for turtle egg laying. • Removal of natural vegetation using heavy machinery within suitable turtle and / or snake hibernating habitat is proposed to occur outside the winter turtle and snake hibernation season, from October 15 to April 30 (GBBR, n.d.), within aquatic habitats or wetlands. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible.	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of vegetation clearing. *Residual effect on change in behaviour* • Effects on the behaviour of wildlife can be minimized provided recommended mitigation is implemented; however, some wildlife may exhibit changes in behaviour (e.g., avoidance) as a result of vegetation clearing.

Table 4-3: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
		• Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. * Note: Complex habitats refer to habitats that contain many likely nesting spots. For instance forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer. Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds, such as open rock barrens or other sparsely vegetated habitats.	
Change in mortality risk • Mortality to wildlife as result of vehicles using access roads.	• Avoid mortality of wildlife on access roads.	• Clearly post speed limit signage along access roads (30 kilometres per hour (km/hr)), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible. • Ecopassages or designated movement corridors should be considered in areas of high reptile activity or abundance, to limit road mortality. • Develop and implement a reporting and tracking system for turtle and snake sightings as well as any wildlife mortality on access roads, which could be used to inform adaptive management for mortality, if required. • Install movement fencing in areas of high turtle and / or snake crossing activity or wildlife mortality. Monitor locations where fencing is installed to ensure that it is in good repair.	*Residual effect on change in mortality risk* • Increase in mortality risk can be minimized provided recommended mitigation is implemented; however, isolated wildlife mortality may occur as a result of vehicles using access roads.
Habitat change • Increased erosion and sedimentation into wildlife habitat resulting from construction activity. *Habitat change* • Removal / disturbance of topsoil and increased soil compaction within wildlife habitat from manoeuvring of heavy machinery, excavation, backfilling, and other construction activity.	• Minimize erosion and sedimentation into wildlife habitat. • Minimize removal / disturbance of topsoil and minimize soil compaction within wildlife habitat.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Refer to mitigation measures for "*Reduction in soil quality and/or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials*" in Table 4-8.	*No residual effect* • Effects on habitat change can be mitigated provided recommended mitigation is implemented.
Habitat change • Damage to wildlife habitat as a result of accidental soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	• Minimize damage to wildlife habitat from soil or water contamination • Minimize changes in surface water drainage patterns and obstruction of lateral flows in surface water to wildlife habitat in wetlands.	• Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" in Table 4-8.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, some habitat change may occur due to limitation in current spill clean-up processes.
Habitat change • Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wildlife habitat in wetlands resulting from changes in land contours. • Reductions in groundwater recharge quantities into wildlife habitat in wetlands due to increases in impervious surfaces.	• Minimize reductions in groundwater recharge.	• Refer to mitigation measures in "*Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation*" in Table 4-5. • Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" in Table 4-8. • Refer to mitigation measures for "*Reduction in groundwater recharge quantities due to increases in impervious surfaces"* in Table 4-8.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, changes in surface water drainage patterns may result in alteration of some wildlife habitat.

Table 4-3: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Habitat change *Change in mortality risk* *Change in behaviour* • Habitat change and increased mortality to wildlife due to construction dewatering activities and associated dewatering discharge.	• Minimize habitat change and avoid wildlife mortality due to construction dewatering activities.	• During turtle and snake hibernation period (October 15 to April 30; GBBR, n.d.) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features: ▪ Area will be monitored to observe any drawdown; and ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist. • Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. • Refer to mitigation measures in "*Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities*" in Table 4-8.	*Residual effect on habitat change* • Effects on habitat change can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in alteration of some wildlife habitat (e.g., water level drawdown) within the ZOI of dewatering activities. *Residual effect on change in mortality risk* • Increase in mortality can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in isolated wildlife mortality within the ZOI of dewatering activities. *Residual effect on change in behaviour* • Effects on behaviour can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in displacement or avoidance of wildlife within the ZOI of dewatering activities.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Bat Hibernacula[2]			
Habitat change • Disturbance to bat hibernaculum habitat. *Change in mortality risk* • Increased mortality risk to bats.	• Minimize disturbance to bat hibernaculum habitat. • Avoid mortality of bats.	• The cave feature identified as a potential bat hibernaculum (BH-004) will not be disturbed or removed as a result of construction of the HIWEC. • Entrance of any site personnel into the cave will be prohibited at all times (MNRF, 1984). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows within 1 km of bat hibernacula; ▪ Appropriate blasting setbacks to bat hibernacula habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock), within one (1) year of the completion of the construction / decommissioning phase.	*No residual effects* • Effects on habitat change can be mitigated provided recommended mitigation is implemented. • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Bat Maternity Colonies			
Habitat change • Removal of suitable cavity trees in bat maternity colony features. *Change in behaviour* *Change in mortality risk* • Displacement and / or mortality of nursing female and juvenile bats. *Change in behaviour* • Noise and / or light disturbance to bats during construction activities.	• Minimize disturbance to bat maternity colony habitat. • Avoid displacement and / or mortality of nursing female and juvenile bats. • Minimize noise and / or light disturbance to bats during construction.	• Any suitable cavity trees within forested areas proposed for removal during the bat roosting season (April 30 to September 1) will be searched for signs of maternity roosts by a qualified Biologist prior to any construction activities that may affect the habitat. ▪ If an active maternity roost is found, a buffer area will be implemented around the cavity tree. The radius of the buffer will range depending on the level of disturbance and landscape context which will be confirmed by a qualified Biologist. ▪ Removal of the cavity tree can occur once a qualified Biologist provides confirmation that the cavity tree is not actively being used as a maternity roost. • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock), within one (1) year of the completion of the construction / decommissioning phase. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements.	*Residual effect on habitat change* • Effects on bat maternity colony habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for bat maternity colonies will be removed. *No residual effect on change in behaviour* • Effects on the behaviour of bats due to artificial lighting at night can be mitigated provided construction and decommissioning activities occur during daylight hours. *Residual effect on change in mortality risk* • Increased mortality risk to bats can be minimized provided recommended mitigation is implemented; however, isolated bat mortality may occur.
Turtle Wintering Areas[1]			
Change in mortality risk • Possible mortality of turtles within turtle wintering areas, or moving between turtle wintering areas and other areas. *Change in behaviour* • Disturbance to turtles within wintering areas, or moving between turtle wintering areas and other areas. *Habitat change* • Loss and / or habitat degradation of turtle wintering habitat.	• Avoid mortality of turtles. • Minimize disturbance to turtles. • Minimize loss and / or degradation of turtle wintering habitat.	• Field crews will immediately stop work for all turtles observed within the construction area during area searches and observe whether the individual(s) vacate the construction area. Should observed turtle(s) (except for nesting turtles) encountered within the construction area not vacate the construction area, they will be relocated to a safe and suitable location within proximity to where they were found by a qualified Biologist / handler or Environmental Monitor. • Removal of natural vegetation using heavy machinery within suitable turtle hibernating habitat is proposed to occur outside the winter hibernation period, from October 15 to April 30 (GBBR, n.d.), within aquatic habitats or wetlands. • During the turtle hibernation period (October 15 to April 30; GBBR, n.d.) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features: ▪ Area will be monitored to observe any drawdown; and ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist. • Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. • Limit duration of dewatering to as short a time frame as possible. • Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible.	*Residual effect on habitat change* • Effects on turtle wintering habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for turtle wintering will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of turtles due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, turtles may elicit changes in behaviour such as avoidance. *Residual effect on change in mortality risk*

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

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		• Construct new water supply wells according to regulatory standards and be operated in a manner to conserve water (i.e., excessive water taking is avoided). • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Pre-blast search and species relocations; ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to turtle habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for turtles is affected to satisfy the habitat requirements (e.g., installation of artificial nesting structures) for these species within one (1) year of the completion of the construction / decommissioning phase. Ecopassages or designated movement corridors will be considered in areas of high turtle activity or abundance, to limit road mortality. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated turtle activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements.	• Increased mortality risk to turtles can be minimized provided recommended mitigation is implemented; however, isolated turtle mortality may occur.
Reptile Hibernacula[1]			
Change in mortality risk • Possible mortality of snakes within reptile hibernacula, or moving between reptile hibernacula and other areas. *Change in behaviour* • Disturbance to snakes within reptile hibernacula, or moving between reptile hibernacula and other areas. *Habitat change* • Loss and / or habitat degradation of reptile hibernacula.	• Avoid mortality of snakes. • Minimize disturbance to snakes. • Minimize loss and / or degradation of reptile hibernacula habitat.	• Trained Rattlesnake Monitors will be present on-site during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. • During the active reptile period, from April 30 to October 15 (GBBR, n.d.), a trained Rattlesnake Monitor will complete area searches immediately prior to vegetation removal and blasting to identify any snake activity. • Field crews will immediately stop work for all snakes observed within the construction area and observe whether the individual(s) vacate the construction area. Should observed snake(s) encountered within the construction area not vacate the construction area, they will be relocated to a safe and suitable location within proximity to where they were found by a trained Rattlesnake Monitor. • Removal of vegetation using heavy machinery within suitable hibernating habitat is proposed to occur outside the winter hibernation season, from October 15 to April 30 (GBBR, n.d.), within aquatic habitats or wetlands. • During the snake hibernation period (October 15 to April 30; GBBR, n.d.) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features: ▪ Area will be monitored to observe any drawdown; and ▪ If there is drawdown, stop construction work and determine mitigation appropriate to the site (i.e., redirect water, monitoring rain events) through discussions with a qualified Biologist and Hydrogeologist. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Pre-blast search and species relocations; ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to snake habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area. • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for snakes is affected to satisfy the habitat requirements (e.g., pile of blast rock, artificial gestation / hibernation structures may be created on site) for these species within one (1) year of the completion of the construction / decommissioning phase. • Ecopassages or designated movement corridors will be considered in areas of high snake activity or abundance, to limit road mortality. • Install exclusionary fencing during construction / decommissioning within areas (where feasible) of concentrated snake activity to limit road and construction-related mortality. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated snake activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors (e.g., Rattlesnake Monitors) will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements.	*Residual effect on habitat change* • Effects on reptile hibernacula habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for reptile hibernacula will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of snakes due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, snakes may elicit changes in their behaviours such as avoidance. *Residual effect on change in mortality risk* • Increased mortality risk to snakes can be minimized provided recommended mitigation is implemented; however, isolated snake mortality may occur.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Deer Yarding Areas			
Habitat change • Loss and / or degradation of deer yarding areas resulting from construction activities. *Change in behaviour* • Disturbance to wintering deer. *Change in mortality risk* • Possible mortality of deer from construction activities.	• Minimize loss and / or degradation of deer yarding areas. • Minimize disturbance to wintering deer. • Avoid mortality of deer.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Even though MNR states that to ensure adequate cover, at least 30% of the deer yarding areas will not be removed (MNRF, 2010), only up to 7% of deer yarding areas will be removed. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site.	*Residual effect on habitat change* • Effects on deer yarding habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for deer yarding will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of deer due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, deer may temporarily exhibit avoidance behaviour. *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Cliffs and Talus Slopes			
Habitat change • Loss and / or degradation of cliffs and talus slopes resulting from construction activities.	• Minimize loss and / or degradation of cliffs and talus slopes.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Where possible, avoid construction activities within the boundaries of cliffs and talus slopes. • Where construction must occur within cliffs and talus slopes: ▪ The topsoil / seedbank (if present) will be stripped prior to construction, preserved during construction and reapplied in suitable rehabilitation areas post construction. ▪ Rehabilitation activities will be initiated within all temporary construction / decommissioning areas within one (1) year of the completion of the construction / decommissioning phase. Rehabilitate cliff face by roughening the smoothly blasted edges of the cliff face and leaving talus at the base. The roughened edges will create benches, cracks, crevices and fissures that allow for re-colonization of the cliff (MNFR, 2014).	*Residual effect on habitat change* • Effects on cliff and talus slope habitat can be minimized provided recommended mitigation is implemented; however, some cliff and talus slope habitat will be removed.
Precambrian Rock Barren			
• Precambrian rock barrens are abundant and widespread within the HIWEC study area and therefore no mitigation measures, monitoring or contingency measures are required during the construction / decommissioning phase.			
Sand Barrens			
Habitat change • Loss and / or degradation of sand barrens resulting from construction activities.	• Minimize loss and / or degradation of sand barrens.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Where possible, avoid construction activities within the boundaries of sand barrens. • Site transmission line poles outside the boundaries of sand barren feature SB-002, if possible. • Where construction must occur within sand barrens: ▪ The topsoil / seedbank will be stripped prior to construction, preserved during construction and reapplied in suitable rehabilitation areas post construction. ▪ Avoid the use of heavy machinery within sand barren communities to the extent possible. ▪ Rehabilitation activities will be initiated within all temporary construction / decommissioning areas within one (1) year of the completion of the construction / decommissioning phase.	*Residual effect on habitat change* • Effects on sand barren habitat can be minimized provided recommended mitigation is implemented; however, some sand barren habitat may be removed.
Old-growth Forest[1]			
Change in community diversity • Permanent removal of old-growth forest.	• Minimize removal of old-growth forest.	• Complete pre-construction field survey to confirm the location, age and spatial extent of old-growth forests (if any) within the proposed construction footprint area. • Where potential old-growth forests are confirmed through the pre-construction field surveys: ▪ Avoid construction within old-growth forests to the extent possible. ▪ If avoidance is not feasible, first minimize the area of vegetation removal within old-growth forest to the extent possible by reducing the construction footprint areas of permanent HIWEC infrastructure (e.g., access roads, WTG construction footprints, etc.) and avoiding placement of temporary HIWEC infrastructure (e.g., construction compounds and laydown yards) in old growth forests. If this is not possible, an effort will be made to retain old tree specimens identified within the construction footprint area, if any. ▪ Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained where feasible. ▪ Delineate construction footprint area within old-growth forests. ▪ Ensure that no vegetation removal or damage occurs outside of the construction footprint area. ▪ Where excavation for construction of access roads, WTGs or collector lines is required within the rooting zone of trees (i.e., within 1 m of the dripline), implement proper root pruning measures to protect tree roots.	*Residual effect for change in community diversity* • Effects on old-growth forest can be minimized provided recommended mitigation is implemented; however, some old growth forest may be removed.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Bogs			
Refer to **Table 4-5** for mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phase for Important Wetlands.			
Waterfowl Nesting Areas[1]			
Change in mortality risk • Possible mortality of nesting waterfowl. *Change in behaviour* • Disturbance and / or displacement of nesting waterfowl resulting from noise and / or vibration from construction activities. *Habitat change* • Loss and / or degradation of waterfowl nesting habitat.	• Avoid mortality of nesting waterfowl. • Minimize disturbance and / or displacement of nesting waterfowl. • Minimize loss and / or degradation of waterfowl nesting habitat.	• If vegetation must be removed during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the *MBCA*: ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28 as per EC's Nesting Calendar for Zone C3 (EC, 2014b); ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014b) and UTM co-ordinates will be taken. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to bird habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity, and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. * Note: Complex habitats refer to habitats that contain many likely nesting spots. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer. Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds, such as open rock barrens and other sparsely vegetated habitats.	*Residual effect on habitat change* • Effects on waterfowl nesting habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for waterfowl nesting will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of waterfowl can be minimized provided recommended mitigation is implemented; however, some waterfowl may exhibit temporary changes in behaviour (e.g. avoidance). *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat			
Change in mortality risk • Possible mortality of Osprey. *Change in behaviour* • Disturbance and / or displacement of Osprey resulting from noise and / or vibration from construction activities. *Habitat change* • Loss and / or degradation of Osprey nesting, foraging and perching habitat.	• Avoid mortality of Osprey. • Minimize disturbance and /or displacement of Osprey. • Minimize loss and / or degradation of Osprey nesting, foraging and perching habitat.	• If construction activities are scheduled to occur within 300 m of an identified Osprey nests during the critical breeding period April 15 to August 31, the activity of the Osprey nest will be confirmed by a qualified Biologist. Activity surveys would follow the protocol described for pre-construction survey and be completed between April 25 and June 1. ▪ If an active Osprey nest is found, vegetation removal and blasting will not be permitted within 300 m of the nest between April 15 and August 31 or when a qualified Biologist confirms the nest is no longer active, whichever is first, unless behavioural monitoring is completed. ▪ Vegetation clearing and blasting may proceed up to but not within 150 m of the active nest after June 1 provided that behavioural monitoring is completed by a qualified Biologist during these activities. If extreme agitated behaviour (e.g., if Osprey flies off the nest and doesn't return within 5 minutes) is observed through behavioural monitoring, then construction activities will be halted for the remainder of the day. Construction activities may resume the following day provided that behavioural monitoring is completed again by a qualified Biologist during these activities. If the same level of agitated behaviour is observed on the second day, then construction activities within 300 m of the nest will be halted until the young have fledged the nest or as otherwise determined through consultation with EC-CWS. ▪ Construction staff will be notified of the location of the active nest to ensure that they are aware of its location and species awareness training will be delivered. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to bird habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.	*Residual effect on change in behaviour* • Effects on the behaviour of Osprey can be minimized provided recommended mitigation is implemented; however, Osprey may exhibit temporary changes in behaviour during construction. *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		• Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements.	
Woodland Raptor Nesting Habitat[1]			
Change in mortality risk • Possible mortality of nesting raptors. *Change in behaviour* • Disturbance and / or displacement of nesting raptors resulting from noise and / or vibration from construction activities. *Habitat change* • Loss and / or degradation of woodland raptor nesting habitat.	• Avoid mortality of nesting raptors. • Minimize disturbance and /or displacement of nesting raptors. • Minimize loss and / or degradation of woodland raptor nesting habitat.	• If vegetation must be removed during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the MBCA: ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28 as per EC's Nesting Calendar for Zone C3 (EC, 2014b); ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014b) and UTM co-ordinates will be taken. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to bird habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. * Note: Complex habitats refer to habitats that contain many likely nesting spots. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer. Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds, such as open rock barrens and other sparsely vegetated habitats.	*Residual effect on habitat change* • Effects on raptor nesting habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for raptor nesting will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of raptors can be minimized provided recommended mitigation is implemented; however, some raptors may exhibit temporary changes in behaviour (e.g. avoidance). *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Turtle and Lizard Nesting Areas			
Change in mortality risk • Possible mortality of turtles within turtle nesting areas, or moving between turtle nesting areas and other areas. *Change in behaviour* • Disturbance to turtles within nesting areas, or moving between turtle nesting areas and other areas. *Habitat change* • Loss and / or habitat degradation of turtle nesting habitat.	• Avoid mortality of turtles. • Minimize disturbance to turtles. • Minimize loss and / or degradation of turtle nesting habitat.	• Site transmission line poles outside the boundaries of the sand barren community associated with turtle nesting feature TLN-001, if possible. Avoid the use of heavy machinery within this feature, to the extent possible. • Within those areas that provide confirmed and / or likely turtle nesting habitat (i.e., within sandy habitats, shorelines, or wetlands where turtle nesting activity has been observed or suitable habitat is within an area with concentrated turtle observations) and that are identified to be cleared of vegetation: ▪ Construction will avoid nesting areas where possible; ▪ In areas are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (Georgian Bay Biosphere Reserve (GBBR), n.d.); ▪ In the rare case where construction initially avoided an area and exclusionary fencing had not been installed prior to the turtle nesting period, a qualified Biologist will complete area searches immediately prior to construction to identify any potential nesting areas and nesting activity during the turtle nesting / hatching period of June 1 to September 15 (GBBR, n.d.); ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Biologist. The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked and UTM co-ordinates will be taken; and ▪ Once the Biologist has cleared the area, install turtle appropriate exclusionary fencing during construction / decommissioning within areas of concentrated turtle activity to limit road and construction-related mortality. • Field crews will immediately stop work for all turtles observed within the construction area during area searches and observe whether the individual(s) vacate the construction area. Should observed turtle(s) (except for nesting turtles) encountered within the construction area not vacate the construction area, they will be relocated to a safe and suitable location within proximity to where they were found by a qualified Biologist / handler or Environmental Monitor. • Develop and implement a Blasting Plan that might include, but will not be limited to:	*Residual effect on habitat change* • Effects on turtle and lizard nesting habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for turtle and / or lizard nesting will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of turtles and lizards due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, turtles may alter nest site selection along gravel access roads. *Residual effect on change in mortality risk* • Increased mortality risk to turtles and lizards can be minimized provided recommended mitigation is implemented; however, isolated turtle and / or lizard mortality may occur.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		▪ Pre-blast search and species relocations; ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to turtle habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for turtles is affected to satisfy the habitat requirements (e.g., installation of artificial nesting structures) for these species within one (1) year of the completion of the construction / decommissioning phase. • Ecopassages or designated movement corridors will be considered in areas of high turtle activity or abundance, to limit road mortality. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated turtle activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal, dewatering and blasting, and as required to ensure compliance with environmental requirements.	
Seeps and Springs			
Refer to **Table 4-7** for mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phase for Surface Water features.			
Aquatic Feeding Habitat			
Habitat change • Loss and / or degradation of aquatic feeding habitats resulting from construction activities. *Change in behaviour* • Disturbance to moose or deer from construction activities. *Change in mortality risk* • Possible mortality of moose or deer from construction activities.	• Minimize loss and / or degradation of aquatic feeding habitat. • Minimize disturbance to moose or deer. • Avoid mortality of moose or deer.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site.	*Residual effect on habitat change* • Effects on aquatic feeding habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for deer yarding will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of moose or deer due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, moose or deer may temporarily exhibit avoidance behaviour. *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf			
Habitat change • Loss and / or degradation of denning sites resulting from construction activities. *Change in behaviour* • Disturbance to Fisher or Eastern Wolf from construction activities. *Change in mortality risk* • Possible mortality of Fisher or Eastern Wolf from construction activities.	• Minimize loss and / or degradation of denning sites. • Minimize disturbance to Fisher or Eastern Wolf. • Avoid mortality of Fisher or Eastern Wolf.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Within 200 m of an active Eastern Wolf den, vegetation clearing and blasting will be limited to the greatest extent possible from April 1 to June 30. ▪ For any vegetation removal or blasting that will occur within 200 m of an active Eastern Wolf den between April 1 and June 30, a qualified Biologist will ensure that no Eastern Wolf pups are actively using the denning site through the use of motion sensor cameras. ▪ If Eastern Wolf pups are confirmed, or suspected, to be present within the den, no vegetation removal or blasting will be permitted within 200 m of the denning site until June 30 or when a qualified Biologist confirms the pups are mobile, whichever is first. ▪ Construction staff will be notified of the location of the active den to ensure that they are aware of its location and species awareness training will be delivered regarding steps to be taken if the species is encountered. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site.	*Residual effect on habitat change* • Effects on mammal denning habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for mammal denning may be removed. *Residual effect on change in behaviour* • Effects on the behaviour of Fisher or Eastern Wolf due to disturbance from construction activities can be minimized provided recommended mitigation is implemented; however, Fisher or Eastern Wolf may temporarily exhibit avoidance behaviour. *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Amphibian Breeding Habitat (Woodland and Wetland)			
Change in mortality risk • Possible mortality of amphibians within breeding habitat, or moving between breeding habitat and other areas. *Change in behaviour* • Disturbance to amphibians within breeding habitat, or moving between breeding habitat and other areas. *Habitat change* • Loss and / or habitat degradation of amphibian breeding habitat.	• Avoid mortality of amphibians. • Minimize disturbance to amphibians. • Minimize loss and / or degradation of amphibian breeding habitat.	• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated amphibian activity and instruct all staff to be vigilant for wildlife while driving on site. • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas where suitable habitat for amphibians is affected to satisfy the habitat requirements for breeding amphibians within one (1) year of the completion of the construction / decommissioning phase. • Ecopassages or designated movement corridors should be considered in areas of high amphibian activity or abundance, to limit road mortality.	*Residual effect on habitat change* • Effects on amphibian breeding habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for amphibian breeding will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of amphibians due to disturbance can be minimized provided recommended mitigation is implemented; however, amphibians may alter movement patterns or breeding site selection. *Residual effect on change in mortality risk* • Increased mortality risk to amphibians can be minimized provided recommended mitigation is implemented; however, isolated amphibian mortality may occur.
Mast Producing Areas			
Habitat change • Permanent removal of mast producing areas.	• Minimize removal of mast producing areas.	• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained. • Where excavation for construction of access roads, WTGs or collector lines is required within the rooting zone of trees (i.e., within 1 m of the dripline), implement proper root pruning measures to protect tree roots. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of woodland that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. Include plantings of mast producing species in rehabilitated areas, if appropriate to local soil conditions. These plants should be sourced from the local gene pool and may consist of local seed or salvaged seedlings.	*Residual effect on habitat change* • Effects on mast producing area habitat can be minimized provided recommended mitigation is implemented; however, some mast producing area habitat may be removed.
Marsh Bird Breeding Habitat[1]			
Change in mortality risk • Possible mortality of marsh breeding birds. *Change in behaviour* • Disturbance and / or displacement of marsh breeding birds resulting from noise and / or vibration from construction activities. *Habitat change* • Loss and / or degradation of marsh bird breeding habitat.	• Avoid mortality of marsh breeding birds. • Minimize disturbance and / or displacement of marsh breeding birds. • Minimize loss and / or degradation of marsh bird breeding habitat.	• If vegetation must be removed during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the *MBCA*: ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28 as per EC's Nesting Calendar for Zone C3 (EC, 2014b); ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014b) and UTM co-ordinates will be taken. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to bird habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. * Note: Complex habitats refer to habitats that contain many likely nesting spots. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer. Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds, such as open rock barrens and other sparsely vegetated habitats.	*Residual effect on habitat change* • Effects on marsh bird breeding habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for marsh breeding birds will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of marsh breeding birds can be minimized provided recommended mitigation is implemented; however, some marsh breeding birds may exhibit temporary changes in behaviour (e.g. avoidance). *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.

Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Habitat for Avian SOCC (Black Tern, Yellow Rail)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phases for **Marsh Bird Breeding Habitat** as described above.			
Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)[1]			
Change in mortality risk • Possible mortality of avian SOCC. *Change in behaviour* • Disturbance and / or displacement of avian SOCC resulting from noise and / or vibration from construction activities. *Habitat change* • Loss and / or degradation of avian SOCC habitat.	• Avoid mortality of avian SOCC. • Minimize disturbance and / or displacement of avian SOCC. Minimize loss and / or degradation of avian SOCC habitat.	• If vegetation must be removed during the overall bird nesting season of April 1 to August 31, the following mitigation will apply, in accordance with the *MBCA*: ▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required; ▪ Within complex habitats*, removal of all vegetation is proposed to occur outside the core bird nesting season of May 1 to July 28 as per EC's Nesting Calendar for Zone C3 (EC, 2014b); ▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014b). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014b) and UTM co-ordinates will be taken. • Blasting will not be undertaken within vegetated habitats until vegetation has been removed. • Develop and implement a Blasting Plan that might include, but will not be limited to: ▪ Suitable blasting timing windows; ▪ Appropriate blasting setbacks to bird habitat; and ▪ Mitigation to minimize blast effects (i.e., use blasting mats over top of holes to minimize scattering of blast debris around the area, reduce blasting footprint to the extent possible, and remove all blasting debris and other associated equipment / products from the blast area). • Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined. • Vegetation removal will be minimized to the extent possible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed (e.g., replant forested areas using native stock) within one (1) year of the completion of the construction / decommissioning phase. • Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Clearly post speed limit signage along access roads (30 km/hr), consider installing speed bumps within areas of concentrated wildlife activity and instruct all staff to be vigilant for wildlife while driving on site. • An Environmental Monitor will be on site during all construction activities. Additional Environmental Monitors will be present during key construction activities including vegetation removal and blasting, and as required to ensure compliance with environmental requirements. * Note: Complex habitats refer to habitats that contain many likely nesting spots. For instance, forest and shrub-dominated communities may contain nesting spots within the canopy, sub-canopy, shrub layer and ground layer. Simple habitats refer to habitats that contain few likely nesting spots or a small community of migratory birds, such as open rock barrens and other sparsely vegetated habitats.	*Residual effect on habitat change* • Effects on avian SOCC habitat can be minimized provided recommended mitigation is implemented; however, some habitat suitable for avian SOCC will be removed. *Residual effect on change in behaviour* • Effects on the behaviour of avian SOCC can be minimized provided recommended mitigation is implemented; however, some avian SOCC may exhibit temporary changes in behaviour (e.g. avoidance). *No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Habitat for Insect SOCC (Horned Clubtail, Mottled Darner)			
• Refer to **Table 4-5** for mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phases for Important Wetlands.			
Habitat for Insect SOCC (Pine Imperial Moth)			
• This species is relatively common across the Canadian Shield (Dave Beadle, personal communication, September 3, 2015) and its habitat is not limiting within the HIWEC study area. Therefore, no mitigation, monitoring or contingency measures are required during the construction / decommissioning phases.			
Habitat for Mammal SOCC (Eastern Wolf)			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phases for **Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf** as described above.			
Habitat for Turtle and Lizard SOCC (Common Five-lined Skink, Northern Map Turtle, Snapping Turtle)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phases for **Turtle Wintering Areas** and **Turtle and Lizard Nesting Areas** as described above.			
Habitat for Snake SOCC (Eastern Ribbonsnake, Milksnake)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning phases for **Reptile Hibernacula** as described above.			

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wetlands Resulting from Construction

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Change in community diversity *Change in wetland quantity and function* • Increased erosion and sedimentation resulting from construction activity.	• Minimize erosion and sedimentation from construction activity.	• 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 footprint area if within 30 m of a wetland to minimize potential sediment loading to the feature. • Also refer to mitigation measures for effects of "Reduction *in soil quality and/or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials*" in **Table 4-8**.	*No residual effects.* • Effect on community diversity can be mitigated provided recommended mitigation is implemented. • Effects on wetland quantity and function can be mitigated provided recommended mitigation is implemented.
Change in community diversity *Change in wetland quantity and function* • Damage to vegetation as a result of soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling.	• Prevent soil or water contamination.	• Refer to mitigation measures for *"Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc."* in **Table 4-8**. • Also refer to mitigation measures for "*Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge*" in **Table 4-8**.	*Residual effect on change in community diversity* • Effects on community diversity can be minimized provided recommended mitigation is implemented; however, some changes to community diversity may occur due to limitation in current spill clean-up processes. *Residual effect on change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, some damage to wetlands may occur due to limitation in current spill clean-up processes.
Change in wetland quantity and function • Permanent loss of wetlands.	• Minimize amount of wetland vegetation removal. • Minimize disturbance to Important Wetlands.	• Vegetation removal will be minimized to the extent possible. • Site permanent infrastructure outside of wetlands to the extent possible. • Where excavation of a wetland cannot be avoided, the area of disturbance will be delineated to ensure that work does not occur outside the construction footprint. • Where construction activities occur within 30 m of a wetland, install and maintain construction fencing (or similar delineation device) to clearly define the construction footprint area to prevent accidental damage to vegetation. • Preserve topsoil (and therefore seed bank), where present, for use during rehabilitation. • Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained, where feasible. • Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of wetland that was removed (e.g., replant swamp areas using native stock, consider transplanting native wetland species into temporarily disturbed areas suitable for wetland planting) within one (1) year of the completion of the construction / decommissioning phase. • Where excavation for construction of access roads, WTGs or collector lines is required within the rooting zone of trees (i.e., within 1 m of the dripline), implement proper root pruning measures to protect tree roots.	*Residual effect for change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, some wetlands will be removed.
• *Change in wetland quantity and function* Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation. • Reductions in groundwater recharge quantities into wetlands due to increases in impervious surfaces.	• Minimize effects to soil moisture and species composition of vegetation. • Minimize reductions in groundwater recharge.	• Ensure BMPs are used to maintain current drainage patterns, including: ▪ Minimize paved surfaces and design roads to promote infiltration; ▪ Limit changes in land contours to the maximum extent possible; and ▪ 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. • Also refer to mitigation measures in "*Reduction in groundwater recharge quantities due to increases in impervious surfaces*" under the in **Table 4-8**.	*Residual effect on change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, changes in surface water drainage patterns may result in some effects on wetland quantity and function.
Change in wetland quantity and function • Change in wetland function due to reduced water levels caused by temporary construction dewatering activities and associated dewatering discharge.	• Minimize water draw down in wetlands from groundwater takings.	• Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. • Also refer to mitigation measures in "*Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities*" in **Table 4-8**.	*Residual effect on change in wetland quantity and function* • Effects on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, construction dewatering may result in some effects on wetland quantity and function within the ZOI of dewatering activities.

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wetlands Resulting from Construction

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Change in species diversity *Change in wetland quantity and function* • Damage to wetland vegetation due to increased dust accumulation.	• Minimize dust accumulation on peripheral vegetation.	• Use water as a dust suppressant, as needed, along areas where construction activities are located within 5 m of a wetland. • In the event that dust accumulates on leaves of wetland plants, which may reduce photosynthesis, water will be used to wash dust off of vegetation. • Also refer to mitigation measures for "*Dust generation from vehicle use and construction activity contributing to a reduction in local air quality*" in **Table 4-9**.	*No residual effects* • Effects on species diversity can be mitigated provided recommended mitigation is implemented. • Effects on wetland quantity and function can be mitigated provided recommended mitigation is implemented.

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 are documented and assessed in the Water Assessment and Waterbody Report (**Appendix H** of **Volume A**) 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 shoreline of Georgian Bay to the Algonquin Highlands, the region that runs approximately north-south along its eastern boundary. Ground elevations within the HIWEC study area generally decline in a southwest direction from a topographic high of approximately 213 m Above Sea Level (mASL) in the southeast portion of the HIWEC study area to a low of about 169 mASL in the northeast and along the shoreline of Georgian Bay.

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, frequently weathered and fractured bedrock accounts for much of the surficial geology, with the remainder being characterized by organic deposits which accumulated in low-lying areas and bedrock valleys as well as a bedrock-drift complex consisting of a thin, discontinuous veneer of glaciolacustrine sand and/or gravel, isolated occurrences of ice-contact stratified sands and gravels, and of loose, stony glacial till (OGS, 2003). Where present, the thickness of the overburden generally is less than about 1 m, however, with slightly thicker accumulations of up to 3 m being found in bedrock hollows, topographic lows, and on the lee-side of bedrock knobs in relation to the direction of glacial ice-flow.

4.3.2.2.3 Water Well Survey

An inventory of private water wells (i.e., domestic, commercial, industrial, etc.) was performed within a radius of approximately 1,000 m from the HIFN I.R. #2 boundary, by means of searching the MOECC Water Well Database.

The northern limit of the water well survey area was truncated at the Key River as this feature would serve as a hydrogeological divide between the HIFN I.R. # 2 boundary and those lands to the north. Results are shown in **Figure 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 the HIFN I.R. #2 boundary. A review of the water well records indicates that the majority (88%) of wells are completed in bedrock and range in depth between about 3.1 and 79.2 m. Two (2) of the located wells are reported to be completed in overburden material (sand) and are located on the north side of Key River, outside of the HIWEC study area.

As shown in **Table 4-6**, 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 4-6: 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

Table 4-7 identifies potential effects on surface water resources that could occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

4.3.3.2 Groundwater, Soils and Terrain

Table 4-8 describes potential effects on groundwater resources, soils and terrain that could occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Figure 4-2: Surficial Geology

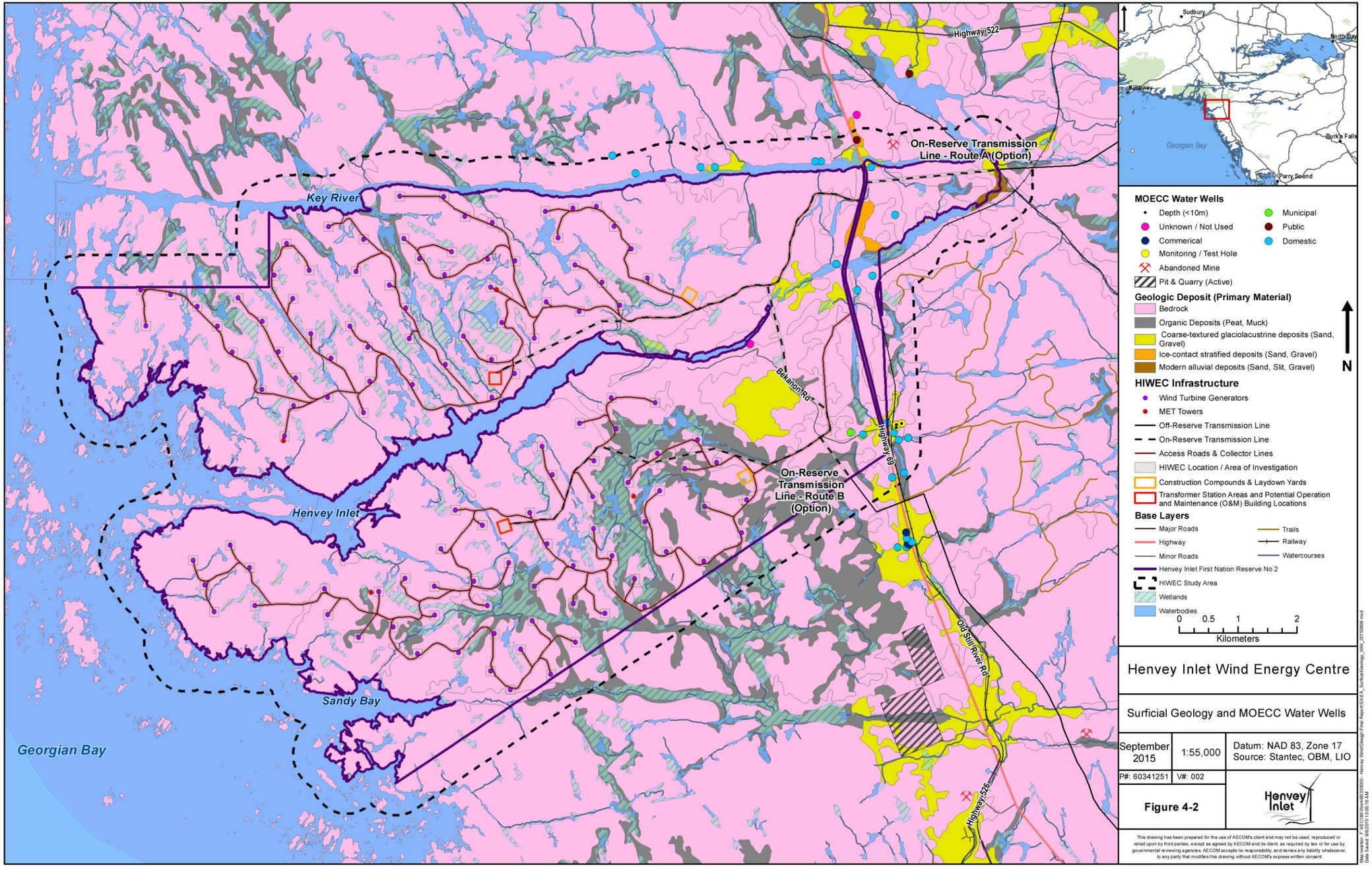


Table 4-7: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to surface water quality • Reduction in surface water quality from erosion and sedimentation	• Minimize erosion and sedimentation. • Minimize vegetation removal near waterbodies.	• **Erosion and Sediment Control** ▪ A Sediment and Erosion Control Plan will be prepared prior to construction start. ▪ Implement sediment and erosion control measures prior to construction near wetlands or waterbodies and maintain such measures until re-vegetation of disturbed areas is complete. ▪ Monitoring 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. ▪ 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. ▪ Ensure an additional supply of erosion and sediment control materials are readily available on the site. ▪ Minimize removal of riparian vegetation to the greatest extent possible (maintaining riparian shrubs) in order to limit the area of exposed soil. ▪ In the Erosion and Sedimentation Control Plan include measures (e.g., monitoring and response) should a flood or higher water levels occur due to adverse weather events. ▪ Discharge water through energy dissipation and filtration systems (filter bag, sediment basin), as required. Ensure the volume of water is controlled 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. ▪ Use temporary crossing structures or other practices to cross waterbodies with steep and highly erodible (e.g., dominated by organic materials and silts) banks and beds. ▪ Remove non-biodegradable erosion and sediment control materials once site is stabilized. • **Grading and Excavation** ▪ Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion. ▪ 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. • **Equipment Use** ▪ In order to avoid compacting or hardening of natural ground surface, and to avoid movement of machinery on sensitive slopes, restrict construction equipment to designated controlled vehicle access routes and to within identified work areas. ▪ Whenever possible, operate machinery from outside the waterbody and on land above the high water mark or on ice in a manner that minimizes disturbance to the banks and bed of the waterbody. ▪ Limit machinery fording (if required) to only the amount necessary and only outside of sensitive time periods and upon consultation with a qualified Environmental Monitor. If repeated fording of the waterbody is required, construct a temporary crossing structure (e.g., jersey bridge, swamp mats). ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands and waterbodies. ▪ Wash water used for the cleaning of cement construction materials not to come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck. ▪ Use and maintain emission control devices on motorized equipment (as provided by the manufacturer of the equipment) to minimize the emissions so that they remain within industry standards. Heavy equipment and machinery to be used within operating specifications. ▪ Run vehicles and equipment only when necessary (i.e., limit idling). • **Blasting** ▪ 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, vibration and slope instability from blasting, including: – Follow proper drilling, explosive handling and loading procedures; – Implement safe handling and storage procedures for all material, including 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; – Ensure the order of firing is correct to minimize the frequency of blasts; – Do not use ammonium nitrate based explosives near water due to the production of toxic by-products; and – Remove all blasting debris and other associated equipment / products from the blast area. ▪ In the event of fish mortality, immediately stop all work and correct the cause of the mortality. ▪ Report the fish kill immediately to DFO and HIFN ▪ If release of significant blast rock, dust or residues is detected, suspend blast work until additional mitigations as required are in place. • **Water Quality** ▪ Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. ▪ Turbid water shall not be discharged to a watercourse or wetland. ▪ Vegetation management will be done using mechanical techniques rather than herbicides. • **Material Stockpiling and Handling** ▪ Stabilize and store stockpiled materials (topsoil, grubbed materials) above the high water mark and 30 m away from wetlands and waterbodies. Transmission and collector poles or other structures will be placed above the normal high water mark.	*Residual effect to surface water quality* • Effects on surface water quality can be minimized provided recommended mitigation is implemented; however, changes to surface water quality due to erosion and sedimentation may still occur

Table 4-7: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
		▪ 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. ▪ 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 / meter bags, geotextile fabric, sheet pile or other clean material). ▪ Waste management to be completed in accordance with relevant federal and provincial guidelines and standards. ▪ Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers. • **Rehabilitation** ▪ 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. • **Work Area** ▪ Delineate work areas. ▪ Maintain undisturbed buffer strips greater than 30 m in width around waterbodies and wetlands, where possible, except where access roads approach waterbody and wetland crossings. ▪ Restrict vehicle traffic to posted speed limits. ▪ Investigate complaints related to dust and emissions and address to the extent possible. • **Monitoring** ▪ Monitor on-site conditions (i.e., erosion and sediment control, spills, flooding, etc.) where construction occurs within 30 m of a water course on the following basis: ▪ Weekly during active construction periods. ▪ Prior to, during and post forecasted large rainfall events (>20 mm in 24 hours) or significant snowmelt events (i.e., spring freshet). ▪ Daily during extended rain or snowmelt periods. ▪ Monthly during inactive construction periods, where the site is left alone for 30 days or longer.	
Changes to surface water quality • Reduction in surface water quality due to accidental spills including fuels, lubricants, and concrete washing near waterbodies.	• Prevent contaminant discharge to the environment.	• **Equipment Use (see above)** • **Water Quality (see above)**	*Residual effect on surface water quality* • Effects on surface water quality are minimized following implementation of proposed mitigation, however, changes to surface water quality due to accidental spills may remain.
Changes to surface water quality and quantity • Potential effects on surface water quality and quantity due to dewatering discharge.	• Minimize construction dewatering discharge.	• **Dewatering Activities** ▪ Limit duration of dewatering to as short a time frame as possible. ▪ Develop and implement a Construction Dewatering Discharge Plan describing appropriate areas and methods for discharge. ▪ Leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids, if discharge is to a waterbody and / or wetland, where feasible. ▪ Discharge water shall not be directed to a waterbody that has potential to flood as a result of the added input of water caused by direct dewatering discharge. ▪ Screen all hoses drawing water from a waterbody to prevent potential entrainment of fish and other species. ▪ If dewatering of excavations is required, mitigation could include the use of splash pads, discharge diffusers, filter bags, sediment basins or similar measures (if required and as appropriate) at discharge locations to ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks. ▪ If dewatering of excavations is required and 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 milligrams per litre (mg/L), appropriate measures (e.g., geosock or similar device) to mitigate these impacts will be implemented. ▪ Limit water taking quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible. ▪ No direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable approvals. • **Water Management** ▪ Should groundwater dewatering activities be expected to exceed 50,000 L/day, the following measures will be implemented: – Inlet pump head shall be surrounded with clear stone and filter fabric. ▪ The discharge shall be regulated at such a rate that there is no flooding in the receiving waterbody and that no soil erosion is caused that impacts the receiving waterbody. ▪ Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided. ▪ 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 regulatory approvals.	*No residual effect* • Effects on surface water quality and quantity from dewatering discharge can be mitigated provided recommended mitigation is implemented.

Table 4-7: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
		▪ 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. ▪ 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 or wetland. ▪ 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 off-site (unless contaminated). ▪ Where possible, groundwater discharge water shall be directed to areas of groundwater recharge to allow for natural infiltration to the groundwater system. • **Water Quality (see above)** • **Monitoring (see above)**	
Changes to surface water quantity • Potential for alteration to local surface water quantity 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. • Minimize construction disturbance to surficial soils and changes to surficial topography.	• **Water Crossing Design** ▪ Design water crossings to accommodate high and low flows of the watercourse. • **Erosion and Sediment Control (see above)** • **Water management (see above)** • **Grading and Excavation (see above)** • **Rehabilitation (see above)** • **Monitoring (see above)**	*Residual effect on surface water quantity* • Alterations to local surface water quantity can be minimized provided recommended mitigation is implemented (e.g., proper culvert sizing and rehabilitation and enhancement activities).

Table 4-8: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to groundwater quantity • 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; ▪ Lining ditches with permeable material (rather than clay, for example); and, ▪ Groundwater should remain on site and not disposed of off-site (unless contaminated). • Where possible, direct groundwater discharge water to natural infiltration systems.	*No residual effects* • No reduction in groundwater recharge quantities anticipated provided recommended infiltration techniques and measures are implemented.
Changes to groundwater quantity • Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells, as a result of temporary construction dewatering and water taking activities.	• .Minimize construction dewatering and water taking.	• Conduct a Detailed Water Taking Assessment for WTG foundations and new water supply well locations based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted ZOI prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features and private wells within the anticipated ZOI will be provided. • Limit duration of dewatering to as short a time frame as possible. • Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible. • Construct new water supply wells according to regulatory standards and be operated in a manner to conserve water (i.e., excessive water taking is avoided).	*Residual effect on groundwater quantity* • Reduction in groundwater quantity resulting in changes in groundwater flow patterns and yield of private water wells would be minimized provided the recommended mitigation measures are implemented; however, a reduction in groundwater quantity may not be avoided within the ZOI of dewatering activities, but will likely be temporary and have no long term residual effects.
Changes to groundwater quality • Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge.	• Minimize construction dewatering discharge to areas of substantial groundwater recharge.	• Develop and implement a Construction Dewatering Discharge Plan describing appropriate areas and methods for discharge. • If dewatering of excavations is required and is expected to exceed 50,000 L/day, sample discharge water daily during the days the water is discharged and tested for suspended sediments. The company shall not discharge turbid water 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). • The Contractor shall implement appropriate measures (e.g., geosock or similar device) to reduce the amount of sediment released. • Dispose of any contaminated waste material generated from construction activities off-site by authorized and approved haulers and receivers. Where feasible, leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids. • Ensure that no direct discharge to Georgian Bay, Key River, Henvey Inlet or any surface water feature outside the HIWEC will occur without acquiring applicable approvals. • Ensure that any overland discharge complies with previous mitigation for erosion and sedimentation included with "*Reduction in soil quality and quantity due to erosion, sedimentation and compaction resulting from excavation, use of heavy equipment and stockpiling of cleared materials*." as described below. • Should groundwater dewatering activities be expected to exceed 50,000 L/day, implement the following measures : ▪ Surround inlet pump head with clear stone and filter fabric. ▪ Regulate the discharge rate to ensure there is no flooding in the receiving water body and that no soil erosion is caused that impacts the receiving water body.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to the accidental release of contaminated construction dewatering discharge in areas of substantial groundwater recharge would be minimized following mitigation; however, residual contaminants may remain in some areas of the HIWEC.
Changes to groundwater quality and quantity • Reduction in groundwater quality (turbidity), quantity and physical damage to groundwater supply wells due to agitation of the subsurface during construction blasting (including potential release of soluble substances used during blasting) and pile driving.	• Minimize impacts of blasting and vibration.	• Undertake blasting operations and pile driving 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 mitigation measures for "*Disturbance to topography, including rock and soil instability, due to blasting*." as described below for a list of proposed blasting BMPs). • In the event an impact to a private water well is detected the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on groundwater quality and quantity* • Reduction in groundwater quality (turbidity) and quantity would be minimized through the development and implementation of a Blasting Plan; however, potential disturbance to the subsurface resulting in a temporary reduction in groundwater quality and/or quantity may remain. • Physical damage to groundwater supply wells would be compensated through the implementation of mitigation.

Table 4-8: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to groundwater quality • Reduction in groundwater quality due to accidental contaminant spills from 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 wetlands, woodlands or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands, woodlands or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Also refer to mitigation measures for "*Reduction in soil quality due accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc.*" as described below for additional proposed mitigation measures. • Ensure that wash water used for the cleaning of cement construction materials does not come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck. • In the event of a contaminant release that has potential to cause harm to an individual if consumed, the spill exceeds 100 L in volume and is located less than 500 m from a private water well, the potentially affected well(s) will be included in a well monitoring program that includes water quality sampling for the suspected contaminant. In the event an impact to a private water well is detected the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills from vehicle and machinery operation, and concrete truck rinsing would be minimized provided a Spill Prevention and Response Plan is developed and implemented; however, residual contaminants may remain in some areas of the HIWEC.
Changes to soil quality Reduction in soil quality due to mixing of topsoil and subsoils.	• Minimize mixing of topsoil and subsoil.	• Strip and store topsoil (where present) from temporary work areas separately from subsoils and maintain for reclamation use after construction. • Where topsoil quality has been compromised, import topsoil for reclamation activities (according to the Rehabilitation Plan).	*Residual effect on soil quality* • Reduction in soil quality due to mixing of topsoil and subsoils would be minimized following mitigation; however, some mixing of topsoil and subsoil may still occur.
Changes to soil quality • Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, concrete truck rinsing, etc.	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: ▪ In the event of a contaminant spill all work will stop in the immediate area until the spill is cleaned up. ▪ Spill control and containment equipment/materials shall be readily available on site. ▪ 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. ▪ Including the use of 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. ▪ Proper training of construction staff on associated emergency response and spill clean-up procedures. ▪ Spills to be cleaned up as soon as possible, 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. ▪ To include reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and HIWEC management phone numbers. • Apply the following general mitigation measures to avoid soil contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and/or waterbodies. ▪ Store any stockpiled materials at least 30 m away wetlands and/or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Undertake waste management in accordance with relevant federal and provincial guidelines and standards and construction site to be kept clear of garbage and debris. • Ensure that wash water used for the cleaning of cement construction materials does not come in contact with the ground. Deposit waste water in a concrete washout container that allows evaporation and hardening for easier disposal or recover and recycle wash water back into cement truck.	*Residual effect on soil quality* • Reduction in soil quality due to accidental release of contaminants would be minimized following mitigation; however, a minor reduction in soil quality may remain due to limitation in current spill clean-up processes.
Changes to soil quantity and quality • Reduction in soil quantity and quality due to the release of construction dewatering discharge resulting in erosion and sedimentation.	• Minimize erosion and sedimentation.	• If dewatering of excavations is required, implement mitigation such as the use of splash pads, discharge diffusers, filter bags, sediment basins or similar measures (if required and as appropriate) at discharge locations to ensure that any water discharged to the natural environment does not result in scouring, erosion or physical alteration of the streams channel or banks. • Leave a layer of vegetation intact between the outfall and receiving waterbody to provide additional water dispersion and entrapment of suspended solids, if discharge is to a waterbody and/or wetland, where feasible. • Ensure that any overland discharge complies with previous mitigation for erosion and sedimentation included with "*Reduction in soil quality and quantity due to erosion, sedimentation and compaction resulting from excavation, use of heavy equipment and stockpiling of cleared materials.*" as described below. • Routine visual inspections of sediment and erosion control devices for effectiveness. • Repair and maintenance to sediment and erosion control devices performed regularly.	*No residual effects* • No reduction in soil quantity and quality due to the release of construction dewatering discharge provided recommended mitigation is implemented.

Table 4-8: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to soil quantity and quality • Reduction in soil quality and/or quantity due to erosion, sedimentation and compaction resulting from excavation, blasting, use of heavy equipment on exposed soils and stockpiling of cleared materials.	• Minimize erosion and sedimentation. • Minimize removal and compaction of soils. • Minimize impacts of blasting and vibration.	• 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. • Utilize sediment logs (compost filter sock) in areas where bedrock is exposed at surface or trenching and securing of erosion control fencing is not possible. • 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 or waterbody. • Monitor 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 for the duration of construction/decommissioning activity. • 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 waterbodies 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. • Grade soil stockpiles 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 unstable rock structures and sensitive soils through field investigation prior to construction. If any areas of concern are identified, design modifications 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 and to minimize vehicle traffic on exposed and/or sensitive soils. • Routine visual inspections of sediment and erosion control devices for effectiveness. • Repair and maintenance to sediment and erosion control devices performed regularly. • Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards. • Investigate alternative rock-excavating techniques (i.e., mechanical means) where possible. • Develop and implement a Blasting Plan that includes standard best management practices (BMPs) to minimize extent of adverse noise, vibration and slope instability from blasting, including: ▪ Follow proper drilling, explosive handling and loading procedures; ▪ Implement safe handling and storage procedures for all material, including 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; ▪ Ensure the order of firing is correct to minimize the frequency of blasts; ▪ Remove all blasting debris and other associated equipment / products from the blast area. • Identify unstable rock structures through field investigations prior to construction. If any areas of concern are identified, design modifications may be implemented (as required) to minimize potential erosion, settlement, slope instability, foundation failure or rock fall hazards as a result of construction. • Routine visual inspections for slope instability performed during and after blasting operations.	*Residual effects on soil quality and soil quantity* • Reduction in soil quality due to erosion and sedimentation would be minimized through the implementation of an Erosion and Sediment Control Plan; however, disturbance to soils within construction areas cannot be avoided and a residual reduction in soil quality and quantity in these areas may remain. • Reduction in soil quality and/or quantity due to compaction, blasting, and removal of soils within construction areas would be minimized provided recommended mitigation is implemented; however the potential for removal and compaction of soils within construction areas may remain.

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

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

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

Table 4-9 describes potential effects on air quality that could occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Table 4-9: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Vehicle and equipment emissions contributing to a reduction in local air quality	• Minimize emissions from vehicles and equipment.	• Equip vehicles with effective exhaust systems. • Avoid unnecessary idling of engines. • Ensure that construction equipment is frequently maintained and kept in good working condition.	*No residual effects*

Table 4-9: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Dust generation from vehicle use and construction activity contributing to a reduction in local air quality	• Minimize dust generation from vehicle use and construction activities.	• Implement construction speed limit of 30 km/hr on all access roads. • Conduct dust suppression (i.e., spraying water on access roads and work areas) during dry conditions to minimize dust generation. • If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*No residual effects*

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.). A Noise Impact Study has been completed for the HIWEC and is included in **Appendix M** of **Volume A**.

4.5.2 Potential Effects and Proposed Mitigation Measures

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 4-10 describes potential effects from nuisance noise that could occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A**.

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.

Table 4-10: Proposed Mitigation Measures Associated with Noise Resulting from Construction

Potential Effect	Performance Objectives	Proposed Mitigation Strategy	Residual Effects
• Disturbance to current land users from construction/decommissioning noise and vibration.	• Minimize the generation of noise and vibration.	• Limit construction activities to daylight hours • 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. • Implement construction speed limit of 30 km/hr on all access roads. • Undertake blasting operations in accordance with applicable federal and provincial guidelines (Ontario Ministry of the Environment Guidelines on Information Required for the Assessment of Blasting Noise and Vibration, 1985). • Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about construction timelines and activities. • If complaints arise from users, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Disturbance to current land users can be minimized through standard mitigation measures for construction noise effects; however some intermittent disturbance will remain through the construction and decommissioning phases.
• Disturbance to local residents, cottagers and businesses from construction/decommissioning noise and vibration.		• Mitigation for disturbance to local residents, cottagers and businesses due to construction/ decommissioning noise and vibration is considered as described above.	*Residual effect local residents, cottagers and businesses* • Disturbance to local residents, cottagers and businesses can be minimized through standard mitigation measures for construction noise effects; however some intermittent disturbance may remain through the construction and decommissioning phases.
• Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise and vibration.		• Mitigation for avoidance of overnight accommodations and recreational activities near the HIWEC due to noise and vibration is considered as described above.	*Residual effect on recreation and tourism* • Avoidance of overnight accommodations and recreational activities near HIWEC is not anticipated. Noise and vibration disturbance can be partially mitigated through standard mitigation measures for construction noise effects; however some disturbance will remain through the construction and decommissioning phases.

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

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

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

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

4.6.1.5 Local Infrastructure, Roads and Traffic

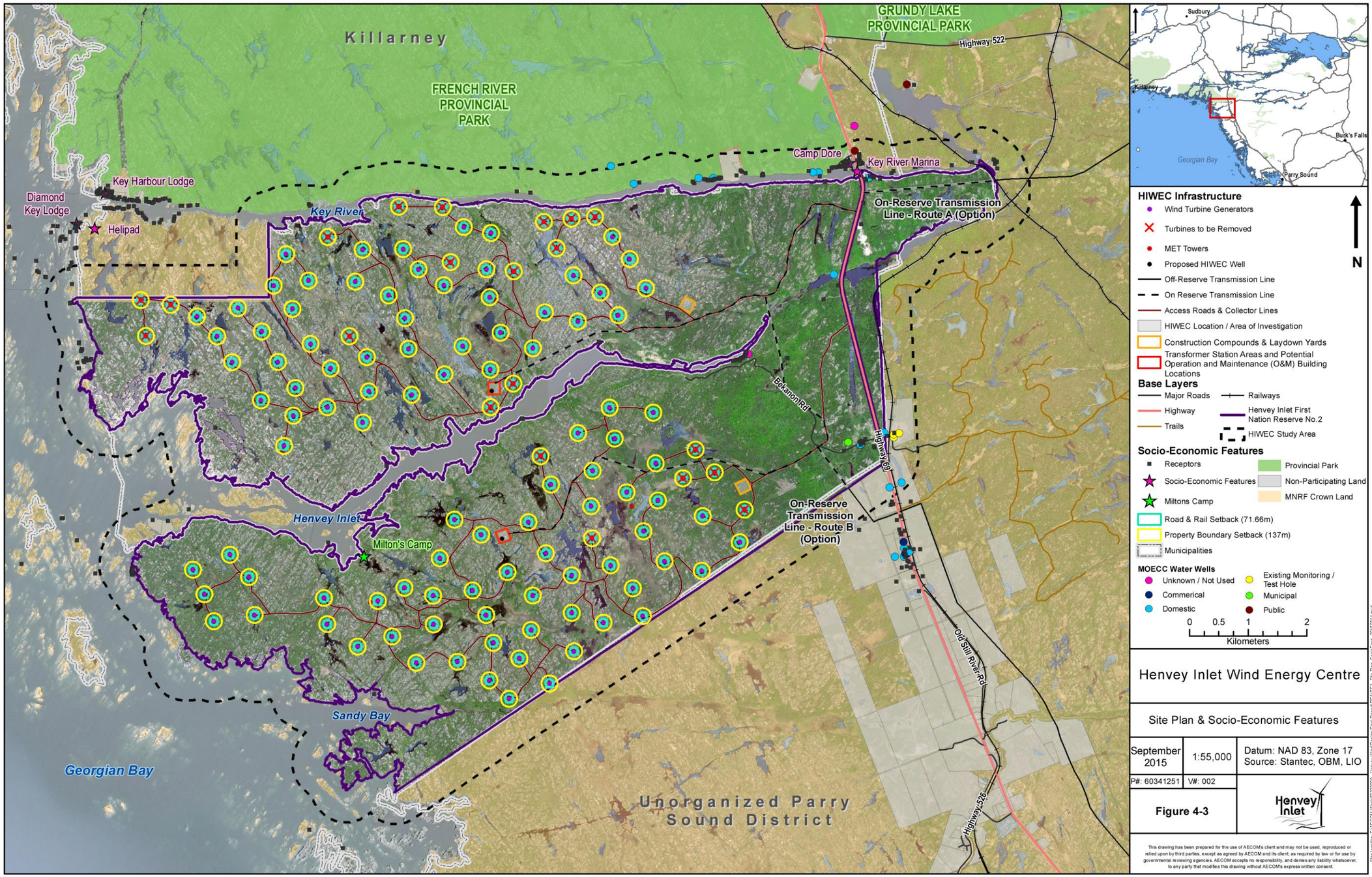
The HIWEC site plan (**Figure 4-3**) displays existing local and provincial roads in proximity to the HIWEC study area. HIFN I.R. #2 is accessible from Highway 69 and Highway 522, both of which are provincially maintained highways with Highway 69 being part of the Trans-Canada Highway. Within the HIWEC 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 (5) television stations broadcasting in the vicinity of the HIWEC study area. Four (4) of the five (5) stations have converted to digital television signals which are not impacted by WTGs or transmission infrastructure. It was confirmed that one (1) television station which has service contours overlapping the HIWEC study area is still using analog signals. No FM or AM broadcast stations have been identified within proximity of proposed WTGs that could impact broadcast signals (Yves R. Hamel et Associés Inc., 2011). An EC weather radar tower is located approximately 6.5 km from the HIWEC study area. HIW will continue to engage with EC to identify and mitigate any impact on the operations of the weather radar tower.

Figure 4-3: Site Plan and Socio-economic Features



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** – HIW Transmission Line Environmental Review Report.

4.6.1.8 Visual Landscape

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

4.6.2 Potential Effects and Proposed Mitigation Measures

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 4-11 describes potential effects on HIFN interests, local interests, land use and infrastructure including local roads that could occur during the construction of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A**.

4.7 Environmental Effects Monitoring Plan

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

Table 4-11: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Construction

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering.	• Minimal decline in traditional land uses. • Minimal decline in availability of country foods and medicinal plants. • Minimal decline in spiritual, ceremonial or cultural sites. • No impact on Nishshing Aki. • Minimal off-Reserve impacts to Aboriginal traditional rights or interests. • Minimal impacts to navigable waterways used by Anishinabek groups.	• Develop a site policy for safety and permitted access within the HIWEC regarding Aboriginal traditional uses allowed on the site during construction/decommissioning, (e.g., a firearms and / or hunting policy). • HIWEC components sited based on feedback from the community through Aboriginal Traditional Knowledge and constraint discussions. • Continue existing access to Henvey Inlet. • Minimize clearing widths for access roads, collector lines, transmission lines and WTG areas to the area necessary for safe construction and operation of the HIWEC. • Initiate site reclamation of temporarily disturbed areas immediately following construction. • Mitigation measures proposed in under the **Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Resulting from Construction and Decommissioning Table 4-7** to minimize loss of habitat and disturbance to wildlife will serve to further reduce impacts to HIFN traditional use activities.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint. Land uses including hunting, trapping, fishing, plant gathering, boating and the use of seasonal and permanent residences can continue outside of the construction/decommissioning footprint.
• Reduced HIFN access to on-Reserve lands during construction / decommissioning.	• Minimal impacts to access to on-Reserve lands.	• Maintain ongoing communication with Bekanon Road residents, other HIFN members on HIFN I.R. #2 and other affected land users about construction/decommissioning timelines, activities and associated access limitations. • Maintain existing access Henvey Inlet throughout construction/ decommissioning. • Access limitations will be confined to active construction areas. • Restricted areas to be clearly marked. • Develop access plans for authorized users during the construction/ decommissioning period. • Install signage to notify authorized road users of construction/decommissioning activities, where appropriate. • If complaints arise from users, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons* • Reduced access will be confined to the active construction areas. Access to primary land uses including hunting, trapping, fishing, plant gathering, boating and the use of seasonal and permanent residences will be largely unaffected by construction/decommissioning activities. Some restricted access to active construction areas would remain.
• Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence/cottage owners on HIFN I.R. #2.	• Minimal impacts to access of trails and traditional resource areas.	• Maintain existing access to Henvey Inlet, throughout construction/ decommissioning. • Access limitations will be confined to active construction areas. • Work restricted areas to be clearly marked. • Develop access plans for authorized users during the construction/ decommissioning period. • Install signage to notify authorized road users of construction/decommissioning activities, where appropriate.	*No residual effect.* • Reduced access is not anticipated since construction and decommissioning activity will not affect access primary use areas for recreation and tourism such as Henvey Inlet, Georgian Bay and Key River.
• Increase in truck traffic where the south access road crosses Bekanon Road.	• Minimize disturbances to local traffic patterns.	• Prohibit construction vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road, wherever possible. • Notify HIFN in advance of construction delivery schedules and install signage to notify road users of construction activity, where appropriate.	*Residual effect on traffic* • Construction vehicles will not be permitted to travel along Bekanon Road, wherever possible; however some residual traffic effects may occur intermittently where the south access road crosses Bekanon Road throughout the construction period.
• Potential disruption to local water supply wells from construction activity.	• Minimize disruption to local water supply wells.	• Mitigation measures proposed under the **Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning Table 4-12** will be followed and include: • Undertake blasting operations and pile driving 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 mitigation measures for "*Disturbance to topography, including rock and soil instability, due to blasting*." Under the **Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning Table 4-12** for a list of proposed blasting BMPs). • In the event an impact to private water well is detected the well owner will be provided with a potable supply of water and maintain the supply until water quality conditions are comparable to baseline conditions. In the event water quality does not recover to baseline conditions, the impacted well will be modified (i.e., deepened) or a new well be constructed that is sufficient to provide the resident with a potable supply of water similar in quantity and quality of baseline conditions.	*Residual effect on local water supply wells* • Reduction in groundwater quality (turbidity) and quantity would be minimized through the development and implementation of a Blasting Plan; however, a disturbance to the subsurface resulting in a temporary reduction in groundwater quality and/or quantity may remain. • In the unlikely event of physical damage to groundwater supply wells appropriate mitigation to the affected well owner will ensure effects are minimal. • **See Table 4-12 for residual effects on water supply wells from construction activity.**

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