Henvey Inlet Wind LP

Henvey Inlet Wind

Volume C: Overlapping and Cumulative Effects Assessment

Final

Henvey Inlet Wind LP

Henvey Inlet Wind

Volume C: Overlapping and Cumulative Effects Assessment – Final

Prepared by:

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

Project Number:

60341251

Date:

January, 2016

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to Consultant which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

Consultant agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but Consultant makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by Consultant represent Consultant's professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since Consultant has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, Consultant, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by Consultant and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

Consultant accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of Consultant to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2012-01-06

AECOM Signatures

Report Prepared By:

Marian Tibor-McMahon, Hons.B.A
Aboriginal Engagement Consultant

Report Reviewed By:

Kyle Hunt, M.E.Des.
Senior Environmental Planner

Table of Contents

List of Figures

List of Tables

List of Acronyms and Glossary

AECOM .....AECOM Canada Ltd.
BMPs.....Best management practices
CEAA 2012 .....*Canadian Environmental Assessment Act, 2012*
EA .....Environmental Assessment
EMA .....Enhanced Management Area
FIT.....Feed-in-Tariff
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
MNRF.....Ontario Ministry of Natural Resources and Forestry
MTO .....Ontario Ministry of Transportation
MW.....Megawatt
Nigig.....Nigig Power Corporation
O.Reg. .....Ontario Regulation
OPA.....Ontario Power Authority
PPCRA.....*Provincial Parks and Conservation Reserves Act, 2006*
PTTW.....Permit To Take Water
ROW .....Right-of-way
SAR.....Species at Risk
SOCC.....Species of Conservation Concern
SS .....Switching station
VEC.....Valued Ecosystem Components
WTG.....Wind turbine generator
ZOI .....Zone of influence

1. Introduction

Nigig Power Corporation (Nigig) received a Feed-in-Tariff (FIT) Contract from the Ontario Power Authority (OPA) in 2011 for a 300 megawatt (MW) wind energy generation centre. Henvey Inlet Wind LP (HIW), a limited partnership between Pattern Renewable Holdings Canada ULC and Nigig, is proposing to develop the Henvey Inlet Wind Energy Centre (HIWEC), a 300 MW facility on Henvey Inlet First Nation Reserve No. 2 (HIFN I.R. #2). The HIWEC requires a new off-Reserve Transmission Line to deliver the electricity generated by the HIWEC to the Ontario electricity grid. AECOM Canada Ltd. (AECOM) was retained by HIW to:

1. Prepare an Environmental Assessment (EA) for the proposed HIWEC (**Volume A**) in accordance with the Henvey Inlet First Nation Environmental Assessment Guidance Instrument (HIFN EA Guidance) requirements; and
2. Conduct an Environmental Review under Ontario Regulation (O.Reg.) 116/01 for the proposed off-Reserve Transmission Line (**Volume B**).

This Overlapping and Cumulative Effects Assessment (**Volume C**) was conducted in accordance with HIFN EA Guidance requirements including consideration of:

1. Overlapping environmental effects that arise from the proposed HIWEC and Transmission Line together; and
2. Cumulative environmental effects that are likely to arise from the combination of HIWEC and Transmission Line, and their overlapping effects in conjunction with other past, present and future projects and activities.

Overlapping effects are defined as the combined residual / net environmental effects of both the HIWEC and Transmission Line, as shown in **Figure 1** below. This provides a broad picture of potential effects on the environment resulting from both the HIWEC and Transmission Line.

Figure 1: Overlapping Effects

Cumulative effects occur when the residual / net overlapping effects (after the application of mitigation measures) are considered in conjunction with other environmental residual effects from past, present and reasonably foreseeable future projects or other activities, as shown on **Figure 2** below.

Figure 2: Cumulative Effects

2. Overlapping Effects

This section provides a summary of the approach followed to assess overlapping effects as a result of activities conducted during construction / decommissioning and operations of both the HIWEC and Transmission Line, as well as the results of the assessment. This includes:

- An assessment of overlapping environmental effects that could potentially affect the biophysical and socio-economic environments as a result of activities during construction / decommissioning and operations;
- An assessment of the overlapping environmental effects that could potentially affect the environment as a result of accidents and malfunctions during construction / decommissioning and operations;
- A summary of the residual / net overlapping environmental effects that are expected to remain following the implementation of mitigation measures;
- An evaluation of the significance of the residual overlapping environmental effects that could potentially affect the environment as a result of the combination of both the HIWEC and Transmission Line activities; and,
- Recommendations for follow-up and monitoring programs, where applicable, to verify the accuracy and effectiveness of mitigation measures.

2.1 Methodology

The overlapping effects assessment considers how the combination of the HIWEC and Transmission Line can potentially affect the environment. Residual overlapping effects are the residual / net effects of both the HIWEC and Transmission Line after the application of mitigation measures. If there are residual / net effects as a result of the HIWEC and Transmission Line on Valued Ecosystem Components (VEC), Nishshing Aki, or other components they will be carried forward for an evaluation of significance.

The purpose of assessing the overlapping effects of both the HIWEC and Transmission Line is to identify the overlapping interactions on the VECs, Nishshing Aki and other components, and evaluate what the residual / net overlapping effects are, if any, after the application of mitigation measures. As described in **Volumes A** and **B**, VECs are defined as existing components of the environment that have recognized ecological value in existing science, law, or policies. Nishshing Aki are defined as social or cultural features or conditions that have been (i) identified as valued by Henvey Inlet First Nation (HIFN); or (ii) designated as valued by HIFN with community input as provided by the Land Code. Other components have been added to **Volumes A** and **B** based on the professional judgement of the assessment practitioners, based on experience with similar projects.

Based on the HIFN EA Guidance requirements, the following steps outline the overlapping effects assessment methodology that was applied to the HIWEC and Transmission Line:

1. Describe the potential overlapping environmental effects of the HIWEC and Transmission Line;
2. Describe proposed mitigation measures for the overlapping environmental effects;
3. Determine the likely residual / net overlapping environmental effects after the implementation of mitigation measures;
4. Assess the significance of any adverse residual / net overlapping environmental effects that are likely to occur; and
5. Recommend follow-up and monitoring programs, where applicable, to verify the accuracy and effectiveness of mitigation measures.

VECs, Nishshing Aki and other components, as scoped in **Volumes A** and **B**, were used to focus the overlapping effects assessment on important elements of the biophysical and socio-economic environments that have the potential to be affected by both HIWEC and Transmission Line components, or conversely might have an effect on the HIWEC and Transmission Line components. The overlapping effects assessment is based on the residual / net effects to VECs, Nishshing Aki and other components from both the HIWEC and Transmission Line as detailed in **Volumes A** and **B**.

VECs, Nishshing Aki and other components assessed for the overlapping effects assessment for the HIWEC and Transmission Line are listed in **Table 1** below.

Table 1: VECs, Nishshing Aki and Other Components for the Overlapping Effects Assessment

HIWEC VECs, Nishshing Aki and Other Components	Transmission Line VECs
• Soils and Terrain • Groundwater • Wildlife and Wildlife Habitat • Vegetation and Ecological Communities • Surface Water • Fish and Fish Habitat • Species at Risk (SAR) • Land and Resources Used for Traditional Purposes by Aboriginal Persons • Cultural Resources / Heritage and Archaeological Sites • Noise • Visual Landscape • Nishshing Aki (Sacred Sites, Burial Grounds, Old Settlements) • Air Quality • Socio-Economic Features: On and Off-Reserve (Local Residents, Cottagers and Businesses; Recreation and Tourism; Community Services and Infrastructure) • Infrastructure • Recreation and Tourism	• Topography and Soils • Wildlife and Wildlife Habitat • Vegetation and Ecological Communities • SAR • Fish and Fish Habitat • Surface Water Quality/Quantity • Groundwater Quality/Quantity • Air Quality • Noise • Socio-Economic Features • Land Use • Aboriginal Land Use and Resources • Resources • Cultural Resources / Heritage and Archaeological Sites • Landscapes and Views

2.1.1 Spatial and Temporal Boundaries

Spatial and temporal boundaries define the geographic and time-based limits of the overlapping effects assessment. To determine the overlapping effects and the interactions between the HIWEC and Transmission Line components, the spatial and temporal boundaries for the assessment will be limited to both the HIWEC and Transmission Line study areas, as defined below:

HIWEC Study Area

The HIWEC study area includes HIFN I.R. #2 plus a 550 m buffer extending beyond the HIFN I.R. #2 boundary. The HIWEC study area is of sufficient size to include the HIWEC components, phases and activities.

Regional effects are considered in the HIWEC regional study area which includes the HIWEC study area as well as the adjacent Municipality of Killarney and the geographic municipalities of Henvey Township and Mowat Township. Henvey Township and Mowat Township are two unincorporated townships that are part of the Parry Sound District which do not have local level governance or any local service boards that provide typical municipal services.

Transmission Line Study Area

The Transmission Line local study area is limited to the 1 kilometre (km) buffer on each side of the proposed transmission centre line. Route B extends from HIFN I.R. #2 follows the proposed Highway 69/400 south to Woods Road, then travels east to parallel the existing HONI 500 kV Transmission Line system, before travelling south to connect to the existing HONI 230 kV Transmission Line system south of the Town of Parry Sound. The length of the Transmission Line is approximately 86 km.

Where a regional study area is warranted, the boundaries are described in **Section 2.3** of this report. Individual spatial boundaries are defined specifically for each VEC, Nishshing Aki or other component, where required, based on the anticipated spatial extent of potential overlapping environmental effects. These individual regional study areas are identified for the applicable VECs, Nishshing Aki or other components, where required, in **Section 2.3**.

The temporal boundaries for each phase of HIWEC and Transmission Line components are defined as:

- Construction Phase – May 2016 to February 2018
- Operation Phase – February 2018 to February 2048
- Decommissioning Phase – February 2048 to September 2049

Based on the timing of phases, the overall temporal boundary for the overlapping effects assessment is from May 2016 to September 2049.

The spatial and temporal boundaries are considered a minimum and some exceptions to these boundaries may apply for different environmental components, features or effects. If any exceptions are considered for this assessment, they are identified where applicable within this overlapping effects assessment chapter.

2.1.2 Potential Overlapping Effects and Mitigation

The HIFN EA Guidance document defines mitigation as the elimination, reduction, or control of any adverse environmental effect which can also include restitution for any damage caused by such effects through replacement, restoration, compensation, or other means. Proposed mitigation strategies are developed based on federal and provincial laws and regulations, industry best practices and previous experience on similar renewable energy and transmission line projects.

Potential overlapping environmental effects of the HIWEC and Transmission Line were determined by assessing the interaction of components and activities of both HIWEC and Transmission Line with VECs, Nishshing Aki and other components based on the residual / net environmental effects identified in **Volume A** and **B**. Additionally, mitigation measures proposed in **Volume A** and **B** were reviewed to determine their suitability, and where required additional mitigation to address potential adverse overlapping environmental effects were proposed.

2.1.3 Residual / Net Effects and Evaluation of Significance

As defined in **Volumes A** and **B**, residual / net effects are those environmental effects that are likely to occur, even after proposed mitigation measures are in place. The main purpose of the overlapping effects assessment is to determine the overlapping environmental effects of the HIWEC and Transmission Line so as to avoid or minimize significant residual / net adverse overlapping environmental effects. In order to assess the significance of residual / net adverse overlapping environmental effects, the following criteria are used:

- **Magnitude**: is the effect inconsequential, minor, moderate, or major?
- **Spatial Extent**: is the effect confined to a small area around a physical work or activity, a larger area within property boundaries, an area beyond property boundaries but confined to Crown land, or a larger area?

- **Duration / Frequency**: is the effect short-term, medium-term, or long-term? Infrequent, frequent, or continuous?
- **Permanence**: is the effect reversible?
- **Context**: Is the effect upon a common feature or a sensitive / scarce feature?

These criteria are further defined in **Table 2**, as identified in **Volumes A** and **B**. To assist in determining significance, the degree of the effect is defined in **Table 2** below. Once the degree is understood, significance can be determined. The final determination of significance is based on weighing all criteria and identifying the likelihood of the effect occurring. The significance of residual / net overlapping environmental effects is assessed based on professional judgement as well as previous experience on similar projects. Only adverse residual / net overlapping environmental effects are advanced for an assessment of significance, whereas positive effects are not carried forward for further consideration.

Table 2: Residual / Net 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.
Spatial Extent	Effect confined to sites within construction footprint including temporary and permanent facilities.	Local effect within and / or near the HIWEC and Transmission Line study area.	Regional effect.
Duration and Frequency	Effect is evident only during one (1) HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently for short durations.	Effect is evident during more than one (1) HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently or frequently for short durations.	Effect is evident during more than one (1) HIWEC and Transmission Line 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 and Transmission Line.	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.

Based on these criteria, the overlapping effects assessment identifies one of the following conclusions for each adverse residual / net overlapping 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.

In addressing conclusions (1) to (3), the standard is not certainty, but likelihood. The assessment addresses the uncertainty of any adverse effect consistent with the precautionary principle[1].

1. *"precautionary principle" means where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation;*

2.2 Interaction with Valued Ecosystem Components, Nishshing Aki and Other Components

Table 3 presents the scoping of the overlapping effects assessment. This interaction matrix provides a high-level summary of residual / net effects identified in **Volumes A** and **B**, and illustrates the potential overlapping environmental effects of the combined HIWEC and Transmission Line on VECs, Nishshing Aki and other components during construction / decommissioning and operations phases.

If a residual / net effect was identified for both the HIWEC and Transmission Line, it was determined to have an overlapping effect and was brought forward to the overlapping environmental effects assessment. As stated previously, only adverse residual / net overlapping environmental effects of the HIWEC and Transmission Line, after the application of mitigation measures, are advanced for an evaluation of significance.

The following sections provide a discussion of the identification of overlapping environmental effects, application of mitigation measures, and evaluation of significance for residual / net overlapping environmental effects.

2.3 Identification of Overlapping Effects, Proposed Mitigation Measures, and Residual Overlapping Effects

This section identifies the overlapping environmental effects resulting from both HIWEC and Transmission Line components and activities and their interaction with VECs and other components. No overlapping environmental effects were identified for Nishshing Aki, as the HIWEC was sited to avoid these features.

The Effects Interaction Matrix is presented in **Table 4**. The Effect Interaction Matrix provides a summary of the HIWEC and Transmission Line residual / net effects interacting with each other. If a potential overlapping effect is identified, the effects are identified and assessed in **Tables 5** and **6**.

Table 5 outlines the potential overlapping environmental effects during the construction / decommissioning phases. Any residual overlapping environmental effects after mitigation measures are applied are also identified in **Table 7**.

Table 6 outlines the potential overlapping environmental effects during the operations phase. Any residual overlapping environmental effects after mitigation measures are applied are also identified in **Table 8**.

2.4 Residual Overlapping Effects Characterization and Evaluation of Significance

2.4.1 Construction and Decommissioning

As per **Section 2.1.3**, only likely adverse residual / net overlapping effects are evaluated against the criteria outlined previously in **Table 2**. An assessed determination of minor, moderate or major for each criterion is included in **Table 7**, along with an overall statement of significance for each potential adverse residual / net overlapping effect.

2.4.2 Operations

As per **Section 2.1.3**, only likely adverse residual / net overlapping effects are evaluated against the criteria previously outlined in **Table 2**. An assessed determination of minor, moderate or major for each criterion is included in **Table 8**, along with an overall statement of significance for each potential adverse residual / net overlapping effect.

Table 3: Overlapping Environmental Effects Interaction Matrix

	HIWEC	Residual Effect	Transmission Line	Net Effect	Potential Overlapping Environmental Effect[2]
CONSTRUCTION / DECOMMISSIONING PHASE					
Valued Ecosystem Components	Soils and Terrain	X	Soils, Sedimentation and Erosion	X	X
	Groundwater	X	Groundwater Quality/Quantity	X	X
	Wildlife and Wildlife Habitat	X	Wildlife and Wildlife Habitat	X	X
	Vegetation and Ecological Communities	X	Vegetation and Ecological Communities	X	X
	Surface Water	X	Surface Water Quality/Quantity	X	X
	Fish and Fish Habitat	X	Fish and Fish Habitat	X	X
	SAR	X	SAR	X	X
	Land and Resources Used for Traditional Purposes by Aboriginal Persons	X	Aboriginal Land Use	X	X
	Cultural Resources / Heritage and Archaeological Sites	X	Heritage and Culture	X	X
	Noise	X	Noise	X	X
	Visual Landscape	X	Landscapes and Views	X	X
Other Components	Climate	-	-	-	-
	Air Quality	X	Air Quality	X	X
	Socio-Economic (Features On and Off-Reserve, Infrastructure, Recreation and Tourism)	X	Socio-Economic (Community Character, Employment, Recreation and Tourism, Community Services, Traffic, Public Health and Safety, Land Use and Resources)	X	X
Nishshing Aki	Sacred Sites	-	-	-	-
	Burial Grounds	-	-	-	-
	Old Settlements	-	-	-	-
OPERATIONS PHASE					
Valued Ecosystem Components	Soils and Terrain	X	Topography and Soils (Contaminated & Hazard Lands)	-	-
	Groundwater	X	Groundwater Quality/Quantity	X	X
	Wildlife and Wildlife Habitat	X	Wildlife and Wildlife Habitat	X	X
	Vegetation and Ecological Communities	X	Vegetation and Ecological Communities	X	X
	Surface Water	X	Surface Water Quality/Quantity	X	X
	Fish and Fish Habitat	X	Fish and Fish Habitat	X	X
	SAR	X	SAR	X	X
	Land and Resources Used for Traditional Purposes by Aboriginal Persons	X	Aboriginal Land Use	X	X
			Land Use	-	
			Resources	X	
	Cultural Resources / Heritage and Archaeological Sites	-	Heritage and Culture	X	X
	Noise	X	Noise	X	X
	Visual Landscape	X	Landscapes and Views	X	X
Other Components	Air Quality	X	Air Quality	X	X
	Socio-Economic (Features On and Off-Reserve, Infrastructure, Recreation and Tourism)	X	Socio-Economic (Community Character, Employment, Recreation and Tourism, Community Services, Traffic, Public Health and Safety)	X	X
Nishshing Aki	Sacred Sites	-	-	-	-
	Burial Grounds	-	-	-	-
	Old Settlements	-	-	-	-

2. *Overlapping environmental effects are the combined adverse residual effects of the HIWEC and the Transmission Line, after the application of mitigation measures*

Table 4: HIWEC and Transmission Line Effects Interaction Matrix

	HIWEC Environmental Effects	Residual Effect	Transmission Line Environmental Effects	Net Effects	Potential Overlapping Environmental Effect
CONSTRUCTION / DECOMMISSIONING					
Soils and Terrain / Topography and Soils (Contaminated & Hazard Lands)	Changes to soil quality	X	Changes to soil quality	X	X
	Changes to soil quantity	X	Changes to soil quantity	X	X
	-	-	Increased risk for soil and/or rock instability	X	ø
Groundwater	Changes to groundwater quantity	X	Changes to groundwater quantity	X	X
	Changes to groundwater quality	X	Changes to groundwater quality	X	X
	Changes to groundwater quality and quantity	X	Changes to groundwater quality and quantity	X	X
Wildlife and Wildlife Habitat	Habitat change	X	Habitat Change	X	X
	Change in mortality risk	X	Change in mortality risk	X	X
	Change in behaviour	X	Change in behaviour	X	X
Vegetation and Ecological Communities	Change in community diversity (including community loss)	X	Change in community diversity (including community loss)	X	X
	Change in wetland quantity and function	X	Change in wetland quantity and function	X	X
	Change in species diversity	-	Change in species diversity	X	ø
Surface Water	Change in surface water quality	X	Change in surface water quality	X	X
	Change in surface water quantity	X	Change in surface water quantity	X	X
Fish and Fish Habitat	Change in fish habitat	X	Change in fish habitat	X	X
	Change in fish mortality risk	X	Change in fish mortality risk	X	X
Species at Risk	Habitat change	X	Habitat change	X	X
	Change in behaviour	X	Change in behaviour	X	X
	Change in mortality risk	X	Change in mortality risk	X	X
Lands and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use	Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering	X	Loss of available lands used for Aboriginal traditional activities due to loss of wildlife habitat and disturbance to wildlife	X	X
	Reduced access to on-Reserve lands during construction / decommissioning	X	-	-	ø
	Disturbance to current land users from construction / decommissioning noise and vibration	X	Disturbance to current land users of traditional lands from construction / decommissioning noise and vibration	X	X
Cultural Resources / Heritage and Archaeological Site / Heritage and Culture	Potential effects on archaeological resources	-	Discovery or disturbance to archaeological resources, previously unknown	-	ø
	Potential direct and indirect effects on cultural heritage features	-	-	-	ø
	Potential effects on cultural landscapes	-	-	-	ø
Socio-Economic *(Local Residents, Cottagers, and Businesses, Recreation and Tourism, Community Services and Infrastructure) / Socio-Economic (Economic Base, Employment and Labour Supply, Local Businesses, Institutions and Public Facilities, Neighbourhood and Community Character, Community Services and Infrastructure, Traffic, Recreation, Cottaging and Tourism, Public Health and Safety, Non-Renewable Resources, Forestry, Game and Fishery Resources, Land Uses - Residential, Commercial, Institutional Land uses within 500m of Site)*	Vehicles and equipment emissions contributing to a reduction in local air quality	-	Vehicle and equipment combustion emissions contributing to a reduction in air quality	X	ø
	Dust generation from vehicle access and construction activity contributing to a reduction in local air quality	-	Nuisance effects related to dust generated from vehicle access and construction activity contributing to a reduction in local air quality	X	ø
	Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence /cottage owners on HIFN I.R. #2	-	Temporary disruption of access to existing recreational trails that will be used for construction access	X	ø
	Avoidance of overnight accommodation and recreational activities near the HIWEC due to noise and vibration	X	Avoidance of recreational areas due to noise and vibration	X	X
	Increase in truck traffic where the south access road crosses Bekanon Rd	X	Delays in traffic	X	X
	-		Increased potential for traffic related incidents on Hwy 69/400 and regional roads		ø
	Disturbance to local residents and businesses due to construction and decommissioning noise and vibration	X	Disturbance to local permanent and seasonal residents due to construction and decommissioning noise and vibration	X	X
	Potential disruption to local water supply wells from construction activity	X	-	-	ø
	-	-	Positive effect on economic base, specifically for the "construction" and retail" industries as a result of revenue generation	-	ø
	-	-	Positive indirect and induced economic benefits based on an increase of the local workforce for the construction and decommissioning phases	-	ø
	-	-	Positive effect as jobs are created for local workers	-	ø
	-	-	Positive effect on local businesses	-	ø
	-	-	Increased demand for local goods and services	-	ø
	-	-	Increased demand on medical services in Parry Sound and Sudbury	-	ø
	-	-	Avoidance of recreational areas due to dust	X	ø
	-	-	Reduction in the licensed area and quantity of extractable resources	X	ø
	-	-	Loss of harvestable forest resources due to vegetation clearing	X	ø
	-	-	Decline in available game resources for recreational hunters	X	ø
	-	-	Change in land use on private property	X	ø

Table 4: HIWEC and Transmission Line Effects Interaction Matrix

	HIWEC Environmental Effects	Residual Effect	Transmission Line Environmental Effects	Net Effects	Potential Overlapping Environmental Effect
OPERATIONS					
Soils and Terrain / Topography and Soils (Contaminated & Hazard Lands)	Changes to soil quality	X	Changes to soil quality	X	X
	Changes to soil quantity	X	Changes to soil quantity	-	ø
Groundwater	Changes to groundwater quality	X	Changes to groundwater quality	X	X
	Changes to groundwater quantity	X	Changes to groundwater quantity	-	ø
Wildlife and Wildlife Habitat	Change in mortality risk	X	Change in mortality risk	X	X
	Change in behaviour	X	Change in behaviour	X	X
Vegetation and Ecological Communities	Change in community diversity (including community loss)	X	Change in community diversity (including community loss)	X	X
	Change in wetland quantity and function	X	Change in wetland quantity and function	-	ø
	Change in species diversity	X	Change in species diversity	X	X
Surface Water	Change in surface water quality	X	Change in surface water quality	X	X
Fish and Fish Habitat	Change in fish habitat	X	Change in fish habitat	X	X
Species at Risk	Habitat change	X	Habitat change	X	X
	Change in behaviour	X	Change in behaviour	X	X
	Change in mortality risk	X	Change in mortality risk	X	X
Lands and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use	Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering	-	Available lands used for Aboriginal traditional activities and cultural site	X	ø
	Disturbance to current land users from noise associated with maintenance activity	X	Disturbance to users of traditional lands due to noise associated with maintenance	X	X
	Disturbance to current land users resulting from noise from wind turbine generator (WTG) operation	X	Disturbance to users of traditional lands due to noise associated with the SS	X	X
Cultural Resources / Heritage and Archaeological Site / Heritage and Culture	Potential effects on archaeological resources	-	Discovery or disturbance to archaeological resources, previously unknown	-	ø
	Potential direct and indirect effects on cultural heritage features	-	-	-	ø
	Potential effects on cultural landscapes	-	Change to the cultural heritage landscape character of Moose Lake Trading Post	X	ø
Socio-Economic *(Local Residents, Cottagers, and Businesses, Recreation and Tourism, Community Services and Infrastructure) / Socio-Economic (Economic Base, Employment and Labour Supply, Local Businesses, Institutions and Public Facilities, Neighbourhood and Community Character, Community Services and Infrastructure, Traffic, Recreation, Cottaging and Tourism, Public Health and Safety, Non-Renewable Resources, Forestry, Game and Fishery Resources, Land Uses - Residential, Commercial, Institutional Land uses within 500m of Site)*	Vehicle and equipment emissions contributing to a reduction in local air quality	-	Vehicle and equipment combustion emissions contributing to a reduction in air quality	X	ø
	Dust generation from maintenance vehicle access contributing to a reduction in local air quality	-	Nuisance effects related to dust generated from vehicle access and construction activity contributing to a reduction in local air quality	X	ø
	Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence /cottage owners on HIFN I.R. #2	-	Temporary disruption of access to existing recreational trails that will be used for construction access	-	ø
	Disturbance to local residents, cottagers and businesses from noise associated with maintenance activities	X	Disturbance to local permanent and seasonal residents due to noise from maintenance activities	X	X
	Disturbance to local residents, cottagers and businesses from noise associated with WTG operation	X	Disturbance to local permanent and seasonal residents due to noise associated with SS operation	X	X
	Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs	X	Effect on the visual character of some communities perceived by permanent and seasonal residents on private lands or community spaces within the Route B Transmission Line study area.	X	X
	Avoidance of overnight accommodation and recreational activities near the HIWEC due to noise and vibration	X	Disturbance to recreational users, cottagers and tourists due to noise related to maintenance activities.	X	X
	Avoidance of overnight accommodation and recreational activities near the HIWEC from noise associated with WTG operation	X	Disturbance to recreational users, cottagers and tourists due to noise related to SS operation	X	X
	Avoidance of overnight accommodations and recreational activities from changes to the visual landscape	X	Avoidance of nearby recreational areas by tourists and other recreational users due to the changes to the landscape and views.	X	X
	Increase in truck traffic where the south access road crosses Bekanon Rd	X	-	-	ø
	-	-	Reduction in the quantity of prospect extractable resources	X	ø
	-	-	Changes to current access (physical and/or administrative) due to presence of Transmission Line infrastructure	X	ø
	-	-	Change in land use on private property	X	ø

Table 5: Potential Overlapping Effects and Mitigation Measures – Construction / Decommissioning

VEC	Project Activity	Potential Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Surface Water** *TRANSMISSION LINE* • **Surface Water**	• Site preparation • Construction and decommissioning of access roads and laydown areas • Transportation of equipment and materials during construction and decommissioning • Installation and Construction of HIWEC and Transmission Line components. • Construction and decommissioning of water crossing for access roads • Power connection and commissioning / disconnection and decommissioning of service • Disassembly and removal of O&M building infrastructure	*Overlapping effect on surface water quality / quantity due to:* • Accidental spills including fuels, lubricants, and concrete washing near waterbodies. • Dewatering discharge. • Erosion and sedimentation from blasting activities. • Loss of vegetation, changes in surficial topography and changes in surficial soils in disturbed construction areas including along access roads.	• For mitigation measures relating to Surface Water Quality and Quantity please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on surface water quality / quantity* • Effects on surface water quality (spills) • Effects on surface water quality and quantity due to dewatering discharge • Effects on surface water quality (erosion, sedimentation, blasting) • Effects on surface water quantity
HIWEC • **Fish and Fish Habitat** *TRANSMISSION LINE* • **Fish and Fish Habitat**		*Overlapping effect on fish habitat / fish mortality* • Disturbance of aquatic biota (fish and invertebrates) and aquatic habitat during water crossing installation and removal due to in-water work, alteration to channel bed, banks and riparian areas, resulting from erosion and sedimentation. • Effects on aquatic biota (fish, invertebrates) and aquatic habitat due to accidents and/or spills including fuels, lubricants and concrete washing near waterbodies. • Disturbance to fish and fish habitat and changes in mortality of fish due to construction blasting and/or vibration (includes disturbance to or mortality of fish eggs or larvae).	• For mitigation measures relating to Fish and Fish Habitat please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in **Volume A and Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on fish habitat and fish mortality* • Effects on fish habitat (water crossing installation and removal) • Effects on fish habitat (erosion and sedimentation) • Effects on fish habitat (spills) • Effects on fish mortality (blasting and/or vibration)
HIWEC • **Rare Aquatic Species**[3] *TRANSMISSION LINE* • **Rare Aquatic Species**		*Overlapping effect on rare aquatic species mortality* • Potential for changes in mortality of rare aquatic fish species during works on or adjacent to watercourse banks and riparian areas due to construction blasting and/or vibrations and erosion and sedimentation. • Potential for disturbance to rare aquatic species habitat and changes in mortality of fish due to construction blasting and/or vibration (includes disturbance to or mortality of fish eggs or larvae). *Overlapping effect on rare aquatic species habitat* • Potential for disturbance of aquatic habitat during water crossing installation and removal due to in-water work, alteration to channel bed, banks and riparian area, due to erosion and sedimentation.	• For mitigation measures relating to rare aquatic species please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*No residual overlapping effects on rare aquatic species mortality are anticipated.*
HIWEC • **Soil and Terrain** *TRANSMISSION LINE* • **Soils; Sedimentation and Erosion**		*Overlapping effect on soil quality* • Reduction in soil quality due to mixing of topsoil and subsoils. • Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, excavation, and concrete truck rinsing, etc. *Overlapping effect on soil quantity and quality* • Reduction in soil quantity and quality due to the release of construction dewatering discharge resulting in erosion and sedimentation. • Reduction in soil quality and/or quantity due to erosion, sedimentation and compaction resulting from excavation, use of heavy equipment on exposed soils and stockpiling of cleared materials. *Overlapping effect on rock and soil slope stability* • Disturbance to topography, including rock and soil instability due to blasting.	• For mitigation measures relating to Soils, Terrain and Topography please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).**With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on soil quality / quantity* • Effects on soil quality (erosion, topsoil mixing) • Effects on soil quality (spills) • Effects on soil quantity (compaction, erosion, excavation) • Effects on rock and soil slope stability (blasting)

3. *Not an identified criteria for HIWEC as no rare aquatic species were noted in the HIWEC study area.*

Table 5: Potential Overlapping Effects and Mitigation Measures – Construction / Decommissioning

VEC	Project Activity	Potential Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Contaminated Lands**[4] *TRANSMISSION LINE* • **Contaminated Lands**		*Overlapping effect on soil quality* • Reduction in soil quality due accidental release of contaminants during construction, heavy equipment and vehicle use, and concrete truck rinsing, etc.	• For mitigation measures relating to Contaminated Lands please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume** B no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on contaminated lands* • Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, and concrete truck rinsing, etc.
HIWEC • **Groundwater** *TRANSMISSION LINE* • **Groundwater Quantity / Quality**		*Overlapping effect on groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills from vehicle and machinery operation, and concrete truck rinsing. *Overlapping effect on groundwater quality and quantity* • Reduction in groundwater quality (turbidity), quantity and physical damage to groundwater supply wells due to agitation of the subsurface during construction blasting (including potential release of soluble substances used during blasting) and pile driving.	• For mitigation measures relating to Groundwater please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in Volume A and Volume B no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on groundwater quantity/ quality* • Effects on groundwater quantity (blasting operations, dewatering and water taking) • Effects on groundwater quality (blasting operation, spills, dewatering discharge) • Reduction in groundwater quality due accidental release of contaminants during construction, heavy equipment and vehicle use, and concrete truck rinsing, etc.
HIWEC • **Noise**[5] *TRANSMISSION LINE* • **Noise**		*Noise* • Construction / decommissioning activities, and associated noise effects, will be temporary.	• For mitigation measures relating to Noise please refer to the HIWEC EA and the Transmission Line Environmental review report. With the application of prescribed mitigations measures as outlined in Volume A and Volume B no additional mitigation measures are anticipated to be required.	*No residual overlapping effect resulting from Noise is anticipated.*
HIWEC • **Air Quality** *TRANSMISSION LINE* • **Air Quality**		*Overlapping effect on Air Quality* • Vehicle and equipment combustion emissions contributing to a reduction in local air quality. • Nuisance effects related to dust generated from vehicle access and construction activity contributing to a reduction in local air quality.	• For mitigation measures relating to Air Quality please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).**With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*No residual overlapping effect to Air Quality is anticipated.* • Low levels of vehicle and equipment emissions contributing to a reduction in local air quality. • Low levels of dust generation contributing to a reduction in local air quality
HIWEC • **Species at Risk** *TRANSMISSION LINE* • **Species at Risk**		*Overlapping effect to Habitat change* • Effect for habitat change may occur for bird SAR, bat SAR, turtle SAR, mammal SAR and snake SAR. *Overlapping effect to behaviour* • Effect for changes in behaviour may occur for bird SAR, turtle SAR, snake SAR and mammal SAR. *Overlapping effect on mortality risk* • Changes in mortality risk may occur for bird SAR, turtle SAR, bat SAR, snake SAR and mammal SAR.	• For mitigation measures relating to SAR please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).**With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect to habitat change* • Habitat change, including possible damage or destruction of SAR residences or SAR habitat. *Residual overlapping effect on change in behaviour* • Effects on the behaviour of SAR due to disturbance from construction activities *Residual overlapping effect on change in mortality risk* • Increased mortality risk (including harm) to SAR.
HIWEC • **Wildlife and Wildlife Habitat (including Species of Conservation Concern)** *TRANSMISSION LINE* • **Wildlife (including Avifauna) and Wildlife Habitat**		*Overlapping effect to habitat change* • Loss and fragmentation of wildlife habitat due to construction. • Removal / disturbance of topsoil and increased soil compaction within wildlife habitat from manoeuvring of heavy machinery, excavation, backfilling, and other construction activity. • Damage to wildlife habitat as a result of accidental soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling. • Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wildlife habitat in wetlands resulting from changes in land contours. • Reductions in groundwater recharge quantities into wildlife habitat in wetlands due to increases in impervious surfaces.	• For mitigation measures relating to Wildlife and Wildlife habitat please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).**With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effect on habitat change* • Some wildlife habitat will be removed as a result of construction of the HIWEC. • Some habitat change may occur due to limitation in current spill clean-up processes. • Changes in surface water drainage patterns may result in alteration of some wildlife habitat. *Residual effect on change in mortality risk* • Isolated wildlife mortality is possible as a result of construction activities, for example, blasting, vegetation clearing. And vehicles using access roads.

4. Not an identified VEC for the HIWEC EA, please refer to the Soils VEC.
5. Not an identified VEC for the HIWEC EA. However, the effects of Noise were assessed for all VECs for the construction and operations phase.

Table 5: Potential Overlapping Effects and Mitigation Measures – Construction / Decommissioning

VEC	Project Activity	Potential Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
		• Habitat change and increased mortality to wildlife due to construction dewatering activities and associated dewatering discharge. *Overlapping effect to behaviour* • Disturbance to wildlife due to construction activities, including noise and vibration from sub-surface excavation activities (e.g., blasting). • Disturbance and possible mortality to terrestrial wildlife due to vegetation clearing. • Habitat change and increased mortality to wildlife due to construction dewatering activities and associated dewatering discharge. *Overlapping effect on mortality risk* • Disturbance to wildlife due to construction activities, including noise and vibration from sub-surface excavation activities (e.g., blasting). • Disturbance and possible mortality to terrestrial wildlife due to vegetation clearing. • Mortality to wildlife as result of vehicles using access roads. • Habitat change and increased mortality to wildlife due to construction dewatering activities and associated dewatering discharge.		*Residual effect on change in behaviour* • Some wildlife are expected to exhibit avoidance behaviour during construction activities (blasting). • Some wildlife may exhibit changes in behaviour (e.g. avoidance) as a result of vegetation clearing. • Construction dewatering may result in displacement or avoidance of wildlife within the zone of influence (ZOI) of dewatering activities.
HIWEC • **Vegetation and Ecological Communities** *TRANSMISSION LINE* • **Vegetation and Ecological Communities, Wetlands and Protected Areas**		*Overlapping effect on community diversity* • Permanent loss of forest cover. • Permanent removal of old growth forest. • Damage to vegetation as a result of soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling. *Overlapping effect on wetland quantity and function* • Damage to vegetation as a result of soil or water contamination (including groundwater) by oils, gasoline, grease and other materials from construction equipment, materials storage and handling. • Permanent loss of wetlands. • Changes in surface water drainage patterns or obstruction of lateral flows in surface water to wetlands resulting in effects to soil moisture and species composition of vegetation. • Reductions in groundwater recharge quantities into wetlands due to increases in impervious surfaces. • Change in wetland function due to reduced water levels caused by temporary construction dewatering activities and associated dewatering discharge.	• For mitigation measures relating to Vegetation and Ecological Communities please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).**With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on community diversity* • Some forest cover will be removed. • Some old growth forest may be removed. • Some changes to community diversity may occur due to limitation in current spill clean-up processes. *Residual overlapping effect on wetland quantity and function* • Some damage to wetlands may occur due to limitation in current spill clean-up processes. • Some wetlands will be removed. • Changes in surface water drainage patterns may result in some effects on wetland quantity and function. • Construction dewatering may result in some effects on wetland quantity and function within the ZOI of dewatering activities.
HIWEC • **Community Services and Infrastructure** *TRANSMISSION LINE* • **Traffic** • **Community Services and Infrastructure**		*Overlapping effect on Community Services and Infrastructure and Traffic.* • Delays in traffic during construction and decommissioning phases.	• For mitigation measures relating to Community Services and Infrastructure and Traffic, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effect on Community Services and Infrastructure and Traffic.* • Traffic delays on highways and regional roads intermittently throughout construction and decommissioning phases.

Table 5: Potential Overlapping Effects and Mitigation Measures – Construction / Decommissioning

VEC	Project Activity	Potential Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Recreation and Tourism** *TRANSMISSION LINE* • **Recreation, Cottaging and Tourism**		*Overlapping Effect on Recreation and Tourism / Recreation, Cottaging and Tourism.* • Avoidance of recreational areas near the Transmission Line due to delay of traffic.	• For mitigation measures relating to Recreation and Tourism / Recreation, Cottaging and Tourism, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effect on Recreation and Tourism / Recreation, Cottaging and Tourism.* • Some disturbance to recreation, cottaging and tourism due to traffic delays will remain through the construction and decommissioning phases.
HIWEC • **Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)** *TRANSMISSION LINE* • **Noise (as it relates to Land and Neighbourhood and Community Character, Recreation, Cottaging and Tourism and Aboriginal Land and Resource Use VECs)**		*Overlapping effect of Noise.* • Disturbance to local residents, cottagers and businesses from construction/decommissioning noise and vibration. • Avoidance of overnight accommodations and recreational activities / areas near the HIWEC and Transmission Line due to noise and vibration. • Disturbance to local permanent and seasonal residents due to construction and decommissioning noise and vibration. • Disturbance to current traditional land users from construction/decommissioning noise and vibration.	• For mitigation measures relating to Noise, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effect of Noise.* • Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations, recreational activities, permanent and seasonal residents, recreational and traditional land users, cottagers and tourists from construction/decommissioning noise and vibration.
HIWEC • **Land and Resources Used for Traditional Purposes by Aboriginal Persons** *TRANSMISSION LINE* • **Aboriginal Land Use and Resources**		*Overlapping effect on Land and Resources Used for Traditional Purposes by Aboriginals Persons / Aboriginal Land Use and Resources.* • Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering. • Reduced access to on-Reserve lands during construction/decommissioning. • Loss of available lands used for Aboriginal traditional activities due to loss of wildlife habitat and disturbance to wildlife. • For effects relating to noise Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources, refer to the **Noise VEC**.	• For mitigation measures relating to **Land and Resources used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources**, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation.	*Residual effect on land and resources used for traditional purposes by Aboriginal persons / Aboriginal Land Use and Resources.* • Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint active construction areas • Reduced access confined to active construction areas within the study area • Some decline in the available lands used for Aboriginal traditional activities. • See **Noise VEC** for residual effects on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources.

Table 6: Potential Overlapping Effects and Mitigation Measures – Operations

VEC	Project Activity	Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Surface Water** *TRANSMISSION LINE* • **Surface Water**	• Maintenance of HIWEC and Transmission Line components including: WTGs, overhead collector and transmission lines, transformer station, operations and maintenance building and, meteorological towers. • Road and transmission crossing repair / maintenance • Environmental monitoring • Physical presence of HIWEC, Transmission Line and access roads.	*Overlapping effects to surface water quality* • Potential effects on surface water quality due to contaminant spills, dust and emissions from maintenance vehicles and equipment and maintenance/repair of water crossings	• For mitigation measures relating to surface water please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on surface water quality* • Effect on surface water quality due to use of roads by vehicles during operation and the creation of dust emissions and the potential for spills.
HIWEC • **Fish and Fish Habitat** *TRANSMISSION LINE* • **Fish and Fish Habitat**		*Overlapping effects to fish habitat* • Potential for effects on fish habitat due to contaminant spills, dust and emissions from maintenance vehicles and equipment. • Potential for obstruction of fish passage in waterbodies due to design of replacement water crossings and debris build-up at watercourses.	• For mitigation measures relating to fish and fish habitat please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on fish and fish habitat* • Effects on fish and fish habitat (due to accidental spills and/or water crossing).
WIND • **Soils and Terrain** *TRANSMISSION LINE* • **Contaminated Lands**		*Overlapping effects to soil quality* • Reduction in soil quality due accidental release of contaminants during operation, etc.	• For mitigation measures relating to soils and terrain and contaminated lands please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effects to soil quality* • Reduction in soil quality due to accidental release of contaminants during operations.
HIWEC • **Groundwater** *TRANSMISSION LINE* • **Groundwater**		*Overlapping effects to groundwater quantity* • Reduction in groundwater recharge quantities due to increases in impervious surfaces (e.g., WTG foundations, access roads and buildings) and changes to infiltration and surface runoff patterns *Overlapping effects to groundwater quality* • Reduction in groundwater quality due to accidental contaminant spills, vehicle and machinery operation during operation.	• For mitigation measures relating to groundwater please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effects to groundwater quantity / quality* • Reduction in groundwater quality due accidental release of contaminants during operations.
HIWEC • **Air Quality** *TRANSMISSION LINE* • **Air Quality**		*No overlapping effects to air quality are anticipated* • Emissions from maintenance activities are not anticipated to result in a measureable increase in local or regional air quality parameters.	• N/A	*No residual overlapping effects to air quality are anticipated.*
WIND • **Species at Risk** *TRANSMISSION LINE* • **Species at Risk**		*Overlapping effect to habitat change* • Effect for habitat change is possible for bird SAR, turtle SAR, bat SAR, snake SAR and mammal SAR. *Overlapping effect to behaviour* • Effect for change in behaviour is possible for SAR birds, SAR turtles, SAR bats and SAR snakes. *Overlapping effect on mortality risk* • Effect on mortality risk is possible for bird SAR, turtle SAR, bat SAR and snake SAR.	• For mitigation measures relating to SAR please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on change in behaviour* • Some bird SAR may exhibit avoidance behaviour during operations. • Some turtle SAR may alter nest site selection along access roads. • Some snake SAR may alter basking site selection along access roads. • Some bat SAR may exhibit altered feeding behaviour. *Residual overlapping effect on change in mortality risk* • Isolated mortality of bird SAR is possible as a result of collisions with WTGs and maintenance activities. • Isolated mortality of turtle SAR is possible as a result of vehicular traffic on access roads and maintenance activities. • Isolated mortality of snake SAR is possible as a result of vehicular traffic on access roads and maintenance activities. • Isolated mortality of bat SAR is possible through collisions with WTGs and maintenance activities.

Table 6: Potential Overlapping Effects and Mitigation Measures – Operations

VEC	Project Activity	Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Wildlife and Wildlife Habitat** *TRANSMISSION LINE* • **Wildlife and Wildlife Habitat**		*Overlapping effect to behaviour* • Disturbance to wildlife caused by noise and light from operating WTGs and other infrastructure, and possible avoidance of the area. *Overlapping effect on mortality risk* • Bat and bird mortality as a result of collision with WTGs. • Bird and bat mortality as result of vegetation removal during routine maintenance of the overhead collector lines, on-reserve transmission line and other HIWEC and Transmission Line infrastructure. • Mortality of wildlife as result of vehicles using access roads and maintenance of access roads. • Bird mortality as a result of collision with overhead collector lines and transmission lines.	• For mitigation measures relating to Wildlife and Wildlife Habitat please refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect to behaviour* • Some wildlife may exhibit changes in behaviour during operations. *Residual overlapping effect on mortality risk* • Some mortality of birds and bats as a result of collisions with WTGs is anticipated • Isolated mortality as a result of vegetation removal during maintenance activities is possible. • Isolated wildlife mortality as a result of vehicles using access roads is possible. • Isolated mortality as a result of collisions with overhead collector lines or the transmission line is possible.
HIWEC • **Vegetation and Ecological Communities** *TRANSMISSION LINE* • **Vegetation and Ecological Communities**		*Overlapping effect on wetland quantity and function* • Accidental soil or water contamination from oil, gas, etc. during maintenance activities. • Introduction of invasive species. *Overlapping effect in species diversity* • Introduction of invasive species. *Overlapping effect in community diversity (including community loss)* • Introduction of invasive species.	• For mitigation measures relating to Vegetation and Ecological Communities please refer to **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B)**. With the application of prescribed mitigations measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual overlapping effect on wetland quantity and function* • Temporary changes in wetland quantity or function may occur. *Residual overlapping effect in species diversity* • Temporary changes in species diversity may occur. *Residual overlapping effect in community diversity* • Temporary changes in community diversity may occur.
HIWEC • **Visual Landscape (refer to Local Residents, Cottagers and Businesses)** *TRANSMISSION LINE* • **Neighbourhood and Community Character** • **Landscape and Views**		*Overlapping effect on Visual Landscape (as it relates to Local Residents, Cottagers and Businesses, Neighbourhood and Community Character, and Landscape and Views).* • Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs. • Avoidance of overnight accommodations and recreational activities near the HIWEC from changes to the visual landscape. • Change to the existing landscape and views as perceived by recreational land / trail users and permanent and seasonal residents.	For mitigation measures relating to **Visual Landscape / Neighbourhood and Community Character, Landscape and Views**, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effects on Visual Landscape (as related to Local Residents, Cottagers and Businesses, Neighbourhood and Community Character, and Landscape and Views).* • WTGs will be visible from various vantage points within and adjacent to the HIWEC study area. • Potential avoidance of HIWEC overnight accommodations and recreational activities from changes to the visual landscape • Change to the existing landscape and views as perceived by recreational land / trail users and permanent and seasonal residents.
HIWEC • **Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)** *TRANSMISSION LINE* • **Noise (as it relates to Land and Neighbourhood and Community Character, Recreation, Cottaging and Tourism and Aboriginal Land and Resource Use VECs)**		*Overlapping effect of Noise.* • Disturbance to local residents, cottagers and businesses due to noise from noise associated with maintenance activity. • Disturbance to local residents, cottagers, businesses, overnight accommodations and recreational activities resulting from noise from WTG operation. • Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from WTG and switching station (SS) operation. • Avoidance of overnight accommodations and recreational activities near the HIWEC due to noise from maintenance vehicles and equipment. • Disturbance to users of traditional lands due to noise associated with maintenance. • Disturbance to users of traditional lands due to noise associated with the SS.	For mitigation measures relating to **Noise**, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation measures are anticipated to be required.	*Residual effect of Noise.* • Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations, recreational activities, permanent and seasonal residents, recreational and traditional land users, cottagers and tourists due to noise from maintenance activities. • Disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities due to noise from WTG and SS operation.

Table 6: Potential Overlapping Effects and Mitigation Measures – Operations

VEC	Project Activity	Overlapping Environmental Effects	Additional Mitigation Measures	Residual Overlapping Environmental Effects
HIWEC • **Land and Resources Used for Traditional Purposes by Aboriginal Persons** *TRANSMISSION LINE* • **Aboriginal Land Use and Resources**		*Overlapping effect on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resource.* • Loss of available lands used for Aboriginal traditional activities and cultural site • For effects relating to noise on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources, refer to the **Noise VEC**.	For mitigation measures relating to **Land and Resources used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources**, refer to the **HIWEC EA (Volume A)** and the **Transmission Line ERR (Volume B).** With the application of prescribed mitigation measures as outlined in **Volume A** and **Volume B** no additional mitigation.	*Residual effect on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources.* • Some decline in the available lands used for Aboriginal traditional activities.

Table 7: Overlapping Effects – Evaluation of Significance – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Soil and Terrain** *TRANSMISSION LINE* • **Soils; Sedimentation and Erosion**	*Residual overlapping effect on soil quality* • Effects on soil quality (erosion, topsoil mixing) • Effects on soil quality (spills) • Effects on rock and soil slope stability (blasting)	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect is confined to sites within the construction footprint.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (i.e. construction) and occurs infrequently for short durations	• Minor; effect is readily reversible over a short period of time	• Minor; effect is on a common feature.	• After applying effective mitigation, the overlapping effect is not significant.
	Residual overlapping effect on soil quantity • Effects on soil quantity (compaction, erosion, excavation, blasting)	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect is confined to sites within the construction footprint.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (i.e. construction) and occurs infrequently for short durations	• Minor; effect is readily reversible over a short period of time	• Minor; effect is on a common VEC. •	• After applying effective mitigation, the overlapping effect is not significant.
HIWEC • **Surface Water** *TRANSMISSION LINE* • **Surface Water Quality / Quantity**	*Residual overlapping effect on surface water quality* • Effects on surface water quality (spills) • Effects on surface water quality and quantity due to dewatering discharge • Effects on surface water quality (erosion, sedimentation, blasting)	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect is confined to sites within the construction footprint.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (i.e. construction) and occurs infrequently for short durations	• Minor; effect is readily reversible over a short period of time	• Minor; effect is on a common feature.	• After applying effective mitigation, the overlapping effect is not significant.
	Residual overlapping effect on surface water quantity • Effects on surface water quantity (water crossing)	• Minor; effect will be a minor change to existing conditions	• Minor; effect is confined to sites within construction footprint.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations.	• Minor; effect is reversible following construction activities	• Minor; effect is on a common feature.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Fish and Fish Habitat** *TRANSMISSION LINE* • **Fish and Fish Habitat**	*Residual overlapping effect on fish habitat and fish mortality* • Effects on fish habitat (water crossing installation and removal) • Effects on fish habitat (erosion and sedimentation) • Effects on fish habitat (spills)	• Minor to Moderate; effect may exceed existing conditions; and activities associated with water crossing installation will proceed under provisions of the Fisheries Act.	• Minor; effect is confined to sites within construction footprint.	• Minor; effect evident only during on HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations	• Minor; effect is readily reversible over a short period of time.	• Minor to Moderate; effect may be on a sensitive feature that is common within the study area.	• After applying identified mitigation, the effect is not significant.
	Residual overlapping effect on fish mortality • Effects on fish mortality (blasting and/or vibration)	• Minor; effect will be a minor change from existing conditions	• Minor; effect is confined to sites within construction footprint of the study area.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations	• Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Moderate; effect is on a sensitive feature.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Groundwater** *TRANSMISSION LINE* • **Groundwater Quantity / Quality**	*Residual overlapping effect on groundwater quantity* • Effects on groundwater quantity (blasting operations)	Minor; effect will be a minor change from existing conditions	• Minor; effect is confined to the blasting ZOI.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations.	• Minor; effect is readily reversible over a short period of time with the application of identified mitigation measures for private water wells.	• Minor; effect is on a common feature.	• After applying identified mitigation, the effect is not significant.
	Residual overlapping effect on groundwater quality • Effects on groundwater quality (blasting operation) • Reduction in groundwater quality due accidental release of contaminants during construction, heavy equipment and vehicle use, and concrete truck rinsing, etc.	• Minor; effect is a minor change compared to existing conditions.	• Minor to moderate; local effect within and / or near the HIWEC and Transmission Line study area.	• Minor; effect is evident only during on HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations.	• Minor; potential effect is readily reversible once construction dewatering and water taking activities cease and impacted aquifer recovers or well owners are provided with an alternative source of water (i.e., new well) as a permanent solution.	• Minor; effect is on a common feature.	• After applying identified mitigation, the effect is not significant.

Table 7: Overlapping Effects – Evaluation of Significance – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Noise** *TRANSMISSION LINE* • **Noise**	*Refer to VECs for more information regarding effects relating to noise and vibration.*	• N/A	• N/A	• N/A	• N/A	• N/A	• N/A
HIWEC • **Species at Risk** *TRANSMISSION LINE* **Species at Risk**	*Residual overlapping effect on habitat change* • Habitat change, including possible damage or destruction of SAR residences or SAR habitat.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning) and occurs infrequently for short durations.	• Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Moderate; effect is on a sensitive feature (SAR habitat) that is common.	• After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
	Residual overlapping effect on change in behaviour • Effects on the behaviour of SAR due to disturbance from construction / decommissioning activities.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor to Moderate; local effect within and / or near the HIWEC and Transmission Line study area.	• Moderate; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning); however, effect occurs frequently throughout the construction / decommissioning phase.	• Minor; effect is readily reversible over a short period of time.	• Moderate to Major; overall effect is on a sensitive feature (overall SAR populations) that is common. Effect on sensitive features that is not common (Kirtland's Warbler and Hog-nosed Snake), if any, is expected to be localized and temporary in nature.	• After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
	Residual overlapping effect on change in mortality risk • Increased mortality risk to SAR, including harm.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning) and occurs infrequently for short durations.	• Minor; effect is readily reversible over a short period of time.	• Moderate; overall effect is on a sensitive feature (overall SAR populations) that is common. Kirtland's Warbler and Hog-nosed Snake are sensitive features that are not common; however, the likelihood of mortality to these species is considered very low with the implementation of mitigation measures.	• After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
HIWEC • **Wildlife and Wildlife Habitat (including Species of Conservation Concern)** *TRANSMISSION LINE* • **Wildlife (including Avifauna) and Wildlife Habitat**	*Residual effect on habitat change* • Some wildlife habitat will be removed as a result of construction of the HIWEC. • Some habitat change may occur due to limitation in current spill clean-up processes. • Changes in surface water drainage patterns may result in alteration of some wildlife habitat.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning) and occurs infrequently for short durations.	Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Minor; effect is on a common feature (wildlife habitat).	• After applying identified mitigation, monitoring and follow-up the effect is not significant.
	Residual effect on change in mortality risk • Isolated wildlife mortality is possible as a result of construction activities (blasting). • Isolated wildlife mortality is possible as a result of vegetation clearing. • Isolated wildlife mortality is possible as a result of vehicles using access roads.	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning) and occurs infrequently for short durations.	• Minor; effect is readily reversible over a short period of time.	• Moderate; effect is on a sensitive feature (wildlife, including Species of Conservation Concern (SOCC)) that is common.	• After applying identified mitigation, monitoring and follow-up the effect is not significant.

Table 7: Overlapping Effects – Evaluation of Significance – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
	Residual effect on change in behaviour • Some wildlife are expected to exhibit avoidance behaviour during construction activities (blasting). • Some wildlife may exhibit changes in behaviour (e.g. avoidance) as a result of vegetation clearing. • Construction dewatering may result in displacement or avoidance of wildlife within the ZOI of dewatering activities.	• Minor to Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Moderate; local effect within the HIWEC and Transmission Line study area.	• Moderate; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning); however, effect occurs frequently throughout the construction / decommissioning phase.	• Minor; effect is readily reversible over a short period of time.	• Moderate; effect is on a sensitive feature (wildlife, including SOCC) that is common.	• After applying identified mitigation, monitoring and follow-up, the effect is not significant.
HIWEC • **Vegetation and Ecological Communities** *TRANSMISSION LINE* • **Vegetation and Ecological Communities, Wetlands and Protected Areas[6]**	*Residual overlapping effect on community diversity* • Some forest cover will be removed. • Some old growth forest may be removed. • Some changes to community diversity may occur due to limitation in current spill clean-up processes.	• Low to Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. construction / decommissioning) and occurs infrequently for short durations.	• Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Minor; effect is on a common feature. • *Moderate; the effect is on a sensitive feature (i.e. potential old growth forest) that is common within the study area. * Note – this Effect Level Definition is based on worst case scenario and will be confirmed based on fall confirmatory surveys for old growth forest for the Final EA.	• After applying identified mitigation, monitoring and follow-up the effect is not significant.
HIWEC • **Community Services and Infrastructure** *TRANSMISSION LINE* • **Traffic** • **Community Services and Infrastructure**	*Residual effect on Community Services and Infrastructure and Traffic.* • Traffic delays on highways and regional roads intermittently throughout construction and decommissioning phases.	• Minor; effect is a minor change compared to existing conditions.	• Moderate; local effect within and / or near the HIWEC and Transmission Line study area.	• Moderate; effect is evident during more than one HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently or frequently for short durations.	• Minor; effect is readily reversible over a short period of time.	• Minor; effect is on a common feature.	• After applying identified mitigation, the effect is not significant.
HIWEC • **Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)** *TRANSMISSION LINE* • **Noise (as it relates to Land and Neighbourhood and Community Character, Recreation, Cottaging and Tourism and Aboriginal Land and Resource Use VECs)**	• Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations, recreational activities, permanent and seasonal residents, recreational and traditional land users, cottagers and tourists from construction and decommissioning noise and vibration.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values. .	• Moderate; local effect within and / or near the HIWEC and Transmission Line study area, with some noise audible at 1 km.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (e.g. construction) and occurs infrequently for short durations.	• Minor; effect is readily reversible over a short period of time. .	• Minor; effect is on a common feature.	• After applying identified mitigation, the effect is not significant.

6. *Transmission Line construction or decommissioning actives are not expected to occur in wetlands.*

Table 7: Overlapping Effects – Evaluation of Significance – Construction / Decommissioning

VEC	Residual Environmental Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Land and Resources Used for Traditional Purposes by Aboriginal Persons** *TRANSMISSION LINE* **Aboriginal Land Use and Resources**	*Residual effect on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources* • Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint active construction areas. • Reduced access confined to active construction areas within the study area. • Some decline in the available lands used for Aboriginal traditional activities. • See **Noise VEC** for residual effects on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources.	• Minor; effect is a minor change compared to existing conditions.	• Moderate; local effect within and / or near the HIWEC and Transmission Line.	• Minor; effect is evident only during one HIWEC and Transmission Line phase and occurs infrequently and for short durations.	• Minor; effect is reversible over a short period of time.	• Minor; effect is on a common feature.	• After applying the identified mitigation, the effect is not significant.

Table 8: Overlapping Effects – Evaluation of Significance – Operations

VEC	Residual / Net Overlapping Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Surface Water** *TRANSMISSION LINE* **Surface Water**	*Residual overlapping effect on surface water quality* • Effect on surface water quality due to use of roads by vehicles during operation and the creation of dust emissions and the potential for spills.	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect confined to sites within operations footprint.	• Moderate; effect is evident during two HIWEC and Transmission Line phases (e.g. construction and operations) and occurs infrequently and for short durations.	• Minor; effect is reversible over a short period of time	• Minor to Moderate; effect is on a common VEC. Affected surface water features are generally resilient to disturbances although effect may occur on some sensitive features within the study area.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Fish and Fish Habitat** *TRANSMISSION LINE* • **Fish and Fish Habitat**	*Residual overlapping effect on fish and fish habitat* • Effects on fish and fish habitat (spills; water crossing).	• Minor; effect is a minor change compared to existing conditions	• Minor; effect confined to sites within the operations footprint.	• Moderate; effect is evident during two HIWEC and Transmission phases (e.g. construction and operations) and occurs infrequently for short durations.	• Minor; effect is reversible over a short period of time	• Minor to Moderate; effect is on a common VEC. Affected fish and fish habitat are common and resilient to disturbances, although effect may occur on some sensitive features within the study area.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Soils and Terrain** *TRANSMISSION LINE* • **Contaminated Land**	*Residual overlapping effects to soil quality* • Reduction in soil quality due to accidental release of contaminants during operations.	• Minor; effect is a minor change compared to existing conditions.	• Minor; effect confined to sites within operations footprint.	• Moderate; effect is evident during more than one HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently or frequently for short durations.	• Minor; effect is readily reversible over a short period of time..	• Minor; effect is on a common feature.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Groundwater** *TRANSMISSION LINE* • **Groundwater**	*Residual overlapping effects to groundwater quantity / quality* • Reduction in groundwater quality due accidental release of contaminants during operations.	• Minor to Moderate; effect on groundwater may exceed existing conditions, with residual contaminants after mitigation.	• Minor to Moderate; local effect within and / or near the HIWEC and Transmission Line study area.	• Minor to Moderate; effect is evident during more than one HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently for short durations.	• Minor to Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Minor; effect is on a common feature.	• After applying the identified mitigation, the effect is not significant.
HIWEC • **Species at Risk** *TRANSMISSION LINE* • **Species at Risk**	*Residual overlapping effect on change in behaviour* • Some bird SAR may exhibit avoidance behaviour during operations. • Some turtle SAR may alter nest site selection along access roads. • Some snake SAR may alter basking site selection along access roads. • Some bat SAR may exhibit altered feeding behaviour.	• Low to Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Moderate; local effect within the HIWEC and Transmission Line study area.	• Moderate; effect is evident during one HIWEC and Transmission Line phase (e.g. operations); however, if it occurs, change in behaviour may occur frequently for short durations.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; overall effect is on sensitive feature (SAR population) that is common. Kirtland's Warbler and Hog-nosed Snake are sensitive features that are not common, however, the likelihood of a behavioural change to these species is considered very low with the implementation of mitigation measures.	• After applying identified mitigation, monitoring, follow-up and potential compensation the effect is not significant.
	Residual overlapping effect on change in mortality risk • Isolated mortality of bird SAR is possible as a result of collisions with WTGs and maintenance activities. • Isolated mortality of turtle SAR is possible as a result of vehicular traffic on access roads and maintenance activities. • Isolated mortality of snake SAR is possible as a result of vehicular traffic on access roads and maintenance activities. • Isolated mortality of bat SAR is possible through collisions with WTGs and maintenance activities.	• Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; increase in mortality risk will occur during one project phase (operations), and mortalities are anticipated to occur infrequently.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; overall effect is on a sensitive feature (overall SAR populations) that is common. Kirtland's Warbler and Hog-nosed Snake are sensitive features that are not common; however, the likelihood of mortality to these species is considered very low with the implementation of mitigation measures.	• After applying identified mitigation, monitoring, follow-up, and potential compensation the effect is not significant.

Table 8: Overlapping Effects – Evaluation of Significance – Operations

VEC	Residual / Net Overlapping Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Wildlife and Wildlife Habitat** *TRANSMISSION LINE* • **Wildlife and Wildlife Habitat**	*Residual overlapping effect to behaviour* • Some wildlife may exhibit changes in behaviour during operations.	• Minor to Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guidelines.	• Moderate; local effect within the HIWEC and Transmission Line study area.	• Minor to Moderate; effect is evident during one HIWEC and Transmission Line phase (e.g. operations); however, if it occurs, change in change in behaviour may occur frequently for short durations.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; effect is on a sensitive feature (wildlife, including SOCC) that is common.	• After applying identified mitigation, monitoring and follow-up, the effect is not significant.
	Residual overlapping effect on mortality risk • Some mortality of birds and bats as a result of collisions with WTGs is anticipated • Isolated mortality as a result of vegetation removal during maintenance activities is possible. • Isolated wildlife mortality as a result of vehicles using access roads is possible. • Isolated mortality as a result of collisions with overhead collector lines or the transmission line is possible.	• Low to Moderate; effect exceeds existing conditions, but is less than federal or provincial regulatory criteria or published guideline values.	• Minor; effect confined to sites within construction / decommissioning footprint including temporary and permanent facilities.	• Minor; effect is evident only during one HIWEC and Transmission Line phase (e.g. operations) and occurs infrequently for short durations.	• Minor; effect is reversible during the life of the HIWEC with the implementation of adaptive management measures.	• Moderate; effect is on a sensitive feature (wildlife, including SOCC) that is common.	• After applying identified mitigation, monitoring and follow-up the effect is not significant.
HIWEC • **Vegetation and Ecological Communities** *TRANSMISSION LINE* • **Vegetation and Ecological Communities**	*Residual overlapping effect in species diversity* • Temporary changes in species diversity may occur.	• Minor; effect is a minor change compared to existing conditions.	• Moderate; local effect within the HIWEC and Transmission Line study area.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. operations) and occurs infrequently for short durations.	• Minor to Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Minor; effect is on a common feature. There are no rare plant species within the HIWEC and Transmission Line study area.	• After applying identified mitigation, monitoring and follow-up, the effect is not significant.
	Residual overlapping effect in community diversity • Temporary changes in community diversity may occur.	• Minor; effect is a minor change compared to existing conditions.	• Moderate; local effect within the HIWEC and Transmission Line study area.	• Minor; effect is evident during one HIWEC and Transmission Line phase (e.g. operations) and occurs infrequently for short durations.	• Minor to Moderate; effect is not readily reversible during the life of the HIWEC and Transmission Line.	• Minor; the effect is on a sensitive feature (e.g. potential old growth forest) that is expected to recover given that the effect is readily reversible with the application of management recommendations.	• After applying identified mitigation, monitoring and follow-up, the effect is not significant.
HIWEC • **Visual Landscape (refer to Local Residents, Cottagers and Businesses)** *TRANSMISSION LINE* • **Neighbourhood and Community Character** • **Landscape and Views**	*Residual effects on Visual Landscape (as related to Local Residents, Cottagers and Businesses, Neighbourhood and Community Character, and Landscape and Views)* • WTGs will be visible from various vantage points within and adjacent to the HIWEC study area. • Potential avoidance of HIWEC overnight accommodations and recreational activities from changes to the visual landscape. • Change to the existing landscape and views as perceived by recreational land / trail users and permanent and seasonal residents.	• Moderate; effect exceeds existing conditions. No federal or provincial regulatory criteria or guidelines exist.	• Minor to Moderate; local effects within and / or near the HIWEC study area. WTGs will be visible beyond 10 km offshore of Georgian Bay. The Transmission Line will be confined to the operations footprint.	• Major; effect is evident during more than one HIWEC and Transmission Line phase (e.g. construction and operations) and occurs frequently for long durations and continuously.	• Moderate; effect is not reversible during the life of the HIWEC and Transmission Line.	• Minor to Moderate; effect is on a sensitive feature.	• Without mitigation, the effect is not significant.

Table 8: Overlapping Effects – Evaluation of Significance – Operations

VEC	Residual / Net Overlapping Effects	Magnitude	Spatial Extent	Duration / Frequency	Permanence	Context	Significance Statement
HIWEC • **Noise (as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)** *TRANSMISSION LINE* • **Noise (as it relates to Land and Neighbourhood and Community Character, Recreation, Cottaging and Tourism and Aboriginal Land and Resource Use VECs)**	• Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations, recreational activities, permanent and seasonal residents, recreational and traditional land users, cottagers and tourists due to noise from maintenance activities. • Disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities due to noise from WTG and SS operation.	• Minor; effect is a minor change compared to existing conditions.	• Moderate; local effect within and / or near the HIWEC and Transmission Line study area. Some WTG noise may be audible at 1.5 km.	• Moderate; effect is evident during more than one HIWEC and Transmission Line phase (e.g. construction and operations) and occurs infrequently or frequently for short durations.	• Minor; effects are reversible following the operations phase.	Minor; effects are on a common feature.	After applying identified mitigation, the effect is not significant.
HIWEC • **Land and Resources Used for Traditional Purposes by Aboriginal Persons** *TRANSMISSION LINE* • **Aboriginal Land Use and Resources**	*Residual effect on Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources.* • Some decline in the available lands used for Aboriginal traditional activities.	• Minor; effect on is a minor change compared to existing conditions.	• Moderate; effect is within and / or near the HIWEC and Transmission Line study area.	• Moderate; effect is evident during operation phase and occurs continuously.	• Minor; effect is readily reversible	• Minor; effect is on a common feature.	• After applying identified mitigation, the effect is not significant.

2.5 Proposed Follow-up and Monitoring

Monitoring and follow-up plans verify the effectiveness of mitigation measures following construction and involve applying appropriate mitigation measure, if required. Follow-up and monitoring plans recommended in both **Volumes A** and **B** are sufficient to verify the effectiveness of the mitigation measures prescribed for both the HIWEC and Transmission Line. These plans would also address the potential adverse overlapping environmental effects.

3. Cumulative Effects

This section provides: a summary of the approach followed to assess cumulative effects as a result of activities conducted during construction, operations and maintenance, and decommissioning of both the HIWEC and Transmission Line in combination with other projects and activities that have occurred or are reasonably foreseeable to occur; and the results of the cumulative effects assessment. This includes:

- An analysis of cumulative effects that could potentially impact the biophysical and socio-economic environments as a result of activities during construction, operations and maintenance, and decommissioning;
- A summary of the residual / net cumulative environmental effects that are expected to remain following the implementation of mitigation measures;
- An evaluation of the significance of the cumulative effects on the environment as a result of the combination of both HIWEC and Transmission Line activities with other past, present and reasonably foreseeable future projects ; and,
- Recommendations for monitoring and follow-up programs, where applicable, to verify the accuracy and effectiveness of mitigation measures.

3.1 Methodology

The cumulative effects assessment was undertaken in accordance with the HIFN EA Guidance requirements and the *Technical Guidance for Assessment Cumulative Environmental Effects* under the *Canadian Environmental Assessment Act, 2012* (CEAA, 2012).

Cumulative effects are changes to the environment caused by the combination of residual / net effects from a project with residual / net effects from other past, present and future projects. In accordance with the guidance documents noted above, the approach to undertake a cumulative effects assessment is:

1. **Scoping** – Define the scope of the analysis to determine which VECs, Nishshing Aki and other components should be carried forward to be examined.
2. **Analysis** – Consider the physical activities being examined that may affect the identified VECs, Nishshing Aki and other components within spatial and temporal boundaries set for the cumulative effects assessment.
3. **Mitigation** – Identify technically and economically feasible measures that would mitigate any adverse cumulative effects. Mitigation measures may include: elimination, reduction or control or, restitution measures such as replacement, restoration or compensation.
4. **Significance** – Determine the significance of any adverse environmental effects that are likely to result from the HIWEC and Transmission Line components in combination with other physical activities.
5. **Follow-up** – Develop a follow-up program that addresses both project-specific environmental and cumulative effects.

The cumulative effects assessment is based on residual / net effects to VECs, Nishshing Aki and other components from both the HIWEC and Transmission Line combined with residual / net effects of other projects and activities that have occurred or are reasonably foreseeable. As identified in **Volumes A** and **B**, VECs are defined as existing

components of the environment that have recognized ecological value in existing science, law, or policies. The VECs that were examined in the cumulative effects assessment include both biophysical and socio-economic environmental components. Nishshing Aki are defined as social or cultural features or conditions that have been (i) identified as valued by HIFN; or (ii) designated as value by HIFN with community input as provided by the Land Code. Other components have been added to the EA and ERR based on the professional judgement of the assessment practitioners, based on experience with similar projects.

3.1.1 Scoping of Spatial and Temporal Boundaries

Spatial and temporal boundaries define the geographic and time-based limits of the cumulative effects assessment. To determine the cumulative effects and interactions between both the HIWEC and Transmission Line and other projects and activities, the spatial boundaries will include the HIWEC and Transmission Line local study areas in addition to adjacent municipalities. Temporal boundaries will be limited to the project phases of both the HIWEC and Transmission Line, as defined in Section 2.1.1.

Forest management activities in the region are expected to occur within the French-Severn Forest from 2009-2019 as identified in the French-Servern Forest 2009-2019 Forest Management Plan. As no specific spatial or temporal boundaries are provided in the 2009-2019 Forest Management Plan for the HIWEC and Transmission Line study area activities (construction, decommissioning and operations); it is difficult to determine the exact spatial and temporal boundaries of forest management activities in the region.

Spatial boundaries for other infrastructure and road projects are considered to be within their respective study areas as outlined in Table 6 below. Temporal boundaries for these projects are considered to overlap with the construction, decommissioning, and operations phase of the HIWEC and Transmission Line.

The spatial and temporal boundaries are considered a minimum and some exceptions to these boundaries may apply for different environmental components, features or effects. If any exceptions are considered for this assessment, they are identified where applicable within this cumulative effects assessment chapter.

3.1.2 Potential Cumulative Effects and Mitigation

Potential cumulative environmental effects are determined by assessing the combined effects of the HIWEC and Transmission Line with other past, present and reasonably foreseeable future projects and activities and their interaction with VECs, Nishshing Aki and other components.

Mitigation measures proposed in **Volume A** and **B** were reviewed to determine their suitability, and where required additional mitigation to address potential adverse cumulative environmental effects were proposed. The HIFN EA Guidance document defines mitigation as the elimination, reduction, or control of any adverse environmental effect which can also include restitution for any damage caused by such effects through replacement, restoration, compensation, or other means. Proposed mitigation strategies are developed based on federal and provincial laws and regulations, industry best practices and previous experience on similar renewable energy and transmission line projects.

3.1.3 Residual / Net Effects and Evaluation of Significance

As defined in **Volumes A** and **B**, residual / net effects are those environmental effects that are likely to occur, even after proposed mitigation measures are in place. The main purpose of the cumulative effects assessment is to assess residual / net effects from the combined HIWEC and Transmission Line with residual / net effects of other projects and activities that have occurred or are reasonably foreseeable to occur so as to avoid or minimize significant residual / net adverse cumulative environmental effects. The significance of cumulative effects is stated in Section 3.3.

3.2 Other Projects and Activities Considered

3.2.1 Identification of Projects

The identification of additional projects is based on the *Technical Guidance for Assessment Cumulative Environmental Effects* under the *Canadian Environmental Assessment Act, 2012 (CEAA, 2012),* which indicates to include certain and reasonably foreseeable projects. As such, certain or reasonably foreseeable projects and activities within the regional study areas of both the HIWEC and Transmission Line are considered in the cumulative effects assessment.

Table 9 lists each of the projects that are considered in the cumulative effects assessment, and outlines the name of the project, the type of project, general location of the project, and a brief description of the project. The projects are grouped into two categories:

- **Past or Existing Physical Activity** – these are projects that have been developed and are currently on the land
- **Certain and Reasonably Foreseeable Physical Activity** – these are planned / proposed activities to be developed.

The past or existing physical activities and certain and reasonably foreseeable physical activities were identified within the local and regional study areas of both the HIWEC and Transmission Line based on the following sources:

- Ontario Environmental Registry;
- Canadian Environmental Assessment Registry;
- The Ontario Mining Association;
- The Ministry of Environment and Climate Change Renewable Energy Projects Listing;
- The Ontario Ministry of Natural Resources and Forestry (MNRF);
- HIFN; and
- Forest Management Activities in the region.

For further description of past or existing physical activities refer to existing conditions sections in **Volumes A** and **B**.

The HIWEC study area is generally dominated by current and traditional land use by HIFN and recreational activity associated with cottaging (e.g. boating and fishing). The Transmission Line study area consists of linear development activities including Highway 69 and adjacent roads and side roads, forestry, recreational activity associated with cottaging (e.g. boating and fishing). Additionally, there are forest management activities in the French-Severn forest, as well as pits and quarries adjacent to Highway 69 and the proposed Transmission Line.

3.3 Potential Cumulative Effects, Proposed Mitigation Measures and Residual Cumulative Effects

Table 10 below presents the scoping of the cumulative effects assessment. This interaction matrix provides a high-level summary of residual / net effects identified in the **Volumes A** and **B**, and illustrates the potential cumulative environmental effects of the combined HIWEC and Transmission Line and other past, present and future projects on VECs, Nishshing Aki and other components during construction / decommissioning and operations phases.

Table 9: HIWEC and Transmission Line Project Inclusion List

HIWEC Inclusion List			
Past or Existing Physical Activity			
Project	**Type of Project**	**General Location**	**Description**
• Existing Linear Infrastructure • Residential Development • Other Resource Activities (e.g. aggregate extraction, small scale forestry, recreational and traditional land use)			
Certain and Reasonably Foreseeable Physical Activity			
Ontario Ministry of Transportation (MTO)	Widening and improvement of Highway 69	Highway 69 south of Magnetawan River, and nearby secondary roads/highways	Widening and improvement of Highway 69 south of Magnetawan River
Transmission Line Inclusion List			
Past or Existing Physical Activity			
Project	**Type of Project**	**General Location**	**Description**
• Forest Management (e.g. French Severn forest) • Aggregate Resource Extraction (e.g. pits and quarries) • Existing Linear Infrastructure (e.g. Highway 69 and adjacent roads and side roads) • Residential Development • Other Resource Activities (e.g. agricultural conversion, recreational and traditional land use)			
Certain and Reasonably Foreseeable Physical Activity			
Forest Licence Holder	Forest management activities within the French-Severn Forest	2.1 million acres or 885,446 hectares (ha) of crown land bordering Georgian Bay to the West, Algonquin Park to the East, the French and Severn Rivers to the North and South	Forest Harvesting areas for the period 2009-2019 in the French-Severn Forest
MTO	Widening and improvement of Highway 69	Highway 69 south of Magnetawan River, and nearby secondary roads/highways	Widening and improvement of Highway 69 south of Magnetawan River

Table 10: Cumulative Effects Assessment Interaction Matrix

	HIWEC Environmental Effects	Residual Effect	Transmission Line Environmental Effects	Net Effects	Residual Effects of Past or Existing Physical Activity	Residual Effects of Certain and Reasonably Foreseeable Physical Activity		Potential Cumulative Effects
						Forest Licence Holder	*New Four-Lane Highway 69*	
CONSTRUCTION / DECOMMISSIONING								
Soils and Terrain / Topography and Soils (Contaminated & Hazard Lands)	Changes to soil quality	X	Changes to soil quality / rock stability	X	X	X	X	X
	Changes to soil quantity	X	Changes to soil quantity / rock stability	X	X	X	X	X
Groundwater	Changes to groundwater quantity	X	Changes to groundwater quantity	X	X	-	X	X
	Changes to groundwater quality	X	Changes to groundwater quality	X	X	X	X	X
Wildlife and Wildlife Habitat	Habitat change	X	Habitat Change	X	X	X	X	X
	Change in mortality risk	X	Change in mortality risk	X	X	X	-	X
	Change in behaviour	X	Change in behaviour	X	X	X	X	X
Vegetation and Ecological Communities	Change in community diversity (including community loss)	X	Change in community diversity (including community loss)	X	X	X	X	X
	Change in wetland quantity and function	X	Change in wetland quantity and function	X	X	X	X	X
	Change in species diversity	-	Change in species diversity	X	X	X	X	X
Surface Water	Change in surface water quality	X	Change in surface water quality	X	X	X	-	X
	Change in surface water quantity	X	Change in surface water quantity	X	X	-	-	X
Fish and Fish Habitat	Change in fish habitat	X	Change in fish habitat	X	X	X	X	X
	Change in fish mortality risk	X	Change in fish mortality risk	X	-	-	-	X
Species at Risk	Habitat change	X	Habitat change	X	X	X	X	X
	Change in behaviour	X	Change in behaviour	X	X	X	X	X
	Change in mortality risk	X	Change in mortality risk	X	X	X	X	X
Lands and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use	Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering	X	Loss of available lands used for Aboriginal traditional activities due to loss of wildlife habitat and disturbance to wildlife	X	X	-	-	X
	Disturbance to current land users from construction / decommissioning noise and vibration	X	Disturbance to current land users of traditional lands from construction / decommissioning noise and vibration	X	X	-	-	X
	Reduced access to on-Reserve lands during construction / decommissioning	X	-	-	-	-	-	X
Cultural Resources / Heritage and Archaeological Site / Heritage and Culture	Potential effects on archaeological resources	-	Discovery or disturbance to archaeological resources, previously unknown	-	-	-	-	ø
	Potential direct and indirect effects on cultural heritage features	-	-	-	-	-	-	ø
Socio-Economic *(Local Residents, Cottagers, and Businesses, Recreation and Tourism, Community Services and Infrastructure) / Socio-Economic (Economic Base, Employment and Labour Supply, Local Businesses, Institutions and Public Facilities, Neighbourhood and Community Character, Community Services and Infrastructure, Traffic, Recreation, Cottaging and Tourism, Public Health and Safety, Non-Renewable Resources, Forestry, Game and Fishery Resources, Land Uses - Residential, Commercial, Institutional Land uses within 500m of Site)*	Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence /cottage owners on HIFN I.R. #2	-	Temporary disruption of access to existing recreational trails that will be used for construction access	X	-	-	-	-
	Disturbance to local residents and businesses due to construction and decommissioning noise and vibration	X	Disturbance to local permanent and seasonal residents due to construction and decommissioning noise and vibration	X	-	-	-	X
	Avoidance of overnight accommodation and recreational activities near the HIWEC due to noise and vibration	X	Avoidance of recreational areas due to noise and vibration	X	-	-	-	-
	Vehicles and equipment emissions contributing to a reduction in local air quality	-	Vehicle and equipment combustion emissions contributing to a reduction in air quality	X	-	-	-	-
	Dust generation from vehicle access and construction activity contributing to a reduction in local air quality	-	Nuisance effects related to dust generated from vehicle access and construction activity contributing to a reduction in local air quality	X	-	-	-	-
	Increase in truck traffic where the south access road crosses Bekanon Rd	X	Delays in traffic	X	-	-	-	-
	-		Increased potential for traffic related incidents on Hwy 69/400 and regional roads		-	-	-	-
	Potential disruption to local water supply wells from construction activity	X	-	-	-	-	-	-
	-	-	Positive indirect and induced economic benefits based on an increase of the local workforce for the construction and decommissioning phases	-	-	-	-	-
	-	-	Positive effect as jobs are created for local workers	-	-	-	-	-
	-	-	Positive effect on local businesses	-	-	-	-	-
	-	-	Increased demand for local goods and services	-	-	-	-	-
	-	-	Increased demand on medical services in Parry Sound and Sudbury	-	-	-	-	-
	-	-	Avoidance of recreational areas due to dust	X	-	-	-	-
	-	-	Reduction in the licensed area and quantity of extractable resources	X	-	-	-	-
	-	-	Loss of harvestable forest resources due to vegetation clearing	X	-	-	-	-
	-	-	Decline in available game resources for recreational hunters	X	-	-	-	-
	-	-	Change in land use on private property	X	-	-	-	-

Table 10: Cumulative Effects Assessment Interaction Matrix

	HIWEC Environmental Effects	Residual Effect	Transmission Line Environmental Effects	Net Effects	Residual Effects of Past or Existing Physical Activity	Residual Effects of Certain and Reasonably Foreseeable Physical Activity		Potential Cumulative Effects
						Forest Licence Holder	*New Four-Lane Highway 69*	
OPERATIONS								
Soils and Terrain / Topography and Soils (Contaminated & Hazard Lands)	Changes to soil quality	X	Changes to soil quality	X	X	X	X	X
Groundwater	Changes to groundwater quality		Changes to groundwater quality	X	X	X	X	
	Changes to groundwater quantity	X	N/A					
Wildlife and Wildlife Habitat	Change in mortality risk	X	Change in mortality risk	X	X	X	X	X
	Change in behaviour	X	Change in behaviour	X	X	X	X	X
Vegetation and Ecological Communities	Change in community diversity (including community loss)	X	Change in community diversity (including community loss)	X	X	X	X	X
	Change in wetland quantity and function	X	Change in wetland quantity and function	X	X	X	X	X
	Change in species diversity	X	Change in species diversity	X	X	X	X	X
Surface Water	Change in surface water quality	X	Change in surface water quality	X	X	-	X	X
Fish and Fish Habitat	Change in fish habitat	X	Change in fish habitat	X	X	-	X	X
Species at Risk	Habitat change	X	Habitat change	X	-	X	-	X
	Change in behaviour	X	Change in behaviour	X	-	-	-	X
	Change in mortality risk	X	Change in mortality risk	X	-	-	-	X
Lands and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use	Change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering	-	Available lands used for Aboriginal traditional activities and cultural site	X	X	X	X	X
Cultural Resources / Heritage and Archaeological Site / Heritage and Culture	Potential effects on archaeological resources	-	Discovery or disturbance to archaeological resources, previously unknown	-	-	-	-	-
	Potential effects on cultural landscapes	-	Change to the cultural heritage landscape character of Moose Lake Trading Post	X	-	-	-	-
Noise	Disturbance to current land users, local residents, cottagers and businesses from noise associated with maintenance activity	X	Disturbance to users of traditional lands due to noise associated with maintenance	X	-	-	-	X
	Disturbance to current land users, local residents, cottagers and businesses resulting from noise from WTG operation	X	Disturbance to users of traditional lands due to noise associated with the SS	X	-	-	-	-
	Avoidance of overnight accommodation and recreational activities near the HIWEC due to noise and vibration	X	Disturbance to recreational users, cottagers and tourists due to noise related to maintenance activities.	X	-	-	-	-
	Avoidance of overnight accommodation and recreational activities near the HIWEC from noise associated with WTG operation	X	Disturbance to recreational users, cottagers and tourists due to noise related to SS operation	X	-	-	-	-
Air Quality	Vehicle and equipment emissions contributing to a reduction in local air quality	-	Vehicle and equipment combustion emissions contributing to a reduction in air quality	X	-	-	-	-
	Dust generation from maintenance vehicle access contributing to a reduction in local air quality	-	Nuisance effects related to dust generated from vehicle access and construction activity contributing to a reduction in local air quality	X	-	-	-	-
Socio-Economic *(Local Residents, Cottagers, and Businesses, Recreation and Tourism, Community Services and Infrastructure) / Socio-Economic (Economic Base, Employment and Labour Supply, Local Businesses, Institutions and Public Facilities, Neighbourhood and Community Character, Community Services and Infrastructure, Traffic, Recreation, Cottaging and Tourism, Public Health and Safety, Non-Renewable Resources, Forestry, Game and Fishery Resources, Land Uses - Residential, Commercial, Institutional Land uses within 500m of Site)*	Reduced access to HIFN I.R. #2 by Aboriginal and non-Aboriginal residence /cottage owners on HIFN I.R. #2	-	Temporary disruption of access to existing recreational trails that will be used for construction access	-	-	-	-	-
	Increase in truck traffic where the south access road crosses Bekanon Rd	X	-	-	-	-	-	-
	-	-	Reduction in the quantity of prospect extractable resources	X	-	-	-	-
	-	-	Changes to current access (physical and/or administrative) due to presence of Transmission Line infrastructure	X	-	-	-	-
	-	-	Change in land use on private property	X	-	-	-	-
Visual Landscape	Changes to the visual landscape for local residents, cottagers and businesses from the operation of WTGs	X	Effect on the visual character of some communities perceived by permanent and seasonal residents on private lands or community spaces within the Route B Transmission Line study area.	X	-	-	-	-
	Avoidance of overnight accommodations and recreational activities from changes to the visual landscape	X	Avoidance of nearby recreational areas by tourists and other recreational users due to the changes to the landscape and views.	X	-	-	-	-

Tables 11 and **12** document an assessment of cumulative effects considering past, present, existing and reasonably foreseeable projects and activities, the effects of which act cumulatively with the proposed works of both HIWEC and Transmission Line combined. Only the adverse residual / net effects of the combined HIWEC and Transmission Line remaining after the application of mitigation measures are carried forward to the cumulative effects assessment.

The HIWEC and Transmission Line are subject to the HIFN Land Code and O.Reg.116/01 respectively. Both processes meet provincial and federal requirements. In addition, the HIWEC and Transmission Line will implement Best Management Practices (BMPs) and necessary site-specific mitigation measures to prevent any significant adverse residual / net effects.

Table 11: Potential Cumulative Effects with Other Projects / Activities – Construction / Decommissioning

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Soils and Terrain	Effects on surface geology and soils (grading, rock blasting, excavations, vegetation clearing, construction embankments, and sedimentation and erosion) due to road and infrastructure and tree harvesting.	Effects on soil quality (erosion, topsoil mixing, spills, blasting, grading, vegetation clearing, construction embankments).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Disturbance of soil including erosion, slope instability and mixing of topsoil will be confined to designated construction areas and occur frequently within the HIWEC and infrequently Transmission Line study area, and Highway 69 and Forest Management area for short durations during the construction period. Affected areas will be restored through the application of imported clean topsoil or the effective application of stockpiled topsoil. • Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the construction and decommissioning period. Effects to soil quality will be confined to the construction footprints and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Site damage and loss of forest productivity from compaction and erosion.	Effects on soil quantity (compaction, erosion, excavation, blasting).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Disturbance of soil resulting in erosion, compaction and removal will be confined to the designated construction areas and occur frequently within the HIWEC and the Transmission Line for short durations during the construction period. Affected areas will be restored through the application of imported clean topsoil or the effective application of stockpiled topsoil. • Disturbance to soil quantity resulting in slope instability will be localized and occur for short durations intermittently throughout the construction period. Slope instability due to blasting can be mitigated through the application of slope stability techniques. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Contaminated Lands	Effects on contaminated soils due to excavation for roads and infrastructure.	Reduction in soil quality due to accidental release of contaminants during construction, heavy equipment and vehicle use, and concrete truck rinsing, etc.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the operation period. Effects to soil quality will be confined to designated work areas and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Hazard Lands	Residual effect not identified for other projects / activities.	Increased risk for rock and/or soil slope instability due to blasting.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Groundwater	Residual effect not identified for other projects / activities.	Effects on groundwater quality (blasting operation, spills, dewatering discharge).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Mitigation measures are expected to minimize or mitigate effects related to the reduction in groundwater quality and physical damage to supply wells from blasting and pile driving activities and therefore the effect to groundwater quality is anticipate to be minor. • Effects to groundwater and private water wells will be confined to an area around blasting locations (Blast ZOI) and/or groundwater taking locations (dewatering ZOI), which is predicted to be a small area relative to the HIWEC study area. The effects of blasting and dewatering will occur for a short duration or until contingency measures are applied (i.e., provide well owner with alternative source of water). Where blast and/or dewatering ZOI intercept ZOI from other projects the effects to groundwater may be greater. Additional mitigation measures should include the avoidance of simultaneous blasting and or dewatering activities within intercepting blast and/or dewatering ZOI. • Reduction in groundwater quality due to the accidental release of contaminants will be localized and occur infrequently during the construction and decommissioning period. Effects to groundwater quality may extend beyond the study area and the extent of contamination is dependent on local groundwater flow patterns. • Groundwater contamination within a fractured bedrock aquifer is not easily remediated and may remain for a time exceeding that of the construction or decommissioning phase if current spill clean-up processes cannot be applied. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	No residual effect identified at this time. Residual effect of Highway 69 activities will depend upon results of PTTW findings and mitigation measures proposed during the detail design phase.	Effects on groundwater quantity (blasting operations, dewatering and watertaking).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Mitigation measures are expected to minimize or mitigate effects related to the reduction in groundwater quantity and physical damage to supply wells from blasting and pile driving activities, and therefore the effect to groundwater quality is anticipate to be minor. • Effects to groundwater quantity due to dewatering and water taking activities will be localized to an area around the water taking locations (Dewatering ZOI), which is predicted to be a small area relative to the study area. The effects of water taking will occur for a short duration or until contingency measures are applied (i.e., provide well owner with alternative source of water) and will naturally reverse once water taking activities stop. Where blast and/or dewatering ZOI intercept ZOI from other projects the effects to groundwater quantity may be greater. Additional mitigation measures should include the avoidance of simultaneous blasting and or dewatering activities within intercepting blast and/or dewatering ZOI. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effects is not significant.

Table 11: Potential Cumulative Effects with Other Projects / Activities – Construction / Decommissioning

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Wildlife and Wildlife Habitat	Habitat loss and fragmentation from past and existing physical activity. Habitat loss and fragmentation as a direct result of the new four-lane Highway 69 (MTO, 2010; FRi, 2013 and 2014). Reduction in habitat for Pileated Woodpecker, Barred Owl, Marten, Red-shouldered Hawk, Moose (winter habitat), Red-backed Salamander, Snowshoe Hare, White-tailed Deer (deer yards) and White-throated Sparrow as result of forest management (Davidson, n.d.).	Habitat Change – loss and fragmentation of wildlife habitat.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Wildlife habitat is abundant within the regional study area, and, assuming harvested forested areas are rehabilitated, permanent habitat removal and fragmentation will be localized within the construction footprint of the new four-lane Highway 69, HIWEC and Transmission Line. In addition, a number of areas within the HIWEC and Transmission Line construction footprints will be rehabilitated after decommissioning. However, habitat loss and fragmentation as a result of HIWEC and Transmission Line and other projects / activities will result in some permanent loss of habitat which is not anticipated to reduce habitat availability beyond a level capable of sustaining wildlife populations, including Species of Conservation Concern, in the regional study area. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Change in mortality risk for wildlife from past and existing physical activity (e.g., mortality on existing roads and Highway 69). Road mortality of wildlife, including black bear, white-tailed deer and other large ungulates, as a result of vehicular traffic on the four-lane Highway 69 (FRi, 2014). No effects on wildlife mortality are identified in the French / Severn Forest Management Plan 2009 - 2019 (Davidson, n.d.); however, isolated mortality as result of forest management activities is possible.	Change in Mortality Risk – increased mortality risk to wildlife.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures are expected to minimize potential wildlife mortality resulting from construction of the HIWEC and Transmission Line. Wildlife is abundant within the regional study area and construction related mortality is expected to be minor in comparison to wildlife mortality related to other projects / activities. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Change in behaviour of wildlife from past and existing physical activity (e.g., avoidance of areas of human activity). Nuisance effects for wildlife from the new four-lane Highway 69 (MTO, 2010). No effects on wildlife behaviour are identified in the French / Severn Forest Management Plan 2009 - 2019 (Davidson, n.d.); however, avoidance behaviour as result of forest management activities is possible.	Change in Behaviour – avoidance of areas of human activity.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Mitigation measures are expected to minimize changes in wildlife behaviour; however, some wildlife are expected to exhibit avoidance behaviour due to the presence of humans and noise from the HIWEC and Transmission Line, as well as other projects / activities. • Existing wildlife (including common wildlife and SOCC) is abundant within the regional study area and, given the proposed mitigation, change in behaviour will not likely affect the viability and sustainability of populations within the regional study area. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Vegetation and Ecological Communities	Direct and indirect residual effects to vegetation communities as a result of vegetation removal from past and existing physical activity. Direct and indirect residual effects to vegetation communities along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). Change in community diversity resulting from tree harvesting in Red and White Pine, Red Oak and Hemlock forests as result of forest management activities (Davidson, n.d.).	Change in Community Diversity – changes in the relative abundance of vegetation communities, including forested areas.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Vegetation covers a large proportion of the regional study area and, assuming harvested forested areas are rehabilitated, permanent vegetation removal will be localized within the construction footprint of the new four-lane Highway 69, HIWEC and Transmission Line. In addition, a number of areas within the HIWEC and Transmission Line construction footprints will be rehabilitated after decommissioning. However, vegetation loss as a result of HIWEC and Transmission Line and other projects / activities will result in some permanent loss of vegetation which is not anticipated to significantly reduce community diversity within the regional study area. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 11: Potential Cumulative Effects with Other Projects / Activities – Construction / Decommissioning

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
	Direct and indirect residual effects to species diversity as a result of past and existing physical activity (e.g., invasive species introduction). Changes in species diversity along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). Change in relative abundance of tree species resulting from tree harvesting in Red and White Pine, Red Oak and Hemlock forests as result of forest management activities (Davidson, n.d.).	Change in Species Diversity - changes in the relative abundance and diversity of plant species.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Vegetation covers a large proportion of the regional study area and, assuming harvested forested areas are rehabilitated, changes in species diversity will be localized within the construction footprint of the new four-lane Highway 69 and Transmission Line. In addition, a number of areas within the Transmission Line construction footprints will be rehabilitated after decommissioning. However, vegetation trimming as a result of the Transmission Line construction and other projects / activities will result in some changes in species diversity which are not anticipated to significantly alter species diversity in a regional context. • After applying mitigation measures for the Transmission Line and other projects / activities, the cumulative effect is not significant.
	Changes in wetland quantity and function as a result of past and existing physical activity (e.g., vegetation removal and invasive species introduction). Direct and indirect residual effects to wetland communities along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). No effects on wetland quantity and function are identified in the French / Severn Forest Management Plan 2009 -2019 (Davidson, n.d.); however, changes in wetland quantity and function as result of forest management activities are possible.	Change in Wetland Quantity and Function – removal of wetland communities and changes in function such as flood attenuation and water quality improvement.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • The HIWEC has been sited to avoid as much wetland area as possible and the Transmission Line will not result in the removal of any wetlands. Some removal of wetland communities as result of the new four-lane Highway 69 is unavoidable; however, mitigation measures will be applied to minimize effects on wetland function. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Surface Water	Impacts to water quality where forest management activities occur.	Effects on surface water quality (spills, erosion, sedimentation, dewatering discharge and blasting).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Residual effect not identified for other projects / activities.	Effects on surface water quantity (water crossing, dewatering discharge, blasting).	Effects on surface water quantity will be minor in magnitude, spatial extent, frequency / duration and permanence. Therefore, additional mitigation measures are not required. After applying mitigation measures for the HIWEC and Transmission Line the cumulative effect is not significant.
Fish and Fish Habitat	Effects on fish habitat (new watercourse crossings, extension of existing crossings, replacement of existing culverts or structures, forest management activities).	Effects on fish habitat (water crossing installation and removal, erosion and sedimentation, spills, forestry management activities).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Effects may exceed existing conditions but will not cause serious harm to fish and fish habitat. • Fish habitat is a sensitive feature that is common within the region. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Residual effect not identified for other projects / activities.	Effects on fish mortality risk (blasting and/or vibration, water crossing installation, spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Localized to construction footprint. With the implementation of a Blasting Plan and avoidance of blasting in waterbodies, residual effects to fish mortality can be minimized. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 11: Potential Cumulative Effects with Other Projects / Activities – Construction / Decommissioning

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Rare Aquatic Species	Residual effect not identified for other projects / activities.	Effects on rare aquatic species mortality (blasting and/or vibration, water crossing installation, spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Rare aquatic species habitat is a sensitive feature that is not common within the region. Provided mitigation measures are implemented, effects are moderate in magnitude and permanence, and minor in spatial extent and frequency, and the cumulative effect is not significant.
	Residual effect not identified for other projects / activities.	Effects on rare aquatic species habitat (water crossing installation and removal, erosion and sedimentation, spills, forestry management activities).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Rare aquatic species are sensitive and not common within the region. Effects are minor in magnitude, spatial extent, duration/frequency and permanence provided project activities do not cause serious harm to fish as defined under the Fisheries Act. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant
Species at Risk	Changes in SAR habitat resulting from past and existing physical activity (e.g., removal and fragmentation). Removal of potentially suitable habitat for Kirtland's Warbler, Chimney Swift, Whip-poor-will, Blanding's Turtle, Spotted Turtle, Massasauga Rattlesnake and Eastern Hog-nosed Snake as a result of the new four-lane Highway 69 (MTO, 2010; FRi, 2014). Reduction in habitat for Southern Flying Squirrel as result of forest management (Davidson, n.d.).	Habitat Change - possible damage or destruction of SAR residences or SAR habitat.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • SAR habitat is abundant within the regional study area, and, assuming harvested forested areas are rehabilitated, permanent habitat removal and fragmentation will be localized within the construction footprint of the new four-lane Highway 69, HIWEC and Transmission Line. In addition, a number of areas within the HIWEC and Transmission Line construction footprints will be rehabilitated after decommissioning. However, projects / activities will result in some permanent loss of SAR habitat which is not anticipated to reduce habitat availability in the regional study area. • After applying identified mitigation, monitoring, follow-up and potential compensation, the cumulative effect is not significant.
	Changes in SAR mortality resulting from past and existing physical activity (e.g., mortality on existing roads and Highway 69). Mortality or injury of SAR, including Spotted Turtle, Blanding's Turtle and Massasauga Rattlesnake as result of the new four- lane Highway 69 (MTO, 2010). No effects on SAR mortality are identified in the French / Severn Forest Management Plan 2009 - 2019 (Davidson, n.d.); however, isolated mortality as result of forest management activities is possible.	Change in SAR Mortality Risk – increased mortality risk, including harm, to SAR.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures are expected to minimize potential SAR mortality resulting from construction of the HIWEC and Transmission Line. Construction related mortality of SAR, if it occurs, it is expected to be minor. • Based on the Species Recovery Strategies (Parks Canada, 2012 and Parks Canada Agency 2015), development of roads and forest management are considered as a high level of concern and medium level of concern, respectively, for Massasauga Rattlesnake and Blanding's Turtle. The access roads in the HIWEC and Transmission Line are considered minor roads with low frequency of vehicular traffic compared to the Highway 69. • After applying identified mitigation, monitoring, follow-up and potential compensation, the cumulative effect is not significant.
	Changes in SAR behaviour resulting from past and existing physical activity (e.g., avoidance of areas of human activity). Nuisance effects for SAR from the new four-lane Highway 69 (MTO, 2010). No effects on SAR behaviour are identified in the French / Severn Forest Management Plan 2009 - 2019 (Davidson, n.d.); however, avoidance behaviour as result of forest management activities is possible.	Change in SAR Behaviour – avoidance of areas of human activity and/ or disturbance of SAR.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures are expected to minimize changes in SAR behaviour; however, some SAR are expected to exhibit avoidance behaviour due to the presence of humans and noise from the HIWEC and Transmission Line, as well as other projects / activities. • Disturbance effects to SAR will be minimized by the identified mitigation measures. • After applying identified mitigation, the cumulative effect is not significant.

Table 11: Potential Cumulative Effects with Other Projects / Activities – Construction / Decommissioning

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources	Residual effects not identified for other projects / activities.	Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint active construction areas Reduced access confined to active construction areas within the study area Some decline in the available lands used for Aboriginal traditional activities.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect on land and resources used for Traditional Purposes is a minor change and will be temporarily disturbed. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effects are not significant.
Noise *(as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)*	Noise effects due to road and infrastructure and tree harvesting.	Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities due to noise and vibration associated with the development of road infrastructure and tree harvesting.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effects primarily localized within and / or near the road infrastructure development and tree harvesting, with some noise audible at 1 km. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Traffic	Residual effects not identified for other projects / activities.	Traffic delays on highways and regional roads intermittently throughout construction and decommissioning phases.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect is on a common feature that currently experiences intermittent traffic delays. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Forestry	Residual effects not identified for other projects / activities.	Loss of some harvestable forest resources.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Residential, Commercial and Institutional Lands	Residual effects not identified for other projects / activities.	Change in land use on private property.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Air Quality	Effects on air quality from road and infrastructure and tree harvesting – e.g. release of dust, change in local air quality, increased, or decreased, creation and release of air pollutants. (MTO, 2010).	Low levels of vehicle and equipment emissions contributing to a reduction in local air quality. Low levels of dust generation contributing to a reduction in local air quality.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Emissions of dust will not create a measurable effect to local or regional air quality parameters. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Neighbourhood and Community Character	Residual effects not identified for other projects / activities.	Visual effects to some land owners and local residents may remain, affecting nearby residents and lessening their enjoyment of their private lands and / or community spaces.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Visual effects to neighbourhood and community character are a minor change compared to existing conditions • Effects primarily localized within and / or near the construction footprint. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Recreation and Tourism	Residual effects not identified for other projects / activities.	Some disturbance to recreation, cottaging and tourism due to dust will remain through the construction and decommissioning phases.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Some effects will exceed existing conditions in the local area and / or region. • Dust will not result in a measurable effect to local or regional air quality parameters. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant
Game and Fishery	Effects on game and fishery resources due to vegetation removal, disturbance to wildlife and vegetation species from road and infrastructure and tree harvesting.	Some decline in available game resources.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect on game and fishery resources is a minor change compared to existing conditions, although some habitat and sensory disturbance to game and fishery resources is anticipated. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Non-Renewable Resources	Residual effects not identified for other projects / activities.	Reduction in licensed area and the quantity of extractable resources.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Resources will remain unavailable for exploitation throughout construction / decommissioning of the HIWEC and Transmission line, and road infrastructure and tree harvesting activities but will become available again after decommissioning phase. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 12: Potential Cumulative Effects with Other Projects / Activities – Operations

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Soils and Terrain	Effects on surface geology and soils (erosion and spills).	Effects on soil quality (spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Effect on soils may exceed existing conditions if not cleaned up accordingly, with residual contaminants after mitigation. • Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the operations period. Effects to soil quality will be confined to designated work areas and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Contaminated Land	Residual effects were not identified for other projects / activities.	Reduction in soil quality (spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Effect on soils may exceed existing conditions, if not cleaned up accordingly with residual contaminants after mitigation. • Reduction in soil quality due to the accidental release of contaminants will be localized and occur infrequently during the operations period. Effects to soil quality will be confined to designated work areas and localized to a small area where the spill occurred. Effects to soil quality can be easily remediated and soil quality restored to conditions similar to baseline. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Groundwater	Residual effects were not identified for other projects / activities.	Effects on groundwater quantity (impervious surfaces).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Residual effects were not identified for other projects / activities.	Effects on groundwater quality (spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Reduction in groundwater quality due to the accidental release of contaminants will occur infrequently during the operations period. Effects to groundwater quality may extend beyond the study area and the extent of contamination is dependent on local groundwater flow patterns. Groundwater contamination within a fractured bedrock aquifer is not easily remediated and may remain for a time exceeding that of the operations or decommissioning phase if current spill clean-up processes cannot be applied. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Wildlife and Wildlife Habitat	Change in mortality risk for wildlife from past and existing physical activity (e.g., mortality on existing roads and Highway 69). Road mortality of wildlife, including black bear, white-tailed deer and other large ungulates, as a result of vehicular traffic on the four-lane Highway 69 (FRi, 2014). No effects on wildlife mortality are identified in the French / Severn Forest Management Plan 2009 - 2019 (Davidson, n.d.); however, isolated mortality as result of forest management activities is possible.	Change in Mortality Risk – increased mortality risk to wildlife.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures, monitoring, follow-up and contingency measures, are expected to minimize potential wildlife mortality resulting from operation of the HIWEC and Transmission Line. Wildlife is abundant within the regional study area and operation related mortality is expected to be minor in comparison to wildlife mortality related to other projects / activities. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Change in behaviour of wildlife from past and existing physical activity (e.g., avoidance of areas of human activity). Nuisance effects for wildlife from the new four-lane Highway 69 (MTO, 2010). No effects on wildlife behaviour are identified in the French / Severn Forest Management Plan 2009 -2019 (Davidson, n.d.); however, avoidance behaviour as result of forest management activities is possible.	Change in Behaviour – avoidance of areas of human activity.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Mitigation measures are expected to minimize changes in wildlife behaviour; however, some wildlife may exhibit avoidance behaviour due to the intermittent presence of humans and noise during operations from the HIWEC and Transmission Line, as well as other projects / activities. • Existing wildlife (including common wildlife and Species of Conservation Concern) is abundant within the regional study area and, given the proposed mitigation, change in behaviour will not likely affect the viability and sustainability of populations within the regional study area. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 12: Potential Cumulative Effects with Other Projects / Activities – Operations

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Vegetation and Ecological Communities	Direct and indirect residual effects to species diversity as a result of past and existing physical activity (e.g., invasive species introduction). Changes in species diversity along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). Change in relative abundance of tree species resulting from tree harvesting in Red and White Pine, Red Oak and Hemlock forests as result of forest management activities (Davidson, n.d.).	Change in Species Diversity - changes in the relative abundance and diversity of plant species.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Vegetation covers a large proportion of the regional study area and, assuming harvested forested areas are rehabilitated, changes in species diversity will be localized within the right-of-way (ROW) of the new four-lane Highway 69 and Transmission Line. However, vegetation trimming as a result of the Transmission Line maintenance activities and other projects / activities will result in some localized changes in species diversity. In addition, proposed mitigation measures are expected to minimize or mitigate changes in species diversity due to introduction of invasive species within the HIWEC. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Direct and indirect residual effects to vegetation communities as a result of vegetation removal from past and existing physical activity. Direct and indirect residual effects to vegetation communities along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). Change in community diversity resulting from tree harvesting in Red and White Pine, Red Oak and Hemlock forests as result of forest management activities (Davidson, n.d.).	Change in Community Diversity – changes in the relative abundance of vegetation communities, including forested areas.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Vegetation covers a large proportion of the regional study area and, assuming harvested forested areas are rehabilitated, changes in community diversity will be localized within the ROW of the new four-lane Highway 69 and Transmission Line. However, vegetation trimming as a result of the Transmission Line maintenance activities and other projects / activities will result in some localized changes in community diversity. In addition, proposed mitigation measures are expected to minimize or mitigate changes in community diversity due to introduction of invasive species within the HIWEC. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Changes in wetland quantity and function as a result of past and existing physical activity (e.g., vegetation removal and invasive species introduction). Direct and indirect residual effects to wetland communities along the new four-lane Highway 69 resulting from vegetation removal, accidental damage beyond the working area, introduction of invasive species, accidental spills of contaminants and salt spray (MTO, 2010). No effects on wetland quantity and function are identified in the French /	Change in Wetland Quantity and Function – removal of wetland communities and changes in function such as flood attenuation and water quality improvement.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures are expected to minimize or mitigate changes in wetland quantity and function due to introduction of invasive species within the HIWEC. • Some removal of wetland communities as result of the new four-lane Highway 69 is unavoidable; however, mitigation measures will be applied to minimize effects on wetland function. • After applying mitigation measures for the HIWEC and other projects / activities, the cumulative effect is not significant.

Table 12: Potential Cumulative Effects with Other Projects / Activities – Operations

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
	Severn Forest Management Plan 2009 -2019 (Davidson, n.d.); however, changes in wetland quantity and function as result of forest management activities are possible.		
Surface Water	No residual effects are identified for other projects / activities.	Effects on surface water quality (spills).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Low probability of spills of contaminants and limited magnitude of effects on surface water quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid significant residual adverse effects • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Fish and Fish Habitat	Effects on fish habitat (runoff contaminants, ROW management issues, repair or rehabilitation of watercrossings).	Effects on fish habitat (spills, water crossing installation / maintenance).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Low probability of spills of contaminants and limited magnitude of effects on fish habitat quality. Minor leaks or spills may occur. Application of mitigation and spill response measures are expected to avoid residual adverse effects. • Effects from water crossing repair and maintenance will be limited in magnitude, spatial extent, duration and permanence. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Species at Risk	Changes in SAR mortality resulting from past and existing physical activity (e.g., mortality on existing roads and Highway 69). Mortality or injury of SAR, including Spotted Turtle, Blanding's Turtle and Massausaga Rattlesnake as result of the new four- lane Highway 69 (MTO, 2010). No effects on SAR mortality are identified in the French / Severn Forest Management Plan 2009 -2019 (Davidson, n.d.); however, isolated mortality as result of forest management activities is possible.	Change in SAR Mortality Risk – increased mortality risk, including harm, to SAR.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures, monitoring and follow-up, are expected to minimize potential SAR mortality resulting from operation of the HIWEC and Transmission Line. Operation related mortality of SAR, if it occurs, is expected to be minor in comparison to mortality related to other projects / activities. • Based on the Species Recovery Strategies (Parks Canada, 2012 and Parks Canada Agency 2015), development of roads and forest management are considered as a high level of concern and medium level of concern, respectively, for Massasauga Rattlesnake and Blanding's Turtle. The access roads in the HIWEC and Transmission Line are considered minor roads with low frequency of vehicular traffic. • After applying mitigation measures, monitoring and follow-up for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
	Changes in SAR behaviour resulting from past and existing physical activity (e.g., avoidance of areas of human activity). Nuisance effects for SAR from the new four-lane Highway 69 (MTO, 2010). No effects on SAR behaviour are identified in the French / Severn Forest Management Plan 2009 -2019 (Davidson, n.d.); however, avoidance behaviour as result of forest management activities is possible.	Change in SAR Behaviour – avoidance of areas of human activity and/ or disturbance of SAR.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. Therefore, additional mitigation measures are not required. • Proposed mitigation measures, monitoring and follow-up, are expected to minimize changes in SAR behaviour resulting from operation of the HIWEC and Transmission Line; however, some SAR may exhibit avoidance behaviour due to presence of humans, WTGs, roads and infrastructure from the HIWEC and Transmission Line, as well as other projects / activities. • Disturbance effects to SAR will be minimized by the identified mitigation measures. • After applying mitigation measures, monitoring and follow-up for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 12: Potential Cumulative Effects with Other Projects / Activities – Operations

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Land and Resources Used for Traditional Purposes by Aboriginal Persons / Aboriginal Land Use and Resources	Residual effects not identified for other projects / activities.	Temporary change in land use on lands currently available for traditional activities such as hunting, trapping, fishing and plant gathering due to loss of habitat and disturbance to wildlife and vegetation species within the construction footprint active construction areas. Some decline in the available lands used for Aboriginal traditional activities.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect on land and resources used for Traditional Purposes is a minor change and will be temporarily disturbed. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effects are not significant.
Built Heritage and Cultural Heritage Landscapes	Residual effects not identified for other projects / activities.	Shadows will be cast on Moose Lake Trading Post, throughout the operation of the Transmission Line.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect of increased construction activity near the Highway 69 expansion and tree harvesting activities. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Noise as it relates to Land and Resources Used for Traditional Purposes by Aboriginal Persons; Local Residents, Cottagers and Businesses; and Recreation and Tourism VECs)	Noise effects due to road and infrastructure and tree harvesting.	Intermittent disturbance to current land users, local residents, cottagers, businesses, overnight accommodations and recreational activities from construction/decommissioning noise and vibration.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Recreation and Tourism	Residual effects not identified for other projects / activities.	• Potential avoidance of HIWEC overnight accommodations and recreational activities from changes to the visual landscape • Changes to the landscape and views as perceived by cottagers, tourists, and recreational users may cause some avoidance of recreational lands.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effects due to increased visibility of road infrastructure and tree harvesting activities. • Visual effects and some avoidance of recreational lands can be expected to exceed existing conditions. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effects are not significant.
Residential, Commercial and Institutional Lands	Residual effects not identified for other projects / activities.	Change in land use of private property.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant
Landscape and Views	Effects due to increased visibility of road infrastructure and tree harvesting activities.	Some disturbance to the landscape and views as perceived by recreational land and trail users as well as permanent and seasonal residents will remain.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effects due to increased visibility of road infrastructure and tree harvesting activities. • Visual effects are expected to exceed existing conditions, however there are no federal or provincial regulatory criteria regarding landscapes and views. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Non-Renewable Resources	Residual effects not identified for other projects / activities.	There will be a reduction in the quantity of prospect extractable resources (future pit / quarry / mineral operations).	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.

Table 12: Potential Cumulative Effects with Other Projects / Activities – Operations

VEC	Residual Effects of the Other Projects	Potential Cumulative Effects	Significance
Game and Fishery Resources	Residual effects not identified for other projects / activities.	Some displacement of game resources.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effects on game and fishery resources may result in specific effects from changes to road infrastructure and tree harvesting. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effect is not significant.
Forestry	Residual effects not identified for other projects / activities.	Potential that the forest licence holder will experience access restrictions to their remaining silviculture plots due to the presence of Transmission Line infrastructure. Some harvestable forest resources will remain unavailable.	• It is anticipated that all projects / activities will implement BMPs and necessary site specific mitigation measures, as warranted, to prevent any significant residual effects. • Effect on access to forest licence holder silvicultulre plots will differ from existing conditions, but mitigation measures are expected to minimize effects. • After applying mitigation measures for the HIWEC, Transmission Line and other projects / activities, the cumulative effects are not significant.

3.4 Overall Effects at a Broader Ecological Scale

There 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 and Transmission Line do not contribute to significant cumulative effects, the HIWEC and transmission line are 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 (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 13**). 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. Protection of natural heritage may also be important for areas designated as Forest Reserves and Enhanced Management Areas (EMAs), but activities that would be prohibited under the *PPCRA* may be permitted (MNRF, 2011).

Table 13: Protected areas in Parry Sound and Manitoulin Island District

Protected Area[1]	Type	Size (ha)
French River Provincial Park	Provincial Park (Waterway Class)	73,530
Grundy Lake Provincial Park	Provincial Park (Natural Environment Class)	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)	450
Round Lake Provincial Nature Reserve	Provincial Park (Nature Reserve Class)	2,585

Table 13: Protected areas in Parry Sound and Manitoulin Island District

Protected Area[1]	Type	Size (ha)
Sturgeon Bay Provincial Park	Provincial Park (Recreational Class)	14
Killarney Provincial Park	Provincial Park (Wilderness Class)	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
Shawanaga Lake Conservation Reserve	Conservation Reserve	4,932
Blair Township Nature Reserve Wilderness Area	Wilderness Area	61
O'Donnell Point Provincial Nature Reserve	Provincial Park (Nature Reserve Class)	875
Axe Lake Wetland Conservation Reserve	Conservation Reserve	793
Cardwell Township Old Growth Conservation Reserve	Conservation Reserve	1,029
Lower Moon River Conservation Reserve	Conservation Reserve	2,723
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)	131
Oastler Lake	Provincial Park (Recreational Class)	32
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 AreaReserve	Conservation Reserve	1,657
Bray Lake Conservation Reserve	Conservation Reserve	265
Louck Lake Wetland Conservation R**eserve**	Conservation Reserve	265
Sausage Lake Forest Conservation Reserve	Conservation Reserve	664
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
Monteith Forest Conservation Reserve	Conservation Reserve	185
Crane Lake Forest Conservation Reserve	Conservation Reserve	387
Georgian Bay Island National Park	National Park	1,400
Six Mile Lake Provincial Park	Provincial Park (Recreational Class)	212
Gibson River Provincial Park	Provincial Park (Nature Reserve Class)	333
Hardy Lake Provincial Park	Provincial Park (Natural Environment Class)	808
Arrowhead Provincial Park	Provincial Park (Natural Environment Class)	1,237
J. Albert Bauer Provincial Park	Provincial Park (Natural Environment Class)	164
Big East River Provincial Park	Provincial Park (Waterway Class)	1,050
Oxtongue River-Ragged Falls Provincial Park	Provincial Park (Waterway Class)	507
Dividing Lake Provincial Park	Provincial Park (Nature Reserve Class)	469
Bigwind Lake Provincial Park	Provincial Park (Natural Environment Class)	1,967
Queen Elizabeth II Wildlands Provincial Park	Provincial Park (Natural Environment Class)	33,505
Eastern Cardwell Forest Conservation Reserve	Conservation Reserve	627
Moon River Conservation Reserve	Conservation Reserve	455
Freeman Township Sugar Maple Forest Conservation Reserve	Conservation Reserve	123
Shack Creek Wetland Conservation Reserve	Conservation reserve	288

Table 13: Protected areas in Parry Sound and Manitoulin Island District

Protected Area[1]	Type	Size (ha)
Draper Township Conservation Reserve	Conservation Reserve	81
Moreau's Bay Conservation Reserve	Conservation Reserve	141
Cognashene Lake Conservation Reserve	Conservation Reserve	3,945
Cognashene Point Conservation Reserve	Conservation Reserve	42
McCrae Lake Conservation Reserve	Conservation Reserve	2,039
Gibson River Conservation Reserve	Conservation Reserve	172
Severn River Conservation Reserve	Conservation Reserve	9,929
Torrance Barrens Conservation Reserve	Conservation Reserve	1,906
Loon Lake Conservation Reserve	Conservation Reserve	372
Morrison Lake Wetland Conservation Reserve	Conservation Reserve	77
Muldrew Barrens Conservation Reserve	Conservation Reserve	803
Jevins & Silver Lake Conservation Reserve	Conservation Reserve	2,144
Kahshe Lake Barrens Conservation Reserve	Conservation Reserve	3,169
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
Joly Township Hardwoods Conservation Reserve	Conservation Reserve	496
Chain Lakes Conservation Reserve	Conservation Reserve	926
Bridge Lake Outwash Plain Forest Conservation Reserve	Conservation Reserve	149
Bear Creed Creek Conservation Reserve	Conservation Reserve	212
Upper Raft Lake Conservation Reserve	Conservation Reserve	476
Mac's Bay Conservation Reserve	Conservation Reserve	290
Total		**1,072,880**

Note: 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

A total of 14 Provincial Parks and 32 Conservation Reserves were identified within the Parry Sound and Manitoulin Districts. Cumulatively, this includes an area of 228,595 ha (excluding Algonquin Provincial Park), that is protected and at least partially within the Parry Sound and Manitoulin Island District. These protected areas are generally concentrated along the Georgian Bay coastline where high concentrations of SAR occur. Additionally, these protected areas are connected by EMAs 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, habitat 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 and Transmission Line.

4. References

Davidson, B., no date:
French / Severn Forest 2009-2019 Forest Management Plan – Summary of the Long-Term Management Direction. 40 p.

D'Eon, R.G., S.M. Glenn, I. Parfitt and M.-J. Fortin, 2002:
Landscape connectivity as a function of scale and organism vagility in a real forested landscape. Conservation Ecology 6(2): 10.

Fri Ecological Services (FRi), 2014:
Terrestrial Ecosystems Technical Report GWP 5404-05-00 Highway 69 Four-Laning from 1.7 km North of Highway 529 Northerly to Straight Lake (Henvey Inlet First Nation). Prepared for Ontario Ministry of Transportation.

Fri Ecological Services (FRi), 2013:
Fisheries and Aquatic Habitat & Terrestrial Ecosystems Report GWP 5404-05-00 Patrol Yard From the South Study Limits Northerly for 1.6 km Highway 69 Four-Laning. Prepared for Ontario Ministry of Transportation.

Johnson, A.R., C.R. Allen and K.A.N. Simpson, 2004:
"Estimating Functional Connectivity of Wildlife Habitat and Its Relevances to Ecological Risk Assessment," *Landscape Ecology and Wildlife Habitat Evaluation: Critical Information for Ecological Risk Assessment, Land-Use Management Activities, and Biodiversity Enhancement Practices,* L.A. Kapustka, H. Galbraith, M. Luxon, and G.R. Biddinger (Eds.), ASTM International, West Conshohocken, PA, pp. 41-55.

Ontario Ministry of Natural Resources and Forestry (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

Ontario Ministry of Natural Resources and Forestry (MNRF), 2011:
State of Ontario's Protected Areas Report. Queen's Printer for Ontario. 92 pp. Accessed December 2015. Available: https://dr6j45jk9xcmk.cloudfront.net/documents/2713/stdprod-085564.pdf

Ontario Ministry of Natural Resources and Forestry (MNRF), 2000:
Significant Wildlife Habitat Technical Guide. Queen's Printer, pp. 155.

Ontario Ministry of Transportation (MTO), 2010:
Environmental Assessment Screening Report Highway 69 Four-Laning North of Highway 559 to Murdock River (102 km).

Parks Canada, 2012:
Recovery Strategy for the Blanding's Turtle (*Emydoidea blandingii*), Nova Scotia population, in Canada [Draft]. Species at Risk Act Recovery Strategy Series. Ottawa: Parks Canada. xx + 34 p.

Parks Canada Agency, 2015:
Recovery Strategy for the Massasauga (*Sistrurus catenatus*) in Canada. Species at Risk Act Recovery Strategy Series. Ottawa: Parks Canada. vii + 35 p.

With, K.A., 1999:
"*Is Landscape Connectivity Necessary and Sufficient for Wildlife Management*?". Forest Fragmentation: Wildlife and Management Implications, J. A., Rocelle, L.A. Lehmann and J. Wisniewski (Eds.), Brill, Leiden, pp. 97-115.