Henvey Inlet Wind LP

Henvey Inlet Wind

Henvey Inlet Wind Energy Centre

Description Report

Final Draft

Henvey Inlet Wind LP

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

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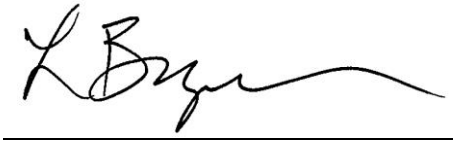

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List of Acronyms and Glossary

AADT ..... Annual Average Daily Traffic
ACSR ..... Aluminum Conductor Steel Reinforced
AECOM ..... AECOM Canada Ltd.
ATK ..... Aboriginal Traditional Knowledge
AQI ..... Air Quality Index
BMPs ..... Best Management Practices
CCME ..... Canadian Council of Ministers of the Environment
CEAA ..... *Canadian Environmental Assessment Act*
COSEWIC ..... Committee on the Status of Endangered Wildlife in Canada
CSA ..... Canadian Standards Association
CWS ..... Canadian Wildlife Service
dB ..... Decibels
dBA ..... Decibels A-weighted
DFO ..... Fisheries and Oceans Canada
DND ..... Department of National Defence
EA ..... Environmental Assessment

EC .....Environment Canada
EEMP .....Environmental Effects Monitoring Plan
EIS .....Environmental Impact Study
EMF.....Electromagnetic Fields
ESA .....*Endangered Species Act*
FIT .....Feed-in-Tariff
FNLMA .....*First Nations Land Management Act*
ha .....Hectare
HIFN.....Henvey Inlet First Nation
HIFN EA Guidance ....Henvey Inlet First Nation Environmental Assessment Guidance Instrument
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.
Hz.....Hertz
IESO.....Independent Electricity System Operator
IWH .....Important Wildlife Habitat
km .....Kilometres
kV .....Kilovolt
L/day .....Litres per day
m .....Metre
mm .....Millimetres
mASL .....Metres Above Sea Level
MBCA.....*Migratory Birds Convention Act*
Met Tower .....Meteorological Tower
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 Sheet
MTO .....Ontario Ministry of Transportation
MW.....Megawatt
NAV CANADA.....Navigation Canada
NHA.....Natural Heritage Assessment
NHIC .....Natural Heritage Information Centre
Nigig .....Nigig Power Corporation
O&M .....Operations and maintenance
OGSR.....MNRF's Oil, Gas & Salt Resources database
OEB.....Ontario Energy Board
OPA.....Ontario Power Authority
OPGW.....Optical Ground Wire
OWES .....Ontario Wetland Evaluation System
PIW .....Provincially Important Wetland
PWQO.....Provincial Water Quality Objectives
RABC .....Radio Advisory Board of Canada

RCMP.....Royal Canadian Mounted Police
ROW .....Right-of-way
SAR.....Species at Risk
SARA .....*Species at Risk Act*
SCADA.....Supervisory Control and Data Acquisition
SFL.....Sustainable Forest License
SOCC.....Species of Conservation Concern
SODAR .....Sonic Detection and Ranging
TS.....Transformer Station
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 Henvey Inlet Wind Energy Centre Overview

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

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

One hundred and twenty wind turbine generators (WTGs) are currently being assessed for the HIWEC with up to 91 WTGs to be constructed. To date, 20 of the 120 WTG locations have been identified for removal based on technical and environmental studies completed and comments received from HIFN members and the public. The permanent HIWEC footprint will be approximately 173.1 hectares (ha) based on installation of 120 WTGs. This footprint represents 1.4% of the land within the approximately 12,278 ha that constitute the HIWEC study area. The final layout of (up to) 91 WTGs will result in approximately 20-25% reduction in the overall footprint from what is presented in this EA.

The HIWEC will use wind to generate energy through the use of commercial WTG technology. The HIWEC will also include pad-mounted transformers, crane pads, 34.5 kilovolts (kV) overhead and / or underground electrical collector cables, communication lines, meteorological towers, access roads, an operations and maintenance (O&M) building, an on-Reserve transmission line (230 kV) within the study area, two (2) 34.5 – 230 kV transformer stations (TSs), construction compounds and storage yards. It will include other ancillary facilities as required, such as a concrete batch plant(s), crusher(s), and parking areas.

HIFN has broad authority to manage and protect its Reserve lands. This authority comes from the *First Nations Land Management Act* (*FNLMA*), related instruments, and the HIFN Land Code. On August 9th, 2015, HIFN approved a Land Law allowing for the lease of HIFN I.R. #2 lands for the HIWEC. This authority includes responsibility for environmental protection and the environmental assessment of projects and physical activities on Reserve lands.

Off-Reserve there will be a new Transmission Line to deliver the electricity generated by the HIWEC to the Ontario electricity grid.

The HIW FIT Contract awarded in 2011 has an approved interconnection point south of Parry Sound to the 230 kV HONI system (Route B). In addition to the assessment of interconnection of Route B, HIW in close consultation and discussions with Independent Electricity System Operator (IESO), HONI and expert consultants, conducted a technical and legal assessment of the possibility of amending the FIT Contract to permit interconnection at the HONI 500 kV circuit (Route A) to reduce the overall length of transmission required for the HIWEC. The FIT Contract amendment was not approved and the assessment has resulted in the conclusion that the current technically and legally viable interconnection point for the HIWEC is the connection point south of Parry Sound to the 230 kV HONI system (Route B), and HIW will continue exclusive assessment and development of that interconnection point and the associated Transmission Line.

The off-Reserve Transmission Line is not within the regulatory authority of HIFN powers and responsibilities set out in the *FNLMA* or the Land Code. The off-Reserve Transmission Line is undergoing an EA under Ontario Regulation 116/01. However, HIFN requested that this EA consider this off-Reserve electricity transmission and its effects so that HIFN may fully understand the implications of approving what is proposed on-Reserve. The off-Reserve Transmission Line is described in **Volume B**.

1.1.1 Summary of Description Report Requirements

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

Table 1-1: Adherence to Description Report Requirements under HIFN EA Guidance Document

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

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

The Interim Draft Description Report was posted to the HIW website on June 24, 2015 to provide information about the HIWEC to HIFN and its members, the public, government agencies and other stakeholders, as early as

possible in the EA process. In addition, this Final Draft Description 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 Purpose

The province of Ontario's Long Term Energy Plan (Ontario Ministry of Energy, 2013), which is predated by the Integrated Power System Plan (Ontario Ministry of Energy, 2008), establishes a goal of bringing 20,000 MW of renewable energy online by 2025. As part of the effort to achieve this goal, Nigig was awarded a FIT contract to develop a 300 MW wind energy generation centre on HIFN I.R. #2. It will be a large-scale renewable energy centre capable of providing substantial economic benefits to HIFN's local economy. It will also provide economic spin-off benefits accruing to communities outside of HIFN related to procurement, construction and operation. Renewable energy contributes to a reduced reliance on fossil fuel based power generation resulting in additional environmental benefits such as reduced greenhouse gas emissions.

1.3 Location and Study Area

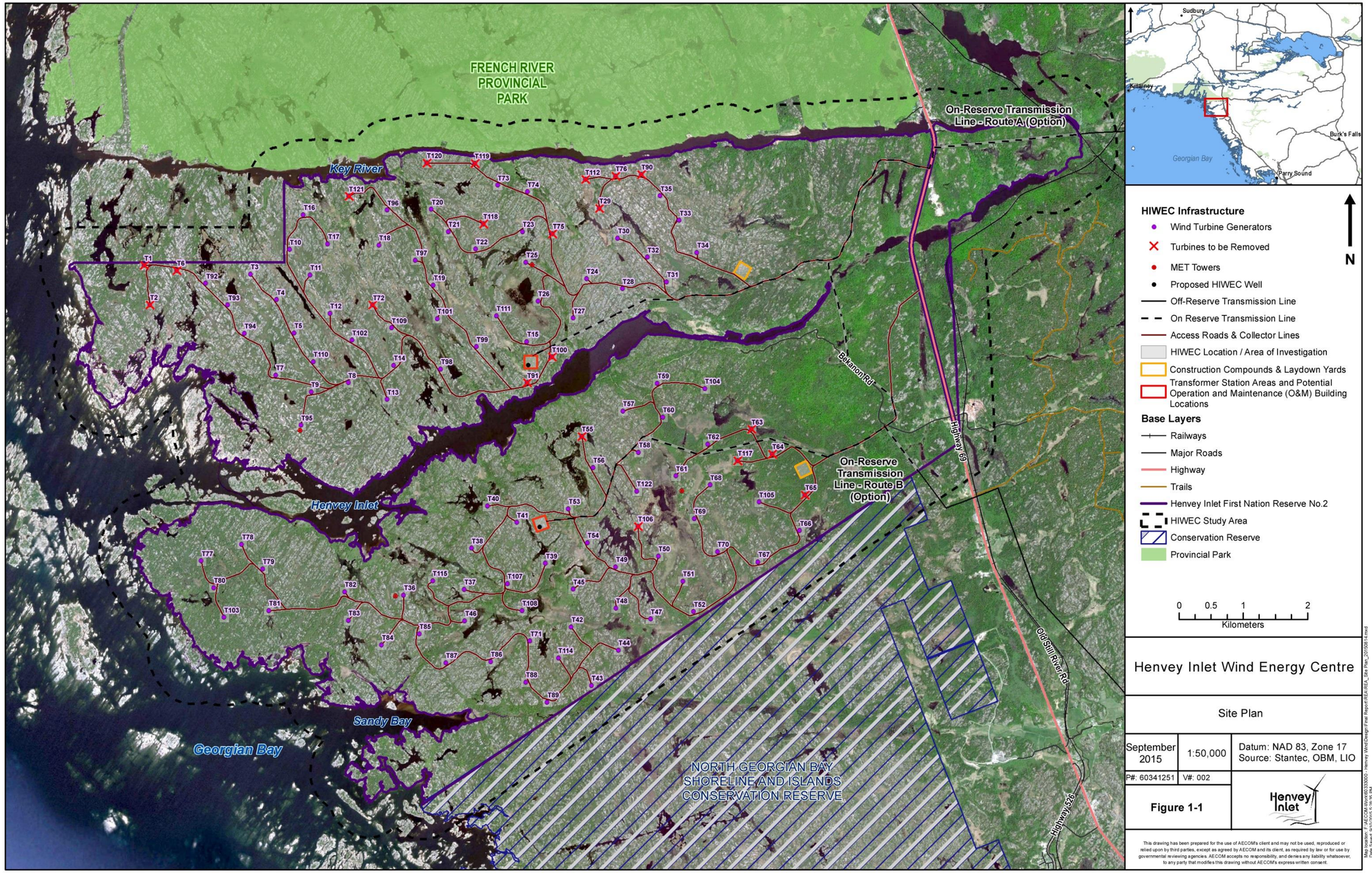
The HIWEC study area includes the entirety of HIFN I.R. #2 plus a 550 m buffer extending beyond the HIFN I.R. #2 boundary. HIFN I.R. #2 is bounded on the north by the Key River, Georgian Bay to the west, Highway 69 to the east with some HIFN I.R. #2 property located on the east side of Highway 69. The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

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

1.4 Regulatory Framework

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

Figure 1-1: Site Plan



1.4.1 Henvey Inlet First Nation

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

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

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

1.4.2 Federal

Table 1-2 provides a list of potentially applicable permits and approvals with federal departments and agencies. Any applicable federal permits and approvals required for the HIWEC will be confirmed during the development process prior to construction. A *Species At Risk Act* (*SARA*) permit from Environment Canada-Canadian Wildlife Service (EC-CWS) may be required for activities that affect a species listed as threatened or endangered. If a permit is required, EC-CWS will determine the likelihood of significant environmental effects of the HIWEC under section 67 of the *Canadian Environmental Assessment Act, 2012* (*CEAA 2012*).

Table 1-2: Potentially Applicable Federal Permits and Approvals

Permit / Approval	Approval Authority	Details
Aeronautical Obstruction Clearance *(Lighting scheme)*	Transport Canada – Aviation Division	Required for WTG marking and lighting
***Navigation Protection Act* Application for Approval**	Transport Canada – Marine Division	Required if crossing a navigable watercourse
Explosives In Transit Permit (*Explosives Act*, 2013)	Natural Resources Canada (NRCan) - Explosives Regulatory Division	Required to transport explosives
Temporary magazine license (section 7(1) of the *Explosives Act*)	NRCan - Explosives Regulatory Division	Required to acquire and store certain explosives and equipment over specified quantities
Permit or approvals under *Species at Risk Act*	Environment Canada (EC-CWS)	Required if the HIWEC will destroy or remove species at risk (SAR) or critical habitat for SAR
Permit to collect bird carcasses of species listed as endangered or threatened (*Species at Risk Act*)	EC	Required to collect carcasses of endangered or threatened bird species during bird mortality surveys

Permit / Approval	Approval Authority	Details
Permit under *Migratory Birds Convention Act* to Collect Bird Carcasses	EC-Canadian Wildlife Service (CWS)	Required to collect carcasses of bird species protected by the *Migratory Birds Convention Act* during bird mortality surveys
Authorization for Watercourse Crossing *(Fisheries Act subsection 35(2))*	Fisheries and Oceans Canada (DFO)	Potentially required if a proposed work, undertaking or activity result in serious harm to fish
Aviation Safety Land Use Proposal	Navigation Canada (NAV CANADA)	Required for all land use proposals near airports and air navigation infrastructure
Mandatory Co-ordination Contacts	Radio Advisory Board of Canada (RABC)	Recommended process to contact the following organizations for wind energy centres: ▪ Industry Canada - General Radio Frequency Database - Spectrum Direct - Broadcasting Database - Integrated Spectrum Observation Centre ▪ Department of National Defence (DND) - DND Radiocommunication Systems - Military Air Defence and ATC Radars ▪ Royal Canadian Mounted Police - Wind Farm Co-ordinator ▪ Environment Canada - Weather Radars ▪ NAV CANADA - Land use Clearance
Review of Proposal by the RCMP Mobile Communications Services	Royal Canadian Mounted Police (RCMP)	Recommended review for potential signal disruptions from wind energy centres

1.4.3 Provincial

HIFN I.R. #2 is under HIFN jurisdiction and therefore the majority of provincial permits, licenses and authorizations do not apply to the HIWEC. However, there are some exceptions to this; for example, there are several requirements through the IESO to be met for the HIWEC to connect to the provincial grid. **Table 1-3** provides a list of potentially applicable permits and approvals from provincial ministries and agencies. Any applicable provincial permits and approvals required for the HIWEC will be confirmed during the development process and in place prior to the related work element for construction or for operations, as applicable.

Table 1-3: Potentially Applicable Provincial Permits and Approvals

Permit / Approval	Approval Authority	Details
Notice of Proposal Prohibition, Transmission or Distribution by Generators (Section 80 of the *Ontario Energy Board Act*).	Ontario Energy Board (OEB)	Notification to the OEB is required to construct a generation facility
Leave to Construct (Section 92 of the *Ontario Energy Board Act*)	OEB	Required for the development of a high-voltage transmission facility
License to Generate Electricity (Section 57 of the *Ontario Energy Board Act*)	OEB	Required to generate electricity or provide ancillary services for sale through the IESO-administered markets or directly to another person without a license
License to Transmit Electricity	OEB	Required for transmission of electrical power to interconnect with provincial grid

Permit / Approval	Approval Authority	Details
Facility Registration	IESO	Registration for a physical generation facility that is connecting to the IESO-controlled grid, will participate in the IESO-administered markets or programs, or is required by a Connection Assessment to register with the IESO
Connection Application	HONI / IESO	The customer completes the System Impact Assessment / Customer Impact Assessment application for a generation facility and submits to both Hydro One and the IESO
Connection and Cost Recovery Agreement	HONI	An agreement between HIW and HONI which includes the recovery of costs to grid operator of changes to allow connection, scope of work, costs, payment schedule etc.
Certificate of Inspection and Authorization to Connect	Electrical Safety Authority	Ensure work complies with Ontario Electrical Safety Code

1.4.4 Municipal

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

1.5 Proponent Contact and Key Information

The following table provides key HIWEC information.

Table 1-4: Key Information

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

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 WTGs are currently being assessed for the HIWEC with up to 91 WTGs to be constructed. The selected WTG technology is the Vestas V126-3.3MW 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**.

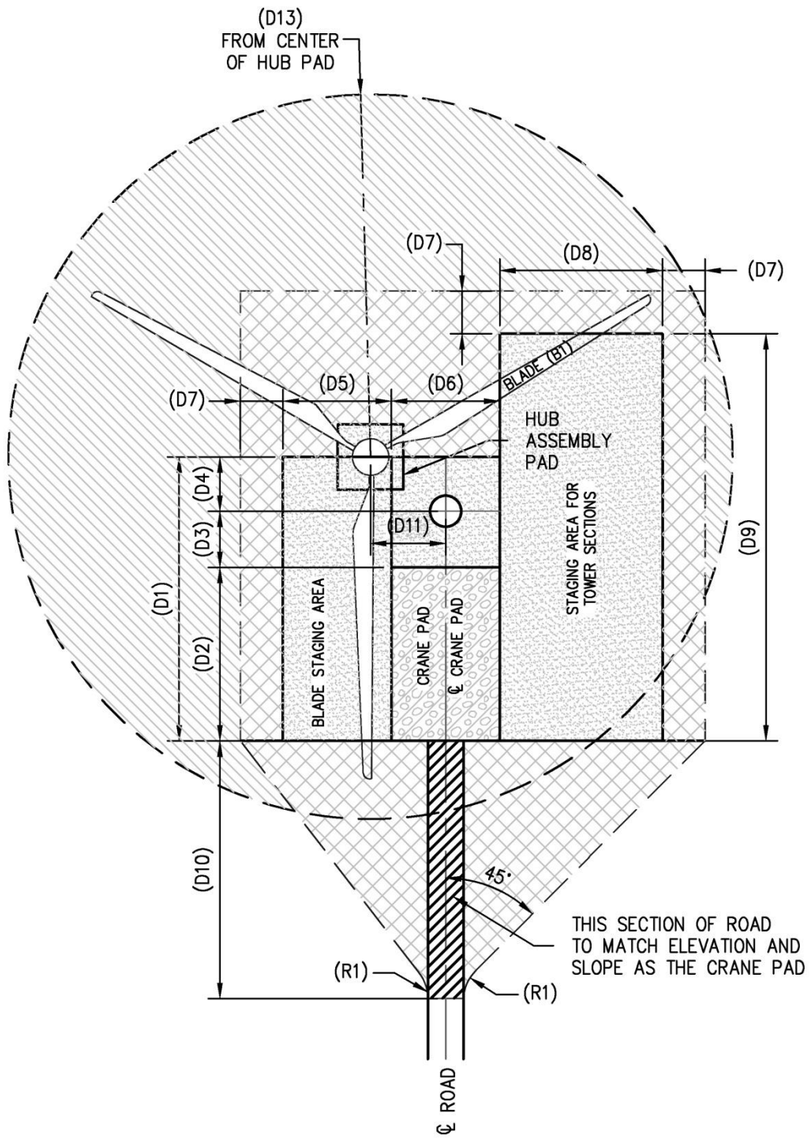
2.1.2 Access Roads and Crane Pads

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.

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.

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.

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

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

DRAWING NUMBER: CP2

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 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.

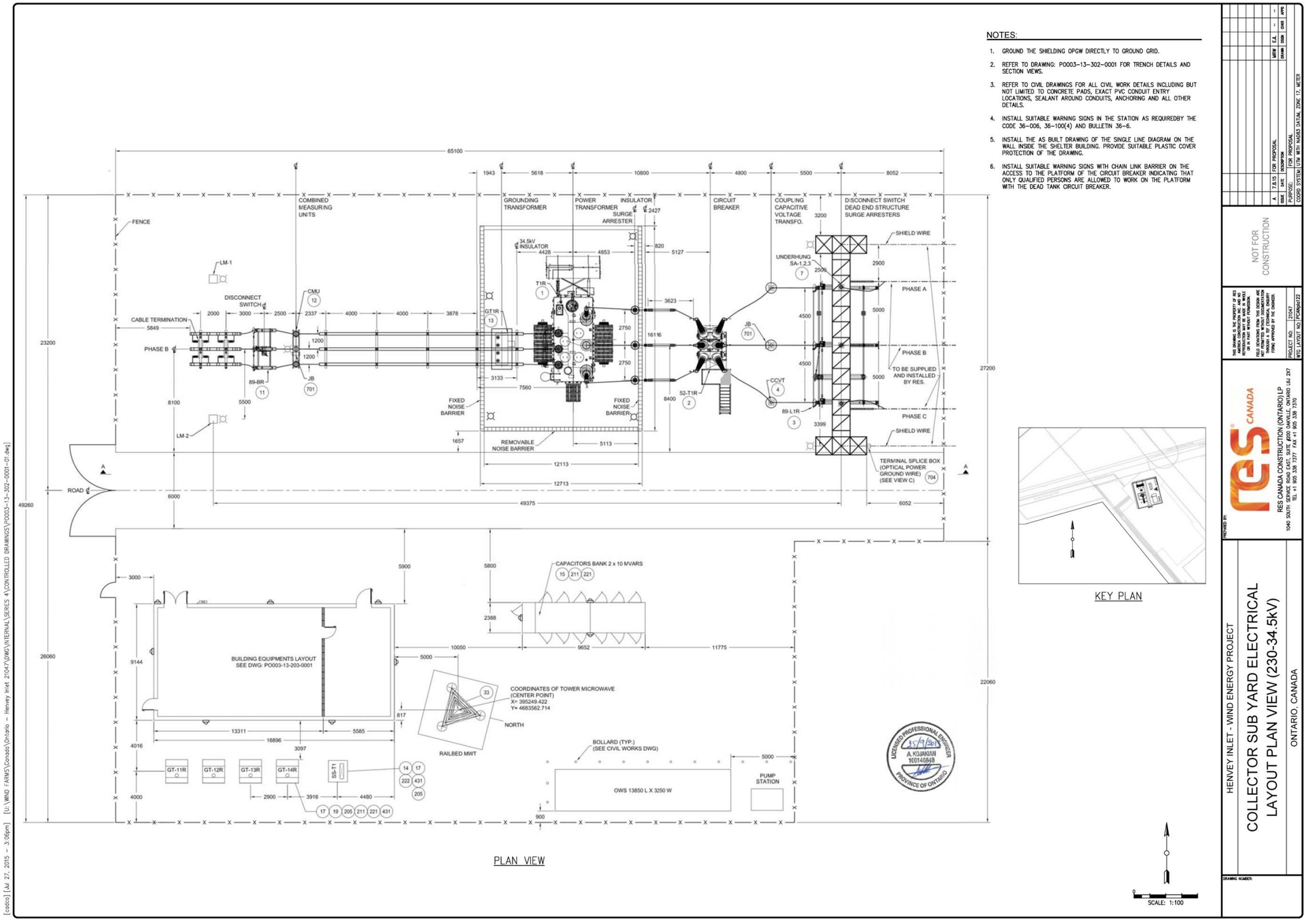
The collector lines may include overhead or below ground sections dependent on site specific conditions, however it is anticipated that the collector system will be primarily aboveground due to the rocky nature of the site. Aboveground collector lines will be constructed on standard single wooden pole 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.

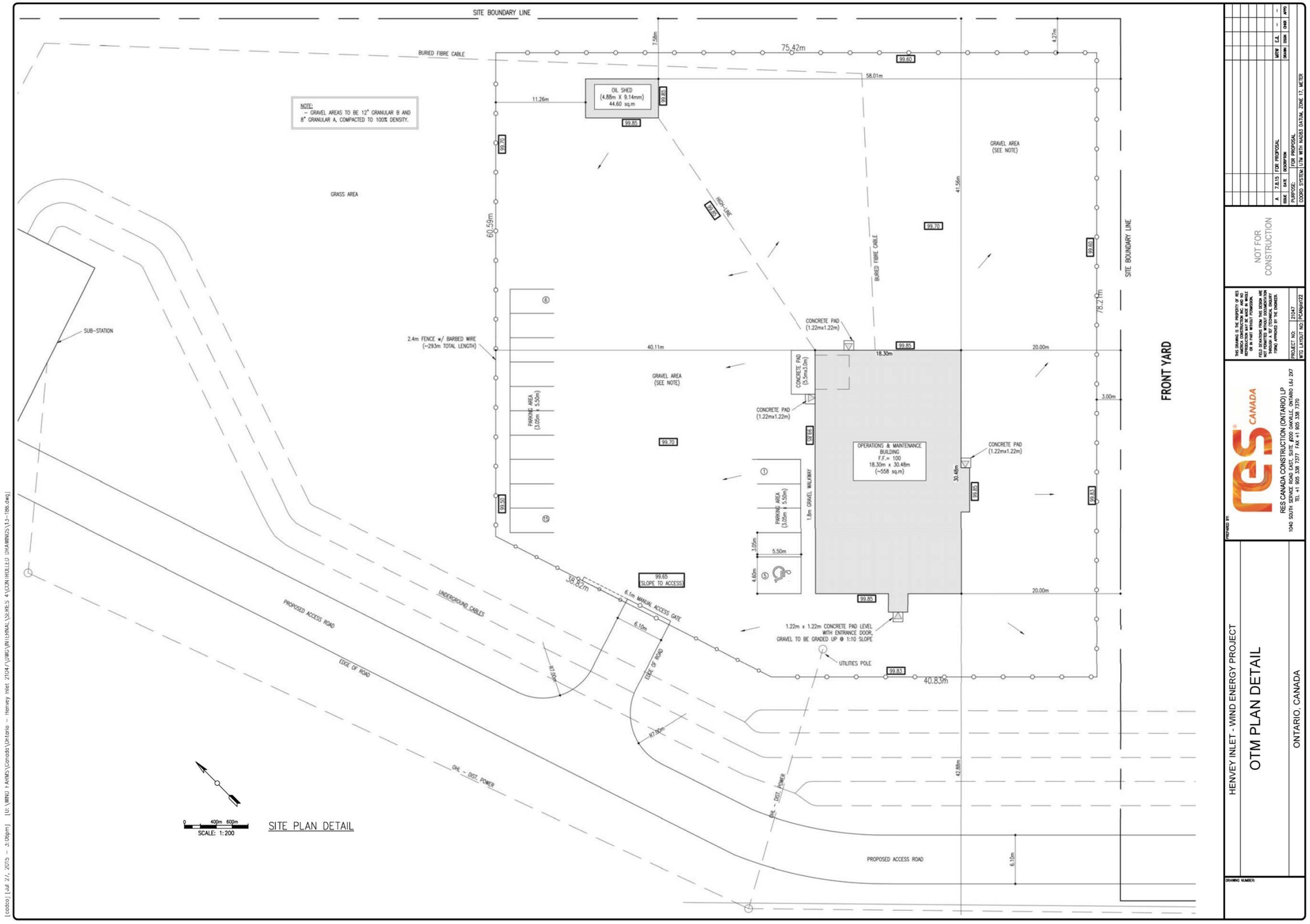
2.2.1 Construction Compounds & Laydown Yards

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 levelled (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 (1) 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 levelling 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. Phases, Activities and Schedule

3.1 Construction

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

The construction phase may consist of the following key activities:

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

3.2 Operations and Maintenance

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

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

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

The safe operation of the proposed HIWEC will involve the real-time collection of a series of operations parameters, including: wind speed, wind direction, air temperature, atmospheric pressure and electrical parameters. This real-time monitoring of WTG functioning is essential to reduce unplanned outage events and duration by detecting early changes to WTG performance. To provide accurate on-site monitoring of climatic conditions, four (4) Met towers up to 100 m tall were installed for the HIWEC. An additional Sonic Detection and Ranging (SODAR) unit has also been installed adjacent to one Met tower to supplement meteorological data collected from the tower. Nacelle-mounted meteorological data collection points will be located such that no WTG will be located further than 5 km from the nearest data collection point.

If temperature and humidity conditions result in ice formation on WTG blades, sensors installed on each WTG will detect ice build-up by monitoring vibrations, imbalances and generation efficiency. If an event occurs that is considered to be out of the normal operating range for a WTG, the WTG will be taken out of service immediately. Through the Supervisory Control and Data Acquisition (SCADA) system, the status of the WTG will be reported to the HIWEC operator. WTGs that have been shut down will not be re-started until a site visit has been conducted to inspect the WTG and an investigation is completed that deems the WTG safe. Operational logs will be kept by technical staff that will document HIWEC operations (including WTG shutdowns) and communications with the public and agencies.

Routine preventative maintenance activities will be scheduled at approximately six (6) month intervals with specific maintenance tasks scheduled for each interval. Scheduled maintenance activities for WTGs will include a complete inspection of the tower and components, functionality testing, replacement of any worn parts, and lubrication of moving parts. Following all maintenance work on WTGs the area in the vicinity of the WTGs will be thoroughly cleaned to ensure continued safe operation.

WTGs are very reliable and major components are designed to operate for over 20 years. However, there is a possibility that component failure may occur despite the reliability of the WTGs fleet-wide. Most commonly, the failure of small components such as switches, fans or sensors will take the WTG out of service until the facility component is replaced. These repairs can usually be carried out by a single crew visiting the WTG for several hours. Events involving the replacement of a major component such as a gearbox or rotor are rare. If they do occur, the use of large equipment, sometimes as large as that which was used to install the WTGs, may be required.

The collector lines and TSs will require periodic preventative maintenance activities. Routine maintenance will include condition assessment for aboveground infrastructure and protective relay maintenance of the TSs, in addition to monitoring of the secondary containment systems for traces of oil. Vegetation control will be required around the collector lines and on-Reserve transmission line to prevent any damage to the lines and ensure safe operation. The vegetation is typically cleared by mechanized equipment (e.g., chainsaw / hydro axe).

3.3 Decommissioning

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

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

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

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

3.4 Other Activities

3.4.1 Waste Generation

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

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

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

3.4.2 Toxic / Hazardous Materials

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

3.4.3 Sewage

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

3.4.4 Stormwater

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

3.4.5 Water-taking Activities

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

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

3.5 Schedule

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

Table 3-1: HIWEC Milestones

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

4. Description of Potential Environmental Effects and Proposed Mitigation Measures

This section provides a summary of the potential environmental effects that may result from the construction, operation and decommissioning 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, operations and decommissioning of the HIWEC. For each potential effect, performance objectives were developed to describe a desired outcome of proposed mitigation. Next, mitigation measures were proposed to achieve the performance objectives. The proposed mitigation measures that are described in this section 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 and operation of the HIWEC reveal that the proposed mitigation measures are not achieving the intended results; the identified contingency measures will then be implemented.

4.1 Cultural Heritage and Archaeology

4.1.1 Existing Conditions

During the site planning process for the HIWEC, HIFN identified areas of cultural significance, including areas of past settlement as well as current settlements, and excluded them from the HIWEC study area. These areas of cultural significance are known as Nishshing Aki, specifically defined as 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 cottages, eight residences, and two 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. 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 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 and decommissioning phases 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 4-2 identifies potential effects on cultural heritage and archaeological resources that might occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

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

Potential Effects	Performance Objectives	Proposed Mitigation Measures	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 and decommissioning 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 project infrastructure to avoid cultural heritage features. • If unanticipated cultural heritage features are discovered during construction and decommissioning 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.

Table 4-2: Proposed Mitigation Measures Associated with Potential Effects to Cultural Heritage and Archaeological Resources Resulting from Operations

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

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 (refer to **Appendix F** of **Volume A**):

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

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

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 *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 (**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 4-3**. The observation year(s) of these species across all baseline field studies conducted between 2011 and 2015 are also summarized in **Table 4-3**.

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 4-3**.

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 4-3: 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

Table 4-3: 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*
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
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 (**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 Natural Heritage Assessment (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 4-4 describes potential effects to Generalized Candidate IWH resulting from construction and decommissioning 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**.

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

Figure 4-1: Site Plan and Natural Heritage Features

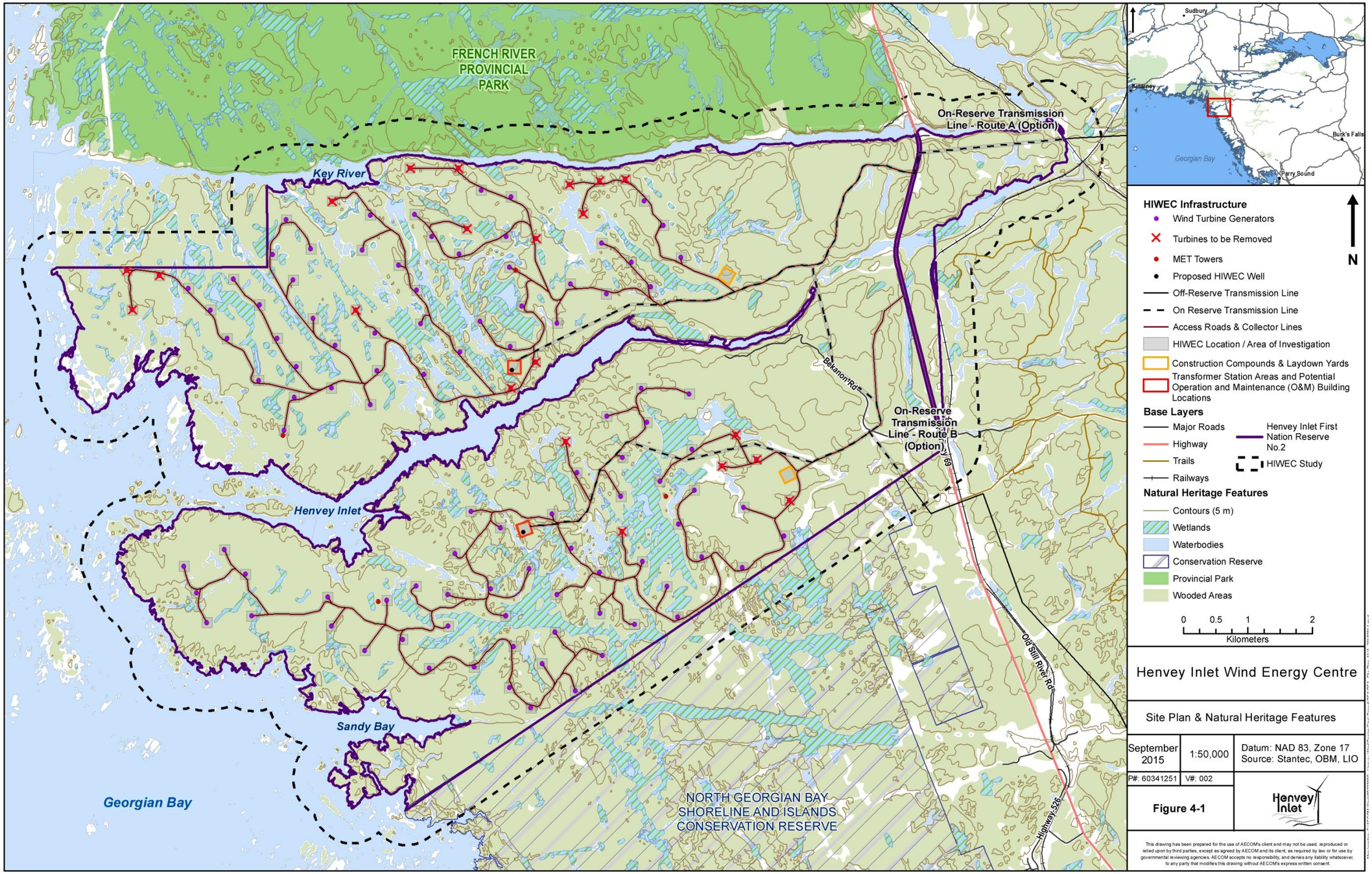


Table 4-4: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction and Decommissioning

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 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, 2014). ▪ 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, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014) and 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 (Georgian Bay Biosphere Reserve (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. • 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.	*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 4-4: Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
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 4-12.	*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 4-12.	*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 4-7 • 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 4-12. • Refer to mitigation measures for "*Reduction in groundwater recharge quantities due to increases in impervious surfaces"* in Table 4-12.	*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.
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 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 4-12.	*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

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

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
			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.

4.2.2.1.2 Important Wildlife Habitat

Table 4-5 describes potential effects to IWH resulting from construction and decommissioning 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**.

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

4.2.2.2 Important Wetlands[1]

Table 4-7 describes potential effects to Important Wetlands resulting from construction and decommissioning 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**.

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

4.2.2.3 Conservation Reserves

No construction, decommissioning or operations activities will take place inside the North Georgian Bay Shoreline and Islands Conservation Reserve. Taking into consideration the close proximity of the North Georgian Bay Shoreline and Islands Conservation Reserve to the HIWEC location, and the similar ecological characteristics of this feature compared to other locations within 120 m of the HIWEC location, the mitigation measures presented in **Tables 4-4, 4-5, 4-6, 4-7 and 4-8** 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.

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

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

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. • 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.	*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* • Increased mortality risk to turtles can be minimized provided recommended mitigation is implemented; however, isolated turtle mortality may occur.

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 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		• 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.	
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 behaviour 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.
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.

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
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.
Bogs			
• Refer to **Table 4-7** 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 Environment Canada's Nesting Calendar for Zone C3 (EC, 2014); ▪ 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, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. • 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.

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
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. • 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.	*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.
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 Environment Canada's Nesting Calendar for Zone C3 (EC, 2014); ▪ 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, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. • 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.

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
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 (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: ▪ 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.	*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.
Seeps and Springs			
• Refer to **Table 4-10** 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.

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
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.
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 Environment Canada's Nesting Calendar for Zone C3 (EC, 2014); ▪ 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, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. • 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).	*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).

Table 4-5: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
		• 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.	*No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
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, 2014); ▪ 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, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation, however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. • 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 4-7** 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 4-6: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Bat Hibernacula[3]			
Change in mortality risk • Possible mortality of swarming bats resulting from operating WTGs. *Change in behaviour* • Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise	• Minimize risk of WTG related mortality. • Minimize disturbance to bat hibernacula.	• Utilize a lighting scheme that will minimize potential risks for bat collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Develop and implement a follow-up and monitoring plan as per EC guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011b). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect on change in behaviour* • Effects on the behaviour of bats can be minimized provided recommended mitigation is implemented; however, some bats may exhibit altered feeding behaviour. *Residual effect for change in mortality risk* • Increase in mortality risk to bats can be minimized provided recommended mitigation is implemented; however, some mortality of bats may occur as a result of collisions with WTGs.
Bat Maternity Colonies			
Change in mortality risk • Possible mortality of bats resulting from operating WTGs. *Change in behaviour* • Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise. *Change in mortality risk* • Bat mortality resulting from removal of cavity trees during routine maintenance of access roads, collector lines or transmission line.	• Minimize risk of WTG related mortality. • Minimize disturbance to bat maternity colonies. • Avoid bat mortality from vegetation removal during maintenance activities.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • If suitable cavity trees must be removed during the bat roosting season (April 30 to September 1), each cavity tree will be searched for signs of maternity roosts by a qualified Biologist prior to removal. If an active maternity roost is found, removal activities will be scheduled after the bat roosting season (April 30 to September 1). • If any suitable hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Bats and Bat Habitats: Guidelines for Wind Power Projects* (MNRF, 2011b).	*Residual effect on change in behaviour* • Effects on the behaviour of bats can be minimized provided recommended mitigation is implemented; however, some bats may exhibit altered feeding behaviour. *Residual effect for change in mortality risk* • Increase in mortality risk to bats can be minimized provided recommended mitigation is implemented; however, some mortality of bats may occur as a result of collisions with WTGs.
Turtle Wintering Areas[1]			
Change in behaviour • Disturbance to turtles within wintering areas, or moving between turtle wintering areas and other areas. *Change in mortality risk* • Risk of road mortality to turtles moving between turtle wintering areas and other areas.	• Minimize disturbance to turtles. • Avoid turtle mortality on access roads.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high turtle activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, and under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan, will be developed and include: ▪ In the case a turtle is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest turtle trauma centre. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site.	*Residual effect on change in behaviour* • Effects on the behaviour of turtles can be minimized provided recommended mitigation is implemented; however, some turtles may alter nest site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to turtles can be minimized provided recommended mitigation is implemented; however, isolated mortality of turtles may occur as a result of vehicular traffic on access roads and maintenance activities.
Change in mortality risk			
• Possible snake mortality from vehicles using access roads.	• Minimize snake mortality on access road. • Minimize disturbance to reptile hibernacula.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Avoid maintenance of culverts where substrates at or below the frost line are disturbed during the reptile winter hibernation period (October 15 to April 30; GBBR, n.d.) to the extent possible where suitable hibernation habitat within wetlands or aquatic features has been identified for reptiles. If this is not possible, under emergency circumstances, a contingency mitigation strategy in the Wildlife Management Plan will be developed and include: ▪ In the case a snake is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre. • In the rare instance a snake is encountered and must be relocated, a qualified Biologist / Handler will be contacted to move the snake a safe distance away in appropriate habitat. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site.	*Residual effect on change in behaviour* • Effects on the behaviour of snakes can be minimized provided recommended mitigation is implemented; however, some snakes may alter basking site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to snakes can be minimized provided recommended mitigation is implemented; however, isolated mortality of snakes may occur as a result of vehicular traffic on access roads and maintenance activities.
Deer Yarding Areas			
Change in mortality risk • Possible mortality of deer moving in / out of deer yarding areas.	• Avoid mortality of deer.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.	*No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.

3. *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 4-6: Proposed Mitigation Measures Associated with Potential Effects to Important Wildlife Habitat Resulting from Operations

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Cliffs and Talus Slopes			
• No effects on cliffs and talus slopes anticipated during operation.	• None required.	• None required.	*No residual effect*
Precambrian Rock Barrens			
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 operations phase.			
Sand Barrens			
Habitat change • Disturbance and / or degradation of sand barrens during maintenance of the transmission line or access roads.	• Minimize disturbance and / or degradation of sand barrens during maintenance activities.	• Avoid the use of heavy machinery within sand barrens during maintenance activities to the extent possible. • Pesticides will not be used to maintain vegetation within sand barrens.	*No residual effect* • Habitat change can be mitigated provided recommended mitigation is implemented.
Old-growth Forest[1]			
Change in species diversity *Change in community diversity* • Introduction and / or spread of invasive species in old	• Prevent the establishment and / or spread of invasive species in old-growth forest.	• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist. • Vegetation trimming will be limited to within areas that have been cleared during construction.	*Residual effect for change in species diversity* • Effects of invasive species introductions on species diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in species diversity may occur. *Residual effect for change in community diversity* • Effects of invasive species introductions on community diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in community diversity may occur.
Bogs			
Refer to **Table 4-8** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Important Wetlands.			
Waterfowl Nesting Areas[1]			
Change in behaviour • Disturbance and / or displacement of waterfowl in nesting habitat during operation. *Change in mortality risk* • Possible mortality of waterfowl resulting from operating WTGs. *Change in mortality risk* *Change in behaviour* • Possible mortality or disturbance to nesting waterfowl resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of waterfowl from nesting habitat. • Minimize risk of WTG related waterfowl mortality. • Avoid mortality and minimize disturbance to nesting waterfowl during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of waterfowl can be minimized provided recommended mitigation is implemented; however, some waterfowl may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to waterfowl can be minimized provided recommended mitigation is implemented; however, some mortality of waterfowl as a result of collisions with WTGs may occur.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat			
Change in behaviour • Disturbance and / or displacement of Osprey during operation. *Change in mortality risk* • Possible mortality of Osprey from operating WTGs. *Change in mortality risk* • Possible mortality of Osprey resulting from collisions with the transmission line.	• Minimize disturbance and / or displacement of Osprey. • Minimize risk of Osprey mortality from of WTGs, collector lines or the transmission line.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring. • Bird diverters / anti-perching devices should be considered in areas of Osprey nests along the on-Reserve transmission line to minimize potential collisions.	*Residual effect for change in behaviour* • Effects on the behaviour of Osprey can be minimized provided recommended mitigation is implemented; however, Osprey may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to Osprey can be minimized provided recommended mitigation is implemented; however, isolated mortality of Osprey as a result of collisions with WTGs may occur.

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

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Woodland Raptor Nesting Habitat[1]			
Change in behaviour • Disturbance and / or displacement of nesting raptors during operation. *Change in mortality risk* • Possible mortality of raptors from operating WTGs. *Change in mortality risk* • Possible mortality of raptors resulting from collisions with the transmission line.	• Minimize disturbance and / or displacement of nesting raptors. • Minimize risk of raptor mortality from of WTGs, collector lines or the transmission line.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring. • Bird diverters / anti-perching devices should be considered in areas of confirmed raptor nests along the on-Reserve transmission line to minimize potential collisions.	*Residual effect for change in behaviour* • Effects on the behaviour of raptors can be minimized provided recommended mitigation is implemented; however, some raptors may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to raptors can be minimized provided recommended mitigation is implemented; however, some mortality of raptors as a result of collisions with WTGs is anticipated.
Turtle and Lizard Nesting Areas			
Change in behaviour • Disturbance to turtles within nesting areas, or moving between turtle nesting areas and other areas. *Change in mortality risk* • Risk of road mortality to turtles moving between turtle nesting areas and other areas. *Habitat change* • Disturbance and / or degradation of turtle nesting habitat during maintenance of the transmission.	• Minimize disturbance to turtles. • Avoid turtle mortality on access roads. • Minimize disturbance and / or degradation of turtle nesting habitat during maintenance activities.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high turtle activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 30; GBBR, n.d.). • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality and poaching through installation of access gate with operations staff throughout the site. • Avoid the use of heavy machinery within the sand barren community associated with turtle nesting feature TLN-001 during maintenance activities to the extent possible. • Pesticides will not be used to maintain vegetation within the sand barren community associated with turtle nesting feature TLN-001.	*Residual effect on change in behaviour* • Effects on the behaviour of turtles and lizards can be minimized provided recommended mitigation is implemented; however, some turtles may alter nest site selection along access roads. *Residual effect on change in mortality risk* • Increase in mortality risk to turtles and lizards can be minimized provided recommended mitigation is implemented; however, isolated mortality of turtles may occur as a result of vehicular traffic on access roads and maintenance activities. *No residual effect* • Habitat change can be mitigated provided recommended mitigation is implemented.
Seeps and Springs			
Refer to **Table 4-11** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Surface Water features.			
Aquatic Feeding Habitat			
Change in mortality risk • Possible mortality of moose or deer moving between aquatic feeding habitats and other areas.	• Avoid mortality of moose or deer.	• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site. • Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.	*No residual effect* • Change in mortality risk can be mitigated provided recommended mitigation is implemented.
Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf			
▪ No effects on denning sites during operation.	▪ None required.	▪ None required.	*No residual effect*
Amphibian Breeding Habitat (Woodland and Wetland)			
Change in behaviour • Disturbance to amphibians within breeding areas, or moving between breeding areas and other areas. *Change in mortality risk* • Risk of road mortality to amphibians moving between breeding areas and other areas.	• Minimize disturbance to amphibians. • Avoid amphibian mortality on access roads.	• Periodically maintain any ecopassages that were installed during construction to allow for movement corridors in areas where high amphibian activity has been identified, to limit road mortality. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Avoid maintenance of culverts where in-water works are required within amphibian breeding habitats during the amphibian breeding season (April 1 to June 30) to the extent possible. • Maintain speed limit signage (30 km/hr) and speed bumps installed along access roads and instruct all staff to be vigilant for wildlife while driving on site.	*Residual effect on change in behaviour* • Effects on the behaviour of amphibians due to disturbance can be minimized provided recommended mitigation is implemented; however, amphibians may alter movement patterns or breeding site selection. *Residual effect on change in mortality risk* • Increased mortality risk to amphibians can be minimized provided recommended mitigation is implemented; however, isolated amphibian mortality may occur.
Mast Producing Areas			
• No effects on mast producing areas anticipated during operation.	▪ None required.	▪ None required.	*No residual effect*

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

Potential Effects	Performance Objectives	Mitigation Measures	Residual Effects
Marsh Bird Breeding Habitat[1]			
• Disturbance and / or displacement of marsh breeding birds during operation. • Possible mortality of marsh breeding birds resulting from operating WTGs. • Possible mortality or disturbance to marsh breeding birds resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of marsh breeding birds. • Minimize risk of WTG related marsh breeding bird mortality. • Avoid mortality and minimize disturbance to marsh breeding birds during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power Projects* (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of marsh breeding birds can be minimized provided recommended mitigation is implemented; however, some marsh breeding birds may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to marsh breeding birds can be minimized provided recommended mitigation is implemented; however, some mortality of marsh breeding birds as a result of collisions with WTGs may occur.
Habitat for Avian SOCC (Black Tern, Yellow Rail)[1]			
Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Marsh Bird Breeding Habitat** as described above.			
Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)[1]			
• Disturbance and / or displacement of avian SOCC during operation. • Possible mortality of avian SOCC resulting from operating WTGs. • Possible mortality or disturbance to avian SOCC resulting from vegetation clearing during maintenance activities.	• Minimize disturbance and / or displacement of avian SOCC. • Minimize risk of WTG related avian SOCC mortality. • Avoid mortality and minimize disturbance to avian SOCC during maintenance activities.	• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting. • Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible. • Vegetation trimming will be limited to areas that have been previously cleared during construction. • Schedule trimming of any necessary vegetation removal during routine maintenance activities to occur outside of the overall bird nesting season, from April 1 to August 31 (EC, 2014). If this is not possible, the following mitigation will apply, in accordance with the *MBCA* and the Wildlife Management Plan: ▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance. ▪ If an active nest or confirmed nesting activity is found, a buffer area will be implemented around the nest or nesting activity. The radius of the buffer will range depending on the species, level of disturbance and landscape context which will be confirmed by a qualified Avian Biologist (EC, 2014). The nest itself will not be marked using flagging tape or other similar material as this increases the risk of nest predation however the outer limits of the buffer can be marked (EC, 2014) and UTM co-ordinates will be taken. ▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of HIWEC equipment, is identified, the tree may be removed at any time through consultation with EC-CWS. The need for additional mitigation measures or permits in these circumstances will be addressed on a site-specific basis. • Develop and implement a follow-up and monitoring plan as per Environment Canada guidelines which includes a post-construction bird and bat mortality and disturbance monitoring program consistent with *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (EC-CWS, 2007a), *Wind Turbines and Birds A Guidance Document for Environmental Assessment* (EC-CWS, 2007b) as well as *Birds and Bird Habitats: Guidelines for Wind Power* Projects (MNRF, 2011a). • Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis. • Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.	*Residual effect for change in behaviour* • Effects on the behaviour of bird SOCC can be minimized provided recommended mitigation is implemented; however, some bird SOCC may exhibit changes in behaviour during operations. *Residual effect for change in mortality risk* • Increase in mortality risk to bird SOCC can be minimized provided recommended mitigation is implemented; however, some mortality of bird SOCC as a result of collisions with WTGs may occur.
Habitat for Insect SOCC (Horned Clubtail, Mottled Darner)			
• Refer to **Table 4-8** for mitigation measures, monitoring and contingency measures to be applied during the operations phase for Important Wetlands.			
Habitat for Insect SOCC (Pine Imperial Moth)			
• This species is relatively common across the Canadian Shield (Dave Beadle, personal communication, September 3, 2015) and its habitat is not limiting within the HIWEC study area. Therefore, no mitigation, monitoring or contingency measures are required during the operations phase.			
Habitat for Mammal SOCC (Eastern Wolf)			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf** as described above.			
Habitat for Turtle and Lizard SOCC (Common Five-lined Skink, Northern Map Turtle, Snapping Turtle)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Turtle Wintering Areas and Turtle and Lizard Nesting Areas** as described above.			
Habitat for Snake SOCC (Eastern Ribbonsnake, Milksnake)[1]			
• Refer to the mitigation measures, monitoring and contingency measures to be applied during the operations phase for **Reptile Hibernacula** as described above.			

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

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 4-12**.	*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 4-12**. • 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 4-12**.	*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 **Table 4-12**.	*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 zone of 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 4-12**.	*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.
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 4-14**.	*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.

Table 4-8: Proposed Mitigation Measures Associated with Potential Effects to Important Wetlands Resulting from Operations

Potential Environmental Effects	Performance Objectives	Proposed Mitigation Measures	Residual Environmental Effects
Change in species diversity, Change in community diversity Change in wetland quantity and function • Introduction of invasive species.	• Prevent the introduction and spread of invasive species.	• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist. • Vegetation trimming will be limited to within areas that have been previously cleared during construction.	*Residual effect for change in species diversity* • Effects of invasive species introductions on species diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in species diversity may occur. *Residual effect for change in community diversity* • Effects of invasive species introductions on community diversity can be minimized provided recommended mitigation is implemented; however, temporary changes in community diversity may occur. *Residual effect for change in wetland quantity and function* • Effects of invasive species introductions on wetland quantity and function can be minimized provided recommended mitigation is implemented; however, temporary changes in wetland quantity or function may occur.
Change in wetland quantity and function • Risk of accidental soil or water contamination from oil, gas, etc. during maintenance activities.	• No on-site contamination of soil, groundwater or surface water.	• Refer to mitigation measures for "*Reduction in soil quality due to accidental release of contaminants during operation, etc."* in **Table 4-13**.	*No residual effects.* • Changes in wetland quantity and function can be mitigated provided a Spill Prevention and Response Plan is developed and 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 4-9**, 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 4-9: 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 4-10 identifies potential effects on surface water resources that could occur during the construction and decommissioning phases 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 4-11 identifies potential effects on surface water resources that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

4.3.3.2 Groundwater, Soils and Terrain

Table 4-12 describes potential effects on groundwater resources, soils and terrain that could occur during the construction and decommissioning phases 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 4-13 describes potential effects on groundwater resources, soils and terrain that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Figure 4-2: Surficial Geology

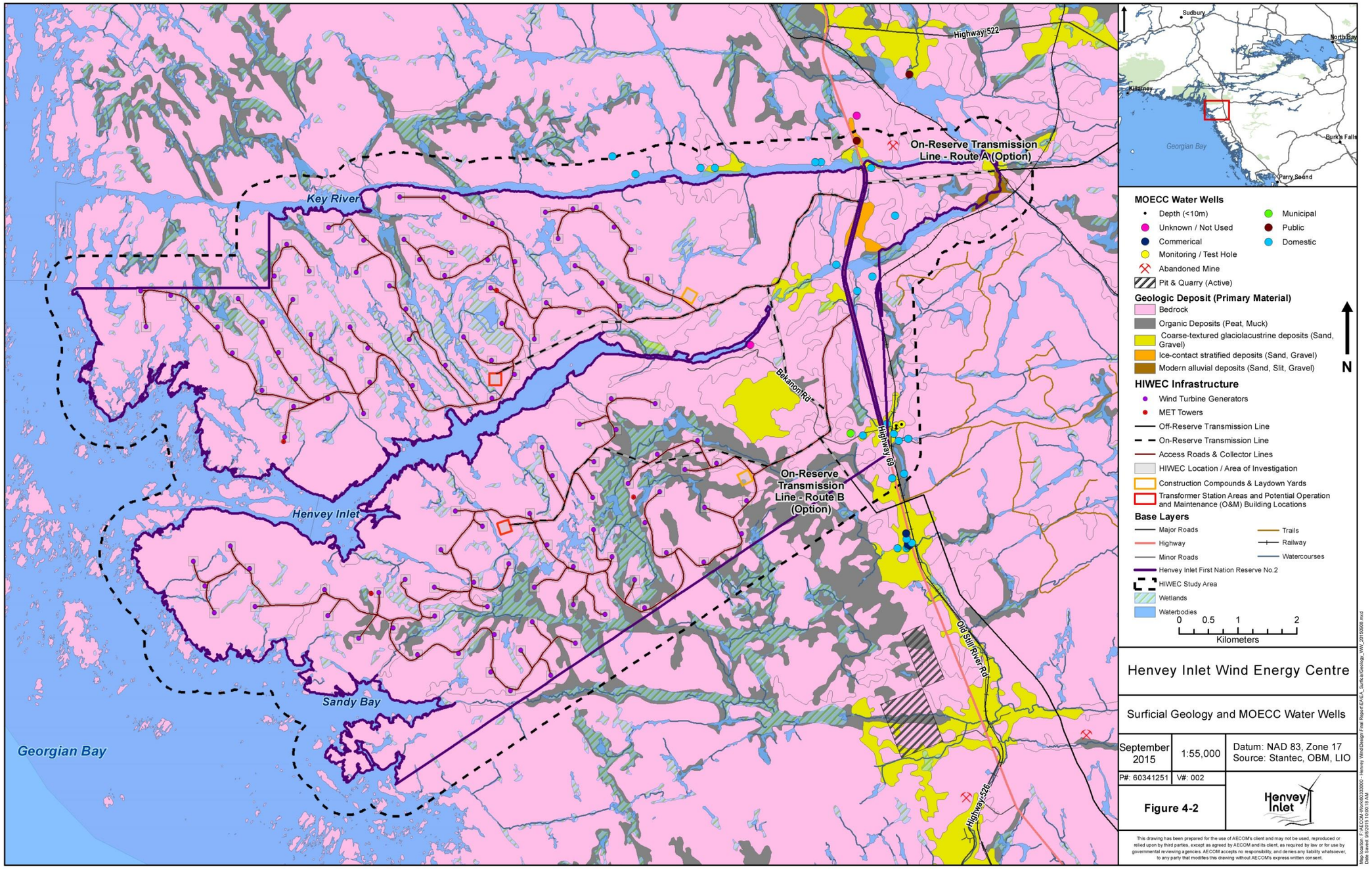


Table 4-10: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction and Decommissioning

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; – 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. ▪ 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.	*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 4-10: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
		• **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. ▪ 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 4-11: Proposed Mitigation Measures Associated with Potential Effects to Surface Water Resulting from Operations

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

Table 4-12: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning

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 zone of influence (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 for through the implementation of mitigation.
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.

Table 4-12: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
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 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.
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 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;	*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.

Table 4-12: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
		▪ 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.	

Table 4-13: Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
Changes to groundwater quantity • Reduction in groundwater recharge quantities due to increases in impervious surfaces (e.g., WTG foundations, access roads and buildings) and changes to infiltration and surface runoff patterns	• Minimize the increase in impervious areas. • Limit disturbances to surface water drainage patterns.	• Apply mitigation measures to increase groundwater infiltration, as described in the **Proposed Mitigation Measures Associated with Potential Effects to Groundwater, Soils and Terrain Resulting from Construction and Decommissioning Table 4-12** during the design and construction phase**.**	*Residual effect on groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces and changes to infiltration and surface runoff patterns would be minimized following implementation of mitigation measures; however, the creation of impervious surface (i.e., paved parking lots, compressed gravel roads, WTG foundations and buildings) is not completely avoidable and therefore some reduction in groundwater recharge may remain.
Changes to groundwater quality • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation.	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals or to avoid contamination of adjacent waterbodies and train staff on associated procedures. • Apply the following general mitigation measures to avoid soil and/or water contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done in specified areas at least 30 m away from wetlands, woodlands and or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and/or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. • Also refer to mitigation measures for “Reduction in soil quality due accidental release of contaminants during operation, etc.” for additional proposed mitigation measures.	*Residual effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation during operation would be minimized through the implementation of a Spill Prevention and Response Plan and other mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.
Changes to soil quality • Reduction in soil quality due to accidental release of contaminants	• Prevent contaminant discharge to the environment.	• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: ▪ Protocols for access to spill control and containment equipment/materials (e.g., ensure that spill control and containment equipment/materials are readily available on site and additional spill clean-up materials will be available if needed, restock materials contained in spill clean-up kits as necessary). ▪ Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards). ▪ MSDS which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site. ▪ Training requirements for operational staff on associated emergency response plan and spill clean-up procedures. ▪ Protocols for cleaning up spills (i.e., clean up spills as soon as possible, with contaminated soils removed to a licenced disposal site, if required; analyze any soil encountered during operation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to determine its quality in order to identify the appropriate disposal method). ▪ Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and HIWEC management phone numbers. • Apply the following general mitigation measures to avoid soil contamination: ▪ Ensure machinery is maintained free of fluid leaks. ▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and/or waterbodies. ▪ Store any stockpiled materials at least 30 m away from wetlands and/or waterbodies. ▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary. ▪ All potentially hazardous materials to be stored in containment sites within the O&M building, within berms where possible. ▪ Keep ROW for access roads, collector lines /on-Reserve transmission lines and WTGs clear of garbage and debris.	*Residual effect on soil quality* • Reduction in soil quality due to accidental release of contaminants during operation would be minimized following implementation of mitigation measures; however, residual contaminants may remain in some areas of the HIWEC.

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 4-14 describes potential effects on air quality that could occur during the construction and decommissioning phases 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**.

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

No emissions of odours are anticipated during operations.

Table 4-15 describes potential effects on air quality that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final Draft EA Report of **Volume A**.

Table 4-14: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Construction and Decommissioning

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*
• 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*

Table 4-15: Proposed Mitigation Measures Associated with Emissions to Air Resulting from Operations

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

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 Assessment 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 4-16 describes potential effects from nuisance noise that could occur during the construction and decommissioning phases 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**.

The operation of WTGs and the TSs will generate noise that has the potential to affect local residents.

Table 4-17 describes potential effects from nuisance noise that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A.**

Table 4-16: Proposed Mitigation Measures Associated with Noise Resulting from Construction and Decommissioning

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 may 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 on 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 overnight accommodations and recreational activities* • 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 may remain through the construction and decommissioning phases.

Table 4-17: Proposed Mitigation Measures Associated with Noise Resulting from Operation

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

4.6 Local Interests, Land Use and Infrastructure

4.6.1 Existing Conditions

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

4.6.1.1 Traditional Anishinabek Land Uses and Resources

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

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

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

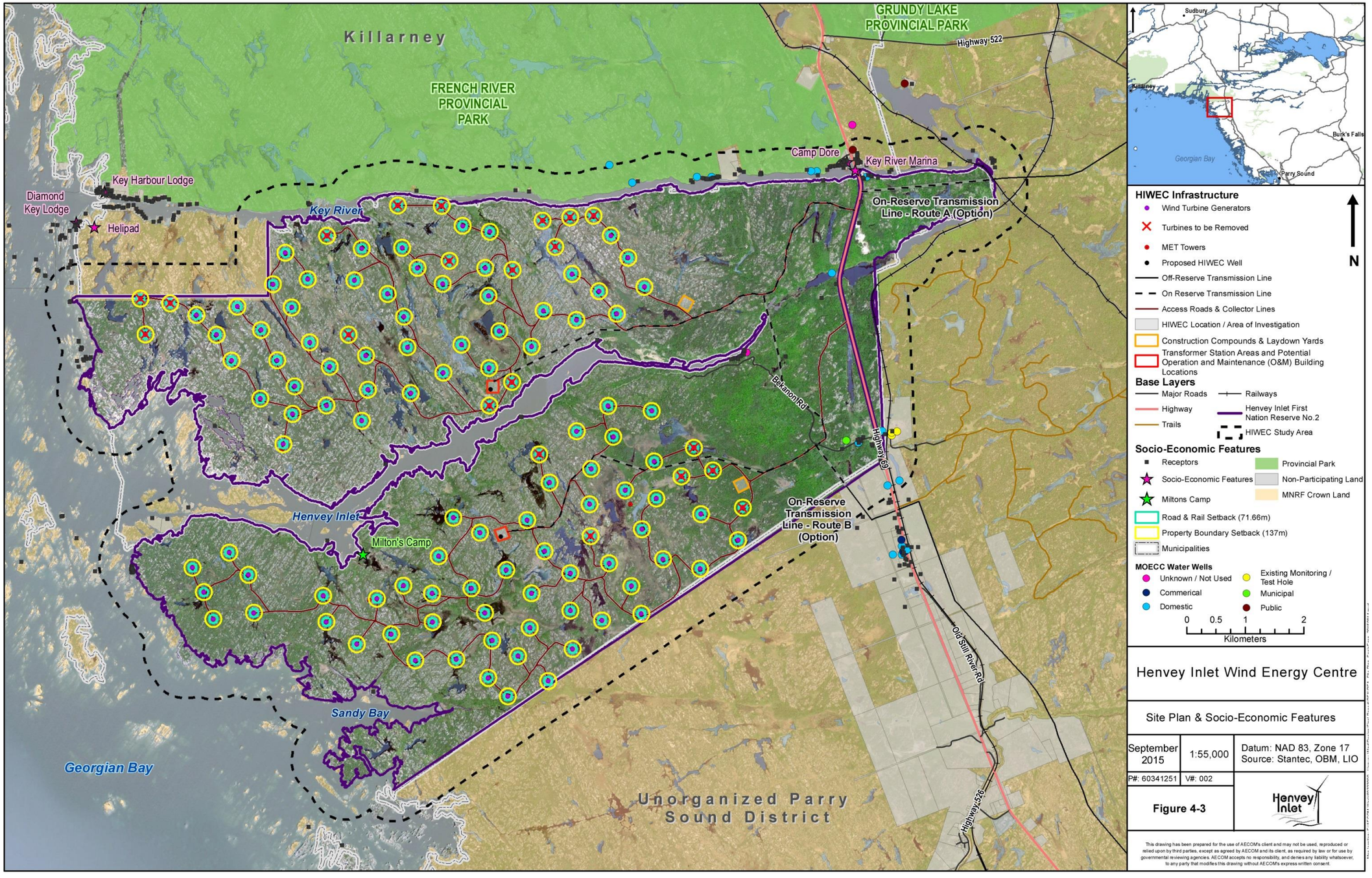
4.6.1.4 Adjacent Properties

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 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).

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



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 (YRH, 2011). An Environment Canada (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.

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 4-18 describes potential effects on HIFN interests, local interests, land use and infrastructure including local roads that could occur during the construction and decommissioning phases of the HIWEC and identifies proposed mitigation strategies 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**.

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

Table 4-19 describes potential effects on local interests, land use and infrastructure that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects. An evaluation of significance of these residual effects along with proposed monitoring and follow-up plans are described in **Section 6** and **Section 8** of the Final EA Draft Report of **Volume A.**

4.7 Public Health and Safety

4.7.1 Existing Conditions

4.7.1.1 Stray Voltage

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

4.7.1.2 Structural Hazards

In the unlikely event of structural collapse or blade detachment, equipment will fall within a very small diameter due to the weight of the WTG components. WTG siting for the proposed HIWEC will meet (at a minimum) the setback distances from non-participating residences (550 m) as required by the HIFN EA Guidance document. The nearest WTG to houses located along Bekanon Road will be sited approximately 2 km away.

4.7.1.3 Ice Throw

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

Table 4-18: Proposed Mitigation Measures Associated with Potential Effects to Local Interests, Land Use and Infrastructure Resulting from Construction and Decommissioning

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 4-5** 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 4-18** 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 4-18 for residual effects on water supply wells from construction activity.**

Table 4-19: Proposed Mitigation Measures Associated With Potential Effects To Local Interests, Land Use And Infrastructure Resulting From Operations

Potential Effects	Performance Objectives	Proposed Mitigation Measures	Residual Effects
• Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species	• Minimal impact to traditional Anishinabek lands. • Minimal decline in availability of country foods and medicinal plants. • Minimal decline in spiritual, ceremonial or cultural sites. • No impact on Nishshing Aki. • Minimal off-Reserve impacts to Aboriginal traditional rights or interests. • Minimal impacts to navigable waterways used by Anishinabek groups.	• Develop a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding Aboriginal traditional uses allowed on the site during operations, (e.g., a firearms and / or hunting policy). • Ensure maintenance activity is limited to pre-determined work areas. • Mitigation measures proposed in under the **Proposed Mitigation Measures Associated with Potential Effects to Generalized Candidate Important Wildlife Resulting from Operations Table 4-6** to minimize disturbance to wildlife will serve to further reduce impacts to HIFN traditional use activities.	*No residual effects.* • Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering will be confined to WTG locations (approximately 173.1 ha or 1.4% of the HIWEC study area) are temporary and will be available after decommissioning. Development of a site policy for safety and permitted access within the HIWEC on HIFN I.R. #2 regarding traditional uses will minimize potential effects.
• Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence/cottage owners on I.R. #2.	• Minimal impacts to access of trails and traditional resource areas.	• Develop access plans for authorized users during the operations phase. • Maintain ongoing communication with authorized users of HIFN I.R. #2 and other affected adjacent land users about maintenance activities and associated access limitations. • Maintain existing access to primary use areas including Henvey Inlet throughout operations. • Access limitations will be confined to active maintenance areas. Work restricted areas to be clearly marked.	*No residual effects.* • Reduced access to lands within and adjacent to HIFN I.R. #2 for recreation is not anticipated as access to primary recreation and tourism areas such as Henvey Inlet, will not be restricted.
• Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs.	• Minimize light emissions from WTGs.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations in areas along the Key River, Henvey Inlet and Georgian Bay have been removed as only up to 91 locations will be constructed • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of turbines to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • Turbine lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effect on local residents, cottagers and businesses* • Changes to the visual landscape for local residents, cottagers and businesses will be partially mitigated by applying minimum setbacks from waterbodies, minimizing lighting requirements and reducing the overall layout from 120 to up to 91 turbines. However, there will be some residual effect as turbines will continue to be visible from various vantage points within and adjacent to the HIWEC study area.
• Avoidance of overnight accommodations and recreational activities near the HIWEC from changes to the visual landscape	• Minimize visual change within vicinity of the HIWEC.	• Minimum 500 m setback from Georgian Bay shoreline. • Potential WTG locations along the Key River and Georgian Bay have been removed as only up to 91 locations will be constructed. • No vegetation clearing within 120 m of Georgian Bay, Henvey Inlet and Key River shoreline areas to preserve the shoreline landscape where possible. HIW will ensure that the final location and determination of turbines to be constructed meet a setback of 120 m from waterbodies and shoreline. • Limit WTG markings to manufacturer / company markings / logos. • Turbine lighting beam angle will be adjusted to minimize lighting observed from ground level. • Avoid white obstruction lighting. • Ensure that all lights flash simultaneously. • Use minimum amount of lighting required to meet Transport Canada requirements.	*Residual effects on overnight accommodations and recreational activities* • Avoidance of overnight accommodations and recreational activities near the HIWEC due to changes to the visual landscape during operations is not anticipated, but difficult to predict; some avoidance by people who do not like the appearance of wind turbines may occur. Changes to the visual landscape will be minimized by applying minimum setbacks from waterbodies and reducing the overall layout from 120 to 87-91 turbines; however turbines will be visible from various vantage points within and adjacent to the HIWEC study area.
• Increase in truck traffic where the south access road crosses Bekanon Road	• Minimize disturbance to local traffic patterns.	• Prohibit maintenance vehicles (including personal vehicles) from travelling along Bekanon Road, except to cross Bekanon Road.	*Residual effect on traffic near south access road* • Construction vehicles will not be permitted to travel along Bekanon Road so minimal residual traffic effects may occur intermittently throughout the operations and maintenance period.

4.7.1.4 Low Frequency Sound, Infrasound and Vibration

WTGs have the potential to emit low frequency sound, infrasound and vibration. Low frequency sound commonly refers to sound at frequencies between 20 and 200 Hertz (Hz); infrasound commonly refers to sound at frequencies below 20 Hz (i.e., below the threshold of human perception). Although generally considered inaudible, infrasound at high-enough sound pressure can be audible to some people (CMOH, 2010). The "Potential Heath Impacts of Wind Turbines Report" (CMOH, 2010) identified that infrasound and low frequency sound from modern WTGs were found to be well below the level where known health effects occur (50 to 70 dB) in studies of WTG noise. Thus, low frequency sound, infrasound and vibration have not been considered in the effects assessment.

4.7.1.5 Electric and Magnetic Fields

Concerns surrounding electromagnetic fields (EMFs) have been raised during consultation processes for other wind energy centres. EMFs are a combination of invisible electric and magnetic fields. They occur both naturally (e.g., light is a natural form of EMF) and as a result of human activity. Nearly all electrical and electronic devices emit some type of EMF (CMOH, 2010). The generation of electrical fields from any underground electrical collector lines from the HIWEC will be shielded by line insulation and the surrounding ground but will still generate magnetic fields. Associated magnetic fields will be similar to other buried distribution lines in Ontario. The "Potential Heath Impacts of Wind Turbines Report" (CMOH, 2010) indicates that "wind turbines are not considered a significant source of EMF exposure". Thus, EMFs have not been considered in the effects assessment.

4.7.2 Potential Effects and Proposed Mitigation Measures

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

To minimize or avoid effects on public health and safety, the WTGs are sited according to setback distances as required by the HIFN EA Guidance document and as described in **Section 4.7.1**.

Table 4-20 describes potential effects on public health and safety that could occur during the operations phase of the HIWEC and identifies proposed mitigation strategies and residual effects.

Table 4-20: Proposed Mitigation Measures Associated with Potential Effects to Public Health and Safety Resulting from Operations

Potential Effect	Performance Objective	Proposed Mitigation Strategy	Residual Effects
Impacts on public health and safety from structural hazards, and / or ice throw.	• No public health and safety incidents.	• Adhere to setback requirements to limit likelihood of any impacts.	*No residual Effects* • Impacts on public health and safety from structural hazards, and/or ice throw can be mitigated provided recommended mitigation is implemented.
Stray voltage effects to the public and wildlife.	• No health and safety incidents associated with stray voltage.	• Build and maintain the HIWEC as prescribed by the Distribution System Code and the Electrical Safety Authority to minimize the risk of stray voltage. • Ensure ongoing regular maintenance and monitoring of WTGs. • Ensure that all electrical design conforms and complies with relevant electrical safety standards.	*No residual Effects* • Stray voltage effects to the public and wildlife can be mitigated provided recommended mitigation is implemented.

4.8 Other Resources

4.8.1 Existing Conditions

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

4.8.1.1 Landfills

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

4.8.1.2 Aggregate Resources

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

4.8.1.3 Forest Resources

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

4.8.1.4 Petroleum Resources

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

4.9 Areas Protected under Provincial Plans and Policies

The HIFN EA Guidance document requires a determination as to whether the HIWEC is being proposed in any of the following protected or plan areas:

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

The HIWEC is not proposed in an area within the jurisdiction of the plans noted above. As such, there will be no effects on these areas as a result of the HIWEC.

4.10 Environmental Effects Monitoring Plan

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

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