Henvey Inlet Wind LP

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Henvey Inlet Wind Energy Centre

Detailed Discussion of Significance of Predicted Residual Effect for Species at Risk

Final

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Henvey Inlet Wind Energy Centre (HIWEC) – Detailed Discussion of Effects on Wildlife and Significance of Predicted Residual Effects on Species at Risk – Final

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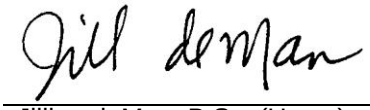

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List of Acronyms and Glossary

AECOM .....AECOM Canada Ltd.
BMPs.....Best Management Practices
EA .....Environmental Assessment
EEMP .....Environmental Effects Monitoring Plan
FIT.....Feed-in-Tariff
GBBR .....Georgian Bay Biosphere Reserve
ha .....Hectare
HIFN.....Henvey Inlet First Nation
HIFN EA Guidance ....Henvey Inlet First Nation Environmental Assessment Guidance Instrument
HIFN I.R. #2 .....Henvey Inlet First Nation Reserve No. 2
HIW .....Henvey Inlet Wind
HIWEC .....Henvey Inlet Wind Energy Centre
km .....Kilometre
m .....Metre
Met tower .....Meteorological tower
MW.....Megawatt
Nigig .....Nigig Power Corporation
O&M .....Operations and maintenance
OPA.....Ontario Power Authority
TS.....Transformer station
UNESCO.....United Nations Educational, Scientific, and Cultural Organization
WTG.....Wind turbine generator

The following document presents anticipated effects to overall wildlife and Species at Risk (SAR) as a result of the Henvey Inlet Wind Energy Centre (HIWEC). This analysis is based on field studies completed between 2011 and 2015, and a series of comprehensive mitigation measures as described within the *Final Volume A: EA Report* (AECOM, 2015a).

This discussion first considers overall wildlife and their habitats, and then provides further discussion on residual effects on SAR that have been confirmed and observed within HIWEC study area.

1. Wildlife and Wildlife Habitat

The following describes the environmental setting within the HIWEC study area as well as the surrounding landscape.

1.1 HIWEC Environment

Wildlife habitat is a function of the biotic and abiotic elements of the surrounding environment; the land surface including its soils, geology, and associated aquatic and terrestrial environment. As described in the *Final Volume A: EA Report,* the character of the land surface across the region is dictated by the irregular bedrock surface that underlies a thin, discontinuous blanket of overburden (AECOM, 2015a).

Within HIWEC study area, steep-walled valleys and bedrock-controlled features are observed to trend generally northwest – southeast and are dictated by the fault and fracture network prevalent in the bedrock. Very little overburden is present within the HIWEC study area where exposed, frequently weathered and fractured bedrock accounts for much of the surficial geology. The remainder of the study area is characterized by organic deposits accumulated in low-lying areas and bedrock valleys as well as a bedrock-drift complex consisting of a thin, discontinuous veneer of glaciolacustrine sand and / or gravel, isolated occurrences of ice-contact stratified sands and gravels, and of loose, stony glacial till (Ontario Geological Survey (OGS), 2003).

Considering the land surface of the HIWEC study area, dominant aquatic features include Henvey Inlet, Key River and Georgian Bay. Surface drainage of inland waters within the HIWEC study area is generally directed northwest to the Key River and Henvey Inlet, and westward towards Georgian Bay. Surface water features are common across the site given the complex topography of the site and its rocky nature and generally comprise of small inland lakes / watercourses and as like the bedrock, also trend northwest – southeast.

Considering the prevalence of exposed bedrock, rock barren vegetation communities dominate the HIWEC study area. These communities consist of jack pine coniferous trees, juniper shrubs with a variety of lichen and moss amongst the ground layer. Within the low-lying areas, wetlands occur and include bog, fen, marsh and swamp wetland types. In the areas to the east where there is a more established soil layer, forest communities occur. Through the field investigations a total of 26 vegetation communities with 598 vascular plants, lichen and moss have been documented within the HIWEC study area.

This diverse vegetation community with an available water source throughout the HIWEC study area provides habitat for numerous wildlife including birds, mammals, amphibians and reptiles. Summaries of all species groups are provided in **Section 4.0** of *Final Volume A: EA Report*.

1.2 Natural Setting within the Landscape

As discussed above, the HIWEC study area provides for a diverse community of flora and fauna, of which, are part of an overall contiguous protected natural landscape along the shoreline of Georgian Bay including operating and non-operating provincial parks, conservation reserves and wilderness areas. This is an expansive system of protected areas that conserve and protect the ecological integrity and functionality of the landscape within the Parry Sound and Manitoulin Island Districts. Based on the mitigation, monitoring and potential compensation measures to ensure the HIWEC does not contribute to significant cumulative effects, the HIWEC is not anticipated to have significant fragmentation effects at a broader ecological scale.

Landscape connectivity is an important ecological attribute for conservation and wildlife management at a broader ecological scale (With, 1999). It refers to the amount and spatial distribution of habitat available within a landscape and its ability to facilitate movement for organisms between these habitat patches (D'eon *et al.*, 2002). Animal movement corridors provide connectivity within the landscape and are important to ensure genetic diversity in populations. They allow seasonal migration of animals throughout their home range from feeding areas to cover areas (Ontario Ministry of Natural Resources and Forestry (MNRF), 2000). Anthropogenic disturbances such as habitat loss and fragmentation may interfere with the functional connectivity and integrity of the landscape leading to decreases in biodiversity and movement of species across the landscape (With, 1999; Johnson *et al*., 2004; D'eon *et al.*, 2002).

There are numerous protected areas of various sizes within Parry Sound and Manitoulin Island Districts (**Table 1-1**). This includes operating and non-operating provincial parks, conservation reserves and wilderness areas. Land uses permitted within provincial parks are subject to the provisions of the *Provincial Parks and Conservation Reserves Act, 2006* (*PPCRA*). According to *PPCRA*, the common objective of provincial parks and conservation reserves is the protection of natural and / or cultural heritage features and maintaining the ecological integrity of these areas. According to the *State of Ontario's Protected Areas Report* (MNRF, 2011), ecological integrity is manifested by ecosystems with biotic and abiotic components that are characteristic for the region, and ecosystem processes that proceed without disruption by human activity. Conservation reserves are primarily distinguished by non-industrial resource use (MNRF, 2011). Both provincial parks and conservation reserves prohibit the following activities:

- Commercial timber harvest;
- Commercial power generation development;
- Mineral exploration and development;
- Extraction of aggregate, topsoil or peat; and
- Other industrial uses.

There is considerable variation in the activities permitted within provincial parks (MNRF, 2011). For example, permitted activities are significantly limited within provincial parks that are classified as wilderness or nature reserves while high quality recreational and education experiences are objectives of parks classified as the following: natural environment, waterway and recreational.

Ecological effects resulting from the development of the HIWEC are anticipated as described in **Section 6.2** of the *Final Volume A: EA Report*. In spite of this, there are a large number of protected areas (**Table 1-1**) in the vicinity of the HIWEC study area. A total of 14 provincial parks, 32 conservation reserves and one (1) wilderness area were identified within the Parry Sound and Manitoulin Districts. Also, Killarney Provincial Park (Sudbury District) is located in close proximity to the HIWEC study area. Cumulatively, this includes an area of 227,195 ha (excluding Algonquin Provincial Park), that is protected within the broader landscape of the HIWEC. These protected areas are generally concentrated along the Georgian Bay coastline where high concentrations of SAR occur. Additionally, these protected areas are connected by Enhanced Management Areas (EMA) or undeveloped areas consisting of natural cover. EMAs are largely undeveloped and currently provide habitat for a variety of wildlife; however, these areas may permit activities prohibited by the *PPCRA*.

Due to the large number and spatial extent of protected areas in the Parry Sound and Manitoulin Island Districts, as well as a relatively undeveloped landscape regionally, wildlife habitat availability and landscape connectivity in the greater region is anticipated to remain high such that fragmentation effects on a broader ecosystem scale are not anticipated as result of the development of the HIWEC.

Table 1-1: Protected areas within the Parry Sound District and Manitoulin Island District

Protected Area[1]	Type	Size (ha)
French River Provincial Park	Provincial Park (Waterway Class[2])	73,530
Grundy Lake Provincial Park	Provincial Park (Natural Environment Class[3])	3,614
Noganosh Lake Provincial Park	Provincial Park (Waterway Class)	3,082
Magnetawan River Provincial Park	Provincial Park (Waterway Class)	3,424
Limestone Islands Provincial Nature Reserve	Provincial Park (Nature Reserve Class[4])	450
Round Lake Provincial Nature Reserve	Provincial Park (Nature Reserve Class)	2,585
Killbear Provincial Park	Provincial Park (Natural Environment Class)	1,760
The Massasauga Provincial Park	Provincial Park (Natural Environment Class)	13,105
Mikisew Provincial Park	Provincial Park (Recreational Class[5])	131
Sturgeon Bay Provincial Park	Provincial Park (Recreational Class)	14
Oastler Lake	Provincial Park (Recreational Class)	32
Queen Elizabeth the Queen Mother Mnidoo Mnising Provincial Park	Provincial Park (Natural Environment Class)	6,530
Misery Bay Provincial Park	Provincial Park (Nature Reserve Class)	1,076
Algonquin Provincial Park	Provincial Park (Natural Environment)	772,300
Killarney Provincial Park[6]	Provincial Park (Wilderness Class[7])	49,325
North Georgian Bay Shoreline and Islands Conservation Reserve	Conservation Reserve	17,107
Pakeshkag River Forest Conservation Reserve	Conservation Reserve	1,299
Mowat Township Hemlock Forest Conservation Reserve	Conservation Reserve	197
Northern McConkey Conservation Reserve	Conservation Reserve	1,249
Island Lake Forest and Barrens Conservation Reserve	Conservation Reserve	15,473
Pointe au Baril Forests and Wetlands Conservation Reserve	Conservation Reserve	2,366
Upper Shebeshekong Wetland Conservation Reserve	Conservation Reserve	5,304
Swan Lake Conservation Reserve	Conservation Reserve	265
Raganooter Lake Conservation Reserve	Conservation Reserve	311
Big Deer Lake Conservation Reserve	Conservation Reserve	436
Ferrie Township Forest Conservation Reserve	Conservation Reserve	474
Little Spring Lake Conservation Reserve	Conservation Reserve	106
Commanda Creek Conservation Reserve	Conservation Reserve	1,657
Bray Lake Conservation Reserve	Conservation Reserve	265

1. *Source: Ontario Ministry of Natural Resources (MNRF), 2015: Crown Land Use Policy Atlas. Queen's Printer for Ontario. Accessed December 2015. Available: http://www.giscoeapp.lrc.gov.on.ca/CLUPA/Index.html?site=CLUPA&viewer=CLUPA&locale=en-US*
2. *Waterway class parks protect recreational water routes and significant terrestrial and aquatic ecosystems with their associated natural and cultural features. These areas provide recreational and educational opportunities for visitors.*
3. *Natural environment class parks protect recreational landscapes, representative ecosystems, and provincially significant elements of Ontario's natural and cultural heritage. These areas provide recreational and educational opportunities for visitors.*
4. *Nature reserve class parks protect representative ecosystems and provincially significant elements of Ontario's natural heritage including distinctive habitats and landforms. These areas are protected for their intrinsic value, to support scientific research, and to maintain biodiversity.*
5. *Recreational class parks provide a natural setting for outdoor recreation opportunities.*
6. *Killarney is located in the Sudbury District but was included because of its proximity to the HIWEC study area.*
7. *Wilderness reserve class parks protect large areas where nature exists freely. Visitors typically permitted low-impact recreation and travel via non-mechanized methods.*

Table 1-1: Protected areas within the Parry Sound District and Manitoulin Island District

Protected Area[1]	Type	Size (ha)
Louck Lake Wetland Conservation Reserve	Conservation Reserve	265
Sausage Lake Forest Conservation Reserve	Conservation Reserve	664
Joly Township Hardwoods Conservation Reserve	Conservation Reserve	496
Shawanaga Lake Conservation Reserve	Conservation Reserve	4,932
Ferguson Township White Pine Forest Conservation Reserve	Conservation Reserve	364
Ahmic Forest and Rock Barrens Conservation Reserve	Conservation Reserve	6,081
Seguin River Conservation Reserve	Conservation Reserve	275
Horseshoe Lake Conservation Reserve	Conservation Reserve	115
Dutcher Lake Conservation Reserve	Conservation Reserve	1,952
Bear Lake Peatland Conservation Reserve	Conservation Reserve	3,845
Ryerson Township Forest Conservation Reserve	Conservation Reserve	353
Chain Lakes Conservation Reserve	Conservation Reserve	926
Bridge Lake Outwash Plain Forest Conservation Reserve	Conservation Reserve	149
Bear Creek Conservation Reserve	Conservation Reserve	212
Upper Raft Lake Conservation Reserve	Conservation Reserve	476
Monteith Forest Conservation Reserve	Conservation Reserve	185
Crane Lake Forest Conservation Reserve	Conservation Reserve	387
Mac's Bay Conservation Reserve	Conservation Reserve	290
Blair Township Nature Reserve Wilderness Area	Wilderness Area	61
Total		**999,495**

2. Significance of Predicted Residual Effects on Species at Risk

Considering the diverse habitat and overall connectivity within the greater landscape, several federal Species at Risk (SAR) including Canada Warbler, Common Nighthawk, Kirtland's Warbler, Olive-sided Flycatcher, Whip-poor-will, Blanding's Turtle, Eastern Musk Turtle, Eastern Foxsnake, Eastern Hog-nosed Snake, Massasauga Rattlesnake, Little Brown Bat, Northern Myotis and Tri-colored Bat were confirmed to occur within the HIWEC study area through baseline field studies completed between 2011 and 2015, as described in **Section 4.1.5** of the *Final Volume A: EA Report*.

The HIWEC has been sited considering reasonable alternatives, in order to select the best option to avoid or minimize effects on SAR. However, potential effects on SAR and their habitat may still occur, as a result of the HIWEC development, if left unmitigated (refer to **Section 6.2.7.1 and 6.2.7.2** of the *Final Volume A: EA Report* for potential effects).

As identified in **Section 6.2.7.1 and 6.2.7.2** of the *Final Volume A: EA Report* (AECOM, 2015a), SAR may be encountered during the site preparation, construction, operations and decommissioning of the project. Mitigation measures presented in **Table 6-4 and 6-5** of the *Final Volume A: EA Report* (hereafter referred to as **Table 6-4** or **Table 6-5**, respectively) will be implemented to avoid and minimize effects on SAR, should they be encountered during the identified phases of the HIWEC. Potential residual effects on SAR are environmental effects that are likely to occur and remain after the mitigation measures proposed in **Table 6-4 and Table 6-5** have been implemented.

Potential residual effects on SAR during construction and decommissioning of the HIWEC include:

- Habitat change (including possible damage, destruction and / or fragmentation of SAR residences or SAR habitat);
- Change in mortality risk (including harm, harassment and / or killing of SAR); and
- Change in behaviour, due to disturbance of SAR.

Potential effects on SAR during operation of the HIWEC include:

- Change in mortality risk (including harm, harassment and / or killing of SAR); and
- Change in behaviour, due to disturbance of SAR.

The methods used to assess and determine the overall significance for each predicted adverse residual effect is described in **Section 3.2.5** of the *Final Volume A: EA Report* (AECOM, 2015a). This involved assessing the degree of each residual effects against criteria outlined in **Table 2-1** below.

Table 2-1: Residual Effects Significance Criteria and Levels

Residual Effects Criteria	Effects Level Definition		
	Minor	*Moderate*	*Major*
Magnitude	Effect is inconsequential or is a minor change compared to existing conditions.	Effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	Effect exceeds federal or provincial regulatory criteria or published guideline values.

Table 2-1: Residual Effects Significance Criteria and Levels

Residual Effects Criteria	Effects Level Definition		
	Minor	*Moderate*	*Major*
Spatial Extent	Effect confined to sites within construction footprint including temporary and permanent facilities.	Local effect within and / or near the HIWEC study area.	Regional effect.
Duration and Frequency	Effect is evident only during one (1) HIWEC phase (e.g., construction and operations) and occurs infrequently for short durations.	Effect is evident during more than one (1) phase HIWEC phase (e.g., construction and operations) and occurs infrequently or frequently for short durations.	Effect is evident during more than one (1) HIWEC phase (e.g., construction and operations) and occurs frequently for long durations or continuously.
Permanence	Effect is readily reversible over a short period of time (e.g., one (1) growing season).	Effect is not readily reversible during the life of the HIWEC.	Effect is permanent.
Context	Effect is on a common feature.	Effect is on a sensitive feature that is common.	Effect is on a sensitive feature that is not common.

Overall significance of the each residual effect was then predicted based on **Table 2-1** and professional judgement as well as previous experience on similar projects. One (1) of the following conclusions regarding overall significance is made for each adverse residual environmental effect:

1. Without any mitigation, the effect is not significant;
2. After applying identified mitigation, the effect is not significant;
3. After applying identified mitigation, the effect is significant; or
4. The significance of the effect is uncertain.

Overall significance of the residual environmental effects on SAR was concluded to be as follows: “after applying identified mitigation, monitoring, follow-up, and potential compensation the effect is not significant” as described in **Table 6-6** and **Table 6-7** of the *Final Volume A: EA Report* (hereafter referred to as **Table 6-6** or **Table 6-7**, respectively). The purpose of this appendix is to provide a detailed discussion of the evaluation of significance of predicted residual effects on SAR and how this conclusion was reached.

Note that adaptive management in response to the results of follow-up and monitoring was taken into consideration in the assessment and determination of significance of the residual effects. The follow-up and monitoring program will ensure the mitigation measures taken to minimize the adverse environmental effects of the project are effective and if any additional mitigation is required (refer to **Table 8-1** of the *Final Volume A: EA Report*). This will involve ongoing monitoring by Environmental Monitors and construction / operations staff for any wildlife mortality associated with HIWEC activities during construction and operations. Environmental Monitors and construction / operations staff will be required to document any mortality caused by HIWEC activities including the cause of mortality during the construction and operation phase of the HIWEC. This will also include a tracking system developed and implemented for any SAR sightings (i.e., Sighting Response Protocol in the Wildlife Management Plan) as well as any wildlife mortality on access roads in order to inform adaptive management for mortality, if required.

During operation, a follow-up bird and bat mortality monitoring program will be implemented following the relevant federal and provincial guidelines for wind projects in Ontario. Therein, three (3) years of post-construction mortality monitoring for bats and birds (including migratory birds and SAR) in conjunction with breeding bird and bat acoustic monitoring surveys for two (2) years post-construction. The Environmental Effects Monitoring Plan (EEMP) has been developed in accordance with mortality monitoring guidance for wind farms in Ontario including specific mortality thresholds (AECOM, 2015b). In the event that a mortality threshold is exceeded, the proponent will consider operational mitigation to address mortality in excess of thresholds (e.g., changes in cut-in speed, selective

shutdown of specific wind turbine generators (WTGs) at key times of year or under certain weather conditions) during periods of high mortality. Any mortality documented through the EEMP will be included in the overall wildlife mortality tracking system discussed above.

Additionally, road mortality surveys for turtle and snakes will be conducted during construction and decommissioning phases as well as during the first two (2) years of operations of the HIWEC. The results of these surveys will be included in the overall wildlife mortality tracking system above. Any documented mortality of turtle or snake SAR will trigger consideration of contingency measures and adaptive management (e.g., installation of additional ecopassages, speed bumps or wildlife crossing signs; restricting specific access roads to essential vehicular traffic, etc.). Pre-construction herpetofauna surveys completed in 2015 will also be repeated annually for two (2) years post-construction to monitor disturbance effects. In the event that disturbance, i.e., changes in species abundance and diversity, occurs, Environment Canada – Canadian Wildlife Service (EC-CWS) will be consulted to determine if additional mitigation measures are warranted.

2.1 Eastern Whip-poor-will

2.1.1 Construction / Decommissioning

2.1.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Eastern Whip-poor-will will occur as a result of the HIWEC development, it is considered to be moderate in magnitude and minor in extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.3%) or 172.7 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (7,415.7 ha; refer to Figure 3-6e in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat). Within the HIWEC study area suitable habitat is available where currently there are no records of Eastern Whip-poor-will, suggesting the potential presence of alternative breeding / nesting sites available within the HIWEC study area (refer to Figure 3-5 in **Appendix F3** of the *Final Volume A: EA Report*). The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. Although the relatively large number of observations made incidentally or during targeted surveys indicates that this species is quite common throughout the HIWEC study area, Eastern Whip-poor-will is listed as Threatened under Schedule 1 of the Species at Risk Act (*SARA*) and the context for the effects of habitat change is considered moderate.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Eastern Whip-poor-will.

Rehabilitation of temporary construction / decommissioning areas will occur within one (1) year of the completion of construction / decommissioning phase. Eastern Whip-poor-will has been shown to use forest habitats altered by human-made openings, if these open areas are left to regenerate after human disturbance (COSEWIC, 2009). It is likely that the Eastern Whip-poor-will return to these temporary areas post-construction / decommissioning.

The majority of Eastern Whip-poor-will habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the HIWEC. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat as well as the rehabilitation of habitat damage / destroyed. The habitat

removal will not result in a loss of the overall habitat functionality for Eastern Whip-poor-will within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of habitat change for Eastern Whip-poor-will is not significant.

2.1.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in increased Eastern Whip-poor-will mortality and / or destruction of their nests. Since Eastern Whip-poor-will is protected under federal legislation (i.e., *SARA*), this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Eastern Whip-poor-will are a ground-nesting species, which typically lay eggs directly in forested leaf litter, in close proximity to low vegetation where these nests may not easily be seen. Based on these life cycle and behavioural attributes, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated. Mitigation measures identified in **Table 6-4**, such as timing windows for the completion of specific work, a sighting and response protocol, etc., will be implemented to avoid and minimize any potential effects on Eastern Whip-poor-will.

Vegetation clearing will occur outside of the April 1 to August 31 timing window (overall bird nesting season), where possible, to avoid increased mortality to Eastern Whip-poor-will. If adherence to the timing window is not feasible, nest surveys during suitable survey periods depending on type of habitat (see **Table 6-4**) will be undertaken to minimize increased mortality to Eastern Whip-poor-will as a result of construction / decommissioning activities.

The mitigation measures identified will avoid and minimize mortality during the construction / decommissioning phase. Although isolated occurrences of Eastern Whip-poor-will mortality may still occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Eastern Whip-poor-will mortality is to occur, long-term population level effects are not anticipated. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for Eastern Whip-poor-will is not significant.

2.1.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Eastern Whip-poor-will present within the HIWEC study area. Changes in Eastern Whip-poor-will behaviour due to disturbance are reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Eastern Whip-poor-will, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent). This bird species is typically active from dusk until dawn, and as construction activities are to be limited to daylight hours as much as possible, there is expected to be limited overlap between construction activity and the activity period for this species. With the implementation of the mitigation measures identified in **Table 6-4** and given the minimal overlap of construction and bird activity, disturbance to Eastern Whip-poor-will will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for Eastern Whip-poor-will is not significant.

2.1.2 Operations

2.1.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The operation of WTGs for the HIWEC has the potential to result in direct mortality to local populations of Eastern Whip-poor-will. Although the operation of large scale WTGs has been documented to cause some mortality to birds, the overall impact of the operational WTGs is a small fraction (< 0.01%) of annual human-related avian mortality (Zimmerling, *et al.* 2013). However, these low levels of mortality could be magnified in species that have sensitive populations or that are in a state of decline. Any mortality to Eastern Whip-poor-will will result in a moderate magnitude as this species is a SAR and is protected under the *SARA*. In general, mortality of birds due to the operation of WTGs is low, and the Eastern Whip-poor-will has a lower potential of collision with these structures due to their enhanced visual acuity at night (Stevenson and Anderson, 1994; BSC, *et al.* 2014). This visual acuity at night also indicates that the risk of collision with overhead wires and other standing structures within the HIWEC study area is low.

The Eastern Whip-poor-will also has a low flight pattern and does not exhibit aerial displays, and thus has a low likelihood of colliding with the WTGs (Cink, 2002). Eastern Whip-poor-will most frequently flies within 20 m of the ground; however, they may forage as high as the canopy for prey (Cink, 2002). Both of these flight heights are well below the lowest portion of the WTG blade sweep, which will reach approximately 70 m above ground level.

Although some Eastern Whip-poor-will mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and the potential effect of mortality risk will be reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures.

As the typical flight patterns of the Eastern Whip-poor-will generally put the species well below the WTG blade sweeping height and the bird has a demonstrated low risk of collision with standing structures, it is anticipated that a change in mortality to Eastern Whip-poor-will will be low. Mitigation measures (e.g., proactive feathering WTG blades below the manufacturer's recommended cut-in speed) to avoid and further reduce the potential for mortality of Eastern Whip-poor-will during operations are identified in **Table 6-5**. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in mortality risk for Eastern Whip-poor-will is not significant.

2.1.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Eastern Whip-poor-will. Any disturbance to Eastern Whip-poor-will as a consequence of the HIWEC operation will result in a moderate magnitude effect as the bird species is a SAR and their protection against disturbance is federally regulated under *SARA*. Research indicates that the potential disturbance by noise produced by operational WTGs is low, and that the birds are less likely to hear the WTGs than humans (Dooling, 2002). Although it is unlikely that disturbance from operational WTGs will occur, there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Eastern Whip-poor-will within the HIWEC study area (moderate spatial extent). If disturbance to Eastern Whip-poor-will occurs during operations these disturbances will occur frequently but for short durations (moderate duration / frequency). However, the effect of change in behaviour due to the operation of the WTGs will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor permanence).

As the birds are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Eastern Whip-poor-will as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within

the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of changes in behaviour for Eastern Whip-poor-will is not significant.

2.2 Canada Warbler

2.2.1 Construction / Decommissioning

2.2.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Canada Warbler will occur as a result of the HIWEC development, it is considered to be of a moderate magnitude and minor spatial extent. The habitat loss will be restricted to the construction footprint and a small percentage (1.8 %) or 31.6 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (1,805.2 ha; refer to Figure 3-6b in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat). The distribution of Canada Warbler observations within the HIWEC study area suggests that unoccupied suitable habitat is available to displaced individuals (refer to Figure 3-2 in **Appendix F3** of the *Final Volume A: EA Report*). The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although this species is quite common throughout the HIWEC study area (as indicated by the relatively large number of observations), Canada Warbler is listed as Threatened under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of suitable habitat for Canada Warbler.

Rehabilitation of temporary construction / decommissioning areas will occur within one (1) year of the completion of construction / decommissioning phase. Canada Warbler has been shown to use forest habitats altered by human-made openings, if these open areas are left to regenerate after human disturbance (COSEWIC, 2008a). It is likely that the Canada Warbler will return to these temporary areas post construction / decommissioning.

The majority of Canada Warbler habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat as well as the rehabilitation of habitat damaged / destroyed. The habitat removal will not result in a loss of the overall habitat functionality for Canada Warbler within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of habitat change for Canada Warbler is not significant.

2.2.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in Canada Warbler mortality and / or destruction of their nests. Since Canada Warbler is protected under federal legislation (i.e., *SARA*), this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Based on the life cycle and behavioural attributes of the Canada Warbler, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated. Mitigation measures identified in **Table 6-4**, such as timing windows for the completion of specific work, a sighting response protocol, etc. will be implemented in order to avoid and minimize effects on Canada Warbler.

Vegetation clearing will occur outside of the April 1 to August 31 timing window (overall bird nesting season), where possible, to avoid increased mortality to Canada Warbler. If adherence to the timing window is not feasible, nest surveys during suitable survey periods depending on type of habitat (see **Table 6-4**) will be undertaken to minimize increased mortality to Canada Warbler as a result of construction / decommissioning activities.

The mitigation measures identified will avoid and minimize increased mortality risk during the construction / decommissioning phase. Although isolated occurrences of Canada Warbler mortality may happen they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Canada Warbler mortality is to occur, long-term population level effects are not anticipated. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for Canada Warbler is not significant.

2.2.1.3 Changes in Behaviour, due to disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Canada Warbler that occur within the HIWEC study area. Any change in Canada Warbler behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Canada Warbler, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. Canada Warbler tend to rarely abandon nests upon the initiation of egg laying as long as visits to nests are infrequent and disturbance to nests are minimal (Reitsma, *et al.* 2010).

The implementation of the mitigation measures identified in **Table 6-4**, and the temporary and localized nature of these disturbances indicate that the likelihood for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for Canada Warbler is not significant.

2.2.2 Operations

2.2.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The operation of WTGs for the HIWEC has the potential to result in direct mortality to local populations of Canada Warbler. Although the operation of large scale wind WTGs has been documented to cause some mortality to birds, the overall impact of the operational WTGs is a small fraction (< 0.01%) of annual human-related avian mortality (Zimmerling, *et al.* 2013). However, these low levels of mortality could be magnified in species that have sensitive populations or that are in a state of decline. Any mortality to Canada Warbler will result in a moderate magnitude as this species is a SAR and is protected under the federal *SARA*. In general, mortality of birds due to the operation of WTGs is low, with an average annual bird mortality estimate of 5.45 birds / WTG in Ontario (BSC, *et al.* 2014). Canada Warbler makes up 0.29% of mortalities to birds in Ontario (BSC, *et al.* 2014). Using these values, it can be estimated that 1.44 Canada Warbler mortalities have the potential to occur per year at the HIWEC. In addition, avian mortalities at wind facilities are more likely to occur during the spring or fall migration when flights occur at higher altitudes and / or at night (Smithsonian Migratory Bird Centre, 2008), so it is likely that local breeding populations have a lower mortality risk.

Local breeding populations of Canada Warbler likely have this low risk of mortality as they have a low flight pattern. The Canada Warbler predominantly forages in the shrub layer (EC, 2015). These flight heights are typically below even the lowest portion of the WTG blade sweep. Also, Canada Warbler are not likely to collide with overhead wires during the operation of the HIWEC as it is unlikely that this small species, approximately 12 to 15 cm in length (EC, 2015) would come in contact with multiple wires simultaneously, in addition to their low flying height.

Although isolated Canada Warbler mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures.

Mitigation measures (e.g., feathering WTG blades below the manufacturer's recommended cut-in speed) to avoid and further reduce the potential for mortality of Canada Warbler during operations are identified in **Table 6-5**. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in mortality risk for Canada Warbler is not significant.

2.2.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Canada Warbler. Any disturbance to Canada Warbler as a consequence of the HIWEC operation will result in a moderate magnitude effect as the bird species is a SAR and their protection against disturbance is regulated under *SARA*. Research indicates that the potential disturbance by noise produced by operational WTGs is low, and that the birds are less likely to hear the WTGs than humans (Dooling, 2002). Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Canada Warbler within the HIWEC study area (moderate spatial extent). If disturbance to Canada Warbler occurs during operations, these disturbances will occur frequently but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of the WTGs will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures if required (minor permanence).

As the birds are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Canada Warbler as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations with the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up, and potential compensation the effect of change in behaviour to Canada Warbler is not significant.

2.3 Common Nighthawk

2.3.1 Construction / Decommissioning

2.3.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) will occur for Common Nighthawk as a result of the HIWEC it is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.2 %) or 161.9 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (7329.2 ha; refer to Figure 3-6d in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat). Within the greater HIWEC study area abundant suitable habitat is available that currently is unoccupied which

consisted of 6,797 ha of alternative habitat (refer to Figure 3-5 in **Appendix F3** of the *Final Volume A: EA Report*). This suggests the potential presence of alternative breeding/nesting sites. The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although this species is quite common throughout the HIWEC study area (as indicated by the relatively large number of observations), Common Nighthawk is designated as Threatened under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include micrositing of the construction footprint within the larger permitted HIWEC location, where possible, to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Common Nighthawk.

Rehabilitation of temporary construction / decommissioning areas will occur within one (1) year of the completion of construction / decommissioning phase. Common Nighthawk has been shown to use forest habitats altered by human-made openings, if these open areas are left to regenerate after human disturbance (COSEWIC, 2007a). It is likely that the Common Nighthawk will return to these temporary areas post construction / decommissioning.

The majority of Common Nighthawk habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat as well as the rehabilitation of habitat damage / destroyed. The habitat removal will not result in a loss of the overall habitat functionality for Common Nighthawk within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of habitat change for Common Nighthawk is not significant.

2.3.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in Common Nighthawk mortality and / or destruction of their nests. Since Common Nighthawk is protected under federal legislation (i.e., *SARA*) this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Common Nighthawk is a ground- nesting species, which prefer a wide range of habitat. Based on these life cycle and behavioural attributes, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated. Mitigation measures identified in **Table 6-4,** such as timing windows for the completion of specific work, a sighting and response protocol, etc. will be implemented in order to avoid and minimize any potential effects on Common Nighthawk.

Vegetation clearing will occur outside of the April 1 to August 31 timing window (overall bird nesting season), where possible, to avoid increased mortality to Common Nighthawk. If adherence to the timing window is not feasible, nest surveys during suitable survey periods depending on type of habitat (see **Table 6-4**) will be undertaken to minimize increased mortality to Common Nighthawk as a result of construction / decommissioning activities.

The mitigation measures identified will avoid and minimize mortality during the construction / decommissioning phase. Although isolated occurrences of Common Nighthawk mortality may occur they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Common Nighthawk mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for Common Nighthawk is not significant.

2.3.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Common Nighthawk that occur within the HIWEC study area. Any change in Common Nighthawk behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Common Nighthawk, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area at a time (moderate spatial extent) and only for short durations. This bird species is typically active from dusk until dawn and as construction activities are to be limited to daylight hours as much as possible, there is expected to be limited overlap between construction activity and the activity period for this species.

The implementation of the mitigation measures identified in **Table 6-4** and paired with the minimal overlap of construction and bird activity, and the temporary and localized nature of these disturbances indicate that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour to Common Nighthawk is not significant.

2.3.2 Operations

2.3.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The operation of WTGs for the HIWEC has the potential to result in direct mortality to local populations of Common Nighthawk. Although the operation of large scale WTGs has been documented to cause some mortality to birds, the overall impact of the operational WTGs is a small fraction (< 0.01%) of annual human-related avian mortality (Zimmerling, *et al.* 2013). However, these low levels of mortality could be magnified in species that have sensitive populations or that are in a state of decline. Any mortality to Common Nighthawk will result in a moderate magnitude as this species is a SAR and is protected under *SARA*. In general, mortality of birds due to the operation of WTGs is low, and the Common Nighthawk has a lower potential of collision with these structures due to their enhanced visual acuity at night (Stevenson and Anderson, 1994; BSC, *et al.* 2014). This also indicates that the risk of collision with overhead wires and other standing structures within the HIWEC is also low.

The Common Nighthawk also has a low flight pattern, and usually forages within 14-50 m of the ground, but may reach altitudes of up to 175-250 m (Rust, 1947; Wedgewood, 1973). This species also engages in territorial courtship flight displays. The flight behaviour of Common Nighthawk suggests that this species may be at an increased risk over other bird species.

Although some Common Nighthawk mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures if required.

As the majority of the Common Nighthawks flight patterns generally puts the species well below the WTG blade sweeping height and the bird has a demonstrated low risk of collision with standing structures, it is anticipated that a change in mortality to Common Nighthawk will be minimal. Mitigation measures (e.g., potential WTG curtailment during active breeding period within suitable habitat, feathering WTG blades below the manufacturer's

recommended cut-in speed) to avoid and further reduce the potential for mortality of Common Nighthawk during operations are identified in **Table 6-5**. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in mortality risk to Common Nighthawk is not significant.

2.3.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Common Nighthawk. Any disturbance to Common Nighthawk as a consequence of the HIWEC operation will result in a moderate magnitude effect, as the bird species is a SAR and their protection against disturbance regulated under *SARA*. Research indicates that the potential disturbance by noise produced by operational WTGs is low, and that the birds are less likely to hear the WTGs than humans (Dooling, 2002). Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Common Nighthawk within the HIWEC study area (moderate spatial extent). If disturbance to Common Nighthawk occurs during operations, these disturbances will occur frequently but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of the HIWEC will not be permanent and can be reversed during the life of the HIWEC (minor permanence) through adaptive management measures, if required.

As the birds are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Common Nighthawk as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation monitoring, follow-up, and potential compensation the residual effect of change in behaviour on Common Nighthawk is not significant.

2.4 Kirtland's Warbler

2.4.1 Construction / Decommissioning

2.4.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Kirtland's Warbler will occur as a result of the HIWEC it is considered to be of a moderate magnitude and minor extent. The habitat loss will be restricted to the construction footprint and a small percentage (3.1% or 116.8 ha) of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (3767.0 ha; refer to Figure 3-6g in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat).

Unoccupied alternative habitat has also been identified where no observations have been made within suitable habitat; this suggests the presence of alternative breeding / nesting sites. The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase (construction) but will occur infrequently. As Kirtland's Warbler is a SAR and although not common throughout the HIWEC study area, their habitat is, thereby the context for this effect is moderate.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of Kirtland's Warbler habitat.

The majority of Kirtland's Warbler habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat as well as the rehabilitation of habitat damaged / destroyed. The habitat removal will not result in a loss of the overall habitat functionality for Kirtland's Warbler within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of habitat change for Kirtland's Warbler is not significant.

2.4.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in Kirtland's Warbler mortality and / or destruction of their nests. Since Kirtland's Warbler is protected under federal legislation (i.e., *SARA*), this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Kirtland's Warblers are ground nesters, and construct nests at the base of young jack pines (COSEWIC, 2008b). Based on the life cycle and behavioural attributes of the Kirtland's Warbler, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated. Mitigation measures identified in **Table 6-4**, such as timing windows for the completion of specific work, a sighting and response protocol etc., will be implemented in order to avoid and minimize effects to Kirtland's Warbler.

Vegetation clearing will occur outside of the April 1 to August 31 timing window (overall bird nesting season), where possible, to avoid increased mortality to Kirtland's Warbler. If adherence to the timing window is not feasible, nest surveys during suitable survey periods depending on type of habitat (see **Table 6-4**) will be undertaken to minimize increased mortality to Kirtland's Warbler as a result of construction / decommissioning activities.

Although the risk of increased mortality cannot be completely eliminated, isolated incidents of SAR mortality will be infrequent and will be limited to the construction footprint (minor spatial extent and duration / frequency). If mortality of Kirtland's Warbler is to occur, it will result in serious effects to the local population, given the small and isolated nature of this one (1) breeding pair. However, the likelihood of mortality to Kirtland's Warbler is considered very low with the implementation of the mitigation measures in **Table 6-4**. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for Kirtland's Warbler is not significant.

2.4.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Kirtland's Warbler that occur within the HIWEC study area. Changes in Kirtland's Warbler behaviour due to disturbance are reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Kirtland's Warbler, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. The HIWEC study area provides extensive habitat suitable for this species and although some temporary disturbance may occur during construction, there is ample breeding habitat in all directions that could be used as alternative breeding sites.

The implementation of the mitigation measures identified in **Table 6-4** paired with the minimal overlap of construction and bird activity, and the temporary and localized nature of these disturbances indicate that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour is not significant.

2.4.2 Operations

2.4.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The operation of WTGs for the HIWEC has the potential to result in direct mortality to local populations of Kirtland's Warbler. Although the operation of large scale WTGs has been documented to cause some mortality to birds, the overall impact of the operational WTGs is a small fraction (< 0.01%) of annual human-related avian mortality (Zimmerling, *et al.* 2013). However, these low levels of mortality could be magnified in species that have sensitive populations or that are in a state of decline. Any mortality to Kirtland's Warbler will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

Kirtland's Warblers have a low risk of mortality as they have a low flight pattern. The species sometimes hovers to catch flying insects but generally forage near ground level. Females tend to fly lower than males who forage mainly from the ground up to 3 m (Sykes and Clench, 1998; Bocetti, *et al.* 2014). These flight heights are below even the lowest portion of the WTG blade sweep. Although flight altitude during migration for this species is not available from literature, 75% of Neotropical songbirds migrate between 150 and 600 m above ground (Smithsonian Migratory Bird Centre, 2008). Within the Great Lakes region, the average nocturnal flight altitudes are at about 530 m above the ground, with only 4% of migrants flying within 125 m above ground level and are at risk with colliding with WTGs (Ewert, *et al*. 2011). The heights of WTGs (i.e., hub height and length of WTG) at the HIWEC are approximately 199 m above ground. There may be a higher risk of collision with operational WTGs during migration.

Kirtland's Warbler are also not likely to collide with overhead wires during the operation of the HIWEC as it is unlikely that this species, approximately 15 cm in length (Government of Ontario, 2015) would come in contact with multiple wires simultaneously, in addition to their low flying height.

It is anticipated that an increased risk of mortality to Kirtland's Warbler during operations will be very low with the implementation of the mitigation measures identified in **Table 6-5.** After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in mortality to Kirtland's Warbler is not significant.

2.4.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Kirtland's Warbler. Any disturbance to Kirtland's Warbler as a consequence of the HIWEC operation will result in a moderate magnitude effect as this bird species is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*). Research indicates that the potential disturbance by noise produced by operational WTGs is low, and that the birds are less likely to hear the WTGs than humans (Dooling, 2002). Although it is unlikely that disturbance from operational WTGs will occur, there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Kirtland's Warbler within the study area (moderate spatial extent). If disturbance to Kirtland's Warbler occurs during operations, these disturbances will occur frequently, but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of the HIWEC will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor permanence).

As the birds are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5,** including adaptive management if required, disturbance to Kirtland's Warbler as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of the population with the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up, and potential compensation the effect of change in behaviour to Kirtland's Warbler is not significant.

2.5 Olive-sided Flycatcher

2.5.1 Construction / Decommissioning

2.5.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Olive-sided Flycatcher will occur as a result of the HIWEC development it is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint and a small percentage (0.9 %) or 9.3 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (1,037.4 ha; refer to Figure 3-6i in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat). The distribution of Olive-sided Flycatcher observations within the HIWEC study area suggests that unoccupied suitable habitat is available to displaced individuals (refer to Figure 3-4 in **Appendix F3** of the *Final Volume A: EA Report*). The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Olive-sided Flycatcher is designated as Threatened under Schedule of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Olive-sided Flycatcher.

Rehabilitation of temporary construction / decommissioning areas will occur within one (1) year of the completion of construction / decommissioning phase. The Olive-sided Flycatcher has been shown to use forest habitats altered by human-made openings, if these open areas are left to regenerate after human disturbance (COSEWIC, 2007b). It is likely that the Olive-sided Flycatcher will return to these temporary areas post construction / decommissioning.

The majority of Olive-sided Flycatcher habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat as well as the rehabilitation of habitat damage / destroyed. The habitat removal will not result in a loss of the overall habitat functionality for Olive-sided Flycatcher within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of habitat change for the Olive-sided Flycatcher is not significant.

2.5.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in Olive-sided Flycatcher mortality and / or destruction of their nests. Since Olive-sided Flycatcher is protected under federal legislation (i.e., *SARA*), this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Olive-sided Flycatcher breeds and forages in forest opening, forest edges near natural openings, or human-made openings, or open to semi-open forest stands (Altman and Sallabanks, 2012). Based on the life cycle and behavioural attributes of the Olive-sided Flycatcher, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated. Mitigation measures presented in **Table 6-4**, such as timing windows for the completion of specific work, a sighting and response protocol, etc. will be implemented in order to avoid and minimize any potential effects on Olive-sided Flycatcher.

Vegetation clearing will occur outside of the April 1 to August 31 timing window (overall bird nesting season), where possible, to avoid increased mortality to Olive-sided Flycatcher. If adherence to the timing window is not feasible, nest surveys during suitable survey periods depending on type of habitat (see **Table 6-4**) will be undertaken to minimize increased mortality to Olive-sided Flycatcher as a result of construction / decommissioning activities.

The mitigation measures identified will avoid and minimize increased mortality during the construction / decommissioning phase. Although isolated occurrences of Olive-sided Flycatcher mortality may occur they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Olive-sided Flycatcher mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for the Olive-sided Flycatcher is not significant.

2.5.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Olive-sided Flycatcher that occur within the HIWEC study area. Any changes in Olive-Sided Flycatcher behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence).These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Olive-sided Flycatcher, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. There is expected to be limited overlap between construction activity and the activity period for this species. The implementation of the mitigation measures identified in **Table 6-4** paired with the minimal overlap of construction and bird activity, and the temporary and localized nature of these disturbances indicate that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for the Olive-sided Flycatcher is not significant.

2.5.2 Operations

2.5.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The operation of wind WTGs for the HIWEC has the potential to result in direct mortality to local populations of Olive-sided Flycatcher. Although the operation of large scale wind WTGs has been documented to cause some mortality to birds, the overall impact of the operational WTGs is a small fraction (< 0.01%) of annual human-related avian mortality (Zimmerling, *et al.* 2013). However, these low levels of mortality could be magnified in species that have sensitive populations or that are in a state of decline. Any mortality to Olive-sided Flycatcher will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

In general, mortality of birds due to the operation of WTGs is low, and there have been no records of Olive-sided Flycatcher mortality for Canadian wind facilities, dating from 2012 to present (BSC, *et al.* 2014). This also indicates that the risk of collision with overhead wires and other standing structures within the HIWEC is low. This may be attributed to the swift, direct flight pattern of this species, and its agility demonstrated by its ability to turn sharply when pursuing prey or chasing predators (Altman and Sallabanks, 2012).

Although some Olive-sided Flycatcher mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor permanence), through adaptive management measures.

Mitigation measures to avoid and further reduce the potential or mortality of Olive-sided Flycatcher during operations is identified in **Table 6-5**. It is anticipated that a change in mortality to Olive-sided Flycatcher will be low given the documented low risk of collision with operational WTGs and the flight behaviour of the species. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in mortality to Olive-sided Flycatcher is not significant.

2.5.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Olive-sided Flycatcher. Any disturbance to Olive-sided Flycatcher as a consequence of the HIWEC operation will result in a moderate magnitude effect as the bird species is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*). Research indicates that the potential disturbance by noise produced by operational WTGs is low, and that the birds are less likely to hear the WTGs than humans (Dooling, 2002). Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of some other activities (e.g., Human presence) that could result in disturbance to Olive-sided Flycatcher within the HIWEC study area (moderate spatial extent). If disturbance to Olive-sided Flycatcher occurs during operations, these disturbances will occur frequently, but for short durations (moderate duration / frequency). However, this effect is unlikely. The effect of change in behaviour due to the operation of the wind farm will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor permanence).

As the birds are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Olive-sided Flycatcher as result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in behaviour to Olive-sided Flycatcher is not significant.

2.6 Blanding's Turtle

2.6.1 Construction / Decommissioning

2.6.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Blanding's Turtle utilize a variety of wetland habitats including but not limited to lakes, ponds, creeks, rivers, manmade channels, marshes, marshy meadows, and coastal areas; however, the preferred habitats of this species are characterized by shallow water with an organic substrate and a high density of aquatic vegetation (COSEWIC, 2005). Although these types of habitats were generally avoided in the design of the HIWEC, some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Blanding's Turtle will occur as a result of the HIWEC. Loss of Blanding's Turtle habitat is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.4 %) or 154.5 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (6477.3 ha; refer to Figure 3-6l in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat). The spatial distribution of Blanding's Turtles observed between 2011 and 2015 indicate that alternative suitable

habitat exists within the HIWEC study area (refer to Figure 3-6 in **Appendix F3** of the *Final Volume A: EA Report*). Recent research in Algonquin Park (habitat similar to the HIWEC study area) has demonstrated that Blanding's Turtle select macrohabitats, but not microhabitats within pristine areas (Edge, *et al.* 2010). In addition, Blanding's Turtle have been shown to move extensively between wetlands within one wetland complex (Edge, *et al.* 2010). Therefore, Blanding's Turtle will select any suitable habitat within their home range and are not restricted to an individual wetland site (Edge, *et al.* 2010).

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Blanding's Turtle.

Water levels in wetlands and / or aquatic features adjacent to hibernation sites will be taken prior to and during dewatering activities during construction / decommissioning activities of the HIWEC. Detailed water taking assessments will be conducted to ensure that drawdown within wetlands will not affect turtle species.

The development of the HIWEC has the potential to damage or destroy terrestrial habitats used by Blanding's Turtle as movement corridors or nesting habitat. To address the potential loss of suitable movement corridors and nesting habitat for Blanding's Turtle, ecopassages and artificial nesting mounds will be installed within the HIWEC study area. The creation of ecopassages and artificial nesting habitat will have multiple benefits to reptile species present within the HIWEC study area. The creation of these nesting habitats is anticipated to improve the overall nesting conditions within the HIWEC study area and thus should offset the destruction of any suitable nesting habitat.

The majority of Blanding's Turtle within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat. The habitat removal will not result in a loss of the overall habitat functionality for the Blanding's Turtle within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for Blanding's Turtle is not significant.

2.6.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in Blanding's Turtle mortality and / or destruction of nests. Since Blanding's Turtle is designated as Threatened, this effect is considered moderate with respect to its magnitude, context, and duration and frequency.

Although the HIWEC has been sited to avoid as much wetland area, the Blanding's Turtle may use upland sites for nesting (COSEWIC, 2005). Furthermore, Blanding's Turtle may travel extensively to the variety of aquatic and terrestrial habitat this species depends upon to complete its annual life cycle (COSEWIC, 2005).Based on these life cycle and behavioural attributes of the Blanding's Turtle, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated.

Although direct mortality due to vehicle use on access roads is a potential impact to Blanding's Turtle, this species has been found to avoid crossing roads (Proulx, *et al.* 2014). An individual turtle's likelihood of crossing roads was not influenced by the material of road surface (Proulx, *et al.* 2014). Based on the potential avoidance of Blanding's Turtle to crossing both paved and unpaved roads, this species is expected to be encountered infrequently along access roads. This possibility, combined with very low vehicle traffic along access roads is expected to result in minimal interactions between this species and vehicular traffic.

Avoidance of confirmed or likely turtle nesting habitat from June 1 and September 15 (turtle nesting / hatching period; GBBR, n.d.) will be implemented. If construction is required within this timing window, turtles will be excluded from the area of construction that overlaps the nesting habitat. The avoidance of nesting habitat and / or installation of exclusionary fencing will limit interaction between construction activities and turtles. This will effectively eliminate the potential destruction of turtle nests.

To protect hibernating turtles, removal of natural vegetation within suitable turtle hibernating habitat will be completed by hand from October 15 to April 30 (GBBR, n.d.) when feasible. If removal of vegetation with heavy equipment is required within suitable hibernation wetlands during this timing window, best management practices will be employed (**see Table 6-4**). A detailed dewatering plan will also be made to ensure monitoring of wetlands before, during and after dewatering occur in suitable turtle hibernation wetlands. As development infringes mainly along the edges of wetland pockets, proposed mitigation measures are anticipated to effectively protect overwintering turtle SAR.

Additional mitigation measures identified in **Table 6-4** will avoid and minimize mortality during the construction / decommissioning phase. Although isolated incidents of Blanding's Turtle mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Blanding's Turtle mortality is to occur, long-term population level effects are not anticipated. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality for the Blanding's Turtle is not significant.

2.6.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Blanding's Turtle that occur within the HIWEC study area. Any change in Blanding's Turtle behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Blanding's Turtle, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. The Blanding's Turtle is a primarily aquatic species, although may travel extensively in a season and nest more than 400 m from the nearest water source (COSEWIC, 2005). Although some proposed work will occur adjacent or within small sections of suitable habitat for Blanding's Turtle, the majority of the HIWEC will be in upland habitats that are not often used by the turtles.

The implementation of the mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for the Blanding's Turtle is not significant.

2.6.2 Operations

2.6.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

During operations there is a potential risk of road mortality to Blanding's Turtle. The access roads will primarily be used for maintenance of WTGs and by biologists conducting follow-up monitoring programs. It is expected that project personnel will account for less than five (5) vehicles per day. HIFN has noted that there are very few hunters that use HIFN I.R. #2 and it is not anticipated that there will be an increase due to the development of the HIWEC, as HIFN members that do hunt have already established their preferred areas. It is the intent of HIFN to regulate the use of the HIWEC location and HIFN I.R. # 2 by members of HIFN and non-members. Potential risk of mortality to Blanding's turtle associated with poaching will be minimized through the installation of electronic gates and security cameras at the entrance to the HIWEC in co-ordination with operations staff patrolling throughout the site. Currently, the site is monitored by HIFN and the MNRF. Additionally, security cameras will be installed at any known turtle nesting sites. Any mortality to Blanding's Turtle will be moderate in magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

The highly aquatic nature and road avoidance of this species, paired with the limited use of access roads by project personnel and other members of the public will result in negligible opportunity for interactions between vehicular traffic and Blanding's Turtle. Although some Blanding's Turtle mortality may occur, it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

The implementation of the mitigation measures identified in **Table 6-5** will avoid and further reduce any potential increase in mortality to Blanding's Turtle during operations. These include but are not limited to scanning for wildlife when driving on access roads, maintenance activity timing windows, and adaptive management if required. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality is not significant.

2.6.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Blanding's Turtle. Any disturbance to Blanding's Turtle as a consequence of the HIWEC operation will result in a moderate magnitude effect as the turtle species is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*). As the Blanding's Turtle is primarily an aquatic species the low levels of sound that the operation of the HIWEC may produce are likely to have negligible effects on Blanding's Turtle and should not result in a loss of function to the Blanding's Turtle habitat. Although it is unlikely that disturbance from operational WTGs there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Blanding's Turtle within the HIWEC study area (moderate spatial extent). If disturbance to Blanding's Turtle occurs during operations, these disturbances will occur frequently but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of the wind farm will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor permanence).

As the turtles are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Blanding's Turtle as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up, and potential compensation the residual effect of change in behaviour to Blanding's Turtle is not significant.

2.7 Eastern Musk Turtle

2.7.1 Construction / Decommissioning

2.7.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Eastern Musk Turtle is a highly aquatic species, and typically prefers not to leave littoral areas of waterbodies other than to nest or access adjacent wetlands (COSEWIC, 2012). The preferred habitat of this species contains shallow water (< 2 m) with an abundance of floating and submerged vegetation (COSEWIC, 2012). Although these types of habitats were generally avoided in the design of the HIWEC, some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Eastern Musk Turtle will occur as a result of the HIWEC. Habitat change is considered to be of moderate magnitude and minor in extent, as the habitat loss will be restricted to the construction footprint and a small percentage (1.1 %) or 19.5 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (1,800.9 ha; refer to Figure 3-6m in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat).

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Eastern Musk Turtle is a designated as Threatened under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Eastern Musk Turtle.

Water levels in wetlands and / or aquatic features adjacent to hibernation sites will be taken prior to and during dewatering activities. Detailed water taking assessments will be conducted to ensure that drawdown within wetlands will not affect turtle species.

The development of the HIWEC has the potential to damage or destroy suitable Eastern Musk Turtle nesting habitat. Artificial nesting mounds will be created within the HIWEC study area. The creation of this artificial nesting habitat will have multiple benefits to turtle species present within the HIWEC study area. The creation of these nesting habitats is anticipated to improve the overall nesting conditions within the HIWEC study area and should thus offset the destruction of any suitable nesting habitat.

The majority of Eastern Musk Turtle habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat. The habitat removal will not result in a loss of overall habitat functionality for the Eastern Musk Turtle within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for Eastern Musk Turtle is not significant.

2.7.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Construction and / or decommissioning activities including vegetation removal, blasting and vehicle activity can result in Eastern Musk Turtle mortality or damage to their nests if left unmitigated.

Based on the strong aquatic preferences of this species, there will be a limited overlap between project activities within suitable habitats for the Eastern Musk Turtle. The potential of increased mortality for the Eastern Musk Turtle is anticipated to be minimal.

To protect hibernating turtles, removal of natural vegetation within suitable turtle hibernating habitat will be completed by hand from October 15 to April 30 (GBBR, n.d.) when feasible. If removal of vegetation is required within suitable hibernation wetlands with heavy equipment during this timing window, best management practices will be employed (**see Table 6-4**). A detailed dewatering plan will also be made to ensure monitoring of wetlands before, during and after dewatering occur in suitable turtle hibernation wetlands. As development infringes mainly along the edges of wetland pockets, proposed mitigation measures are anticipated to effectively protect overwintering turtle SAR.

Additional mitigation measures identified in **Table 6-4** will avoid and minimize mortality during the construction / decommissioning phase. Although isolated incidents of Eastern Musk Turtle mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Eastern Musk Turtle mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Eastern Musk Turtle is not significant.

2.7.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Eastern Musk Turtle that occur within the HIWEC study area. Any change in Eastern Musk Turtle behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Eastern Musk Turtle, although some disturbance may still occur. Disturbance will be localized to the areas where active construction / decommissioning are occurring. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. The Eastern Musk Turtle is a highly aquatic species; typically preferring not to leave their aquatic habitats. Although some proposed work will occur adjacent or within small sections of suitable habitat for Eastern Musk Turtle, the majority of the HIWEC will be in upland habitats that are not likely or rarely used by this turtle SAR.

The implementation of the mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for the Eastern Musk turtle is not significant.

2.7.2 Operations

2.7.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

There is the risk of road mortality for turtles during the operational phase. Any mortality to Eastern Musk Turtle will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*). Expected traffic throughout the HIWEC at this phase will primarily be biologists and technicians conducting post-

construction follow-up and monitoring programs and HIWEC infrastructure maintenance work. Increased use of access roads other than monitoring and maintenance activities will be limited to HIFN Band Members, and access to the site will be controlled. Potential risk of mortality to Blanding's turtle associated with poaching will be minimized through the installation of electronic gates and security cameras at the entrance to the HIWEC in co-ordination with operations staff patrolling throughout the site. Currently, the site is monitored by HIFN and the MNRF. Additionally, security cameras will be installed at any known turtle nesting sites.

Although some Eastern Musk Turtle mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

Considering the mitigations proposed in **Table 6-5**, the amount of traffic through the HIWEC and particularly Eastern Musk Turtle avoidance of upland terrestrial habitats (other than nesting and limited wetland movement), mortality caused by traffic during the operation of the HIWEC is expected to be minimized or avoided altogether. Mitigation measures include but are not limited to scanning for wildlife when driving on access roads, maintenance activity timing windows, and adaptive management if required. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect on Eastern Musk Turtle is not significant.

2.7.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Eastern Musk Turtle. Any disturbance to Eastern Musk Turtle as a consequence of the HIWEC operation will result in a moderate magnitude effect as the turtle species is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

Although it is unlikely that disturbance from operational WTGs will occur, there is still the possibility of some other activities (e.g., human presence) that could result in disturbance to Eastern Musk Turtle within the study area (moderate spatial extent). If disturbance to Eastern Musk Turtle occurs during operations, these disturbances will occur frequently but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of the HIWEC will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor permanence).

As the Eastern Musk Turtle is primarily an aquatic species the low levels of sound that the operation of the HIWEC may produce are likely to have negligible effects on the turtle and should not result in a loss of function to the Eastern Musk Turtle habitat.

As the turtles are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Eastern Musk Turtle as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation monitoring, follow-up and potential compensation the residual effect of change in behaviour to Eastern Musk Turtle is not significant.

2.8 Massasauga Rattlesnake

2.8.1 Construction / Decommissioning

2.8.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Massasauga Rattlesnake observed within the HIWEC study area are considered part of the Eastern Georgian Bay Population and have three essential habitat requirements: gestation, hibernation and foraging (Johnson, *et al.* 2000), which includes both wetland and terrestrial sites. Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) will occur for the Massasauga Rattlesnake as a result of the HIWEC, it is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint. Critical habitat was mapped by Natural Resource Solutions Inc. (NRSI) as a 1.2 km radius buffer centred on observation records collected during the 2011-2015 baseline field studies; this covers an area of 7,615.1 ha. Loss of critical habitat is a small percentage (2.3 %) or 174.1 ha compared to the available critical habitat within the HIWEC study area (7,615.1 ha; refer to Figure 6-4 of **Appendix O** of the *Final Volume A: EA Report*).

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Massasauga Rattlesnake.

The loss of suitable Massasauga Rattlesnake gestation, basking and retreat sites will be offset with establishment of gestation sites using blast rock. The Massasauga Rattlesnake seem to be slightly adaptive to disturbed areas, as they have been noted to regularly use the nearby Killbear Provincial Park campground (Parent and Weatherhead, 2000). Water levels in wetlands and / or aquatic features adjacent to hibernation sites will be taken prior to and during dewatering activities. Detailed water taking assessments will be conducted to ensure that drawdown within wetlands will not affect snake species.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although this species is quite common throughout the HIWEC study area (as indicated by the relatively large number of observations), Massasauga Rattlesnake is designated as Threatened under Schedule 1 of *SARA*.

The majority of Massasauga Rattlesnake habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures will result in a further reduction in the loss of habitat. The habitat removal will not result in a loss of the overall habitat functionality for the Massasuaga within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for Massasauga is not significant.

2.8.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in mortality of Massasauga Rattlesnake; therefore, this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Massasauga Rattlesnake has been shown to exhibit some road avoidance behaviour, which may reduce the risk of road mortality (Parent and Weatherhead, 2000; Andrews, *et al.* 2008; Eads, 2013).

Based on the varied habitat requirements of Massasauga Rattlesnake to complete its annual life cycle, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated.

To protect hibernating snakes, removal of natural vegetation within suitable Massasauga hibernation habitat will be completed by hand from October 15 to April 30 (GBBR, n.d.) when feasible. If removal of vegetation with heavy equipment is required within suitable hibernation wetlands, best management practices will be employed (**See Table 6-4**). A detailed dewatering plan will also be made to ensure monitoring of wetlands before, during and after dewatering occurs in suitable snake hibernation wetlands. As development infringes mainly along the edge of wetland pockets, proposed mitigation measures are expected to effectively protect overwintering Massasauga Rattlesnake.

Gestating snakes may also be at an increased risk of mortality during construction activities, particularly in areas where blasting is to occur. The mitigation measures outline in **Table 6-4** are designed avoid and minimize these potential effects. Trained Rattlesnake Monitors will be present during key construction activities when vegetation removal or blasting will be required. A blasting plan will be developed to ensure minimal impact to gestating Massasauaga Rattlesnake. This plan will include but will not be limited to:

- Blasting will only occur in areas that have already been cleared of vegetation;
- Where feasible, the construction footprint will be microsited to select areas where blasting is not required;
- No blasting will occur in wetland or open aquatic habitats;
- Blast mats will be used to control debris and sound generated from blasting;
- Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for snakes (April 15 to September 30). If a snake SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area proposed for blasting. In the highly unlikely event that similar habitat is not found within those parameters, the snake will be relocated to the next closest location of similar habitat; and
- Follow proper drilling, explosives handling and loading procedures.

Additional mitigation measures identified in **Table 6-4** as well as those measures addressed above will avoid and minimize mortality during the construction / decommissioning phase. Although isolated incidents of Massasauga Rattlesnake mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor in spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Massasauga mortality is to occur, long-term population level effects are not anticipated. After applying identified mitigation, monitoring, follow-up, and compensation the residual effect of change in mortality to Massasauga is not significant.

2.8.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Massasauga Rattlesnake occurring within the HIWEC study area. Any change in Massasauga Rattlesnake behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be moderate in magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Massasauga Rattlesnake, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections

of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (moderate spatial extent) and only for short durations. In Ontario, Massasauga Rattlesnake populations are known to tolerate intermediate levels of human disturbance, and coexist with relatively high levels of human activity over short periods (Rouse and Wilson, 2001). Encounters between people and Massasauga Rattlesnake may also increase during the construction phase, which could lead to snake harassment. Snake harassment can be curbed through educating on-site staff by posting SAR Fact Sheets and implementation of a SAR Sighting Response Protocol in the Wildlife Management Plan.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for the Massasauga Rattlesnake is not significant.

2.8.2 Operations

2.8.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The use of access roads in the HIWEC has the potential to result in direct mortality to local populations of Massasauga Rattlesnake. Any mortality to Massasauga Rattlesnake will be moderate in magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

The use of these access roads will primarily be by maintenance staff and biologists participating in monitoring programs. Maintenance crews will likely visit a normally operating WTG once a month and biologists may be conducting monitoring programs twice a week. It is expected that project personnel will account for less than five (5) vehicles per day. Massasauga Rattlesnake has been shown to exhibit some road avoidance behaviour, which may reduce the risk of road mortality (Parent and Weatherhead, 2000; Andrews, *et al.* 2008; Eads, 2013). Due to the limited amount of times personnel will travel these access roads, there will be minimal interactions (low impact) between vehicular traffic and Massasuaga Rattlesnake. Although some Massasauga Rattlesnake mortality may occur, it will be isolated to the HIWEC footprint (minor in spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

Additional mitigation measures identified in **Table 6-5** to avoid and further reduce potential mortality of Massasuaga Rattlesnake include but are not limited to: scanning for wildlife when driving on access roads, maintenance activity timing windows, and adaptive management if required. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality is not significant.

2.8.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Massasauga Rattlesnake. Any disturbance to Massasauga Rattlesnake as a consequence of the HIWEC will be moderate in magnitude as the Massasauga Rattlesnake is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of other activities (e.g., human presence) that could result in disturbance to Massasauga Rattlesnake within the HIWEC study area (moderate in spatial extent). If disturbance to Massasauga Rattlesnake occurs during operations, these disturbances will occur frequently but for short durations (moderate in duration / frequency). The effect of change in behaviour due to the operation of the HIWEC will not be permanent and can be reversed during the life of the

HIWEC through adaptive management measures (minor permanence). As the snakes are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Massasuaga Rattlesnake as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour is not significant.

2.9 Eastern Hog-nosed Snake

2.9.1 Construction / Decommissioning

2.9.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Eastern Hog-nosed Snake utilized open woods, brushlands and / or forest edge with loose or sandy soil (COSEWIC, 2007c). Although some habitat loss of moderate permanence (i.e., lost habitat will not be reversible during the life of the HIWEC) for Eastern Hog-nosed Snake will occur as a result of the HIWEC, it is considered to be moderate in magnitude and minor in extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.4 %) or 171.1 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (7,207.2 ha; refer to Figure 3-6o in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat).

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location in order to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Eastern Hog-nosed Snake.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently as well as habitat loss will be offset by the establishment hibernation sites for Eastern Hog-nosed Snake throughout the HIWEC study area. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Eastern Hog-nosed snake is designated as Threatened under *SARA*.

The majority of Eastern Hog-nosed Snake habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the project. In addition, the identified mitigation measures above and in **Table 6-4** will result in a further reduction in the loss of habitat. The habitat removal will not result in a loss of the overall habitat functionality for Eastern Hog-nosed Snake within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for Eastern Hog-nosed Snake is not significant.

2.9.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in mortality of Eastern Hog-nosed Snake, a SAR; therefore, this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Based on the life cycle and behavioural attributes of the Eastern Hog-nosed Snake, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated.

Basking snakes may also be at an increased risk of mortality during construction activities, particularly in areas where blasting is to occur. The mitigation measures outline in **Table 6-4** are designed avoid and minimize these potential effects. A blasting plan will be developed to ensure minimal effects on basking Eastern Hog-nosed snake. This plan will include but will not be limited to:

- Blasting will only occur in areas that have already been cleared of vegetation;
- Where feasible, the construction footprint will be microsited to select areas where blasting is not required;
- No blasting will occur in wetland or open aquatic habitats;
- Blast mats will be used to control debris and sound generated from blasting;
- Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for snakes (April 15 to September 30). If a snake SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area proposed for blasting. . In the highly unlikely event that similar habitat is not found within those parameters, the snake will be relocated to the next closest location of similar habitat; and
- Follow proper drilling, explosives handling and loading procedures.

Conducting blasting in already cleared areas and completing pre-blasting wildlife searches will ensure no Eastern Hog-nosed Snake are present in the proposed blasting area. These mitigation measures are anticipated to mitigate direct mortality to Eastern Hog-nosed Snake due to blasting.

Additional mitigation measures identified in **Table 6-4** will avoid and minimize mortality during the construction / decommissioning phase. Although isolated incidents of Eastern Hog-nosed Snake mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Eastern Hog-nosed Snake mortality is to occur, long-term population level effects are not anticipated. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of change in mortality to Eastern Hog-nosed Snake is not significant.

2.9.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Eastern hog-Nosed Snakes occurring within the HIWEC study area. Any change in Eastern Hog-nosed behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Eastern Hog-nosed Snake, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time. Therefore, noise disturbance should be limited to particular areas of the HIWEC study area (moderate in spatial extent) and only for short durations. Encounters between people and Eastern Hog-nosed Snakes may also increase during the construction phase, which could lead to snake harassment. Snake harassment could be curbed through educating on-site staff by posting SAR Fact Sheets and implementation of a Sighting Response Protocol in the Wildlife Management Plan.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour for the Eastern Hog-nosed Snake is not significant.

2.9.2 Operations

2.9.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The use of access roads for the HIWEC has the potential to result in direct mortality to local populations of Eastern Hog-nosed Snakes. Any mortality to Eastern Hog-nosed Snake will be moderate in magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*). The use of these access roads will primarily be used by maintenance staff, and biologists participating in monitoring programs. Maintenance crews will likely have to visit a normally operating WTG once a month. Biologists may be conducting monitoring programs twice a week. It is expected that project personnel will account for less than five (5) vehicles per day.

Although some Eastern Hog-nosed Snake mortality may occur it will be isolated to the HIWEC construction footprint (minor in spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency) , and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

Additional mitigation measures identified in **Table 6-5** to avoid and further reduce potential mortality of Eastern Hog-nosed Snake include but are not limited to: scanning for wildlife when driving on access roads, maintenance activity timing windows, and adaptive management if required. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality is not significant.

2.9.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Eastern Hog-nosed Snake. Any disturbance to Eastern Hog-nosed Snake as a consequence of the HIWEC operation will be moderate in magnitude as the Eastern Hog-nosed Snake is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of other activities (e.g., human presence) that could result in disturbance to Eastern Hog-nosed Snake within the HIWEC study area (moderate spatial extent). If disturbance to Eastern Hog-nosed Snake occurs during operations, these disturbances will occur frequently but for short durations (moderate duration / frequency). The effect of change in behaviour due to the operation of HIWEC will not be permanent and can be reversed during the life of the HIWEC through adaptive management measures (minor in permanence). As the snakes are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Eastern Hog-nosed Snake as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour is not significant.

2.10 Eastern Foxsnake

2.10.1 Construction / Decommissioning

2.10.1.1 Habitat Change (including possible damage, or destruction and / or fragmentation of residences or habitat)

Eastern Foxsnake within the HIWEC study area utilizes a variety of open habitats within 1 km of the Georgian Bay, Henvey Inlet and Key River shorelines. Although some habitat loss of moderate permanence (i.e., lost habitat will

not be reversible during the life of the HIWEC) will occur for the Eastern Foxsnake as a result of the HIWEC, it is considered to be moderate in magnitude and minor in extent. This is because the construction footprint and a small percentage (1.9 %) or 78.3 ha of suitable habitat will be lost compared to the available suitable habitat within the HIWEC study area (4,053.1; refer to Figure 3-6n in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat).

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Eastern Foxsnake.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently as well as habitat loss will be offset by the establishment hibernation sites for Eastern Hog-nosed Snake throughout the HIWEC study area. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Eastern Foxsnake is designated as Endangered under Schedule 1 of *SARA*.

The majority of Eastern Foxsnake habitat within the HIWEC study area will remain intact due to the limited amount of habitat removal required for the HIWEC. In addition, the identified mitigation measures above and in **Table 6-4** will result in a further reduction in the loss of suitable habitat for Eastern Foxsnake. The habitat removal will not result in a loss of the overall habitat functionality for Eastern Foxsnake within the HIWEC study area. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for Eastern Foxsnake is not significant.

2.10.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Vegetation removal, blasting, and vehicle activity proposed for the construction / decommissioning of the HIWEC may result in mortality of Eastern Foxsnake mortality, a SAR; therefore, this effect is considered moderate with respect to its magnitude, context, and duration and frequency. Based on the life cycle and behavioural attributes of the Eastern Foxsnake, there is the potential for an increased risk of direct mortality / population level effects during construction, if left unmitigated.

Basking snakes may also be at an increased risk of mortality during construction activities, particularly in areas where blasting is to occur. The mitigation measures outline in **Table 6-4** are designed avoid and minimize these potential effects. A blasting plan will be developed to ensure minimal impact to basking Eastern Hog-nosed snake. This plan will include but will not be limited to:

- Blasting will only occur in areas that have already been cleared of vegetation;
- Where feasible, the construction footprint will be microsited to select areas where blasting is not required;
- No blasting will occur in wetland or open aquatic habitats;
- Blast mats will be used to control debris and sound generated from blasting;
- Pre-blast species searches will be completed by a qualified Biologist prior to any blasting activity that occurs during the active period for snakes (April 15 to September 30). If a snake SAR is encountered during a pre-blast search, it will be relocated to an area of similar habitat at least 50 m, but less than 300 m, from the area proposed for blasting. In the highly unlikely event that similar habitat is not found within those parameters, the snake will be relocated to the next closest location of similar habitat; and
- Follow proper drilling, explosives handling and loading procedures.

These mitigation measures are anticipated to avoid and minimize direct mortality to Eastern Foxsnake due to blasting.

Additional mitigation measures identified in **Table 6-4** will avoid and minimize mortality during the construction / decommissioning phase. Although isolated incidents of Eastern Foxsnake mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Eastern Foxsnake mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and compensation the residual effect of change in mortality to Eastern Foxsnake is not significant.

2.10.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities for the HIWEC may produce noise, vibration and other disturbances which may result in avoidance behaviour and / or temporary disturbance to Eastern Foxsnake occurring within the HIWEC study area. Any change in Eastern Foxsnake behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Eastern Foxsnake, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. Work will be limited to a few WTGs and / or sections of access road at any one time and thus noise disturbance should be limited to particular areas of the HIWEC study area (Moderate spatial extent) and only for short durations. Encounters between people and Eastern Foxsnake may also increase during the construction phase, which could lead to snake harassment. Snake harassment could be curbed through educating on-site staff by posting SAR Fact Sheets and implementation of a Sighting Response Protocol in the Wildlife Management Plan.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation that residual effect of change in behaviour for the Eastern Foxsnake is not significant.

2.10.2 Operations

2.10.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

The use of access roads for the HIWEC has the potential to result in direct mortality to local populations of Eastern Foxsnake. Any mortality to Eastern Foxsnake will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

The use of these access roads will primarily be used by maintenance staff, and biologists participating in monitoring programs. Maintenance crews will likely have to visit a normally operating WTG once a month and biologists may be conducting monitoring programs twice a week. It is expected that project personnel will account for less than five (5) vehicles per day and therefore, there will be minimal interactions between vehicular traffic and Eastern Foxsnake.

Although some Eastern Foxsnake mortality may occur it will be isolated to the HIWEC footprint (minor in spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

Due to the limited amount of times personnel will travel these access roads, and the fact that Eastern Foxsnake prefer habitat close to large open aquatic features (such as the Key River, Georgian Bay and Henvey Inlet), a change in mortality to the Eastern Foxsnake is not anticipated. Additional mitigation measures identified in **Table 6-5** to avoid and further reduce potential mortality of Eastern Foxsnake include but are not limited to: scanning for wildlife when driving on access roads, maintenance activity timing windows, and adaptive management if required. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality is not significant.

2.10.2.2 Changes in Behaviour, Due to Disturbance

During operations, the HIWEC will produce low levels of sound that have the potential to cause some disturbance to Eastern Foxsnake. Any disturbance to Eastern Foxsnake as a result of the HIWEC operation will result in a moderate magnitude effect as the Eastern Foxsnake is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

Although it is unlikely that disturbance from operational WTGs will occur there is still the possibility of other activities (e.g., human presence) that could result in disturbance to Eastern Foxsnake within the HIWEC study area (moderate in spatial extent). If disturbance to Eastern Foxsnake occurs during operations it will occur frequently but for short durations (moderate in duration / frequency). As the snakes are unlikely to be disturbed by the operational noise of WTGs, and with the implementation of additional mitigation measures identified in **Table 6-5**, including adaptive management if required, disturbance to Eastern Foxsnake as a result of the operation of the HIWEC is not anticipated to affect the viability and sustainability of populations within the HIWEC study area or Parry Sound District. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect for change in behaviour to Eastern Foxsnake is not significant.

2.11 Little Brown Bat

2.11.1 Construction / Decommissioning

2.11.1.1 Habitat Change (including damage, destruction and / or fragmentation of habitat)

Construction activities for the development of HIWEC project components and infrastructure such as tree clearing and blasting is expected to result in a loss of suitable habitat for Little Brown Bat, which is considered to be moderate in magnitude and minor in extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.2 %) or 189.1 ha of suitable habitat will be lost. Though this loss cannot be avoided, it is comparatively small to the amount of suitable habitat (8,715.4 ha; refer to Figure 3-6j in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat) that will remain unaltered throughout the HIWEC.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Little Brown Bat is designated as Endangered under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible, by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Little Brown Bat. Additional mitigation measures include searching for active bat roosts (habitat assessments and / or exit surveys), if tree removal or blasting is required during the roosting season for bats (April 30 to September 1).

After construction a minimum of ten (10) artificial roosting structures will be erected within the HIWEC study area. The number of artificial roosting structures should equal the number of cavity trees removed up to a maximum of 30 structures. It is anticipated that the installation of at least ten (10) bat houses will provide adequate alternative roosting sites for Little Brown Bat within the HIWEC study area as the amount and overall percentage of suitable bat habitat proposed for removal is minimal (2.2%).

Considering the abundance of suitable habitat that will remain unaltered throughout the HIWEC, it is expected that the minimal amount of habitat removal will not negatively impact the potential maternity, foraging, hibernating or roosting functions of the identified habitat. In addition, the mitigation measures above and in **Table 6-4** will result in a further reduction in the loss of suitable habitat for Little Brown Bat. After applying the identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for the Little Brown Bat is not significant.

2.11.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Activities associated with the construction and decommissioning phases such as: tree clearing (particularly maternity colony or roosting trees), blasting (particularly hibernacula or roosting areas), equipment and vehicle activity within Little Brown Bat habitat have the potential to result in mortality to the species. This effect is considered moderate with respect to its magnitude, context, and duration and frequency. Considering the life cycle of Little Brown Bat and varied use of habitats for critical phases of this species' life cycle, specific mitigation and protection measures are required to avoid or minimize these negative effects.

To ensure residences for bat SAR (roosting sites) are not destroyed, which may cause Little Brown Bat mortality, mitigation including searches for bats if tree removal or blasting is required during the roosting season for bats (April 30 to September 1) will be implemented.

In addition, mitigation measures identified in **Table 6-4** avoid and minimize mortality during the construction / decommissioning phase. Although isolated occurrences of Little Brown Bat mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Little Brown Bat mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Little Brown Bat is not significant.

2.11.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities in the HIWEC will produce noise, vibration and other disturbances which may result in avoidance of habitat or temporary disturbance to Little Brown Bat. These disturbances will be localized to the areas of active construction / decommissioning, giving SAR including Little Brown Bat the opportunity to move to undisturbed habitat (which, as previously noted, will remain abundant). Any change in Little Brown Bat behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be moderate in magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid and minimize most disturbances to Little Brown Bat, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. To further avoid and minimize this potential effect, active construction and decommissioning work will be limited to a number of WTG or sections of access roads at a time; therefore, this disturbance will remain localized to the HIWEC study area (moderate spatial extent) and will be shortened in duration in a particular area.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized.

After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality risk to Little Brown Bat is not significant.

2.11.2 Operations

2.11.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

Studies indicate that operational WTGs pose a risk of mortality to bats. Resident bat populations are less at risk of mortality than migrant bats. The average bat mortality estimate at wind power facilities in Ontario is 19.08 bats / WTG, of which Little Brown Bat make up 15.7% (BSC, *et al.* 2014). These data predicts approximately 272.6 potential Little Brown Bat mortalities per year in the HIWEC (91 WTGs). More recent mortality studies since the spread of white-nose syndrome indicate an approximate average mortality rate of 0.14 Little Brown Bat / WTG / year (NRSI, unpublished). These data predicts approximately 12.75 / year in the HIWEC (91 WTGs). Any mortality to Little Brown Bat will be moderate in magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

Although some Little Brown Bat mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor in permanence) through adaptive management measures.

Considering these data and the abundance of unaltered suitable habitat that will remain in the HIWEC, it is expected the total decline in resident Little Brown Bat populations throughout the life of the HIWEC operational phase will be low. The implementation of the mitigation measures identified in **Table 6-5** will avoid and further reduce any potential increase in mortality to Little Brown Bat during operations. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Little Brown Bat is not significant.

2.11.2.2 Changes in Behaviour (including habitat avoidance and noise disturbance)

Noise and vibration caused by normal operation of HIWEC WTGs or other components have the potential to disturb or cause Little Brown Bat to avoid habitat. Any disturbance to Little Brown Bat as a result of the HIWEC operation will result in a moderate magnitude effect as the Little Brown Bat is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

It is expected that the sound of normal operations of the HIWEC will not be sufficient to disrupt life processes of Little Brown Bat. Furthermore, considering the abundance of suitable habitat that will remain unaltered throughout the HIWEC Study Area, Little Brown Bat will have the opportunity to move to undisturbed areas. The mitigation measures identified in **Table 6-5** will avoid and minimize effects due to disturbance. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour to Little Brown Bat is not significant.

2.12 Northern Myotis

2.12.1 Construction / Decommissioning

2.12.1.1 Habitat Change (including damage, destruction and / or fragmentation of habitat)

Construction activities for the development of HIWEC project components and infrastructure such as tree clearing and blasting is expected to result in a loss of suitable habitat for Northern Myotis, which is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint and a small

percentage (2.2%) or 189.1 ha of suitable habitat will be lost. Though this loss cannot be avoided or mitigated, it is comparatively small to the amount of suitable habitat (8715.4 ha; refer to Figure 3-6j in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat) that will remain unaltered throughout the HIWEC.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Northern Myotis is designated as Endangered under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Northern Myotis. Additional mitigation measures including searching for active bat roosts (habitat assessments and / or exit surveys), if tree removal or blasting is required during the roosting season for bats (April 30 to September 1) are also proposed.

After construction a minimum of ten (10) artificial roosting structures will be erected within the HIWEC study area. The number of artificial roosting structures should equal the number of cavity trees removed up to a maximum of 30 structures. It is anticipated that the installation of at least ten (10) bat houses will provide adequate alternative roosting sites for Northern Myotis within the HIWEC study area as the amount and overall percentage of suitable bat habitat proposed for removal is minimal (2.2%).

Considering the abundance of suitable habitat that will remain unaltered throughout the HIWEC, it is expected that the minimal amount of habitat removal will not negatively impact the potential maternity, foraging, hibernating or roosting functions of the identified habitat. In addition, the mitigation measures above and in **Table 6-4** will result in a further reduction in the loss of suitable habitat for Northern Myotis. After applying the identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for the Northern Myotis is not significant.

2.12.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Activities associated with the construction and decommissioning phases such as: tree clearing (particularly maternity colony or roosting trees), blasting (particularly hibernacula or roosting areas), equipment and vehicle activity within Northern Myotis habitat have the potential to result in mortality to the species that is of moderate magnitude and minor spatial extent. Considering the life cycle of Northern Myotis and varied use of habitats for critical phases of this life cycle, specific mitigation and protection measures are required to avoid or minimize these negative effects.

To ensure residences for SAR bats (roosting sites) are not destroyed and to mitigate any associate mortality, mitigation including searches for bats if tree removal or blasting is required during the roosting season for bats (April 30 to September 1) will be implemented.

The mitigation measures identified in **Table 6-4** will avoid and reduce increased mortality risk during the construction phase / decommissioning phase. Although isolated occurrences of Northern Myotis mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Northern Myotis mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Little Brown Bat is not significant.

2.12.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities in the HIWEC will produce noise, vibration and other disturbances which may result in avoidance of habitat or temporary disturbance to Northern Myotis. Any change in Northern Myotis behaviour due to disturbance is reversible following the construction phase of the HIWEC (minor permanence). These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Northern Myotis, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase. These disturbances will be localized within the HIWEC study area to the areas of active construction / decommissioning (moderate spatial extent), giving Northern Myotis the opportunity to move to undisturbed habitat (which, as previously noted, will remain abundant). To further avoid and minimize this potential impact, active construction and decommissioning work will be limited to a number of WTGs or sections of access roads at a time; therefore, this disturbance will remain localized and will be shortened in duration in a particular area.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicate that the potential for residual effects due to disturbance are will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality risk to Northern Myotis is not significant.

2.12.2 Operations

2.12.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

Studies indicate that operational WTGs pose a risk of mortality to bats. Resident bat populations are less at risk of mortality than migrant bats. The average bat mortality estimate at wind power facilities in Ontario is 19.08 bats / WTG, of which Northern Myotis make up 0.41% (BSC, *et al.* 2014). These data predicts approximately 7.12 potential Northern Myotis mortalities per year in the HIWEC (91 WTGs). Any mortality to Northern Myotis will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

Although some Northern Myotis mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor; permanence) through adaptive management measures.

Considering these data and the abundance of unaltered suitable habitat that will remain in the HIWEC, it is expected the total decline in resident Northern Myotis populations throughout the life of the HIWEC operational phase will be low. The implementation of the mitigation measures identified in **Table 6-5** will avoid and further reduce any potential increase in mortality to Northern Myotis during operations. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Northern Myotis is not significant.

2.12.2.2 Changes in Behaviour, Due to Disturbance

Noise and vibration caused by normal operation of HIWEC WTGs or other components have the potential to disturb or cause Northern Myotis to avoid habitat. Any disturbance to Northern Myotis as a result of the HIWEC operation will result in a moderate magnitude effect as the Northern Myotis is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

It is expected that the sound of normal operations of the HIWEC will not be sufficient to disrupt life processes of Northern Myotis. Furthermore, considering the abundance of suitable habitat that will remain unaltered throughout the project area, Northern Myotis have the opportunity to move to undisturbed areas. The mitigation measures identified in **Table 6-5** will avoid and minimize potential effects due to disturbance. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour to northern myotis is not significant.

2.13 Tri-colored Bat

2.13.1 Construction / Decommissioning

2.13.1.1 Habitat Change (including damage, destruction and/or fragmentation of habitat)

Construction activities for the development of HIWEC project components and infrastructure such as tree clearing and blasting is expected to result in a loss of suitable habitat for the Tri-colored Bat, which is considered to be of a moderate magnitude and minor extent, as the habitat loss will be restricted to the construction footprint and a small percentage (2.2 %) or 189.1 ha of suitable habitat will be lost. Though this loss cannot be avoided or mitigated, it is comparatively small to the amount of suitable habitat (8715.4 ha; refer to Figure 3-6j in **Appendix F2** of the *Final Volume A: EA Report* for a map of suitable habitat) that will remain unaltered throughout the HIWEC.

The duration and frequency of habitat removal will be moderate as the habitat change will be evident during more than one (1) phase but will occur infrequently. The context for the effects of habitat change is considered moderate because although habitat for this species is quite common throughout the HIWEC study area, Tri-colored Bat is designated as Endangered under Schedule 1 of *SARA*.

In most cases, the HIWEC location encompasses an area that is larger than the actual construction footprint; this allows flexibility to accommodate site-specific considerations. Identified mitigation measures include that the construction footprint will be microsited within the larger permitted HIWEC location to construct project infrastructure, such as roads, away from SAR habitats and residences and complex habitats, where possible by a qualified Biologist. This mitigation will result in a further reduction in the loss of habitat for Tri-colored Bat. Additional mitigation measures include searching for active bat roosts (habitat assessments and / or exit surveys), if tree removal or blasting is required during the roosting season for bats (April 30 to September 1).

After construction a minimum of ten (10) artificial roosting structures will be erected within the HIWEC study area. The number of artificial roosting structures should equal the number of cavity trees removed up to a maximum of 30 structures. It is anticipated that the installation of at least ten (10) bat houses will provide adequate alternative roosting sites for Tri-colored Bat within the HIWEC study area as the amount and overall percentage of suitable bat habitat proposed for removal is 2.2%.

Considering the abundance of suitable habitat that will remain unaltered throughout the HIWEC, it is expected that the minimal amount of habitat removal will not negatively impact the potential maternity, foraging, hibernating or roosting functions of the identified habitat. In addition, the mitigation measures above and in **Table 6-4** will result in a further reduction in the loss of suitable habitat for Tri-colored Bat. The habitat removal will not result in a loss of the overall habitat functionality for the Tri-colored Bat. After applying the identified mitigation, monitoring, follow-up and compensation the residual effect of habitat change for the Tri-colored Bat is not significant.

2.13.1.2 Changes in Mortality Risk (including harm, harassment and / or killing)

Activities associated with the construction and decommissioning phases such as: tree clearing (particularly maternity colony or roosting trees), blasting (particularly hibernacula or roosting areas), equipment and vehicle activity within Tri-colored Bat habitat have the potential to result in mortality to the species that is of moderate magnitude and minor spatial extent. Considering the life cycle of Tri-colored Bat and varied use of habitats for critical phases of this life cycle, specific mitigation and protection measures are required to avoid or minimize these negative effects.

To ensure residences for SAR bats (roosting sites) are not destroyed and any associated mortality is mitigated, mitigation including searches for bats if tree removal or blasting is required during the roosting season for bats (April 30 to September 1) will be implemented.

The mitigation measures identified in **Table 6-4** will avoid and minimize increased mortality risk during the construction / decommissioning phase. Although isolated occurrences of Tri-colored Bat mortality may occur, they are likely to occur infrequently and will be isolated to the construction footprint (minor spatial extent and duration / frequency). Increase mortality risk is considered reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures. If any isolated Tri-colored Bat mortality is to occur, it is not anticipated to have long-term population level effects. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality to Tri-colored Bat is not significant.

2.13.1.3 Changes in Behaviour, Due to Disturbance

Construction and decommissioning activities in the HIWEC will produce noise, vibration and other disturbances which may result in avoidance of habitat or temporary disturbance to Tri-colored Bat. These disturbances will be of a moderate magnitude as the mitigation measures identified in **Table 6-4** should be adequate to avoid most disturbances to Tri-colored Bat, although some disturbance may still occur. Duration and frequency of changes in behaviour will be moderate as changes in behaviour may occur during more than one (1) phase and may occur frequently for short durations through the construction phase.

These disturbances will be localized within the HIWEC study area to the areas of active construction / decommissioning (moderate spatial extent), giving Tri-colored Bat the opportunity to move to undisturbed habitat (which, as previously noted, will remain abundant). To further avoid and minimize this potential impact, active construction and decommissioning work will be limited to a number of WTGs or sections of access roads at a time; therefore, this disturbance will remain localized and will be shortened in duration in a particular area.

The implementation of mitigation measures identified in **Table 6-4** paired with the temporary and localized nature of these disturbances indicates that the potential for residual effects due to disturbance will be avoided and minimized. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour to Tri-colored Bat is not significant.

2.13.2 Operations

2.13.2.1 Change in Mortality Risk (including harm, harassment and / or killing)

Studies indicate that operational WTGs pose a risk of mortality to bats. Resident bat populations are less at risk of mortality than migrant bats. The average bat mortality estimate at wind power facilities in Ontario is 19.08 bats / WTGs, of which Tri-colored Bat make up 0.41% (BSC, *et al.* 2014). These data predicts approximately 7.12 potential Tri-colored Bat mortalities / year in the HIWEC (91 WTGs). Any mortality Tri-colored Bat will result in a moderate magnitude as this species is a SAR and is protected under federal legislation (i.e., *SARA*).

Although some Tri-colored Bat mortality may occur it will be isolated to the HIWEC footprint (minor spatial extent), occur infrequently during the operations phase which is anticipated to be 30+ years (moderate duration / frequency), and will be reversible during the lifetime of the HIWEC (minor permanence) through adaptive management measures.

Considering these data and the abundance of unaltered suitable habitat that will remain in the HIWEC, it is expected the total decline in resident Tri-colored Bat populations throughout the life of the HIWEC operational phase will be low. The implementation of the mitigation measures identified in **Table 6-5** will avoid and further reduce any potential increase in mortality to Tri-colored Bat during operations. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in mortality is not significant.

2.13.2.2 Changes in Behaviour, Due to Disturbance

Noise and vibration caused by normal operation of HIWEC WTGs or other components have the potential to disturb or cause Tri-colored Bat to avoid habitat. Any disturbance to Tri-colored Bat as a result of the HIWEC operation will result in a moderate magnitude effect as the Tri-colored Bat is a SAR and their protection against disturbance is federally regulated (i.e., *SARA*).

It is expected that the sound of normal operations of the HIWEC will not be sufficient to disrupt life processes of Tri-coloured Bat. Furthermore, considering the abundance of suitable habitat that will remain unaltered throughout the project area, Tri-coloured Bat will have the opportunity to move to undisturbed areas. The mitigation measures identified in **Table 6-5** paired with the temporary and localized nature of these disturbances indicate that the potential for residual effects due to disturbance are low and expected to be minimal. After applying identified mitigation, monitoring, follow-up and potential compensation the residual effect of change in behaviour is not significant.

3. Summary

During the construction phase, effects of the loss and / or fragmentation of habitat on wildlife and SAR are not anticipated to be significant given the abundance of suitable habitat within the study area and surrounding landscape. The area of suitable habitat proposed for removal contained in **Table 3-1** below is based on the 120 WTG layout. Predicted loss of suitable habitat is a conservative estimate since 91 WTGs will ultimately be built. The HIWEC has been sited considering reasonable alternatives, in order to select the best option to avoid or minimize effects on wildlife, SAR and their habitats. The potential effects on wildlife, SAR and their habitats will be further avoided and minimized with the implementation of proposed mitigation, monitoring, follow-up and compensation. Also, due to the large number and spatial extent of protected lands in the Parry Sound and Manitoulin Districts, as well as a relatively undeveloped landscape, wildlife habitat availability / connectivity in the area is anticipated to remain high including after the construction / decommissioning and operation of the HIWEC. The effect of increased mortality and disturbance on SAR populations during construction and operations of the HIWEC is also expected to be not significant after applying the proposed mitigation, monitoring, follow-up and compensation.

Table 3-1: Suitable Habitat for SAR within the HIWEC Study Area and Overlapped by the Construction Footprint based on the 120 WTG Layout

SAR	Total Suitable Habitat within the HIWEC Study Area (ha)	Loss of Suitable Habitat within the HIWEC Study Area	
		Area (ha)	*Percent of Total Suitable Habitat within the HIWEC Study Area (%)*
Canada Warbler	1805.2	31.6	1.8
Common Nighthawk	7329.2	161.9	2.2
Eastern Whip-poor-will	7415.7	172.7	2.3
Kirtland's Warbler	3767.0	116.8	3.1
Olive-sided Flycatcher	1037.4	9.3	0.9
Blanding's Turtle	6477.3	154.5	2.4
Eastern Musk Turtle	1800.9	19.5	1.1
Eastern Foxsnake	4053.1	78.3	1.9
Eastern Hog-nosed Snake	7207.2	171.1	2.4
Massasauga Rattlesnake[8]	7615.1	174.1	2.3
Bat SAR[9]	8715.4	189.1	2.2

8. *Of the confirmed SAR present within the HIWEC study area, Massasauga Rattlesnake is the only species that has critical habitats defined in a final recovery strategy or action plan. Their critical habitats are protected under SARA.*
9. *Bat SAR includes Little Brown Bat, Northern Myotis and Tri-colored Bat.*

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