



Henvey Inlet Wind LP

## **Henvey Inlet Wind**

Henvey Inlet Wind Energy Centre

# **Natural Environment Assessment: Environmental Impact Study Report**

Final Draft

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## Henvey Inlet Wind Energy Centre Natural Heritage Assessment: Environmental Impact Study Report – Final Draft

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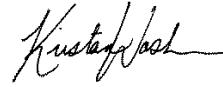
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## List of Acronyms and Glossary

<b>ANSI</b>	Area of Natural and Scientific Interest
<b>Candidate Important Wildlife Habitat</b>	Potential area of wildlife habitat that may be considered important using procedures established or accepted by the Ministry of Natural Resources and Forestry.
<b>Confirmed Important Wildlife Habitat</b>	Area of important wildlife habitat verified using procedures established or accepted by the Ministry of Natural Resources and Forestry.
<b>COSEWIC</b>	Committee on the Status of Endangered Wildlife in Canada
<b>COSSARO</b>	Committee on the Status of Species at Risk in Ontario
<b>CLI</b>	Canada Land Inventory
<b>DFO</b>	Fisheries and Oceans Canada
<b>Dripline</b>	The area defined by the outermost circumference of a tree canopy.
<b>EC-CWS</b>	Environment Canada – Canadian Wildlife Service
<b>EIS</b>	Environmental Impact Study
<b>ELC</b>	Ecological Land Classification; refers to ecological units defined on the basis of bedrock, climate (temperature, precipitation), physiography (soils, slope, aspect) and corresponding vegetation.
<b>ESA</b>	Environmental Sensitive Area
<b>Feathering of blades</b>	Pitching of turbine blades out of the wind so the turbine does not capture the wind and will not produce power.
<b>Federal SAR</b>	Species listed as Endangered or Threatened under Schedule 1 of the federal <i>Species at Risk Act</i> , 2002.
<b>Frac-out</b>	Escape of drilling mud into the environment as a result of a spill, tunnel collapse or the rupture of mud to the surface.

<b>Generalized Candidate Important Wildlife Habitat</b>	Potential wildlife habitats listed in Appendix D of the Natural Heritage Assessment Guide for Renewable Energy Projects (MNR, 2012), which are not required to be identified for a particular HIWEC component, but may exist within 120 m of that component and are assumed to exist.
<b>GIS</b>	Geographic Information System
<b>HIWEC</b>	Henvey Inlet Wind Energy Centre
<b>HIWEC Location</b>	The area encompassing all construction activities and HIWEC components.
<b>Important</b>	Natural feature that (1) the Ministry of Natural Resources and Forestry has identified as important, or (2) has been determined to be important using applicable evaluation criteria or procedures established or accepted by the Ministry of Natural Resources and Forestry.
<b>IWH</b>	Important Wildlife Habitats
<b>LIO</b>	Land Information Ontario
<b>MNR</b>	Ontario Ministry of Natural Resources and Forestry
<b>MOECC</b>	Ontario Ministry of Environment and Climate Change
<b>Natural Feature</b>	One of the following: (1) an Area of Natural and Scientific Interest (earth science or life science), (2) a wetland, (3) a wildlife habitat, (4) a woodland, (5) a provincial park, or (6) a conservation reserve.
<b>NHIC</b>	Natural Heritage Information Centre
<b>NRVIS</b>	Natural Resource Value and Information System
<b>NTS</b>	National Topographic System
<b>OGS</b>	Ontario Geological Survey
<b>OGSR</b>	Oil, Gas and Salt Resources
<b>OPA</b>	Ontario Power Authority
<b>OWES</b>	Ontario Wetland Evaluation System
<b>PIW</b>	Provincially Important Wetland
<b>Provincial SAR</b>	Species listed as Endangered or Threatened under the provincial <i>Endangered Species Act, 2007</i> but not listed as Endangered or Threatened under Schedule 1 of the Federal <i>Species at Risk Act, 2002</i> .
<b>REA</b>	Renewable Energy Approval
<b>SAR</b>	Species at Risk, including both Federal SAR (species listed as Endangered or Threatened under Schedule 1 of the Federal <i>Species at Risk Act, 2002</i> ) and Provincial SAR (species listed as Endangered or Threatened under the provincial <i>Endangered Species Act, 2007</i> but not listed as Endangered or Threatened under Schedule 1 of the federal <i>Species at Risk Act, 2002</i> ).

<b>SARA</b>	Federal <i>Species at Risk Act</i> , 2002
<b>SARO</b>	Species at Risk In Ontario
<b>SOCC</b>	Species of Conservation Concern, including (a) 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 <i>Species at Risk Act</i> , 2002 (SARA) or the Provincial <i>Endangered Species Act</i> , 2007 (ESA); (b) species listed as Special Concern under Schedule 1 of SARA; (c) 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 (d) species listed as Special Concern under the ESA.
<b>SWHTG</b>	Significant Wildlife Habitat Technical Guide
<b>UTM</b>	Universal Transverse Mercator
<b>Wetland</b>	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.
<b>Wildlife Habitat</b>	Area where plants, animals and other organisms live or have the potential to live and find adequate amounts of food, water, shelter and space to sustain their population, including an area where a species concentrates at a vulnerable point in its annual or life cycle and an area that is important to a migratory or non-migratory species.
<b>Woodland</b>	Treed area, woodlot or forested area, other than a cultivated fruit or nut orchard or a plantation established for the purpose of producing Christmas trees, that is located south and east of the Canadian Shield.



# 1. Introduction

## 1.1 Project 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.

The HIFN EA Guidance document includes a requirement to complete a Natural Heritage Assessment (NHA) having regard to the provincial process. Under the provincial process, a proponent who proposes to engage in a renewable energy project is required to conduct a NHA, consisting of the following:

- A Records Review;
- A Site Investigation; and
- An Evaluation of Importance.

Through this process, proponents identify natural features near the proposed HIWEC location and determine if prohibitions and setbacks apply. In instances where the HIWEC location is proposed within such a setback, the proponent must prepare an Environmental Impact Study (EIS) Report to identify and assess the potential negative environmental effects that may result from the proposed HIWEC, identify appropriate mitigation measures and describe how the potential effects will be addressed through the Environmental Effects Monitoring Plan (EEMP) and Construction Plan Report.

This document is intended to address the EIS requirements of the NHA for the HIWEC, including:

- Identify and assess the potential negative environmental effects of the HIWEC on natural features, provincial parks, federal parks and / or conservation reserves identified through the Evaluation of Importance;
- Identify mitigation measures to address the potential negative environmental effects on natural features, provincial parks, federal parks and / or conservation reserves where following activities are proposed:
  - The construction, installation or expansion of a transmission line in or within 50 meters (m) of an important wetland, important woodland, important wildlife habitat, provincial park, federal park or conservation reserve;
  - The construction, installation or expansion of other HIWEC components within 120 m of an important wetland, important woodland, important wildlife habitat, provincial park, federal park or conservation reserve;
- Describe how the Environmental Effects Monitoring Plan (EEMP) addresses any potential negative environmental effects; and
- Describe how the Construction Plan Report addresses any potential negative environmental effects.

Please note that the potential negative environmental effects of the HIWEC on water body features including lakes, lake trout lakes, permanent or intermittent streams and seepage areas, and associated mitigation measures, are described in the Water Assessment and Water Bodies Report (**Appendix H of Volume A**).

Throughout this NHA, the term “significant” or “significance” as per provincial requirements has been changed to “important” or “importance” as the term “significance” has specific meaning in the federal EA process which is different from the meaning in the provincial process. Therefore, the term in the provincial process has been changed to avoid confusion. The meaning of “significance” in the provincial process is carried over to the term “importance” for the purpose of the NHA. The term “significance” is not changed if it is in the title of a reference document.

## 1.2 Summary of Natural Features Carried Forward to the Environmental Impact Study

**Table 1-1** provides a summary of the natural features either treated as important or confirmed to be important during the Evaluation of Importance; these are the features that were carried forward to the Environmental Impact Study (EIS). The EIS was conducted to assess potential negative environmental effects of the HIWEC on these features and identify appropriate mitigation measures to address those effects in accordance with the HIFN EA Guidance document.

**Table 1-1: Summary of Natural Features Carried Forward to the EIS**

Feature	Natural Features Carried Forward to the EIS															
<b>Conservation Reserves</b>	The North Georgian Bay Shoreline and Islands Conservation Reserve was carried forward to the EIS.															
<b>Important Wetlands</b>	Four (4) wetland features were evaluated and confirmed to be important, and carried forward to the EIS.															
<b>Important Wildlife Habitat</b>	<p>The following Candidate IWH features were either evaluated and determined to be IWH, or were treated as IWH, and carried forward to the EIS (in some cases, a determination as to whether the mitigation measures described in the EIS will be applied may be made based on the outcome of pre-construction surveys):</p> <ul style="list-style-type: none"> <li>• Bat Hibernacula;</li> <li>• Bat Maternity Colonies;</li> <li>• Turtle Wintering Areas;</li> <li>• Reptile Hibernacula;</li> <li>• Deer Yarding Areas;</li> <li>• Cliffs and Talus Slopes;</li> <li>• Precambrian Rock Barrens;</li> <li>• Sand Barrens;</li> <li>• Old-growth Forest;</li> <li>• Bogs;</li> <li>• Waterfowl Nesting Areas;</li> <li>• Bald Eagle and Osprey Nesting, Foraging and Perching Habitat;</li> <li>• Woodland Raptor Nesting Habitat;</li> <li>• Turtle Lizard and Nesting Areas;</li> <li>• Seeps and Springs;</li> <li>• Aquatic Feeding Habitat;</li> <li>• Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf;</li> <li>• Amphibian Breeding Habitat (Woodland and Wetland);</li> <li>• Mast Producing Areas;</li> <li>• Marsh Bird Breeding Habitat;</li> <li>• Habitat for Specific SOCC, including:               <table border="0" style="width: 100%; margin-left: 20px;"> <tr> <td style="width: 33%;">– Black Tern;</td> <td style="width: 33%;">– Horned Clubtail;</td> <td style="width: 33%;">– Eastern Ribbonsnake;</td> </tr> <tr> <td>– Eastern Wood-pewee;</td> <td>– Mottled Darner;</td> <td>– Milksnake;</td> </tr> <tr> <td>– Prairie Warbler;</td> <td>– Pine Imperial Moth;</td> <td>– Northern Map Turtle; and</td> </tr> <tr> <td>– Wood Thrush;</td> <td>– Eastern Wolf;</td> <td>– Snapping Turtle.</td> </tr> <tr> <td>– Yellow Rail;</td> <td>– Common Five-linked Skink;</td> <td></td> </tr> </table> </li> </ul>	– Black Tern;	– Horned Clubtail;	– Eastern Ribbonsnake;	– Eastern Wood-pewee;	– Mottled Darner;	– Milksnake;	– Prairie Warbler;	– Pine Imperial Moth;	– Northern Map Turtle; and	– Wood Thrush;	– Eastern Wolf;	– Snapping Turtle.	– Yellow Rail;	– Common Five-linked Skink;	
– Black Tern;	– Horned Clubtail;	– Eastern Ribbonsnake;														
– Eastern Wood-pewee;	– Mottled Darner;	– Milksnake;														
– Prairie Warbler;	– Pine Imperial Moth;	– Northern Map Turtle; and														
– Wood Thrush;	– Eastern Wolf;	– Snapping Turtle.														
– Yellow Rail;	– Common Five-linked Skink;															

**Table 1-1: Summary of Natural Features Carried Forward to the EIS**

Feature	Natural Features Carried Forward to the EIS												
	<p>The following Generalized Candidate IWH features were carried forward to the EIS:</p> <ul style="list-style-type: none"> <li>• Shorebird Migratory Stopover Areas;</li> <li>• Bat Maternity Colonies;</li> <li>• Turtle Wintering Areas;</li> <li>• Reptile Hibernacula;</li> <li>• Precambrian Rock Barren;</li> <li>• Bogs;</li> <li>• Waterfowl Nesting Areas;</li> <li>• Woodland Raptor Nesting Habitat;</li> <li>• Turtle and Lizard Nesting Areas;</li> <li>• Seeps and Springs;</li> <li>• Amphibian Breeding Habitat (Woodland and Wetland);</li> <li>• Mast Producing Areas;</li> <li>• Marsh Bird Breeding Habitat; and</li> <li>• Habitat for Specific SOCC, including:               <table border="0" style="margin-left: 20px;"> <tr> <td>– Eastern Wood-pewee;</td> <td>– Horned Clubtail;</td> <td>– Milksnake;</td> </tr> <tr> <td>– Prairie Warbler;</td> <td>– Mottled Darner;</td> <td>– Northern Map Turtle; and</td> </tr> <tr> <td>– Wood Thrush;</td> <td>– Pine Imperial Moth;</td> <td>– Snapping Turtle.</td> </tr> <tr> <td>– Yellow Rail;</td> <td>– Eastern Ribbonsnake;</td> <td></td> </tr> </table> </li> </ul>	– Eastern Wood-pewee;	– Horned Clubtail;	– Milksnake;	– Prairie Warbler;	– Mottled Darner;	– Northern Map Turtle; and	– Wood Thrush;	– Pine Imperial Moth;	– Snapping Turtle.	– Yellow Rail;	– Eastern Ribbonsnake;	
– Eastern Wood-pewee;	– Horned Clubtail;	– Milksnake;											
– Prairie Warbler;	– Mottled Darner;	– Northern Map Turtle; and											
– Wood Thrush;	– Pine Imperial Moth;	– Snapping Turtle.											
– Yellow Rail;	– Eastern Ribbonsnake;												
<p><b>Federal Species at Risk</b></p>	<p>A total of 15<sup>1</sup> Federal Species At Risk (SAR) were carried forward to the EIS, including:</p> <ul style="list-style-type: none"> <li>• Canada Warbler;</li> <li>• Common Nighthawk;</li> <li>• Olive-sided Flycatcher;</li> <li>• Eastern Whip-poor-will;</li> <li>• Little Brown Bat;</li> <li>• Northern Bat;</li> <li>• Tri-coloured Bat;</li> <li>• Branched Bartonia;</li> <li>• Blanding’s Turtle;</li> <li>• Eastern Foxsnake;</li> <li>• Eastern Hog-nosed Snake;</li> <li>• Eastern Musk Turtle;</li> <li>• Massausaga Rattlesnake; and</li> <li>• Kirtland’s Warbler.</li> </ul>												

1. Records of Species At Risk considered to be restricted are not being made public due to the threat of poaching experienced by these species. These records will be provided under a separate cover to the Ministry of Natural Resources and Forestry (MNR) and / or Environment Canada – Canadian Wildlife Service (EC-CWS) for permitting purposes.

## 2. Project Description

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 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 2.1**. 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.

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.

The EA assesses 120 wind turbine generators (WTGs) for the HIWEC; however, only up to 91 WTGs will 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 250 hectares (ha) based on installation of 120 WTGs. This footprint represents 2% 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.

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 9<sup>th</sup>, 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 Hydro One Network Inc. (HONI) system (Route B). In addition to the assessment of interconnection of Route B, HIW in close consultation and discussions with 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**.

## 2.1 HIWEC Components

### 2.1.1 *Permanent Components*

#### 2.1.1.1 Wind Turbine Generators and Foundations

One-hundred and twenty commercial WTGs are being assessed for the HIWEC with only up to 91 WTGs ultimately being 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 (3) 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.

#### 2.1.1.2 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 20 m wide, with additional travel clearance required to accommodate large cranes and equipment transport during construction and decommissioning. In some locations it is anticipated that rock will need to be blasted and some areas filled with crushed rock to reduce grades to allow vehicles to bring in required equipment, cranes and WTG components.

Access roads that intersect with Highway 69 will be designed in accordance with Ontario Ministry of Transportation (MTO) standards. Applicable MTO permits will be obtained prior to construction.

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

### 2.1.1.3 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 (4) Met towers will be utilized. 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.

### 2.1.1.4 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 volts (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.

### 2.1.1.5 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.

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.

### 2.1.1.6 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).

### **2.1.1.7 Operations and Maintenance Building**

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

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

## **2.1.2 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.

### **2.1.2.1 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.

### **2.1.2.2 Wind Turbine Generator Staging Areas**

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

### **2.1.2.3 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 leveling activities. Concrete batching activities will occur in parallel with the relevant HIWEC construction activities (i.e., foundation installation).

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

#### **2.1.2.4 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.

#### **2.1.2.5 Parking Areas**

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

### **2.1.3 Construction, Operation and Decommissioning Activities**

#### **2.1.3.1 Construction Phase**

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 sedimentation 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**

### 2.1.3.2 Operations Phase

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 WTG 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 (1) 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).

### 2.1.3.3 Decommissioning Phase

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 equipment and 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. Conservation Reserves

This section describes potential environmental effects of the HIWEC on Conservation Reserves during its construction, operational and decommissioning phases. Details regarding how the Construction Plan and Environmental Effects Monitoring Plan address these potential negative effects, including mitigation measures, performance objectives, monitoring methods and contingency measures, are also described herein.

A total of one (1) Conservation Reserve, the North Georgian Bay Shoreline and Islands Conservation Reserve, was identified within 120 m of the HIWEC location. The North Georgian Bay Shoreline and Islands Conservation Reserve is located within 19 m of a proposed WTG, along the south side of the HIFN Reserve #2 lands. 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 **Sections 4, 5 and 6** for construction, decommissioning and operations activities that will take place adjacent to wetlands and IWH features, as well as Federal Species at Risk (SAR) habitat, 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.

## 4. Important Wetlands

This section describes potential environmental effects of the HIWEC on Important Wetlands during its construction, operational and decommissioning phases. Details regarding how the Construction Plan and Environmental Effects Monitoring Plan address these potential negative effects, including mitigation measures, performance objectives, monitoring methods and contingency measures, are also described herein.

A total of four (4) Important Wetland features were identified within 120 m of the HIWEC location. The HIWEC was designed to avoid or minimize placing infrastructure or temporary construction disturbance areas within Important Wetland features to the extent possible. However, up to 24.5 ha of Important Wetland features (comprising 1% of wetlands within the HIWEC study area) will be removed as a result of the HIWEC, which will result in direct loss and fragmentation of these features. Adjacent wetlands being retained may also be negatively affected by construction, operation and decommissioning. The potential negative environmental effects of the HIWEC on Important Wetland features are described in **Table 4-1** below.

Where the HIWEC location is proposed within Important Wetland features or in areas adjacent to Important Wetland features, mitigation measures have been identified to address the potential negative environmental effects associated with construction, operation and decommissioning in **Table 4-1** below. The mitigation measures in this table are also described in the Construction Plan Report (**Appendix B of Volume A**) and the Description Report (**Appendix A of Volume A**).

**Table 4-1: Potential Effects and Proposed Mitigation Measures for Important Wetlands**

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
<p><b>Construction activities within 120 m of an Important Wetland feature</b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Damage to wetland 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.</li> </ul> <ul style="list-style-type: none"> <li>• Damage to wetland vegetation due to increased dust accumulation.</li> </ul>	<ul style="list-style-type: none"> <li>• Prevent soil or water contamination.</li> </ul> <ul style="list-style-type: none"> <li>• Minimize dust accumulation on peripheral vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example: <ul style="list-style-type: none"> <li>▪ In the event of a contaminant spill all work will stop in the immediate area until the spill is cleaned up.</li> <li>▪ Spill control and containment equipment / materials shall be readily available on site.</li> <li>▪ Protocols for access to additional spill clean-up materials if needed.</li> <li>▪ Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards.</li> <li>▪ Including the use of Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li> <li>▪ Proper training of construction staff on associated emergency response and spill clean-up procedures.</li> <li>▪ Spills to be cleaned up as soon as possible, with contaminated soils removed to a licenced disposal site, if required.</li> <li>▪ Materials contained in spill clean-up kits are restocked as necessary.</li> <li>▪ Any soil encountered during excavation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to be analyzed to determine its quality in order to identify the appropriate disposal method.</li> <li>▪ To include reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers.</li> </ul> </li> <li>• Apply the following general mitigation measures to avoid soil contamination: <ul style="list-style-type: none"> <li>▪ Ensure machinery is maintained free of fluid leaks.</li> <li>▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.</li> </ul> </li> <li>• Undertake waste management in accordance with relevant federal and provincial guidelines and standards and construction site to be kept clear of garbage and debris.</li> <li>• 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.</li> <li>• Develop and implement a Construction Dewatering Discharge Plan describing appropriate areas and methods for discharge.</li> <li>• 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).</li> <li>• The Contractor shall implement appropriate measures (e.g., geosock or similar device) to reduce the amount of sediment released.</li> <li>• 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.</li> <li>• 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.</li> <li>• Should groundwater dewatering activities be expected to exceed 50,000 L/day, implement the following measures: <ul style="list-style-type: none"> <li>▪ Surround inlet pump head with clear stone and filter fabric.</li> <li>▪ 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.</li> </ul> </li> </ul> <ul style="list-style-type: none"> <li>• Use water as a dust suppressant, as needed, along areas where construction activities are located within 5 m of a wetland.</li> <li>• Implement construction speed limit of 30 km/hr on all access roads.</li> <li>• Conduct dust suppression (i.e., spraying water on access roads and work areas) during dry conditions to minimize dust generation.</li> <li>• If complaints arise, develop and maintain a reporting log, respond to complaint in a timely fashion and mitigate accordingly.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to conduct routine inspections of construction equipment for leaks / spills.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ If a spill enters a wetland: <ul style="list-style-type: none"> <li>– Collect and analyze water samples for comparison with appropriate parameters.</li> <li>– Monitor daily until cleanup is completed or a Biologist determines that contaminant levels are below thresholds which may affect wetland form or function. If this is not possible, Environment Canada and HIFN will be contacted regarding additional mitigation measures that may be required.</li> </ul> </li> </ul> </li> </ul> <ul style="list-style-type: none"> <li>• Daily monitoring of areas where active construction is occurring within 5 m of an Important Wetland by an Environmental Monitor.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ 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.</li> </ul> </li> </ul>

**Table 4-1: Potential Effects and Proposed Mitigation Measures for Important Wetlands**

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
	<ul style="list-style-type: none"> <li>Changes in wetland function due to change in surface water drainage patterns or obstructions of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize effects to soil moisture and species composition of vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure BMPs are used to maintain current drainage patterns, including:                             <ul style="list-style-type: none"> <li>Minimize paved surfaces and design roads to promote infiltration;</li> <li>Limit changes in land contours to the maximum extent possible; and</li> <li>Ensure roadway culverts are designed and installed to maintain existing drainage patterns.</li> </ul> </li> <li>Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion which can change land contours.</li> </ul>	<ul style="list-style-type: none"> <li>Inspect locations following completion of culvert installation by an Environmental Monitor to ensure no changes in drainage patterns.</li> <li>Examine condition of Important Wetlands within 30 m of construction areas at the completion of construction.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>If surface water drainage alterations are detected, undertake corrective measures to restore drainage patterns.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Changes in wetland function due to reductions in groundwater recharge quantities into wetlands due to increases in impervious surfaces.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize reductions in groundwater recharge.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize paved surfaces and design roads to promote groundwater infiltration.</li> <li>Implement groundwater infiltration techniques to the maximum extent possible. Examples include:                             <ul style="list-style-type: none"> <li>Releasing water to vegetated areas after applying appropriate water quality and temperature controls;</li> <li>Lining ditches with permeable material (rather than clay, for example); and</li> <li>Groundwater should remain on site and not disposed of off-site (unless contaminated).</li> </ul> </li> <li>Where possible, direct groundwater discharge water to natural infiltration systems after applying appropriate water quality and temperature controls.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>Reduced wetland function due to increased erosion and sedimentation resulting from construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize erosion and sedimentation from construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>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 an Important Wetland to minimize potential sediment loading to the feature.</li> <li>Develop and implement an Erosion and Sediment Control Plan.</li> <li>Utilize erosion blankets, sediment control fencing, straw bale etc. for construction activities in areas where there is erosion and sedimentation potential near a wetland, woodland or waterbody.</li> <li>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.</li> <li>Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings.</li> <li>Store stockpiled material at least 30 m from a wetland or waterbody.</li> <li>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.</li> <li>Minimize the size of cleared areas to limit the area of exposed soil.</li> <li>Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure.</li> <li>Divert access road runoff through drainage ditches directed into vegetated areas or through environmental protection measures (such as sediment traps, rock flow check dams, sediment barriers etc.) to ensure that exposed soils or road materials are not transported into waterbodies or wetlands. Ditches &gt;5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity.</li> <li>Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion.</li> <li>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.</li> <li>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.</li> <li>Keep all equipment within identified work areas to minimize disturbance of adjacent soils.</li> <li>Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction and to minimize vehicle traffic on exposed and / or sensitive soils.</li> <li>Routine visual inspections of sediment and erosion control devices for effectiveness.</li> <li>Repair and maintenance to sediment and erosion control devices performed regularly.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor on-site conditions (i.e., erosion and sediment control, flooding, etc.) where construction occurs within 30 m of an Important Wetland by an Environmental Monitor on the following basis:                             <ul style="list-style-type: none"> <li>Weekly during active construction periods (or daily where construction occurs within 5 m of an Important Wetland);</li> <li>Prior to, during and post forecasted large rainfall events (&gt;20 millimetres in 24 hours) or significant snowmelt events (i.e., spring freshet);</li> <li>Daily during extended rain or snowmelt periods;</li> <li>Increased vigilance will be given to sediment and erosion control materials installed on bedrock to ensure proper functioning during large rainfall events.</li> <li>Monthly during inactive construction periods, where the site is left alone for 30 days or longer.</li> </ul> </li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>If the amount of sediment being released into the environment is not being contained by the primary mitigation measure, other sediment and erosion control measures should be employed to increase effectiveness of the erosion and sediment controls in place. Suspend work if excessive flows of sediment discharges occur until additional mitigation measures are in place.</li> </ul> </li> </ul>

**Table 4-1: Potential Effects and Proposed Mitigation Measures for Important Wetlands**

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
	<ul style="list-style-type: none"> <li>Change in wetland function due to reduced water levels caused by temporary construction dewatering activities and associated dewatering discharge.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize water draw down in wetlands from groundwater takings.</li> </ul>	<ul style="list-style-type: none"> <li>Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li> <li>Investigate alternative rock-excavating techniques (i.e., mechanical means) where possible.</li> <li>Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise, vibration and slope instability from blasting, including:                             <ul style="list-style-type: none"> <li>Follow proper drilling, explosive handling and loading procedures;</li> <li>Implement safe handling and storage procedures for all material, including soluble substances used for blasting;</li> <li>Use blasting mats over top of holes to minimize scattering of blast debris around the area;</li> <li>Reduce blasting footprint to the extent possible;</li> <li>Ensure the order of firing is correct to minimize the frequency of blasts;</li> <li>Remove all blasting debris and other associated equipment / products from the blast area.</li> </ul> </li> <li>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.</li> <li>Routine visual inspections for slope instability performed during and after blasting operations.</li> <li>Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided.</li> <li>Limit duration of dewatering to as short a time frame as possible.</li> <li>Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible.</li> <li>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).</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li><b>Contingency Measures:</b></li> <li>In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul>
<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Risk of soil or water contamination from oil, gas, etc. during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>No on-site contamination of soil, groundwater or surface water.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example:                             <ul style="list-style-type: none"> <li>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).</li> <li>Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards).</li> <li>Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li> <li>Training requirements for operational staff on associated emergency response plan and spill clean-up procedures.</li> <li>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).</li> <li>Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers.</li> </ul> </li> <li>Apply the following general mitigation measures to avoid soil contamination:                             <ul style="list-style-type: none"> <li>Ensure machinery is maintained free of fluid leaks.</li> <li>Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies.</li> <li>Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies.</li> <li>Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.</li> <li>All potentially hazardous materials to be stored in containment sites within the Operations and Maintenance Building, within berms where possible.</li> <li>Keep ROW for access roads, collector lines / on-reserve transmission lines and WTGs clear of garbage and debris.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>No monitoring required.</li> <li><b>Contingency Measures:</b></li> <li>If a spill enters a wetland:                             <ul style="list-style-type: none"> <li>Collect and analyze water samples for comparison with appropriate parameters.</li> <li>Monitor daily until cleanup is completed or a Biologist determines that contaminant levels are below thresholds which may affect wetland form or function. If this is not possible, Environment Canada and HIFN will be contacted regarding additional mitigation measures that may be required.</li> </ul> </li> </ul>	



**Table 4-1: Potential Effects and Proposed Mitigation Measures for Important Wetlands**

Important Wetland Feature(s)	Potential Effects	Performance Objectives	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
	<ul style="list-style-type: none"> <li>Introduction of invasive species resulting in change in wetland species diversity, quality and function.</li> </ul>	<ul style="list-style-type: none"> <li>Prevent the introduction and spread of invasive species.</li> </ul>	<ul style="list-style-type: none"> <li>If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist.</li> <li>Vegetation trimming will be limited to within areas that have been cleared during construction.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor Important Wetlands once per growing season for two (2) years to confirm introduction of invasive species has not occurred.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Should invasive species introduction occur, corrective actions to remove and reduce the spread of these species will be undertaken. Habitat rehabilitation will occur.</li> </ul> </li> </ul>
<p><b>Construction activities within an Important Wetland feature</b></p>	<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>Permanent loss of Important Wetland features.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize amount of wetland vegetation removal.</li> <li>Minimize disturbance to Important Wetlands.</li> </ul>	<ul style="list-style-type: none"> <li>Vegetation removal will be minimized to the extent possible.</li> <li>Site permanent infrastructure outside of wetlands to the extent possible.</li> <li>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.</li> <li>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.</li> <li>Preserve topsoil (and therefore seed bank), where present, for use during rehabilitation.</li> <li>Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained, where feasible.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated wetlands will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Repair string lines (or alternative method used) if damaged.</li> <li>Any damaged trees will be pruned through implementation of proper arboricultural techniques, under supervision of an Arborist or Forester.</li> </ul> </li> </ul>

## 5. Important Wildlife Habitat

This section describes potential environmental effects of the HIWEC on Important Wildlife Habitat (IWH) during its construction, operational and decommissioning phases. Details regarding how the Construction Plan and Environmental Effects Monitoring Plan address these potential negative effects, including mitigation measures, performance objectives, monitoring methods and contingency measures, are also described herein.

### 5.1 Potential Direct Effects of Operations on Birds and Bats

The potential direct effects of operation of WTGs at the HIWEC on bird and bat mortality, and mitigation measures to address these effects, are described in **Table 5-1** below. The mitigation measures in this table are also described in the Design and Operations Report (**Appendix C of Volume A**). Additional details regarding the post-construction bird and bat mortality monitoring program are provided in the Environmental Effects Monitoring Plan (**Appendix G of Volume A**).

**Table 5-1: Potential Direct Effects of Turbine Operation on Birds and Bats and Associated Mitigation Measures**

Potential Effect	Performance Objective	Mitigation Strategy	Monitoring Plan and Contingency Measures
<ul style="list-style-type: none"> <li>Possible bat and bird mortality as a result of collisions with WTGs (project-wide).</li> </ul>	<ul style="list-style-type: none"> <li>Minimize mortality to birds and bats.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks to bat and bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Develop and implement an Environmental Effects Monitoring Plan (EEMP) which includes a post-construction mortality monitoring program consistent with the following guidance documents:                             <ul style="list-style-type: none"> <li><i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011a);</li> <li><i>Bats and Bat Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011b);</li> <li><i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a); and</li> <li><i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b).</li> </ul> </li> <li>Report the findings of the post-construction mortality monitoring program to HIFN and Environment Canada – Canadian Wildlife Service (EC-CWS) as required on an annual basis.</li> <li>Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Refer to the EEMP for details of the post-construction mortality monitoring program.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> </ul> </li> </ul>

### 5.2 Potential Effects on Important Wildlife Habitat Features

In accordance with provincial guidance (MNRF, 2012), potential IWH features were identified through the Site Investigation were assessed to determine whether they are either overlapped by the HIWEC location or within 120 m of qualifying HIWEC infrastructure. Potential IWH features identified within 120 m of the HIWEC location but not within 120 m of qualifying HIWEC infrastructure (as described in MNRF, 2012) were carried forward to the EIS as Generalized Candidate IWH; these features require only generalized mitigation measures during the construction

and decommissioning phases of the HIWEC, as described in **Section 5.2.1** below. Potential IWH features that are either overlapped by the HIWEC location or within 120 m of qualifying HIWEC infrastructure (as described in MNRF, 2012) were either evaluated and confirmed to be important or treated as important in the Evaluation of Importance; these features require habitat-specific mitigation measures as described in **Section 5.2.2**.

### **5.2.1 Potential Effects on Generalized Candidate Important Wildlife Habitat Features**

This section describes potential environmental effects of the HIWEC on Generalized Candidate IWH features during its construction, operational and decommissioning phases. The following Generalized Candidate IWH features were identified within 120 m of the HIWEC location:

- Shorebird Migratory Stopover Areas;
- Bat Maternity Colonies;
- Turtle Wintering Areas;
- Reptile Hibernacula;
- Precambrian Rock Barren;
- Bog;
- Waterfowl Nesting Areas;
- Woodland Raptor Nesting Habitat;
- Turtle and Lizard Nesting Areas;
- Seeps and Springs;
- Amphibian Breeding Habitat (Woodland and Wetland);
- Mast Producing Areas;
- Marsh Bird Breeding Habitat;
- Habitats for specific SOCC, including:
  - Eastern Wood-pewee;
  - Prairie Warbler;
  - Wood Thrush;
  - Yellow Rail;
  - Horned Clubtail;
  - Mottled Darner;
  - Pine Imperial Moth;
  - Eastern Ribbonsnake;
  - Milksnake;
  - Northern Map Turtle;
  - Snapping Turtle.

The potential negative environmental effects of the HIWEC on these Generalized Candidate IWH features are described in **Table 5-2** below. Where the HIWEC location is proposed in areas adjacent to Generalized Candidate IWH features, mitigation measures have been identified to address the potential negative environmental effects associated with construction and decommissioning in **Table 5-2** below. These mitigation measures are also described in the Construction Plan Report (**Appendix B** of **Volume A**). No negative environmental effects on these features are anticipated during the operational phase of the HIWEC.

Note that this section discusses non-Species at Risk (SAR) species. Please refer to **Section 6** for potential effects and proposed mitigation for SAR species.

**Table 5-2: Potential Effects and Mitigation Measures Associated with Generalized Candidate Important Wildlife Habitat Features**

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>Disturbance to wildlife due to construction activities, including noise and vibration from sub-surface excavation activities (e.g., blasting).</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>Reduce blasting footprint to the extent possible and undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li> <li>Blasting will not be undertaken within vegetated habitats that have not been removed.</li> <li>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:               <ul style="list-style-type: none"> <li>Complete pre-blasting search and rescue of wildlife by a qualified Biologist;</li> <li>Follow proper drilling, explosive handling and loading procedures;</li> <li>Implement safe handling and storage procedures for all materials, including soluble substances used for blasting;</li> <li>Use blasting mats over top of holes to minimize scattering of blast debris around the area;</li> <li>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</li> <li>Remove all blasting debris and other associated equipment / products from the blast area.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> </ul>
<ul style="list-style-type: none"> <li>Loss and fragmentation of wildlife habitat due to construction.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss and fragmentation of wildlife habitat to the extent possible.</li> </ul>	<ul style="list-style-type: none"> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>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.</li> <li>Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained where feasible.</li> <li>Where excavation for construction of access roads, WTGs or collector lines is conducted within the rooting zone of trees (e.g., within 5 m of the dripline), implement proper root pruning measures to protect tree roots.</li> </ul>	<ul style="list-style-type: none"> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated areas will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Prune any damaged trees through application of proper arboricultural techniques, under supervision of an Arborist or Forester.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>Disturbance and possible mortality to terrestrial wildlife due to vegetation clearing.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance and avoid mortality of wildlife.</li> </ul>	<ul style="list-style-type: none"> <li>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 <i>Migratory Birds Convention Act</i> (MBCA):               <ul style="list-style-type: none"> <li>A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>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).</li> <li>Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>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.</li> </ul> </li> <li>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:               <ul style="list-style-type: none"> <li>Construction will avoid nesting areas where possible;</li> <li>In areas that are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (GBBR, date unknown);</li> <li>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, date unknown);</li> <li>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</li> <li>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.</li> </ul> </li> <li>Stockpile areas placed prior to June 30 (turtle egg laying period; GBBR, date unknown) 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 placed after June 30 do not require assessment or installation of exclusionary fencing as this is after the typical period for turtle egg laying.</li> <li>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, date unknown), within aquatic habitats or wetlands.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible.</li> <li>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.</li> </ul> <p>* 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.</p>	<ul style="list-style-type: none"> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated wetlands will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>

**Table 5-2: Potential Effects and Mitigation Measures Associated with Generalized Candidate Important Wildlife Habitat Features**

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
<ul style="list-style-type: none"> <li>Mortality to wildlife as result of vehicles using access roads.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of wildlife on access roads.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, whenever possible.</li> <li>Ecopassages or designated movement corridors should be considered in areas of high reptile activity or abundance, to limit road mortality.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Install exclusionary 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.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>Increased erosion and sedimentation into wildlife habitat resulting from construction activity.</li> <li>Removal / disturbance of topsoil and increased soil compaction within wildlife habitat from manoeuvring of heavy machinery, excavation, backfilling, and other construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize erosion and sedimentation into wildlife habitat.</li> <li>Minimize removal / disturbance of topsoil and minimize soil compaction within wildlife habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Develop and implement an Erosion and Sediment Control Plan.</li> <li>Utilize erosion blankets, sediment control fencing, straw bale etc. for construction activities in areas where there is erosion and sedimentation potential near a wetland, woodland or waterbody.</li> <li>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.</li> <li>Maintain undisturbed buffer strips greater than 30 m in width around watercourses, where possible, except where access roads approach water crossings.</li> <li>Store stockpiled material at least 30 m from a wetland or waterbody.</li> <li>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.</li> <li>Minimize the size of cleared areas to limit the area of exposed soil.</li> <li>Re-vegetate or stabilize exposed sites as soon as possible following disturbance using species native to the area to limit the duration of soil exposure.</li> <li>Divert access road runoff through drainage ditches directed into vegetated areas or through environmental protection measures (such as sediment traps, rock flow check dams, sediment barriers etc.) to ensure that exposed soils or road materials are not transported into waterbodies or wetlands. Ditches &gt;5% in slope may require lining with appropriate sized rip rap to protect against erosion and also slow the flow velocity.</li> <li>Grade disturbed / remediated slopes or stockpiles to a stable angle to avoid slope instability and reduce erosion.</li> <li>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.</li> <li>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.</li> <li>Keep all equipment within identified work areas to minimize disturbance of adjacent soils.</li> <li>Restrict construction equipment to designated controlled vehicle access routes to minimize the potential for soil compaction and to minimize vehicle traffic on exposed and / or sensitive soils.</li> <li>Routine visual inspections of sediment and erosion control devices for effectiveness.</li> <li>Repair and maintenance to sediment and erosion control devices performed regularly.</li> <li>Undertake blasting operations in accordance with relevant federal and provincial guidelines and standards.</li> <li>Investigate alternative rock-excavating techniques (i.e., mechanical means) where possible.</li> <li>Develop and implement a Blasting Plan that includes standard BMPs to minimize extent of adverse noise, vibration and slope instability from blasting, including:             <ul style="list-style-type: none"> <li>Follow proper drilling, explosive handling and loading procedures;</li> <li>Implement safe handling and storage procedures for all material, including soluble substances used for blasting;</li> <li>Use blasting mats over top of holes to minimize scattering of blast debris around the area;</li> <li>Reduce blasting footprint to the extent possible;</li> <li>Ensure the order of firing is correct to minimize the frequency of blasts;</li> <li>Remove all blasting debris and other associated equipment / products from the blast area.</li> </ul> </li> <li>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.</li> <li>Routine visual inspections for slope instability performed during and after blasting operations.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor on-site conditions (i.e., erosion and sediment control, flooding, etc.) where construction occurs within 30 m of an IWH by an Environmental Monitor on the following basis:             <ul style="list-style-type: none"> <li>Weekly during active construction periods (or daily where construction occurs within 5 m of an IWH);</li> <li>Prior to, during and post forecasted large rainfall events (&gt;20 millimetres in 24 hours) or significant snowmelt events (i.e., spring freshet);</li> <li>Daily during extended rain or snowmelt periods;</li> <li>Increased vigilance will be given to sediment and erosion control materials installed on bedrock to ensure proper functioning during large rainfall events.</li> <li>Monthly during inactive construction periods, where the site is left alone for 30 days or longer.</li> </ul> </li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>If the amount of sediment being released into the environment is not being contained by the primary mitigation measure, other sediment and erosion control measures should be employed to increase effectiveness of the erosion and sediment controls in place. Suspend work if excessive flows of sediment discharges occur until additional mitigation measures are in place.</li> </ul> </li> </ul>

**Table 5-2: Potential Effects and Mitigation Measures Associated with Generalized Candidate Important Wildlife Habitat Features**

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
<ul style="list-style-type: none"> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize damage to wildlife habitat from soil or water contamination.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example:               <ul style="list-style-type: none"> <li>▪ 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).</li> <li>▪ Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards).</li> <li>▪ Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li> <li>▪ Training requirements for operational staff on associated emergency response plan and spill clean-up procedures.</li> <li>▪ 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).</li> <li>▪ Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers.</li> </ul> </li> <li>• Apply the following general mitigation measures to avoid soil contamination:               <ul style="list-style-type: none"> <li>▪ Ensure machinery is maintained free of fluid leaks.</li> <li>▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.</li> <li>▪ All potentially hazardous materials to be stored in containment sites within the Operations and Maintenance Building, within berms where possible.</li> </ul> </li> <li>• Keep ROW for access roads, collector lines / on-reserve transmission lines and WTGs clear of garbage and debris.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor to conduct routine inspections of construction equipment for leaks / spills.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ If a spill enters a wetland:               <ul style="list-style-type: none"> <li>○ Collect and analyze water samples for comparison with appropriate parameters.</li> <li>○ Monitor daily until cleanup is completed or a Biologist determines that contaminant levels are below thresholds which may affect wetland form or function. If this is not possible, Environment Canada and HIFN will be contacted regarding additional mitigation measures that may be required.</li> </ul> </li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize changes in surface water drainage patterns and obstruction of lateral flows in surface water to wildlife habitat in wetlands.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure BMPs are used to maintain current drainage patterns, including:               <ul style="list-style-type: none"> <li>▪ Minimize paved surfaces and design roads to promote infiltration;</li> <li>▪ Limit changes in land contours to the maximum extent possible; and</li> <li>▪ Ensure roadway culverts are designed and installed to maintain existing drainage patterns.</li> </ul> </li> <li>• Where the installation of a flow equalizing culvert is proposed, appropriate erosion control measures (i.e., rip rap, seeding) will be installed at the ends of each culvert to prevent erosion which can change land contours.</li> </ul>	<ul style="list-style-type: none"> <li>• Inspect locations following completion of culvert installations by an Environmental Monitor to ensure no changes in drainage patterns.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ If surface water drainage alterations are detected, undertake corrective measures to restore drainage pattern.</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• Reductions in groundwater recharge quantities into wildlife habitat in wetlands due to increases in impervious surfaces.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize reductions in groundwater recharge.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a Spill Prevention and Response Plan outlining steps to prevent and contain any chemicals and to avoid soil contamination. This plan will include, for example:               <ul style="list-style-type: none"> <li>▪ In the event of a contaminant spill all work will stop in the immediate area until the spill is cleaned up.</li> <li>▪ Spill control and containment equipment / materials shall be readily available on site.</li> <li>▪ Protocols for access to additional spill clean-up materials if needed.</li> <li>▪ Contaminated materials to be handled in accordance with relevant federal and provincial guidelines and standards.</li> <li>▪ Including the use of Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li> <li>▪ Proper training of construction staff on associated emergency response and spill clean-up procedures.</li> <li>▪ Spills to be cleaned up as soon as possible, with contaminated soils removed to a licenced disposal site, if required.</li> <li>▪ Materials contained in spill clean-up kits are restocked as necessary.</li> <li>▪ Any soil encountered during excavation that has visual staining or odours, or contains rubble, debris, cinders or other visual evidence of impacts to be analyzed to determine its quality in order to identify the appropriate disposal method.</li> <li>▪ To include reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers.</li> </ul> </li> <li>• Apply the following general mitigation measures to avoid soil contamination:               <ul style="list-style-type: none"> <li>▪ Ensure machinery is maintained free of fluid leaks.</li> <li>▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.</li> </ul> </li> <li>• Undertake waste management in accordance with relevant federal and provincial guidelines and standards and construction site to be kept clear of garbage and debris.</li> <li>• 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.</li> <li>• Minimize paved surfaces and design roads to promote groundwater infiltration.</li> <li>• Implement groundwater infiltration techniques to the maximum extent possible. Examples include:               <ul style="list-style-type: none"> <li>▪ Releasing water to vegetated areas after applying appropriate water quality and temperature controls;</li> <li>▪ Lining ditches with permeable material (rather than clay, for example); and</li> <li>▪ Groundwater should remain on site and not disposed of off-site (unless contaminated).</li> </ul> </li> <li>• Where possible, direct groundwater discharge water to natural infiltration systems after applying appropriate water quality and temperature controls.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event of a reduction in wetland water level and / or water quantity, corrective will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>

**Table 5-2: Potential Effects and Mitigation Measures Associated with Generalized Candidate Important Wildlife Habitat Features**

Potential Effect	Performance Objective(s)	Proposed Mitigation Measures	Monitoring Plan and Contingency Measures
<ul style="list-style-type: none"> <li>Habitat change and increased mortality to wildlife due to construction dewatering activities and associated dewatering discharge.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize habitat change and avoid wildlife mortality due to construction dewatering activities.</li> </ul>	<ul style="list-style-type: none"> <li>During turtle and snake hibernation period (October 15 to April 30; GBBR, date unknown), where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:                             <ul style="list-style-type: none"> <li>Area will be monitored to observe any drawdown; and</li> <li>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.</li> </ul> </li> <li>Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided.</li> <li>Limit duration of dewatering to as short a time frame as possible.</li> <li>Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible.</li> <li>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).</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li><b>Contingency Measures:</b></li> <li>In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul>

### 5.2.2 Potential Effects on Important Wildlife Habitat Features

This section describes potential environmental effects of the HIWEC on IWH features during its construction, operational and decommissioning phases. The following IWH features were identified within 120 m of the HIWEC location:

- Bat Hibernacula;
- Bat Maternity Colonies;
- Turtle Wintering Areas;
- Reptile Hibernacula;
- Deer Yarding Areas;
- Cliffs and Talus Slopes;
- Precambrian Rock Barrens;
- Sand Barrens;
- Old-growth Forest;
- Bogs;
- Waterfowl Nesting Areas;
- Bald Eagle and Osprey Nesting, Foraging and Perching Habitat;
- Woodland Raptor Nesting Habitat;
- Turtle and Lizard Nesting Areas;
- Seeps and Springs;
- Aquatic Feeding Habitat;
- Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf;
- Amphibian Breeding Habitat (Woodland and Wetland);
- Mast Producing Areas;
- Marsh Bird Breeding Habitat;
- Habitat for Specific SOCC, including:
  - Black Tern;
  - Eastern Wood-pewee;
  - Prairie Warbler;
  - Wood Thrush;
  - Yellow Rail;
  - Horned Clubtail;
  - Mottled Darner;
  - Pine Imperial Moth;
  - Eastern Wolf;
  - Common Five-linked Skink;
  - Eastern Ribbonsnake;
  - Milksnake;
  - Northern Map Turtle; and
  - Snapping Turtle.

Potential negative environmental effects and mitigation measures that apply generally to all IWH features are described in **Table 5-2** above. Additional potential negative environmental effects of the HIWEC on specific IWH features are described in **Table 5-3** below. Where the HIWEC location is proposed within these IWH features or in areas adjacent to IWH features, additional mitigation measures have been identified to address the potential negative environmental effects associated with construction, operation and decommissioning in **Table 5-3** below. The mitigation measures in this table are also described in the Construction Plan Report (**Appendix B of Volume A**) and the Description Report (**Appendix A of Volume A**).

Note that this section discusses non-Species at Risk (SAR) species. Please refer to **Section 6** for potential effects and proposed mitigation for SAR species.



**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
Bat Hibernacula <sup>2</sup>	<b>Construction / Decommissioning</b> <ul style="list-style-type: none"> <li>Disturbance to bat hibernaculum habitat.</li> <li>Increased mortality risk to bats.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to bat hibernaculum habitat.</li> <li>Avoid mortality of bats.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Entrance of any site personnel into the cave will be prohibited at all times (MNRF, 1984).</li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to:                             <ul style="list-style-type: none"> <li>Suitable blasting timing windows within 1 km of bat hibernacula;</li> <li>Appropriate blasting setbacks to bat hibernacula habitat; and</li> <li>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).</li> </ul> </li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>
	<b>Operation</b> <ul style="list-style-type: none"> <li>Possible mortality of swarming bats resulting from operating WTGs.</li> <li>Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize risk of WTG related mortality.</li> <li>Minimize disturbance to bat hibernacula.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks for bat collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Bats and Bat Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011b).</li> <li>Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including:                             <ul style="list-style-type: none"> <li>Conduct two (2) years of post-construction disturbance effects monitoring at bat hibernacula feature BH-004 following pre-construction (2015) survey methods;</li> <li>Include WTGs adjacent to bat hibernacula feature BH-004 in the post-construction mortality monitoring program; and</li> <li>Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> </li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>In the event that, after two (2) years, bat acoustic monitoring surveys indicate notable changes in bat populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</li> </ul> </li> </ul>
Bat Maternity Colonies	<b>Construction / Decommissioning</b> <ul style="list-style-type: none"> <li>Removal of suitable cavity trees in bat maternity colony features.</li> <li>Displacement and / or mortality of nursing female and juvenile bats.</li> <li>Noise and / or light disturbance to bats during construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to bat maternity colony habitat.</li> <li>Avoid displacement and / or mortality of nursing female and juvenile bats.</li> <li>Minimize noise and / or light disturbance to bats during construction.</li> </ul>	<ul style="list-style-type: none"> <li>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.                             <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>

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 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Possible mortality of bats resulting from operating WTGs.</li> <li>• Avoidance behaviour and / or habitat degradation caused by turbine lighting and / or noise.</li> <li>• Bat mortality resulting from removal of cavity trees during routine maintenance of access roads, collector lines or transmission line.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize risk of WTG related mortality.</li> <li>• Minimize disturbance to bat maternity colonies.</li> <li>• Avoid bat mortality from vegetation removal during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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).</li> <li>• 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 project 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.</li> <li>• 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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Bats and Bat Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011b).</li> </ul>	<ul style="list-style-type: none"> <li>• If suitable bat maternity habitats are removed during construction activities:                         <ul style="list-style-type: none"> <li>▪ Re-vegetation, habitat rehabilitation, and off-site habitat creation will be considered.</li> <li>▪ Propose re-vegetation and habitat rehabilitations, or possibly artificial roost creation, such as bat houses or artificial bark.</li> </ul> </li> <li>• Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including:                         <ul style="list-style-type: none"> <li>▪ Pre-construction bat acoustic monitoring surveys completed in 2011 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area;</li> <li>▪ Include WTGs adjacent to bat maternity colony features in the post-construction mortality monitoring program; and</li> <li>▪ Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> </li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>▪ In the event that, after two (2) years, bat acoustic monitoring surveys indicate notable changes in bat populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</li> </ul> </li> </ul>
<p><b>Turtle Wintering Areas<sup>1</sup></b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Possible mortality of turtles within turtle wintering areas, or moving between turtle wintering areas and other areas.</li> <li>• Disturbance to turtles within wintering areas, or moving between turtle wintering areas and other areas.</li> <li>• Loss and / or habitat degradation of turtle wintering habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid mortality of turtles.</li> <li>• Minimize disturbance to turtles.</li> <li>• Minimize loss and / or degradation of turtle wintering habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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, date unknown), within aquatic habitats or wetlands.</li> <li>• During the turtle hibernation period (October 15 to April 30; GBBR, date unknown) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:                         <ul style="list-style-type: none"> <li>▪ Area will be monitored to observe any drawdown; and</li> <li>▪ 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.</li> </ul> </li> <li>• Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided.</li> <li>• Limit duration of dewatering to as short a time frame as possible.</li> <li>• Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible.</li> <li>• 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).</li> <li>• Develop and implement a Blasting Plan that might include, but will not be limited to:                         <ul style="list-style-type: none"> <li>▪ Pre-blast search and species relocations;</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li>• Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>• In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>▪ Suitable blasting timing windows;</li> <li>▪ Appropriate blasting setbacks to turtle habitat; and</li> <li>▪ 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).</li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• 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.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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.</li> </ul>	
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Disturbance to turtles within wintering areas, or moving between turtle wintering areas and other areas.</li> <li>• Risk of road mortality to turtles moving between turtle wintering areas and other areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize disturbance to turtles.</li> <li>• Avoid turtle mortality on access roads.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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, date unknown) 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:               <ul style="list-style-type: none"> <li>▪ In the case a turtle is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest turtle trauma centre.</li> </ul> </li> <li>• 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.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>• While accessing the site to conduct turtle surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>• The 2-year report will be provided to HIFN and EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event that, after two (2) years, herpetofauna surveys indicate notable changes in turtle populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> </ul> </li> </ul>
<p><b>Reptile Hibernacula<sup>1</sup></b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Possible mortality of snakes within reptile hibernacula, or moving between reptile hibernacula and other areas.</li> <li>• Disturbance to snakes within reptile hibernacula, or moving between reptile hibernacula and other areas.</li> <li>• Loss and / or habitat degradation of reptile hibernacula.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid mortality of snakes.</li> <li>• Minimize disturbance to snakes.</li> <li>• Minimize loss and / or degradation of reptile hibernacula habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• During the active reptile period, from April 30 to October 15 (GBBR, date unknown), a trained Rattlesnake Monitor will complete area searches immediately prior to vegetation removal and blasting to identify any snake activity.</li> <li>• 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.</li> <li>• 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, date unknown), within aquatic habitats or wetlands.</li> <li>• During the snake hibernation period (October 15 to April 30; GBBR, date unknown) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:               <ul style="list-style-type: none"> <li>▪ Area will be monitored to observe any drawdown; and</li> <li>▪ 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.</li> </ul> </li> <li>• Develop and implement a Blasting Plan that might include, but will not be limited to:               <ul style="list-style-type: none"> <li>▪ Pre-blast search and species relocations;</li> <li>▪ Suitable blasting timing windows;</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li>• Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>▪ Appropriate blasting setbacks to snake habitat; and</li> <li>▪ 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.</li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• 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.</li> <li>• Ecopassages or designated movement corridors will be considered in areas of high snake activity or abundance, to limit road mortality.</li> <li>• Install exclusionary fencing during construction / decommissioning within areas (where feasible) of concentrated snake activity to limit road and construction-related mortality.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Possible snake mortality from vehicles using access roads.</li> <li>• Disturbance of hibernating snakes caused by routine maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize snake mortality on access road.</li> <li>• Minimize disturbance to reptile hibernacula.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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, date unknown) 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: <ul style="list-style-type: none"> <li>▪ In the case a snake is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre.</li> </ul> </li> <li>• 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.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the areas of the HIWEC study area.</li> <li>• While accessing the site to conduct snake surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>• The 2-year report will be provided to HIFN and EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event that, after two (2) years, herpetofauna surveys indicate notable changes in snake populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> </ul> </li> </ul>
<p><b>Deer Yarding Areas</b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Loss and / or degradation of deer yarding areas resulting from construction activities.</li> <li>• Disturbance to wintering deer.</li> <li>• Possible mortality of deer from construction activities.</li> </ul> <p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Possible mortality of deer moving in / out of deer yarding areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize loss and / or degradation of deer yarding areas.</li> <li>• Minimize disturbance to wintering deer.</li> <li>• Avoid mortality of deer.</li> </ul> <p>• Avoid mortality of deer.</p>	<ul style="list-style-type: none"> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• Even though MNR states that to ensure adequate cover, at least 30% of the deer yarding areas will not be removed (MNR, 2010), only up to 7% of deer yarding areas will be removed.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.</li> </ul>	<ul style="list-style-type: none"> <li>• Deer are highly mobile animals that are usually able to move away from areas or periods of disturbance, therefore no monitoring or contingency measures are required. Deer will likely return to these areas when construction disturbance has ended.</li> <li>• No monitoring or contingency measures required.</li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<b>Cliffs and Talus Slopes</b>	<b>Construction / Decommissioning</b> • Loss and / or degradation of cliffs and talus slopes resulting from construction activities.	• Minimize loss and / or degradation of cliffs and talus slopes.	<ul style="list-style-type: none"> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• Where possible, avoid construction activities within the boundaries of cliffs and talus slopes.</li> <li>• Where construction must occur within cliffs and talus slopes: <ul style="list-style-type: none"> <li>▪ The topsoil / seedbank (if present) will be stripped prior to construction, preserved during construction and reapplied in suitable rehabilitation areas post construction.</li> <li>▪ 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).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>
	<b>Operation</b> • No effects on cliffs and talus slopes anticipated during operation.	• None required.	• None required.	• No monitoring or contingency measures required.
<b>Precambrian Rock Barrens</b>	<b>Construction / Decommissioning &amp; Operation</b> • 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 or operation phases.			
<b>Sand Barrens</b>	<b>Construction / Decommissioning</b> • Loss and / or degradation of sand barrens resulting from construction activities.	• Minimize loss and / or degradation of sand barrens.	<ul style="list-style-type: none"> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• Where possible, avoid construction activities within the boundaries of sand barrens.</li> <li>• Site transmission line poles outside the boundaries of sand barren feature SB-002, if possible.</li> <li>• Where construction must occur within sand barrens: <ul style="list-style-type: none"> <li>▪ The topsoil / seedbank will be stripped prior to construction, preserved during construction and reapplied in suitable rehabilitation areas post construction.</li> <li>▪ Avoid the use of heavy machinery within sand barren communities to the extent possible.</li> <li>▪ Rehabilitation activities will be initiated within all temporary construction / decommissioning areas within one (1) year of the completion of the construction / decommissioning phase.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>
	<b>Operation</b> • 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.	<ul style="list-style-type: none"> <li>• Avoid the use of heavy machinery within sand barrens during maintenance activities to the extent possible.</li> <li>• Pesticides will not be used to maintain vegetation within sand barrens.</li> </ul>	• No monitoring or contingency measures required.
<b>Old-growth Forest<sup>1</sup></b>	<b>Construction / Decommissioning</b> • Permanent removal of old-growth forest.	• Minimize removal of old-growth forest.	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Where potential old-growth forests are confirmed through the pre-construction field surveys: <ul style="list-style-type: none"> <li>▪ Avoid construction within old-growth forests to the extent possible.</li> <li>▪ 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, turbine 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.</li> <li>▪ Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained where feasible.</li> <li>▪ Delineate construction footprint area within old-growth forests.</li> <li>▪ Ensure that no vegetation removal or damage occurs outside of the construction footprint area.</li> <li>▪ 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.</li> </ul> </li> </ul>	• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.
	<b>Operation</b> • Introduction and / or spread of invasive species in old-growth forest.	• Prevent the establishment and / or spread of invasive species in old-growth forest.	<ul style="list-style-type: none"> <li>• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist.</li> <li>• Vegetation trimming will be limited to within areas that have been cleared during construction.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitor old-growth forests once per growing season for two (2) years to confirm introduction of invasive species has not occurred.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Should invasive species introduction occur, corrective actions to remove and reduce the spread of these species will be undertaken. Habitat rehabilitation will occur.</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<b>Bogs</b>	<b>Construction / Decommissioning &amp; Operation</b>			
<b>Waterfowl Nesting Areas<sup>1</sup></b>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>Possible mortality of nesting waterfowl.</li> <li>Disturbance and / or displacement of nesting waterfowl resulting from noise and / or vibration from construction activities.</li> <li>Loss and / or degradation of waterfowl nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of nesting waterfowl.</li> <li>Minimize disturbance and / or displacement of nesting waterfowl.</li> <li>Minimize loss and / or degradation of waterfowl nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>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 <i>Migratory Birds Convention Act</i> (MBCA): <ul style="list-style-type: none"> <li>A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>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);</li> <li>Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>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.</li> </ul> </li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to: <ul style="list-style-type: none"> <li>Suitable blasting timing windows;</li> <li>Appropriate blasting setbacks to bird habitat; and</li> <li>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).</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul> <p>* 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.</p>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Disturbance and / or displacement of waterfowl in nesting habitat during operation.</li> <li>Possible mortality of waterfowl resulting from operating WTGs.</li> <li>Possible mortality or disturbance to nesting waterfowl resulting from vegetation clearing during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance and / or displacement of waterfowl from nesting habitat.</li> <li>Minimize risk of WTG related waterfowl mortality.</li> <li>Avoid mortality and minimize disturbance to nesting waterfowl during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>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 <i>Migratory Birds Convention Act</i> (MBCA) and the Wildlife Management Plan: <ul style="list-style-type: none"> <li>Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance.</li> <li>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.</li> <li>If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of project 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</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including: <ul style="list-style-type: none"> <li>Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area;</li> <li>Include WTGs adjacent to waterfowl nesting areas in the post-construction mortality monitoring program; and</li> <li>Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> </li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS and</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<p>site-specific basis.</p> <ul style="list-style-type: none"> <li>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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011a).</li> <li>Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	<p>HIFN will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</p>
<p><b>Bald Eagle and Osprey Nesting, Foraging and Perching Habitat</b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>Possible mortality of Osprey.</li> <li>Disturbance and / or displacement of Osprey resulting from noise and / or vibration from construction activities.</li> <li>Loss and / or degradation of Osprey nesting, foraging and perching habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of Osprey.</li> <li>Minimize disturbance and /or displacement of Osprey.</li> <li>Minimize loss and / or degradation of Osprey nesting, foraging and perching habitat.</li> </ul>	<ul style="list-style-type: none"> <li>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. <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul> </li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to: <ul style="list-style-type: none"> <li>Suitable blasting timing windows;</li> <li>Appropriate blasting setbacks to bird habitat; and</li> <li>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).</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>If an active Osprey nest is found, a buffer area will be implemented around the nest. The radius of the buffer will range depending on the 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).</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Disturbance and / or displacement of Osprey during operation.</li> <li>Possible mortality of Osprey from operating WTGs.</li> <li>Possible mortality of Osprey resulting from collisions with the transmission line.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance and / or displacement of Osprey.</li> <li>Minimize risk of Osprey mortality from of WTGs, collector lines or the transmission line.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNRF, 2011a).</li> </ul>	<ul style="list-style-type: none"> <li>Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including: <ul style="list-style-type: none"> <li>Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area;</li> <li>Include WTGs adjacent to Osprey nests in the post-construction mortality monitoring program; and</li> <li>Report the findings of the post-construction monitoring</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> <li>Bird diverters / anti-perching devices should be considered in areas of Osprey nests along the on-reserve transmission line to minimize potential collisions.</li> </ul>	<p>program to EC-CWS and HIFN on an annual basis.</p> <ul style="list-style-type: none"> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS and HIFN will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</li> </ul> </li> </ul>
<p><b>Woodland Raptor Nesting Habitat<sup>1</sup></b></p>	<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>Possible mortality of nesting raptors.</li> <li>Disturbance and / or displacement of nesting raptors resulting from noise and / or vibration from construction activities.</li> <li>Loss and / or degradation of woodland raptor nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of nesting raptors.</li> <li>Minimize disturbance and /or displacement of nesting raptors.</li> <li>Minimize loss and / or degradation of woodland raptor nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>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 <i>Migratory Birds Convention Act</i> (MBCA): <ul style="list-style-type: none"> <li>A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>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);</li> <li>Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>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.</li> </ul> </li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to: <ul style="list-style-type: none"> <li>Suitable blasting timing windows;</li> <li>Appropriate blasting setbacks to bird habitat; and</li> <li>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).</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul> <p>* 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.</p>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Disturbance and / or displacement of nesting raptors during operation.</li> <li>Possible mortality of raptors from operating WTGs.</li> <li>Possible mortality of raptors resulting from collisions with the</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance and / or displacement of nesting raptors.</li> <li>Minimize risk of raptor mortality from of WTGs, collector lines or the transmission line.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A</i></li> </ul>	<ul style="list-style-type: none"> <li>Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including: <ul style="list-style-type: none"> <li>Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>Include WTGs adjacent to confirmed raptor nests in the post-</li> </ul> </li> </ul>



**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
	transmission line.		<p><i>Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNR, 2011a).</p> <ul style="list-style-type: none"> <li>Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> <li>Bird diverters / anti-perching devices should be considered in areas of confirmed raptor nests along the on-reserve transmission line to minimize potential collisions.</li> </ul>	<p>construction mortality monitoring program; and</p> <ul style="list-style-type: none"> <li>Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> <p><b>Contingency Measures:</b></p> <ul style="list-style-type: none"> <li>Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS and HIFN will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</li> </ul>
<p><b>Turtle and Lizard Nesting Areas</b></p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>Possible mortality of turtles within turtle nesting areas, or moving between turtle nesting areas and other areas.</li> <li>Disturbance to turtles within nesting areas, or moving between turtle nesting areas and other areas.</li> <li>Loss and / or habitat degradation of turtle nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of turtles.</li> <li>Minimize disturbance to turtles.</li> <li>Minimize loss and / or degradation of turtle nesting habitat.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>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:             <ul style="list-style-type: none"> <li>Construction will avoid nesting areas where possible;</li> <li>In areas are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (GBBR, date unknown);</li> <li>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, date unknown);</li> <li>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</li> <li>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.</li> </ul> </li> <li>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.</li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to:             <ul style="list-style-type: none"> <li>Pre-blast search and species relocations;</li> <li>Suitable blasting timing windows;</li> <li>Appropriate blasting setbacks to turtle habitat; and</li> <li>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).</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Ecopassages or designated movement corridors will be considered in areas of high turtle activity or abundance, to limit road mortality.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Disturbance to turtles within nesting areas, or moving between turtle nesting areas and other areas.</li> <li>Risk of road mortality to turtles moving between turtle nesting areas and other areas.</li> <li>Disturbance and / or degradation of turtle nesting habitat during maintenance of the transmission line.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to turtles.</li> <li>Avoid turtle mortality on access roads.</li> <li>Minimize disturbance and / or degradation of turtle nesting habitat during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 30; GBBR, unknown).</li> <li>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.</li> <li>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.</li> <li>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.</li> <li>Pesticides will not be used to maintain vegetation within the sand barren community associated with turtle nesting feature TLN-001.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>While accessing the site to conduct turtle surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>In the event that, after two (2) years, herpetofauna surveys indicate notable changes in turtle populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> </ul> </li> </ul>
<b>Seeps and Springs</b>	<p><b>Construction / Decommissioning &amp; Operation</b></p> <ul style="list-style-type: none"> <li>Refer to the Water Assessment and Water Bodies Report (<b>Appendix H of Volume A</b>) for mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for seeps and springs.</li> </ul>			
<b>Aquatic Feeding Habitat</b>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>Loss and / or degradation of aquatic feeding habitats resulting from construction activities.</li> <li>Disturbance to moose or deer from construction activities.</li> <li>Possible mortality of moose or deer from construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss and / or degradation of aquatic feeding habitat.</li> <li>Minimize disturbance to moose or deer.</li> <li>Avoid mortality of moose or deer.</li> </ul>	<ul style="list-style-type: none"> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Moose and deer are highly mobile animals that are usually able to move away from areas or periods of disturbance, therefore no monitoring is required. Moose and deer will likely return to these areas when construction disturbance has ended.</li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Possible mortality of moose or deer moving between aquatic feeding habitats and other areas.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of moose or deer.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>Restrict public use of access roads to minimize risk of road mortality through installation of access gate with operations staff throughout the site.</li> </ul>	<ul style="list-style-type: none"> <li>No monitoring or contingency measures required.</li> </ul>
<b>Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf</b>	<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>Loss and / or degradation of denning sites resulting from construction activities.</li> <li>Disturbance to Fisher or Eastern Wolf from construction activities.</li> <li>Possible mortality of Fisher or Eastern Wolf from construction activities.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss and / or degradation of denning sites.</li> <li>Minimize disturbance to Fisher or Eastern Wolf.</li> <li>Avoid mortality of Fisher or Eastern Wolf.</li> </ul>	<ul style="list-style-type: none"> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.                             <ul style="list-style-type: none"> <li>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.</li> <li>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.</li> <li>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.</li> </ul> </li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Prior to construction activities within 200 m of an identified Eastern Wolf den, the activity of the den will be confirmed by a qualified Biologist.</li> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>No effects on denning sites during operation.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>	<ul style="list-style-type: none"> <li>No monitoring or contingency measures required.</li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<b>Amphibian Breeding Habitat (Woodland and Wetland)</b>	<b>Construction / Decommissioning</b> <ul style="list-style-type: none"> <li>Possible mortality of amphibians within breeding habitat, or moving between breeding habitat and other areas.</li> <li>Disturbance to amphibians within breeding habitat, or moving between breeding habitat and other areas.</li> <li>Loss and / or habitat degradation of amphibian breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of amphibians.</li> <li>Minimize disturbance to amphibians.</li> <li>Minimize loss and / or degradation of amphibian breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Ecopassages or designated movement corridors should be considered in areas of high amphibian activity or abundance, to limit road mortality.</li> </ul>	<ul style="list-style-type: none"> <li>If construction must occur at night within 30 m of amphibian breeding habitats between April 1 and June 30 due to a critical phase of construction, work may be permitted if conditions for amphibian breeding are marginal. The Environmental Monitor will track weather conditions and determine if suitable amphibian breeding conditions are present.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> </ul>
	<b>Operation</b> <ul style="list-style-type: none"> <li>Disturbance to amphibians within breeding areas, or moving between breeding areas and other areas.</li> <li>Risk of road mortality to amphibians moving between breeding areas and other areas.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize disturbance to amphibians.</li> <li>Avoid amphibian mortality on access roads.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Pre-construction amphibian surveys completed in 2015 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>While accessing the site to conduct amphibian surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>In the event that, after two (2) years, amphibian surveys indicate notable changes in amphibian populations, HIFN and EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> </ul> </li> </ul>
<b>Mast Producing Areas</b>	<b>Construction / Decommissioning</b> <ul style="list-style-type: none"> <li>Permanent removal of mast producing areas.</li> </ul>	<ul style="list-style-type: none"> <li>Minimize removal of mast producing areas.</li> </ul>	<ul style="list-style-type: none"> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>Fell trees toward the construction footprint area to reduce damage to adjacent vegetation being retained.</li> <li>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.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>
	<b>Operation</b> <ul style="list-style-type: none"> <li>No effects on mast producing areas anticipated during operation.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>	<ul style="list-style-type: none"> <li>None required.</li> </ul>	<ul style="list-style-type: none"> <li>No monitoring or contingency measures required.</li> </ul>
<b>Marsh Bird Breeding Habitat<sup>1</sup></b>	<b>Construction / Decommissioning</b> <ul style="list-style-type: none"> <li>Possible mortality of marsh breeding birds.</li> <li>Disturbance and / or displacement of marsh breeding birds resulting from noise and / or vibration from construction activities.</li> <li>Loss and / or degradation of marsh bird breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Avoid mortality of marsh breeding birds.</li> <li>Minimize disturbance and / or displacement of marsh breeding birds.</li> <li>Minimize loss and / or degradation of marsh bird breeding habitat.</li> </ul>	<ul style="list-style-type: none"> <li>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 <i>Migratory Birds Convention Act</i> (MBCA): <ul style="list-style-type: none"> <li>A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>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);</li> <li>Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>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.</li> </ul> </li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>Develop and implement a Blasting Plan that might include, but will not be limited to: <ul style="list-style-type: none"> <li>Suitable blasting timing windows;</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>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</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>▪ Appropriate blasting setbacks to bird habitat; and</li> <li>▪ 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).</li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• 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.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>* 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.</p>	<p>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.</p>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Disturbance and / or displacement of marsh breeding birds during operation.</li> <li>• Possible mortality of marsh breeding birds resulting from operating WTGs.</li> <li>• Possible mortality or disturbance to marsh breeding birds resulting from vegetation clearing during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize disturbance and / or displacement of marsh breeding birds.</li> <li>• Minimize risk of WTG related marsh breeding bird mortality.</li> <li>• Avoid mortality and minimize disturbance to marsh breeding birds during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>• 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 <i>Migratory Birds Convention Act</i> (MBCA) and the Wildlife Management Plan:             <ul style="list-style-type: none"> <li>▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance.</li> <li>▪ 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.</li> <li>▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of project 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.</li> </ul> </li> <li>• 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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNR, 2011a).</li> <li>• Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>• Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including:             <ul style="list-style-type: none"> <li>▪ Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area;</li> <li>▪ Include WTGs adjacent to marsh bird breeding habitats in the post-construction mortality monitoring program; and</li> <li>▪ Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> </li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>▪ In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS and HIFN will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach.</li> </ul> </li> </ul>
<p><b>Habitat for Avian SOCC (Black Tern, Yellow Rail)<sup>1</sup></b></p>	<p><b>Construction / Decommissioning &amp; Operation</b> Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for <b>Marsh Bird Breeding Habitat</b> as described above.</p>			

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<b>Habitat for Avian SOCC (Eastern Wood-pewee, Prairie Warbler, Wood Thrush)<sup>1</sup></b>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Possible mortality of avian SOCC.</li> <li>• Disturbance and / or displacement of avian SOCC resulting from noise and / or vibration from construction activities.</li> <li>• Loss and / or degradation of avian SOCC habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid mortality of avian SOCC.</li> <li>• Minimize disturbance and / or displacement of avian SOCC. Minimize loss and / or degradation of avian SOCC habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• 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 <i>Migratory Birds Convention Act</i> (MBCA): <ul style="list-style-type: none"> <li>▪ A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>▪ 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);</li> <li>▪ Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>▪ 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.</li> </ul> </li> <li>• Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>• Develop and implement a Blasting Plan that might include, but will not be limited to: <ul style="list-style-type: none"> <li>▪ Suitable blasting timing windows;</li> <li>▪ Appropriate blasting setbacks to bird habitat; and</li> <li>▪ 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).</li> </ul> </li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• 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.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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.</li> </ul> <p>* 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.</p>	<ul style="list-style-type: none"> <li>• An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ 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.</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Disturbance and / or displacement of avian SOCC during operation.</li> <li>• Possible mortality of avian SOCC resulting from operating WTGs.</li> <li>• Possible mortality or disturbance to avian SOCC resulting from vegetation clearing during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize disturbance and / or displacement of avian SOCC.</li> <li>• Minimize risk of WTG related avian SOCC mortality.</li> <li>• Avoid mortality and minimize disturbance to avian SOCC during maintenance activities.</li> </ul>	<ul style="list-style-type: none"> <li>• Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>• 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 <i>Migratory Birds Convention Act</i> (MBCA) and the Wildlife Management Plan: <ul style="list-style-type: none"> <li>▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance.</li> <li>▪ 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.</li> <li>▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of project 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.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Conduct post-construction mortality and disturbance effects monitoring as described in the EEMP, including: <ul style="list-style-type: none"> <li>▪ Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>▪ Include WTGs adjacent to avian SOCC habitat areas in the post-construction mortality monitoring program; and</li> <li>▪ Report the findings of the post-construction monitoring program to EC-CWS and HIFN on an annual basis.</li> </ul> </li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>▪ In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS and HIFN will be consulted to determine if additional mitigation</li> </ul> </li> </ul>

**Table 5-3: Potential Effects and Mitigation Measures Associated with Important Wildlife Habitat Features**

Important Wildlife Habitat (IWH)	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>• 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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a), <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b) as well as <i>Birds and Bird Habitats: Guidelines for Wind Power Projects</i> (MNR, 2011a).</li> <li>• Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>• Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	measures are warranted through an adaptive management approach.
<b>Habitat for Insect SOCC (Horned Clubtail, Mottled Darner)</b>	<b>Construction/ Decommissioning &amp; Operation</b>			
	<ul style="list-style-type: none"> <li>• Refer to <b>Table 4-1</b> for mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for Important Wetlands.</li> </ul>			
<b>Habitat for Insect SOCC (Pine Imperial Moth)</b>	<b>Construction/ Decommissioning &amp; Operation</b>			
	<ul style="list-style-type: none"> <li>• 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 or operation phases.</li> </ul>			
<b>Habitat for Mammal SOCC (Eastern Wolf)</b>	<b>Construction / Decommissioning &amp; Operation</b>			
	<ul style="list-style-type: none"> <li>• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for <b>Denning Sites for Mink, Otter, Marten, Fisher and Eastern Wolf</b> as described above.</li> </ul>			
<b>Habitat for Turtle and Lizard SOCC (Common Five-lined Skink, Northern Map Turtle, Snapping Turtle)<sup>1</sup></b>	<b>Construction/ Decommissioning &amp; Operation</b>			
	<ul style="list-style-type: none"> <li>• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for <b>Turtle Wintering Areas</b> and <b>Turtle and Lizard Nesting Areas</b> as described above.</li> </ul>			
<b>Habitat for Snake SOCC (Eastern Ribbonsnake, Milksnake)<sup>1</sup></b>	<b>Construction / Decommissioning &amp; Operation</b>			
	<ul style="list-style-type: none"> <li>• Refer to the mitigation measures, monitoring and contingency measures to be applied during the construction / decommissioning and operations phases for <b>Reptile Hibernacula</b> as described above.</li> </ul>			

## 6. Federal Species at Risk

Species listed as Endangered and Threatened under Schedule 1 of SARA require protection and are included in this section. In addition, these species may require permits and / or authorization administered by EC-CWS if the proposed HIWEC negatively affects the species or its habitat. Permit requirements, if any, will be determined in consultation with EC-CWS. There is no provincial requirement or guidance for completing an NHA on Federal Species at Risk (SAR); however, these species are included here and duplicated in the main body of the EA Report.

A total of 15<sup>3</sup> Federal SAR were carried forward to the EIS, including:

- Canada Warbler;
- Common Night Hawk;
- Eastern Whip-poor-will;
- Kirtland's Warbler;
- Olive-sided Flycatcher;
- Blanding's Turtle;
- Eastern Musk Turtle;
- Eastern Foxsnake;
- Eastern Hog-nosed Snake;
- Massasauga Rattlesnake;
- Little Brown Bat;
- Northern Myotis;
- Tri-coloured Bat; and
- Branched Bartonia.

Mitigation measures to address potential negative environmental effects of construction, operation and decommissioning of the HIWEC on Federal Species at Risk are presented in **Table 6-1**. This table describes the potential effects, performance objectives, mitigation measures, proposed monitoring plan and contingency measures, as they relate to Federal SAR.

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3. *Records of Species At Risk considered to be restricted are not being made public due to the threat of poaching experienced by these species. These records will be provided under a separate cover to the Ministry of Natural Resources and Forestry (MNR) and / or Environment Canada – Canadian Wildlife Service (EC-CWS) for permitting purposes.*

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<p><b>Avian SAR</b></p> <p><b>Canada Warbler</b> (<i>Cardellina pusilla</i>)</p> <p><b>Common Nighthawk</b> (<i>Chordeiles minor</i>)</p> <p><b>Eastern Whip-poor-will</b> (<i>Caprimulgus vociferous</i>)</p> <p><b>Kirtland's Warbler</b> (<i>Setophaga kirtlandii</i>)</p> <p><b>Olive-sided Flycatcher</b> (<i>Contopus borealis</i>)</p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>Habitat change, including possible damage or destruction of avian SAR residences or avian SAR habitat.</li> <li>Changes in behaviour, due to disturbance of SAR</li> <li>Changes in mortality (including harm),</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss and / or fragmentation of avian SAR habitat.</li> <li>Minimize habitat avoidance and / or noise disturbance to avian SAR.</li> <li>Avoid mortality of avian SAR.</li> </ul>	<ul style="list-style-type: none"> <li>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 <i>Migratory Birds Convention Act</i> (MBCA): <ul style="list-style-type: none"> <li>A qualified Avian Biologist will be on-site during clearing activities to oversee vegetation removal and conduct nest surveys as required;</li> <li>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);</li> <li>Nest surveys will be conducted in areas defined as simple habitat* immediately prior to vegetation clearing; and</li> <li>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.</li> </ul> </li> <li>Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>Develop and implement a SAR Blasting Plan to be submitted to EC-CWS for review, that might include, but will not be limited to: <ul style="list-style-type: none"> <li>Suitable blasting timing windows;</li> <li>Appropriate blasting setbacks to bird habitat;</li> <li>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).</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>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.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include: <ul style="list-style-type: none"> <li>Education of all on-site staff about SAR that may be encountered;</li> <li>Immediate stop in construction activity within 10 m of an observation of a Species at Risk until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction;</li> <li>For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm;</li> <li>Maintain a species observation log to track species observations during the construction / decommissioning phase of the project so that adaptive management can be applied based on species concentrations;</li> <li>All required permits under Section 73(2) of SARA will be obtained prior to handling SAR; and</li> <li>Reporting procedures (e.g., frequency to HIFN and EC-CWS).</li> </ul> </li> <li>Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with possible species encounters.</li> <li>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.</li> </ul> <p>* 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.</p>	<ul style="list-style-type: none"> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>Changes in behaviour, due to disturbance of SAR</li> <li>Changes in mortality (including harm)</li> </ul>	<ul style="list-style-type: none"> <li>Minimize habitat avoidance and /or noise disturbance to avian SAR.</li> <li>Minimize mortality of avian SAR.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize a lighting scheme that will minimize potential risks for bird collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>Vegetation trimming will be limited to areas that have been previously cleared during construction.</li> <li>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 <i>Migratory Birds Convention Act</i> (MBCA) and the Wildlife Management Plan:</li> </ul>	<ul style="list-style-type: none"> <li>Following guidance for Very High Sensitivity (Category 4) sites as per <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b), a minimum of two (2) years of post-construction mortality monitoring will occur at this facility, following Environment Canada's <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (2007).</li> <li>Pre-construction breeding bird surveys completed in 2015, as well as 12 other representative sites at varying distances from the</li> </ul>



**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>▪ Conduct nest and nesting activity surveys by a qualified Avian Biologist immediately prior to vegetation maintenance.</li> <li>▪ 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.</li> <li>▪ If any hazard tree, such as a tree which poses an immediate safety risk to individuals and / or a risk to the functionality of project 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.</li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with species that may be encountered.</li> <li>• 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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a) and <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b).</li> <li>• Report the findings of the post-construction monitoring program to HIFN and EC-CWS as required on an annual basis.</li> <li>• Implement adaptive management techniques, such as operational mitigation as determined appropriate through post-construction monitoring.</li> </ul>	<p>HIWEC location, will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</p> <ul style="list-style-type: none"> <li>• Pre-construction crepuscular bird surveys completed in 2015 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>• The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>▪ In the event that, after two (2) years, breeding bird surveys indicate notable changes in bird populations, EC-CWS will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach. Specific details of the adaptive management framework will be developed in consultation with EC-CWS during the permitting phase and documented in the Environmental Protection Plan.</li> </ul> </li> </ul>
<p><b>Turtle SAR</b></p> <p><b>Blanding's Turtle</b> (<i>Emydoidea blandingii</i>)</p> <p><b>Eastern Musk Turtle</b> (<i>Sternotherus odouratus</i>)</p>	<p><b>Construction / Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Habitat change, including possible damage or destruction of turtle SAR residences or turtle SAR habitat.</li> <li>• Changes in behaviour, due to disturbance of SAR</li> <li>• Changes in mortality (including harm) ,</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize loss and / or fragmentation of turtle SAR habitat.</li> <li>• Minimize habitat avoidance and / or noise disturbance to turtle SAR.</li> <li>• Avoid mortality of turtle SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• 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:             <ul style="list-style-type: none"> <li>▪ Construction will avoid nesting areas where possible;</li> <li>▪ In areas that are unavoidable, exclusionary fencing will be installed prior to the turtle nesting / hatching period of June 1 to September 15 (GBBR, date unknown);</li> <li>▪ 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, date unknown);</li> <li>▪ 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</li> <li>▪ 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.</li> </ul> </li> <li>• 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) that are 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. All required permits under Section 73(2) of SARA will be obtained prior to handling SAR.</li> <li>• Construction activities will not proceed within 30 m of any confirmed turtle nest during the period of June 1 to September 15 (GBBR, date unknown).</li> <li>• 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, date unknown), within aquatic habitats or wetlands.</li> <li>• During the turtle hibernation period (October 15 to April 30; GBBR, date unknown) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:             <ul style="list-style-type: none"> <li>▪ Area will be monitored to observe any drawdown; and</li> <li>▪ 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.</li> </ul> </li> <li>• Conduct a Detailed Water Taking Assessment based on geotechnical investigation results to determine anticipated groundwater taking quantities, groundwater quality and predicted zone of influence (ZOI) prior to construction. Based on this assessment site-specific mitigation measures and a monitoring program for groundwater dependent natural features within the anticipated ZOI will be provided.</li> <li>• Limit duration of dewatering to as short a time frame as possible.</li> <li>• Limit dewatering quantities by implementing targeted groundwater cut-offs (i.e., slurry trench walls) where possible.</li> <li>• 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).</li> </ul>	<ul style="list-style-type: none"> <li>• An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li>• Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>• Develop and implement a SAR Blasting Plan to be submitted to EC-CWS for review that might include, but will not be limited to:               <ul style="list-style-type: none"> <li>▪ Pre-blast search and species relocations;</li> <li>▪ Suitable blasting timing windows;</li> <li>▪ Appropriate blasting setbacks to turtle habitat;</li> <li>▪ 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).</li> </ul> </li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for SAR 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.</li> <li>• Ecopassages or designated movement corridors will be considered in areas of high turtle activity or abundance, to limit road mortality.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:               <ul style="list-style-type: none"> <li>▪ Education of all on-site staff about SAR that may be encountered;</li> <li>▪ Immediate stop in construction activity within 10 m of an observation of a Species at Risk until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction;</li> <li>▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm;</li> <li>▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the project so that adaptive management can be applied based on species concentrations;</li> <li>▪ All required permits under Section 73(2) of SARA will be obtained prior to handling SAR; and</li> <li>▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS).</li> </ul> </li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with possible species encounters.</li> <li>• 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.</li> </ul>	
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Changes in behaviour, due to disturbance of SAR.</li> <li>• Changes in mortality (including harm),</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize habitat avoidance and / or noise disturbance to turtle SAR.</li> <li>• Avoid mortality of turtle SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• Avoid grading as part of access road maintenance during the turtle nesting / hatching period (June 1 to September 15; GBBR, date unknown).</li> <li>• 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, date unknown) 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:               <ul style="list-style-type: none"> <li>▪ A qualified Biologist will be on site monitoring emergency maintenance activities should any hibernating turtle SAR be found; and</li> <li>▪ In the case a turtle is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest turtle trauma centre.</li> </ul> </li> <li>• 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.</li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with species that may be encountered.</li> <li>• 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.</li> <li>• Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:               <ul style="list-style-type: none"> <li>▪ Education of all on-site staff about SAR that may be encountered;</li> <li>▪ Develop a reporting and tracking system for turtle SAR sightings on access roads, which could be used to inform adaptive management for turtle SAR mortality, if required; and</li> <li>▪ Implement an adaptive management plan in the event of turtle SAR mortality on access roads, which may include additional restrictions on use of access roads during sensitive timing windows, or the installation of traffic control measures or ecopassages in specific areas. The details of the adaptive management framework will be developed in consultation with EC-CWS; and</li> <li>▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>• While accessing the site to conduct turtle surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>• The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event that, after two (2) years, herpetofauna surveys indicate notable changes in turtle populations, EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> <li>▪ Implement an adaptive management plan in the event of turtle SAR mortality on access roads, which may include additional restrictions on use of access roads during sensitive timing windows, or the installation of traffic control measures or ecopassages in specific areas. The details of the adaptive management framework will be developed in consultation with EC-CWS.</li> </ul> </li> </ul>

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
<p><b>Snake SAR</b></p> <p><b>Eastern Foxsnake (Georgian Bay population)</b> (<i>Pantherophis gloydi</i> pop. 1)</p> <p><b>Eastern Hog-nosed Snake</b> (<i>Heterodon platirhinos</i>)</p> <p><b>Massasauga Rattlesnake (Great Lakes / St. Lawrence population)</b> (<i>Sistrurus catenatus</i> pop. 1)</p>	<p><b>Construction/Decommissioning</b></p> <ul style="list-style-type: none"> <li>Habitat change, including possible damage or destruction of snake SAR residences or snake SAR habitat.</li> <li>Changes in behaviour, due to disturbance of SAR</li> <li>Changes in mortality (including harm)</li> </ul>	<ul style="list-style-type: none"> <li>Minimize loss and / or fragmentation of snake SAR habitat.</li> <li>Minimize habitat avoidance and / or noise disturbance to snake SAR.</li> <li>Avoid mortality of snake SAR.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>During the active period for snakes, from April 30 to October 15 (GBBR, date unknown), a Rattlesnake Monitor will complete area searches immediately prior to vegetation removal and blasting to identify any snake activity.</li> <li>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.</li> <li>Removal of all natural vegetation within suitable nesting habitats is proposed to occur outside the nesting / early neonate season of July 1 to October 15 (Ontario Nature, 2014; COSEWIC, 2008; GBBR, date unknown) within sandy habitats or shorelines.</li> <li>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, date unknown), within aquatic habitats or wetlands.</li> <li>During the snake hibernation period (October 15 to April 30; GBBR, date unknown) where dewatering activities may have an effect on hibernation habitat located within wetlands or aquatic features:             <ul style="list-style-type: none"> <li>Area will be monitored to observe any drawdown; and</li> <li>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.</li> </ul> </li> <li>Develop and implement a SAR Blasting Plan to be submitted to EC-CWS for review that might include, but will not be limited to:             <ul style="list-style-type: none"> <li>Pre-blast search and species relocations;</li> <li>Suitable blasting timing windows in consideration to gestation periods;</li> <li>Appropriate blasting setbacks to snake habitat; and</li> <li>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.</li> </ul> </li> <li>Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>Vegetation removal will be minimized to the extent possible.</li> <li>Rehabilitation activities will be initiated within all temporary construction / decommissioning areas where suitable habitat for SAR 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.</li> <li>Ecopassages or designated movement corridors will be considered in areas of high snake activity or abundance, to limit road mortality.</li> <li>Install exclusionary fencing during construction / decommissioning within areas (where feasible) of concentrated snake activity to limit road and construction-related mortality.</li> <li>Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>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.</li> <li>Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:             <ul style="list-style-type: none"> <li>Education of all on-site staff about SAR that may be encountered;</li> <li>Immediate stop in construction activity within 10 m of an observation of a Species at Risk until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction;</li> <li>For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm;</li> <li>Maintain a species observation log to track species observations during the construction / decommissioning phase of the project so that adaptive management can be applied based on species concentrations;</li> <li>All required permits under Section 73(2) of SARA will be obtained prior to handling SAR;</li> <li>Reporting procedures (e.g., frequency to HIFN and EC-CWS); and</li> <li>A communication strategy to educate and engage persons who will be working on site will be implemented to reduce any persecution of these species.</li> </ul> </li> <li>Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with possible species encounters.</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>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.</li> <li>An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> <li>Develop and implement a detailed monitoring program to effectively assess impacts to wetlands through monitoring wells installed as required in accordance with the Detailed Water Taking Assessment, within the predicted ZOI for changes in wetland water level and / or water quality prior to, during, and post completion of construction.</li> <li><b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>In the event of a reduction in wetland water level and / or water quantity, corrective measures will be undertaken in accordance with the recommendations of the Detailed Water Taking Assessment. Contingency measures including but not limited to rescue of stranded wildlife will also be developed. A post construction monitoring program will be implemented to evaluate the effectiveness of mitigation measures.</li> </ul> </li> </ul>

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Changes in behaviour, due to disturbance of SAR.</li> <li>• Changes in mortality (including harm)</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize habitat avoidance and / or noise disturbance to snake SAR.</li> <li>• Avoid mortality of snake SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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.</li> <li>• 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, date unknown) 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:               <ul style="list-style-type: none"> <li>▪ A qualified Biologist will be on site monitoring emergency maintenance activities should any hibernating SAR be found; and</li> <li>▪ In the case a snake is disturbed and brought out of hibernation, the individual will be transported immediately to the nearest trauma centre.</li> </ul> </li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with species that may be encountered.</li> <li>• 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.</li> <li>• 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.</li> <li>• Develop and implement a Sighting Response Protocol in the Wildlife Management Plan which will include:               <ul style="list-style-type: none"> <li>▪ Education of all on-site staff about SAR that may be encountered;</li> <li>▪ Develop a reporting and tracking system for snake SAR sightings on access roads, which could be used to inform adaptive management for snake SAR mortality, if required; and</li> <li>▪ Implement an adaptive management plan in the event of snake SAR mortality on access roads, which may include additional restrictions on use of access roads during sensitive timing windows, or the installation of traffic control measures or ecopassages in specific areas. The details of the adaptive management framework will be developed in consultation with EC-CWS; and</li> <li>▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Pre-construction herpetofauna surveys completed in 2015 will be repeated annually for 2 years post-construction to ensure similar species abundance and diversity continue to be found in the areas of the HIWEC study area.</li> <li>• While accessing the site to conduct snake surveys, spot checks for road mortality will occur at high activity areas, as determined through pre-construction monitoring.</li> <li>• The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ In the event that, after two (2) years, herpetofauna surveys indicate notable changes in snake populations, EC-CWS will be consulted to determine if additional mitigation measures are warranted.</li> <li>▪ Implement an adaptive management plan in the event of snake SAR mortality on access roads, which may include additional restrictions on use of access roads during sensitive timing windows, or the installation of traffic control measures or ecopassages in specific areas. The details of the adaptive management framework will be developed in consultation with EC-CWS.</li> </ul> </li> </ul>
<p><b>Bat SAR</b></p> <p><b>Little Brown Bat</b> (<i>Myotis lucifugus</i>)</p> <p><b>Northern Myotis</b> (<i>Myotis septentrionalis</i>)</p> <p><b>Tri-colored Bat</b> (<i>Perimyotis subflavus</i>)</p>	<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Habitat change, including possible damage or destruction of bat SAR residences or bat SAR habitat.</li> <li>• Changes in behaviour, due to disturbance of SAR.</li> <li>• Changes in mortality (including harm),.</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize loss and / or fragmentation of bat SAR habitat.</li> <li>• Minimize habitat avoidance and / or noise disturbance to bat SAR.</li> <li>• Avoid mortality of bat SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• 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.               <ul style="list-style-type: none"> <li>▪ 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.</li> <li>▪ 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.</li> </ul> </li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• 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.</li> <li>• Blasting will not be undertaken within vegetated habitats until vegetation has been removed.</li> <li>• Conduct construction and decommissioning activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• Develop and implement a Sighting Response Protocol, in the Wildlife Management Plan which will include:               <ul style="list-style-type: none"> <li>▪ Education of all on-site staff about SAR that may be encountered;</li> <li>▪ Immediate stop in construction activity within 10 m of an observation of a Species at Risk until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. In lieu of calling a Biologist, work can be resumed after a 24 hr period if no evidence of the species exists within the immediate area of previous observation. If the species still exists within the immediate area after 24 hr, a qualified Biologist will be contacted to provide appropriate direction;</li> <li>▪ For animals in immediate danger, handling procedures will be established for designated personnel (i.e., Environmental Monitor, qualified Biologist) in the event that a SAR needs to be moved out of potential harm;</li> <li>▪ Maintain a species observation log to track species observations during the construction / decommissioning phase of the project so that adaptive management can be applied based on species concentrations;</li> <li>▪ All required permits under Section 73(2) of SARA will be obtained prior to handling SAR; and</li> <li>▪ Reporting procedures (e.g., frequency to HIFN and EC-CWS).</li> </ul> </li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with possible species encounters.</li> <li>• 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.</li> </ul>	<ul style="list-style-type: none"> <li>• An Environmental Monitor will be present during key blasting activities (to review the site prior to blasting activities, prior to blasting and during blasting) to ensure compliance with the Blasting Plan.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary.</li> </ul>

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Changes in behaviour, due to disturbance of SAR</li> <li>• Changes in mortality (including harm)</li> </ul>	<ul style="list-style-type: none"> <li>• Minimize habitat avoidance and /or noise disturbance to bat SAR.</li> <li>• Minimize mortality of bat SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• Utilize a lighting scheme that will minimize potential risks for bat collisions, while still fulfilling Transport Canada requirements. Consider design solutions to minimize lighting.</li> <li>• Conduct maintenance activities during daylight hours for increased visibility as well as to avoid light pollution effects during the night, wherever possible.</li> <li>• 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).</li> <li>• 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 project 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.</li> <li>• 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 <i>Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds</i> (EC-CWS, 2007a) and <i>Wind Turbines and Birds A Guidance Document for Environmental Assessment</i> (EC-CWS, 2007b).</li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar species that may be encountered.</li> <li>• Report confirmed Species at Risk observed during post construction monitoring to HIFN and EC-CWS.</li> </ul>	<ul style="list-style-type: none"> <li>• If suitable SAR bat maternity habitats are removed during construction activities: <ul style="list-style-type: none"> <li>▪ Re-vegetation, habitat rehabilitation, and off-site habitat creation will be considered.</li> <li>▪ Propose re-vegetation and habitat rehabilitations, or possibly artificial roost creation, such as bat houses or artificial bark.</li> </ul> </li> <li>• Conduct post-construction mortality monitoring following MNR <i>Bats and Bat Habitats Guidelines for Wind Power Projects</i> (2011b) to assess the potential mortality impact on SAR bats.</li> <li>• Pre-construction bat acoustic monitoring surveys completed in 2011 will be repeated annually for two (2) years post-construction to ensure similar species abundance and diversity continue to be found in the HIWEC study area.</li> <li>• The 2-year report will be provided to EC-CWS to determine if additional monitoring and / or mitigation measures are warranted.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Consider changes in turbine operations (e.g., changes in cut-in speed, selective shutdown of specific turbines at key times of year or under certain weather conditions) during periods of high mortality.</li> <li>▪ In the event that, after two (2) years, bat acoustic monitoring surveys indicate notable changes in bat populations, EC-CWS will be consulted to determine if additional mitigation measures are warranted through an adaptive management approach. Specific details of the adaptive management framework will be developed in consultation with EC-CWS during the permitting phase and documented in the Environmental Protection Plan.</li> </ul> </li> </ul>
<p><b>Plant SAR</b></p> <p><b>Branched Bartonia</b> (<i>Bartonia paniculata</i>)</p>	<p><b>Construction/ Decommissioning</b></p> <ul style="list-style-type: none"> <li>• Habitat change, including possible damage or destruction of plant SAR residences or plant SAR habitat.</li> <li>• Change in mortality (including harm).</li> </ul>	<ul style="list-style-type: none"> <li>• Identify all occurrences of plant SAR within the construction footprint.</li> <li>• Minimize impact to plant SAR habitat.</li> <li>• Avoid mortality to plant SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• Species specific surveys for Branched Bartonia will be conducted in September 2015 in areas where suitable habitat exists within the construction area.</li> <li>• The following mitigation measures will be applied should Branched Bartonia be confirmed within the construction area: <ul style="list-style-type: none"> <li>• Confirmed specimens will be marked via installation of wooden stakes marking a 1 m x 1 m quadrat, or appropriate distance immediately surrounding the specimen.</li> <li>• Limit vegetation removal to within the construction footprint area. The construction footprint will be clearly defined.</li> <li>• Vegetation removal will be minimized to the extent possible.</li> <li>• Rehabilitation will be initiated within all temporary construction / decommissioning areas as appropriate to the type of habitat that was removed within one (1) year of the completion of the construction / decommissioning phase.</li> <li>• Branched Bartonia is an annual and reproduces from seed (COSEWIC, 2003); therefore, prior to construction in suitable habitat, the topsoil / seedbank will be stripped, preserved during construction and reapplied in suitable rehabilitation areas post construction.</li> <li>• Post Species at Risk Fact Sheets in areas where on-site staff can become familiar with possible species encounters.</li> <li>• 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.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Biological monitoring will be conducted prior to construction / decommissioning activities to document potential occurrence of this species within the construction disturbance footprint.</li> <li>• Daily monitoring of areas where active vegetation removal is occurring by Environmental Monitor.</li> <li>• Vegetation monitoring of rehabilitated habitats will occur at a minimum frequency of annually for the first two (2) years after re-seeding to ensure rehabilitation is progressing. Further rehabilitation will occur as determined necessary in consultation with EC-CWS.</li> </ul>
	<p><b>Operation</b></p> <ul style="list-style-type: none"> <li>• Change in mortality (including harm).</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid mortality to plant SAR.</li> </ul>	<ul style="list-style-type: none"> <li>• If encroachment of invasive species is detected, management recommendations will be determined by a qualified Biologist.</li> <li>• Vegetation trimming will be limited to within areas that have been previously cleared during construction.</li> <li>• 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: <ul style="list-style-type: none"> <li>▪ 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).</li> <li>▪ Protocols for handling contaminated materials (i.e., to be handled in accordance with relevant federal and provincial guidelines and standards).</li> <li>▪ Material Safety Data Sheets (MSDS) which provides information on proper handling of chemicals readily available for the types of chemicals that will be used on-site.</li> <li>▪ Training requirements for operational staff on associated emergency response plan and spill clean-up procedures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Monitor wetland area once per growing season for two (2) years to confirm introduction of invasive species has not occurred.</li> <li>• <b>Contingency Measures:</b> <ul style="list-style-type: none"> <li>▪ Should invasive species introduction occur, corrective actions to remove and reduce the spread of these species will be undertaken. Habitat rehabilitation will occur.</li> <li>▪ If a spill enters a wetland: <ul style="list-style-type: none"> <li>○ Collect and analyze water samples for comparison with appropriate parameters.</li> <li>○ Monitor daily until cleanup is completed or a Biologist determines that contaminant levels are below thresholds which may affect wetland form or function. If this is not</li> </ul> </li> </ul> </li> </ul>

**Table 6-1: Proposed Mitigation Measures Associated with Potential Effects to Federal Species at Risk**

Federal SAR	Potential Effects	Performance Objectives	Mitigation Measures	Monitoring Plan and Contingency Measures
			<ul style="list-style-type: none"> <li>▪ 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).</li> <li>▪ Reporting procedures to meet federal, provincial and local requirements (e.g., reporting spills and verification of clean-up), emergency contact and project management phone numbers.</li> <li>• Apply the following general mitigation measures to avoid soil contamination:                         <ul style="list-style-type: none"> <li>▪ Ensure machinery is maintained free of fluid leaks.</li> <li>▪ Site maintenance, vehicle maintenance, vehicle washing and refuelling to be done on spill pads in specified areas at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any stockpiled materials at least 30 m away from wetlands and / or waterbodies.</li> <li>▪ Store any potential contaminants (e.g., oil, fuels and chemicals) in designated areas using secondary containment, where necessary.</li> <li>▪ All potentially hazardous materials to be stored in containment sites within the Operations and Maintenance Building, within berms where possible.</li> </ul> </li> <li>• Keep ROW for access roads, collector lines / on-reserve transmission lines and WTGs clear of garbage and debris.</li> </ul>	<p>possible, Environment Canada and HIFN will be contacted regarding additional mitigation measures that may be required.</p>

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