Sugar Maple Wind Energy Project

Environmental Assessment

Prepared for: WEB Sugar Maple Wind Inc.

CBCL

April 2, 2026

March 20, 2026

Mr. Jeremy Higgins
Nova Scotia Department of Environment & Climate Change
Environmental Assessment Branch
#2085 - 1903 Barrington Street
PO Box 442
Halifax, NS B3J 2P8

Dear Mr. Higgins,

Re: Environmental Assessment Registration Document
Sugar Maple Wind Energy Project

Please find enclosed the Environmental Assessment Registration Document for the Sugar Maple Wind Energy Project.

The undersigned approves and accepts the contents, as submitted to Nova Scotia Environment & Climate Change, Environmental Assessment Branch.

Sincerely,

Rory Cantwell
Chief Executive Officer
WEB Sugar Maple Wind Inc.

Michael Peters
Chief Executive Officer
Glooscap Energy

Executive Summary

WEB Sugar Maple Wind Inc. (the Proponent), a partnership between Glooscap First Nation (GFN) and SWEB Development LP (the North American subsidiary of W.E.B.), is proposing the construction and operation of the Sugar Maple Wind Energy Project (the 'Project'). The Project is situated on the ancestral and unceded territory of the Mi'kmaq people, in the Pictou region, to the south of Marshy Hope, and approximately 2 kilometres (km) away from the rural community of Upper Barney's River, Pictou County, Nova Scotia.

The Project is a proposed onshore wind farm consisting of up to 16 wind turbine generators (WTGs) that will include associated infrastructure such as access roads, a substation and switchyard, a small service building, and a short transmission line to the Nova Scotia Power Incorporated (NSPI) interconnection point. The Project WTGs will have a capacity of up to 112 megawatts (MW). The development of the Project will provide renewable energy to support the province's clean renewable energy initiative and was one of the wind energy projects selected as part of the Green Choice Program. This program allows 11 of the province's largest energy consumers to obtain up to 100 percent (%) of their energy from renewable sources. The Project is expected to offset approximately 234,900 tonnes of greenhouse gas emissions per year and will generate enough clean energy to power approximately 35,000 homes annually, once operational.

The Project is a Class I undertaking per Schedule A of the Nova Scotia Environmental Assessment (EA) Regulations under the provisions of the *Environment Act*, requiring registration with the Nova Scotia Department of Environment and Climate Change (NSECC). This EA registration document has been prepared by CBCL Limited (CBCL) in accordance with the *A Proponent's Guide to Environmental Assessment, Nova Scotia Class I Environmental Assessment Checklist* as well as the *Environmental Assessment Supplemental Checklist: Wind Energy Projects*.

The Proponent and consultants conducted consultation and engagement as part of the Project planning process. Key rightsholders and stakeholders involved in these discussions included the Mi'kmaq of Nova Scotia, various regulatory agencies, municipal leadership, and members of the local community. These interactions were aimed at providing information, gathering input, addressing concerns, and adhering to regulatory requirements.

The Project will use approximately 17.1 km of existing roads, and approximately 11.4 km of newly constructed access roads. A total of 25 watercourses may intersect with these access roads, with some of these requiring new crossing structures.

The Project is situated on privately-owned lands to the south of the Weaver's Mountain Wind Energy Project (currently under construction). These lands have experienced historical and ongoing disturbance from forestry operations and recreation. Specifically, the lands on which the Project are situated have undergone many cycles of harvesting. The detailed design of the Project and precise placement (micrositing) of WTGs aimed to locate Project infrastructure in previously disturbed areas, whenever possible.

The Project's potential impact on the following Valuable Environmental Components (VECs) has been assessed:

- Climate and Weather
- Air Quality
- Ambient Light
- Acoustic Environment
- Topography and Landform
- Bedrock and Soils
- Subsidence and Sinkholes
- Groundwater
- Hydrology/Watersheds
- Fish and Fish Habitat
- Water Quality
- Flora
- Wetlands
- Terrestrial Wildlife
- Bats
- Birds
- Population and Economy
- Land Use and Value
- Visual Landscape
- Utilities
- Communication and Radar Systems
- Transportation
- Recreation and Tourism
- Human Health
- Indigenous Cultural Resources
- Archaeological Resources

The Proponent will incorporate environmental management approaches and strategies into Project planning and execution so that the Project complies with regulatory requirements and reduces or avoids potential adverse environmental effects. A Project-specific Environmental Protection Plan (EPP) will be developed before commencement of construction, which shall incorporate the Province's Conditions of Approval. The EPP will include information on the following:

- Erosion and Sediment Control
- Blasting Management
- Fire Prevention and Control
- Surface Water Management
- Waste Management
- Dust Control
- Wildlife Management
- Vegetation Management
- Soil and Stockpile Management
- Hazardous Substances Management and Spill Prevention
- Decommissioning and Site Reclamation
- Environmental Emergency Response and Contingencies

In addition to producing renewable energy, the Project will provide the following benefits:

- Use of local labour, services, and materials where possible
- Employment and training opportunities
- Tax revenues for municipal, provincial, and federal government, including more than $30 million in tax revenues to the host municipality over its 25-year lifetime, equal to roughly $1.2 million per year
- Share of revenues to support local community groups and underrepresented communities
- Electricity production will power up to 35,000 homes
- Annual emissions offset of approximately 234 905 tonnes of CO_2 equivalent
- Benefits Agreements with two First Nations communities
- Annual lease payment through Project operations to participating landowners
- Benefits Agreements with Women in Renewable Energy and the Scotia Winds of Change Foundation
- Continual work with the Positive Action for Keppoch Society (PAK) to determine how to best support the organization with respect to the Project.

By adhering to effective mitigation and monitoring, the Project will not result in significant adverse residual effects to the environment. Furthermore, the Project will have a positive residual effect associated with minimizing the regional carbon footprint and contributing economic benefits for the Municipality of Pictou County.

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Appendices

List of Acronyms

Acronym	Defined
°C	degrees Celsius
3D	Three-dimensional
AADT	Annual average daily traffic
AC CDC	Atlantic Canada Conservation Data Centre
ACSR	Aluminum conductor steel reinforced
ADT	Average daily traffic
AQMS	Air Quality Management System
ARD	Acid rock drainage
ARIA	Archaeological resource impact assessment
ARS	Avian radar system
ARU	Autonomous recording unit
ATV	All-terrain vehicle
ATVANS	All-terrain Vehicle Association of Nova Scotia
BT	Biological targets
CAAQS	Canadian Ambient Air Quality Standards
CanREA	Canadian Renewable Energy Association
CanWEA	Canadian Wind Energy Association
CBCL	CBCL Limited
CBNS	Cape Breton & Central Nova Scotia Railway
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CFNS	Community Foundation of Nova Scotia
CLC	Community Liaison Committee
cm	Centimetre
CN	Canadian National Railway Company
CO_2	Carbon dioxide
CO2e	Carbon dioxide equivalent
COD	Commercial operation date
ComFIT	Community Feed-in Tariff
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
dBA	A-weighted decibel
DEM	Digital Elevation Model
DFO	Fisheries and Oceans Canada
DND	Department of National Defence
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EMF	Electromagnetic field

Acronym	Defined
EMI	Electromagnetic interference
EPP	Environmental protection plan
ESC	Erosion and sediment control
GFN	Glooscap First Nation
GHG	Greenhouse gas
GIS	Geographic information system
GPS	Global Positioning System
GW	Gigawatts
ha	Hectare
Hz	Hertz
IAAC	Impact Assessment Agency of Canada
IBA	Important Bird Area
IPCC	Intergovernmental Panel on Climate Change
ISED	Innovation, Science and Economic Development
kg	Kilogram
km	Kilometre
km^2	Square kilometre
km/h	Kilometres per hour
KMK	Kwilmu'kw Maw-klusuaqn
kV	Kilovolt
kWh	Kilowatt-hour
L	Litres
LAA	Local assessment area
LiDAR	Light Detection and Ranging
LMI	Labour Market Information
m	Metre
m^2	Square metre
m^3	Cubic metre
m/s	Metres per second
MAC	Maximum acceptable concentration
masl	Metres above sea level
MBBA	Maritimes Breeding Bird Atlas
mbgs	Metres below ground surface
MEKS	Mi’kmaq Ecological Knowledge Study
mg/L	Milligrams per litre
MGS	Membertou Geomatic Solutions
mm	Millimetres
MOU	Memorandum of Understanding
MW	Megawatt
MWh	Megawatt Hours

Acronym	Defined
na	Not applicable
NFC	Nocturnal flight calls
NO_2	Nitrogen dioxide
NRCan	Natural Resources Canada
NSCAF	Nova Scotia Civic Address File
NSCCTH	Nova Scotia Department of Communities, Culture, Tourism and Heritage
NSDFA	Nova Scotia Department of Fisheries and Aquaculture
NSDLF	Nova Scotia Department of Lands and Forestry
NSDNR	Nova Scotia Department of Natural Resources
NSDPW	Nova Scotia Department of Public Works
NSECC	Nova Scotia Department of Environment and Climate Change
NSESA	Nova Scotia *Endangered Species Act*
NSPI	Nova Scotia Power Incorporated
PAK	Positive Action for Keppoch Society
PCP	Pictou County Partnership
PCT	Pictou County Transit
PDA	Potential development area
PEM	Predictive Ecosystem Mapping
PGI	Pellet group inventory
PID	Property identification number
$PM_{2.5}$	Particulate matter having a size of 2.5 micrometres or less
POL	Petroleum, oils, and lubricants
PPA	Power purchase agreement
ppb	Parts per billion
PPE	Personal protective equipment
RAA	Regional assessment area
RABC	Radio Advisory Board of Canada
RCMP	Royal Canadian Mounted Police
RoW	Right-of-way
RSZ	Rotor-swept zone
SDS	Safety Data Sheet
SANS	Snowmobilers Association of Nova Scotia
SAR	Species at risk
SARA	*Species at Risk Act*
SNA	Status rank not applicable
SO_2	Sulphur dioxide
SoCC	Species of conservation concern
StatCan	Statistics Canada
SWEB	SWEB Development Limited Partnership
SWEmax	Maximum snow water equivalent

Acronym	Defined
t	Tonne
t/ha/yr	Tonnes per hectare per year
TDS	Total dissolved solids
US	United States
USACE	United States Army Corp of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
UTM	Universal Transverse Mercator
VEC	Valued environmental component
VES	Visual Encounter Surveys
WESP-AC	Wetland Ecosystem Services Protocol for Atlantic Canada
WHMIS	Workplace Hazardous Materials Information System
WHO	World Health Organization
WNS	White-nose syndrome
WSP	WSP Global Inc.
WSS	Wetlands of special significance
WTG	Wind turbine generator
$\mu g/m^3$	Micrograms per cubic metre

1 Introduction

The Sugar Maple Wind Energy Project (the Project) is an up to 112-megawatt (MW) wind energy project proposed by WEB Sugar Maple Wind Inc. (the Proponent). The Proponent was formed through a partnership between Glooscap First Nation (GFN) as the majority owner, and SWEB Development Limited Partnership (SWEB), a North American subsidiary of W.E.B. Group. The Project is proposed on privately-owned land in the Municipality of Pictou County, Nova Scotia (NS). The Proponent successfully bid the Project into Nova Scotia's Green Choice Program and was awarded a power purchase agreement (PPA) in 2025. The Green Choice Program is an initiative designed to provide large-scale electricity consumers, including public institutions and businesses, with access to renewable energy (Government of Nova Scotia, 2025).

The Project will consist of up to 16 wind turbine generators (WTGs) (Appendix A, Figure 1.1). The WTG models have not yet been selected; however, there are three models under consideration: the Nordex N163, the Vestas V162, and the Enercon E160. The WTGs will have a generation capacity of either 5.6 MW (Enercon), 6.2 MW (Vestas), or 7.0 MW (Nordex).

The project will also include the following components:

- A network of upgraded and newly constructed access roads
- Aboveground and underground medium-voltage electrical collector lines
- An electrical substation with a step-up transformer
- An electrical switching station and switchyard
- A service building
- A point of interconnection to the Nova Scotia Power Inc. (NSPI) grid

In addition to the above noted infrastructure, it is expected that temporary laydown areas will be necessary during construction. During the development and construction phases of the Project, meteorological towers have and will continue to collect raw wind data in conjunction with light detection and ranging (LiDAR) units to inform the site's wind resource.

The Project is considered a Class I undertaking per Schedule A of the Nova Scotia Environmental Assessment (EA) Regulations under the provisions of the provincial *Environment Act*. On behalf of the Proponent, CBCL Limited (CBCL) has prepared this document, with contributions from other firms and consultants that carried out specialized studies, to serve as the EA Registration Document for submission to the Nova Scotia Department of Environment and Climate Change (NSECC).

1.1 Project Title and Proponent

Project Name:	Sugar Maple Wind Energy Project
Project Location:	Municipality of Pictou County
Proponent:	WEB Sugar Maple Wind Inc.
Principal Proponent Contacts:	**WEB Sugar Maple Wind Inc.** c/o SWEB Development LP 6080 Young St, Suite 403 Halifax, NS B3K 5L2 Lead Contact: Jason Parisé Director of Development – Wind Lead (SWEB) Phone: (902) 431-0564 Email: jason.parise@sweb.energy Proponent Principles: Rory Cantwell Chief Executive Officer (SWEB) Stefan Karkulik Chief Financial Officer (SWEB) Michael Peters Chief Executive Officer (GFN & Glooscap Energy)
Proponent Website	https://www.sweb.energy/ca-en/projectpages/sugar-maple/the-project
Principal Consultant Contact:	CBCL Limited 1505 Barrington Street, Suite 901 Halifax, NS B3J 2R7 Phone: (902) 421-7241

SWEB is the North American subsidiary of W.E.B. Group, an Austrian, community-owned energy transition company. W.E.B. began as a wind developer in 1995 and its mission is to drive global energy transition. W.E.B. is an international company, with locations in eight countries across two continents. W.E.B.'s efforts are based on a strong foundation of community participation and has commissioned approximately 750 MW of primarily wind energy projects with a growing fleet of solar photovoltaic energy projects comprising a smaller portion of its total portfolio.

Through the involvement of community members in Nova Scotia, SWEB and its community partners have successfully developed and commissioned 12 community-owned wind energy projects, totaling 20 WTGs and 39.63 MW of installed capacity under the Community Feed-in Tariff (COMFIT) program and a Distribution-connected request for proposals. In 2022, SWEB, in partnership with GFN (via Glooscap Energy), were awarded a PPA under the Nova Scotia Rate-base Procurement for the Weavers Mountain Wind Energy Project. The awarded project is a 94.4 MW project located southwest of the Town of Antigonish, Nova Scotia and is expected to reach commercial operation by the end of 2026.

In New Brunswick, SWEB partnered with Woodstock First Nation and successfully commissioned the Wisokolamson Energy Project in 2019. The project included five WTGs for a total project capacity of 18 MW. At present, SWEB is currently continuing to develop more than 2,500 MW of clean energy projects in Canada.

GFN is a Mi'kmaw community, located close to the Bay of Fundy between Wolfville and Windsor. Through their wholly owned subsidiary, Glooscap Energy, they are committed to implementing renewable energy projects on behalf of the community and are proud to produce more renewable energy than they consume. GFN's vision is to strive towards a well-balanced community living according to the seven sacred teachings. They are committed to future generations as they unite to become a forward-thinking, self-sustaining community. The members of GFN honour their past and look toward their future. Glooscap Energy, a 100 percent (%) owned entity of GFN, serves to explore and implement green-renewable energy projects on behalf of the community. Its interests are in solar, wind, tidal, and other emerging technologies. GFN produces more renewable energy then they use and are a net exporter of green energy.

1.2 Purpose of the Project

Electricity demand in Atlantic Canada is projected to increase significantly (Natural Resources Canada, 2022). While coal-fired power is still a major energy source, the provinces are working to decrease fossil fuel use and grow renewable energy (Natural Resources Canada, 2022). As the region is shifting to a low-carbon future, the Government of Nova Scotia has committed to phasing out the use of coal and to powering 80% of the provincial grid with renewable energy by 2030 (Nova Scotia Department of Natural Resources and Renewables (NSDNR), 2023), eventually leading to net-zero emissions future by 2050 as stated in the *Environmental Goals and Climate Change Reduction Act* (2021). To fulfill these commitments, the provincial government has proposed to increase onshore wind power generation from 20 % to 50 % or greater, as wind energy is considered the lowest-cost electricity resource in the province (NSDNR, 2023). The provincial government has also stated that it will procure 372 MW of new wind power, which will result in 70 % of electricity being generated from renewable sources by the end of 2026 (NS Environment and Climate Change (NSECC), 2022).

To meet its 2030 targets, Nova Scotia's government launched the Green Choice Program in 2023. This initiative enables 11 of the province's largest energy consumers to source their electricity from local renewable resources. These 11 consumers include provincial government, hospitals, schools, post-secondary institutions, and large scale industrial and commercial businesses, and they consume over 10,000 megawatt hours (MWh) per year. In comparison, the average household in the province consumes only 10 MWhper year. To provide this renewable energy to the grid, the province has helped establish PPAs with two wind energy projects co-owned by private developers and Mi'kmaw communities through a competitive, independent procurement process. The Project was one of the wind energy projects selected as part of the Green Choice Program and will thereby contribute to the province's green energy targets and reduction of greenhouse gas (GHG) emissions (Government of Nova Scotia, n.d.). It is expected that an additional procurement will be released to add additional wind energy capacity to meet the 2030 GHG emissions goals.

Regionally, the Project will contribute to the Government of Nova Scotia's goal to reduce GHG emissions by 2030 per the *Environmental Goals and Climate Change Reduction Act* and concurrent revisions to the Renewable Electricity Regulations under the Nova Scotia *Electricity Act* in 2021 (NSECC, 2022). To conform with these two Acts, NSPI will procure 80% of its energy supply from renewable sources and acquire a minimum of 1,100 GW-hours from independent power producers by 2030—the strictest target of those set by Canadian provinces.

The Project will also support the Municipality of Pictou County in reducing their carbon footprint to net zero by 2031, and to reduce fossil fuel consumption by at least 50% by 2035, as outlined in the *Municipal Climate Change Action Plan 2025-2029* (Municipality of Pictou County, 2025). The plan includes an action to evaluate energy consumption reduction opportunities and use of new energy sources, and purchase and install retrofit or new facilities. The Project will offset approximately 234,900 tonnes (t) of CO_2 equivalent yearly. Furthermore, the Project will produce enough energy to power approximately 35,000 homes per year.

In addition to emissions offsetting and production of clean energy to power the provincial grid, the Project will provide economic and social benefits, including local jobs, a stimulus to local businesses, and municipal tax revenues. These benefits are further outlined in Chapter 3 (Consultation and Engagement) and in Chapter 13 (Socio-Economic Environment) of this EA Registration.

1.3 Project Location and Setting

The Project takes place on Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people. The nearest Mi'kmaq communities to the Project are Pictou Landing First Nation, approximately 40 km northwest of the Project, and Paqtnkek Mi'kmaw Nation, approximately 40 km northeast of the Project.

The Project is located approximately 2 km from the rural community of Upper Barney's River,11 km to the south of the Trans Canada Highway 104 at Barney's River Station and approximately 6.5 km northeast of the community of Garden of Eden. It is in the Municipality of Pictou County (Figure 1.1, Appendix A), with a central coordinate of 45.4724285°N, 62.2166617°W. This area was identified as having a robust wind regime and has already undergone intensive disturbance through forestry clearing (see Chapter 13.2.2 for further detail). Agreements are in place with the private landowners for the use of lands for WTG placement. There are agreements with eight properties, below in Table 1.1 (Figure 1.2, Appendix A).

Table 1.1 Property Ownership of Proposed Project WTG Locations

Property Identification (PID) Number	Ownership
00860221	Private
00902247	Private
01040187	Private
01042654	Private
01042696	Private
65192791	Private
65192809	Private
65192866	Private

The Project lies within the Nova Scotia Uplands ecoregion, characterized by rounded summits and plateaus separated by lower uplands and lowlands, extending from Chignecto Bay to Cape Breton Island (Neily et al., 2017). The Potential Development Area (PDA) is in the Pictou Antigonish Highlands ecodistrict—a high-elevation plateau that separates adjacent lowlands of the Northumberland Lowlands ecodistrict of Pictou County from the St. Georges Bay ecodistrict of Antigonish County (Nova Scotia Department of Lands and Forestry, 2019). According to 2020 LiDAR data available from the province, elevations in the PDA range from 183 to 271 metres above sea level (masl). This high elevation exerts a strong influence on the climate of the uplands with colder winters, late, cool springs, and low annual temperatures overall compared to nearby lowlands.

The high elevation in the region (the Pictou Antigonish Highlands ecodistrict has some of the highest elevations in mainland Nova Scotia) is associated with greater wind speeds, which makes it a good candidate area for wind power generation. As well, the Project has been carefully sited based on municipal and provincially mandated setbacks and considerations to meet all regulatory elements.

The Pictou Antigonish Highlands ecodistrict is underlain by Precambrian to Silurian volcanic, sedimentary and metamorphic rocks. The rugged terrain and soils of the ecodistrict are strongly influenced by faulting and folding, with thin, stony glacial tills and frequent bedrock exposure across the highlands, transitioning to thicker tills and localized colluvial and glaciofluvial deposits along slopes and valleys. The district includes internationally recognized fossil-bearing Silurian exposures near Arisaig. As is characteristic of upland ecodistricts, wetlands and lakes are relatively small and few; however, there are some larger peatland complexes on the flatter areas of the summits. Most of the region has well-drained soils and supporting climax forests characterized by Sugar Maple (*Acer saccharum*), Yellow Birch (*Betula alleghaniensis*), American Beech (*Fagus grandifolia*), and Red Spruce (*Picea rubens*). Tolerant hardwood stands dominated by Sugar Maple, American Beech and Yellow Birch on are common on hill crests and uplands, with mixedwood and coniferous stands present on the lower slopes and valley bottoms. Black Spruce (*Picea mariana*) is commonly found on imperfectly drained sites.

The Project is situated largely on remote private forestry land, which has been cyclically harvested. There are several off-highway vehicle routes managed by the Snowmobilers Association of Nova Scotia (SANS) and the All-Terrain Vehicle (ATV) Association of Nova Scotia (ATVANS) that extend through the lands in and adjacent to the Project.

1.4 Regulatory Framework

Wind projects that produce 2 MW or more are considered Class I undertakings per Schedule A of the Nova Scotia EA Regulations under the provisions of the *Environment Act*, requiring Registration with NSECC to initiate the EA process. This EA Registration Document was prepared by CBCL in accordance with the *A Proponent's Guide to Environmental Assessment* (NSECC, 2025a), *Nova Scotia Class I Environmental Assessment Checklist* (NSECC, 2025b), and the *Environmental Assessment Supplemental Checklist: Wind Energy Projects* (NSECC, 2025c).

The Project does not require a federal impact assessment, as it will not be located on federal lands and is not classified as a designated project per the Physical Activities Regulations under the *Impact Assessment Act*.

Table 1.2 presents a summary of the federal, provincial, and municipal regulatory permits, approvals, or notifications that may be applicable to the Project, along with the status of requirements (as of the date of this report).

Table 1.2 Summary of Regulatory Permits, Approvals and Notifications

Permit/Approval/ Notification	Regulatory Authority	Application/Permit Status
Federal		
Request for Review of Project Near Water	Fisheries and Oceans Canada (DFO) Fish and Fish Habitat Protection Program	A Request for Review will be submitted to DFO after the detailed design phase, and before construction in watercourses or where activities have the potential to impact fish and fish habitat, for determination of the requirement for a *Fisheries Act* Authorization.
Canadian Navigable Waters Act Notification of a Work	Transport Canada	Required for minor works, such as watercourse crossings, or works in a non-scheduled waterway. Will be submitted prior to construction, if required.
Operations Interference Clearance	Department of National Defence (DND)	Required for confirmation that WTGs will not cause electromagnetic interference (EMI) in communications used by DND. DND has confirmed no objections to the Project.
Weather Radar Interference Approval	Environment and Climate Change Canada (ECCC) Meteorological Service of Canada	Required for confirmation that WTGs will not cause EMI in communications used by weather stations. To be confirmed prior to construction.
Aeronautical Assessment Obstacle Evaluation	Transport Canada	Required for marking and lighting of obstacles (e.g., WTGs). Transport Canada assessments have been submitted and have indicated that Transport Canada has no objections to the Project.
Land Use Approval	Nav Canada	Required for confirmation that WTGs will not cause EMI on communications.
Notification of Project	Royal Canadian Mounted Police (RCMP)	RCMP has confirmed that the WTGs are not expected to interfere with their operations, but to follow-up with Bell Mobility Inc. Bell Mobility Inc. has confirmed that no interference is expected.
Provincial		
Water Approval for Watercourse Alteration	NSECC	Application for watercourse alteration to be submitted following EA Approval.
Wetland Alteration Approval	NSECC	Application for wetland alteration to be submitted following EA Approval.
Water Approval	NSECC	Required if there is a need to draw surface water or groundwater for use during construction and/or operation that exceeds 23,000 litres (L) per day.
Special Move Permit	Nova Scotia Department of Public Works (NSDPW)	Application to be submitted prior to mobilization of oversize vehicles on public roads.

Permit/Approval/ Notification	Regulatory Authority	Application/Permit Status
Work within Highway Right of Way Permit	NSDPW	Application to be submitted in advance of planned work within a highway right-of-way (RoW).
Endangered Species Permit	NSDNR	Will be required if species at risk (SAR) listed under the Nova Scotia Endangered Species Act (NSESA) will be directly impacted. The Project is not expected to require a permit under the NSESA.
Municipal		
Development Permits	Municipality of Pictou County	A Development Permit must be applied for with the Development Officer of the Municipality of Pictou County. A Development Permit application will be filed once project design is completed.
Building Permit Under the NS *Municipal Government Act*	Municipality of Pictou County	If a building is to be greater than 20 square metres (m^2), a Building Permit will be required. Given that the Project's WTG foundations, O&M building, and substation will exceed this threshold, a Building Permit application will be filed once project design is completed for these elements.

1.5 Funding

At present, there is no specific funding from federal, provincial, or municipal government sources for the Project. However, it is anticipated that the Project will qualify for the Clean Technology Investment Tax Credit, which provides a 30% tax credit on eligible capital investments for equipment used in generating wind and other clean energy. It is also expected that the Project may qualify for Canada Infrastructure Bank financing which can be used to support overall Project financing prior to the start of construction.

2 Project Description

The Project is a proposed wind energy project with a total capacity of up to 112 MW, comprising up to 16 WTGs. It is located to the east of the rural community of Upper Barney's River in Pictou County. Per the requirements of the Green Choice Program, all WTGs are located on privately held lands. Supporting infrastructure is also located solely on privately held lands. Temporary laydown areas will be necessary during construction. Ancillary components will include a network of upgraded and new access roads, above-ground and below-ground medium-voltage electrical collector lines, an electrical substation and switchyard, a service building, and other interconnection equipment to connect to the NSPI grid in the southern portion of the PDA. Figure 2.1 illustrates a Project layout of the 16 proposed WTGs and one alternate WTG location at S11(Appendix A).

Meteorological towers to assess and monitor the wind resource on site are currently erected but will be decommissioned prior to completion of construction. An industry-standard test will be completed on each WTG prior to commissioning to verify proper performance of all WTG functions, including operational and communication protocol.

This Project was selected through Nova Scotia's Green Choice Program, a competitive procurement initiative that enables 11 of the province's largest electricity consumers (e.g., hospitals and public institutions) to purchase renewable energy. The program supports provincial renewable energy targets and reduces GHG emissions (Government of Nova Scotia, n.d.).

2.1 Potential Development Area

The PDA, an estimated 219 hectares (ha), delineates the area within which Project components may be located. It is intentionally defined as a broad planning boundary to allow flexibility during detailed design. The PDA encompasses all potential locations for Project infrastructure, including the access road network, WTG pads, transmission and collector lines, the substation and switchyard, and the service building, as well as construction laydown areas. It also includes access roads connecting the Project to public roadways, and the proposed transmission corridor.

The PDA does not represent the final Project Footprint; rather, it defines the maximum area under consideration, with only a portion ultimately required for Project construction and operation. The Project Footprint is the permanent space occupied by the Project, including the access roads, WTG pads, and infrastructure (excluding laydown areas) and falls entirely within the PDA. The Project Footprint will be finalized after detailed design is complete (Figure 2.1).

The final extent of the PDA is expected to be approximately half the area described in this EA to assess the potential impacts of the Project; the following rationale has been used for this estimate.

- The PDA includes approximately 17.1 km of existing roads that may require upgrading for use by the Project and approximately 11.4 km of new roads to be constructed. Estimates of clearing and disturbance for road construction are based on the entire road network in the PDA as shown on the EA figures herein, which includes both existing roads and new roads.
- The PDA shown on the EA figures herein overestimates the area required for clearing, site preparation, and construction. For example, an area of approximately 1 ha (i.e., 75 m radius) is expected to be cleared for the construction phase at each WTG location. However, the PDA shows a larger area of approximately 7 ha (i.e., 150 metre (m) radius) (Figure 2.2).
- While four temporary laydown areas are being proposed for the construction phase as part of this EA, it is likely that only one will be required during construction.
- Estimates of clearing and disturbance for Project construction are based on the entire PDA being cleared; however, a substantial portion of the PDA has been previously disturbed or cleared given this Project undergoes active forestry practices annually and will not require clearing.

2.2 Siting Considerations

The Project is located on privately-owned forestry lands that have been subject to historical and ongoing disturbance from harvesting activities and some recreational use. Prior to establishing the layout of the PDA, an environmental constraints analysis was completed. This analysis involved identification and spatial mapping of sensitive receptors, environmental features, and local and regional infrastructure. Applicable setback distances were then applied to these features based on relevant municipal, provincial, and federal legislation, as well as best management practices and guidance obtained through consultation with government regulators.

2.2.1 WTGs

The WTG layout as proposed in this EA Registration Document considers multiple factors, with the objective of maximizing wind energy production while minimizing environmental and social impacts. The design approach prioritized first avoiding and, where avoidance was not reasonably practicable, minimizing potential adverse environmental effects. Layout development also considered the following siting principles:

- Maximizing exposure to areas with high wind resource potential
- Preferential use of previously disturbed areas and existing access networks
- Minimizing potential for noise and visual disturbance
- Avoidance of managed and biologically significant areas
- Reducing interference with radar systems, aviation assets, and communications infrastructure
- Adhering to prescribed regulatory setbacks (see Table 2.1)

The WTG layout underwent further refinements following the completion of field programs, technical modelling, and consultations with the Mi'kmaq of Nova Scotia and the broader public. Where practicable, WTG sites were selected to avoid or reduce impacts on wetlands, watercourses, and old-growth forest stands to the maximum extent feasible. One alternate WTG location is included to provide design flexibility should potential interference with existing communication infrastructure be identified. The alternate location is within the PDA and is located approximately 60 m from the proposed WTG (refer to 13.2.5).

A summary of the WTG setback distances applied to the PDA layout and relevant references are provided in Table 2.1.

Table 2.1 WTG Setback Distances

Feature	Setback Distance	Reference
Protected Areas, Provincial Parks, and Park Reserves	Avoidance	NSECC
Watercourses, Wetlands, and Wetlands of Special Significance	≥ 30 m measured from the area of disturbance (where possible) unless otherwise authorized in writing by the province	NSECC
Old Growth Forests	Avoidance 100 m limited-development buffer on Crown land, where feasible	An Old-Growth Forest Policy for Nova Scotia
Areas of High Archaeological Potential	Avoid	*Special Places Protection Act*
Residences (Civic Addresses)	The minimum setback from residences is 1,000 m (Municipality of Pictou County). There is no setback requirement from residences located on the same lot as WTGs	Minimum Planning Requirements Regulations, made under subsection 214(4) of the *Municipal Government Act*

Feature	Setback Distance	Reference
		Wind Energy By-law for the Municipality of Pictou County
External Property Boundaries	Two times the height of the WTG	Wind Energy By-law for the Municipality of Pictou County
Public Highways	The minimum setback from the boundary of a public road is 300 m	Wind Energy By-law for the Municipality of Pictou County
Noise	Distance required so that WTG operational noise levels are <40 dBA from permanent and seasonal receptors	NSECC
Shadow Flicker	Distance required so that shadow flicker will not exceed 30 minutes per day or 30 hours per year at any permanent or seasonal receptor within 2 km of the project	NSECC
Point-to-Point Microwave Link	3 x First Fresnel Zone	Radio Advisory Board of Canada (RABC) & Canadian Wind Energy Association (CanWEA) Guidelines (2025)
FM Radio Station	2,000 m consultation zone; 1,000 m setback (best practice)	RABC & CanWEA Guidelines (2025)

2.2.2 Other Infrastructure

A setback strategy was also applied to the other infrastructure associated with the Project, to minimize impact to the extent practical on environmental and built features. This included minimizing encroachment of new access roads on wetlands and watercourses, and avoidance of old-growth forest.

2.3 Project Schedule

The necessary site clearing is expected to be performed from mid September 2026 to early December 2027. Project construction is scheduled to begin in spring of 2027 and be completed over a period of approximately 20 months as outlined in Table 2.2.

Table 2.2 Project Construction Schedule

Construction Activity	Estimated Timeline
Site Clearing	September 2026 to December 2026
Site Preparation and Access Roads	May to November 2027
Foundation Installation	June 2027 to December 2027
Collector System and Substation Installation	May 2027 to September 2028
WTG Delivery and Assembly	June to December 2028
Testing and Commissioning	May to December 2028

Commissioning is planned for late 2028. The Project will operate from the commercial operation date (COD) through to decommissioning, with an expected lifespan of at least 25 years as per the Project's PPA. The Project may continue to operate beyond this point, subject to subsequent offtake arrangements, updating and approvals for all necessary permits, as well as any other regulatory requirements at that time.

2.4 Project Components

2.4.1 WTGs

The Project will consist of up to 16 WTGs. The WTG models under consideration are the Nordex N163, Vestas V162, and Enercon E160, which have generating capacities of 7 MW, 6.2 MW, and 5.6 MW, respectively. Details on the WTGs under consideration are provided in Table 2.3. Each WTG will consist of a tower secured to a concrete foundation at the base, nacelle generator, and three blades. The rotors diameters are 163 m (Nordex N163), 162 m (Vestas V162), and 160 m (Enercon 160). Each WTG has three independent pitch control systems with emergency power supply, rotor brake, and a rotor lock controlled remotely. The footprint for each WTG foundation will cover an area of less than 0.5 ha, with the total WTG pad being less than 1 ha. There will be a crane pad at the base of each WTG and surrounding the base of each WTG will be a gravel ring for a total area of up to approximately 1.3 ha (Figure 2.2).

Table 2.3 Technical Specifications of WTGs under Consideration for the Project

Specifications	Nordex N163	Vestas V162	Enercon E160
Rated Capacity	7.0 MW	6.2 MW	5.56 MW
Rotor Diameter	163 m	162 m	160 m
Hub Height	118 m	119 m	114 m
Total Height	199.5 m	200 m	194 m
Maximum Sound Pressure Level	109.2 dBA	107.1 dBA	106.8 dBA
Cut-out Wind Speed	26 m/s	24 m/s	28 m/s
Swept Area	20,867. 2 m^2	20,611.99 m^2	20,106.19 m^2

Specifications	Nordex N163	Vestas V162	Enercon E160
Operating Speed Range of the Rotor	6.0 – 11.6 rpm	4.3 – 12.1 rpm	4.4 – 9.6 rpm

2.4.2 Access Roads

The Project will require approximately 28.5 km of access roads, 17.1 km (60%) of which are existing gravel roads that may require upgrading depending on the present condition. New gravel road sections will be necessary where WTGs branch from the existing roads, resulting in approximately 11.4 km (40%) of new road construction. The proposed WTG delivery routing to the PDA will use the existing Keppoch Road/Weaver's Mountain Road that is accessible from Highway 104. An alternative access route to the Project site is expected to be established via Green's Brook Road.

Access road design will conform to applicable engineering standards, WTG transportation requirements, and industry best practices. These roads will facilitate mobilization of equipment, WTG components, and personnel to and from the PDA during all phases of the Project. Accordingly, road design must provide sufficient bearing capacity and appropriate turning radii to accommodate heavy-haul vehicles, cranes, and other construction equipment. Upgrades will be implemented where existing road conditions do not meet these specifications.

Requirements for ditching, culvert installation, and bridge construction or rehabilitation will be finalized during detailed design to align with industry standards and regulatory requirements.

2.4.3 Ancillary Infrastructure

2.4.3.1 Collector System

A 34.5 kilovolt (kV) overhead WTG collector circuit (medium voltage electrical cabling) will relay power generated from each WTG to the base of wood monopoles that will support the overhead collector lines. Underground collector lines will extend approximately 80 m from the WTG to the overhead collector lines. The overhead collector line system will run parallel to the access road RoW and will converge at the substation. Routing is expected to be optimized as part of detailed design.

2.4.3.2 Substation, Switchyard, Service Building and Transmission Tie-In

The substation, situated southwest in the PDA, is necessary to convert voltage received from the WTG collector system before the power connects to the NSPI grid system as per the NSPI Interconnection Procedure and Transmission System Interconnection Requirements. It is expected that the collection system may be placed underground at the crossing section of the NSPI transmission system and will be fed into the Project substation. The substation will have a maximum footprint of 0.4 ha, with the actual size likely being smaller. The switchyard will have a maximum footprint of 0.5 ha, with the actual size likely being smaller. The service building will be in the substation and switchyard footprint (Figure 2.1).

As the substation is to be constructed to the immediate south of the existing 230 kV NSPI transmission corridor, it will only require a short transmission line tie-in, three stubs of less than 100 m each.

2.4.3.3 Fencing

Fencing will be installed to enclose the Project substation and switchyard area for public safety. The installed fencing will meet the utility and regulatory requirements and will be designed and installed prior to the commencement of Project operations. An example of typical fencing installed at project sites is as follows: a perimeter 2x2 inch chain link fence (approximately 1.8 m in height), with three strands of barbed wire on top, will be installed around the substation, the switching station, and service building to restrict access by unauthorized people. No other restrictive fencing is planned on other Project infrastructure.

2.4.3.4 Meteorological Towers

The Project area includes meteorological towers and co-located LiDAR units to predict the long-term wind regime across the Project site. The equipment was installed early in the Project's development and will be decommissioned upon or shortly after the commencement of project construction.

2.4.4 Temporary Laydown Areas

At the base of each WTG will be a designated temporary laydown area to store WTG components prior to assembly (Figure 2.2). Arrangement of WTG pads will be designed to suit requirements of the WTG and surrounding topography during the detailed design process.

A laydown area may be established at the site of the substation, within that footprint (Figure 2.2). An additional four laydown areas (Figure 2.2) are being considered, each approximately 1.5 ha, totalling approximately 6 ha. It is expected that only one laydown area will be constructed for the Project construction and initial operation phase.

2.5 Construction

The construction phase of the Project will take place over approximately two years, from late 2026 to the end of 2028. Construction will involve site preparation, access road construction and modifications, materials and equipment delivery and storage, installation of infrastructure, and restoration of the temporary areas needed to facilitate construction in the PDA. Testing and commissioning of the Project will mark the end of the construction phase.

The equivalent of up to 150 full-time workers will be employed during the construction phase. Accommodations for traveling workers will be facilitated through established commercial lodging facilities in the region, specifically in the towns of New Glasgow and Antigonish, Nova Scotia, and surrounding areas. Construction is to occur predominantly within daytime hours, seven days per week.

2.5.1 Site Preparation

Site preparation activities will include clearing, grubbing, excavation, grading, compaction, and ditching, supported by appropriate erosion and sediment control (ESC) measures. Grubbing will be completed using a root rake or equivalent equipment capable of removing root material while retaining topsoil for salvage. Excavators will remove topsoil and overburden, which will be stockpiled separately for reuse or managed in accordance with applicable regulations. Topsoil will be stored away from watercourses and other aquatic features for later use in restoring temporary workspaces and laydown areas. Grading and levelling in the PDA will be carried out using heavy equipment (e.g., graders, dozers, scrapers).

Site preparation will be restricted to the minimum practicable footprint to limit environmental effects while providing adequate space for construction activities. ESC measures and other mitigations will be implemented, and soil conservation practices will be applied consistent with regulatory requirements, engineering standards, and industry best practices.

WTG pads are expected to require less than 1 ha with up to 1.5 ha of initial land clearing to be completed per unit; however, siting in previously disturbed locations will be prioritized to reduce vegetation removal. Excavated material resulting from construction will be stockpiled onsite for reuse where feasible or disposed of in accordance with regulatory requirements and best practices.

Earthworks will also be necessary to support access road development, including construction of ditches, drainage features, and WTG pad foundations.

The estimated clearing area in the PDA is up to 219 ha, inclusive of the transmission line right-of-way, WTG pads, new access roads, existing road improvements and ditches, substation, switchyard, service building, and temporary laydown areas. This is a conservative estimate that assumes the entire PDA will be cleared.

2.5.2 Material and Equipment Delivery and Storage

Construction equipment will be mobilized to the PDA from local contractors and will include graders, bulldozers, excavators, telehandlers, cranes, rock trucks, and dump trucks, as well as light-duty trucks.

2.5.2.1 Transportation

Roads that may be used during the phases of the project include provincial highways, NS-104; trunk highways NS-7; Beaver Mountain Road and collector roads NS-347/Sherbrooke Road. Permits from the Department of Public Works will be obtained to facilitate the movement of bulky WTG components to site. A well-defined construction delivery route will be finalized after review of local road networks and consultation with local authorities in each jurisdiction.

Traffic management measures will be implemented on local and provincial roadways, as well as on recreational trails intersecting the PDA. These measures will include communication protocols for sharing proposed transportation schedules and haul routes with local communities and recreational off-road user groups through their representative organizations.

A Special Move Permit will be obtained from NSDPW for the movement of vehicles or equipment exceeding legal weight or dimensional limits on provincial roads.

2.5.2.2 Temporary Lay-down Areas

A laydown area will be established at each WTG location to support crane operations, equipment placement, and staging of WTG components during assembly. Laydown areas are located in the PDA (Figure 2.1).

Each laydown area will include segregated sections for storage of fuel, aggregate, and construction materials. Storage locations will be sited a minimum of 30 m from wetlands and watercourses. Appropriate erosion and sediment control measures will be implemented for aggregate stockpile and appropriate spill containment measures will be in place for fuel storage.

Laydown area configurations will prioritize safe equipment maneuvering and material staging. Demarcation, signage, and designated access routes will be established, together with environmental protection measures, to ensure compliance with applicable regulations and industry best practices.

2.5.3 Access Road Construction and Modification

New and upgraded road surfaces will be constructed using aggregate material transported from off-site quarries. Materials will be stored temporarily until necessary for placement. Excess fill and excavated material generated during construction will be stockpiled for reuse where feasible, or disposed of in accordance with applicable regulations, road construction standards, and best practices. Project roads will be maintained with additional gravel or periodic grading.

Access roads will be approximately 6 to 12 m wide, depending on their location within the Project site. The total width of the corridor will be up to 20 m on average, which includes ditching and grading. The wider roads (12 m) are required for the crane to travel from WTG to WTG, and narrower roads (6 m) will be used if the crane is transported via float trucks. The following equipment is expected to be used during upgrading of roads and construction of new roads: excavators, dump trucks, bulldozers, rollers, graders, crusher, and light trucks.

Roadside ditches will be constructed and stabilized using ESC measures appropriate to local drainage patterns and erosion risk. Culverts and/or bridges will be installed at new watercourse crossings. For existing access roads in the PDA, culvert replacement will be undertaken where current structures do not meet design standards or are in poor condition. The final number and locations of culvert replacements will be confirmed during detailed design.

2.5.4 Infrastructure Installation

This section addresses the construction activities related to the installation of Project infrastructure, including the WTGs, power lines, electrical substation, a small service building, lighting, and security fencing.

2.5.4.1 WTGs

The WTG components described in Section 2.4.1 will be installed sequentially.

Foundations

Tower foundations will consist of steel-reinforced concrete. They will be approximately 26 m in diameter and will extend to a depth of 3 to 4 m below grade. The foundations will be below ground, with the exception of the concrete pedestal, which will be 7 to 8 m in diameter and will extend up to 0.25 m above ground, supporting the WTG tower structure. The WTG foundation design will be finalized once geotechnical investigations are complete and the WTG model is selected.

Excavation may occur via drilling, or localized blasting if bedrock is present and determined not to be a suitable base. If required, blasting activities will be completed by a qualified blasting contractor and will follow the Nova Scotia Blasting Safety Regulations under the *Occupational Health and Safety Act*. Following excavation, reinforcement bar supports will be laid and concrete poured. After the concrete has finished curing, the foundation excavation, apart from the concrete pedestal, will be backfilled to ground level.

Assembly

The WTG assembly will consist of installing the tower sections, nacelle, hub, and three-blade rotors in sequence. The WTG sections will be delivered by flatbed truck, and the pieces will require a crane for removal from the truck upon arrival at each of the prepared WTG temporary laydown areas. WTG erection will be conducted in pieces, starting with the WTG base, followed by the nacelle, hub, and rotor. The rotors will typically be attached to the hub on the ground prior to lifting. The assembly will occur using cranes. WTG erection is weather dependent, particularly dependent on wind and lightning. Assembly is expected to take three to six days, as is typical for WTG assembly.

2.5.4.2 Power Lines and Substation

Collector Lines

Electricity produced from WTGs will be fed into a collection system consisting of overhead conductors and a small number of underground conductors around the WTG foundation. The collector system will be of 34.5 kV, and electricity will be routed through the collector lines to the substation, following industry standards and best practices.

Substation and Switching Station

Collector lines will converge at the Project's substation (Figure 2.1), where the voltage will be converted to 230 kV for interconnection to the NSPI power grid, using a 34.5/230 kV step-up transformer. The Project substation will include all necessary equipment related to protection and control, such as breakers, voltage transformers, and current transformers. The Project will be connected to an NSPI electrical system through a 3-breaker ring bus located at the proposed interconnection point.

2.5.4.3 Service Building

The Project may include a small service building to support the operation and maintenance of the wind facility during the operational phase. The building will be located next to the substation. Construction of the service building will include site preparation activities such as vegetation clearing and grading, followed by foundation installation and building construction. The structure is expected to be a pre-engineered or conventional building and will be used to store equipment, tools, spare parts, and materials, and may include a small office space for Project personnel. Ancillary infrastructure may include laydown areas, parking, exterior lighting, and utility servicing.

2.5.4.4 Security

Security fencing around the substation and switchyard will consist of a perimeter chain-link barrier for public safety. Installation will begin with excavation of post holes at regular intervals and placement of steel posts approximately 2.3 m in height, which will be backfilled with concrete to ensure structural stability. Once the posts are set, top rails and tension bands will be installed and secured to the terminal posts. Chain-link mesh will then be attached to the line posts, gates will be installed, and the fencing fabric will be tensioned and trimmed to achieve the required specifications. The fence will be topped by three strands of barbed wire.

2.5.5 Restoration of Temporary Areas

Whenever possible, topsoil will be set aside during clearing so it can be used again when temporary laydown areas are removed. Soils in temporary construction zones will be decompacted to help restore natural site conditions. Exposed soils will be reseeded or replanted in stages during construction, using native, non-invasive plants.

2.5.6 Testing and Commissioning

The final stage of the construction phase will involve commissioning activities to verify operational performance and undertake any necessary physical adjustments to Project components. Electrical interconnection and power export will be implemented in accordance with the NSPI *Transmission System Interconnection Requirements* (NSPI, 2025). Commercial operation will begin once all required approvals and authorizations are secured, enabling electricity delivery to the provincial grid via the existing NSPI transmission line.

2.6 Operation and Maintenance

The Project is scheduled to be commissioned late 2028, and operation and maintenance will occur for up to 25 years (as per its obligations under its PPA with NSPI), during which the facility will be contributing renewable power to the NSPI electrical grid. The facility will require oversight, maintenance, and repairs as needed for the WTGs, roads, power lines, and substation as well as the management of vegetation and the safety and security of the site.

2.6.1 WTG Operation and Maintenance

The WTGs are designed for fully automated operation. A computerized system, or programmable logic controller, continuously monitors all operational parameters. In the absence of sufficient wind, the WTGs remain idle until the cut-in speed is achieved. Upon reaching the cut-in speed, varying among potential WTG models (Table 2.3), the blades commence rotation and electrical generation begins. At the cut-out speed (Table 2.3), the maximum operational wind speed, the control system automatically initiates shutdown protocols to protect the WTG from excessive wind loads. This process ceases rotor blade movement to prevent potential damage. Additionally, periodic shutdowns are conducted for maintenance purposes or during extreme weather events. The Project may include an anti-icing system for the WTG units if deemed beneficial to the project. This system will further protect the WTG units and help mitigate the chances of ice build up and ice throw during the operational phase.

WTG lighting will meet NAV Canada and Transport Canada requirements for aviation.

Maintenance will be conducted in accordance with manufacturer specifications, industry best practices, and internal procedures and standards. Preventative and predictive maintenance activities will be carried out to avoid component failure and ensure proper system performance. Typical maintenance activities include the following:

- Inspection and condition assessment of mechanical and electrical components

- Application of lubricants and coolants to moving assemblies
- Examination and tightening of bolts and fasteners
- Repair or replacement of damaged or malfunctioning components
- Maintenance and troubleshooting of electrical systems
- Cleaning and upkeep of WTG blades to remove accumulated debris
- Software updates and control system upgrades
- Implementation of health and safety inspections
- Diagnostics and calibration of monitoring systems

There will be approximately seven personnel performing operation and maintenance employed on both a part-time and full-time basis when necessary. Key roles of onsite personnel include a site manager, high voltage and WTG technicians, road maintenance workers, vegetation management service providers, snow removal providers, administrative support, and inventory/materials management.

2.6.2 Road Maintenance

Onsite staff will notify the facility management when maintenance is necessary. Onsite roads will require typical repairs to ditches, culverts, shoulders, and signage. Occasional clearing of brush may be necessary to maintain clearance and onsite litter will be collected for disposal. Washout and pothole repairs will be necessary during the lifetime of the Project. Gravel roads may need occasional resurfacing and grading as well as vegetation clearance at the shoulders (e.g., brush cutting). During the winter, it is expected that all roads will be accessed by snow tracking units or similar and will therefore not impede current snowmobile trail use in the PDA In case of emergency or if required for WTG maintenance, roads will be cleared and sanded/salted as needed to ensure safe driving conditions and access, and notification provided to current recreational users.

2.6.3 Collector Lines, Substation, Switchyard, and Service Building

Maintenance of power lines, substation, switchyard, and the service building may include repair and/or replacement of components such as utility poles, transformers, cables, connections and splices, switchgears, and circuit breakers, computer systems, and office equipment. The housing infrastructure of the substation enclosure and service building may also need repairs, such as roofing replacement, over the course of the Project operation.

2.6.4 Vegetation Management

Onsite vegetation management in the Project footprint will involve the systematic maintenance and control of plant growth in the areas directly surrounding the WTGs, substation, and transmission lines. Vegetation control will be necessary to maintain the safety and environmental features of the facility grounds and will include trimming and removal of vegetation to prevent contact that could damage or disrupt equipment. The *Nova Scotia Industrial Vegetation Management Manual* outlines procedures for industrial vegetation managers (Nova Scotia Department of Environment and Labour, 1999). Management practices will be further developed, as described in Section 2.9 of the manual.

2.6.5 Safety and Security

The selected WTGs are equipped with advanced safety features and technology to maintain operation while safeguarding both people and systems. Safety-related parameters in the system control are continuously monitored. Data from the safety sensors are transmitted to the safety controller for evaluation. If specific parameters are exceeded, the system is stopped using actuators and placed in a secure state.

Specific brake programs are initiated according to the cause of cut-out, which includes the automatic shutdown of the WTG. For external factors such as excessive wind speeds or temperatures outside the operational range, the WTG is gradually decelerated via rotor blade adjustments. Depending on the final WTG model selected, anti-icing or de-icing measures may be deployed. For anti-icing, if icing conditions are detected, the blades are heated to prevent formation of ice. For de-icing, if ice formation thresholds are detected, WTGs are equipped for automatic shutdown and ice removal occurs via internal blade heating. Furthermore, comprehensive safety protocols are implemented to ensure secure cessation of WTG operations during maintenance activities.

During maintenance activities that pose safety risks to the public, clear signage will be erected to notify the public about the maintenance activities and potential hazards. A Traffic Management Plan will be developed to avoid potential risks to public safety on access roads and neighbouring areas. Additionally, signage warning of potential hazards associated with ice throw and fall around WTGs will be installed. Local recreational users will receive education to promote ongoing safe use of the PDA.

Onsite personnel will regularly monitor the condition of the fence. Fencing will require routine maintenance to preserve the security of the substation.

2.7 Waste and Emissions

This section summarizes the Project's primary sources and sinks of waste and emissions, with emphasis on the assessment and quantification of GHG emissions over the Project lifecycle. In addition to identifying Project-generated emissions, the assessment considers the Project's contribution to provincial GHG reduction and avoided emissions, meaning those displaced or reduced because of renewable electricity generation. Beyond GHGs, the Project will generate noise, light, fugitive dust/particulates, and solid waste, primarily during construction. The focus of this section is the characterization and quantification of

GHG emissions associated with construction, operation and maintenance, and decommissioning.

Monitoring of emissions and air quality at the Project site will reference the NSDPW generic Environmental Protection Plan (EPP) (NSDPW, 2007). The construction contractor will be responsible for maintaining equipment in proper operating condition. Measures such as non-idling practices and reduced speed limits may be implemented across Project phases to reduce impacts on local air quality, soil and water quality, and GHG emissions. The NSDPW EPP also provides guidance for waste management and the handling, storage, and control of petroleum, oils, and lubricants (POL).

2.7.1 Waste Management

All hazardous waste produced during the Project—such as used POL, oil filters, solvents, and batteries—will be separated, properly stored, transported, and disposed of according to all applicable regulations at licensed hazardous waste recycling or disposal facilities. Non-hazardous waste will follow similar handling procedures, with final disposal taking place at authorized non-hazardous recycling or disposal sites.

Construction-related wastes such as concrete debris, metal scraps, and other inert materials will be stored, handled, and recycled or disposed of in compliance with municipal by-laws and provincial regulations. Excess soil or excavated material unsuitable for reuse, cleared vegetation, and unused aggregates will be stockpiled in designated laydown areas and transported offsite for disposal in accordance with regulatory requirements once construction activities are complete.

2.7.2 Non-GHG Emissions

During the construction and decommissioning phases, primary noise emission sources include heavy machinery such as excavators, bulldozers, cranes, blasting equipment, and material-hauling trucks. Dust emissions may arise during site preparation, soil handling, and vehicular movement, with elevated levels expected under dry conditions. While most construction and decommissioning work is scheduled for daytime hours, occasional nighttime operations may occur. Artificial lighting associated with nighttime activities—including worksite illumination, vehicle headlights, and temporary construction lights—will result in light emissions. Grading, excavation, and earth-moving activities may disturb soils, increasing the potential for runoff and sedimentation. Stormwater management, ESC measures, and spill prevention and response protocols will be employed. Additional mitigation strategies will be implemented as necessary to minimize noise, dust, light emissions, and stormwater impacts both in and beyond the PDA.

Noise during operation and maintenance mainly comes from the WTGs, including blades, generators, and gearboxes. Maintenance activities produce less frequent and quieter noise compared to construction. Dust will be minimal, except for occasional localized emissions from vehicles on access roads. Artificial lighting is used as needed for maintenance tasks.

Mitigation measures will be in place to control dust and light emissions during operation and maintenance.

2.7.3 GHG Emissions

This section was prepared in accordance with ISO 14064-1: 2018, Greenhouse gases*, Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals*. This section focuses on the characterization and quantification of greenhouse gas emissions during all project phases (construction, operation and maintenance, and decommissioning).

2.7.3.1 Construction Phase

The construction phase will comprise the largest source of emissions out of all three project phases due to manufacturing and transportation of the WTGs, concrete used to develop the foundations, and manufacturing and transport of the materials needed to develop the electrical collection and transmission infrastructure as well as the substation.

The process of developing WTG sites, new roads, improving existing roads, clearing new transmission corridors, and preparing laydown areas will necessitate the clearing of vegetation and overburden, leading to the generation of GHG emissions. The construction of new and upgraded roads as well as the clearing needed for each WTG site will require the removal of existing vegetation as well as some temporary or permanent removal of the organic-rich natural overburden in most of the Project Footprint. A review of forestry layers in the provincial GIS database of the project site, as well as the Global Forest Watch database, lead to the following estimates of the current vegetation cover in the PDA measured in tonnes per hectare per year (t/ha/yr) (NB Forest Carbon Inventory, 2023)

- Mature Forest – 2.0 t/ha/yr (NB Forest Carbon Inventory, 2023)
- Young Forest – 0.8 t/ha/yr (NB Forest Carbon Inventory, 2023)
- Non-Forested Vegetated – 0.1 t/ha/yr (USFS, undated)

It is estimated that 28.5 km of access roads will be required in the PDA to reach the 16 WTG sites and provide access points to the provincial road network. Review of the latest project layout map indicates that the required road network will comprise 17.1 km of upgraded existing roads and 11.4 km of new roads. Total loss of sequestration potential due to land clearing within the PDA to accommodate the Project is presented in Table 2.4.

Table 2.4 Sequestration Loss Attributed to the PDA

Current Vegetation	Area (ha)	Sequestration Intensity (t/ha/yr)	Total Sequestration (t/yr)
Mature Forest	48.5	2.0	96.9
Young Forest	142.9	0.8	114.3
Non-Forested Vegetated	27.5	0.1	1.4

The organic soil layer in the PDA is assumed to contain a large amount of embodied organic carbon, given the predominant type of forest cover. Excavation of this layer to allow for the installation of WTG bases, laydown areas, and crane pads could allow for a large portion of this embodied carbon to be released back into the atmosphere if this material is not reinstated and revegetated before it dries out. It is assumed that all excavated soils at each WTG site will be reinstated and revegetated at a suitable site nearby to prevent soil carbon loss.

Emissions are expected to be temporary and short term for the construction of roads and laydown areas and therefore have not been quantified as they only contribute minimally to the project emissions.

Concrete Foundation

Based on a WTG base for a Nordex model N163 WTG (as an example), it could require as much as 888 cubic metres (m^3) of concrete and 172.5 tonnes of steel rebar for foundation construction. Assuming 16 WTG bases, this will require 14,208 m^3 of concrete and 2,760 tonnes of steel rebar. Each ready-mix concrete truck can haul 7 m^3 (16.8 tonnes) which results in a total of 2,030 truckloads. Assuming concrete is produced at an existing plant in the Town of Antigonish, and an average round trip distance of approximately 60 km, the total haul distance will be 121,800 km. At an average diesel fuel consumption of 0.05 L/t km fully loaded and 0.41 L/km unloaded, the transport of concrete will consume approximately 76125 L of diesel fuel. Steel rebar for each base is assumed to be supplied from a location in Dartmouth, NS, which is approximately 200 km from each WTG location. At an average load of 21.25 t, it will require eight truckloads of steel rebar per WTG base. At an average round trip distance of 400 km the total haul distance will be 6,400 km. Fuel consumption for this portion of the project will be approximately 38,285 L of diesel fuel. Total embodied and transportation carbon emissions associated with the WTG bases are calculated and shown in Appendix B.

WTGs

Based on the Nordex N163 WTGs, each with a maximum generating capacity of 7 MW, Appendix B presents the estimated GHG emissions associated with WTG manufacture and shipment. For this assessment, it is assumed the WTGs will be manufactured in southeast China (nacelles and blades) and Malaysia (tower sections) and transported by truck to dockside and then by ship to the Port of Sheet Harbour, and then by truck to the Project site. Each WTG will have a weight of approximately 668 tonnes that is composed primarily of steel (89%) with the remainder being mostly the fiberglass blades and electronics. The total embodied carbon associated with the manufacture of each WTG is estimated to be 1,650 tonnes. Transport from Quanzhou, China and Kuantan, Malaysia is assumed to include components for two WTGs per ship for a total of 16 shiploads (eight from each port), while land transport will require 19 truckloads per WTG at an average load of 50 to 60 t. The total carbon emissions associated with the transport of each WTG from the manufacturer to the project site is estimated to be 3,668 t.

Electrical Infrastructure

The Project will require electrical infrastructure to permit interconnection with the Nova Scotia Power grid. Each of the 16 WTGs will generate electricity that will be transformed to 34.5 kV at each site. Collector lines composed of three aluminum conductor steel reinforced (ACSR) overhead cables will connect the WTG locations to the project substation. We have estimated that three circuits will be required with each circuit connected to five or six WTGs. The 126 MVA capacity substation will include two 63 MVA utility transformers to increase the voltage to 230 kV. The substation will also include additional high and low voltage equipment as well as a small service building and perimeter fence. The outlet from the substation will travel via a single 120 MW capacity transmission line at 230 kV to intersect with an existing NSPI 230 kV transmission line approximately 0.2 km away. The transmission line will include three ACSR cables supported on freestanding steel lattice towers. Two overhead ACSR shield wires will be included to provide lightning protection and for communication and signalling purposes.

Calculations for the emissions associated with the fabrication and transport of the electrical infrastructure to the project site are included in Appendix B. When calculating the transportation distances, all components except for concrete are assumed to be shipped from Dartmouth which is approximately 200 km from the project site. Concrete will be assumed to be transported from a ready-mix plant in the Antigonish area. Metals used in this infrastructure includes copper (transformers), aluminum (conductor cabling and busbars) and steel. Each transformer will also include mineral oil as a cooling medium. Concrete pads with steel reinforcement are included for all transformers and other major substation equipment, the service building slab, and foundations for steel transmission towers. The substation perimeter will include a steel chain link security fence. Total carbon emissions associated with the fabrication and transport of the electrical infrastructure is estimated to be 3,678 tonnes.

2.7.3.2 Operation and Maintenance Phase

During the operation and maintenance phase, any generation of electricity that offsets higher carbon producing sources of electricity will lead to a reduction in the emission intensity of the electricity grid in Nova Scotia, as the electricity produced will be entirely emissions-free, in contrast to other energy sources like coal, natural gas, and oil that are typically associated with emissions during electricity generation. This phase contributes to GHG emissions mitigation, aiming to combat climate change by reducing the concentration of GHGs in the Earth's atmosphere.

Maintenance activities, such as the servicing and replacement of WTG components, vegetation management, and road, power line and substation maintenance, will be the only contributor of GHG emissions. By way of example, the Nordex N163 maintenance manuals suggest that each WTG will require 144 kg of replacement lubricating oil and 40 kg of replacement coolant per year based on a 25-year WTG life. Replacement parts will average 328 kg per WTG per year and are assumed to be primarily steel. All replacement parts are assumed to be supplied from the Nordex North American distribution centre in

West Branch, Iowa. The distance from West Branch, Iowa to the project site is approximately 2,550 km and it is assumed that one truck per year of spare parts will be sent to the project site. Lubricants and coolants for each WTG as well as mineral oil for transformers can be sourced through local suppliers in Nova Scotia. Annual emissions associated with the supply and transport of spare parts is estimated at 12 t carbon dioxide equivalent (CO_2e). It is expected that other WTG options under consideration for the Project will have similar impacts during the operation and maintenance phase. Energy consumption for the service building and other project infrastructure will be supplied from the windfarm output and will have no carbon emissions.

2.7.3.3 Decommissioning Phase

The sources of emissions during the decommissioning phase are expected to be like those during the construction phase but are expected to contribute less emissions. Most of the metal components associated with the project can be recycled using currently available technology. Fiberglass is currently not easily recycled but advances in recycling technology for this material are ongoing and it is expected that fiberglass recycling will be commonly available prior to the decommissioning phase of this project. Most emissions associated with the decommissioning effort will be linked to the emissions from equipment used to disassemble and haul away the project components and to restore each site. Decommissioning of this project is likely not to occur until the 2060s by which time most construction and heavy transport equipment is expected to be zero emitting.

2.7.3.4 GHG Emission Summary

A summary of the calculated total GHG emissions from the construction, transport, and operation of the windfarm as a producer of electricity for supply to the Nova Scotia grid is presented below:

- Total Emissions from fabrication and transport – 51,392.6 tCO_2e
- Loss of CO_2e sequestration due to land clearing – 212.6 t per year
- Emissions due to operations and maintenance – 12.0 tCO_2e per year

Electricity production in Nova Scotia produces an average of 14,800 tCO_2e per day (NSPI, 2022). This Project is expected to offset approximately 234,905 tCO_2e per year for the lifespan of the Project.

2.8 Environmental Management and Monitoring

The Proponent is integrating environmental management approaches and strategies into Project planning and execution to comply with regulatory requirements and to avoid or minimize potential adverse environmental effects. These approaches inform the design and siting of Project components, the avoidance and mitigation of potential effects, and the development of a Project-specific EPP.

A Project-specific EPP will be prepared prior to construction and will incorporate the conditions of the Project EA Approval. The EPP will outline known or potential environmental issues to be addressed during construction and operation and maintenance, as well as mitigation measures to be implemented based on site-specific conditions. The EPP will be reviewed by contractors and site personnel prior to initiation of construction activities and will describe the following:

- Personnel roles and responsibilities
- Environmental training and orientation requirements
- Document control procedures
- Regulatory requirements and commitments
- Scheduling and sequencing of activities
- Procedures for working in or near watercourses and wetlands
- Noise, light, and traffic management
- Wildlife management practices
- Protocols for heritage and archaeological resource encounters
- Environmental protection and control measures
- Emergency response and contingency plans
- Environmental monitoring and reporting requirements
- Complaints resolution

2.9 Decommissioning

The Project operation phase will span 25 years from the commencement of commercial operation as per the PPA with NSPI. After the initial operation period, the Project operation may continue, subject to subsequent offtake agreements, required permits, and other regulatory approvals. Assuming the Project operation ceases, it will be decommissioned.

Two years prior to Project decommissioning, a Decommissioning and Site Reclamation Plan will be submitted to NSECC for review and approval. If an individual WTG becomes inoperative for a period of two years during the operation and maintenance phase, NSECC will be notified of the Proponent’s plan to either recommission or remove the unit. Additionally, the Council of the Municipality of Pictou County should be informed of the removal of WTGs and associated infrastructure as early as possible, as per the Municipality.

Decommissioning activities will be similar to construction activities but will focus on the removal of infrastructure to a depth of approximately 1 metre below ground surface (mbgs), including foundations, underground collector lines, and overhead distribution poles. Current industry estimates indicate that approximately 85 to 90% of a WTG’s total mass can be reused or recycled (Canadian Renewable Energy Association, 2021). Major components, including the steel tower, gears, and generator assembly, can be recycled or sold as scrap metal, and the concrete foundation can be recycled.

At the time of this EA, recycling options for WTG blades remain limited due to the predominance of fiberglass composites. However, industry advancements are rapidly expanding available pathways. Recent initiatives demonstrate viable solutions such as material recovery through shredding (Beauson et al., 2016) and repurposing fiberglass in cement manufacturing (Paulsen and Enevoldsen, 2021). For example, Carbon Rivers has developed a process that recovers 99.9% pure glass fiber from decommissioned WTG blades, enabling mechanical reuse in new composite products rather than disposal (U.S. Department of Energy, 2023). The European wind sector is also committing to "no-blade-to-landfill" solutions, with manufacturers and researchers working to commercialize fully recyclable blade designs and large-scale recycling programs (WindEurope, 2025). Over the next 25 years, continued innovation is expected to enhance recovery, recycling, and reuse options.

If WTG components cannot be recycled or resold at the time of decommissioning, they will be managed by a qualified contractor and disposed of in accordance with applicable legislation and regulations. Landowners will determine whether access roads are retained or removed as part of site restoration. Restoration will begin following infrastructure removal and will include topsoil replacement and natural revegetation.

Decommissioning will proceed in the following sequence.

- Disconnect the Project from the NSPI transmission system and decommission and remove the substation.
- Re-establish temporary laydown areas to support heavy vehicles, topsoil storage, and equipment at each WTG location.
- Dismantle and remove WTG blades, hubs, nacelles, and tower segments.
- Remove underground electrical infrastructure to approximately 1 mbgs. Remove overhead poles where feasible.
- Remove overhead electrical lines, including the transmission line, unless otherwise requested by NSPI.
- Remove or retain access roads based on landowner agreements. Where roads are removed, affected lands will be restored to pre-construction land use, to the extent practicable and at the discretion of landowners.

Following removal of infrastructure to 1 mbgs, temporary staging areas and associated decommissioning facilities will be restored using stockpiled topsoil or clean imported fill. The site will be graded, contoured, and restored to appropriate elevations and slopes, followed by natural revegetation.

3 Consultation and Engagement

The Proponent and consultants conducted consultation and engagement as part of the Project planning process. Key rightsholders and collaborators involved in these discussions included the Mi'kmaq of Nova Scotia, various regulatory agencies, municipal leadership, and the public. These interactions were aimed at providing information, gathering input, addressing concerns, and adhering to regulatory requirements.

3.1 The Mi'kmaq of Nova Scotia

As stated in Section 1.3, the Project is set on Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people. The nearest Mi'kmaw communities to the Project are Pictou Landing First Nation approximately 41 km northwest of the Project, and Paqtnkek Mi'kmaw Nation approximately 41 km northeast of the Project. The Proponent will engage and collaborate with the Mi'kmaq of Nova Scotia throughout the Project, providing regular updates and feedback opportunities. Efforts will focus on minimizing impacts to the Mi'kmaw community while aiming for economic and environmental benefits.

The Project is a partnership with Glooscap Energy LP which is owned and operated by GFN. Additionally, SWEB has established benefits agreements with two First Nation communities who are active participants in the Project. The benefits agreements include the provision of bursaries and capacity-building initiatives, such as peer-to-peer networking programs, mentoring, and apprenticeship; ultimately, these benefits will be coordinated by the communities based on their unique interests and needs.

Mi'kmaq First Nation community engagement began January 2021. Between 2021 and the date of this EA Registration Document, engagement occurred with the following groups: Kwilmu'kw Maw-Klusauqn (KMK), NS Office of L'nu Affairs, Mi'kmaw Kina'matnewey, Ulnooweg, Ulnooweg Indigenous Communities Foundation, Ulnooweg Development Group, Mi'kmaq Employment Training Secretariat, Mi'kmaw Native Friendship Centre, Mi'kmaw Economic Benefits Office, the Native Council of Nova Scotia, Membertou Geomatics, Eskasoni First Nation, Potlotek First Nation, Wagmatcook First Nation, Membertou First Nation, We'koqma'q First Nation, Paqtnkek First Nation, PLFN, Sipekne'katik First Nation, Millbrook First Nation, Wasoqopa'q (Acadia) First Nation, Bear River First Nation, Annapolis Valley First Nation, and GFN. As with all of the Proponent's projects, engagement with Mi'kmaq First Nation communities will continue throughout project construction and operations as necessary.

Official engagement with the Indigenous communities of Nova Scotia has aligned with the *Proponents Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (Nova Scotia Office of Aboriginal Affairs, 2012). The engagement has taken place through phone calls, email exchanges, and meetings, including the following:

- Project notification letters mailed and sent via email to share information about the Proponent and the Project, including contact information, impacts the Project will have, participation in the province's Green Choice Program, and an invitation to further discuss the Project
- Virtual meetings with community representatives to introduce the Proponent and the Project, and discussion on potential participation and future collaboration.
- Presentations to community representatives with information on the Proponent and the Project.
- Follow up Project notification letters via email to reemphasize and recommunicate Project information and provide an additional opportunity to respond.

A record of communication and engagement is provided in Appendix C, which summarizes engagement activities to date with the 13 Mi'kmaw communities in Nova Scotia and Mi'kmaw community organizations. This record is organized by date and the nature of contact.

Membertou Geomatics Solutions conducted a Mi'kmaq Ecological Knowledge Study (MEKS) to assess historic and current Mi'kmaq land and resource use in the PDA. The study promoted dialogue with Mi'kmaw communities through engagement, interviews with Indigenous Knowledge Holders, historical research, and site visits to document traditional ecological knowledge. The MEKS is a crucial component for integrating Indigenous perspectives, values, and concerns related to the environment into the Project. The Proponent commits to sharing the MEKS with NSECC for circulation to the Mi'kmaq of Nova Scotia (MGS, 2026). Additionally, the MEKS has been shared with KMK.

3.1.1 Summary of Questions and Concerns Identified During Engagement

As per Appendix C, meetings were held with First Nation communities and organizations. Through engagement efforts, no issues and/or concerns were brought forth.

3.2 Regulator Consultation

An essential aspect of Project planning was consultation with various regulatory agencies at the federal, provincial, and municipal levels. The purpose of this consultation was to present the Project and the Proponent, and to gather collaborative feedback on the

Proponent's approach to the EA as required by regulations and established procedures. The following sections detail several important regulatory consultations, with Table 3.1 providing an overview of all completed consultations for the Project.

Table 3.1 Summary of Regulatory Consultation

Regulatory Agency	Branch/ Representatives	Dates, Nature of Contact, Feedback
Federal Government		
ECCC	Meteorological Service of Canada	May 5, 2025 – EMI notification letter sent. February 12, 2026 – EMI notification letter sent with updated Project layout. March 3, 2025 – Letter of non-objection from ECCC received.
NAV Canada	service@navcanada.ca	June 14, 2024 – EMI notification letter sent. December 11, 2025 – Updated Project layout provided. February 12, 2026 – EMI notification letter sent with updated Project layout. February 21, 2026 – Letter of non-objection from NAV Canada received.
Canadian Coast Guard (CCG) through Fisheries and Oceans Canada (DFO)	Vessel Traffic Systems Radar	May 5, 2025 – EMI notification letter sent. December 18, 2025 – Updated Project layout provided. February 12, 2026 – EMI notification letter sent with updated Project layout. February 13, 2026 – Email of non-objection from the Canadian Coast Guard received.
Department of National Defence (DND)	Military Air Defence and Air Traffic Control Radars Military Radio Communication Users	December 18, 2024 – EMI notification letter sent with updated Project layout. February 12, 2026 – EMI notification letter sent with updated Project layout. March 2, 2026 – Letter of non-objection from DND received.
Innovation, Science, and Economic Development (ISED) Canada	Nova Scotia District Office	June 4, 2025 – EMI notification letter sent. February 12, 2026 – EMI notification letter sent with updated Project layout. February 17, 2026 – Email from ISED was received that stated they had not identified any non-disclosed systems that would require additional consultation.

Regulatory Agency	Branch/ Representatives	Dates, Nature of Contact, Feedback
Transport Canada	Civil Aviation Safety Inspector, Aerodromes and Air Navigation	June 13, 2024 – EMI notification letter sent. December 18, 2025 – Updated Project layout provided. January 26, 2026 – Non-objection received from Transport Canada. February 12, 2026 – EMI notification letter sent with updated Project layout.
Royal Canadian Mounted Police (RCMP)	Wind Farm Coordinator	February 12, 2026 – EMI notification letter sent with updated Project layout. February 13, 2026 – Letter of non-objection from the RCMP received.
Provincial Government		
NSECC	NSECC	January 24, 2024; February 29, 2024; April 16, 2024: The Proponent met virtually with NSECC to provide updates on the Project, development of the Project, and EA submission timelines.
NSECC	EA Branch, NSECC	March 22, 2024: Meeting with NSECC to provide brief update on the Project.
NSECC	EA Branch, NSDNR, SAR Biologist, NSECC	September 9, 2024: Email correspondence with the Regional Inspector to request an approval to conduct out of season wetland delineations. The wetland assessment field program was projected to extend into October at this time. The out of season delineations were approved, with understanding that supplemental surveys may be required to support the permitting phase.
NSECC	EA Branch, Wetland Specialist, and Regional Inspector of NSECC	May 12, 2025: Meeting with various representatives from NSECC to provide an overview of completed baseline field surveys, emphasizing the wetland assessments and SAR and SoCC occurrences. The Proponent also provided an overall update on the Project and associated timelines.
NSECC	EA Branch, NSECC	May 22, 2025: Email correspondence with the EA Branch of NSECC to clarify several items discussed in the previous May 12 email. Questions and clarifications were centered around the Project being developed on private lands with ongoing forestry activities and what this may entail for an EA.

Regulatory Agency	Branch/ Representatives	Dates, Nature of Contact, Feedback
NSDNR	NSDNR	June 5, 2025: Meeting with NSDNR to provide an overview of SAR and SoCC occurrences on site, and to discuss the preliminary SAR habitat modelling, and refining this assessment.
NSECC	NSECC	September 8, 2025: Email correspondence with the NSECC Regional Inspector to advise that the wetland assessments would likely extend into October and November 2025. Full wetland assessments could not be completed during the growing season. Wetland screenings were completed and will require follow-up assessment as part of regulatory permitting.
Municipal Government		
Municipality of Pictou County	Pictou County Planning Department	December 4, 2023; January 31, 2024: The Proponent scheduled a meeting with the Pictou County Planning Department that was held January 31, 2024, to present the County with details on the Project, to discuss the municipal permitting process, and to answer initial questions.
Municipality of Pictou County	Pictou County Council	May 22, 2024: The Proponent delivered a presentation to the Pictou County Council on the Sugar Maple proposed project and its projected impacts on the local community.
Municipality of Pictou County	Director of Public Works & Development	October 1, 2025 - SWEB contacted the Director of Public Works & Development for Pictou County to advise of an upcoming engagement session with the intent to file the Sugar Maple EA shortly after.
Municipality of Pictou County	Public Works & Development	October 15, 2025 – Following email communications on October 6 and 7, SWEB met with the department of Public Works & Development for Pictou County to discuss permitting and timelines.
Municipality of Pictou County	Public Works & Development	January 15, 2026 – SWEB met with the department of Public Works & Development for Pictou County to provide project specific updates and discuss expected permitting timelines.

3.2.1 Aviation, Radar, and Communications Consultation

As outlined in Table 1.2 and 3.2 above, an EMI study was completed (Section 13.2.5). During various stages of Project development, letters were issued to stakeholders to solicit feedback on any potential interference between the proposed WTG locations and existing or planned operations.

The Proponent conducted consultation with recommended governmental agencies per the RABC & CanWEA Guidelines (2025), with an aim to notify these agencies of the Project and request feedback. Per the guidelines, the following agencies were sent a notification providing WTG dimensions and coordinates to assess potential impacts to their operations:

- NAV CANADA
- Transport Canada
- Department of National Defence (DND)
- Meteorological Service of Canada (ECCC)
- Royal Canadian Mounted Police (RCMP)
- Canadian Coast Guard (CGG) – under DFO
- Innovation, Science, and Economic Development Canada (ISED)

The following stakeholders were also sent a notification regarding the WTG dimensions and coordinates, and sent updated coordinates when WTGs were shifted:

- NCS Managed Services Inc.
- Rogers Communications
- Bell Aliant Canada
- Eastlink Inc.

Eastlink Inc. and Bell Aliant Canada acknowledged receipt, while NCS Managed Services indicated they did not have infrastructure in the area and they did not have an objection to the Project WTG locations. Through an EMI analysis, it was determined that one Project WTG fell within the RABC & CanWEA (2025) consultation zone for a point-to-point connection owned and operated by Rogers Communications (refer to Section 13.2.5). Rogers Communications was contacted by the Proponent, and consultation with Rogers Communications is ongoing with the expectation that any required changes to the WTG placement will be minor, as illustrated in Figure 2.1, and to be confirmed during the month of April 2026 (Appendix A). All governmental agencies contacted have issued non-objection letters regarding the Project. To ensure thoroughness, the Proponent will submit a final notification to all relevant governmental agencies and the additional stakeholders identified above, requesting a final response prior to the start of construction.

3.3 Public Engagement

Effective public engagement fosters transparency and inclusivity by incorporating diverse perspectives into projects. For the Project, public engagement has included community sessions, virtual community engagement, meetings with interest groups and community members, Project website updates, social media posts, to inform and gather feedback.

A public website (https://www.sweb.energy/ca-en/projectpages/sugar-maple) was launched to support public engagement. It provides project details, information on partnerships, information on the EA, high level information on wind energy, Project news and updates, and contact information. The Proponent will continue updating the site for the duration of the Project.

A dedicated email address (sugarmaple@sweb.energy) was set up so the community can directly contact the Proponent with questions or feedback. The Proponent regularly monitors this inbox, which is promoted on social media, the Project website, pamphlets, and newsletters. This address will be available for community engagement throughout the Project.

The Proponent has established a Community Liaison Committee (CLC) that meets regularly to discuss Project updates, and for community members of the CLC to discuss various issues. The CLC is composed of local community members, a member of PAK, and the Proponent.

3.3.1 Community Engagement Sessions

Two rounds of in-person community engagement sessions took place: one in late March 2024, and another in late February 2026. Additionally, a virtual session was held in mid-May 2024 to accommodate those unable to attend in person and encourage broader participation. This virtual engagement session was then posted in the form of a video recording to the Project's webpage. All sessions were structured as open houses for flexible drop-in attendance.

Notices of the in-person and virtual engagement sessions were widely publicized through various channels, including through website updates, Canada Post mailouts, social media posts, Pictou Advocate (the local newspaper), and personal email invitations. The use of multiple communication channels was intended to allow the public to stay informed on updates and enhance attendance.

The main goals of these open houses were to introduce both the Project and its team, provide general information, and collect local input for the Project's design. Organizers explained the key purpose of the Project, described its scope, expected timeline, and location, and gave attendees an overview of its possible impacts and benefits for the community. The events also offered a chance for people to ask questions, share comments, or express concerns directly with the Proponent and Project team in person, or by filling out feedback forms available at each meeting. Sign-in sheets were posted at the in-person open houses, where attendees could leave their contact details and choose to join the Project mailing list for updates. Additionally, one-page summaries providing information on the Project were handed out to attendees. All feedback gathered during these sessions was recorded and will be used in planning and designing the Project, as well as in the writing of the EA Registration Document.

In both the in-person open houses, the Project team set up poster panels displayed on easels around the rooms of each event location. These boards featured visual representations and detailed information about various aspects of the Project, including a general location and layout, environmental considerations, and potential community enhancements.

The Proponent will provide benefits to the Municipality of Pictou County, including commitments for the following:

- Landowner royalties
- Annual municipal tax of approximately $1.2 M
- Supporting ongoing renewable energy or programming initiatives at The Keppoch as applicable

The dates, times, locations, and number of attendees at each community engagement session are summarized in Table 3.2. The materials presented at the community engagement sessions are included in Appendix C.

Table 3.2 Community Engagement Session Attendance Information

Date/ Time	Engagement Session	Location	Public Attendance Numbers
March 29, 2024 4:30-7:30pm	Open House	St. Joseph's Lakeside Community Center 2752 Ohio East Rd, Antigonish, NS	17
May 14, 2024 5:30-7pm	Virtual Open House	Held Virtually	4
February 24, 2026 4:30-7:30pm	Open House	Garden of Eden Community Centre 28 Garden of Eden Church Loop, Pictou, NS	38

3.3.2 Special Interest Group Meetings

As part of the Proponent's community engagement, various special interest groups were invited to meet with the Proponent to discuss the Project, introduce members of the Project team, present benefit programs, answer questions, and gather community feedback. The special interest groups that the Proponent engaged with included the following:

- St. Mary's River Association
- Pictou County ATV Club
- Positive Action for Keppoch (PAK)
- Antigonish Sno Dogs
- Pictou County Snow Riders

For a complete list of special interest groups engaged, and records of dates, contact information, and nature of contact that took place prior to registering the EA Registration Document, refer to Appendix C. Engagement with these groups is ongoing.

3.3.3 Summary of Concerns Identified During Engagement

The public submitted questions, concerns, and issues by email, at in-person engagement sessions, during stakeholder meetings, and through phone conversations. Table 3.3 summarizes the main issues raised via these communication methods, along with the Proponent's responses and suggested solutions. The table also points to relevant sections of the EA that discuss these concerns.

Table 3.3 Summary of Key Questions and Concerns from Public Engagement

Subject	Questions and Concerns	General Responses/ Solutions	EA Registration Document Reference
WTG Locations	Members of the public were concerned about some of the WTG locations.	The Proponent explained that due to land availability, results from completed environmental studies, setback requirements, and infrastructure and wind resources, it is not feasible to move the WTGs.	Section 2.2 Siting Considerations
Public Access	Members of the public inquired whether the site will continue to be accessible to the public.	The Proponent explained that portions of the Project lands will be leased and that final decisions regarding site access will remain at the discretion of the landowners. However, SWEB does not intend to request that access be reduced or denied to current or future recreational users. During certain periods of Project development and construction, trails may require plowing, which could temporarily limit snowmobile access. These potential limitations are expected to be short term. Some areas of the Project, such as the substation and switchyard, will be fenced and gated for safety and security purposes; however, disturbance to trail users is expected to be minimal.	Section 13.3.1.7 Effects Assessment – Recreation and Tourism
Fire Risk	A member of the public inquired whether there is an increased fire risk with the WTGs.	The Proponent does not expect an increased fire risk associated with the construction or operation of the Project. During construction and operations, the Proponent will maintain ongoing communication with local emergency response teams, with a central point of contact identified for SWEB and the construction contractor. Approximately 1 ha surrounding each WTG will be cleared for the laydown and crane pad area, which will function as a firebreak by providing separation between WTGs and adjacent forested areas. While the final WTG supplier has not yet been selected, most manufacturers offer nacelle-based fire suppression systems.	Section 17.7 Effects of the Environment on the Project – Wildfires

Subject	Questions and Concerns	General Responses/ Solutions	EA Registration Document Reference
Viewpoints	A member of the public inquired if the WTGs will be visible from a boat on Eden Lake.	At the time, visual renderings had not been completed. During development, it is possible that some WTG locations may be changed as environmental studies and engineering design progress. The Proponent notes that this is an important viewpoint for the area and commits to including renderings from the Eden Lake area.	Section 13.3.1.3 Effects Assessment – Visual Landscape
Community Liaison Committee	A member of the public inquired what the composition of the Community Liaison Committee (CLC) will be.	The CLC includes a member of SWEB, local landowners that are nearby the site, and a member of Positive Action for Keppoch, as well as a member of the Antigonish SnoDogs. The CLC is not intended to be a fixed committee, and the Proponent expects numbers will change over the life of the Project.	Section 3.3 Public Engagement
Aircraft Detection Lighting Systems	A member of the public asked whether the Proponent would commit to utilizing Aircraft Detection Lighting Systems.	The Proponent stated that this was not commonly employed for projects in Nova Scotia but may be explored for future projects.	Section 5.3.1.2 Effects Assessment – Ambient Light
Wildlife	Members of the public were concerned about Project siting and the cumulative effects of multiple wind energy projects in the region on Mainland Moose Members of the public inquired about bird habitat loss and risks of WTG collisions during migration periods.	The Proponent stated that the Project was strategically sited within previously disturbed forestry lands to limit new environmental disturbance, including potential effects on wildlife such as the Mainland Moose. In addition, a cumulative effects assessment will be undertaken as part of the Environmental Assessment process. Bird habitat loss will be minimal, as the Project is sited on previously disturbed forestry lands and over half the project roads currently exist. Additionally, preliminary radar results suggested that most birds detected during migration were flying above the rotor-swept zone (RSZ), where collision risk is highest. Post-construction monitoring will be conducted, and adaptive management strategies will be implemented, should they be required.	Section 10 Terrestrial Wildlife & Section 15 Consideration of Cumulative Effects

Subject	Questions and Concerns	General Responses/ Solutions	EA Registration Document Reference
Noise	Members of the public inquired about the effect of noise from Project WTGs.	The Project complies with provincial regulatory requirements pertaining to noise, and seasonal and permanents receptors were included in the assessment.	Section 5.3.1.3 Effects Assessment – Acoustic Environment & Section 13.3.1.8 Human Health – Acoustic Environment

4 Assessment Methods and Initial Screening

4.1 Approach

The methods applied to complete the environmental effects analysis for the Project were developed by CBCL in accordance with NSECC's (2025a) A Proponent's Guide to Environmental Assessment, NSECC's (2025b) Nova Scotia Class I Environmental Assessment Checklist, and NSECC's (2025c) Environmental Assessment Supplemental Checklist: Wind Energy Projects.

CBCL's assessment methodology follows a systematic and defensible approach consistent with provincial EA requirements. The approach involves the following key steps:

- Establish the scope of the EA
- Describe Project (i.e., Undertaking) components and associated activities
- Identify issues and potential interactions between Project activities and the environment
- Select Valued Environmental Components (VECs) based on regulatory requirements, guidance, input from stakeholders and Indigenous communities, and known environmental sensitivities
- Define appropriate spatial and temporal boundaries for each VEC
- Describe the environment as it exists
- Collect and compile baseline information using desktop review, regulatory data sources, field surveys, professional expertise, and Indigenous and stakeholder input
- Characterize current environmental conditions within the defined boundaries
- Evaluate environmental effects
- Identify potential Project–environment interactions by assessing pathways of effects for each Project component and activity
- Identify mitigation measures to avoid, reduce, or otherwise manage potential adverse effects
- Characterize residual environmental effects after mitigation has been applied
- Determine the significance of residual adverse effects using established criteria (e.g., magnitude, duration, geographic extent, reversibility, and likelihood)

The following sections describe the approach used to scope and evaluate environmental effects for this Project. Detailed methods for data collection and VEC-specific analysis are provided in each corresponding VEC chapter.

4.2 Scoping

Establishing the scope of the environmental effects analysis defines the extent of the Project to be assessed and the issues raised by regulators, Indigenous communities, and stakeholders. The primary objective of scoping is to identify VECs that are both important and potentially affected by Project activities. For this Project, the scope encompasses all Project components and activities outlined in Chapter 2: Project Description.

4.2.1 Identifying Issues and Selecting VECs

VECs are biophysical, socio-economic, or cultural components that may be affected by the Project and are considered important to regulators, Indigenous communities, stakeholders, or the public. For this Project, VECs were selected based on the scope and location of the undertaking and consideration of the following:

- Characteristics of the Project and expected construction and operation methods
- Consultation with regulatory authorities
- Applicable guidance, including *A Proponent's Guide to Environmental Assessment* (NSECC, 2025a), the *Nova Scotia Class I Environmental Assessment Checklist* (NSECC, 2025b), and the *Environmental Assessment Supplemental Checklist: Wind Energy Projects* (NSECC, 2025c)
- Community and stakeholder interests and concerns
- Indigenous rights, resource use, and knowledge of the environment
- Nature and extent of potential Project interactions and impacts
- Professional judgement and experience from similar wind projects

4.2.2 Establishing Spatial and Temporal Boundaries

Spatial and temporal boundaries define the geographic areas and time periods within which the Project may interact with a VEC. Environmental effects, including direct and indirect interactions, are assessed within these boundaries. Because Project interactions differ by VEC, boundaries will be defined individually for each VEC in this EA considering the following:

- Geographic range and natural variability of the VEC
- The Project's zone of influence
- Timing and duration of Project phases
- Seasonal presence or use of the area by the VEC
- The time required for recovery from potential effects
- Administrative or regulatory boundaries
- Availability and quality of existing data

4.2.2.1 Spatial Boundaries

Spatial boundary terms are used consistently in this EA. Their specific extent varies by VEC to reflect ecological characteristics, potential pathways of effects, and regulatory context.

Potential Development Area (PDA): The PDA represents the boundaries within which the Project footprint may occur. This will include WTG pads, infrastructure, access roads, service building, substation, collector lines, as well as any temporary areas used during construction only, temporary laydown areas, and temporary access roads. These Project components include appropriate RoW buffers. The PDA is a conservative estimate, and the overall footprint of the Project will be substantially smaller than what is shown in Figure 1.1.

Study Area: The Study Area defines the spatial extent within which existing environmental conditions were characterized and potential Project-related effects were assessed. It includes the PDA and the associated LAA, with boundaries that vary by VEC based on ecological characteristics and potential pathways of effect.

Local Assessment Area (LAA): The LAA represents the area where measurable environmental changes may occur, surrounding and including the PDA, during any phase of the Project (construction, operation, maintenance, or decommissioning), including effects from normal activities or potential accidents or malfunctions. The size of the LAA varies by VEC (e.g., the local area for aquatic assessment differs from that for atmospheric effects).

Regional Assessment Area (RAA): The RAA represents the broader area where Project-related effects may overlap with those of other existing or reasonably foreseeable projects, potentially resulting in cumulative effects. The size of the RAA is also varied by each VEC. For example, the RAA for aquatic effects includes secondary watersheds overlapped by the PDA, whereas the RAA for wetlands extends 1 km beyond the PDA.

To determine the Project's zone of influence, visual landscape simulations, shadow flicker assessment, and acoustic environment modelling was used.

4.2.2.2 Temporal Boundaries

Temporal boundaries for this EA encompass all phases of the Project: construction, operation and maintenance (25-year period), and decommissioning. If a VEC assessment is limited to certain phases, the applicable timeframe and reasoning are specified.

4.3 Describing the Existing Environment

Baseline conditions in the Project assessment areas are described in Chapters 5 to 14. These chapters characterize the physical, biological, socio-economic, and cultural environments to provide context for assessing the potential effects in the PDA, LAA, and RAA. Baseline descriptions are based on field surveys, modelling, background information, and literature review. These descriptions are also supported by technical reports and relevant published sources.

4.4 Evaluating Environmental Effects

4.4.1 Identifying Project–Environment Interactions and Pathways of Effects

Potential interactions between the Project and each VEC are identified using a matrix-based process to evaluate which Project components and activities may influence environmental conditions. Interactions can be classified as positive, negative, or neutral, with the following considerations in mind:

- Some activities may result in both beneficial and adverse effects
- Some activities may not directly affect a VEC but could create indirect pathways influencing other VECs

When possible harmful interactions are found, a thorough assessment takes place. The effects are reviewed both qualitatively and, when possible, quantitatively, using available data, analysis tools, expert judgment, and relevant regulatory guidelines. If an activity is judged unlikely to affect a VEC, no additional analysis is conducted.

4.4.2 Identifying Mitigation Strategies

The pathways of effects used to identify potential environmental interactions also inform mitigation strategies to avoid or reduce adverse effects on VECs. Mitigation measures are applied in accordance with established best practices, where they are technically and economically feasible, and are expected to be effective. When adverse effects cannot be fully avoided or reduced, additional measures may be considered, such as habitat offsetting, species relocation, activity timing restrictions, or monitoring.

For each interaction where mitigation is applied, the effectiveness of the measure is evaluated to determine whether there will be remaining residual effects. Residual effects are the effects on VECs that persist after implementation of mitigations.

4.4.3 Characterizing Residual Environmental Effects

Residual adverse environmental effects are characterized using standard criteria: magnitude, geographic extent, timing, duration, frequency, and reversibility. These criteria define the remaining effect after mitigation and help determine its significance.

Magnitude—the amount of change to a VEC relative to baseline conditions

- Minor—the effect is at, or only marginally above, baseline conditions
- Moderate—the effect exceeds baseline conditions but does not exceed established regulatory criteria or published guidelines
- Large—the effect exceeds baseline conditions, and established regulatory criteria or published guidelines

Geographic Extent—the spatial area within which an effect of a defined magnitude will occur

- Immediate—the effect is limited to the PDA
- Local—the effect extends beyond the PDA, but remains within the LAA defined for each VEC
- Regional—the effect will occur on a regional scale, extending beyond the LAA into the RAA defined for each VEC

Timing—when the effect occurs relative to the sensitive time period for the VEC

- Low—the effect occurs during low or non-sensitive time periods for the VEC
- Moderate—the effect occurs during moderately sensitive time periods for the VEC
- High—the effect occurs during highly sensitive time periods for the VEC

Duration—the period of time the effect persists (i.e., until the VEC returns to baseline conditions)

- Short-term—the effect occurs only during construction or for 0 to 2 years during operation
- Medium-term—the effect occurs through the construction phase and into the operation phase or for 2 to 10 years during operation
- Long-term—the effect persists for over 10 years

Frequency—how often the effect occurs during the Project or a specific Project phase

- Once—the conditions or activities causing the effect occur once
- Intermittent—the conditions or activities causing the effect occur sporadically
- Continuous—the conditions or activities causing the effect persist continuously throughout all Project phases

Reversibility—whether a VEC will recover from an effect and return to baseline conditions

- Reversible—the effect is feasibly reversible
- Irreversible—the effect is permanent

4.4.4 Determining Significance

Residual adverse environmental effects are assessed by comparing their characteristics to established benchmarks or relevant regulatory standards. If specific benchmarks are unavailable, reasoned argument and professional judgment, supported by scientific data and the residual effects characterizations defined in Section 4.4.3, are used.

4.5 Initial Screening and VEC Selection

Potential interactions between the Project's construction, operation, maintenance, and decommissioning activities and the VECs were assessed through a screening process. VECs requiring further assessment were selected based on this screening. The potential interactions are summarized in Table 4.1, and VEC-specific assessment and evaluation are provided in the chapters that follow.

The purpose of the Project is to generate renewable electricity, which will support Nova Scotia’s legislated climate goals, including phasing out coal, achieving 80% renewable energy by 2030, and reducing provincial greenhouse gas emissions. Selected under the provincial Green Choice Program, the Project will supply clean power to 11 large public and institutional energy consumers, will support local economic development, and local community climate goals. Based on operational activities, there are VECs that are expected to be positively affected that will not require in-depth assessment for mitigation measures:

- Climate
- Economy

Pathways to possible adverse environmental effects have been identified based on the project's setting and activities. The assessment is focused on those VECs on which the Project may have adverse effects:

- Air Quality
- Ambient Light
- Acoustic Environment
- Topography and Landform
- Bedrock and Soils
- Groundwater
- Aquatic Environment
- Flora
- Wetlands
- Terrestrial Wildlife
- Bats
- Birds
- Land Use and Value
- Visual Landscape
- Communication and Radar Systems
- Transportation
- Recreation and Tourism
- Human Health
- Archaeological Resources
- Indigenous Cultural Resources

Table 4.1 Potential Project-Environment Interactions and VEC Selection

Project Activities	Environmental Components																						
	Atmospheric Environment				Geophysical Environment			Biophysical Environment						Socio-Economic Environment								Heritage and Cultural Resources	
	Climate and Weather	Ambient Light	Air Quality	Acoustic Environment	Topography and Landform	Bedrock and Soils	Groundwater	Aquatic Environment	Flora	Wetlands	Terrestrial Wildlife	Bats	Birds	Population and Economy	Land Use and Value	Visual Landscape	Electricity and Other Utilities	Communication and Radar Systems	Transportation	Recreation and Tourism	Human Health	Archaeological Resources	Indigenous Cultural Resources
Construction																							
Site Preparation	-	-	X	X	-	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	X
Access Road Construction and Modification	-	-	X	X	-	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	-
Material and Equipment Delivery and Storage	-	-	X	X	-	-	-	-	X	X	X	X	X	X	-	-	-	-	X	X	X	-	-
Infrastructure Installation	-	X	X	X	-	-	-	X	-	X	X	X	X	X	-	X	-	-	-	X	-	-	-
Restoration of Temporary Areas	-	-	X	X	-	-	-	X	-	-	X	X	X	X	-	-	-	-	-	X	X	-	-
Testing and Commissioning	-	X		X	-	-	-		-	-	X	X	X	X	-	-	-	-	-	-	-	-	-
Operation and Maintenance																							
WTG Operation and Maintenance	X*	X	-	X	-	-	-	-	-	-	X	X	X	X	X	X	X	X	-	X	X	-	-
Road Maintenance	-	-	X	X	-	X	X	X	X	X	X	X	X	X	X	-	-	-	X	X	X	X	-
Power Line and Substation Maintenance	-	-	-	X	-	-	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-
Vegetation Management	-	-	X	X	-	-	X	X	X	X	X	X	X	X	-	-	-	-	-	-	X		X
Safety and Security	-	X	-	X	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-
Decommissioning																							
Removal of Infrastructure and Site Restoration	-	X	X	X	-	X	X	X	X	-	X	X	X	X	-	-	-	-	X	X	X	X	X

X = Potential interaction
- = No meaningful interaction
*= Interaction with positive effect that does not require in-depth assessment for mitigation measures

5 Atmospheric Environment

5.1 Overview

The atmospheric environment comprises weather and climate, air quality, ambient light, and acoustic conditions.

Biophysical and socio-economic conditions are closely tied to components of the existing atmospheric environment, effects to which could thereby effect changes to other VECs. Weather conditions such as precipitation and temperature shape features of habitat such as the aquatic environment, wetlands, and vegetation. Skyglow and surrounding noise levels are aspects of habitat and behaviour for terrestrial wildlife, bats, birds, and the human environment. Air quality is a cumulative measure of pollutants in the air from emissions and particulate matter that can settle to our earth and waters, influence climate, and affect health for all forms of life. Interactions of the Project with the atmospheric environment are therefore considered for many VEC assessments that follow in this document.

It is expected that the Project will interact with the atmospheric environment via various pathways during construction, operation and maintenance, and decommissioning. The Project supports the provincial Green Choice Program, which aims for 80% renewable energy generation in the province by 2030.

Effects, mitigation measures, and residual impacts to atmospheric environment as a result of the Project are outlined in this chapter. Mitigation measures will be further developed in a Project-specific EPP prior to construction to minimize adverse effects.

5.1.1 Regulatory Context

Assessment of the atmospheric environment considers provincial and federal regulations, policy, and guidelines:

- Nova Scotia *Environment Act*
- Nova Scotia Air Quality Regulations
- Canadian Ambient Air Quality Standards (CAAQS)
- *Environmental Assessment Supplemental Checklist: Wind Energy Projects* (NSECC, 2025a)
- Minimum Planning Requirements Regulations (NS Reg. 51/2025)

- *Guidelines for Environmental Noise Measurement and Assessment* (NSECC, 2023)
- *Health Canada Guidance for Evaluating Human Health Impacts in Environmental Assessment: Noise* (Health Canada, 2016)

5.1.2 Boundaries

The PDA represents the Project footprint and the maximum limit of potential direct physical disturbance associated with the Project. The LAA and RAA boundaries are defined as follows for each subcomponent of the atmospheric environment VEC.

Air Quality: According to the United States (US) Environmental Protection Agency, influences on air quality are generally limited to a range of 150 to 180 m downwind from the vicinity of heavily travelled roadways or along corridors with significant trucking traffic or rail activities (US Environmental Protection Agency, 2014). A conservative boundary of 500 m surrounding the PDA has therefore been selected as the LAA for air quality. The RAA is within the limits of Nova Scotia’s northern air zone assessed in the AQMS by ECCC through monitoring at Pictou.

Ambient Light: Effects from anthropogenic light depend on properties of the light source and height as well as atmospheric conditions. An LAA of 1 km around the PDA has been selected for effects to light levels to the surrounding receptors; the RAA is limited to 5 km to consider WTG lighting that meets Standard 621 of the Canadian Aviation Regulations.

Acoustic Environment: An LAA of 2 km from WTGs has been selected as per the *Environmental Assessment Supplemental Checklist: Wind Energy Projects* (NSECC, 2025) as well as Health Canada guidance (Health Canada, 2016). An RAA of 2 km combining both the Project LAA and WTGs of the adjacent Weaver’s Mountain was completed.

5.1.3 Assessment Methodology

The description of the existing environment is based primarily on data collected by regional air quality and meteorological monitoring stations as well as online scientific reports:

- ECCC Canadian Climate Normals (2026)
- Nova Scotia Ambient Air Quality Data Reports (NSECC, 2025b)
- Nova Scotia Ecological Landscape Analysis (NSDLF, 2019)

A noise assessment was completed for the Project by Nortek Resource Solutions Inc. (Nortek) and is presented in Appendix D. Nortek (2026) established a study area for the noise assessment as a 2 km buffer around the PDA.

Potential noise receptors were provided by the Proponent, through use of satellite imagery, the Nova Scotia Civic Address Finder, and were field-verified. A total of 22 receptors were included in noise modelling. Nortek (2026) applied a baseline acoustic value recommended by Health Canada (2017) of 35 dBA. This value is considered the average baseline acoustic level in quiet, rural areas during the night. Computer modelling was conducted to predict noise levels from operation of the Project and the cumulative effect of the operation of the Project combined with the nearby Weavers Mountain Wind Energy

Project. Details on the computer noise model inputs are provided in Nortek (2026) and consisted of source emissions from Project WTGs, and environmental conditions known to influence noise propagation (ground cover, temperature, humidity, wind conditions).

5.2 Existing Environment

5.2.1 Climate and Weather

The Project is in the Nova Scotia Highlands ecoregion, which is composed of both low-lying plateaus and lower-level highlands ranging in elevation from 120 to 300 m from Chignecto Bay to Cape Breton Island (Ecological Stratification Working Group, 1995). The ecoregion is characterized by warm, rainy summers and mild to cold, snowy winters. The Project lies within the Pictou Antigonish Highlands ecodistrict—an elevated triangle separating the Northumberland Lowlands ecodistrict of Pictou County from the St. Georges Bay ecodistrict lowlands of Antigonish County. Elevations in this ecodistrict generally range from 210 to 245 m, with the highest point being 300 m at Eigg Mountain (Nova Scotia Department of Lands and Forestry, 2019).

The nearest weather station to the PDA that records Canadian Climate Normal data is the Collegeville Weather Station, approximately 12 km east of the nearest WTG (ECCC, 2026). The station collects data from heights of 69 and 76.2 m, which are lower than that of the Project WTG locations where the elevations range from approximately 183 to 271 m. Climate Normals, based on the most recently available collection of meteorological data from 1991 to 2020, indicate that the average annual temperature at Collegeville was 6.3°C. Daily minimum temperature is lowest in the month of February, at -10.6°C, and highest in the month of July at 24.5°C. The extreme temperatures for that 30-year period were recorded as 36.0°C (July 2012) and – 33.0°C (January 1993). The average annual precipitation at that location was 1,122.0 millimetres (mm), with a daily extreme in the form of rainfall being 77.5 mm in August 1994. The lowest historical daily temperature recorded at this station over the entire period of record (1917 to present) was -37.2°C on February 9, 1934, and the highest was 38.3°C on August 19, 1935.

5.2.2 Air Quality

Nova Scotia shares air quality monitoring data with the federal government to inform the Air Quality Management System (AQMS) across Canada. The Canadian Council of Ministers of the Environment (CCME) assesses provincial values against the CAAQS (CCME, 2026) for fine particulate matter ($PM_{2.5}$), ground-level ozone, sulphur dioxide (SO_2), and nitrogen dioxide (NO_2). The CAAQS are meant to work progressively toward improving the air quality of Canada and are reviewed every five years. The evolving CAAQS for 2020 to 2030 are presented in Table 5.1.

Table 5.1 Canadian Ambient Air Quality Standards

Pollutant	Averaging Time	Standards (concentration)		
		2020	2025	2030
$PM_{2.5}$	24-hour (calendar day)	27 µg/m^3	-	23 µg/m^3
$PM_{2.5}$	Annual (calendar year)	8.8 µg/m^3	-	8.0 µg/m^3
Ground level Ozone	8-hour	62 ppb	60 ppb	Under review
SO_2	1-hour	70 ppb	65 ppb	Under review
	Annual	5.0 ppb	4.0 ppb	Under review
NO_2	1-hour	60 ppb	42 ppb	Under review
	Annual	17.0 ppb	12.0 ppb	Under review

$PM_{2.5}$: Particulate matter having a size of 2.5 micrometres (µm) or less
ppb: parts per billion
µg/m^3: micrograms per cubic metre

Nova Scotia is divided into four air zones; the Project is in the northern air zone, where ambient air is monitored by the province at Pictou. The northern air zone contains a population of 0.2 million people, extending across the entirety of the northern shore of mainland Nova Scotia and to a southern extent that includes the communities of Sherbrooke and Truro (Health Canada, 2023).

Based on the 2023 data (which is the most current at the time of document preparation) the CAAQS were met in all four air zones in Nova Scotia (NSECC, 2025b). With a goal to prevent deterioration of ambient air quality, three parameters in the northern air zone have been categorized as “yellow” under the CCME’s Air Zone Management System, reflecting an aim to further reduce ground-level ozone as well as both the 24-hour and annual $PM_{2.5}$ concentrations. Although ground-level ozone values have risen from 48 to 52 ppb since 2018, the 2023 value is still below the 2025 target standard of 60 ppb. The 24-hr $PM_{2.5}$ level in the northern zone rose for the first time since 2018 (10 to 11 µg/m^3), but the report noted that it may be attributable to the high wildfire activity that year (NSECC, 2025b). The $PM_{2.5}$ concentrations were, however, within CAAQ targets.

5.2.3 Ambient Light

The LAA is predominantly in a forested area of higher elevation, with limited exposure to artificial light sources. Recreational vehicles and vehicles associated with forestry operations in the LAA use headlights to travel the roads and trails throughout the year.

Within the PDA, LAA and RAA, ambient light is typical of rural areas. Streetlights are not present along Route 347 or Highway 7, nor are they present along smaller roads in the area, such as Laggan Road and Weaver’s Mountain Road. Furthermore, there are no lights installed as part of the stretch of Highway 104 directly to the north of the PDA. However, headlights from traffic along the Highway 104 would be prevalent. Headlights from rural traffic can frequently be observed along Route 347 and Highway 7. Headlights on smaller roads such as Laggan Road, Weaver's Mountain Road, and Black Brook Road are observed less frequently, typical of rural areas. Minimal lighting would also be produced by cellular communication towers in the region at night, as required by Transport Canada and NAV Canada. WTGs from the Weavers Mountain Wind Energy Project, currently under construction, could potentially be observed at points in the PDA, and would likely be observed at various points in the LAA and RAA. During summer months, full foliage in the elevated terrain would further limit ambient lighting of the area.

5.2.4 Acoustic Environment

The area in the LAA is considered to match the Health Canada description of being a quiet rural area where natural noise sources tend to dominate, having baseline sound levels of 35 dBA during nighttime periods (Health Canada, 2016). During daytime hours, natural sounds such as songbirds, well as intermittent anthropogenic noise from industrial and recreational activities, are typical of the acoustic environment in the LAA.

Industrial forestry takes place in LAA, with large forestry vehicles often traveling on roads in the PDA. These operations are likely a main source of noise in the area. Recreational vehicles like ATVs and snowmobiles also contribute to the noise in the PDA and surrounding areas. In addition, traffic on Highway 104, Highway 7, and Route 347 adds to the overall noise levels.

5.3 Effects Assessment

5.3.1 Potential Effects and Mitigation

Direct and indirect effects of the Project on components of the atmospheric environment could occur through various interconnected pathways. During construction, operation and maintenance, and decommissioning, vehicular emissions, fugitive dust, and noise are expected to be produced—which will affect air quality. Ground lighting of the Project footprint and aerial lighting on WTGs will contribute to ambient light in the PDA and LAA. There will also be effects on the acoustic environment during all phases of the Project when people and vehicles are on site and WTGs are in operation.

Project activities can affect the atmospheric environment as indicated in Table 5.2; identification of these potential effects does not consider the implementation of mitigation measures described herein.

Table 5.2 Potential Environmental Effects of the Project on the Atmospheric Environment

Project Activity	Potential Environmental Effects		
	Change in Air Quality	Change in Ambient Light	Change in Acoustic Environment
Construction			
Site Preparation	X	-	X
Access Roads Construction and Modifications	X	-	X
Material and Equipment Delivery and Storage	X	-	X
Infrastructure Installation	X	X	X
Restoration of Temporary Areas	X	-	X
Testing and Commissioning	-	X	X
Operation and Maintenance			
WTG Operation and Maintenance	-	X	X
Road Maintenance	X	-	X
Power Line and Substation Maintenance	-	-	X
Vegetation Management	X	-	X
Safety and Security	-	X	X
Decommissioning			
Removal of Infrastructure and Site Restoration	X	X	X

X = Potential Interaction

- = No Interaction

5.3.1.1 Air Quality

Air quality in the LAA will be affected, primarily by dust emissions during construction activities for clearing, road construction and maintenance, and equipment delivery traffic. Potential Project effects on air quality can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on air quality will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

- Onsite workers will visually monitor the construction site and report any dust concerns to the site inspector.
- Dust control measures (e.g., application of water) will be used during any periods of significant dust generation.
- Disturbed areas where soil is exposed will be reestablished as soon as the season permits and in accordance with contract specifications.
- Idling of heavy machinery and vehicles will be minimized as practicable.
- Heavy machinery and vehicles will be regularly checked and maintained for optimal operational emission levels.
- Speed limits will be enforced.
- Drop heights will be minimized when unloading trucks.

- Construction activities during high winds will be avoided whenever possible.
- No burning of cleared or grubbed materials will be permitted on site; surplus clearing and grubbing materials will be hauled off site for disposal.
- A Complaint Resolution Plan will be developed prior to construction.

5.3.1.2 Ambient Light

Activities associated with lighting of the PDA will occur through the life of the Project. In the short term, there may be some nighttime construction activities, which will require lighting for human safety. During operation and maintenance, WTG towers and the tops of WTG nacelles will require lighting for the safe navigation of aircraft during Project operation as per Transport Canada standards. Some site lighting, such as that for the substation and service building, will also be needed for the duration of the operation and maintenance phase. Lighting will be limited to safety and security needs during construction and operation. During construction and maintenance, if lighting on site is needed, spill-over light will be minimized and directed downward, where possible. WTG and transmission line lighting levels will be minimized, while meeting Transport Canada's requirements for aeronautical safety. With these mitigations, change to ambient light levels is expected to be low for the lifespan of the Project.

Potential Project effects on ambient light conditions can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on ambient light will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

- Nighttime construction activities will be minimized or limited and carried out only when necessary for the Project.
- Onsite lighting will be installed to the minimum needed for safety.
- Where onsite lighting is installed near the perimeter of the LAA, open areas will be avoided where possible.
- The fewest number of site-illuminating lights possible will be used in the PDA. Lighting will be minimized to the extent possible, while maintaining Transport Canada requirements.
- Site lighting will be directed downward to minimize light pollution to the surrounding environment and adjacent habitat, without compromising safety.
- Exterior lighting on the service building may utilize a motion-detection system during nighttime hours.
- A Complaint Resolution Plan will be developed prior to construction.

5.3.1.3 Acoustic Environment

The primary noise sources associated with construction will include trucks and other vehicles used to transport workers and materials to the PDA, backhoes and graders, cranes, and smaller equipment such as welding units. Blasting is expected as part of access road construction or upgrades, as well as WTG foundations. During operation and maintenance, the primary noise emissions are expected to occur through operation of the

WTGs. The noise modelling results (Appendix D) predict sound levels ranging from 35 to 39 dBA, all below the threshold of acceptable noise at each receptor.

In combination with natural and non-industrial anthropogenic sources, Nortek (2026) determined that the Project operation will comply with permissible sound levels outlined in the provincial noise guidelines in both the LAA and RAA (Appendix D).

Potential Project effects on acoustic environment can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on acoustic environment will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

- Nearby residents will be notified about scheduled noisy activities (e.g., blasting) to reduce disruption.
- Blasting will be conducted by a certified blaster.
- Blasting patterns and procedures that minimize shock or instantaneous peak noise levels will be used, where possible.
- Blasting activities will be limited to that which is necessary.
- Blasting will not occur near fuel storage facilities.
- Construction will occur during daytime hours and will be restricted at night, when possible.
- Work areas and travel paths will be designed to reduce the amount of time that equipment must operate in reverse to reduce the use of back-up alarms.
- Construction equipment and vehicles will be kept in good working order and loud machinery will be muffled when possible.
- A Complaint Resolution Plan will be developed prior to construction.

5.3.2 Residual Effects

Effects on the atmospheric environment are expected to be moderate. With the exception of particulate matter, activities will not increase air quality parameters in the LAA to levels above CAAQS. Effects to air quality will be temporary, occurring predominantly during construction, but will occur intermittently during operation and maintenance activities and temporarily during decommissioning. Lighting of the footprint will be the minimum needed for safety of the operations crew, and wooded areas will absorb most ground light diffusion in the LAA. Aerial light diffusion will be minimized while meeting the minimum standards in the Canadian Aviation Regulations for WTG lighting (i.e., Standard 621, Section 12.2 and Figure 5-3). The noise assessment predicts that effects will be minor. Project construction and operation is not expected to result in unacceptable noise effects in either the LAA or the RAA. With planning and management of construction activities, the adverse effects on atmospheric environment are not expected to be significant. Overall, the Project's contribution to renewable energy will have positive environmental effects to the atmospheric environment.

5.4 Monitoring

Aside from general observations and mitigation during work activities, monitoring is not proposed. A Complaint Resolution Plan will be developed prior to Project commencement. The plan will include noise monitoring methods should an operational noise related complaint require investigation by the Proponent.

6 Geophysical Environment

6.1 Overview

The geophysical environment comprises the topography (both natural and artificial) and subsurface resources, such as soil, sediment, bedrock, and groundwater. Surficial geology and topography shape the bioterrain of the ecological environment and are therefore closely related to other VECs assessed in this EA. Changes in topography can affect surface water flow, resulting in changes to the aquatic environment, wetlands, and groundwater recharge. Soil and bedrock matrices influence dust formation and erosion. Changes in groundwater can affect the surrounding ecosystems (aquatic and terrestrial) and socio-economic environment, namely human health.

It is expected that the Project will interact with the geophysical environment via various pathways during construction, operation and maintenance, as well as decommissioning. Site works in the PDA will involve the reshaping of the surface during construction that will affect the site's topography and run-off. Existing roads will be used to the extent possible, but excavation and blasting may be used where needed to achieve road grades of 8% or less and/or prepare WTG foundations. During decommissioning, while surface infrastructure will be removed (with the exception of access roads where landowners opt for retainment), it is expected that the PDA will be restored to an approximate depth of 1 mbgs below which remaining structural components will remain in place.

Effects, mitigation measures, and residual impacts to the geophysical environment have been outlined in this chapter and will be further developed in a Project-specific EPP prior to construction to minimize adverse effects.

6.1.1 Regulatory Context

Assessment of the geophysical environment considers characteristics of the existing environment and measures effects using provincial and federal legislation and guidelines:

- Nova Scotia *Environment Act*
- Nova Scotia *Water Resources Protection Act*
- Sulfide Bearing Material Disposal Regulations NS. Reg. 57/1995
- Health Canada Guidelines for Canadian Drinking Water Quality (2022)
- The CCME Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2007)

6.1.2 Boundaries

The PDA represents the Project footprint and the maximum limit of potential direct physical disturbance associated with the Project. The LAA boundary is defined as follows for each subcomponent of the geophysical environment VEC.

Bedrock and Soils (Quantity and Quality): Physical changes in bedrock and soil characteristics will be limited to the PDA for the lifetime of the Project; some infrastructure will remain after decommissioning.

Groundwater (Quantity and Quality): An LAA of 1 km outside the PDA boundary has been established (Figure 6.1).

6.1.3 Assessment Methodology

The description of the existing environment is based primarily on available online data sources:

- Ecological Land Classification for Nova Scotia
- Nova Scotia Geoscience Maps, Reports, and Data
- Nova Scotia Water Resource Reports and Maps
- Nova Scotia Well Logs Database
- Nova Scotia Groundwater Atlas

6.2 Existing Environment

6.2.1 Topography and Seismicity

Nova Scotia is part of the Appalachian region. The PDA lies within Ecodistrict 330: Pictou Antigonish Highlands Ecodistrict. The Cobequid – Chedabucto fault zone is approximately 5 km south of the PDA and is the defining geologic fault system in the region. The Hollow Fault and Browns Mountain Fault extend in a northeast-southwest direction across the ecodistrict, with several smaller faults extending perpendicular to both and overlapping the LAA (DNR, 1974). The Browns Mountain fault is a normal fault, where bedrock displacement is primarily vertical, resulting in a raised and lowered regions of the bedrock following displacement. The region is not located near the edges of tectonic plates and is outside of any seismic zones and is therefore considered low risk for major earthquakes (Natural Resources Canada (NRCan), 2019).

In the LAA, elevations range from 183 to 271 masl. Roadways are limited to dirt and gravel roads through the highlands. Streams and rivers intersect the LAA at various locations and are discussed in Section 7.2.

6.2.2 Bedrock and Soils

The ecodistrict's bedrock geology comprises sedimentary, igneous, and metamorphic rock deposited between the Ordovician and Carboniferous periods, and late Pre-Cambrian sedimentary rocks (White, 2011). The interlayered sedimentary and volcanic rock has been folded, faulted, and intruded by several plutonic assemblages (DNR, 1974). Granite, gabbro, diorite, siltstone, wacke, and conglomerate are typical.

Interactive mapping provided by the province is based on maps originally produced by Keppie (2000 as cited by NSDNR, 2021). Most of the LAA is underlain by the Keppoch Formation (Georgeville Group), which is composed of igneous rock, including rhyolitic flows and granitic sills and dykes (White, 2011). A collection of younger intrusive rocks (granite, diorite – gabbro) underly the northern section of the LAA, known as the Devonian Group (Figure 6.2).

A variety of glacial sediments deposited during the last glaciation intersect the LAA. Stony till derived from local bedrock is deposited across most of the LAA, in addition to undifferentiated till. Bedrock is exposed to northwest, and there are limited sections of peatland and alluvial deposits.

Soils in the LAA consist mostly of Cobequid soils—a stony, dark brown, gravelly loam underlain by a dark brown gravelly loam (Boreas, 2022). These soils are described as well drained, loose, and non-plastic.

6.2.3 Subsidence and Sinkholes

The LAA lies entirely in areas of low-risk karst (Nova Scotia Department of Energy and Mines, 2019). There are no reported sinkholes within 5 km of the LAA (Figure 6.3).

6.2.4 Groundwater

Groundwater flow is influenced by the primary porosity (pore spaces) and secondary porosity (fracture occurrence) in the bedrock. Sedimentary rock is typically highly fractured, and groundwater flows through pore spaces in the rock and along bedding planes and fracture zones. Igneous and metamorphic rock relies on faults and fractures to transmit water. Groundwater flow through igneous rock in the Georgeville Group most likely occurs primarily along fractures, faults, and contacts between geologic units. Geologic contacts in the PDA are the result of igneous intrusions, which could provide preferential groundwater flow pathways. Locally, groundwater flow is likely focused along minor faults and fractures within and between formations.

6.2.4.1 Watersheds and Groundwater Flow Divides

A primary watershed boundary intersects the eastern side of the PDA, running north-northwest to south-southeast. To the east of the boundary is the South/West River watershed which drains northeast to the Northumberland Straight. To the west of the boundary is the St. Mary's River watershed which drains south to the Atlantic Ocean (Nova Scotia Environment (NSE), 2011). Primary watershed boundaries can approximate regional groundwater flow divides. Groundwater flow to the east of the boundary likely continues northeast towards the Northumberland Straight, and groundwater flow to the west of the boundary likely flows south, discharging in part to larger rivers and streams in the St. Mary's watershed. Groundwater flow patterns are likely influenced by the variety of geologic formations and rock types present in the LAA.

Groundwater–surface water interactions are influenced by a variety of factors such as permeability of surficial sediments and bedrock, precipitation that contributes to groundwater recharge, and the presence of wetlands, lakes, and rivers which are influenced by topographic relief. Greens Brook and Black Brook could serve as areas of shallow groundwater discharge, or focused groundwater recharge. Haggarts Lake could serve as an area of focused groundwater recharge, especially if surficial sediments are thin and bedrock permeability is high.

6.2.4.2 Protected Wellfields and Municipal Water Supplies

The nearest source water for a public water supply is the Pictou watershed, over 6 km west of the PDA boundary, and is upstream of the New Glasgow surface water supply and protected water area.

The community of St. Joseph has a single drilled well that appears to supply a small number of homes along Ohio East Road west of Highway 7. The well is more than 8 km northeast of the PDA. The well is drilled into bedrock to a depth of 55 m and has 31 m of casing. Airlift yield following drilling indicated that the well is capable of producing approximately 118 cubic metres per day (m^3/day).

6.2.4.3 Potable Water Wells

One domestic water well identified as within 1 km of the PDA through the Nova Scotia Well Logs Database was determined to be in the community of Eureka, approximately 33 km west of the PDA boundary (NSECC, 2023). There are likely no other source water supplies, domestic or otherwise, identified in the LAA. Characteristics of 51 wells surrounding the LAA that are located in the same bedrock groupings as the PDA (Georgeville and Devonian Groups) were summarized below in Table 6.1. Well distances from the LAA range from 300 m to over 18 km. Information regarding depth to bedrock, total well depth, casing depth, static water level, and estimated yield for these wells is summarized in Table 6.1.

Table 6.1 Summary Table for Wells Surrounding the LAA

	Bedrock Depth (m)	Well Depth (m)	Casing Depth (m)	Static Water Level (m)	Estimated Yield (m^3/day)
Minimum	0.9	2.3	0.8	0	0
1st Quartile[1]	2.6	30.1	6.7	3.5	7
Median	5.2	47.2	10.5	5.5	18
Mean	6.4	48.8	12.2	7.2	46
3rd Quartile[2]	8.4	68.8	12.5	8.5	33
Maximum	20.7	99.0	51.8	33.8	981

	Bedrock Depth (m)	Well Depth (m)	Casing Depth (m)	Static Water Level (m)	Estimated Yield (m^3/day)
Number of Record Entries	50	43	50	43	51

[1] 1st Quartile – The value below which 25% of the data points are found when arranged in ascending order
[2] 3rd Quartile – The value below which 75% of the data points are found when arranged in ascending order

Records indicate that well depths are relatively shallow (median value of 47.2 m) and provide low yields (median value of 18 m^3/day), which is enough water for most domestic uses. Pumping test data provided on the provincial database in the vicinity of the PDA is sparse. A single pumping test completed approximately 7 km northeast of the PDA in metamorphic rock from the Georgeville group indicated the well had a sustainable pumping rate of 11.1 m^3/day.

6.2.4.4 Groundwater Quality

Groundwater quality in general varies depending on the mineral composition of the aquifer. Groundwater from igneous and metamorphic rock in Nova Scotia tends to exhibit higher concentrations of dissolved metals such as iron and manganese. Risk maps of the province (Nova Scotia Department of Mines) show some instances of elevated manganese in regional well water, and the area is broadly characterised as medium risk for elevated manganese (Kennedy, 2021).

In Nova Scotia, arsenic in groundwater is derived from bedrock-hosting sulphide minerals (primarily pyrite/pyrrhotite-bearing slate and granite). The PDA is underlain by rock primarily associated with a low risk of arsenic occurrence in groundwater. There are some limited regions of high risk of arsenic occurrence in groundwater to the north of the PDA associated with the granite and diorite-gabbro intrusive igneous bedrock (Kennedy and Drage, 2017) (Figure 6.4). Arsenic is further discussed in Chapter 13 (Socio-Economic Environment) in relation to human health.

Uranium has been identified in elevated concentrations across many groundwater wells in Nova Scotia. The bedrock deposits underlying the PDA are labelled as low risk for uranium in groundwater (Kennedy and Drage, 2020). Radon is a naturally occurring product of the breakdown of uranium. Radon is not considered a risk for drinking water (NSECC, n.d., a); however, the PDA is underlain by areas of low-risk potential for radon in indoor air (Figure 6.5). Water quality is assessed using Health Canada's Guidelines for Canadian Drinking Water Quality (Health Canada, 2022), which have been adopted by NSECC (NSECC, n.d., b).

6.3 Effects Assessment

6.3.1 Potential Effects and Mitigation

Direct and indirect effects of the Project on the geophysical environment could occur through various interconnected pathways. During construction, there will be blasting in some locations and fill brought to the PDA for developing access roads and WTG pads, which could affect ground stability and possibly future land use. Infrastructure at a depth greater than 1 mbgs, such as WTG foundations, will remain after decommissioning and access roads will be left available in the PDA. Project activities can affect the geophysical environment as indicated in Table 6.2; these potential effects do not consider the implementation of mitigation measures described herein.

Table 6.2 Potential Environmental Effects of the Project on the Geophysical Environment

Project Activity	Potential Environmental Effects			
	Bedrock and Soils		Groundwater	
	Change in Quantity	Change in Quality	Change in Quantity	Change in Quality
Construction				
Site Preparation	X	X	-	X
Access Roads Construction and Modifications	X	X	X	X
Material and Equipment Delivery and Storage	-	-	-	-
Infrastructure Installation	X	X	X	X
Restoration of Temporary Areas	-	-	-	-
Testing and Commissioning	-	-	-	-
Operation and Maintenance				
WTG Operation and Maintenance	-	-	-	-
Road Maintenance	X	-	-	X
Power Line and Substation Maintenance	-	-	-	-
Vegetation Management	-	X	-	X
Safety and Security	-	-	-	-
Decommissioning				
Removal of Infrastructure and Site Restoration	-	X	-	X

X = Potential Interaction
- = No Interaction

There are specific activities that could impact geophysical characteristics.

- Site preparation as well as operation and maintenance that includes vegetation clearing could impact nutrient loading to groundwater and remove or compact native soil. Increases in soil erosion rates could also occur.

- Site preparations involving earthworks and drainage features could alter groundwater recharge pathways and impact groundwater recharge rates.
- Construction and upgrades of access roads will introduce new material and cause soil compaction.
- Construction of WTG foundation footings that involve blasting could disturb established bedrock fracture networks that affect groundwater quantity (i.e., flow paths) and/or groundwater quality (i.e., creation and transmission of turbidity in large fractures, exposure of leachable elements such as arsenic or uranium).
- Temporary dewatering requirements during construction could lower groundwater table elevations in the areas surrounding the foundations.
- Decommissioning of infrastructure would involve heavy machinery and earthworks, which could impact the soil quality.

6.3.1.1 Change in Soil Quantity and Quality

Earthworks activities, such as constructing WTG foundations and new access roads, and/or improving existing access roads, will result in clearing vegetation and exposing soils in the immediate area of the PDA that will affect the characteristics of the site's terrain. Sloping in some areas may affect drainage features and will require ditching and/or installation of berms and culverts. Pathways and effects to surface water resources are described further in Chapter 7 (Aquatic Environment) and Chapter 9 (Wetlands).

Activities associated with earthworks as well as the use of vehicles and heavy equipment will occur during the lifetime of the Project, particularly during construction, and result in changes in ground stability where granular fill is used for building access roads, foundations, and temporary pads for cranes. During decommissioning, it is likely that access roads will be left for landowner and forestry activity use which will continue to be vulnerable to erosion.

Access road materials generally require gravel consisting of stone, sand, and fine particles with a binding characteristic to form a smooth, firm surface that can withstand weight and environmental effects. Appendix F of the Generic EPP used by the NSDPW recommends that Gravel Type II be applied at a thickness of 125 mm, covered by Gravel Type I to a thickness of 75 mm before shaping, compacting, and crowning access roads (NSDPW, 2005). The combination of adding fill to some portions of the PDA while excavating in others will affect soil quantity in those locations.

Below depths of 1 m, portions of foundations may remain after decommissioning. Compacted areas, blasted bedrock, and buried WTG foundations will change the characteristics of the underlying soil and ground stability that could affect land use opportunities after decommissioning.

Potential Project effects on soil quantity can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on soil quantity will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

- Access to WTG locations will use established roads to the extent practicable.
- Areas of clearing and grubbing will be limited to that needed to construct the Project.
- Where practicable, roots of trees and shrubs will be left intact to prevent soil erosion.
- Disturbed or compacted soils will be decompacted and restored using topsoil and stabilized during construction and decommissioning.
- Where possible, surface soil will be reused.
- Drainage features will be installed per the Project-specific EPP and guidance from the generic NSDPW EPP (NSDPW, 2005).
- An ESC Plan will be developed and implemented to avoid or reduce soil erosion during earthworks.

Soil quality in the PDA is also at risk of being adversely affected. Dust and gravel produced during construction as well as operation and maintenance of roadways and foundations could settle into undisturbed areas of the LAA, impacting soil quality at the surface. Vegetation management including vegetation clearing would also impact soil quality as destroyed vegetation decays at a rapid rate into the soil, producing elevated concentrations of nutrients such as dissolved organic carbon, nitrate, and ammonia.

Potential Project effects on soil quality can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on soil quality will be further detailed in a Project-specific EPP to be implemented prior to and during construction. The EPP will be submitted prior to start of construction.

- Topsoil and subsurface excavated material will be stored separately to prevent mixing and will be reused and/or disposed of separately.
- Run-off from stockpiled soil and organic debris will be controlled or minimized using tarps or other means.
- Where possible, surface soil will be reused. Material that cannot be reused on site will be disposed of off site following applicable regulations and guidelines.
- Fill brought to site for access road maintenance will meet CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2007) and parameter-specific updates appropriate for the site's land use.
- Material that cannot be reused on site will be disposed of off-site following applicable regulations and guidelines such as the CCME Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health (CCME, 2007) and parameter-specific updates.

6.3.1.2 Change in Groundwater Quantity and Quality

Groundwater is recharged from the surface via infiltration through porous rock, unconsolidated sediment, and/or bedrock fractures. Any alteration in these flow pathways resulting from Project activities could impact groundwater recharge volumes.

Construction and decommissioning activities have the potential to impact both groundwater quantity and quality. Blasting for access road construction can cause changes in established bedrock fracture networks in the LAA. Alternatively, blasting could open new, or expand, existing fracture networks. Blasting will be necessary only in select locations where the road needs to achieve a grade of 8%. As there anywhere no wells in the LAA, blasting shouldn't have an impact on any well water supplies.

General earthworks, including WTG foundation construction and roadwork, could change infiltration rates and thus groundwater recharge across the LAA, as surfaces and permeability are altered. This could have an impact on the volume of water recharging the water-bearing fractures. Furthermore, surfaces made less permeable during construction, such as roadways, will drain to constructed ditches or undisturbed areas of the LAA, which would in turn contribute to recharge of the aquifer in the same way as pre-construction.

If shallow water tables are encountered during blasting and excavation at foundation locations, temporary dewatering would be needed to allow the curing of the concrete. This has the potential to temporarily impact groundwater table elevations and groundwater flow pathways immediately surrounding the excavation, which could lower water levels in the area surrounding excavations. However, the nearest registered well to any WTG foundation is located approximately 1.2 km west (Figure 6.1), far beyond the extent of any drawdown caused by shallow dewatering.

The apparent well yield data are consistent with expectations for the rock types in the PDA and suggest that water management requirements would be greatest in areas of sedimentary rock, if excavation is needed. Propagation of any associated drawdown effects would extend furthest from the PDA in sedimentary rock, but the magnitude of drawdown would be expected to be relatively minor. Drawdown in the metamorphic rock would be the most significant, but the distance of propagation in this type of rock tends to be limited due to generally poorly developed and connected fracture networks.

The following key measures to mitigate the potential effects of the Project on groundwater quantity will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

- Where blasting is necessary, it will be undertaken by a qualified professional, and explosives will be stored off-site.
- Blasting will be avoided near residential areas.
- Bedrock monitoring wells installed during geotechnical investigations will be used to detect changes in water quantity.
- A Complaint Resolution Plan for the Project will be developed and implemented.

Blasting during construction could have potential adverse impacts on groundwater quality. Blasting during construction can expose uranium or arsenic-bearing bedrock to groundwater (i.e., new fracture development) or surface water (following excavation), which could introduce these contaminants to the groundwater system. Excavated rock piles exposed to rainfall have the potential to leach contaminants from the rock into surface water, and subsequently into groundwater. Blasting also has the potential to open new fracture networks that connect to contamination sources such as surface water bodies.

Clearing of vegetation during both the construction and operation and maintenance phases could also deteriorate groundwater quality. Vegetation clearing has the potential to temporarily enhance the nutrient loading (as cleared vegetation decomposes over time) to surface water and groundwater systems, impacting water quality.

Potential Project effects on groundwater quality can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on groundwater quality will be further detailed in a Project-specific EPP to be implemented prior to construction.

- Refuelling will occur in designated areas at least 30 m from a water feature.
- Where blasting is necessary, it will be undertaken by a qualified professional, and explosives will be stored off site.
- Blasting will be avoided near residential areas
- The Proponent will consult NSECC to determine whether rock samples from areas to be excavated require further analysis for sulphide-bearing materials per the Sulfide Bearing Material Disposal Regulations NS. Reg. 57/1995.
- Site-specific measures will be developed to restore and maintain infiltration areas and receiving water bodies in the Project-specific EPP.
- An ESC Plan will be developed and implemented to mitigate soil erosion during earthworks.
- A Complaint Resolution Plan will be developed and implemented for the Project.

6.3.2 Residual Effects

6.3.2.1 Change in Soil Quantity

Changes in soil quantity directly within the PDA where road building and foundation construction takes place cannot be avoided. The magnitude of these effects will be moderate, and the geographic extent of the impact immediate. These changes will permanently impact soil quantity (compaction, volume) as soil will be removed and roads and foundations are established. Therefore, the duration is assessed as long-term and the frequency continuous, as the access roads will be in place for the duration of the operation of the wind facility. Furthermore, the portions of the foundation slabs at 1 m and below will remain in place; therefore, the impact to these areas is irreversible. The timing is considered to have a low effect on this VEC.

Based on the limited PDA, both in area and depth, the overall residual effects on soil quantity are predicted to be not significant.

6.3.2.2 Change in Soil Quality

Changes in soil quality directly within the PDA where road building and foundation construction take place cannot be avoided. The magnitude of these effects is assessed to be minor, and the geographic extent of the impact immediate, limited to the PDA. These changes will temporarily impact soil quality (pouring concrete and gravel, compacting existing soil) as soil will be removed and roads and foundations established. Therefore, the duration is medium-term and the frequency continuous, as the access roads will be in place for the duration of the operation of the wind facility, with some compacted areas being restored following Project construction. The timing is considered to have a low effect on this VEC.

Based on the limited PDA, both in area and depth, the overall residual effects on soil quality are predicted to be not significant.

6.3.2.3 Change in Groundwater Quantity

Changes in groundwater quantity resulting from dewatering, should it be necessary, will result in temporary changes in the groundwater flow system; however, the magnitude of this effect is assessed to be minor. The geographic extent of this effect is considered local, extending beyond the PDA but not beyond the LAA. Once the foundations are poured, site dewatering will cease, and the groundwater table will be allowed to recharge.

Changes in groundwater quantity resulting from blasting changing fracture occurrence or orientation could result in changes in the groundwater flow system; however, the magnitude of this effect is assessed to be minor. The geographic extent of this effect is considered local, extending beyond the PDA but not beyond the LAA. The timing of these impacts could be high, if groundwater flow pathways were sealed off during the summer, when groundwater tables are typically lower. In the event where a water bearing fracture was sealed, this would be irreversible with continuous, long-term impacts on groundwater flow.

Based on the likely limited extent of any potential impacts on groundwater, and the mitigation measures the impact on groundwater quantity is predicted to be not significant.

6.3.2.4 Groundwater Quality

Similar to the effects on groundwater quantity, changes in groundwater quality resulting from blasting changing fracture occurrence or orientation could result in changes in the groundwater flow system and carry particulates; however, the magnitude of this effect is assessed to be minor. The geographic extent of this effect is considered local, extending beyond the PDA but not beyond the LAA. Long-term, continuous, and irreversible impacts could result from this effect.

Based on the likely limited extent of any potential impacts on groundwater, and the mitigation measures related to blasting (pre-blast surveys), the impact on groundwater quality is predicted to be not significant.

6.4 Monitoring

Construction monitors will report issues observed during earthworks; operation and maintenance staff will report signs of subsidence and erosion.

A Complaint Resolution Plan will be used to address complaints regarding well water quantity or quality should they arise. There is no continuous groundwater monitoring proposed for this Project.

7 Aquatic Environment

7.1 Overview

The assessment of the Project on the aquatic environment includes the aquatic ecosystem found in and associated with watercourses and waterbodies that interact with the Project. Waterbodies support essential ecological and socio-economic functions that are connected to flora (Chapter 8: Flora), wetlands (Chapter 9: Wetlands), and wildlife (Chapter 10: Terrestrial Wildlife, Chapter 11: Bats, and Chapter 12: Birds).

This section evaluates the potential impacts of the Project on the aquatic environment, with emphasis on fish and fish habitat, and provides mitigation, and construction and operational management practices to minimize these possible effects. The information collected for the assessment has also been used to provide input into design of the Project. The Project has the potential to affect the aquatic environment both directly (i.e., change in fish habitat due to installation of watercourse crossings, or change in water quality from sediment-laden runoff or resuspension of sediments into the water column), as well as indirectly due to increased use of Project roads and riparian habitat loss, fragmentation, and modification. In addition, aquatic species (i.e., fish) may exhibit short-term or long-term behavioural changes to avoid habitats subject to disturbance or changes in water or habitat quality, depending on the fish species and level of tolerance to disturbance.

The Proponent has designed the Project layout to avoid or reduce potential for adverse environmental effects on multiple VECs, including the aquatic environment. The nearest protected source water for a public water supply is the New Glasgow – Forbes Lake Protected Water Area, which is nearly 30 km west of the PDA and is entirely avoided by Project infrastructure. Additionally, the road network maximizes use of existing roads and minimizes new clearing as much as practical.

As discussed in the following subsections, the Project avoids impacts to the aquatic environment through detailed design and avoiding instream disruptions to fish habitat during key periods of fish life cycles by working within the least risk window for all instream construction (June 1 to September 30). Additionally, the Proponent will mitigate effects and protect the aquatic environment by acquiring required environmental permits for instream works (e.g. watercourse alteration approval), implementation of ESC measures at watercourse crossing sites, working in the dry and conducting fish salvages, and restoring sites to pre-construction conditions, or better, when possible, after watercourse crossings have been completed. DFO will assess the potential for harmful alteration, disruption, or destruction of fish habitat during the permitting phase of the Project and may require offsetting to counterbalance losses in fish habitat from the Project.

Potential effects, mitigation measures, and residual impacts to the aquatic environment as a result of the Project are outlined in this Chapter. Mitigation measures will be further developed in a Project-specific EPP prior to construction to minimize adverse effects.

7.1.1 Regulatory Context

Assessment of the aquatic environment considers relevant provincial and federal legislation and guidelines:

- *Fisheries Act*
- SARA
- *Canadian Environmental Protection Act*
- Nova Scotia *Environment Act*
- NSESA

7.1.2 Boundaries

The Study Area defines the spatial extent within which aquatic assessments were conducted to characterize baseline conditions.

The PDA represents the Project footprint and the maximum limit of potential direct physical disturbance associated with the Project.

For this assessment, the LAA for the aquatic environment has been set as 100 m upstream and 100 m downstream from the point of interaction of the Project with a watercourse (e.g., crossing location). This is based on the path of the river and not a straight-line distance. The LAA is based on the area where the extent of the effects from Project activities are likely to be detected and is based on the observed local conditions, assessed habitat, and typical size and flows in watercourses in the PDA.

The RAA for the aquatic environment is set as the boundaries of the secondary watersheds that the PDA overlaps: St. Mary's River and West River secondary watersheds (Figure 7.1). The RAA is based on the physical and biological conditions present and the type and location of other past, present, or reasonably foreseeable future projects or activities that have previously been, or will be, implemented. The RAA is used to inform the cumulative effects assessment (Chapter 15: Consideration of Cumulative Effects).

7.1.3 Assessment Methodology

The assessment of the aquatic environment focused on identifying watercourses and waterbodies in or near the PDA and assessing the existing biophysical features to determine presence and quality of fish habitat, including habitat for fish SAR[1] or species of conservation concern (SoCC)[2]. This was achieved though literature review, field surveys and habitat data analysis. The data collected from this assessment were used to identify the presence and quality of the fish habitat present and evaluate the potential impact of the Project on the existing aquatic environment. The description of the existing environment is based on background data collected through a review of the following databases and information resources, followed by field surveys:

- Provincially mapped watercourses
- Watercourse Database
- Atlantic Canada Conservation Data Centre (AC CDC) Data Reports (AC CDC, 2023a, 2023b)
- DFO Aquatic SAR Database (DFO, 2025)
- NSDNR (2018) Significant Species and Habitat Database

Existing biophysical features in the PDA were mapped using available geospatial data. The aquatic environment assessment focussed on identifying existing provincially mapped and predicted watercourses in the PDA and evaluating fish habitat within those watercourses. A total of 25 watercourse assessments were conducted in the PDA, primarily in the St. Mary's River secondary watershed where most of the PDA is located.

7.1.3.1.1 Habitat Assessment

Detailed fish and fish habitat assessments, including habitat biophysical measurements and water quality sampling, were conducted in July, August, and December 2024, and May to December 2025. Fish habitat assessments followed the standards and methods provided in the *Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador* (Sooley et al., 1998), the *Nova Scotia Guide to Altering Watercourses* (Province of Nova Scotia, 2015), and the *NSECC Certification Manual for Watercourse Alteration Installers* (NSECC, 2015). The assessment of the following parameters and characteristics occurred at each assessed site:

- Channel biophysical features (channel width, wetted width, bankfull width, mean channel depth, thalweg depth, bank height, and barriers to fish movement)
- Geomorphologic features (channel morphology, confinement, pattern, bank features)
- Fish habitat characteristics and quality (channel substrates, instream cover, forage presence, siltation)
- Velocity (metres per second)
- Riparian features (vegetation type, crown closure)
- Human disturbance indicators (erosion, siltation)

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[1] SAR are those species that listed under SARA (Schedule 1) or the NSESA.
[2] SoCC are those species that have been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered, Threatened, or Special Concern, but not yet listed under SARA or the NSESA. SoCC also includes those species tracked by the AC CDC and assigned sub-national conservation ranks of S1, S2, or S3.

- Water quality (dissolved oxygen, pH, temperature, conductivity, total dissolved solids)
- Watercourse classification (permanent, intermittent, ephemeral)
- Watercourse stage (high, mid, low, dry, frozen)

Habitat assessments were conducted at existing features (such as culverts) where the PDA interacted with a watercourse. A single habitat assessment point was completed at each location. The same approach applies to assessments within the Study Area that are outside of the current PDA, as they were conducted based on former Project layouts. Watercourses were delineated at least 50 m upstream and downstream of the assessment point.

Watercourses assessed during the detailed field assessments were assigned a classification (e.g., type) based on channel width and characteristics. The watercourses were classified as one, or a combination, of the following: no channel, ephemeral, intermittent, small permanent, or large permanent based on the definitions provided in the Table 7.1.

Table 7.1 Description of Watercourse Types

Watercourse Type	Channel Width	Description
Large Permanent	Greater than 5 m	• Defined channels • Defined beds and banks • Year-round flow • Fish bearing (unless barrier present) • Fish habitat
Small Permanent	Less than 5 m	• Defined channel • Defined beds and banks • Year-round flow • Fish bearing (unless barrier present) • Fish habitat
Intermittent	Typically less than 2 m	• Defined channels with scour • Defined beds and banks • Seasonal water flows (e.g., spring, fall) • May be seasonally fish-bearing • Potential for fish habitat
Ephemeral	Typically less than 1 m; channel not always defined	• Signs of infrequent flow; minor scour • No defined bed or banks • Result of rain events or snowmelt • Signs of surface flow or flooding • Roadside ditches • Typically not fish-bearing • Typically not fish habitat
No Channel	N/A	• No defined channel or scour • Surface or subsurface drainage • Potential mapping error • Not fish-bearing • Not fish habitat

Watercourses were also assessed based on the suitability of the habitat to support fish, using information gathered from both in situ water quality via a handheld multimeter and a rapid evaluation of the presence and quality of overall fish habitat characteristics. Conclusions regarding overall fish habitat quality were also derived from the parameters defined in Section 7.1.3.1.1. Overall fish habitat quality was ranked on a scale from None to Good. Rankings were based on the presence of key habitat features or physical parameters (e.g., substrates, cover, flow) and subject to interpretation by the assessor (i.e., environmental professional) based on previously reviewed published literature or guidance. Descriptions of the habitat quality rankings are provided below.

- Good – Habitat is suitable for the requirements of one or more life history stages of fish expected to present in the area. May contain sensitive habitat for one or more fish species.
- Moderate – Habitat is suitable at specific times of the year, but not ideal, for one or more life history stage of fish expected to be present in the area. No sensitive habitat is present.
- Poor – Habitat is not considered suitable for use for most of the life history stages of fish species expected to be present in the area.
- None – No fish habitat is present for any fish species due to unsuitable conditions.

Where habitat characteristics were suitable for multiple species, the rating was based on the species most likely to use the area.

Where species presence was unknown or uncertain, salmonid (e.g., Brook Trout) habitat was used as the default benchmark criteria for comparison. The use of salmonid habitat as the benchmark is considered conservative, as salmonid species are less adaptable than other fish species and typically have had more studies completed to understand the limits for their survival. Dominant and subdominant substrates were assessed based on the size classification presented in Standard Methods Guide for Freshwater Fish and Fish Habitat Surveys in Newfoundland and Labrador (Sooley et al., 1998) for habitat assessments, as per Table 7.2. Substrate composition could not be determined in one of the locations, as the watercourse was frozen.

Table 7.2 Substrate sizes and classes

Substrate Type	Size
Fines	< 0.06 mm
Sand	0.06 to 2 mm
Gravel	2 to 30 mm
Cobble	30 to 130 mm
Rubble	140 to 250 mm
Boulder	> 250 mm
Bedrock	Continuous slab that is 100% embedded

A conservative approach was used to classify the watercourses assessed. Watercourses that were identified during the field assessment as intermittent or permanent were treated as possibly fish bearing.

Siltation was qualitatively recorded by visually assessing the amount of fine particulates suspended in the water column or settled on the streambed, and was recorded as low, moderate, or high. This visual assessment was done from both banks of the watercourse.

7.1.3.1.2 Water Quality Analysis

A handheld YSI ProQuatro Multimeter was used to measure in situ water quality in watercourses with adequate flow and depth (depth greater than approximately 0.05 m). In situ surface water quality parameters measured using the multimeter at each assessment site:

- Temperature (degrees Celsius (°C))
- pH
- Conductivity (micro Siemens per cm (μS/cm))
- Total dissolved solids (TDS) (milligrams per litre (mg/L))
- Dissolved oxygen (mg/L) and percent oxygen saturation (%) *(when available)

Water quality parameters (i.e., temperature, pH, and dissolved oxygen) measured in the field were compared to the water quality guidelines[3], presented in Table 7.3, to support the determination of fish habitat quality and overall water quality of the ecosystem.

Table 7.3 Water Quality Limits for the Protection of Aquatic Life and Salmonids

Water Quality Parameter	CCME Water Quality Guideline for the Protection of Aquatic Life (Freshwater) (CCME, 2017)	Brook Trout Tolerance and Optimum Range (Raleigh, 1982)
pH	6.5 to 9.0	Tolerance: 4.0 to 9.5 Optimal: 6.5 to 8.0
Temperature (°C)	N/A	Tolerance: 0.5 to 22 Optimal: 11.0 to 16.0
Dissolved oxygen (mg/L)	**Cold water: between 6.5 and 9.5	Tolerance: ≥ 5.0 Optimal: ≥ 7.0

** Depending on the life stage

Water quality parameters were measured at 52 watercourse locations in the Study Area, with 23 being in the PDA. In situ water quality measurements were taken at the watercourse assessment crossing locations, where sufficient waterflow and depth was present. Data collected represent a snapshot view of the water quality in the watercourse

[3] Canadian Council of Ministers of the Environment (CCME) Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2017) and Brook Trout tolerance and optimal ranges for water quality (Raleigh, 1982)

at the time of assessment. The water quality program for the Project was completed from July to December 2024, and from May to December 2025.

7.1.3.1.3 Aquatic Invertebrates

As part of the aquatic habitat assessment program, aquatic invertebrate presence and density was assessed in watercourses by examining rocks in watercourse substrates. Observations of benthic aquatic invertebrates on or beneath rocky substrate were made and recorded as part of the habitat assessment conducted at each location where such substrate was present (i.e., gravel, cobble, and rubble). Some benthic aquatic invertebrates that commonly reside on the underside of rocks in substrate include the larval stages of caddisflies, mayflies, and stoneflies. These species, among others, are indicators of a healthy aquatic environment and good water quality for sensitive salmonid species, as well as a food source. Presence of benthic aquatic invertebrates was recorded numerically as the number and classification of invertebrates found on or beneath each rock.

7.2 Existing Environment

7.2.1 Hydrology / Watersheds

The PDA is in the Nova Scotia Highlands ecoregion and intersects two secondary watersheds: St Mary's River and West River.

The West River watershed drains north towards the Northumberland Strait, and St Mary's River watershed drains southerly toward the Atlantic Ocean. Most of the PDA is in the St Mary's River watershed, which encompasses the highest elevation in the PDA of 273 masl (CGVD2013).

The most prominent soil type in the PDA is Sandy Loam, which is represented across 65% of the watersheds, with Clay Loam and Loam each represented across 10% of the watershed areas. The most prominent land cover type in the two watersheds is forested, with temperate or sub-polar broadleaf deciduous forest, mixed forest, and temperate or sub-polar needleleaf forest making up 75% of the land cover.

The major watercourses crossing the PDA are Green's Brook and Black Brook, which each flow directly into the Main Branch of the St Mary's River. There are several smaller tributaries to these watercourses crossing the PDA, with very few lakes. Haggarts Lake and Indian Lake are headwater lakes to Greens Brook and Black Brook respectively, which are adjacent to the PDA. These lakes do not directly intersect the PDA.

7.2.2 Fish and Fish Habitat

Of the 62 watercourses identified and assessed in the Study Area, 25 overlap with the PDA, the majority of which occur in the St. Mary's River secondary watershed. These 25 watercourses are described in this section. Of the 25, the dominant watercourse type was intermittent (60%). Many of these locations were associated with wetland features as connecting, drainage, or inflow channels. One intermittent watercourse assessed in the PDA was a tributary to Black Brook, the only large permanent watercourse intersecting the PDA, comprising less than 5% of the watercourses in the PDA. Small permanent watercourses comprised 24% of watercourses in the PDA. One of the small permanent watercourses assessed occurred on Greens Brook and drains from Haggarts Lake, which borders the PDA. Twelve percent of watercourses assessed in the PDA were ephemeral channels. A list of the 25 watercourses assessed in the PDA is provided in Table E1 in Appendix E, while a list of all 62 watercourses identified in the Study Area is provided in Table E2 in Appendix E.

Gravel, used by multiple fish species as spawning habitat, was the dominant substrate in only five of the watercourses assessed in the PDA (Table E3 Appendix E). However, gravel or cobble was the subdominant substrate (i.e., second most prominent substrate in a watercourse) in seven watercourses. Fines were the most common dominant substrate observed at 11 watercourses, followed by gravel, then sand at four watercourses. Boulders were the dominant substrate in the large permanent watercourse, which provide resting areas and cover for fish. In the three ephemeral watercourse channels, fines were the dominant substrate, with one channel having sand as a subdominant substrate.

Cover type and abundance are some of the characteristics used to determine the suitability of available habitat for various life stages of fish. Overall, overhanging vegetation and small woody debris were the dominant and sub-dominant cover types observed in the PDA. In possibly fish-bearing watercourses, overhanging vegetation was a dominant cover type in 12 watercourses, followed by small woody debris at four watercourses. Overhanging vegetation, small woody debris, and instream vegetation were the dominant cover types in the three ephemeral channels assessed (Table E4 Appendix E).

In the PDA, out of 25 watercourses assessed for fish habitat quality, only two were identified as having good overall fish habitat: Black Brook and Greens Brook. These are the only two major, or named, watercourses that intersect the PDA. All intermittent and ephemeral watercourses were found to have poor to poor-moderate overall fish habitat. One small permanent watercourse was rated moderate in overall fish habitat quality, with the remaining four rated as poor or poor-moderate. The dominant fish habitat rating among potentially fish-bearing channels was poor, with 14 watercourses having this rating. A summary of overall fish habitat quality is provided in Table E5 Appendix E.

As part of the watercourse and fish habitat field assessment program, fish passage barriers were recorded when encountered. Barriers encountered during the assessment program included loss of channel definition and sections of subsurface flow. At many of the locations where loss of channelization and subsurface flows were observed, the channel led to a wetland. Cascades and damaged, perched, or buried culverts were occasionally encountered in the PDA.

Overall, the results of watercourse and fish habitat assessments indicate similarity among many of the assessed watercourse locations within the PDA, particularly the intermittent watercourses. Fish habitat was generally of poor quality in these watercourses. Locations with the highest quality overall fish habitat within the PDA were the two major watercourses: Black Brook and Greens Brook.

7.2.2.2 Aquatic Species

Fish sampling (e.g., backpack electrofishing) was not conducted within the Study Area. Brook Trout (*Salvelinus fontinalis*) was recorded as an incidental observation during field programs on two occasions outside the PDA, in tributaries of Black Brook. Historical DFO and NS Department of Fisheries and Aquaculture (NSDFA) electrofishing records from within the St. Mary's River Watershed, spanning the years 1969 to 2010, confirm the presence of several fish species (Mitchell, 2012). The following is a list of confirmed species from these records:

- Sea Lamprey (*Petromyzon marinus*)
- Alewife/Gaspereau (*Alosa pseudoharengus*)
- American Shad (*Alosa sapidissima*)
- Atlantic Salmon (*Salmo salar*)
- Brook Trout (*Salvelinus fontinalis*)
- Brown Trout (*Salmo trutta*)
- Rainbow Smelt (*Osmerus mordax*)
- Common Shiner (*Notropis cornutus*)
- Golden Shiner (*Notemigonus crysoleucas*)
- Creek Chub (*Semotilus atromaculatus*)
- Lake Chub (*Couesius plumbeus*)
- Northern Redbelly Dace (*Chrosomus eos*)
- Blacknose Dace (*Rhinichthys atratulus*)
- White Sucker (*Catastomus commersoni*)
- Brown Bullhead (*Ameiurus nebulosus*)
- American Eel (*Anguilla rostrata*)
- Banded Killifish (*Fundulus diaphanus*)
- Ninespine Stickleback (*Pungitius pungitius*)
- Threespine Stickleback (*Gasterosteus aculeatus*)
- Yellow Perch (*Perca fluviatalis*)

7.2.2.3 Species at Risk

Brook Floater (*Alasmidonta varicosa*), a species at risk ranked as Special Concern under *SARA*, is known to occur within 15 km of the PDA in the St. Mary's River Watershed, specifically in Eden Lake and East River St. Mary's (DFO, 2025). It is a freshwater mussel that ranges from the Maritime provinces in Canada south to Georgia, United States. In Canada, this species is only found in Nova Scotia and New Brunswick. This population in Canada represents a stronghold for the species, given that it has disappeared from approximately half of its range in the United States. Habitat preferences of Brook Floater include watercourses with medium to high water flow, with a substrate consisting of cobble and pockets of sand, as well as certain lake environments. In high-velocity waters, they are typically found in clusters behind boulders and under stream banks. Prominent threats facing Brook Floater habitat include forestry and agriculture runoff, shoreline development, sedimentation, and dams that impede migration of their host fish species (Government of Canada, 2026). While Brook Floater was not observed in the PDA, suitable habitat is present in permanent watercourses in the PDA.

Other species of conservation concern that are known to be present within 15 km of the PDA include Brook Trout, the Southern Gulf of St. Lawrence and Cape Breton population of Atlantic Salmon, the Nova Scotia Southern Upland East population of Atlantic Salmon, and Alewife. An invertebrate species of concern that is known to occur within 15 km of the PDA, but was not observed during field programs, is the Eastern Pearlshell (*Margaritifera margaritifera*).

The Southern Gulf of St. Lawrence and Cape Breton population of Atlantic Salmon has been assessed as Endangered by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and have an S-rank of S1 in Nova Scotia. The spawning range of this population covers many known salmon rivers in the southern Gulf of St. Lawrence to rivers in Cape Breton Island, Nova Scotia, that drain into the Gulf of St. Lawrence, Bras d'Or Lakes, and the Atlantic Ocean (COSEWIC, 2025). As occurs with other populations of Atlantic Salmon, this population is anadromous. They spend much of their life feeding and growing at sea in the North Atlantic and then return to reproduce in their natal freshwater streams. Juveniles spend one to eight years in freshwater before migrating to the ocean, where they remain for one to four years before returning to fresh water for their first spawning season (ECCC, 2018). Although Atlantic Salmon were not observed in the PDA, they are known to be present within 15 km and suitable spawning habitat is present in some of the permanent watercourses.

The Nova Scotia Southern Upland East population of Atlantic Salmon was formerly included in a larger population that was assessed as Endangered by COSEWIC with an S-rank of S1 in Nova Scotia. Historically, their range spans rivers across a large portion of the province from the northeastern mainland near Canso down the Atlantic Coast to Hartlen Point (COSEWIC, 2025). This population faces a number of threats, including habitat fragmentation, marine ecosystem change, acidification of freshwater habitat, presence of aquatic invasive species, illegal poaching, and open net-pen salmonid aquaculture (Raab et al., 2024). The life history characteristics of this population are similar to the Southern Gulf of St. Lawrence and Cape Breton population. Juveniles of the Nova Scotia Southern Upland East population typically spend three to four years in freshwater before migrating to the sea during their smolt life stage and often mature after one or two years in the marine environment (Raab et al., 2024).

Brook Trout (S-rank of S3) are a popular sport fish that are found widely around the province in clear, cool, well oxygenated streams. Brook Trout can live in salt or fresh water;

however, they may spend their entire life in fresh water and never migrate to the ocean (DFO, 1988). Both sea run and freshwater Brook Trout spawn in fresh water. Brook Trout generally prefer to spawn over gravel substrates in lakes or small protected streams with groundwater or areas of spring upwelling. Spawning occurs in September and October and trout fry emerge from the gravel between February and April. Juvenile trout feed on plankton, progressing to insects, while adults feed primarily on insects but are opportunistic and will feed on a wide variety of prey (Scott & Crossman, 1985). As they mature, Brook Trout will move into deeper waters for protection and foraging opportunities. A stocking program is active in Nova Scotia, where Brook Trout are stocked in up to 200 lakes around the province in the fall. Brook Trout were observed in tributaries of Black Brook outside the PDA, and suitable habitat is present in some of the permanent watercourses in the PDA.

Alewife (S-rank S3B), one of two species also known as Gaspereau (along with Blueback Herring), are a herring-like fish common to the northwest Atlantic, from the Gulf of St. Lawrence south to North Carolina (DFO, 2016). It is an anadromous species that spawns in rivers, streams, and lakes, and returns to sea shortly thereafter. In coastal areas, movements of schooling adults can be seen migrating inland in the spring (United States Fish and Wildlife Service (USFWS), 2019). The adult diet of Alewife mainly consists of small fish and shrimp, with juveniles feeding on diatoms and copepods in freshwater (USFWS, 2019). The primary threats facing Alewife in Nova Scotia include overharvesting and impassable dams on rivers. Alewife were not observed in the PDA but occur within 15 km of the PDA.

The Eastern Pearlshell is a long-lived, freshwater mussel that has been observed within 15 km of the PDA and has an S-rank of S2S3 in Nova Scotia. In North America, this species can be found in eight US states along the Eastern Seaboard, and in Atlantic Canada. In Nova Scotia, they are primarily found in northern and central areas of the mainland (Davis, 2007). The typical habitat for Eastern Pearlshell includes small to medium-sized cold-water streams and rivers with sand and gravel substrate. They require well-oxygenated water, as this is a requirement of their salmonid host species. Glochidia, a tiny larval stage of freshwater mussels, temporarily attach to the gill filaments of salmonid species while they grow into their juvenile stage and then detach. This parasitic life stage is not known to have any observable negative effects on the host (Mitchell, 2011). This mussel is considered a sensitive species in Nova Scotia due to the reduction in Atlantic Salmon numbers, as well as the impacts of acid rain. While this species was not observed in the PDA during field programs, suitable habitat is present in some of the permanent watercourses.

7.2.3 Water Quality

The summary of in situ water quality parameters collected within the PDA during the field program is presented in Table 7.4. Water quality measurements were taken at different times of the year from May to December, causing seasonal variation in results. For this reason, averages of measurements were omitted from Table 7.4. All water quality readings can be found in Table E4 Appendix E. During sampling, the maximum temperature recorded in the watercourses was 19.7°C, while the minimum temperature recorded was 0.2°C. The median value for pH measured was 5.4, with the lowest value recorded at 3.9. The maximum dissolved oxygen measurement was approximately 17.1 mg/L, with the lowest value measured at 2.6 mg/L. Siltation was visually assessed in 22 watercourses in the PDA. Of these, 16 displayed low levels of siltation, five were moderate, and one displayed high levels of siltation.

Overall, the majority of water quality results fell within the water quality limits stated in Table 7.4. All but one pH measurement fell within the tolerant range (4.0 to 9.5) for salmonids. Dissolved oxygen levels were often optimal (≥ 7.0 mg/L), with three readings falling just below the tolerance level (≥ 5.0 mg/L). All but one temperature reading fell within the tolerant range (0.5 to 22°C) for salmonids. Of these, three fell within the optimal range (11 to 16°C). Dissolved oxygen and pH measured in Black Brook were within optimal ranges, with temperature being within the tolerant range (19.7°C). Water quality measurements were taken at this location in August, when water temperatures are often at or around their peak. At the Greens Brook location, temperature and dissolved oxygen were within optimal ranges, with pH measuring within the tolerant range (5.84).

Table 7.4 Summary Statistics of In Situ Water Quality Measurements

Parameter	Maximum	Minimum	Median
Temperature (°C)	19.7	0.2	6.9
Dissolved Oxygen (mg/L)	17.1	2.6	10.2
Specific Conductivity (µS/cm)	61.9	20.9	36.5
Total Dissolved Solids (mg/L)	40.3	14.3	23.6
pH	7.9	3.9	5.4

7.3 Effects Assessment

7.3.1 Potential Effects and Mitigation

Direct and indirect effects of the Project on the aquatic environment could occur through various interconnected pathways. During construction, activities like earthworks and vegetation clearing may lead to changes in riparian habitat, as well as changes in water quality. Increased road width and density will require additional watercourse crossings which may result in changes to fish habitat and aquatic species movement. Additionally, sensory disturbance from noise during construction (e.g., blasting) has the potential to cause injury or mortality to fish or could impact aquatic organism behaviour.

The Project has the potential to result in adverse effects on the aquatic environment as a result of short-term activities during the construction phase, as well as long-term activities during operation and maintenance. The potential effects include a loss of fish habitat, change in water quality, and mortality or injury of fish. Project construction activities, predominantly earthworks, will result in alteration of fish and riparian habitat and may result in a loss of fish habitat in the PDA. Changes to fish habitat as a result of Project activities are expected to occur within the PDA.

Earth disturbing activities can lead to changes in the local surface water drainage with potential indirect effects on water quantity and quality in watercourses. Project activities can affect the aquatic environment as indicated in Table 7.5; these potential effects do not consider the implementation of mitigation measures described herein.

Table 7.5 Potential Environmental Effects of the Project on the Aquatic Environment

Project Activity	Potential Environmental Effects			
	Change in Fish Habitat		Change in Water Quality	Mortality or Injury of Fish
	Instream Habitat	Riparian Area		
Construction				
Site Preparation	X	X	X	X
Access Roads Construction and Modifications	X	X	X	X
Material and Equipment Delivery and Storage	-	-	-	-
Infrastructure Installation	-	-	X	X
Restoration of Temporary Areas	-	X	X	-
Testing and Commissioning	-	-	-	-
Operation and Maintenance				
WTG Operation and Maintenance	-	-	-	-
Road Maintenance	-	-	X	X
Power Line and Substation Maintenance	-	X	-	-
Vegetation Management	-	X	-	-
Safety and Security	-	-	-	-
Decommissioning				
Removal of Infrastructure and Site Restoration	-	X	X	-

X = Potential Interaction
- = No Interaction

Potential adverse effects on fish habitat in the aquatic environment have been determined through an evaluation of the DFO (2024) Pathways of Effects diagrams based on the proposed Project activities. These effects are described in this section in terms of the loss of fish habitat, changes to water quality, and mortality or injury to fish. Mitigation measures are applied to avoid or minimize the effects of the activities needed for the Project, where possible. Avoidance is the first step of the hierarchy of measures for the conservation and protection of fish and fish habitat, described in DFO (2025), followed by mitigation, then offsetting.

The primary locations of effects to the aquatic environment from Project activities are at watercourse crossings where culvert or bridge works, during road upgrades or new road construction, will occur. The crossings will also require removal of riparian areas. Effects to the aquatic environment are possible during all stages of the Project but are most likely to occur during the construction phase of the Project when direct interaction with watercourses will occur (i.e., watercourse crossing installation or replacement). Generally, effects are expected to be short-term, occurring regularly during the construction phase, localized to the area immediately in or adjacent to watercourses, and expected to be mostly reversible upon completion of the construction. Mitigation measures are expected to be highly effective at preventing effects to the aquatic environment at most construction locations in the PDA. Details on the potential effects to the aquatic environment and applicable mitigation measures are presented in the following subsections.

7.3.1.1 Change in Fish Habitat

Although the Project layout and implementation methods have been designed to minimize adverse impacts to the aquatic environment, some Project activities will interact with the aquatic environment and potentially cause a change in hydrology and fish habitat, including direct losses of instream and riparian fish habitat. Without mitigation, the Project has the potential to change the base flow in existing watercourses in the PDA through surface water drainage ditches and grading in the PDA, which can result in changes in pathways of surface water flows which can change the quantity of water available in watercourses. A reduction in water quantity in fish bearing watercourses can cause a loss of usable area and a change in the availability of suitable habitat for important life stages of fish and aquatic organisms. The change in quantity can result in a reduction in quality of the existing water through increased temperature or changes in availability of food and nutrients. Changes to surface water flow and quantity can also impact watercourse substrates, which, in areas that are important for fish spawning, would affect reproductive success. Substrates are also important in providing cover and foraging areas for fish.

During operation and maintenance, there may be less overall forested land due to clearing activities associated with the Project. This change could reduce stormwater storage on site, leading to increased runoff from precipitation. Riparian clearing for the Project will be limited to only those areas needed for the upgraded access roads or work areas. Banks will be stabilized and reseeded after modification, where possible. Additionally, works in watercourses will be completed in the dry, and all instream areas disturbed will be restored to their previous condition, or better. Loss of instream habitat from sedimentation is not expected after the implementation of mitigation measures.

Habitat loss has the potential to occur where watercourses intersect the PDA, specifically where road crossing culverts require replacement or upgrades, or where additional tree clearing is needed on WTG pads and along roadways. A total of 22 intermittent or permanent watercourses intersect the PDA and may require crossing structure installation or upgrades.

Mitigation measures implemented during the installation of culverts and bridges will include proper culvert and bridge design, including allowing adequate flow conveyance, embedding culverts, and maintaining fish passage through the installed culverts. Additionally, all culverts installed for the access roads will meet or exceed the minimum Nova Scotia Watercourse Alteration Standard (NSECC, 2015). Although the minimum standard for culverts in Nova Scotia is 450 mm, all culverts installed will be able to convey the 1 in 100-year event flows. These measures are expected to be effective at preventing changes in base flows in the watercourses where crossing culverts upgrades or installations are needed. Fish habitat will be established in embedded culverts through the placement of appropriately sized substrates to create cover and foraging habitat, while not impeding migration. Instream areas around culvert and bridge work areas will be modified, if necessary, to improve fish habitat through placement of appropriately sized substrates to create cover, foraging, and potentially spawning habitat.

Most potential Project effects on fish habitat can be effectively mitigated through planning and management of construction activities. Any that cannot be effectively mitigated may require offsetting through DFO's *Fisheries Act* authorization process. Harmful fish habitat alteration, disruption, or destruction is not expected to occur with this Project, and therefore offsetting will not likely be necessary. If it were, offsetting for Project effects on fish habitat would be determined during the permitting phase. The following key measures to mitigate the potential effects of the Project on fish habitat and hydrology will be further detailed in an EPP and will be implemented prior to and during construction.

- Work areas that overlap with watercourses below the high-water mark (i.e., in-water work areas) will be avoided, where not directly in the construction area.
- Watercourses will be clearly marked for Project personnel to avoid impacts to the watercourse.
- Applicable permits will be obtained prior to the start of any activity that has the potential to impact the aquatic environment. The Project will follow the conditions set out in the acquired permits for works in the aquatic environment.
- The Proponent will develop and implement ESC procedures.
- Installation of new or upgraded culverts will meet provincial standards and DFO design criteria for fish passage where applicable.
- Watercourse crossings will be installed in compliance with the Nova Scotia Guide to Altering Watercourses.
  - All work will occur in the dry
  - In-stream work will occur between June 1 to September 30, unless otherwise approved by NSECC
- Restoration of instream and riparian areas will occur as required.

7.3.1.2 Change in Water Quality

Without mitigation, construction and operation and maintenance activities in or adjacent to the aquatic environment may result in a change to the baseline surface water quality in watercourses and waterbodies in the PDA, which could extend into the LAA. Effects on water quality may occur during construction or during operation of the Project in areas where ground disturbance occurs. Effects on water quality are expected to be short-term in duration and localized to the PDA or immediately downstream of the construction area in flowing watercourses.

Potential Project effects on water quality can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on water quality will be further detailed in a Project-specific EPP and implemented prior to construction:

- ESC Measures
  - Implementation of ESC measures around work areas for the duration of construction, especially upslope of wetlands and/or watercourses. ESC measures will be periodically inspected by the onsite environmental monitor and will be modified as needed.
  - Exposed soils, especially on slopes, will be stabilized as soon as possible following completion of construction.
  - Riparian clearing will be limited to only that necessary for the Project and will be conducted in stages to minimize exposure size and duration for soils.
  - Banks will be graded to a stable slope and revegetated/seeded where possible.
  - Environmental monitoring will occur during in-water works, or where works have the potential to adversely impact the aquatic environment.
- Acid Rock Drainage (ARD) Procedures (if required)
  - Site-specific measures will be developed for managing runoff from bedrock that is newly exposed during excavation and/or blasting.
  - An ARD Management Plan will be developed, if required, to manage and mitigate any potential effects from ARD.
- Rock material used during construction must be clean, non-ore bearing, non-toxic to aquatic life, coarse granular, and non-watercourse derived, as per NSECC *Guide to Altering Watercourses.*

7.3.1.3 Fish Mortality

Project activities during construction, operation and maintenance, and decommissioning of the Project have the potential to cause mortality or injury to aquatic organisms (i.e., freshwater fish). Project activities in watercourses for access road construction can include the placement or upgrades of crossing structures, culverts, as well as the placement of materials (e.g., boulders) that support the infrastructure. These activities can cause mortality or injury of fish/eggs/ova from physical crushing as a result of equipment use in watercourses. Sediment, contamination, and excess nutrients have the potential to cause mortality to fish/eggs/ova through the disruption of physiological functions in the organisms. If used in proximity to fish bearing watercourses or waterbodies, explosives have the potential to cause lethal or sublethal effects to fish. Through the blasting of rock or materials, the activity may cause the ejecta to land in adjacent waters where, if present, fish could be harmed or killed. Additionally, the vibrations and sound pressure from the blast can cause damage to internal organs, including swim bladders, which can affect the ability of a fish to regulate buoyancy in the water column, as well as affecting their ability to detect sound or pressure changes (Blanco & Unniappan, 2022; Wright & Hopky, 1998).

Mitigation measures to prevent or reduce loss of fish habitat and change in water quality will also prevent or reduce fish mortality and injury. Project activities in watercourses will be completed in the dry, in the appropriate timing window, and with a fish salvage and relocation program.

Potential Project effects on fish can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on fish will be further detailed in an EPP and will be implemented prior to and during construction.

- Acquire provincial and federal approvals and permits for in-water works.
- Follow recommendations and requirements of the approvals and permits issued for the Project to prevent fish mortality.
- Follow instream work windows to protect fish. In-water works will be conducted between June 1 and September 30, unless otherwise permitted by regulators.
- Equipment will not be used directly in flowing water.
- Follow DFO's Codes of Practice: Temporary Fords: Crossing.
- Isolate the work site with a coffer dam (or similar) and dewater the site.
- Follow DFO's In-Water Site Isolation Standard.
- Avoid the use of explosives, where possible, in the aquatic environment or within the setback from the aquatic environment as per the guideline criteria for various substrates as per Wright & Hopky (1998), or as per a distance as directed by DFO. Any storage of explosives will be a minimum of 30 m away from watercourses unless authorized by applicable regulatory authorities.
- Debris from blasting will not be ejected into any watercourses.

7.3.2 Residual Effects

After mitigation, detailed design, and restoration in accordance with permit conditions, significant residual effects in the aquatic environment are not expected in the LAA. Although habitat losses for instream and riparian areas are expected to occur, residual effects from the Project activities would be minor, short-term, and local in impact, resulting in no permanent or significant impacts. Effects to water quality and mortality or injury of fish can be mitigated to avoid significant residual effects.

7.4 Monitoring

If required, a monitoring plan will be developed prior to the start of construction to meet the conditions of any required regulatory permits for the project, including NSECC Watercourse Alteration Approvals and DFO *Fisheries Act* Authorization (if required) for the Project. The monitoring plan, if required, will identify locations and methods to assess the effectiveness of mitigation measures to protect the aquatic environment during construction of the Project. Monitoring locations will be based on the final project design and the location of impacts to the aquatic environment, including culvert and bridge installations or upgrades. Monitoring targets and goals will be determined during the permitting phase of the Project in coordination with the applicable regulatory agency (e.g., DFO, NSECC).

Monitoring locations will be based on pre-construction conditions and will be monitored through construction and post-construction as required by conditions of permits.

- Experienced environmental monitors will be on site during works in or near the aquatic environment to monitor the effectiveness of implemented mitigation measures and to provide support to the construction team for any environmental issues that arise.
- Environmental monitors will be given authority to stop or modify activities that have the potential to cause, or are causing, an adverse impact to the aquatic environment. The environmental monitor will also have Stop Work authority for the entire work site to mitigate an impact to the aquatic environment due to failing or improperly functioning mitigation measures. Details of the environmental monitor’s responsibilities and authority will be defined in a Project-specific EPP.

8 Flora

8.1 Overview

This chapter assesses the potential effects of the Project on terrestrial flora, including vegetation communities and individual vascular and non-vascular plant, lichen, and bryophyte species (including SAR and SoCC). Project activities can affect flora through direct pathways, such as habitat loss associated with pre-construction clearing, and through indirect pathways, including habitat modification, degradation, and the introduction or spread of invasive species. Interactions with vegetation communities are closely linked to other VECs assessed in this EA Registration Document, including the aquatic environment (Chapter 7), wetlands (Chapter 9), terrestrial wildlife (Chapter 10), bats (Chapter 11), and birds (Chapter 12).

Design of the Project layout, including maximizing the use of existing roads and previously harvested areas, have reduced the potential for adverse effects on vegetation communities. Strategic siting has been applied to limit habitat disturbance, including maintaining vegetated buffers around wetlands and watercourses and prioritizing previously disturbed or lower-value habitats for infrastructure placement.

The potential effects, mitigation measures, and residual impacts on terrestrial flora resulting from the Project are described in the following sections. Mitigation measures will be further refined and consolidated into an EPP prior to construction.

8.1.1 Regulatory Context

Assessment of the terrestrial flora considers relevant provincial and federal legislation and guidelines:

- SARA
- *Canadian Environmental Protection Act*
- NSESA
- Nova Scotia *Wildlife Act*
- Nova Scotia *Biodiversity Act*
- Nova Scotia *Environment Act*
- Nova Scotia *Wilderness Areas Protection Act*
- At-Risk Lichens–Special Management Practices (NSDNR, 2018)
- Old-Growth Forest Policy for Nova Scotia (NSDNR, 2022)

- Nova Scotia Silvicultural Guide for the Ecological Matrix (McGrath et al., 2021)

8.1.2 Boundaries

For the purpose of this assessment, the LAA for flora includes the PDA and a 200 m buffer of the PDA. The RAA for flora incorporates the LAA and all contiguous natural habitat areas.

The Study Area defines the spatial extent within which baseline conditions were characterized during field assessments.

8.1.3 Assessment Methodology

The assessment of terrestrial flora focused on identifying vegetation communities and individual vascular plant and lichen species present or likely to occur in or near the LAA, with emphasis on SAR or SoCC and their habitats. The assessment approach combined a desktop review, habitat analysis, and targeted field surveys.

Information from the desktop review including spatial data related to habitat characteristics was used to predict the potential occurrence of SAR and SoCC. Field surveys were conducted to verify habitat conditions, document existing vegetation communities, and detect SAR or SoCC in the LAA.

Data collected through this process were used to evaluate the potential effects of the Project on terrestrial flora and to inform iterative refinements to the Project design. The findings supported the avoidance of sensitive habitats during siting and the development of mitigation measures to minimize adverse effects during construction, operation, and maintenance.

The description of the existing environment is based primarily on data collected through the following resources plus field surveys carried out for this Project:

- Nova Scotia Significant Species and Habitats Database (NSDNR, 2026)
- AC CDC Data Reports (AC CDC, 2023a, 2023b)
- iNaturalist.ca Observation Database (2026
- Global Biodiversity Information Facility Occurrence Database (2026)
- Nova Scotia Forestry Inventory (Government of Nova Scotia, 2021)
- Predictive Ecosystem Mapping for Nova Scotia (Government of Nova Scotia, 2024)
- Old-Growth Potential Index V2 (NSDNR, 2025)
- Old Growth Forest Policy (Government of Nova Scotia, 2025)
- Forest Ecosystem Classification for Nova Scotia (2022): Field Guide (Neily et al., 2023)
- Ecological Land Classification 2015 (Government of Nova Scotia, 2018)
- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- Nova Scotia Parks and Protected Areas Map (Government of Nova Scotia, 2025)
- Global Forest Watch Tree Cover Loss 2001-2024 (Global Forest Watch, 2025)
- Nova Scotia Forestry Harvest Plan Map (NSDNR, 2025)
- Nova Scotia Wetlands Inventory (Government of Nova Scotia, 2021)

- Nova Scotia Wet Areas Mapping (Government of Nova Scotia, 2012)
- Nova Scotia Topographic Database (Government of Nova Scotia, 2024)
- Nova Scotia LiDAR Data (Government of Nova Scotia, 2024)
- Surficial geology mapping (Government of Nova Scotia, 2021)
- Species at Risk Public Registry documents for federal SAR
- Species at Risk documents for provincial SAR
- Boreal Felt Lichen predictive habitat layer (NSDNR, 2012)
- Nova Scotia Location-sensitive SAR Database (NSDNR, 2025)
- Nova Scotia SAR Core Habitat Data (NSDNR, 2025)
- Critical Habitat for Species at Risk National Dataset – Canada (ECCC, 2025)
- Natural History of Nova Scotia (Davis and Browne, 1996)
- Nova Scotia Plants (Munro et al., 2014)
- Assessment of Species Diversity in the Atlantic Maritime Ecozone (McAlpine and Smith, 2010)

Landcover within 2 km of the PDA was analyzed through the Nova Scotia Forest Inventory layer (this distance was selected to include the habitats covered by the LAAs for the VECs assessed within this document) (Figure 8.1).

A habitat assessment for terrestrial plant and lichen SAR and SoCC known to occur within a 100-km radius of the PDA was completed using available habitat information and species occurrence data, including federal critical habitat and provincial core habitat datasets. This assessment was used to identify areas in the LAA that may support SAR and SoCC.

8.1.3.1 Field Surveys

The objective of the field surveys was to assess the presence and spatial distribution of flora across the Study Area, focussing on SAR and SoCC and their habitats. Field surveys for flora were conducted in the Study Area between July and August 2023 and May 2025 to capture both early- and late-season flora. The survey design targeted areas with the highest potential of hosting SAR and SoCC, including mature forests and wetlands, while also covering representative habitat types present. Habitats in the LAA considered to be highest-priority areas for plant and lichen species inventory included wetlands, mature and productive forest stands, and along watercourses. Additional representative habitat types present across the Study Area were sampled for broad coverage of site conditions.

8.2 Existing Environment

8.2.1 Vegetation Communities

The Project is primarily situated in the Pictou Antigonish Highlands ecodistrict of the Nova Scotia Highlands ecoregion. The Pictou Antigonish Highlands ecodistrict is an upland landscape characterized by rugged plateaus, steep ravines, and productive wetlands. Elevations in this ecodistrict range from approximately 210 to 300 m, contributing to low annual temperatures and shorter growing seasons compared to surrounding lowlands (Neily et al., 2017).

Forests in the Pictou Antigonish Highlands are dominated by tolerant hardwoods such as Sugar Maple (*Acer saccharum*), Yellow Birch (*Betula alleghaniensis*), American Beech (*Fagus grandifolia),* Red Maple (*Acer rubrum*), and White Ash (*Fraxinus americana*). Mixedwood slopes and ravines support Red Spruce (*Picea rubens*), Eastern Hemlock (*Tsuga canadensis*), and Eastern White Pine (*Pinus strobus*), while imperfectly drained depressions feature Balsam Fir (*Abies balsamea*) and Black Spruce (*Picea mariana*) (Davis and Brown, 1997).

According to the Nova Scotia Provincial Landscape Viewer, the LAA includes the following eco-elements:

- Tolerant Hardwood Hills – Well-drained upland soils supporting hardwood-dominated stands with diverse understory species such as Hobblebush (*Viburnum lantanoides*) and Beaked Hazel (*Corylus cornuta*)
- Tolerant Mixedwood Slopes – Mixedwood forest on steep slopes with seepages and springs
- Red and Black Spruce Hummocks– Well-drained plateaus dominated by Red Spruce with Black Spruce on wetter soils

The majority of the landcover surrounding the PDA is categorized as forested stands (75%) with softwood, hardwood, and mixedwood stands comprising 42, 22, and 12%, respectively. Other land cover types include clearcut (10%), and wetland (5%) with the remaining cover types making up 1% or less of the total landcover. The forest inventory layer is outdated and does not reflect current conditions, as extensive areas of forest in the LAA have undergone industrial forestry activities over the past two decades. According to Global Forest Watch, tree cover in the PDA and LAA decreased by 33% and 32%, respectively, between 2002 and 2024 (Global Forest Watch, 2026).

No forest stands in or overlapping the LAA are classified as old growth under the Old-Growth Forest Policy (2022).

8.2.2 Vascular and Non-vascular Flora

Two overlapping AC CDC Data Reports were reviewed representing former iterations of the project layout (see Appendix F - AC CDC Data Reports 7694 and 7695). Together, the reports provide complete spatial coverage of the current LAA. The data reports include observations of between 532 and 544 flora SAR and SoCC that have been recorded in Nova Scotia within a 100-km radius of the LAA. Of these records, between 222 and 238 represent vascular plants and between 114 and 116 represent non-vascular species (lichens and bryophytes). The NSDNR Significant Species and Habitat Database does not contain any records of species and/or habitat records relating terrestrial flora within a 100 km radius of the PDA.

The list of SAR and SoCC vascular plant species from the AC CDC database occurring within 5 km of the PDA, along with other available records, is provided in Table 8.1. Two SAR, Eastern White Cedar (*Thuja occidentatlis*) and Black Ash (*Fraxinus nigra*), are known to occur within 5 km of the PDA. Eastern White Cedar has been documented approximately 3.5 km east of the PDA and this species is typically associated with wetland and wetland-adjacent habitats, including swamps and forested wetlands. Black Ash is considered a location-sensitive species in Nova Scotia and is strongly associated with wetland habitats, particularly forested swamps and riparian wetlands

Table 8.1 SAR and SoCC Vascular Plant Species Occurring Within 5 km (AC CDC 2023a, 2023b and other available sources)

Scientific Name	Common Name	NSESA	SARA	COSEWIC	S-rank*
Fraxinus nigra	Black Ash	Threatened	-	Threatened	S2
Thuja occidentalis	Eastern White Cedar	-	-	Vulnerable	S3
Bidens beckii	Water Beggarticks	-	-	-	S3S4
Fagus grandifolia	American Beech	-	-	-	S3S4
Myriophyllum farwellii	Farwell's Water Milfoil	-	-	-	S2S3
Carex lupulina	Hop Sedge	-	-	-	S3
Diphasiastrum x sabinifolium	Savin-leaved Ground-cedar	-	-	-	S3?
Sceptridium dissectum	Dissected Moonwort	-	-	-	S3
Platanthera huronensis	Fragrant Green Orchid	-	-	-	S3

* Reflects recent updates to S-ranks and are current as of March 3, 2026.

A total of 220 species of vascular flora were recorded in the Study Area (see Table 8.1 in Appendix G for full list of vascular plants observed and Figure 8.2 for survey locations). No SAR vascular plant species were observed in the Study Area; however, one SoCC was documented, American Beech (S-rank: S3S4) during field surveys.

American Beech was common and widespread in the PDA and LAA, occurring primarily in tolerant hardwood forest communities in the western and eastern portions of the LAA.

Of the 220 species of vascular plants, 30 plants considered non-native in Nova Scotia were recorded (Table 8.1 in Appendix G). One of the species observed, Japanese Knotweed (*Reynoutria japonica*), is considered an invasive species in Nova Scotia (Nova Scotia Invasive Species Council, 2025).

No records of non-vascular plant species occurring within 5 km of the PDA were identified in the AC CDC database. However, observations of Acadian Jellyskin Lichen (*Leptogium acadiense*; S-rank: S3S4) were documented during field surveys conducted for the nearby Weavers Mountain Wind Energy Project (Strum, 2023). These observations are located within 5 km of the PDA. Additionally, an incidental observation of Eastern Waterfan

(*Peltigera hydrothyria*, SARA: Threatened) was recorded during a winter bird survey near a watercourse crossing approximately 60 m from the PDA.

Targeted lichen field surveys in the LAA are scheduled after snowmelt in early 2026 and the results of these surveys will be submitted to the province upon completion.

8.3 Effects Assessment

8.3.1 Potential Effects and Mitigation

Several changes were implemented to the Project layout to minimize potential direct and indirect impacts on terrestrial flora, while accommodating engineering and layout constraints.

Direct and indirect effects on flora may occur through multiple, interconnected pathways. Construction activities like vegetation clearing, soil disturbance, and infilling have the potential to cause direct habitat loss for sensitive flora species and communities. Increased road width and density will contribute to vegetation community fragmentation and edge effects. The rise in Project-related vehicle traffic may facilitate the introduction and spread of invasive flora species and decrease air quality including generating dust that can affect vegetation health. While some flora species are adaptable to a variety of habitat types and environmental conditions, others are more specialized when it comes to habitat preferences and requirements. Species that are naturally more specialized, including SAR and SoCC, may be disproportionately affected by direct or indirect habitat loss.

Project activities can affect terrestrial flora as summarized in Table 8.2; identification of these potential effects does not consider the implementation of mitigation measures described herein.

Table 8.2 Potential Environmental Effects of the Project on Terrestrial Flora

Project Activity	Potential Environmental Effects		
	Habitat Loss and Fragmentation	Loss of Flora SAR/SoCC	Degradation of Flora Habitat
Construction			
Site Preparation	X	X	X
Access Roads Construction and Modifications	X	X	X
Material and Equipment Delivery and Storage	-	-	X
Infrastructure Installation	-	-	-
Restoration of Temporary Areas	-	-	-
Testing and Commissioning	-	-	-
Operation and Maintenance			

Project Activity	Potential Environmental Effects		
	Habitat Loss and Fragmentation	Loss of Flora SAR/SoCC	Degradation of Flora Habitat
WTG Operation and Maintenance	-	-	-
Road Maintenance	-	-	X
Power Line and Substation Maintenance	-	-	X
Vegetation Management		X	X
Safety and Security	-	-	-
Decommissioning			
Removal of Infrastructure and Site Restoration	-	-	X

X = Potential Interaction
- = No Interaction

8.3.1.1 Habitat Loss and Fragmentation

The Project may result in habitat loss and fragmentation for terrestrial flora species in the LAA.

Direct habitat loss will occur though vegetation clearing associated with road widening, construction of new access roads, WTG pads, temporary laydown areas and other Project infrastructure. Clearing activities will result in both short- and long-term habitat loss and some areas in the PDA will be permanently affected. Following construction, temporary roads and laydown areas will be decommissioned, and restoration will be undertaken to return these areas to natural habitat.

Indirect habitat loss may also occur. Vegetation clearing and soil disturbance can alter surface and groundwater flow patterns resulting in changes to moisture regimes that support flora species or communities dependent on specific hydrological conditions (Hartsog et al.,1997). Soil compaction from machinery and vehicle traffic may degrade soil structure and nutrient availability, affecting species composition and diversity. Mitigation measures to avoid soil compaction and disruption of surface and groundwater flow pattens are outlined in Sections 6.3.1 and 7.3.1.

Habitat fragmentation may occur where Project infrastructure disrupts contiguous forest cover. Fragmentation can alter canopy structure and moisture regimes, reducing shade and humidity conditions important for certain terrestrial flora species, particularly lichens (Boudreault, 2008). Fragmented habitats may also affect plant-pollinator interactions as both habitat size and connectivity directly or indirectly influence pollinator abundance and movement (Yian, 2016).

It is expected that direct impacts related to habitat loss and fragmentation to flora species and their habitat in the LAA will be minor due to the quality and extent of habitat affected and the application of avoidance and mitigation strategies. The iterative Project design process has prioritized reducing interactions with sensitive terrestrial flora habitat including wetland and mature forests to the extent possible. Results from targeted lichen surveys will inform mitigation measures to avoid or reduce potential Project-related effects on sensitive lichen species.

Potential Project effects related to habitat loss and fragmentation can be effectively mitigated through planning and management of construction activities. The following key measures will be implemented prior to and during construction to mitigate potential effects of the Project on terrestrial flora and associated habitats.

- Existing roads and areas that have been previously altered, such as harvested areas have been and will continue to be prioritized.
- Watercourse crossings, both temporary and permanent, will be constructed in accordance with current applicable guidelines and regulatory requirements, and will be maintained for the duration of the Project.
- Natural vegetation, topsoil, and useable grubbed material will be preserved and reused where feasible to promote reestablishment of native vegetation though existing seed banks.
- Vegetated buffers around wetlands and watercourses will be maintained to support habitat connectivity where possible.
- To minimize the impacts of habitat loss during operation, vegetation will be maintained in cleared areas by removing taller vegetation while preserving low vegetation that does not interfere with Project infrastructure or site access when applicable.
- The Proponent will develop and implement ESC procedures to avoid sedimentation and protect vegetation and habitat.

8.3.1.2 Loss of Flora SAR/SoCC

Field surveys in the LAA identified occurrences of three flora SAR or SoCC. Eastern Waterfan, an aquatic lichen SAR, will not be directly removed through Project clearing activities. Clearing activities can indirectly affect Eastern Waterfan, which are sensitive to siltation and sedimentation. Appropriate clearing buffers will be developed in consultation with ECCC-CWS and NSDNR to minimise the indirect impacts related to sedimentation, hydrological changes, or shade loss.

The only SoCC flora observed in the PDA was American Beech and individuals are expected to be lost during the construction phase of the Project. The total number of individuals expected to be directly impacted by the Project is unknown at this time as detailed design has not been finalized. Potential impacts to non-vascular flora will be assessed following targeted field surveys prior to construction.

To minimize the loss of SoCC flora, strategic site planning will be implemented, including the use of existing roads and previously disturbed areas. The locations of terrestrial SoCC flora will also be reviewed during the detailed design phase to further reduce potential losses.

Habitat loss associated with vegetation clearing has been, and will continue to be, minimized through strategic site planning, including refinement of the final PDA at each WTG location. Despite these measures, clearing activities may result in the loss of vascular and non-vascular SoCC flora, including American Beech.

Potential Project effects related to loss of flora SAR/SoCC can be effectively mitigated through planning and management of construction activities. The following key measures will be implemented prior to and during construction to mitigate potential effects of the Project on terrestrial flora SAR and SoCC.

- Project personnel will be educated on possible SAR and SoCC that may occur in the LAA.
- If an unexpected flora SAR or SoCC is encountered during construction activities, Project personnel will follow procedures outlined in the EPP.
- The Proponent will develop and implement surface water management and erosion and sediment control procedures.

8.3.1.3 Habitat Degradation

Terrestrial flora, including rare species, may be affected by habitat degradation resulting from activities. Construction and associated activities can accelerate natural processes or directly degrade habitats though erosion of soils, sedimentation, altered hydrology, reduced air quality, soil compaction, disturbance of plant communities and the introduction and spread of invasive species.

Soil erosion can be exacerbated on unvegetated surfaces exposed to rainfall exceeding infiltration rates, such as roads and cleared areas. Sediment transport from erosion can reduce soil productivity in terrestrial flora habitats (Al-Kaisi, 2000). Sediment deposited into wetlands or watercourses can impair their function, potentially impacting terrestrial flora and aquatic habitats (Gleason and Euliss, 1998). Mitigation measures to reduce effects of soil erosion and siltation include ESC measures such as installing silt fencing and mulching or revegetation of bare soil and the development and implementation of surface water management procedures.

Fragmentation of habitat in the PDA may create edge habitats, which can affect habitat suitability by altering moisture regimes and microclimatic conditions. Edge habitats are exposed to increased light, dust, and wind (Chen, 1993), causing short-term impacts such as increased susceptibility to windthrow (Esseen, 1994) and disrupting localized moisture and light regimes that may impact sensitive species including lichens (Green and Lange, 1994).

Construction and operation activities may increase the presence and spread of invasive plant species. Non-native species, introduced intentionally or unintentionally by humans, can out-competing native flora, altering species composition and habitat quality (Invasive Species Centre, 2025). One invasive species was observed in the LAA. Soil disturbance and construction activities, along with unintentional seed movement during operation and maintenance, may facilitate their spread.

Air quality changes, including dust and emissions, can impact terrestrial flora. During the construction phase, road development, blasting, and soil disturbance may increase fugitive dust and particulate matter, affecting photosynthesis as they settle on flora surfaces (Farmer, 1993). Accumulation of dust on the soil surface and organic litter can alter soil properties. Airborne contaminants from vehicle exhaust and construction-related products may also affect the terrestrial flora community. They can enter the natural environment by settling on the ground or being absorbed directly from the air. Lichens and other non-vascular flora are particularly susceptible because they absorb moisture and particles directly from the air (Canters et al., 1991).

Potential Project effects related to habitat degradation can be effectively mitigated through planning and management of construction activities. The following key measures will be implemented during Project activities to mitigate potential degradation of habitats for terrestrial flora.

- The Proponent will develop and implement surface water management and erosion and sediment control procedures. ESC materials such as sediment fencing or mulch will be applied to unvegetated areas to limit sedimentation into adjacent wetlands or watercourses, or other upland habitats. These erosion prevention materials will be maintained for the duration of the Project as needed to minimize the transportation and deposition of sediment.
- Vehicular traffic and the staging of equipment will occur on designated roads and laydown areas.
- Alternative road de-icing methods may be employed during winter road maintenance to prevent salt impacts on terrestrial flora habitats.
- Invasive species management procedures will be developed and implemented for construction and operation as part of the Vegetation Management Plan.
- Vehicle and equipment emissions will be managed through regular maintenance on machinery avoidance of unnecessary idling, and minimization of haul distances.
- Construction-related fugitive road dust will be controlled through speed limits on access roads, road watering and limiting construction during high wind events.
- Disturbed areas will be left to revegetate as soon as practical to limit dust and erosion of soils.

8.3.2 Residual Effects

While the impacts on both vascular and non-vascular terrestrial flora may vary, the primary concerns involve habitat loss, fragmentation, loss of rare species, and degradation of flora habitat, including the introduction and spread of invasive species. Proposed mitigation and monitoring measures are designed to minimize these effects, which are expected to be of minor magnitude and localized. Residual effects are assessed as long-term for habitat loss and rare species, and variable for other impacts.

Some residual effects related to habitat degradation may be intermittent during construction, operation and maintenance, and decommissioning phases, corresponding with periods of onsite activity. If mitigation measures are properly implemented the severity and duration of these effects is expected to be low.

With careful detailed design of Project infrastructure to avoid sensitive habitats, combined with active habitat restoration and enhancement efforts, the effects on terrestrial flora (both rare and common species) will not be significant. Residual effects are expected to be minor, local, seasonally varied, and reversible.

Based on current site conditions, the impact assessment, and the mitigation measures implemented or planned for construction, the overall residual effects on terrestrial flora are predicted to be not significant.

8.4 Monitoring

No monitoring is proposed for this VEC.

9 Wetlands

9.1 Overview

The wetland VEC is composed of all provincially regulated wetlands (i.e., greater than 100 m^2 in size) that may interact with the Project. The wetland VEC encompasses each wetland habitat type and function in the PDA.

Wetlands are generally defined as habitats with water at or near the surface, with low water flow and saturated (i.e., hydric) soils, and are host to hydrophytic plants that thrive in wet conditions. Wetlands are routinely categorized by form as marshes, swamps, fens, or bogs. Wetland resources support a variety of essential hydrologic, ecological, and socio-economic functions. Wetlands function in the conservation of biodiversity and maintenance of watershed health, including surface water and groundwater quantity and quality. Wetlands are closely related to other VECs assessed in this EA. Impacts to wetlands can affect surface water, groundwater, and essential habitat for terrestrial and aquatic flora and fauna. The potentially interacting VECs are discussed in their respective chapters and include the geophysical environment (Chapter 6), aquatic environment (Chapter 7), flora (Chapter 8), terrestrial wildlife (Chapter 10), bats (Chapter 11), and birds (Chapter 12).

The Proponent has modified the WTG layout and Project roads to avoid or reduce potential for adverse environmental effects on multiple VECs, including wetlands. These informed modifications are reflected in the PDA.

It is expected that the Project will have direct and indirect impacts on wetlands via loss of wetland habitat and function in the PDA. Site works in the PDA will involve clearing of wetland vegetation and disturbance of wetland soil—both having potential impacts to wetland vegetation communities, hydrology, and wetland function. Changes to the Project layout were implemented to avoid wetlands where possible, and mitigation measures will be used to protect adjacent wetland habitat and function. For wetlands that are temporarily altered, restoration will be conducted to a feasible extent. Wetland compensation, determined through consultation with NSECC, will be completed to offset wetland loss that cannot be avoided.

9.1.1 Regulatory Context

The assessment of wetlands considers the relevant federal and provincial legislation, regulations, and policies in place for wetland protection:

- Nova Scotia *Environment Act*
- Nova Scotia Wetland Conservation Policy
- SARA
- NSESA

9.1.2 Boundaries

A wetland LAA of 500 m was chosen to extend beyond the PDA to a representative distance where potential measurable effects on the wetland VEC may occur. Effects on wetland habitat, hydrology, and function may extend downstream of direct disturbance in the PDA, reaching into the LAA. NSECC has defined the WTG setback for wetlands to be 30 m from the area of disturbance, which has been considered in the LAA definition. To accommodate variations among wetlands, a conservative buffer has been applied. Various parameters, including wetland classification, location, topography, watershed hydrology, soil parent material, vegetation species, and community diversity will influence the extent of the potentially affected area. The LAA has been chosen based on the recognition that potential effects on individual wetlands will vary.

The wetland RAA is 1 km surrounding the PDA. The RAA is used to assess potential cumulative effects where the Project effects may combine with effects of other activities, predominantly forestry operations. There is evidence of historical logging in the RAA and many active forestry operations that currently intersect with wetlands in the PDA. The RAA informs the assessment of cumulative effects resulting from activities such as current and historical forestry operations.

9.1.3 Assessment Methodology

The assessment of wetlands focused on wetland habitat intersecting with the PDA. Existing wetland conditions were assessed through desktop review, and field surveys. Review of the following data sources informed targeted field surveys for wetland delineation and functional assessment. The data collected from this assessment were used to evaluate the impact of the Project on wetland habitat. This information was used to inform the siting of Project infrastructure and to develop mitigation measures for adverse Project impacts in the PDA.

The description of the existing environment is based primarily on data collected through the following resources plus field surveys carried out for this Project:

- NSNRR wetlands database (NSDNR, 2017)
- NSDNR LiDAR wet areas mapping (which depicts predicted depth to water table) (NSDNR, 2012)
- Nova Scotia Hydrographic Network (Open Data NS, 2022)

- Provincial Landscape Viewer (NSDNR, 2017)
- Satellite and aerial imagery
- Nova Scotia Digital Elevation Model (DEM) (GeoNOVA, 2018)

These resources were used in conjunction to assess possible wetland locations and area in the PDA, identifying wet areas and predicted groundwater flow based on the predicted depth-to-water table measurements generated from NSDNR's (2022) wet areas mapping and DEM data (GeoNOVA, 2018).

9.1.3.1 Wetland Delineation Surveys

Formal delineations and functional assessments of wetlands identified in the PDA were conducted, including in the areas of proposed WTGs, access roads, and temporary laydown areas. Field surveys were conducted by WSP and Boreal Environmental between July 8 and 12, 2024, October 7 and 15, 2024, and September 23 and 24, 2025. Wetland field surveys were conducted in the entire Study Area, but only the wetland area intersecting with the PDA has been calculated to characterize potential wetland impacts in the effects assessment.

Individual wetlands were delineated and classified using the US Army Corp of Engineers *Wetlands Delineation Manual* (US Army Corp of Engineers (USACE), 1987). Wetland boundaries and delineation data were collected using a handheld GPS. Sampling points were established at representative locations in the subject wetland, and in the adjacent upland habitat. Observations of SAR/SoCC (if present) were recorded.

Due to timing and design iterations, several wetlands were not fully assessed within the 2025 seasonal window for wetland delineation. These wetlands in the PDA will be assessed during the growing season (June 1 to September 30) in support of the subsequent wetland permitting process. Appendix H, Table 1 identifies wetlands that have been either fully or partially delineated and indicates whether functional assessments are complete.

Hydrophytic Vegetation

Hydrophytic vegetation refers to plant species that have adapted to living in saturated soils (USACE, 1987). The Nova Scotia Wetland Indicator Plant List (NSECC, 2012) was used to determine the associated wetland indicator status for applicable vegetation. The percent cover and wetland status indicator of plant species at each sampling location was visually assessed and recorded for varying plot sizes according to the vegetation stratum (10 m for trees, 5 m for shrubs, and 1 m for herbs) to determine if hydrophytic vegetation was dominant in each of the sample locations.

Hydric Soils

Hydric soil indicators were identified as per the *Field Indicators of Hydric Soils in the United States* (USDA, 2017). Hydric soil is summarized in Appendix H, Table 1. Soil samples were collected using an auger to a maximum depth of 40 cm or to the point of refusal, then visually assessed to identify conditions in the wetland and upland soils. Soil horizons were profiled by their texture, thickness, and colour using a Munsell Soil Colour Chart, and the presence of hydric soil indicators (where applicable).

Wetland Hydrology

Wetland hydrology is characterized by periodic inundation or soils that are saturated to the surface at some point during the growing season. Wetland hydrology indicators were recorded where observed. Wetland hydrology is summarized in Appendix H, Table 1.

9.1.3.2 Wetland Functional Assessment

Wetland functional assessments were completed for each wetland using the Non-tidal *Wetland Ecosystem Services Protocol for Atlantic Canada* (WESP-AC V 2) (Adamus, 2018), a functional assessment technique required by NSECC as part of wetland alteration applications. Physical parameters such as pH, TDS, and conductivity were measured when surface water was present.

WESP-AC V 2 characterizes and ranks 17 individual ecosystem functions and their associated benefits (Table 9.1) based upon input with upwards of 129 ecological characteristics (indicators) into a logic-based model. The WESP-AC calculator incorporates the responses from desktop, field, and stressor questions to determine whether the functions and associated benefits are Low, Moderate, or High in comparison to baseline wetland scores in Nova Scotia.

Table 9.1 WESP-AC Ecosystem Functions and Benefits

Function	Definition	Potential Benefit
Hydrologic Functions		
Water Storage & Delay	The effectiveness for storing runoff or delaying the downslope movement of surface water for long or short periods.	Flood control and maintaining ecological systems.
Stream Flow Support	The effectiveness for extending flow duration into drier parts of a growing season.	Supporting fish and other aquatic life.
Water Cooling	The effectiveness for maintaining or reducing temperature of downslope waters.	Supporting fish and other aquatic life.
Water and Climate Protection Functions		
Sediment Retention & Stabilisation	The effectiveness for intercepting and filtering suspended inorganic sediments and toxins, thus allowing their deposition; reducing current velocity; resisting erosion; and stabilizing underlying sediments or soil.	Maintaining quality of receiving waters and protecting shoreline structures from erosion.
Phosphorus Retention	The effectiveness for retaining phosphorus for long periods (>1 growing season).	Maintaining quality of receiving waters.
Nitrate Removal & Retention	The effectiveness for retaining particulate nitrate and converting soluble nitrate and ammonium to nitrogen gas while generating little or no nitrous oxide (a potent GHG).	Maintaining quality of receiving waters.

Function	Definition	Potential Benefit
Carbon Sequestration	The ability of wetland processes to preserve the total biomass of organic carbon as it accumulates over time within a wetland's soil/sediment (an attribute, not a function).	Maintain carbon sequestration.
Organic Nutrient Export	The effectiveness for producing and subsequently exporting organic nutrients (mainly carbon), either particulate or dissolved. It does not include exports of carbon in gaseous form or as animal matter.	Supporting food chains in receiving waters.
Ecological (Habitat) Functions		
Anadromous Fish Habitat	The capacity to support an abundance and diversity of native anadromous fish for functions other than spawning.	Supporting recreational and ecological values.
Resident Fish Habitat	The capacity to support an abundance and diversity of native non-anadromous fish.	Supporting recreational and ecological values.
Aquatic Invertebrate Habitat	The capacity toe support or contribute to an abundance or diversity of invertebrate animals which spend all or part of their life cycle underwater or in moist soil.	Maintaining regional biodiversity.
Amphibian & Turtle Habitat	The capacity to support or contribute to an abundance and diversity of native amphibians (e.g., frogs, toads, salamanders) and turtles.	Maintaining regional biodiversity.
Waterbird Feeding Habitat	The capacity to support an abundance and diversity of waterbirds that migrate or winter but do not breed in the region.	Supporting hunting and ecological values; and maintaining regional biodiversity.
Waterbird Nesting Habitat	The capacity to support an abundance and diversity of waterbirds that nest in the region.	Maintaining regional biodiversity.
Songbird, Raptor, & Mammal Habitat	The capacity to support an abundance and diversity of native raptors and wetland songbirds.	Maintaining regional biodiversity.
Pollinator Habitat	The capacity to support pollinating insects and birds.	Maintaining regional biodiversity and food chains.
Native Plant Habitat	The capacity to support a diversity of native vascular and non-vascular species and functional groups, especially those that are most dependent on wetlands and water.	Maintaining regional biodiversity and food chains.

9.1.3.3 Wetlands of Special Significance

The Nova Scotia Wetland Conservation Policy (Nova Scotia Environment, 2019) defines Wetlands of Special Significance (WSS) as the following:

- Salt marshes

- Wetlands within, or partially within, a designated Ramsar site, provincial wildlife management area, provincial park, nature reserve, wilderness area, or lands owned or legally protected by non-government charitable conservation land trusts
- Intact or restored wetlands that are project sites under the North American Waterfowl Management Plan and secured for conservation through Nova Scotia Eastern Habitat Joint Venture
- Wetlands that support SAR that are designated under the SARA or the NSESA
- Wetlands in designated protected water areas as described in the *Environment Act* (Section 106)

Wetlands identified in the PDA were assessed to determine if they meet the criteria of WSS. Additionally, the WESP-AC indicated whether assessed wetlands are WSS.

There is currently no clear definition for WSS based on the presence of mobile SAR. As suggested by NSECC, a wetland is flagged for consideration as a possible WSS based on the presence of mobile SAR (e.g., bird species that are provincially listed as Threatened or Endangered only) if the subject wetland provides or supports life functions for the SAR (e.g., a SAR bird species observed during the breeding period in their preferred habitat). NSECC confirmed that the determination of a WSS based on the presence of a mobile SAR should be based on current observations during field surveys in support of this EA, rather than historical records (e.g., AC CDC records).

9.1.3.4 Desktop Interpretation of Wetlands

Wetland areas intersecting with the PDA that were not delineated in the field (due to adjustments in the PDA) were interpreted through a desktop method. This desktop method consisted of 'delineating' wetlands through visual examination of LiDAR DEM, depth to water table mapping, and aerial imagery.

9.2 Existing Environment

9.2.1 Wetland Identification and Area

Wetland identifiers were numbered sequentially. Wetland results were mapped according to a grid system and are provided in Appendix H, Figures 9.1 to 9.12.

A review of NS Provincial Landscape Viewer (NSDNR, 2021) identified four provincially mapped wetlands present in the PDA. A total of 139 wetlands were formally delineated in the Study Area during the field surveys. A total of 75 wetlands areas intersect with the PDA and have partial or complete datasets. Field-delineated wetland characteristics are summarized in Appendix H, Table 1. For each field delineated wetland, the total area (in ha) in the PDA is outlined, including the wetland type, water flow path, landscape position, landform type, hydric soil and hydrology indicators, and vegetation communities. The total interpreted wetland area outside of the PDA is also included for the portions of field delineated wetlands that intersect the PDA, which were subsequently desktop delineated. Summary tables outlining wetland characteristics, impacts to wetlands, and WESP-AC Function Scores for wetlands within the PDA are provided in Appendix H.

All field delineated wetlands in the PDA are classified as swamps. Swamp wetlands with varying vegetation types were encountered in the PDA. Some wetlands encountered consisted of complexes of multiple swamp wetland vegetation types.

The total wetland area delineated in the LAA is 324.5 ha, of which 85.7 ha was field delineated. The total area of desktop delineated wetland within the LAA was 324.5 ha. This number is an underestimate as there may be more wetlands in the LAA that do not intersect the PDA and were therefore not delineated.

9.2.2 Wetland Functional Assessment

WESP-AC scores were calculated for 44 wetlands in the PDA and detailed results are provided in Appendix H, Tables 2 and 3. Lower, moderate, and higher scores are colour-coded (green, yellow, and red, respectively) to illustrate the normalized scores used to determine each function rating, which are summarized in Appendix H, Table 2. Function scores for wetlands in the PDA are provided in Appendix H, Table 2, and summarized by percentage of Project wetlands for each wetland function in Table 9.2. Wetlands assessed in the PDA generally performed lower to moderate for wetland function scores.

Table 9.2 Summary of Wetland Function Performance

Summary of Function Scores (Percentage of Assessed Wetlands)		
Lower	**Moderate**	**Higher**
• Surface Water Storage & Delay (74%) • Sediment Retention & Stabilization (67%) • Phosphorus Retention (77%) • Carbon Sequestration (53%) • Aquatic Invertebrate Habitat (51%) • Anadromous Fish Habitat (98%) • Resident & Other Fish Habitat (91%) • Native Plant Habitat (56%)	• Stream Flow Support (51%) • Water Cooling (58%) • Nitrate Removal & Retention (56%) • Amphibian & Turtle Habitat (70%) • Songbird, Raptor, & Mammal Habitat (53%) • Waterbird Feeding Habitat (74%) • Waterbird Nesting Habitat (81%)	• Pollinator Habitat (67%) • Organic Nutrient Export (65%)

9.2.3 Wetlands of Special Significance

No wetlands in the PDA were determined to be WSS based on the results of the WESP-AC assessment.

No flora SAR designated under the SARA or the NSESA were observed in the wetlands in the PDA.

With respect to the designation of a WSS based on the presence of a mobile SAR species. A Canada Warbler (*Cardellina canadensis*) call was observed by WSP in one wetland (WL71) during the wetland assessment. This observation was recorded once, and the location of individual was not identified. No shrub layer was present, suggesting that it is unlikely this SAR utilized WL71 swamp habitat to support a life function.

9.3 Effects Assessment

9.3.1 Potential Effects and Mitigation

Avoidance is the first step outlined in the process for wetland conservation (Nova Scotia Environment, 2019). Wetland delineation data in the PDA were used to inform the design of the PDA, resulting in refinements that avoid and minimize wetland impacts while meeting engineering and design constraints. The layout was also developed to make use of existing roads where feasible, reducing new disturbance and minimizing landscape fragmentation.

Direct and indirect effects of the Project on the wetland environment could occur through various interconnected pathways. Project construction can result in alteration and loss of wetland habitat via direct disturbance. Impacts to wetland hydrology and wetland function may occur during Project operation and maintenance, and decommissioning. Indirect effects are expected to be lesser in comparison to the direct loss of wetland area.

The effects can result from short-term activities during the construction phase as well as long-term activities during Project operation and maintenance. Project construction activities, predominantly earthworks, will result in immediate alteration and loss of wetland habitat. Excavation activities can lead to changes in the local groundwater regime with potential indirect effects on wetland hydrology. Project activities can affect the wetland environment as indicated in Table 9.3; identification of these potential effects consider the PDA of the Project but does not consider the implementation of mitigation measures described herein.

Table 9.3 Potential Environmental Effects of the Project on Wetlands

Project Activity	Potential Environmental Effects		
	Loss of Wetland Habitat	Change in Wetland Hydrology	Change in Wetland Function
Construction			
Site Preparation	X	X	X
Access Roads Construction and Modifications	X	X	X
Material and Equipment Delivery and Storage	-	-	X
Infrastructure Installation	X	X	X

Project Activity	Potential Environmental Effects		
	Loss of Wetland Habitat	Change in Wetland Hydrology	Change in Wetland Function
Restoration of Temporary Areas	-	-	-
Testing and Commissioning	-	-	-
Operation and Maintenance			
WTG Operation and Maintenance	-	-	-
Road Maintenance	X	X	X
Power Line and Substation Maintenance	X	-	X
Vegetation Management	X	X	X
Safety and Security	-	-	-
Decommissioning			
Removal of Infrastructure and Site Restoration	-	-	-

X = Potential Interaction
- = No Interaction

There are specific Project activities that could impact wetland resources.

- Vegetation clearing and grubbing activities during site preparation and maintenance may directly impact wetlands and could lead to changes in vegetation species/community diversity and structure, altered hydrology, or wetland function in downstream wetland areas.
- Site preparation activities involving earthworks (e.g., use of heavy equipment for excavation, grading) may directly impact wetlands by partially or completely infilling wetland area. Direct impacts are expected in the PDA and will be further detailed as Project design is finalized.
- Upgrades to existing roads, new roadbed preparation, and construction of WTG foundations may introduce fill and compact wetland soil, potentially affecting wetland hydrology and function. Introduction of non-native or invasive plant species may occur as a result of introduced fill material.
- Blasting and foundation construction could disturb local bedrock and potentially impact wetland hydrology and subsequent wetland function through alterations to groundwater flow and nutrient inputs.
- Temporary dewatering activities during construction may lower the water table elevation in surrounding wetland areas, and potentially impact wetland saturation, hydric soil, and available nutrients from groundwater.
- Erosion and sedimentation from road crossings, laydown areas and/or work areas could alter the water quality and/or chemistry of wetlands, potentially affecting the vegetation and wildlife they are able to support. Project-related traffic may contribute to dust and sedimentation.

To minimize effects on wetland habitat, hydrology, and wetland function, mitigation measures outlined in the following subsections will be implemented. Mitigation measures designed to minimize impacts to other VECs, particularly air quality, soil quality, surface water quality, wildlife, wetlands, and the aquatic environment will also aid in minimizing impacts to wetland habitat, hydrology, and function. These mitigation measures are listed in their respective chapters of this EA.

9.3.1.1 Loss of Wetland Habitat

Construction and operation and maintenance activities may result in the direct alteration, degradation, and removal of wetland habitat. The Project may result in the direct loss of wetland habitat in the PDA. This includes the removal of wetland vegetation, organic matter, and hydric soils. The Project impacts to wetlands (e.g., partial infilling, or complete infilling) are summarized in Appendix H, Table 4.

In the PDA, the areas where permanent Project infrastructure will be constructed (e.g., WTG pads, upgrades to existing roads, creation of new roads), site preparation and construction activities may directly impact wetlands through the removal of vegetation and loss of wetland habitat (change in wetland area or fragmentation of wetland habitat). WTGs have been setback 30 m from wetland features where feasible.

Clearing, grubbing, and infilling activities may cause loss of wetland flora and wetland organic matter, peat, and mineral soils. The use of heavy equipment and site vehicle traffic may cause compaction to wetland substrate, impacting vegetation root systems and hydric soil density/porosity, and affecting saturation. These impacts may result in the loss of habitat used by SAR/SoCC and other wildlife and may alter surface water and groundwater hydrology, further discussed under change in wetland hydrology.

The estimated maximum potential loss of wetland area in the PDA is 20.8 ha. This is a conservative estimate calculated to assume the loss of all wetland habitat within the PDA. The Project Footprint is expected to be smaller, and wetlands can potentially be avoided. Avoidance of impacts will be implemented in the detailed design and project micro-siting. Compensation will be required for wetland area lost in the PDA.

The following key measures to mitigate the potential effects of the Project on wetland habitat will be further detailed in an EPP and will be implemented prior to construction:

- Where wetland avoidance is not possible, wetland alteration will not proceed without obtaining a wetland alteration permit from NSECC and the Proponent will adhere to all conditions of the wetland alteration permit.
- Wetland organic material and topsoil will be stored separately and reused for site restoration where practicable.
- Where disturbance to wetlands in temporary laydown areas is unavoidable, stabilization of the wetland surface will be conducted using protective layers such as matting, mulch, or biodegradable geotextiles to protect the wetland root layers and seed beds from rutting, admixing, or compaction.

- All wetland removals or alterations will be offset via wetland compensation activities, determined in consultation with NSECC and NSDNR.

9.3.1.2 Change in Wetland Hydrology

Construction and operation and maintenance activities may result in changes to surface water and groundwater hydrology (quality and quantity) directly in the PDA and may extend to the adjacent downstream areas, affecting aquatic receptors.

Earthworks activities may directly impact surface water and groundwater hydrology and increase the potential for run-off and flooding. Wetland hydrology may be affected through alteration of the water table and natural flow paths (i.e., saturation, impoundment and/or redirection of water, water storage). Wetland surface water quality may be impacted by sediment-laden runoff or nutrient input. Changes to stream flow quantity and direction may affect wetland area and surface water functions. Impeded drainage may cause wetlands upstream or upgradient of construction activities to flood, or wetlands located downstream of activities could be impacted by a decrease in surface water flow. De-watering and excavation activities may affect the water table in the wetland, affecting hydric soil saturation and the input of nutrients via groundwater, further affecting hydrophytic plant communities and wetland function.

Stormwater flow from roads or other impervious surfaces may enter wetlands in quantities exceeding the natural pre-construction flow. Increased flow velocity may cause increased erosion of wetland soil.

Potential Project effects on wetland hydrology can be effectively mitigated through planning and management of construction activities, including surface water management and ESC measures. The following key measures to mitigate the potential effects of the Project on wetland hydrology will be further detailed in an EPP and will be implemented during construction:

- Site clearing will be kept to a minimum necessary for efficient construction and operation of the Project.
- Where possible, clearing operations will be conducted during winter months on frozen ground to protect the underlying vegetative mat and to reduce erosion and sedimentation of wetlands.
- Manual clearing will be conducted where ground conditions are not suitable for heavy equipment access.
- Sediment fencing will be erected around construction areas prior to commencement of site preparation and construction.
- Appropriate ESC measures (e.g., erosion control blankets, hydraulic mulches, turf reinforced mats and/or riprap) will be used to line ditches, swales, drainage channels, and steep banks to avoid erosion and siltation of down-gradient wetlands. These control measures will be installed prior to ground disturbance.

- Mitigation measures for aquatic habitat outlined in Chapter 7 (Aquatic Environment) will also serve to maintain wetland hydrology, saturation, and aquatic habitat that contribute to wetland function.
- Material will be stockpiled in such a way as to prevent erosion and sedimentation to adjacent wetlands.
- Surface runoff and runoff from stockpiled material will be managed using standard ESC measures.
- Surface water hydrology will be maintained through culvert placement and appropriate structure sizing. Drainage structures will act to dissipate hydraulic energy and maintain flow velocity to reduce erosion.
- The Proponent will develop and implement surface water management procedures.
- Cleared areas in and immediately adjacent to wetlands will be stabilized to reduce erosion. Mitigation measures for vegetation maintenance are outlined in Chapter 8 (Flora).
- Whenever possible, work will be stopped during periods of inclement weather (e.g., high winds, high rainfall).

9.3.1.3 Change in Wetland Function

Impacts to wetland habitat and hydrology may change wetland function. The loss of wetland habitat and vegetation diversity may have indirect effects on SAR/SoCC fauna that depend on wetlands for necessary life functions. Effects on these species are discussed in Chapter 7 (Aquatic Environment), Chapter 8 (Flora), Chapter 10 (Terrestrial Wildlife), Chapter 11 (Bats), and Chapter 12 (Birds). Impacts to ecological habitat functions that support fish, amphibian and reptile, bird, mammal, and pollinator species may occur.

Potential changes to wetland function may result from impacts to wetland habitat and hydrology. Earthworks and ground-disturbing activities may cause soil disturbance, impacting hydric soil saturation, water storage, soil nutrients, and carbon sequestration, as well as changes to vegetation communities and the introduction of non-native and invasive plant species. Wetland function in the LAA and RAA will be considered.

There is potential for the introduction of invasive plant species, impacting the existing wetland vegetation community, particularly in the wetlands adjacent to construction and laydown areas. There is also potential for spread of invasive species in a wetland or introduction to downstream or downgradient wetlands.

Wetlands could be adversely affected by sediment-laden runoff during construction, operation and maintenance, and decommissioning activities. Exposed soil from earthworks like site clearing, grading, and material storage can lead to erosion and sedimentation through surface runoff. This sediment input into wetlands has the potential to smother vegetation and introduce nutrients.

The loss of wetland habitat may impact hydrologic function; subsequent change in wetland function is strongly driven by the alteration of wetland hydrology. This may impact flood control and water temperatures that contribute to the maintenance and support of aquatic life. If cross drainage is maintained where roads exist, hydrological impacts are not expected.

Impacts to water quality maintenance of a wetland may occur. Changes to nutrient storage and release in wetlands may change water quality and plant communities in the wetlands. The effects of nutrient loading may be greatest in low nutrient systems such as treed bogs and shrub bogs. Changes to hydrology and input of nutrients may impact aquatic receptors downstream, affecting ecological habitat.

Loss of wetland area may impact the ability to filter suspended particulate, reduce flow velocity, and stabilize substrate that contributes to erosion control and storm buffering.

Carbon sequestration as a wetland function is defined as the effectiveness of the wetland for retaining incoming carbon, and through the process whereby wetland vegetation converts CO_2 gas into organic matter (New Brunswick Department of Environment and Local Government, 2018). Direct impacts on wetland habitat may result in the loss or disturbance of the associated carbon stores through vegetation removal (i.e., trees as carbon stores), grubbing, or stripping of organic-rich overburden (e.g., conifer needle rich peat as a carbon store) of the wetland surface. Indirect impacts to wetland hydrology may alter the water table and saturation in a wetland, affecting rates of organic matter decomposition that contributes to carbon sequestration. These impacts were incorporated into the GHG emissions calculations for the Project in Chapter 2 (Project Description).

Potential Project effects on wetland function can be effectively mitigated through planning and management of construction activities, including surface water management and ESC measures, and through restoration of wetland areas that are altered temporarily for construction. The following key measures to mitigate the potential effects of the Project on wetland function will be further detailed in an EPP and will be implemented during construction:

- Where possible, quarried, crushed material will be used for road building in and near wetlands, with portions to be preserved to minimize the risk of introducing or spreading non-native or invasive plant species into wetland communities.
- Dust suppression measures will be used to avoid sedimentation impacts to wetland habitat and function.
- Wetland monitoring programs will be carried out for impacted wetlands pre- and post-construction, following NSECC wetland alteration approval conditions.
- Organic overburden removed from wetland areas will be stored for reuse and spread in areas from where it was originally removed. Topsoil will be stabilised and revegetated. These practices will mitigate the release of carbon stores in the organic topsoil layers.
- The Proponent will develop and implement sediment and erosion control and surface water management procedures.

9.3.2 Residual Effects

Residual effects on Project wetlands are expected to be minor but long-term with the possibility of some permanent, direct loss of wetland habitat in the PDA. Wetland alteration approvals will be acquired prior to completing wetland alterations. Residual effects on wetland habitat, hydrology, and function will be minimized in the LAA and RAA through the implementation of proposed mitigation measures, wetland monitoring, and wetland restoration required as part of the Wetland Alteration Approval. Alterations will be compensated (following the NSE Policy of No Net Loss) and monitored. Considering the use of existing roads that have already impacted Project wetlands, and the effort to avoid wetland habitat via changes to Project design, the overall effects of the Project on wetland habitat is predicted to be not significant in the LAA and RAA.

9.4 Monitoring

A Wetland Monitoring Plan will be developed as part of the NSECC Wetland Alteration Approval for the Project wetlands. Post-construction, the extent of the wetland habitat affected will be verified through monitoring. Monitoring will also document the success of wetland compensation. Both the monitoring and the compensation will be implemented in accordance with the NSECC Wetland Alteration Approval.

Monitoring is conducted to document pre- and post-construction ecological and hydrological conditions of the Project wetlands. The Wetland Monitoring Plan is intended to monitor the portion of the subject wetlands that will not be altered by the Project (outside the area of direct wetland disturbance) to determine if ecological characteristics change after the completion of the Project.

Subject wetlands will be assessed for changes in the proportion of wetland versus upland plant species and for the presence of invasive species. Hydrological monitoring will measure current water levels and responses to rain events, documenting a baseline for comparison to conditions during and after construction.

10 Terrestrial Wildlife

10.1 Overview

This chapter examines the potential impacts of the Project on terrestrial wildlife and their habitats, excluding bats and birds, which are evaluated separately in Chapters 12 and 13. The assessment addresses both direct and indirect interactions associated with the Project and outlines strategies to avoid, reduce, and mitigate adverse effects during all phases. Interactions between the Project and terrestrial wildlife are closely connected to impacts on other VECs discussed in related chapters, including noise and light disturbance (Chapter 5), vegetation loss or modification (Chapter 8), and wetland alteration or loss (Chapter 9).

The Project has the potential to affect terrestrial wildlife through direct pathways, such as increased mortality risk from vehicle or equipment movement during the construction, operation and maintenance, and decommissioning phases and through indirect pathways, including habitat loss, fragmentation, and modification. Wildlife may also exhibit behavioural changes, either short- or long-term, through avoidance of habitats subject to disturbance or noise, depending on species-specific tolerance to disturbance.

Strategic site planning has been implemented to minimize habitat disturbance, loss, and fragmentation, and other possible Project impacts. This includes using existing roads and previously harvested and disturbed areas, as well as maintaining vegetated buffers around wetlands and watercourses to enhance wildlife connectivity.

The Project has undergone several layout refinements to avoid or reduce potential adverse effects on terrestrial wildlife and sensitive habitat. In response to field assessment findings, the Proponent has modified the PDA layout to avoid or reduce potential adverse effects on multiple VECs, including terrestrial wildlife. The layout limits disturbance to late mature forest areas and wetlands that serve as important habitats for terrestrial species. The detailed design process will continue to minimize habitat interactions through strategic siting of infrastructure.

As described in the following subsections, measures to reduce habitat loss and fragmentation include use of the using existing road network (including the upgrade of existing roads) and previously disturbed areas. Expected effects, mitigation measures, and residual impacts to terrestrial wildlife as a result of the Project are outlined in this chapter and will be further developed in an EPP prior to construction to minimize adverse effects.

10.1.1 Regulatory Context

Assessment of the terrestrial wildlife considers relevant provincial and federal legislation and guidelines:

- SARA
- *Canadian Environmental Protection Act*
- NSESA
- Nova Scotia *Wildlife Act*
- Nova Scotia *Biodiversity Act*
- Nova Scotia *Environment Act*
- Nova Scotia *Wilderness Areas Protection Act*

10.1.2 Boundaries

The PDA represents the Project footprint and the maximum limit of potential direct physical disturbance associated with the Project. For this assessment, the LAA for terrestrial wildlife includes the PDA and a 2 km buffer of the PDA. The RAA for terrestrial wildlife incorporates the entire concentration area occupied by the Pictou/Antigonish/ Guysborough subgroup of Mainland Moose.

The Study Area defines the spatial extent within which baseline conditions were characterized during field assessments.

10.1.3 Assessment Methodology

The assessment of terrestrial wildlife focused on identifying wild terrestrial fauna species present or likely to occur in or near the LAA, with particular emphasis on SAR and SoCC and their associated habitats. This was accomplished though a combination of literature review, habitat analysis, and field surveys. Information gathered during the literature review and desktop habitat analysis informed the design and implementation of field surveys targeting priority species, as outlined in the *Guide to Addressing Wildlife Species and Habitat in an EA Registration Document* (NSECC, 2008).

Data collected through these efforts were used to evaluate the potential impacts of the Project on terrestrial wildlife, guide the siting of Project infrastructure to reduce potential impacts, and develop measures to minimize adverse effects of Project activities on terrestrial wildlife. The information collected though the assessment process provides baseline data for post-construction monitoring and adaptive management.

The description of the existing environment is based primarily on data collected from the following sources, supplemented by field surveys conducted for this Project:

- Nova Scotia Significant Species and Habitats Database (NSDNR, 2025)

- Species at Risk Public Registry documents for federal SAR
- Species at Risk documents for provincial SAR
- Predictive Ecosystem Mapping for Nova Scotia (Government of Nova Scotia, 2024)
- AC CDC Data Reports (Appendix F, AC CDC, 2023a, 2023b)
- iNaturalist.ca Observation Database (2026)
- Global Biodiversity Information Facility Occurrence Database (2026)
- Nova Scotia Forestry Inventory (Government of Nova Scotia, 2021)
- Nova Scotia Wet Areas Mapping (Government of Nova Scotia, 2012)
- Old-Growth Potential Index V2 (NSDNR, 2025)
- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- Nova Scotia Hydrographic Network (Government of Nova Scotia, 2025)
- Global Forest Watch Tree Cover Loss 2001-2024 and Gain 200-2020 (Global Forest Watch, 2026)
- Canada Landsat Disturbance 2017
- Assessment of Species Diversity in the Atlantic Maritime Ecozone (McAlpine and Smith, 2010)

Records of terrestrial mammal, herpetofauna, and invertebrate SAR and SoCC within a 100-km radius of the LAA were obtained from the AC CDC reports (Appendix F, AC CDC, 2023a, 2023b). A habitat assessment of the LAA was completed using available habitat information and mapping data, including federal critical habitat and provincial core habitat data layers.

Predictive habitat mapping was developed to identify areas of suitable habitat in the LAA for Mainland Moose throughout its life cycle. The habitat mapping was used to evaluate the connectivity of predicted Mainland Moose habitat in the LAA and the surrounding landscape and will be used to inform post-construction monitoring.

10.1.3.1 Mainland Moose Habitat Mapping

Spatial analysis was undertaken to evaluate and predict habitat suitability in the LAA for Mainland Moose life history stages (Figure 10.1, Appendix A). The habitat model was developed using biophysical parameters that support life cycle requirements for Mainland Moose, consistent with those applied in identifying core habitat in the Recovery Plan for Mainland Moose (NSDNR, 2021). The following datasets were used to extract areas meeting the criteria for biophysical attributes of Mainland Moose habitat in the LAA:

- Nova Scotia Forestry Inventory
- Wetlands and Watercourses of Nova Scotia
- Global Forest Watch Tree Cover Loss and Gain Data supplemented with recent satellite imagery to capture current forest loss from industrial forestry operations

In Nova Scotia, Mainland Moose occupy a variety of forest types, typically selecting mature stands that provide security and thermal cover, interspersed with areas offering forage such as young deciduous trees and shrubs. Data layers were analysed identify suitable habitat for winter cover, summer cover, winter forage, summer forage, and calving areas in the LAA using parameters outlined in Appendix A of the species Recovery Plan.

The Forestry Inventory database was refined using Global Forest Watch tree cover loss/gain datasets and recent satellite imagery to provide the most current representation of suitable habitat for Mainland Moose in the LAA.

The following outlines the criteria for identifying winter and summer cover habitat components:

- Winter cover – Softwood and softwood dominated mixedwood stands at least 5 ha in size meeting the mature stand requirements (60 % crown closure and at least 12 m in height (or at least 8 m in height with a depth to water table no more than 50 cm).
- Summer cover – Hardwood, mixedwood, and softwood stands at least 5 ha in size meeting the same mature stand requirements above.

After selecting winter and summer forest cover, the following criteria were applied to identify seasonal forage and calving area habitat components:

- Winter forage – Any regenerating forested type within 200 m of winter cover, or mature hardwood or hardwood dominated mixedwood within 200 m of winter cover, or mature softwood dominated mixedwood (no distance requirement from cover).
- Summer forage – Any regenerating forested type within 200 m of cover (summer or winter), or mature mixedwood or hardwood (no distance requirement from cover).
- Calving area – Open water within 40 m of any mature stand, or open water within 40 m of regenerating forage (winter or summer) that is within 200 m of a mature stand, or open water within 40 m of mature forage (winter or summer).

10.1.3.2 Field Surveys

The objective of the field surveys was to assess the presence and distribution of terrestrial wildlife across the LAA, focusing on priority terrestrial wildlife species (SAR and SoCC) and their habitats. Surveys to target Mainland Moose included winter tracking and Pellet Group Inventory (PGI) surveys. Additional terrestrial wildlife data for the Study Area were incorporated from the field surveys conducted in 2022 for the Weaver's Mountain Wind Energy Project EARD, including results from winter tracking surveys, PGI surveys and trail camera traps (Strum, 2023). Locations of winter tracking transects, PGI surveys, and camera traps are presented in Appendix A, Figure 10.2.

Winter Tracking

Winter tracking surveys were conducted in the Study Area on February 7, 10, and March 9, 10, 2022. With additional winter tracking surveys completed January 29 and 30, 2026 to obtain survey coverage in areas not previously surveyed.

The methods for the winter track surveys were developed based on the *Protocol for Mainland Moose Snow Tracking Survey 2022 Update* (NSDNR, 2022a) and informed by habitat parameters in the Mainland Moose Recovery Plan (NSDNR, 2021). The goal of these surveys was to target moose in areas where they are expected to be most active in winter (winter cover and winter forage habitats identified in the Recovery Plan) but were also designed to document signs of wildlife in the winter in representative habitat types present across the Study Area.

The winter tracking surveys were conducted along select survey routes within seven days of a large snowfall event (approximately 10 cm or more). Surveys focused on accessible trails and roadways through forested habitats—with an emphasis on winter cover and winter forage—and open areas. The survey covered approximately 50 km over four days. The additional 2026 surveys covered approximately 7.1 km over two days.

Camera Traps

Camera traps using trail cameras were set up between December 2021 and November 2022 in the Study Area. Locations were selected in a variety of habitat types in the Study Area, in areas where signs of wildlife had previously been found, and along natural corridors for wildlife movement, which include roadways, wetlands, forest trails, harvested areas, and riparian areas along watercourses and waterbodies. During the field program camera traps were relocated to expand site coverage and in consideration of seasonal wildlife movement and observations from both camera traps and other field programs. In total, seven trail camera trap locations were established; Table 10.1 presents deployment locations, habitat, deployment days, and total survey days for each camera trap. The camera traps were visited regularly to replace SD cards and batteries. All photos and videos from the camera traps were then assessed for presence of wildlife.

Table 10.1 Camera Trap Deployment and Retrieval Months. Each name corresponds to the general habitat where the camera is situated.

Camera Trap Name	Deployed	Retrieved
Central Road	May 2022	October 2022
Hardwood Stand Dead End	January 2022	May 2022
Indian Lake Outflow	May 2022	November 2022
Lake Edge Game Trail	January 2022	May 2022
Mixed Wood Stand	September 2022	November 2022
Clearcut	July 2022	November 2022
Softwood Stand	December 2021	May 2022

Pellet Group Inventory

PGI surveys followed the Pellet Group Inventory Data Collection Protocol (NSDNR, 2022b), which involves walking transects and recording winter pellet groups and other evidence of moose and deer. PGI surveys were conducted on foot in the LAA to understand the distribution, suitable habitats, and movement corridors of Mainland Moose and White-tailed Deer (*Odocoileus virginianus*). Transect routes were selected to encompass representative habitats in the Study Area, with a specific emphasis on areas where Mainland Moose are expected to be active, including winter cover and foraging habitats.

The design of the PGI survey routes to assess for potential impacts and allow for integration into a post-construction monitoring program. Post-construction monitoring programs will help assess the effectiveness of Project-specific mitigation measures and detect unexpected impacts the Project may have had on Mainland Moose behaviour.

In the Study Area, PGI transects were surveyed on April 26 and 27, 2022 and over five days between March 22 and 29, 2023. In 2022, ten transects (between 2.4 and 8 km) were surveyed, representing 30 km of total distance surveyed. In 2023, 24 transects (between 0.7 and 1.6 km) were surveyed, representing 28.5 km of total distance surveyed. Survey teams recorded winter pellet groups of moose and deer along the transect routes. All suspected Mainland Moose activity was recorded (i.e., browse, bedding, tracks) and signs of other animal activity, if observed.

Wood Turtle Surveys

Targeted Wood Turtle surveys were conducted in the Study Area during the field surveys for Weaver's Mountain Wind Energy Project (Strum, 2023). Stream habitat suitability was further evaluated at watercourses intersecting the PDA using information from watercourse assessments. These assessments were used to inform the evaluation of potential Project interactions with Wood Turtle and associated habitat. In addition, incidental observations of turtles and other herpetofauna and their habitat features were recorded during other biophysical field surveys.

Wood Turtle surveys were conducted on May 24 and 25, 2022, and June 6 and 7, 2022. Transects were walked at a width of 10 m on both sides of a watercourse for a total of 20 m. Efforts focused on areas of watercourse banks with high sun exposure, or other basking areas. Surveys were conducted with an ambient air temperature higher than the water temperature (at least 10°C), but no higher than 25°C.

10.2 Existing Environment

10.2.1 Mammals

The NSDNR Significant Species and Habitat Database contains 217 records of species and/or habitat records that relate to terrestrial mammals (excluding bats) within a 100-km radius of the PDA. These records all refer to Deer Wintering. Six of the records occur within 5 km of the PDA (Figure 10.3, Appendix A).

The AC CDC (Appendix F, 2023a, 2023b) Data Reports document observations of five terrestrial mammal SAR and SoCC (excluding bats) within a 100 km radius of the LAA. Two of these species, Mainland Moose and Fisher (*Pekania pennanti*), have been observed in the Study Area.

Mainland Moose are expected in the PDA as the Project overlaps with the Core Habitat identified in the Mainland Moose Recovery Plan, spanning most of Pictou County. Historical provincial data show that Mainland Moose have been detected in the vicinity of the PDA (Basquill, 2011). A habitat suitability analysis conducted by Snaith et al. (2002) and incorporated into the species Recovery Plan assessed parts of the Pictou Antigonish Highlands as good suitable habitat for Mainland Moose in the Province.

Signs of Mainland Moose were observed in the Study Area in 2022 during winter tracking surveys, pellet surveys, wetland surveys, and Wood Turtle surveys (Strum, 2023) and during the winter tracking surveys in 2026. Individuals in the Study Area would be considered part of the Pictou/Antigonish/Guysborough localized population group of Mainland Moose, which was estimated at fewer than 100 individuals in the early 2000s (NSDNR, 2021).

A Fisher was observed on a trail camera in the Study Area (Strum, 2023). This trail camera was located in a large, mature hardwood forest stand near a dead-end road. Mature forest stands can provide suitable canopy closure and coarse woody debris of adequate diameter for Fishers on site.

Although Mainland Moose and Fisher are the only species among the nine terrestrial mammal SAR and SoCC confirmed within 100 km of the LAA, the remaining seven species are discussed below due to their broad ranges and greater mobility.

Canada Lynx (*Lynx canadensis*) in Nova Scotia predominantly inhabit the Cape Breton Highlands, with occasional sightings in mainland Nova Scotia (McAlpine and Smith, 2010). The population experiences cyclical abundance, favouring habitats rich in their primary prey, Snowshoe Hare, and is influenced by competition with Bobcats (*Lynx rufus*). It is unlikely that Lynx occur in the LAA as a breeding population. A viable population of Lynx is known only on Cape Breton Island (Nova Scotia Lynx Recovery Team, 2006). The nearest record of Lynx is approximately 76.5 km from the LAA (Appendix F, AC CDC, 2023b).

Southern Flying Squirrel (*Glaucomys volans*) is a species that relies on the presence of mature forest habitat. The mature forest habitats in the LAA may provide suitable habitat for Southern Flying Squirrel, though the reported range of the Atlantic population of the Southern Flying Squirrel is in southwestern Nova Scotia (COSEWIC, 2006). The nearest record of this species is approximately 56 km from the LAA (Appendix F, AC CDC, 2023a).

The Eastern Water Shrew (*Sorex albibarbis*) is typically associated with cool, moist habitats near streams, wetlands, and riparian zones, often in mature forests (McAlpine and Smith, 2010). This species is semi-aquatic and relies on invertebrate prey found in aquatic and terrestrial environments. The open meadow wetlands present along watercourses in the LAA may provide suitable habitat for Eastern Water Shrew. The nearest record of Eastern Water Shrew is approximately 76 km from the LAA, in Prince Edward Island (Appendix F, AC CDC, 2025a).

10.2.1.1 Mainland Moose Suitable Habitat

In general, the LAA encompasses regions that meet the criteria used to identify core habitat for Mainland Moose in the Recovery Plan. Of the total land area evaluated in the LAA, 36% meets one or more of the habitat parameters for moose habitat. Table 10.2 presents the breakdown of area habitat components identified in the LAA and PDA. The results of the Mainland Moose habitat mapping are presented in Appendix A, Figure 10.1.

Table 10.2 Summary of Mainland Moose Habitat Components Identified in the LAA and PDA

Habitat Component	Total Area (ha)	
	LAA	PDA
Winter cover	412.2	4.5
Summer cover	1,095.4	25.6
Summer forage	3,709.7	98.1
Winter forage	2,144.8	48.1
Calving area	736.9	32.88

10.2.1.2 Winter Tracking, PGI Surveys, and Camera Trap Results

A total of 15 terrestrial wildlife species were identified across all field surveys between 2022 and 2026 (including incidental observations) conducted in the Study Area (Table 10.3). Of these species, nine were captured by camera traps (Table 10.4).

Table 10.3 Summary of Terrestrial Wildlife Species Observed in the Study Area

Scientific Name	Common Name	NS ESA	SARA	COSEWIC	S-Rank
Ursus americanus	American Black Bear	-	-	-	S5
Neovison vison	American Mink	-	-	-	S5
Lynx rufus	Bobcat	-	-	-	S5
Tamias striatus	Eastern Chipmunk	-	-	-	S5
Canis latrans	Eastern Coyote	-	-	-	S5
Pekania pennanti	Fisher	-	-	-	S3
Acles alces americanus	Mainland Moose	-	-	Endangered	S1
Erethizon dorsatum	North American Porcupine	-	-	-	S5
Procyon lotor	Raccoon	-	-	-	S5
Tamiasciurus hudsonicus	Red Squirrel	-	-	-	S5
Lepus americanus	Snowshoe Hare	-	-	-	S5
Odocoileus virginianus	White-tailed Deer	-	-	-	S5
Mustela richardsonii	American Ermine	-	-	-	S5
Castor canadensis	North American Beaver	-	-	-	S5

Table 10.4 Summary of Terrestrial Wildlife Observations via Camera Traps

Camera Trap Name	Animals Observed	Number of Observations
Central Road	White-tailed Deer	23
	American Black Bear	8
	Porcupine	15
	Mainland Moose	1
	Eastern Coyote	11
	Bobcat	1
	Raccoon	2
	Snowshoe Hare	15
Hardwood Stand Dead End	White-tailed Deer	32
	American Black Bear	1
	Fisher	1
	Eastern Coyote	2
	Bobcat	2
Indian Lake Outflow	N/A – No observations recorded	
Lake Edge Game Trail	N/A – No observations recorded	
Mixed Wood Stand	N/A – No observations recorded	
Clearcut	White-tailed Deer	10
Softwood Stand	American Porcupine	3
	Eastern Coyote	2
	Bobcat	2

As evident by the observations made during the field programs, Mainland Moose are using habitats in the LAA year-round, though the habitats where moose are present vary seasonally. Signs of Mainland Moose observed included individuals, pellets, tracks, and browse.

As Mainland Moose are a location-sensitive species, the location observations will be provided to NSDNR under separate cover.

In general, the findings indicate that the Study Area supports a year-round moose population, with several forested, open, and wetland habitat types providing suitable habitat components for their various life stages.

10.2.2 Turtles and Other Herpetofauna

The NSDNR Significant Species and Habitat Database contains 36 records of species and/or habitat records that relate to turtles and other herpetofauna within a 100 km radius of the PDA. These records are all for Species at Risk referring to Wood Turtle (510 records at 35 locations) and Snapping Turtle (seven locations).

Twenty-seven of the NSDNR Significant Species and Habitat Database records occur within 5 km of the PDA. All records refer to Wood Turtle observations in the East River St. Marys, St Marys River, West River, and Barneys River.

The AC CDC (Appendix F, 2023a, 2023b) Data Reports list observations of three terrestrial herpetofauna SAR and SoCC that have been recorded within a 100 km radius of the LAA. Table 10.5 summarizes the herpetofauna observed within a 5 km radius of the LAA.

Table 10.5 Herpetofauna SAR and SoCC Observed within a 5-km Radius of the LAA (Source: AC CDC, 2023a, 2023b)

Scientific Name	Common Name	NSESA	SARA	COSEWIC	S-rank
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	Threatened	S2
Chelydra serpentina	Snapping Turtle	Vulnerable	Special Concern	Special Concern	S3

The Wood Turtle and Snapping Turtle records are associated with the St. Marys River and West River and both watersheds overlap the PDA.

10.2.2.1 Turtle Surveys

No turtles were observed during Wood Turtle surveys conducted in 2022; however, suitable habitat was identified (Strum, 2023). This habitat was characterized by sandy and/or gravel banks, clear, flowing water, and adequate sun exposure and occurred outside of the PDA.

Incidental observations of turtle habitat and one turtle nest were collected during other biophysical field surveys conducted on site in 2025. Possible suitable Wood Turtle habitat was identified during the during the aquatic surveys at watercourse assessment point WF27 (see Figure 7.4 for location of assessment point). Additionally, a predated turtle nest was observed on a gravel roadside near Black Brook; however, there was insufficient evidence to identify the nest to a particular species.

Four species of herpetofauna were incidentally observed over the course of the field survey programs conducted in the Study Area (Table 10.6).

Table 10.6 Summary of Herpetofauna Observations Recorded during the Field Survey Programs

Scientific Name	Common Name	NSESA	SARA	COSEWIC	S-rank
Thamnophis sirtalis	Common Gartersnake	-	-	-	S5
Opheodrys vernalis	Smooth Greensnake	-	-	-	S4
Storeria occipitomaculata	Red-bellied Snake	-	-	-	S5
Lithobates palustris	Pickerel Frog	-	-	-	S5

10.2.3 Invertebrates

The AC CDC (2023a, 2023b) Data Reports contains records of six invertebrate SAR and SoCC within a 100 km radius of the LAA. Only one invertebrate species (Question Mark, *Polygonia interrogationis*, S-rank: S3B) was observed within a 5-km radius of the LAA.

No incidental observations of SAR or SoCC terrestrial invertebrates were recorded during the field programs.

10.3 Effects Assessment

10.3.1 Potential Effects and Mitigation

During the design phase of the Project, several modifications were made to minimize both direct and indirect impacts on terrestrial wildlife, while adhering to engineering and design requirements.

Direct and indirect effects of the Project on terrestrial wildlife could occur through several interconnected pathways. During construction, activities like earthworks and vegetation clearing may lead to habitat loss, alteration, and disruptions in movement patterns, as well as changes in food availability. Approximately 28.5 km of access roads will be needed for the Project, with 17.1 km consisting of existing gravel roads that will be upgraded. Additional new gravel road segments will be constructed where WTGs branch from the current network, and alternative access routes are being considered, leading to approximately 11.4 km of new linear disturbance. An increase in road width and density may lead to habitat fragmentation and influence wildlife mobility. The rise in Project-related vehicle traffic poses a risk of mortality and injury due to collisions. Additionally, sensory disturbance from light and noise during construction, operation and maintenance, and decommissioning could impact wildlife behaviour.

Project activities may pose increased threats specific to Mainland Moose. Forest clearing and road construction activities could increase White-tailed Deer access to moose habitat, heightening the risk of disease transmission. Additionally, the updated road infrastructure may facilitate non-Project related human access, potentially attracting individuals engaged in illegal moose poaching.

Project activities can affect terrestrial fauna as indicated in Table 10.7; these potential effects do not consider the implementation of mitigation measures described herein.

Table 10.7 Potential Environmental Effects of the Project on Terrestrial Wildlife

Project Activity	Potential Environmental Effects			
	Habitat Loss/ Fragmentation	Collision Risk	Disruption of Life History	Other Threats (Poaching/ Disease)
Construction				
Site Preparation	X	X	X	-
Access Roads Construction and Modifications	X	X	X	X
Material and Equipment Delivery and Storage	-	X	X	-
Infrastructure Installation		X	X	-
Restoration of Temporary Areas	-	-	X	-
Testing and Commissioning	-	X	X	-
Operation and Maintenance				
WTG Operation and Maintenance	-	X	X	-
Road Maintenance	-	X	X	-
Power Line and Substation Maintenance	-	X	X	-
Vegetation Management	-	X	X	-
Safety and Security	-	-	-	-
Decommissioning				
Removal of Infrastructure and Site Restoration	-	X	X	-

X = Potential Interaction
- = No Interaction

10.3.1.1 Habitat Loss and Fragmentation

The Project will result in some habitat degradation and fragmentation for terrestrial wildlife species in the LAA.

The Project lies within the Pictou/Antigonish/Guysborough Mainland Moose core habitat area, as designated by the Mainland Moose Recovery Plan (NSDNR, 2021). The Recovery Plan notes that renewable energy projects and road construction may harm moose habitat through loss, conversion, degradation, and fragmentation. Project construction could result in the loss or alteration up to 82 ha of habitat that meet one or more of the biophysical parameters for Mainland Moose Core Habitat. This estimate exceeds actual requirements, as portions of the area to be cleared coincide with previously clearcut regions and existing roads.

While direct research on the effects of wind-farm clearing and activity on Moose is limited, studies on other large ungulates and on Moose in forestry-cleared areas provide insight into how Project-related habitat loss and fragmentation could influence the local Mainland

Moose population. Habitat loss, conversion, degradation, and fragmentation from wind projects are known to present a threat to large terrestrial mammals in Europe (Tolvanen et al., 2023 and Schöll & Nopp-Mayr, 2021). For example, one literature review study found that 67% of papers on large terrestrial mammals reported displacement. Of these studies, they found a consistent displacement of up to 5 km in response to wind farm disturbance (Tolvanen et al., 2023). Clearing activities from the Project may lead to both short-term and long-term loss of suitable moose habitat in the PDA. Forest clearing may decrease cover habitat for thermoregulation and shelter, but the area of foraging habitat could increase after construction, as vegetation around WTG bases and road edges will naturally regenerate, helping to minimize the loss of foraging areas. Currently, the majority of the LAA is subject to industrial timber harvesting activities.

The estimate of habitat loss or alteration is based on the PDA. Some of the habitat slated for clearing is directly adjacent to existing roads, and the total cleared areas will be less than estimated because these calculations include areas that have been recently cleared and areas currently occupied by roads. The layout of the Project utilizes habitats along existing roads and lower-quality habitat on industrial forest lands to minimize habitat loss impacts.

The Pictou/Antigonish/Guysborough region currently has the second highest concentration of Mainland Moose in the province, making protection of habitat in the area important for recovery of this species (NSDNR, 2021). Habitat in this region, and especially areas meeting the biophysical requirements for Core Habitat, play a pivotal role in ecological connectivity for moose.

Historical and current land use, including forestry and off-road recreational activities, has considerably fragmented the habitat in the LAA due to degraded forest habitat and extensive road and trail networks. Fragmentation affects the quality and connectivity of habitat for both individual wildlife and populations. Moose in the LAA could be impacted by both further fragmentation of the forests and vegetation removals in foraging areas resulting from WTG, road construction, and road widening. To minimize adverse effects, WTGs will be placed in areas already disturbed by industrial forestry activities, with 60 % of access roads using roads in the PDA. In addition, vegetated buffers around wetlands and watercourses will be maintained to support connectivity and cleared areas will be replanted progressively to mitigate fragmentation effects.

Herpetofauna use terrestrial habitats like wetlands, riparian areas, forested areas near water, and rocky/gravelly areas such as roadsides. The Project layout is designed to minimize impacts on intact habitat, especially in riparian areas and surrounding forests. Most watercourses in the PDA were not observed to support turtle habitat. However, turtles move across the landscape, especially between wetlands and watercourses, and may be present in the LAA. The Project design minimizes habitat alteration of watercourses and adjacent habitat by prioritizing pre-existing roads and watercourse crossings. The construction of new roads may create small gravel roadside habitats suitable for nesting turtles.

Other non-priority species use habitats in the LAA; the Project construction and operation and maintenance phases may result in habitat loss and fragmentation for non-priority species. Project construction may remove refugia, increase predation risks, and disrupt ecological balance. Forest interior species, such as Fisher, are more sensitive to habitat loss and fragmentation, but the Project layout, which involves using existing roads and avoiding old-growth habitat, is designed to minimize bisecting intact forested areas with substantial unsuitable habitat. In general, it is expected that movement patterns may be affected in the short-term as alternate habitats are sought, but terrestrial wildlife will likely continue using habitats (including new and existing roads) post-construction.

Direct impacts of habitat loss and fragmentation to non-priority species in the LAA will be low to moderate and can be mitigated through strategies to reduce these effects. Careful site planning has been implemented to minimize habitat disturbance and to reduce habitat loss and fragmentation, use existing roads and areas that have been previously altered, such as clearcuts and harvested areas. Habitat modelling, field survey results, and NSDNR guidance have been considered during Project layout design. The iterative Project design process has prioritized avoidance and minimization of interactions with important wildlife habitat such as wetlands.

Potential Project effects related to habitat loss and fragmentation can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on terrestrial wildlife habitat will be further detailed in an EPP and will be implemented prior to and during construction.

- Mainland Moose habitat mapping was considered in the design of the Project layout.
- Vegetated buffers around wetlands and watercourses will be maintained to support connectivity for wildlife where possible.
- Vegetation management practices that benefit Mainland Moose will be implemented, such as maintaining natural browse areas and creating new foraging opportunities.
- To minimize the impacts of habitat loss during operation and maintenance, particularly for Mainland Moose, compatible vegetation will be maintained in cleared areas (i.e., cutting tree species while preserving low shrub species that do not interfere with Project infrastructure or site access).
- Alternative road de-icing methods will be employed during road maintenance as practicable to prevent the impacts of salt on wildlife and their habitats.
- Measures will be implemented to control and prevent the spread of invasive species.
- A Mainland Moose monitoring plan will be developed and submitted to NSDNR and NSECC prior to construction. The program will be implemented two years from the time WTGs become operational.
- The Proponent will develop and implement a Wildlife Management Plan.

10.3.1.2 Collision Risk

Due to an increase in road traffic in the PDA, predominantly during the construction phase, the Project will increase the risk of collision with wildlife using the roadways. Currently the LAA is used by local residents, recreational users (particularly snowmobiles and all-terrain vehicles (ATVs)), and for industrial forestry operations.

Surveys conducted in the LAA show current year-round use of roads by a variety of animals including Mainland Moose, Fisher, White-tailed Deer, Snowshoe Hare, and Eastern Coyote. These species may be at increased risk of injury and death due to collisions through all phases of the Project, but particularly during construction when increases in vehicular traffic will be greatest.

Herpetofauna are particularly vulnerable to increased exposure to road traffic due to their slow movement. During seasonal migrations from their overwintering areas, they often cross roads to reach breeding sites. Wood Turtles, in particular, frequently nest in human-made habitats such as road embankments. Turtle species are highly sensitive to increased mortality among adults and older juveniles due to their delayed sexual maturity and slow reproductive rate. Mortality and injury from road networks (including new road construction, road widening and increased traffic volume and speed) are identified as high-level concerns for the recovery of Wood Turtle (ECCC, 2020). The construction phase of the Project poses the greatest increase in risk of collision injury and mortality due to the increased traffic levels on the roads, but impacts can be mitigated by avoiding construction activities during peak seasonal activity and movement patterns of individual species.

The threat of wildlife vehicle collisions will be local in the medium-term and with the highest likelihood of occurring during the construction phase. It is expected that traffic associated with the Project operational phase (maintenance of equipment and vegetation) will have minimal impact on the potential for wildlife collisions. Considering existing traffic load and the expected minimal impact from the Project beyond the construction phase, the impact of collisions on terrestrial fauna in the LAA due to road traffic is assessed to be low.

Flying invertebrates are at risk of mortality due to collisions with operating WTG structures, particularly those exhibiting hill-topping, swarming, and migrating behaviours (Voigt, 2021). A potential influencing factor contributing to the collision risk is the attraction of some insect species to WTGs, with WTG colour identified as a potential influencing factor (Crawford et al., 2023). However, gaps in the literature persist regarding how attraction to WTGs influences insect mortality rates and whether WTG-induced fatalities contribute to overall insect population declines (Voigt, 2021). Based on the limited available data, no measurable Project-related effects on flying invertebrate populations in the LAA have been identified.

Potential Project effects related to wildlife collision risk can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on terrestrial wildlife collision risk will be further detailed in an EPP and will be implemented prior to and during construction.

- Project staff will be briefed on wildlife dangers and hotspots, aiming to minimize traffic and associated stress to wildlife.
- Signage will be posted in sensitive habitat during sensitive periods for wildlife to caution drivers.
- Traffic signs (speed limit and wildlife warning signs) will be installed to reduce speed and alert road users to presence of wildlife.
- Project related traffic will be minimized to reduce wildlife vehicle collisions.
- The amount of road that parallels a watercourse will be minimized where possible.
- Permanent and temporary road and water crossings will be planned to prevent turtle mortality and protect water quality.
- Onsite monitoring for Mainland Moose, will be conducted during site preparation and construction activities, as outlined in a Wildlife Management Plan.
- Turtle VES will be considered immediately prior to site preparation and construction activities. If SAR turtles are present, ECCC recommends clearing no earlier than mid-October to avoid risk of destruction of individuals.
- If a SAR or SoCC turtle or nest is encountered during construction activities, work will cease, and the local regional biologist contacted for direction.
- Vegetation management practices to enhance visibility for wildlife and reduce the risk of collisions will be implemented.

10.3.1.3 Disruption of Life History

The Project activities may cause habitat disturbance, disrupting the life history of terrestrial wildlife in an area already influenced by human activities, such as forestry operations and recreational use. During the Project construction period, disturbance levels are expected to be comparable to active forestry operations, but extended over a longer duration (excluding short-term, isolated activities like blasting). Wildlife may exhibit behavioural changes as a result of the Project and seek out alternate habitats outside of the LAA due to sensory disturbance and stress. In the operation and maintenance phase, sporadic increases in lighting, traffic, and human presence may occur, potentially prompting wildlife to avoid or abandon suitable habitats over the longer term. The greatest difference in the disturbance regime in the LAA as a result of the Project may arise from the noise (and possibly vibration) generated by the operating WTGs.

Mainland Moose could be especially sensitive to disruptions in their life history caused by Project roads during construction, operation and maintenance, and decommissioning. Moose experience disturbances from road construction, maintenance, and traffic, with even low-intensity roads such as recreational trails prompting some degree of habitat avoidance (Beazley et al., 2004). Studies on the impacts of road density on moose individuals and populations have been conducted, revealing direct and indirect influences (Yost and Wright, 2001; Beazley et al., 2004; Shanley and Pyare, 2011). Conversely, a study on moose tracked using GPS collars in west-central Alberta found no significant response of moose to the presence of roads (including two-lane gravel roads, single-lane gravel roads, and small truck trails) and found considerable variation amongst individuals tracked. For example, some individuals avoided areas with any human activity, while others selected road edges for foraging areas (Finnegan et al., 2023). Another study in Quebec found that collared cow moose tended to avoid both paved and forest roads, likely due to the associated human disturbance and activity rather than the roads themselves (Gagnon et al., 2024). The extent of the impact of roads on moose may vary based on the road type, the level of use, and overall road density. Areas in the Pictou/Antigonish/Guysborough region surpass the road density threshold considered detrimental to Mainland Moose yet host the province's second highest concentration of individuals (NSDNR, 2021).

Moose could exhibit altered behaviour and movement patterns in response to Project activities that cause loss of habitat, increased vehicular traffic, increased human presence, and noise. Some studies have looked at the impact of operational WTGs on moose, but the impacts to their behaviour and habitat selection remains unclear (Bernt, 2021). The Mainland Moose Recovery Plan recognizes stress from renewable energy infrastructure, specifically citing artificial lighting sources and the flicker effect as a potential threat to the Mainland Moose (NSDNR, 2021).

While there is limited research on the response of moose to WTGs, studies on other large mammals like deer, reindeer, and elk show behavioural changes during construction and operation (Łopucki et al., 2017; Skarin et al., 2015; Skarin and Alam, 2017; Skarin et al., 2018), with some studies indicating no significant impact on behaviour during operation (Walter et al., 2006; Colman et al., 2013; Tsegaye et al., 2017; Taylor et al., 2016). Studies on carnivores (including martens) indicate that wind farms can influence habitat use and abundance, especially during construction (Sirén et al., 2016; Łopucki et al., 2017; Sirén et al., 2017). To reduce disruptions to wildlife life history, seasonality will be considered when planning construction, maintenance, and decommissioning activities. The field studies and habitat mapping indicate where Mainland Moose presence is likely the highest and avoiding these areas during sensitive seasonal windows will help reduce the impacts.

Despite existing noise from extensive forestry operations and recreational activities on site, including recreational snowmobiling and ATV use, various mammal species were observed in the LAA, including Mainland Moose. This suggests wildlife in the area are relatively tolerant or habituated to some sensory disruptions from these existing human activities.

Small-mammal (e.g., rodent and shrew) populations are not likely impacted by wind energy development (De Lucas et al., 2005; Łopucki and Mróz, 2016). Due to lack of studies on the impacts of WTGs on local small mammal populations it is unclear what impacts the Project may have, if any, on small mammals in the LAA.

Sensitive periods for herpetofauna, related to migration or nesting periods, may be disrupted by Project activities, impacting migratory or breeding behaviours and potentially creating barriers to important habitat due to habitat removal or fragmentation. It is expected that impacts on life history of herpetofauna will be negligible considering the

Project use of existing roads and previously disturbed habitats, especially if construction, maintenance, and decommissioning activities are conducted outside of sensitive periods for these species.

Potential Project effects related to disruption of life history can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on life history of terrestrial wildlife will be further detailed in an EPP and will be implemented prior to and during construction.

- Blasting will be undertaken in accordance with regulatory requirements and will only be conducted by qualified blasting professionals.
- Pre-blast wildlife searches will be completed.
- Blasting will be monitored and will be planned to occur on days where weather conditions are less likely to cause excessive noise levels.
- Noise-reducing technologies will be used to minimize the impact of construction noise on wildlife.
- Onsite lighting will be designed to minimize disturbance.
- Project personnel will be prohibited from harassment and feeding of wildlife.
- A Mainland Moose monitoring plan will be developed and submitted to NSDNR and NSECC prior to construction. The program will be implemented for two years from the time WTGs become operational.
- The Proponent will develop and implement a Wildlife Management Plan.

10.3.1.4 Other Threats (Disease/Poaching)

Project activities including forest clearing and road construction may increase White-tailed Deer access to moose habitat, potentially increasing the risk of disease transmission, including Brainworm (*Parelaphostrongylus tenuis*) and Winter Tick (*Dermacentor albipictus*). The evidence from the field surveys shows prominent use of the LAA by deer and existing roads connecting the known deer over-wintering area to the PDA. The increased impact from the Project on Mainland Moose disease will be small.

Poaching is recognized as a potential threat to Mainland Moose in the Recovery Plan (NSDNR, 2021). Although increased human access, including local hunters and recreational users, may elevate the risk, the LAA is already highly accessible. Upgrades to existing roads may allow for more types of vehicles accessing moose habitat which could increase the poaching risk. However, the heightened presence of operational and maintenance staff may serve as a deterrent to moose poaching.

Project construction may enhance non-Project-related human access to the LAA, potentially attracting increased use by ATV users, hikers, and hunters, including those engaging in illegal moose poaching—a significant threat to Mainland Moose (NSDNR, 2021). These users might exploit the newly constructed or upgraded access roads. To mitigate this effect, plans for decommissioning and revegetating access roads will be implemented.

Establishment or spread of invasive weed populations through Project construction, operation and maintenance, and decommissioning activities may impact wildlife in the LAA. The Recovery Plan for Mainland Moose lists invasive plant species as a concern for Mainland Moose due to their impact on available food sources. Best management practices will be implemented during Project activities to limit the spread of invasive species. Additionally, invasive species management procedures will be adopted in the PDA to identify, prevent, control, and mitigate the impact of invasive species.

Impacts of disease, poaching and other threats to priority and non-priority species in the LAA will be low and can be mitigated through strategies to reduce these effects.

Potential Project effects related to other threats (disease/poaching) can be effectively mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on terrestrial wildlife will be further detailed in an EPP and implemented prior to and during construction.

- As much natural cover as possible will be retained to favour moose habitat over deer habitat to minimize incursion of brainworm and winter tick.
- Invasive species management procedures will be developed and implemented as part of the Vegetation Management Plan.
- Access roads for construction will be decommissioned and revegetated where possible.
- Decommissioning of existing roads in strategic areas or the use of barriers to limit human presence will be considered.
- The Proponent will develop and implement a Wildlife Management Plan.

10.3.2 Residual Effects

Although effects on mammals, herpetofauna, and invertebrates vary, primary concerns include habitat loss, fragmentation, and vehicle collision and the associated disruptions to life history. The magnitude of residual effects is expected to be moderate to large on an immediate scale based on the loss of core habitat for Mainland Moose. Magnitude of the effects of habitat fragmentation is expected to be minor on a local scale. Residual effects are predicted to be long-term for habitat loss and fragmentation but variable for individual species. Habitat disruption and avoidance will most likely occur during periods of construction and may be more intermittent during periods of operation and maintenance when onsite human activities are less frequent and would occur on a short-term basis. This will return to baseline during inactive periods and after the decommissioning of the Project. Timing of residual effects, if the mitigation measures are followed, should be low to moderate. Through proposed mitigation and monitoring, expected effects on terrestrial fauna are expected to be minor and local. These effects are continuous but seasonally varied and reversible.

Based on current site conditions, the impact assessment, and the mitigation measures implemented or planned for construction, the overall residual effects on terrestrial wildlife are predicted to be not significant.

10.4 Monitoring

An environmental monitoring program will be developed prior to Project construction. Additional surveys or mitigations may be identified in consultation with regulators following review of the monitoring program.

A post-construction monitoring program for Mainland Moose will be developed in consultation with NSDNR and implemented for two years post-construction to assess effects of the Project. The results of the post-construction monitoring program will be submitted to NSDNR as required.

11 Bats

11.1 Overview

This section examines how the Project may impact bats, considering both migratory and resident species, and their habitats. Wind energy developments can adversely affect bats, as WTG operation can be associated with an increased risk of mortality. Additionally, indirect effects, such as the loss and fragmentation of habitat and disturbances from noise or light, also pose threats to bat populations. The Project's design has been refined to help minimize these potential impacts on bats and their habitats.

Interactions of the Project with bats are closely linked to potential effects on other VECs discussed in related chapters, including noise and light disturbance (Chapter 5: Atmospheric Environment), vegetation loss or modification (Chapter 8: Flora), and loss or alteration of wetlands (Chapter 9: Wetlands).

For this assessment, studies were conducted to evaluate the existing environment, including the presence and activity of bats, maternity roosting habitats in the Study Area and nearby hibernacula. Data collected from the pre-construction surveys was used to assess site risk, guided the placement of project infrastructure, shaped mitigation strategies, and established a baseline for ongoing monitoring and adaptive management after construction (NSDNR, 2022).

Potential effects, mitigation measures, and residual impacts to bats as a result of the Project are outlined in this Chapter. Mitigation measures will be further refined in a project-specific EPP before construction begins, ensuring that potential adverse impacts on bat populations are minimized.

11.1.1 Regulatory Context

Assessment of bats considers the existing environment and measures effects using relevant provincial and federal legislation:

- Nova Scotia *Wildlife Act*
- NSESA
- SARA
- *Canadian Environmental Protection Act*

- Nova Scotia *Biodiversity Act*
- Nova Scotia *Environment Act*
- Nova Scotia *Wilderness Areas Protection Act*

11.1.2 Boundaries

The Study Area defines the spatial extent within which autonomous recording units (ARUs) were deployed to characterize baseline conditions. For this assessment, the LAA for bats includes the PDA, a 500 m buffer, and associated airspace. The RAA is a 5-km buffer around the PDA.

11.1.3 Assessment Methodology

The assessment of bats focused on identifying migratory and resident bat species present on or near the LAA and activity in the Study Area. Data was collected through literature review, online databases and reports, habitat analysis, and field surveys conducted during migratory and breeding periods.

The information gathered during the literature review and habitat analysis was used to inform the design of baseline field surveys and reflective of the protocols outlined in *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022), *Bats and Wind Turbines, Pre-siting and preconstruction survey protocols* (Lausen et al., 2010), *Pre-Construction Bat Survey Guidelines for Wind Farm Development in NB* (New Brunswick Department of Fish and Wildlife, 2009).

Baseline field surveys were conducted to assess which bat species are present and their activity levels in the Study Area. Locations of possible suitable maternity roost habitats in the LAA were modelled. Additionally, the collected data provides a foundation for future monitoring and adaptive management after construction is complete.

The description of the existing environment is based primarily on data collected through the following resources plus field surveys carried out for this Project:

- Karst Risk Map of Nova Scotia (Drange and McKinnon, 2019)
- Locations of Known Bat Hibernacula in Nova Scotia (Moseley, 2007)
- Nova Scotia Geoscience Atlas - Abandoned Mine Openings (GeoNOVA, 2024)
- Nova Scotia Significant Species and Habitats Database (GeoNOVA, 2024)
- AC CDC Data Reports (Appendix F, AC CDC, 2023a, 2023b)
- Global Forest Watch Tree Cover Loss 2001-2024 and Gain 200-2020 (Global Forest Watch, 2025)
- Nova Scotia Forest Inventory (GeoNOVA, 2024)
- Nova Scotia LiDAR Point Cloud (GeoNOVA, 2020)
- Nova Scotia Hydrographic Network (GeoNOVA, 2024)
- Nova Scotia Wetlands Inventory (NSDNR, 2021)
- Nova Scotia Predictive Ecosystem Mapping (GeoNOVA, 2024)

An assessment of suitable bat maternity habitat known to occur within a 100 km radius of the LAA was completed using available habitat information and mapping data.

Detailed habitat suitability modelling was developed to identify possible suitable bat maternity roost habitat for Little Brown Myotis (*Myotis lucifugus*) and Northern Myotis (*Myotis septentrionalis*) that may occur in the LAA. This map was used to evaluate Project impacts. Details of the habitat suitability modelling for *Myotis* species are presented below. Since the summer range of Tri-colored Bat (*Perimyotis subflavus*) has historically been considered restricted to southern Nova Scotia and outside the LAA (Quinn and Broders, 2007; McBurney and Segers, 2020), habitat modelling for this species was not completed.

11.1.3.1 SAR Bat Habitat Modelling

Spatial parameters representing biophysical attributes of *Myotis* maternity roost habitat were assigned based on peer-reviewed literature and expert knowledge. The spatial layers used to represent and measure suitable roosting habitat were retrieved from the following datasets:

- Nova Scotia Forest Inventory (GeoNOVA, 2024)
- Nova Scotia LiDAR Point Cloud (GeoNOVA, 2020)
- Nova Scotia Old Growth Potential Index (NSDNR, 2025)

As forest-dwelling species, natural roosting sites for Myotis are typically tall, large diameter trees located in older stands with open canopies (ECCC, 2018; COSEWIC, 2013: Balzer et al., 2022; Kalcounis-Ruppel et al., 2005; Barclay and Brigham, 1996). While species of *Myotis* sp. have been recorded in both coniferous and deciduous stands, evidence suggests that deciduous and mixedwood forests are preferred for maternity roosts (Broders et al., 2006; Kalcounis et al., 1999; Patriquin and Leonard, 2011). Among these habitat factors, stand age is more important, likely because older stands contain more snags and decaying trees suitable for roosting (Patriquin and Leonard, 2011; COSEWIC, 2013; Fabianek et al., 2015).

The following biophysical attributes were used to model possible suitable maternity roosting habitat for Myotis species:

- Diameter at Breast Height – Any stand classified as having an average total diameter of 17 cm or greater
- Canopy Height – Any stand with a canopy height of 15 m or greater
- Predictive Ecosystem Mapping – Any stand classified at the 6th level as Acadian Deciduous Forest, Acadian Mixedwood Forest, Acadian Coniferous Forest, Wet Deciduous Forest, Wet Coniferous Forest, Wet Mixedwood Forest
- Old Growth Potential – Any stand with the potential to be old growth at any rank

11.1.4 Field Surveys

The objective of the field surveys was to gather baseline information on bats that use and move through the Study Area. Following the *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022), other accepted survey protocols and guidance documents, and consultation with regulators, baseline survey protocols were developed. The bat surveys were carried out using stationary acoustic recorders to passively monitor bat activity.

The *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022) states a minimum of two to three survey stations are required for wind energy projects with less than 10 WTGs, with an additional survey station for every five WTGs beyond this amount. Acoustic bat monitoring was conducted in the Study Area over three field seasons (2021, 2022, 2023, and 2024). Four ARUs were deployed in 2021 and 2022, 20 in 2023, and five in 2024.

In 2021 and 2022, bat surveys were conducted between August 25 and September 8, and May 31 and November 1, respectively, to support the nearby Weavers Mountain Wind Energy Project, which is currently under construction. Given its proximity to the Project Study Area, these data were incorporated to provide additional context on bat activity and species composition in the Study Area.

ARUs were deployed between June 9 and October 15, 2023, and between June 12 and October 15, 2024, except for one ARU that lost power on October 13, 2024. These monitoring periods overlap with key periods of bat activity, including the maternity season, fall migration, and general movement of resident species.

Survey locations were selected to target areas where bats are likely to congregate (e.g., wetlands and waterbodies used for foraging) and along natural corridors (e.g., valleys, streams, and ridges) where migratory bat movements are likely to occur (Lausen et al., 2010) to maximize recordings of bats foraging or commuting in the area.

Table 11.1 Detailed Habitat Description for Each ARU Location.

ARU ID	Habitat
WM-01	Edge of a previously cleared/regenerating area. Mature softwood trees surrounding immature deciduous shrubs.
WM-02	Edge of a small lake surrounded by a medium-aged conifer forest.
WM-03	Edge of a clearing at the end of a seldom-used roadway. Surrounding forests are mature conifer, transitioning to mixed woods.
WM-04	In a previously clear-cut area, currently dominated by regenerating deciduous shrubs approximately 2-3 m tall.
BM01	Riparian area (wetland) where a tributary intersects Indian Lake
BM02	Treed swamp (mixed wood)
BM03	Riparian area dominated by softwood, where a tributary meets Duck Ponds
BM04	Open, cleared, and graded area.
SM01	Overstory is dominated by Sugar Maple, with some Balsam Fir. The shrub layer contains sarsaparilla and regenerating conifers
SM02	Regenerating clearcut. Large open cleared area with early regenerating vegetation.

ARU ID	Habitat
SM03	Late successional vegetation, with an overstory of Sugar Maple and Yellow Birch. Hay-scented fern was dominant in the shrub layer.
SM04	Black Spruce dominated overstory with cinnamon fern. Coarse woody debris and snags are present.
SM05	White Birch and Sugar Maple overstory. Coarse woody debris and snags due to forestry operations.
SM06	Mixed wood including American Beech, Sugar Maple. Coarse woody debris and snags are present.
SM07	Mixed wood area. Sugar Maple, Grey Birch, Red Spruce and/or Black Spruce, some American Beech. Coarse woody debris and snags present.
SM08	Overstory is dominated by White Birch with some Balsam Fir. The shrub layer is Canadian Mayflower and Northern Starflower.
SM09	Overstory is dominated by Red Maple with other various hardwoods mixed in (some Black Spruce, White Birch). Coarse woody debris and snags are present at bat station. The shrub layer is a mix of Canadian Mayflower and regenerating conifers and hardwoods.
SM10	Mix of hardwoods and conifer tree stands. Somewhat dense forests with no real vegetation in the shrub layer, limited moss for ground cover.
SM11	Early to mid-successional forest with abundant Balsam Fir regeneration. Significant woody debris and snags
SM12	Mixed wood regenerating forest (Red Maple, Black Spruce, Alder).
SM13	Mixed wood regenerating forest (Red Maple, Black Spruce, Alder).
SM14	Mixed wood forest with Black Spruce, Red Maple, Sugar Maple, Cinnamon Fern and sarsaparilla veg.
SM15	Mix of old hardwood trees and regenerating spruce and pines.
SM16	Along shore of small lake. Windblown trees, Black Spruce dominated.
SM17	Wetland surrounded by regenerating forest of pines and spruce. Woody debris present.
SM18	Dense regenerating Balsam Fir, early to mid-successional forest with some mature hardwood trees.
SM19	Open area, surrounding forest is mixed trees (maples, birches) and pines
SM20	Lots of coarse woody debris, snags, regenerating softwood/hardwood (alders, spruce, maples, birch). Likely windthrown.

Each ARU was programmed to record between solar sunset and solar sunrise, and to meet the requirement of at least four hours of recording per night. ARU settings were programmed to limit environmental noise while maximizing detection of bat species. Bat detectors were deployed approximately 3 to 4 m from the ground and were mounted directly to tree trunks.

Analysis of the data collected by ARUs deployed between 2021 and 2024 was limited to nights with favourable weather—specifically, no precipitation, temperatures above ten degrees Celsius, and wind speeds under 20 kilometres per hour. Out of the total period ARUs were deployed, the following met these criteria and were included in the analysis: 15

nights for WM-01 to WM-04, 115 nights for ARUs 01 to 10, 105 nights for ARUs 11 to 20, and 155 nights for BM01 to BM04. An additional 141 nights were analyzed from ARUs 15 to 20, during their re-deployment in 2024.

Analytical software was used to interpret and analyze bat calls recorded during ARU surveys. Files were then manually vetted, prioritizing calls with a lower confidence level based on results of the automated identification module.

When possible, recorded bat passes were identified to species. Where bat calls could not be identified to species with confidence, these calls were classified into groupings of bats with similar or overlapping call characteristics (Table 11.2). Myotis calls (Little Brown Myotis and Northern Myotis) were generally classified into one common group, Myotis.

Table 11.2 Species and Groupings used during Analysis of Data Recorded in the Study Area

Species	Code
Little Brown Myotis (*Myotis lucifugus*)	MYLU
Northern Myotis (*Myotis septentrionalis*)	MYSE
Tri-colored Bat (*Perimyotis subflavus*)	PESU
Eastern Red Bat (*Lasiurus borealis*)	LABO
Hoary Bat (*Lasiurus cinereus*)	LACI
Silver-haired Bat (*Lasionycteris noctivagans*)	LANO
Big Brown Bat (*Eptesicus fuscus*)	EPFU
Groupings	**Code**
Little Brown Myotis/Northern Myotis	*Myotis*
Big Brown Bat/Silver-haired Bat	EPFULANO
Little Brown Myotis, Northern Myotis, Tri-colored Bat, or Eastern Red Bat	High Frequency/HighFreq
Silver-haired or Hoary Bat	Low Frequency/LowFreq

After identification, bat passes were analysed to determine seasonal and temporal activity patterns in the Study Area. Subsequent analysis was carried out to assess activity of migratory species—those at a higher risk of mortality.

11.2 Existing Environment

Seven species of bats have been recorded in Nova Scotia (Broders et al., 2003) and are protected under Nova Scotia's *Wildlife Act*. Of these, three species are listed as Endangered at both the provincial (NSESA) and federal (Schedule 1 of SARA) levels (Table 11.3).

Table 11.3 Bat Species of Nova Scotia and Conservation Status

Scientific Name	Common Name	NSESA	SARA	COSEWIC	S-rank
Myotis lucifugus	Little Brown Myotis	Endangered	Endangered	Endangered	S1
Myotis septentrionalis	Northern Myotis	Endangered	Endangered	Endangered	S1
Perimyotis subflavus	Tri-colored Bat	Endangered	Endangered	Endangered	S1
Lasiurus cinereus	Hoary Bat	--	--	Endangered	SUB, S1M
Lasiurus borealis	Eastern Red Bat	--	--	Endangered	SUB, S1M
Lasionycteris noctivagans	Silver-haired Bat	--	--	Endangered	SUB, S1M
Eptesicus fuscus	Big Brown Bat	--	--	--	SNR

In Nova Scotia, three non-migratory bat species—Little Brown Myotis, Northern Myotis, and Tri-colored Bat—over-winter in caves and abandoned mines (Moseley, 2007). However, the Tri-colored Bat is primarily found in southern Nova Scotia and the Fundy coast of New Brunswick (Broders et al., 2003).

White-nose Syndrome (WNS) is currently the most significant threat to the survival of these three bat species. Caused by the fungus, *Pseudogymnoascus destructans*, WNS thrives in cold, humid underground environments typical of bat hibernacula. The disease causes bats to wake frequently during hibernation, depleting their energy reserves prematurely and often leading to death (ECCC, 2018; NSDLF, 2020). This disease has led to severe population declines, with mortality rates exceeding 90% in many hibernacula in eastern Canada, including Nova Scotia (COSEWIC, 2013; ECCC, 2018; US Fish and Wildlife, 2019). Dobony and Johnson (2018) found that despite severe early declines from WNS, the monitored Little Brown Myotis colony in this study exhibited stabilized counts over several years and some individuals survived multiple years after initial exposure, suggesting potential long-term resilience in this population.

The other four bat species known to occur in Nova Scotia are long-distance migratory species, three of which were assessed by COSEWIC in May 2023 as Endangered: Hoary Bat, Eastern Red Bat, and Silver-haired Bat. The fourth migratory species is Big Brown Bat. While the range and population of Big Brown Bat is largely unknown, there have been a few occurrence records for Nova Scotia (Broders et al., 2003).

The NSDNR Significant Species and Habitat Database contains 23 records of species and/or habitat records which relate to bats within a 100-km radius of the PDA. These records include Species at Risk (13 records), Species of Concern (six records) and Other Habitat (four records). The details of these records include the following:

- Species at Risk – Records relate to Little Brown Bat (11), Bat (unclassified) (1), and Northern Myotis (1).
- Species of Concern and Other Habitat – Records relate to significant areas (caves and mines) (10).

The AC CDC data (Appendix F, AC CDC, 2023a, 2023b), indicate a single bat species occurrence or hibernacula recorded within a 5-km radius of the LAA.

11.2.1 Bat Detections

Acoustic bat monitoring conducted in the Study Area over four years (2021–2024) recorded a total of 5,651 bat passes across all ARU locations (Table 11.4). Both migratory bat species and Myotis species were detected in the Study Area. Monitoring conducted in 2021 recorded eight bat passes across four ARUs and in 2022, 1,781 bat passes were recorded across four ARUs. Monitoring conducted in the Study Area in 2023 recorded 997 bat passes across 20 ARUs, and monitoring in 2024 recorded 2,865 bat passes across five ARUs. Overall, bat activity was generally low, with a few ARU locations accounting for a disproportionately large proportion of total bat passes.

Acoustic monitoring was conducted between August 25 and September 8, 2021, and recorded eight bat passes across four ARUs. Myotis species accounted for six of the eight bat passes. The other two were listed as unidentified bat passes. Acoustic monitoring conducted between May 31 and November 1, 2022, recorded 1,781 bat passes across four ARUs. Myotis species accounted for the majority of detections (1,227 passes; 68.9%), while the rest were attributed to migratory or unidentifiable bat species (31.1%). Species identified included Tri-colored Bat (four passes), Silver-haired Bat (10 passes), Eastern Red Bat (134 passes), and Hoary Bat (401 passes). Bat activity was concentrated at ARU WM01, which recorded 74.6% of total detections (1,328 passes), including 1,227 Myotis passes (92.4% of detections at that location) (Strum, 2023). This ARU was deployed adjacent to Indian Lake, a feature that provides suitable bat foraging habitat.

A total of 997 bat passes were recorded between June 9 and October 15, 2023, across 20 ARUs. Myotis species accounted for 470 passes (47.1%), followed by Eastern Red Bat (104 passes; 10.4%), Silver-haired Bat (62 passes; 6.2%), Hoary Bat (four passes; 0.4%), and Big Brown Bat (three passes; 0.3%). Bat activity was highest at ARU SM16, which recorded 374 passes (37.5% of total detections), including 262 Myotis passes. This ARU was also deployed adjacent to a lake that provides suitable foraging habitat.

Table 11.4 Summary of Acoustic Bat Passes Recorded at ARU Locations During Baseline Acoustic Monitoring Conducted from 2022 to 2024.

ARU Location	Survey Year	*Myotis*	PESU	EPFU-LANO	EPFU	LANO	LABO	LACI	High Frequency	Low Frequency	NoID	Total
WM-01	2021	0	0	0	0	0	0	0	0	0	0	0
WM-02	2021	1	0	0	0	0	0	0	0	0	0	1
WM-03	2021	4	0	0	0	0	0	0	0	0	0	4
WM-04	2021	1	0	0	0	0	0	0	0	0	2	3
BM01	2022	1156	4	0	0	10	114	42	0	0	2	1328
BM02	2022	3	0	0	0	0	0	87	0	0	1	91
BM03	2022	44	0	0	0	0	14	219	0	0	0	277
BM04	2022	25	0	0	0	0	6	53	0	0	1	85
SM01	2023	6	0	0	0	0	0	0	0	0	14	20
SM02	2023	21	0	0	0	0	2	0	0	0	1	24
SM03	2023	2	0	1	0	2	0	0	0	0	0	5
SM04	2023	4	0	1	0	2	0	0	0	0	39	46
SM05	2023	25	0	1	1	1	9	0	0	0	3	40
SM06	2023	88	0	0	1	0	14	2	0	0	6	111
SM07	2023	6	0	2	1	0	2	0	0	0	4	15
SM08	2023	0	0	0	0	1	0	0	0	0	7	8
SM09	2023	1	0	0	0	1	0	0	0	0	1	3
SM10	2023	3	0	1	0	1	0	0	0	0	24	29
SM11	2023	3	0	0	0	4	1	0	0	0	0	8
SM12	2023	12	0	0	0	6	2	0	0	0	2	22
SM13	2023	5	0	0	0	6	2	1	0	0	31	45
SM14	2023	2	0	0	0	7	1	0	0	0	99	109
SM15	2023	3	0	0	0	2	0	0	0	0	15	20
SM16	2023	262	0	0	0	3	62	0	0	0	47	374
SM17	2023	10	0	0	0	4	2	1	0	0	3	20
SM18	2023	4	0	0	0	4	3	0	0	0	9	20
SM19	2023	4	0	2	0	8	0	0	0	0	7	21

ARU Location	Survey Year	*Myotis*	PESU	EPFU-LANO	EPFU	LANO	LABO	LACI	High Frequency	Low Frequency	NoID	Total
SM20	2023	9	0	2	0	10	4	0	0	0	32	57
SM15	2024	6	1	0	0	0	11	322	20	0	0	360
SM16	2024	369	4	0	0	3	80	94	1563	0	1	2114
SM18	2024	18	0	0	0	3	4	24	12	0	0	61
SM19	2024	15	0	0	0	0	4	237	6	0	1	263
SM20	2024	0	0	0	0	0	1	61	5	0	0	67

Notes:

Survey Periods: August 25 to September 8, 2021; May 31 to Nov 1, 2022; June 9 to Oct 15, 2023; June 12 to Oct 15, 2024

EPFU-LANO = Big Brown Bat / Silver-haired Bat

High Freq. = High frequency bat calls

Low Freq. = Low frequency bat calls

NoID = Bat calls too degraded to identify

In 2024, acoustic monitoring conducted between June 12 and October 15 recorded a higher level of bat passes, with a total of 2,865 bat passes across five ARUs. High-frequency bat calls accounted for 1,606 passes (56.1%), followed by Hoary Bat (738 passes; 25.8%), Myotis species (408 passes; 14.2%), Eastern Red Bat (100 passes; 3.5%), and Silver-haired Bat (six passes; 0.2%). Five passes were identified as Tri-colored Bat. Similarly to 2023, the ARU (SM16) deployed adjacent to a foraging area, recorded approximately 75% of all bat passes.

In 2023, the majority of bat passes recorded occurred during the fall migration period, suggesting some migratory bats may traverse through the Study Area during fall migration. However, the relatively low number of passes suggest that the Study Area does not appear to be serving as a migration corridor for bats. In 2024, the majority of bat passes occurred during the breeding period, suggesting that some bats may use the area for breeding. As per the Weaver's Mountain EARD, the majority of bat passes were recorded during June, and again late July to August (Strum, 2023).

Bat activity was generally low and spatially heterogeneous across the Study Area, with a few ARU locations accounting for a substantial proportion of total detections. Elevated activity was consistently recorded at ARUs (WM01 and SM16) deployed adjacent to waterbodies that likely serve as foraging areas. As stated by McCallum Environment Limited (2012), low bat activity levels were recorded at the site of a wind power project to the north of the PDA; the Glen Dhu South Wind Power Project. All the calls detected during acoustic monitoring of the site were attributed to Myotis species, no migratory bats were detected (McCallum Environment Ltd., 2012). These results, as well as results from other acoustic monitoring in the region (Broders and Henderson, 2007; Strum 2025; EonWind Electric, 2013) suggest that there is likely no significant movements of migratory bat species through the region.

11.2.2 Bat Habitat

Regions with limestone karst topography can yield features such as caves and sinkholes, which can be used by bats for roosting and hibernation. The PDA is in an area of low relative risk of encountering karst with very small areas of medium and high karst risk occurring near the eastern and southern portions of the PDA (Figure 13.2) (Drange and McKinnon, 2019). Few abandoned mine openings occur in the Study Area and no known hibernacula occur in the Study Area.

The Study Area does not overlap critical habitat defined by Environment Canada (2015) for SAR bat species, which is represented as 10 by 10 km standardized Universal Transverse Mercator (UTM) grid squares where the description of critical habitat is met (i.e., hibernacula have been identified). The closest UTM grid square of critical habitat for SAR bats is located to the south of the PDA, below Sherbrooke.

The closest recorded bat hibernaculum is the Hirschefield Galena Prospect (24 km to the south of the Project Area) (Moseley, 2007). This bat hibernaculum is in a horizontal passage leading into an abandoned mine, and in 2007, it was reported to be a significant hibernaculum with an estimated 200 to 300+ individuals present (Moseley, 2007). As this observation predates the emergence of WNS, it is likely that the number of individuals has since declined, as WNS has caused bat population reductions of over 90% (COSEWIC, 2013).

As observed in Figure 11.2 (Appendix A), there are very few abandoned mine openings in the vicinity of the PDA, as recorded in the Abandoned Mine Openings database (GeoNOVA, 2024). There are no abandoned mine openings in the PDA or the LAA. Only one abandoned mine was recorded in the RAA (5-km buffer around the PDA). It is located 1.9 km from the PDA may have been filled in.

Many bat species prefer roosting in older forest stands over younger ones. Older forests offer increased snag availability for roosting and provide foraging habitat with a relatively closed canopy (Barclay and Brigham, 1996; Crampton and Barclay, 1996; Krusic et al., 1996; Jung et al., 1999; as cited in ECCC, 2018). Based on habitat modelling, the LAA provides some habitat (17 ha; 0.6%) that may serve as maternity roost habitat for Little Brown Myotis or Northern Myotis (Figure 11.3). Suitable maternity roosting habitat is limited in the PDA (0.5 ha; 0.2%), primarily due to previous forestry activities that have resulted in a scarcity of mature forest stands. No suitable bat maternity roost trees were recorded in the Study Area in 2022, 2023, 2024, and 2025.

Foraging Little Brown Myotis are commonly found in open habitats, including ponds, roads, and open forests, whereas Northern Myotis foraging sites include small ponds, forest canopies, and along paths and roadways (ECCC, 2018). Migratory species such as the Hoary Bat and Silver-haired Bat generally forage high above clearings, treetops, or over water. Therefore, a large portion of the Study Area can serve as foraging habitats for resident and migratory bat species.

11.3 Effects Assessment

11.3.1 Potential Effects and Mitigation

The detailed design of the Project and the micrositing of WTGs aim to minimize disruption to bat foraging habitats (e.g., wetlands) wherever feasible, thereby reducing potential interactions between the Project and bats.

Potential impacts on bats through multiple interconnected pathways, both direct and indirect, may arise. Construction activities such as earthworks and vegetation clearance have the potential to cause habitat loss and modification. If these activities occur during critical periods, such as migratory or breeding seasons, they could result in mortality, injury, or displacement of bats.

Provincial and federal recovery strategies (NSDLF, 2020; ECCC, 2018) acknowledge that anthropogenic disturbances add to the challenges posed by WNS. Bats may be affected both directly and indirectly by various project activities during construction, operation, maintenance, and decommissioning. Collisions with WTGs and transmission lines can cause injury or death, while barotrauma[4] is another direct risk. Indirectly, the installation of wind energy infrastructure can lead to habitat loss and fragmentation, which may negatively impact bats' long-term survival and reproductive success (Lemaitre et al., 2017). Removing trees with cavities or peeling bark could displace bats or harm roosting individuals if done during their active period. Project activities can impact bats in several ways, outline in Table 11.5; these potential effects do not account for the refined Project Footprint or the mitigation measures described in this chapter.

Table 11.5 Potential Environmental Effects of the Project on Bats

Project Activity	Potential Environmental Effects		
	Habitat Loss/ Fragmentation	Direct Mortality and Injury	Sensory Disturbance
Construction			
Site Preparation	X	X	X
Access Roads Construction and Modifications	-	X	X
Material and Equipment Delivery and Storage	-	-	X
Infrastructure Installation	-	-	X
Restoration of Temporary Areas	-	-	X
Testing and Commissioning	-	X	X
Operation and Maintenance			
WTG Operation and Maintenance	-	X	X
Road Maintenance	-	X	X
Power Line and Substation Maintenance	-	X	X
Vegetation Management	-	X	X
Safety and Security	-	-	X
Decommissioning			
Removal of Infrastructure and Site Restoration	-	X	X

X = Potential Interaction
- = No Interaction

[4] Barotrauma is injury resulting from a change in air pressure.

11.3.1.1 Habitat Loss and Fragmentation

The Project activities that result in removal of trees may affect roosting habitat for bats, and changes to riparian habitat or wetlands has the potential to impact foraging and drinking habitat for bats.

Clearing vegetation and forests during construction will lead to both temporary and permanent habitat loss in the PDA. These activities are needed for the installation of access roads, WTGs, transmission lines, and other infrastructure, and will result in the removal of potential roosting trees and, to a lesser degree, maternity roosting habitat. Only a minor amount of the PDA, 0.5 ha (representing 0.2%), provides suitable maternity roost habitat for Little Brown and Northern Myotis bats. The small amount of suitable maternity roost habitat reflects the historical forestry operations in the area and resulting lack of mature forest. Therefore, it is expected that clearing associated with the project will have minimal impact on maternity roost habitat. Beyond the PDA, the LAA offers minimal maternity roost habitat (17 ha, 0.6%), and some foraging habitats that mainly consist of lakes, wetlands, and forests; impacts to these habitats are further discussed in Chapter 7 (Aquatic Environment), Chapter 8 (Flora), and Chapter 9 (Wetlands). The estimate of habitat loss is greater than the final Project Footprint (see Section 2.1). Therefore, the amount of clearing required for the Project will be less than what has been estimated for this EA.

The PDA was designed to avoid and reduce habitat loss by using existing roads and previously cleared areas. Adjustments were made to mitigate the loss of areas identified as suitable maternity roost habitat for SAR bats (e.g., old-growth and mature forests), whose habitat is limited on site due to industrial forestry activities. Project boundaries avoid waterbodies, wetlands and riparian zones, where possible. Hibernacula do not occur in the Study Area and given the distance to the closest known hibernaculum (24 km from the PDA), no impacts to critical habitat are expected.

Although some bat species tend to avoid extensive clearcuts and open spaces, forested and vegetated edges have been observed to offer foraging opportunities for certain bats. These edges may additionally serve as protective zones against predators and wind, and they may concentrate prey (Krusic et al., 1996; Grindal and Brigham, 1998; Swystun et al., 2001; Henderson and Broders, 2008; as cited in ECCC, 2018).

Potential Project effects related to habitat loss and fragmentation can be mitigated through planning and management of construction activities. The following key measures to mitigate the potential effects of the Project on bat habitat will be further detailed in a Project-specific EPP and will be implemented prior to and during construction.

- Existing gravel roads will be used as access roads, to the extent possible.
- Vegetated buffers around wetlands and watercourses will be maintained to support connectivity and foraging habitat where possible.
- Avoidance of suitable maternity roosting habitat.
- Habitat will be restored and revegetated naturally after construction.
- Measures will be implemented to control and prevent the spread of invasive species.

- Work crews will recognize the working limits of the PDA and will refrain from entering surrounding habitat.

11.3.1.2 Direct Injury or Fatality

The Project poses a risk of direct harm to bats during construction, mainly from clearing vegetation and increased traffic. When the WTGs are operational, most bat fatalities result from collisions that cause blunt force injuries, while some deaths occur due to barotrauma—rapid changes in air pressure (Baerwald et al., 2008; Rollins et al., 2012). According to COSEWIC (2013), any increase in mortality of SARA-listed bat species in regions affected by WNS, including deaths at WTGs, may seriously impact local population survival, slow recovery efforts, and hinder the development of resistance to the fungus responsible for WNS.

Construction activities, such as tree clearing and grubbing, pose a risk for bat mortality. Clearing trees any time during the active season poses a risk for individual bats as they will use trees for day roosting. Tree clearing should be scheduled to avoid the active season to avoid risk to SAR bats that may be passing through the PDA during construction.

Collisions with Project infrastructure is the main cause of bat mortality from wind farms. An estimated 50,000 bats die from collisions with WTGs per year in Canada (Zimmerling & Francis, 2016). However, mortality levels from WTGs vary based on species, location, season (Kunz et al., 2007; Arnett et al., 2008; Baerwald and Barclay, 2011), WTG height (Barclay et al., 2007; Anderson et al., 2022), wind speeds (Arnett et al., 2008; Horn et al., 2008), speed of WTG, and weather (Arnett et al., 2008).

Bat deaths caused by WTG collisions vary widely across regions. One study that included 64 Canadian wind farms reported an average of 15.5 ± 3.8 bats killed per WTG each year, with individual sites ranging from 0 up to 103 fatalities per WTG per year. Nova Scotia recorded the lowest mortality rate in Canada, at only 0.5 bat deaths per WTG annually. In a 2016 Birds Canada study focused on Atlantic Canada, researchers found an average of 0.26 ± 0.11 bats per WTG died within 50 m of the base of WTGs between May 1 and October 31, 2016. These studies show large differences in bat mortality rates depending on location and underscore the need for regional research to better understand the issue.

Research on how bats avoid WTGs has yielded mixed findings. In Germany's low mountain regions, clearing forests around WTGs created open spaces that attracted bats—especially those that hunt in open or forest-edge habitats (Ellerbrok et al., 2023). Bat species such as Myotis, which normally forage in dense understory, also increased their use of these clearings versus nearby intact forests. Another study observed no difference in Myotis activity between newly cleared areas and closed forests (Kirkpatrick et al., 2017). Further research in Finnish boreal forests found notably higher numbers of Myotis bats at locations over 800 m away from WTG sites, suggesting greater abundance away from WTG infrastructure (Gaultier et al., 2023). While the European Myotis species studied differ from those considered in this Environmental Assessment (Northern and Little Brown), they share many traits, including insect diets, winter hibernation, and social behavior, due to their shared genus and adaptation to northern climates (Blomberg et al., 2025; Tidenberg et al., 2019). Collectively, the European studies indicate that Myotis bats tend to stay away from WTGs, thereby reducing collision risks (Kirkpatrick et al., 2017; Gaultier et al., 2023).

Several factors contribute to bat collisions with WTGs. Behaviours such as breeding, swarming, and foraging often lead bats to make repeated passes around WTGs, increasing their risk of collision (Cryan and Brown, 2007; Arnett et al., 2008; Rydell et al., 2010a; Roeleke et al., 2016). Research has also shown that insect abundance near WTGs is affected by WTG location and configuration, including factors such as forest clearings, aviation warning lights, roads, WTG color, and air currents generated by blade movement (Horn et al., 2008; Rydell et al., 2010b).

During baseline bat activity monitoring, the ARU with the highest bat activity levels was ARU SM16 (in both 2023 and 2024). This ARU was located on the edge of a small lake, indicating that the elevated activity levels are most likely attributed to foraging behaviour. Furthermore, during nights of peak bat activity—for example, July 12, 2024, when 242 bat passes were documented—the distribution of activity was consistent through the night. This pattern also indicates that the increased activity is likely attributable to foraging behaviour.

Many bat species will forage over waterbodies due to the abundance of aquatic insects, including all three SAR bat species present in Nova Scotia. Riparian habitats therefore can support higher levels of bat activity (Salvarina et al., 2018; COSEWIC, 2013; Johnson et al., 2010; Grindal et al.1999). Bats that forage over or near waterbodies, such as the Little Brown Myotis, will typically forage at heights between 1 and 6 m (McBurney and Segers, 2021). Furthermore, a recent study found that fewer Little Brown Myotis fatalities occurred at taller WTGs than shorter (WTGs ranged from 119 to 186 m (hub height plus blade length) but fatalities of migratory bats increased with increased WTG heights (Anderson et al., 2022). Since slightly less than half of the bat activity recorded in the Study Area was attributed to Myotis species, especially SM16, which had mostly Myotis passes. This study indicates that the planned WTG height (up to 200 m) could help reduce the risk of collisions for about half of the bats present, particularly those at-risk Myotis species. Considering these factors, the elevated bat activity at ARU SM16 does not correspond to an increased risk in bat-WTG collisions.

Annual fluctuations in bat activity and the potential alteration of activity patterns in the vicinity of WTGs (Barclay et al., 2007; Kunz et al., 2007; Horn et al., 2008; Cryan and Brown, 2007) imply that predicting project risk is challenging because pre-construction data might not accurately predict fatality rates (Hein et al., 2013). Hence, post-construction monitoring of fatalities is essential to monitor and assess bat mortalities, assess effectiveness of mitigations, and inform adaptive management programs. This is especially significant because any increase in mortality among SAR bats in regions affected by WNS could threaten local population survival, hinder recovery, and potentially affect their ability to develop resistance to the fungus responsible for WNS (ECCC, 2018).

A post-construction monitoring program will be developed in consultation with ECCC-CWS and NSDNR and implemented for two years. Carcass searches will be conducted during the spring and fall, regardless of the weather. The *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022), *Wind Energy & Birds Environmental Assessment Guidance Update* (ECCC-CWS, 2022), and other accepted guidelines will be referenced when developing the monitoring program.

Ongoing monitoring and adaptive management strategies will be implemented to assess the effectiveness of Project-specific mitigation measures and detect unexpected impacts on bats during the construction, and operation and maintenance phases of the Project.

Potential Project effects related to direct injury or fatality can be effectively mitigated through planning and management of construction and operation activities. The following key measures to mitigate the potential risks of bat collision will be further detailed in a Project-specific EPP and will be implemented prior to and during Project construction, as well as during operations.

- Tree clearing will be done, to the extent feasible, outside the active period for bats to avoid accidental injury or mortality of any bat, not only maternity roosting bats.
- During construction and operation, appropriate drainage will be installed around WTGs to prevent formations of wetted areas or pooled water that might increase insect populations and attract bats.
- Vehicle speed will be reduced, especially in key areas during sensitive seasonal windows for wildlife.
- The Proponent will develop and implement wildlife management procedures during construction.
- Site lighting will be reduced to the extent practicable, reducing insect attraction and subsequent attraction to infrastructure by bats.
- Guidance specific to minimizing impacts to bats will be provided in a Wildlife Management Plan. The plan will include guidelines to avoid harm to bats, actions/steps to take should a roosting bat be discovered, and appropriate buffers based on disturbance activities.
- A post-construction monitoring program will be developed and implemented in consultation with NSDNR and ECCC-CWS to assess the ongoing impact of WTGs on wildlife, particularly bats, and inform adaptive management strategies.
- Adaptive management strategies will be employed through the lifespan of the Project, if needed based on the findings of the post-construction mortality monitoring program.

11.3.1.3 Sensory Disturbance

Noise and lighting at wind projects generally pose lower risks to bats than collisions. However, excessive disturbance like light, noise, and vibrations can wake bats from torpor. Noise may indirectly disturb bats, while nighttime light pollution can attract them to project infrastructure, increasing their risk of collision and barotrauma due to higher prey availability.

Noise will be generated during all phases of the Project. Heavy equipment during construction, operation and maintenance, and decommissioning will contribute to noise generation. Additionally, WTGs will produce noise during operation. Because the closest known hibernaculum is 24 km from the PDA, disturbance to hibernating bats during construction and operation are not expected. Construction and decommissioning activities will primarily occur during daylight hours, limiting sensory disturbance to roosting bats.

WTGs generate noise that can interfere with bats' communication, foraging, and predator avoidance, leading forest species like Myotis to avoid WTG sites and causing indirect habitat loss (Kunz et al., 2007; Ellerbrok et al., 2022). However, some sensory disturbances may also attract bats to WTGs, as these structures can mimic features of favourable roost trees and affect cues like vision, vibration, and temperature (Cryan et al., 2014; Horn et al., 2010; Jonasson et al., 2024; Guest et al., 2022). Additionally, transmission corridors and roads resemble natural linear pathways used by bats, and all these factors may disrupt bat navigation, particularly in forests (Jameson & Willis, 2014; Jonasson et al., 2024).

Potential Project effects related to sensory disturbance can be effectively mitigated through planning and management of construction and operation activities. The following key measures to mitigate the potential effects that Project lighting and noise may have on bats will be further detailed in a Project-specific EPP and will be implemented prior to and during Project activities.

- Onsite lighting will be minimized to the extent possible to prevent insect congregation that may attract bats to WTGs while maintaining Transport Canada requirements.
- Movement detection lighting will be used on office structures, doors to WTGs, gates, etc., which will turn off when not in use.
- Construction will mostly occur during daytime hours and will be restricted at night, when possible, to avoid illuminating the habitat unnaturally.
- Noise-reducing technologies may be considered to minimize the impact of construction noise on bats.
- Intense sound operations (i.e., blasting) will be scheduled to avoid maternity roost windows, when possible.
- Blasting will be undertaken in accordance with regulatory requirements and will only be conducted by qualified blasting professionals.
- The Proponent will develop and implement a Wildlife Management Plan.

11.3.2 Residual Effects

Activities associated with the Project may induce short to long-term impacts on bats in the PDA and LAA primarily due to vegetation clearing and cutting, collisions with WTGs, and sensory disturbance.

The residual impacts resulting from habitat loss during construction are assessed to be long-term yet minor in scope. In general, suitable bat habitat in the Study Area is limited, and the proportion of potential maternity roost habitat present in the PDA is comparatively low (0.5 ha; 0.2%). These effects will be confined to the local area and are expected to occur only once, during a period when bats exhibit reduced sensitivity.

The residual effects related to bat mortality during the operation and maintenance phase are expected to be minor in magnitude (lowest level of mortality risk (per Government of Alberta, 2013)), restricted to the Project, and occur during times of moderate to high sensitivity. Based on the low numbers of bats observed in the Study Area, the period of observations, and the low numbers of bat fatalities that have been reported in Atlantic Canada from WTGs, bat fatalities are expected to be intermittent.

The Proponent will design and position infrastructure to avoid high-quality habitats and avoid creating areas around WTGs that are attractive to bats, to reduce potential risks. Through these steps and the implementation of mitigation measures, post-construction monitoring, and adaptive management planning, significant effects are not expected. The residual effects of Project activities on the bats (i.e., change in habitat and change in mortality rate) are predicted to be not significant.

11.4 Monitoring

In addition to the onsite monitoring for wildlife species conducted during site preparation and construction activities, a post-construction mortality monitoring program will be development in consultation with ECCC-CWS and NSDNR and implemented for two years post-construction. Carcass searches will be conducted during the spring and fall, regardless of the weather. The *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022), *Wind Energy & Birds Environmental Assessment Guidance Update* (ECCC-CWS, 2022), and other accepted guidelines will be referenced when developing the monitoring program.

The results of the post-construction mortality monitoring program will be submitted to the appropriate regulatory agencies as required. Additional surveys or mitigations may be identified in consultation with regulators following review of the results. An Adaptive Management Plan will be prepared in consultation with NSDNR and ECCC-CWS detailing acceptable bat mortality thresholds and appropriate operational responses should mortality records exceed those thresholds.

Data from post-construction mortality surveys may also be shared with the AC CDC and *The Wind Energy Bird and Bat Monitoring Database* (NatureCounts - Wind Energy Bird & Bat Monitoring Database) (Birds Canada, 2022).

12 Birds

12.1 Overview

This chapter assesses the potential effects of the Project on migratory and resident bird species and their habitats. Wind energy developments can affect birds through direct pathways, such as collision mortality with WTGs and associated infrastructure, and through indirect pathways, including habitat loss or alteration, fragmentation, and sensory disturbance.

Project interactions with birds are closely connected to environmental effects on other VECs, including noise and lighting (Chapter 5: Atmospheric Environment), vegetation removal or alteration (Chapter 8: Flora), and wetland loss or modification (Chapter 9: Wetlands). These VECs, and the Project effects on them, influence habitat availability, quality, and use by birds and therefore inform the effects analysis presented in this chapter.

Four-season field studies were completed to characterize bird presence, distribution, and habitat use in the LAA. Pre-construction survey results informed Project infrastructure siting decisions, supported the effects assessment, and guided the development of mitigation measures for each phase of the Project. Baseline data will also support post-construction mortality monitoring and adaptive management. Mitigation measures presented in this chapter will be refined and integrated into a Project-specific EPP prior to construction to minimize adverse effects.

12.1.1 Regulatory Context

Assessment of birds considers the following relevant provincial and federal legislation and guidelines:

- *Migratory Birds Convention Act, 1994* and Migratory Birds Regulations, 2022
- SARA
- *Canadian Environmental Protection Act*
- NSESA
- Nova Scotia *Wildlife Act*
- Nova Scotia *Biodiversity Act*
- Nova Scotia *Environment Act*
- Nova Scotia *Wilderness Areas Protection Act*

12.1.2 Boundaries

The Study Area defines the spatial extent within which bird surveys were conducted to characterize baseline conditions.

For the purposes of this assessment, the LAA for birds includes the PDA, a 500 m buffer, and associated airspace. The RAA is a 5 km buffer around the PDA.

12.1.3 Assessment Methodology

The assessment of birds focused on identifying migratory and resident bird species present or likely to occur in the Study Area, with emphasis on SAR, SoCC, and their habitats. Information was collected through a combination of literature review, online databases and reports, habitat analysis, and field surveys conducted across all seasons.

Information gathered during the desktop review informed the design of baseline field surveys that are reflective of the Project's site sensitivity and risk level (Category 4) as outlined in the *Wind Energy & Birds Environmental Assessment Guidance Update* (ECCC, 2022a), *Wind Turbines and Birds: A Guidance Document for Environmental Assessment* (ECCC, 2007a) and *The Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia* (NSDNR, 2022a). Survey methods followed protocols outlined in *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (ECCC, 2007b), *Wind Energy & Birds Environmental Assessment Guidance Update* (ECCC, 2022a), and *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022).

Baseline field surveys were designed to document bird presence, diversity, and abundance of bird species and their habitats in the Study Area and to evaluate the potential impacts of the Project. The data collected through the assessment process will also serve as a baseline to support post-construction mortality monitoring and adaptive management.

The description of the existing environment in this chapter is based primarily on data from the following sources, supplemented by field surveys completed for this Project:

- Critical Habitat for Species at Risk National Dataset – Canada (ECCC, 2025)
- Nova Scotia Significant Species and Habitats Database (NSDNR, 2025a)
- Important Bird Areas (IBAs) (Birds Canada & Nature Canada, 2025)
- Migratory Bird Areas and National Wildlife Areas
- Species at Risk Public Registry documents for federal SAR
- AC CDC Data Reports (AC CDC, 2023a, 2023b)
- Second Atlas of Breeding Birds of the Maritime Provinces (Maritimes Breeding Bird Atlas (MBBA)) (Stewart et al., 2015)
- eBird (2025)
- Global Forest Watch Tree Cover Loss 2001-2024 and Gain 2000-2020 (Global Forest Watch, 2026)
- Old-Growth Potential Index V2 (NSDNR, 2025b)

- Nova Scotia Forest Inventory (GeoNOVA, 2024)
- Nova Scotia Hydrographic Network (GeoNOVA, 2025a)
- Nova Scotia Wet Areas Mapping and Flow Accumulation Channel (GeoNOVA, 2025b)
- Nova Scotia Wetlands Inventory (NSDNR, 2021b)
- Nova Scotia LiDAR Point Cloud (GeoNOVA, 2020)

An assessment was completed for SAR and SoCC bird species known or expected to occur within a 100 km radius of the LAA. This assessment used available habitat information and spatial data, including federal critical habitat and provincial core habitat data layers.

Land cover in the LAA was characterized using the Predictive Ecosystem Mapping (PEM) layer for Nova Scotia, a nine-level hierarchical classification system for mapping the diversity and distribution of ecosystems across Nova Scotia based on existing biotic and abiotic spatial data. Land cover was further refined using Global Forest Watch Tree Cover Loss and Gain Data and with recent satellite imagery to capture current forest loss associated with industrial forestry operations.

Detailed habitat suitability mapping was developed to identify potential breeding habitat for eight SAR birds in the LAA (Table 12.1). These spatial analyses supported the evaluation of Project effects. Details of the SAR habitat suitability mapping are described in the subsections that follow.

Table 12.1 SAR Birds for which Habitat Suitability was Modelled in the Sugar Maple Wind Project LAA.

Scientific Name	Common Name	Status			
		NSESA	SARA	COSEWIC	S-rank
Cardellina canadensis	Canada Warbler	E	T	SC	S2S3B
Chaetura pelagica	Chimney Swift	E	T	T	S2S3B,S2S3M
Chordeiles minor	Common Nighthawk	T	SC	SC	S3S4B
Coccothraustes vespertinus	Evening Grosbeak	V	SC	SC	S3B,S3N
Contopus cooperi	Olive-sided Flycatcher	T	T	SC	S3B
Contopus virens	Eastern Wood-Pewee	V	SC	SC	S3S4B
Euphagus carolinus	Rusty Blackbird	E	SC	SC	S2S3B
Riparia riparia	Bank Swallow	E	T	T	S3B

E – Endangered, T – Threatened, V – Vulnerable, SC – Special Concern, NAR – Not at Risk

12.1.3.1 SAR Bird Habitat Modelling

Spatial parameters representing key biophysical attributes of breeding habitat were selected based on peer-reviewed literature, jurisdictional guidance, and expert knowledge. The spatial layers used to develop the habitat suitability models were obtained from the following datasets:

- Nova Scotia Hydrographic Network (GeoNOVA, 2025a)

- Nova Scotia Wet Areas Mapping and Flow Accumulation Channel (GeoNOVA, 2025b)
- Nova Scotia Interpreted Forest Inventory (GeoNOVA, 2021)
- Nova Scotia Wetlands Inventory (NSDNR, 2021)
- NSDNR Old Growth Potential Index V2 (NSDNR, 2025)
- Nova Scotia LiDAR Point Cloud (GeoNOVA, 2020)

Canada Warbler

Canada Warbler generally breeds in wet deciduous or mixedwood forests with a dense understory and high canopy (Haché et al., 2014; NSDLF, 2021; COSEWIC, 2020). In Nova Scotia, Westwood (2016) found that Canada Warbler habitat was correlated with mixedwood forests dominated by Black Spruce and Red Maple, with lesser quantities of Red Spruce and Balsam Fir. However, overall forest structural diversity appears to be a more important predictor of habitat suitability than tree species composition alone (Stewart et al., 2015).

The following parameters were used to model suitable breeding habitat for Canada Warblers in the LAA:

- Depth to water table – Sites with a depth to water table less than or equal to 2 m depth to water has been identified as a strong predictor of habitat suitability for forested wetland–associated species such as Canada Warbler (Westwood, 2016; Westwood et al., 2019).
- Stand type – Forest stands classified as deciduous forest and mixedwood forest.
- Canopy closure – Forest stands with a canopy closure between 5 and 85% (Westwood et al., 2017).

Chimney Swift

Chimney Swift primarily nests in artificial structures like chimneys, silos, air shafts, wells, and barns. However, this species will nest in natural habitats, including large hollow trees and tree cavities in mature and old-growth forests (COSEWIC, 2018a; Zanchetta et al., 2014). Because of the limited suitable artificial structures in the PDA, the model focused on natural habitats that may provide suitable breeding habitat.

The following parameters were used to model suitable breeding habitat for Chimney Swifts in the LAA:

- Old-Growth Potential Index - Values 10 and 11, representing stands with high potential for old-growth characteristics.

Common Nighthawk

Common Nighthawk nests on open ground and in clearings. A variety of habitats provide suitable breeding conditions, including open forests (particularly those with recent cuts, burns, or rocky outcrops), grasslands, wetlands, rocky areas such as quarries, gravel pits, and railway margins, and cultivated lands such as orchards and blueberry fields (COSEWIC, 2018b; ECCC, 2016).

The following parameters were used to model suitable breeding habitat or Common Nighthawks in the LAA:

- Land classification – Areas classified as clearcut, barren, rock barren, agriculture, blueberries, gravel pits, old field, open peatland, powerlines, railways, and urban areas.

Eastern Wood-Pewee

Eastern Wood-Pewee primarily inhabits open deciduous and mixedwood forests with high canopies, as well as forest edges and clearings (ECCC, 2023c). In Nova Scotia, both treed swamps and mature upland forests provide important habitats for the species (Brazner & MacKinnon, 2020). Eastern Wood-Pewee generally avoids human-occupied areas and regenerating forests (NSDNR, 2022; COSEWIC, 2012).

The following parameters were used to model suitable breeding habitat for Eastern Wood-Pewees in the LAA:

- Forest inventory – Any stand classified as forested.
- Canopy closure – Forested stands among the above types with canopy cover between 55% and 70%.
- Distance to clearings – Forested stands located within 150 m of a clearing or habitat edge.

Evening Grosbeak

Evening Grosbeak prefers to breed in mature, old coniferous and mixedwood stands, often dominated by fir, spruce, Tamarack, pine, and aspen with relatively low canopy cover (COSEWIC, 2016; ECCC, 2022b). Nests are typically located in trees greater than 40 m in height (Bekoff et al., 1987).

The following parameters were chosen to model suitable breeding habitat for Evening Grosbeaks in the LAA:

- Old-Growth Potential Index - All Values (7 to 11).
- Stand type – Forest stands classified as coniferous forest and mixedwood forest.

Olive-sided Flycatcher

Olive-sided Flycatcher prefers to breed in moist, coniferous, or mixedwood forest, and is often associated with wetlands, forest edges (particularly adjacent to wetlands), and gaps created by recent burns or clearcuts (NSDLF, 2021b). In Nova Scotia, this species is typically found in stands dominated by spruce, Balsam Fir, and Red Maple, with lesser amounts of pine and Tamarack (Staicer et al., 2015). While the species prefers forested areas for nesting, Olive-sided Flycatchers rely on open areas or clearings in their breeding habitat to forage for insects on the wing. Nests are built in tall trees, typically 5 to 20 m above ground, with snags nearby (COSEWIC, 2018c). Studies in Nova Scotia indicate a preference for stands with lower canopy cover but greater canopy height (Staicer et al., 2015).

The following parameters were chosen to model suitable breeding habitat for Olive-sided Flycatchers in the LAA:

- Canopy height – Stands with an average canopy height of 5 m or greater.
- Forest inventory – Stands classified as coniferous and mixedwood forest.
- Tree cover – Forested stands with a canopy closure between 20 and 70%.
- Wet area mapping – Areas with a depth to water table of 2 m or less.

Rusty Blackbird

An obligate wetland species, Rusty Blackbird requires wetland habitats for nesting, foraging, and shelter (ECCC, 2015). In Nova Scotia, the species nests in coniferous and mixedwood forested wetlands, bogs, beaver ponds, marshes, and in riparian zones (COSEWIC, 2006). Breeding habitat in forested wetlands are characterized by short (0.5 to 6 m), dense canopies consisting mainly of Black Spruce, Balsam Fir, Tamarack, White Cedar, and Red Maple (Stacier et al., 2015; COSEWIC, 2006). Rusty Blackbirds will also breed in disturbed wetland habitats in Nova Scotia, including wetlands surrounded by regenerating clearcuts or forest plantations (COSEWIC, 2006).

The following parameters were used to model suitable breeding habitat for Rusty Blackbirds in the LAA:

- Forest inventory – Stands classified as coniferous and mixedwood forest.
- Depth to water table – Sites where the depth to water table is 50 cm or less.
- Canopy height – Stands with an average canopy of height between 0.5 m and 6 m.

Bank Swallow

Bank Swallow breeds in burrows typically excavated from vertical or near-vertical earthen banks of composed of sand or silt (ECCC, 2022c). Nests and nest colonies are most often found along riverbanks, lakeshores, or coastlines where regular erosion occurs but have also been found in human-made environments such as aggregate pits, road cuts, gravel, sand and sawdust piles, and holes in retaining walls (ECCC, 2022c). Suitable habitat generally requires a minimum height of 0.5 m above the base of a bank (ECCC, 2022c).

The following parameters were used to model suitable breeding habitat for Bank Swallow in the LAA:

- Slope model – Slopes greater than 45° were considered to provide moderate suitability for nesting; Slopes greater than 70° were considered to provide high suitability for nesting.

12.1.3.2 Field Surveys

The objective of the field surveys was to collect baseline information on bird species using and moving through the Study Area year-round. Survey protocols followed seasonally appropriate guidance, including *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (ECCC, 2007b), *Wind Energy & Birds Environmental Assessment Guidance Update* (ECCC, 2022), and *Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy* (NSDNR, 2022), other standard survey protocols and guidance documents.

Surveys were designed to obtain coverage across the Study Area. Winter surveys identified resident species present during the general non-breeding season for migratory birds; breeding bird surveys, including nocturnal owl and nightjar surveys, assessed species diversity and abundance during the general nesting period for migratory birds; and migration surveys, including point counts, passage counts, radar, and acoustic monitoring, assessed species at potential risk of WTG collisions during spring and fall migration periods.

Winter Bird Surveys

Winter bird surveys were conducted in the Study Area from December to March in 2023, 2024, and 2025, using ten-minute point counts to document species presence and abundance. Survey areas included access roads, areas near proposed infrastructure at the time of the surveys and representative habitat types across the Study Area. Surveys were conducted over 16 days in total, at 52-point count locations (Figure 12.1).

Nocturnal Owl Surveys

Nocturnal owl surveys were conducted in the Study Area over five days between February 8 and June 22, 2023, and one day on April 22, 2024, under suitable weather conditions (e.g., minimal wind and precipitation).

Forty-four survey stations were established across the Study Area in various habitat types (Figure 12.2). Local owl vocalizations (provided by Birds Canada) were broadcasted at each survey station. While the focus was to target nocturnal owls, all detected species including species that sing or display at dusk (e.g., American Woodcock (*Scolopax minor*), were recorded.

Migration Surveys

Migration monitoring included point counts, passage migration surveys, as well as radar and acoustic monitoring, to assess the presence, abundance, and movement of birds in the Study Area during migration.

Migration Point Count Surveys

Ten-minute, unlimited radius point counts were conducted between dawn (30 minutes before sunrise) through approximately four hours after dawn in suitable weather conditions (e.g., minimal wind and precipitation). Surveys were conducted at predetermined locations across major habitat types to provide representative coverage of the Study Area. Point counts were generally placed along existing roads and trails as songbirds are readily detected along the edges of habitats.

At each survey location, species seen or heard were recorded as well as an estimate of the number of individuals of each species during the survey period. The distance to each bird was estimated using fixed distance categories (0 to 50 m, 51 to 100 m, and further than 100 m) and individuals were monitored for the duration of each point count to limit double counting. General observations including date, time, weather conditions (temperature, wind speed, presence of any precipitation), and notable behaviour (e.g., drumming, breeding evidence) were also recorded. Age and sex were recorded when known.

Spring migration point counts were conducted across 61 locations from April to May in 2023, 2024, and 2025 (Figure 12.3). Four rounds of surveys were conducted at 46 locations in 2023, four rounds at 15 locations in 2024, and three rounds at 11 locations in 2025, totaling 277-point counts.

Fall migration point counts were conducted across 50 locations from August to November in 2023, 2024, and 2025 (Figure 12.4). Twenty-eight unique point count locations were surveyed in 2023, with eight rounds of varying size completed. Six rounds of surveys at 20 locations were completed in 2024, and four rounds at nine locations in 2025. A total of 349 fall migration point counts were completed from 2023 to 2025.

Passage Migration Counts

Passage migration counts were conducted from five suitable observation points in the Study Area, with four being surveyed in 2023, and one being surveyed in 2024 and 2025 (Figures 12.3 and 12.4). The counts were conducted during the spring and fall migration periods to assess the number of birds flying through the Study Area, particularly where WTGs are proposed to be built. Observation points were placed in areas of high elevation. Observation points were placed in areas of high elevation. The species, number of individuals, and the direction, distance, and height of passing birds were recorded. Age and sex were also recorded when known.

Passage migration counts started as early as 9 a.m. and continued for 1 to 6 hours. Three to four rounds of passage migration surveys were completed across observation points in spring of 2023, four rounds were completed in 2024, and three rounds were completed in 2025. A total of 64 hours of survey effort occurred in spring across all years. Two to three rounds of passage migration surveys were completed across observation points in the fall of 2023, six rounds in 2024, and three rounds in 2025. A total of 80 hours of survey effort occurred in the fall across all years.

Radar and Acoustic Monitoring

Two years of nocturnal migration monitoring were completed using an avian radar system (ARS), which detects volume and flight height (i.e., passage rate) of nocturnal migrants that traverse the Study Area, and ARUs to record nocturnal flight calls (NFCs) during the spring and fall migratory periods in 2022 and 2023. Monitoring was conducted by Strum Consulting for the Proponent's nearby Weavers Mountain Wind Energy Project, encompassed within the Study Area boundary for this Project. These two years of monitoring captured both pre-approval and post-approval monitoring for the environmental assessment. Based on consultation with NSDNR in 2025, it was determined that additional radar and acoustic monitoring was not required, as two years of monitoring conducted at the centrally located Weavers Mountain Wind Energy Project radar unit provided representative coverage of the Study Area and sufficiently characterized bird movement patterns, flight altitudes, and seasonal activity. The radar unit was strategically located to capture migratory bird movements across potential co-located wind projects, which share similar topography, habitat, and proximity to sensitive features. Results indicate relatively low levels of interaction between migratory birds and the WTG interaction corridor, and no unique site-specific conditions that would warrant additional baseline monitoring.

The ARS detects all organisms using the airspace approximately 50 to 600 m in altitude, which may include birds, bats, and insects. Diagonal orientation allowed for a 180-degree expanse that the radar could scan in the airspace above the ARS. During data analysis, particular filters are placed on values to remove clutter and non-target individuals (i.e., insects and bats) from the data, but it is difficult or impossible to know if this is 100% effective. Therefore, detections are generically referred to as biological targets (BTs).

In 2022, the ARS was deployed in the Study Area from April 25 to May 31, and from June 26 to November 28. In 2023, it was deployed from April 20 to November 21, capturing the breeding season in addition to spring and fall migration periods. Due to an internal system malfunction the ARS was not operational for most of May in 2023. The ARS was located centrally in the Weavers Mountain Wind Energy Project PDA, in an open area north of Indian Lake along Weavers Mountain Road. The ARS had a clear, unobstructed view of the overhead sky and was positioned to maximize southern exposure for solar charging.

Acoustic monitoring was conducted using Wildlife Acoustics Song Meter SM4 ARUs deployed in tandem with the ARS to record nocturnal flight calls (NFCs) during the spring and fall migratory periods in 2022 (deployed from April 25 to May 23, and August 30 to November 1) and 2023 (deployed from May 18 to November 22). An ARU was deployed in 2023 and remained operational during the breeding season to capture additional species activity vocalizations. This ARU experienced a power malfunction from late August onwards, resulting in infrequent recordings during the 2023 fall season. ARUs were programmed to record from 21:00 to 04:00 in the spring, and from 20:00 to 05:00 in the fall. Acoustic data was analyzed using several software programs specializing in avian acoustic classification to ensure accurate identifications. These programs included BirdNET, Nighthawk, and Raven Pro.

Breeding Bird Surveys

Breeding bird surveys were conducted in the Study Area to determine which species regularly use the area for nesting, for foraging during the breeding season, or for raising their young.

Breeding Bird Point Count Surveys

Following the point count methodology used during migration surveys, 10-minute, unlimited radius point counts were conducted between dawn (half an hour before sunrise) and approximately 10:00 a.m. in suitable weather conditions (e.g., minimal wind and precipitation). Observed breeding evidence was recorded using standard MBBA breeding bird codes.

A total of 77 survey locations were generally distributed across the Study Area (e.g., at or near WTG pads and access roads) from 2023 to 2025 to target the different habitat types in the Study Area (Figure 12.5). Breeding bird surveys were completed in June and July in 2023, 2024, and 2025. Two to four rounds of surveys were completed each year, with the exception of one round in 2025, across a variable number of survey locations with the aim to detect both early and late breeders. Seven-point counts were completed in 2025, 36 in 2024, and 132 in 2023, for a total of 175 breeding bird point count surveys.

Nightjar Surveys

Common Nighthawk is listed under the federal SARA as Special Concern and Eastern Whip-poor-will (*Antrostomus vociferus)* is listed under the federal SARA as Threatened; both are listed under the provincial NSESA as Threatened. Because Common Nighthawk are crepuscular and Eastern Whip-poor-will are nocturnal, these species are not typically detected during standard breeding bird surveys (as outlined above) and targeted surveys are needed to determine the presence of these species in a particular geographical area.

Following the general methodology outlined in the *Canadian Nightjar Survey Protocol* (Birds Canada, 2022), 18 survey stations were spread across the Study Area (Figure 12.6). Nightjar surveys were conducted 30 minutes before sunset and extended until approximately two hours after sunset to capture the Eastern Whip-poor-will window. Two rounds of surveys were completed at eight survey locations on June 22 and July 6, 2023, and a single round was conducted at ten locations on July 4, 2024. Because there is potential for Eastern Whip-poor-will in the Study Area, surveys were timed to coincide with a full moon. At each survey station, the surveyor listened for six minutes, recording all species identified by sight or sound. Attention was also given to other species that sing or display at dusk (e.g., American Woodcock).

Pileated Woodpecker Surveys

Pileated Woodpecker (*Dryocopus pileatus*) nest cavity searches were carried out in conjunction with other field programs. The nests of this species are protected year-round under the Migratory Birds Regulations, 2022, and there is suitable nesting habitat in the PDA. Evidence of current or historical nesting was recorded during the execution of bird surveys and other biological field programs conducted in the Study Area from 2023 to 2025. These incidental observations are included in the assessment of the existing environment.

12.2 Existing Environment

Conservation areas occurring in proximity to the Study Area are shown on Figure 12.7. The PDA is approximately 4 km south of the 567-hectare Barneys River Nature Reserve, which protects old-growth hardwood forest in the Barneys River watershed, provides important habitat for forest-dwelling species, and supports water quality in Barneys River.

The Ohio River Nature Reserve and East River St. Marys Nature Reserve are located east and south of the Study Area, respectively. The Ohio River Nature Reserve (28 ha) protects floodplain meadow, shrubland, and adjacent upland forest along approximately 600 m of the Ohio River, a tributary of the West River in Antigonish County. The East River St. Marys Nature Reserve (5 ha) protects an intact forested floodplain in a highly modified agricultural landscape in southern Pictou County and represents one of the few publicly owned parcels along the East Branch of St. Marys River. The Indian Man Lake Nature Reserve is a 126-ha parcel of land situated approximately 14 km south of the PDA. It was established to protect a rare forest type in eastern Nova Scotia: mature red oak forest.

The PDA is 9 km south of the Eigg Mountain - James River Wilderness Area, which protects large stands of old growth, contiguous forest and provides habitat for numerous species of birds that require expansive, contiguous forests, such as American Goshawk (*Astur atricapillus*). It encompasses approximately 7,600 ha of upland forests and includes much of the James River Watershed Protected Water Area, in which the drinking water for the Town of Antigonish in withdrawn.

The IBA nearest the PDA is Pomquet Beach Region IBA (NS009), approximately 30 km northeast. This IBA consists of a series of barrier beaches, including Pomquet Beach, Mahoneys Beach, Dunns Beach, and Monks Head Beach. This region provides habitat for the endangered Piping Plover (*Charadrius melodus*) and has supported a breeding population for many years. In 1996, this IBA had 12 breeding birds, equalling 3 % of Atlantic Canada's Piping Plover population. Areas in this IBA have been designated federally as critical habitat for Piping Plover (ECCC, 2025). Parcels of Provincially Significant Migratory Bird Habitat has also been identified in this IBA and along the shores of St. Georges Bay. The Pomquet Beach Region also attracts other shorebird species, due to the presence of tidal marine invertebrates. A Great Blue Heron (*Ardea herodias*) colony is also present in the region, located on Pomquet Island.

Tracadie River Wilderness Area is a 2,526 ha parcel of land in the Mulgrave Hills region, protecting old growth upland hardwood stands at the watershed divide between Northumberland Strait and Chedabucto Bay. The boundary of the protected area is approximately 36 km east of the PDA. The Tracadie River valley provides an important travel corridor for wildlife between the lowlands and plateau regions of the protected area.

Ogden Round Lake Wilderness Area is a 5,606 ha parcel of land in eastern Guysborough County, protecting ecosystems and important habitat for many wildlife species. The landscape of this wilderness area contains numerous lakes and spans the watershed divide between Salmon River and Roman Valley River. Immature and old growth hardwood forests in this wilderness area are considered regionally significant. The boundary of the Ogden Round Lake Wilderness Area is approximately 35 km east of the PDA.

A parcel of Provincially Significant Migratory Bird Habitat exists on the Milford Haven River in Guysborough and is approximately 6 km by 1 km in size. This area, located near the mouth of the river at Chedabucto Bay, is known to provide habitat for various species of sea ducks during the non-breeding season. This area is roughly 43 km east of the PDA.

Based on the Critical Habitat for Species at Risk National Dataset (ECCC, 2022), no critical habitat for SAR birds occurs in the Study Area. The closest proposed critical habitat identified is for Bank Swallow (*Riparia riparia*) in the Lismore area along the Northumberland Strait (Site ID: 1233_NS_14), approximately 21 km north of the PDA. Critical habitat for Bank Swallow is also identified in Livingstone Cove, approximately 37 km northeast the PDA. Several parcels of Piping Plover critical habitat have also been identified nearby, with sites on Big Merigomish Island approximately 21 km away, and sites along St. Georges Bay approximately 30 km away.

The NSDNR Significant Species and Habitat Database contains 810 historical records of species and/or habitat records that relate to birds within a 100 km radius of the PDA. These records include Migratory Bird (161 records), Species at Risk (201 records), Species of Concern (160 records), and Other Habitat (288 records). None of these records are within 5 km of the PDA. Some of the records in this database do not reflect current species status (e.g., Common Loon). The details of these records include the following:

- Migratory Bird – Most records relate to Willet (38), Common Eider (*Somateria mollissima*) (44), Double-crested Cormorant (*Phalacrocorax auritus*) (19), migratory birds (15), shorebirds (unclassified) (10), and waterfowl (unclassified) (10)
- Species at Risk – Most records relate to Piping Plover (*Charadrius melodus*) (27), Canada Warbler (31), Eastern Wood-Pewee (23), Harlequin Duck (42), and Common Loon (22).
- Species of Concern – Most relate to Tern (unclassified) (59), Common Loon (33), Common Tern (23), Northern Goshawk (17) and Common Eider (7).
- Other Habitat – These records relate to Bald Eagle (*Haliaeetus leucocephalus*) (247), Osprey (*Pandion haliaetus*) (31), Great Blue Heron (9) and Great Horned Owl (1).

Different bird groups demonstrate differences in potential sensitivity to WTGs (Kingsley and Whittam, 2004). Based on the species observed in the Study Area, Project-specific functional groups were selected (Table 12.2). Common Nighthawks may be susceptible to collision with WTGs and associated blades due to foraging and breeding behaviour. Common Nighthawk is an aerial insectivore known to occupy open habitat areas in search of flying insects at various heights and defend their territories by aerial displays (wing booms). Due to these factors, Nightjars are considered as a functional group for further assessment. Songbirds (passerines) are the bird group reported to be most affected by wind energy facilities in North America (Zimmerling et al., 2013); as such, this group is also separate from the functional group Other Landbirds.

Table 12.2 Project-specific Functional Groups

Functional Group	Description
Waterfowl	Order Anseriformes (e.g., Ducks, Geese, and Swans), Order Suliformes (Cormorants)
Waterbirds	Includes seabirds (i.e., marine birds), Order Podicipediformes (e.g., Grebes), Order Gaviiformes (e.g., Loons), Order Pelicaniformes (e.g., Herons), Order Coraciiformes (e.g., Kingfishers), Order Guriformes (e.g., Rails, Gallinules, Coot)
Shorebirds	Order Charadriiformes (Sandpipers, Plovers, Snipes, Woodcocks)
Diurnal Raptors	Eagles, buteos, accipiters, Northern Harrier, Osprey and falcons. Turkey Vultures were included in this group due to their similarity to many soaring raptors
Nocturnal Raptors	Order Stringiformes (i.e., Owls)
Nightjars	Order Caprimulgiformes (e.g., Nighthawks and Whip-poor-wills).
Passerines	Order Passeriform (songbirds)
Other Landbirds	Orders Apodiformes (e.g., Swifts, Hummingbirds), Order Columbiformes (e.g., Pigeons), Order Cuculiformes (i.e., Cuckoos), Order Galliformes (e.g., Grouse, Pheasants), Order Piciformes (e.g. Woodpecker, Flicker, Sapsucker)

The desktop habitat assessment identified that the Study Area is predominantly composed of forested landcover types. Key landcover classes include hardwood, softwood, mixedwood forests and wetlands. As noted above and in Chapter 8 (Flora), large portions of the forested landscape in the Study Area are subject to ongoing industrial forestry activities, including clearcutting, thinning, and plantation management.

Based on historical eBird records from 1991 to 2026, 156 species of birds across eight functional groups were observed within 5 km of the Study Area (Appendix I; Table 12.3). These species may currently use the Study Area during their life cycle. Most of the species observed in the Study Area are passerines.

Table 12.3 Functional Groups and Species Diversity Known to Occur within 5 km of the LAA based on eBird data.

Functional Group	Total Species	Percent of Total
Diurnal Raptors	14	9
Nightjars	1	1
Nocturnal Raptors	3	2
Other Landbirds	17	11
Passerines	93	59
Shorebirds	8	5
Waterbirds	6	4
Waterfowl	14	9
Total	156	100

The following are historical records of bird species within or in proximity to the LAA:

- AC CDC (2023a, 2023b) Data Reports – 114 SAR and SoCC bird species within a 100 km radius of the LAA and 22 were observed within 5 km of the LAA (Appendix F).
- eBird – 8,378 records representing 145 species and eight unidentified taxa (Turdidae, Picidae, Accipitridae, Anatidae, Laridae, Passeriformes, Hirundinidae, and Fringillidae species) within 5 km of the LAA (Table I1 in Appendix I; Table 12.3).
- MBBA – LAA intersects or occurs directly adjacent to ten MBBA squares. Of the 124 species recorded, 84 were classified as confirmed breeders in one or more atlas squares. Four of the species categorized as confirmed breeders are listed federally or provincially at risk (Table I3 in Appendix I).

The PDA and LAA contain suitable breeding habitat for seven SAR birds, although suitable habitat for most SAR is limited (Table 12.4; Figures 12.8 to 12.14). The most abundant suitable SAR habitat present is that for Olive-sided Flycatcher, Canada Warbler, and Common Nighthawk. Suitable habitat was modeled for Bank Swallow, but a figure was not generated due to the few, very small areas of potential habitat predicted by the model. The areas were undetectable in a figure, and land cover values register as zero (Table 12.4).

Table 12.4 Summary of Suitable SAR Breeding Habitat in the PDA and LAA

Species	LAA (ha)	Percent of LAA	PDA (ha)	Percent of PDA
Rusty Blackbird	228.7	8.0	0.0	0.0
Chimney Swift	32.5	1.1	0.5	0.2
Canada Warbler	336.9	11.8	18.0	8.2
Eastern Wood-Pewee	250.7	8.8	11.3	5.2
Evening Grosbeak	48.3	1.7	3.8	1.7
Common Nighthawk	291.7	10.2	19.5	8.9
Olive-sided Flycatcher	446.4	15.6	22.2	10.1
Bank Swallow	0.0	0.0	0.0	0.0

From 2023 to 2025, a total of 12,736 individuals, representing 120 species and 14 unidentified taxa (passerine, raptor, waterfowl, and other landbird species) were observed (Table I2 in Appendix I). Of the 120 species identified, 21 SoCC and ten SAR were observed (Table 12.5). The most abundant species observed include Pine Siskin (*Spinus pinus*; 1,147 observations), White-winged Crossbill (*Loxia leucoptera*; 831 observations), White-throated Sparrow (*Zonotrichia albicollis*; 616 observations), Black-capped Chickadee (*Poecile atricapillus*, 574 observations), and Dark-eyed Junco (*Junco hyemalis*; 556 observations). Seven of the 31SAR and SoCC species listed in Table 12.5 have been categorized in the MBBA as confirmed breeders in the LAA. Survey information and weather conditions at the time of each survey are outlined in Table I4 in Appendix I.

Table 12.5 Summary of SAR and SoCC Recorded Across all Bird Surveys Completed in the Study Area from 2023 to 2025

Functional Group	Scientific Name	Common Name	Status				Numbers of Observations Recorded during 2025 Field Surveys								
			NSESA	SARA	COSEWIC	S-rank	Nocturnal Owls	Winter Residency	Spring Migration		Fall Migration		Breeding Birds	Nightjar	Total
									Point Counts	Passage Migration	Point Counts	Passage Migration			
Diurnal Raptors	*Accipiter atricapillus*	American Goshawk	-	-	-	S3S4		1		3		1	1		6
Diurnal Raptors	*Falco sparverius*	American Kestrel	-	-	-	S3B,S4S5M			4	5	9	12	1		31
Passerines	*Hirundo rustica*	Barn Swallow	E	T	SC	S3B				5		5			10
Other Landbirds	*Picoides arcticus*	Black-backed Woodpecker	-	-	-	S3S4						1			1
Passerines	*Setophaga striata*	Blackpoll Warbler	-	-	-	S3?B,S5M			4		114	1			119
Passerines	*Dolichonyx oryzivorus*	Bobolink	V	T	SC	S2S3B			2	2					4
Passerines	*Poecile hudsonicus*	Boreal Chickadee	-	-	-	S3		40	19		66	5	23		153
Passerines	*Perisoreus canadensis*	Canada Jay	-	-	-	S3		22	16		74	28	7		147
Passerines	*Cardellina canadensis*	Canada Warbler	E	T	SC	S2S3B			7				66		73
Passerines	*Setophaga tigrina*	Cape May Warbler	-	-	-	S3S4B,S4M			1						1
Other Landbirds	*Chaetura pelagica*	Chimney Swift	E	T	T	S2S3B,S2S3M			9	4		2	15		30
Waterbirds	*Gallinula galeata*	Common Gallinule	-	-	-	S1B							1		1
Nightjars	*Chordeiles minor*	Common Nighthawk	T	SC	SC	S3S4B				1		11	3	12	27
Diurnal Raptors	*Accipiter cooperii*	Cooper's Hawk	-	-	NAR	S1B,S1N				1					1
Passerines	*Contopus virens*	Eastern Wood-Pewee	V	SC	SC	S3S4B					1				1
Passerines	*Coccothraustes vespertinus*	Evening Grosbeak	V	SC	SC	S3B,S3N		17	9	2	33	3	1		65
Passerines	*Ammospiza nelsoni*	Nelson's Sparrow	-	-	NAR	S3S4B					1				1
Diurnal Raptors	*Circus hudsonius*	Northern Harrier	-	-	-	S3B,S4M			1	10	1	4	1		17
Passerines	*Lanius borealis*	Northern Shrike	-	-	-	S3N				1					1
Passerines	*Contopus cooperi*	Olive-sided Flycatcher	T	SC	SC	S3B			1				13		14

Functional Group	Scientific Name	Common Name	Status				Numbers of Observations Recorded during 2025 Field Surveys								
			NSESA	SARA	COSEWIC	S-rank	Nocturnal Owls	Winter Residency	Spring Migration		Fall Migration		Breeding Birds	Nightjar	Total
									Point Counts	Passage Migration	Point Counts	Passage Migration			
Diurnal Raptors	*Falco peregrinus*	Peregrine Falcon	V	-	-	S1B,S3M				1		1			2
Passerines	*Vireo philadelphicus*	Philadelphia Vireo	-	-	-	S3?B,S4M							1		1
Passerines	*Pinicola enucleator*	Pine Grosbeak	-	-	-	S2S3B,S5N		120							120
Passerines	*Setophaga pinus*	Pine Warbler	-	-	-	S3?B					1				1
Shorebirds	*Phalaropus lobatus*	Red-necked Phalarope	-	SC	SC	S2S3M					1				1
Passerines	*Pheucticus ludovicianus*	Rose-breasted Grosbeak	-	-	-	S3S4B						1			1
Passerines	*Euphagus carolinus*	Rusty Blackbird	E	SC	SC	S2S3B			9				2		11
Shorebirds	*Tringa solitaria*	Solitary Sandpiper	-	-	-	SUB,S3S4M							1		1
Passerines	*Leiothlypis peregrina*	Tennessee Warbler	-	-	-	S3B,S5M						1	1		2
Shorebirds	*Gallinago delicata*	Wilson's Snipe	-	-	-	S3B,S4M			1	2			1		4
Passerines	*Cardellina pusilla*	Wilson's Warbler	-	-	-	S3B,S4M					2	1			3
E – Endangered, T – Threatened, V – Vulnerable, SC – Special Concern, NAR – Not at Risk															

12.2.1 Winter Birds

A total of 1,953 individuals, consisting of 35 species, were recorded during the winter bird surveys from 2023 to 2025. Of the 35 species, one SAR (Evening Grosbeak; 17 observations) and four SoCC were recorded: American Goshawk (one observation), Boreal Chickadee (40 observations), Canada Jay (22 observations), and Pine Grosbeak (120 observations). The most abundant species included Pine Siskin, White-winged Crossbill (645 observations), and Pine Grosbeak (Table I2 in Appendix I).

During the 2021-2022 winter bird surveys for the Weavers Mountain Wind Energy Project, located in the Study Area, a total of 25 species comprising 1,498 individuals were observed. A similar species composition was recorded, with Pine Siskin and White-winged Crossbill ranking among the most abundant. Evening Grosbeak was also the only SAR recorded during these surveys, and a very similar list of four SoCC: American Tree Sparrow (*Spizella arborea*), Boreal Chickadee, Canada Jay, and Pine Grosbeak.

12.2.2 Owls

A total of 23 individuals, consisting of five species, were recorded during the 2023 and 2024 nocturnal owl surveys. These species include Barred Owl (*Strix varia;* 11 observations), Northern Saw-whet Owl (*Aegolius acadicus;* one observation), American Woodcock (*Scolopax minor;* seven observations), Ruffed Grouse (*Bonasa umbellus;* three observations), and Wilson's Snipe (*Gallinago delicata;* one observation) (Table I2 in Appendix I).

During 2022 nocturnal owl and nightjar surveys for the Weavers Mountain Wind Energy Project, located in the Study Area, a total of six species comprising 108 individuals were recorded. Common Nighthawk (53 observations) and Chimney Swift (37 observations) were the most abundant. No owl species were observed during these surveys.

12.2.3 Migration

12.2.3.1 Spring Migration

A total of 2,928 individuals, consisting of 88 species and four unidentified taxa (passerine, waterfowl, and other landbird species) were recorded during the spring migration point count surveys in the Study Area from 2023 to 2025 (Table I2 in Appendix I). Of these 88 species, six are SAR and seven are SoCC (Table 12.5). Passerines (87%) and Other Landbirds (9%) represent most species detected. The most abundant species included American Robin (230 observations), White-throated Sparrow (215 observations), Black-throated Green Warbler (158 observations), and Yellow-rumped Warbler (137 observations).

A total of 320 individuals, representing 52 species and five unidentified taxa (raptor, passerine, and other landbird species), were observed during spring passage migration surveys conducted in the Study Area from 2023 to 2025 (Table I2 in Appendix I). Of the 52 species identified, five are SAR and six are SoCC (Table 12.5). Passerines (69 %) and diurnal raptors (18%) were the most abundant functional groups detected. The most abundant species include White-winged Crossbill (44 observations), White-throated Sparrow (32 observations), and Bald Eagle (23 observations).

The largest flocks observed during spring passage migration surveys were two flocks of 30 and 14 White-winged Crossbills observed during a single watch in 2024. Both flocks were recorded between 0 and 50 m above ground level (agl). When altitude was recorded, 64% of observations occurred between 0 and 50 m agl, with 24% being between 51 and 100 m agl. The remaining 12% were recorded above 100 m agl. These results suggest that many individuals recorded were within the RSZ; the area between the lowest and highest rotor tip height or where the blades are moving (i.e., approximately 40 to 200 m above ground level).

No concentrations of diurnal raptors were observed during spring migration point counts or passage migration surveys; however, individuals from nine species were observed on one or more occasions: Bald Eagle (*Haliaeetus leucocephalus*), Red-tailed Hawk (*Buteo jamaicensis*), American Kestrel (*Falco sparverius*), Broad-winged Hawk (*Buteo platypterus*), Cooper's Hawk (*Accipiter cooperii*), Northern Harrier (*Circus hudsonius*), Sharp-shinned Hawk (*Accipiter striatus*), American Goshawk (*Accipiter atricapillus*), and Peregrine Falcon (*Falco peregrinus*).

During 2022 spring migration point-count surveys for the Weavers Mountain Wind Energy Project, located in the Study Area, a total of 76 species comprising 1,677 individuals were observed. American Robin and White-Winged Crossbill were the most abundant species. Four SAR were observed: Canada Warbler, Chimney Swift, Evening Grosbeak, and Rusty Blackbird. During 2022 spring passage migration surveys, a total of 20 species comprising 117 individuals were observed. Similarly to the results presented here, the majority of individuals observed were Passerines (64%). Chimney Swifts were the most abundant species recorded. No large concentrations of raptors were observed during 2022 spring passage migration surveys.

12.2.3.2 Fall Migration

Eighty-seven species and seven unidentified taxa (raptor, passerine, and other landbird species), totalling 4,147 individuals, were recorded in the Study Area during the fall migration point count surveys from 2023 to 2025 (Table I2 in Appendix I). Of the 87 species (64% Passerines), three are SAR (Evening Grosbeak, Eastern Wood-Pewee, and Red-necked Phalarope) and seven are SoCC. The most abundant species included Blue Jay (323 observations), Dark-eyed Junco (320 observations), Black-capped Chickadee (297 observations), and Golden-crowned Kinglet (284 observations). A summary of the SAR and SoCC observed during the fall migration point counts are provided in Table 12.5.

A total of 973 individuals, representing 62 species and six unidentified taxa (passerine and raptor species), were observed during fall passage migration surveys conducted in the Study Area in 2023 to 2025 (Table I2 in Appendix I). Of the 62 species identified, four SAR and 11 SoCC were observed (Table 12.5). The most abundant functional bird groups detected include Passerine (85%) and Diurnal Raptors (9%).

The most abundant species observed during fall passage migration surveys were Pine Siskins (138 observations), Dark-eyed Juncos (63 observations), Blue Jays (*Cyanocitta cristata*; 63 observations), American Goldfinches (*Spinus tristis;* 61 observations), and Cedar Waxwings (*Bombycilla cedrorum*; 55 observations), and 62 % of these individuals were recorded flying through the LAA at 0 to 50 m agl. The remainder were either recorded between 51 and 200 m agl, or altitude was not recorded.

The largest flocks observed during fall migration were flocks of 40, 38, 20, and 15 Pine Siskins. Small flocks of crossbill (10 individuals) and blackbird (16 individuals) species, and Cedar Waxwings (12 individuals) were also observed flying through the survey area. Altitude was recorded for three of the seven flocks (crossbills, blackbirds, and the flock of 38 Pine Siskins), which were all flying between 0 and 100 m agl. Across all species observations, when altitude was recorded, 75% occurred between 0 and 50 m agl, and 24% between 51 and 200 m. The remaining 1% (two observations) were over 200 m agl.

No concentrations of diurnal raptors were observed during point counts or passage migration surveys; however, individuals from nine species were observed on one or more occasions: Red-tailed Hawk, American Goshawk, Bald Eagle, Northern Harrier, American Kestrel, Merlin (*Falco columbarius*), Sharp-shinned Hawk, Osprey (*Pandion haliaetus*), and Peregrine Falcon.

During 2021 fall migration point-count surveys for the Weavers Mountain Wind Energy Project, located in the Study Area, 44 species comprising 1,269 individuals were recorded. The most abundant species observed were Golden-crowned Kinglet, Purple Finch, and White-winged Crossbill. Two SAR, Evening Grosbeak and Rusty Blackbird, were observed. The SoCC observed included Boreal Chickadee and Canada Jay. During 2021 fall passage migration surveys, a total of 15 species comprising 149 individuals were observed. The most abundant species observed included Common Raven and Purple Finch. No concentrations of raptors were observed during passage migration surveys. The only flocks noted were two flocks of 15 or more finches (species unknown).

12.2.3.3 Radar Monitoring

During the 2022 spring monitoring period, 23,189 biological targets (BTs) were identified by the ARS. The highest number of detections occurred on May 5 (6,767 BT detections) and May 17 (9,026 BT detections). Most BTs occurred between 250 and 3,000 m agl. Of this, the largest numbers occurred between 500 and 1,000 m agl (6,103 BT detections) and between 1000 and 1500 m (7,792 BT detections).

During the 2022 fall monitoring period, 104,075 BTs were identified by the ARS. The highest number of detections occurred on August 9, with 97,647 BT detections. This was also the last night any detections occurred. Like the 2022 spring monitoring results, most BTs were recorded between 500 and 3,000 m agl. The largest numbers occurred between 500 and 1,000 m agl (37,945 BT detections) and between 1,000 and 1,500 m agl (37,261 BT detections).

In the fall of 2023, 711 BTs were identified by the ARS. Peak activity occurred on August 27 (217 BT detections) and November 18 (221 BT detections). Most BTs were detected between 250 and 1,000 m agl during the fall. Of this, the highest proportion occurred between 250 and 500 m agl (329 BT detections). The influx of BT activity in mid-November occurred just before daily average temperature began to sharply decrease.

Similar altitude patterns were observed during the breeding season period, with most BT detections occurring between 250 and 1,000 m agl, and of that, the highest proportion being between 250 and 500 m agl. A total of 1,257 BTs were detected over the summer breeding period. Peak activity occurred on July 22 (840 BT detections) and July 28 (227 BT detections). These days of peak activity occurred when temperatures were rising towards the seasonal high in late July. This could suggest an influx of birds opportunistically taking advantage of warmer weather to forage instead of sitting on the nest.

Overall, altitudinal results across years and migratory seasons were consistent, with the majority of detections occurring above 250 m, or above the RSZ of WTGs. Significantly fewer detections occurred in the fall of 2023 than in fall of 2022. Peak detection nights also differed between years. Differences in bird migration activity can likely be attributed to weather and atmospheric conditions, which have the greatest influence on migration behaviour.

12.2.3.4 Acoustic Monitoring

In the spring of 2022, the bulk of nocturnal flight calls (NFCs) occurred in mid-May, with the greatest number occurring on May 14. This was mismatched with peak radar detection, which occurred on May 17. This could be due to several factors, including a combination of detection range and weather conditions. The bulk of NFC detections identified on May 17 were from sparrows. Data clarity early in the spring season was poor, due to strong interference from the calls of Spring Peepers (*Pseudocris crucifer*), a frog that produces loud vocalizations in the spring that occupy a similar frequency to many avian NFCs.

In the fall of 2022, many NFCs were detected throughout the season, with a peak occurring on October 3. Data clarity in early fall was poor, likely due to noise interference from species of crickets and katydids, including *Gryllus pennsylvanicus* and *Scudderia pistillata* which create loud noises that interfere with acoustic monitoring.

During manual verification of the 2023 acoustic data, a total of 44 species of birds were confirmed with 26 of these identified as being SoCC. Five SAR were reported: Canada Warbler, Chimney Swift, Common Nighthawk, Evening Grosbeak, and Olive-sided Flycatcher. Avian NFC vocalizations peaked during the last week of May during spring migration and slowly trailed off through June and July. Acoustic data from the fall period was not collected due to a power malfunction in the ARU.

Analyzed acoustic data from 2023 yielded a total of 7,063 audio detections, of which 35.5% were manually verified for accuracy. Of these manually verified NFCs, American Robins and Cape May Warblers produced the highest number of vocalizations in late May. In mid-June, the highest number belonged to Cape May Warblers and Pine Warblers (*Setophaga pinus*). Common Nighthawk NFCs were confirmed 27 times from June 9 to Jun 25, 2023.

When 2023 acoustic data was processed through Nighthawk software, 14,152 NFCs were detected, in which 7% were manually verified. Peak detection levels occurred on May 25 and 26, 2023, with 159 and 148 calls, respectively. Twenty-eight species were identified, including seven SoCC. Canada Warbler was the only SAR detected by Nighthawk.

Overall, the analysis of acoustic monitoring results from 2022 provided limited aid to radar assessment results, with some data limitations due to external noise interference from non-avian species. Weather conditions and detection range could have also impacted results. The acoustic monitoring results from 2023 demonstrate the Study Area is used by a diversity of species during spring and summer and provide additional evidence of SAR and SoCC presence.

12.2.4 Breeding Birds

From 2023 to 2025, 2,407 individuals of 81 species and three unidentified taxa (waterfowl, blackbird, and woodpecker species) were recorded in the Study Area during the breeding bird point count surveys (Table i2 in Appendix I). Of these 81 species (94 % Passerines), six are SAR and 10 are SoCC. A summary of SAR and SoCC and associated breeding evidence codes are provided in Table 12.6. The most abundant species included Black-throated Green Warbler (*Setophaga virens;* 188 individuals), White-throated Sparrow (*Zonotrichia albicollis*; 170 individuals), Red-eyed Vireo (*Vireo olivaceus*; 154 individuals), Ovenbird (*Seiurus aurocapilla*; 129 individuals), and Hermit Thrush (*Catharus guttatus*; 121 individuals). There was no evidence of colonial breeding or roosting birds observed in the LAA.

During 2022 breeding bird surveys for the Weavers Mountain Wind Energy Project, located in the Study Area, a total of 66 species comprising 920 individuals were recorded. Similarly to breeding bird surveys conducted for this Project, the most abundant species included Black-throated Green Warbler and Red-eyed Vireo, as well as Common Yellowthroat. SAR species observed included Canada Warbler, Chimney Swift, Eastern Wood-Pewee, Evening Grosbeak, and Olive-sided Flycatcher. SoCC observed during surveys for the Weavers Mountain Wind Energy Project were similar to those observed elsewhere in the Study Area.

According to the Second Atlas of Breeding Birds of the Maritime Provinces (MBBA; Stewart et al., 2015), three of the six SAR observed during breeding bird surveys are confirmed breeders in the Study Area (Table 12.6). The remaining three are probable breeders. Canada Warblers (*Cardellina canadensis*) were the most common SAR encountered during breeding bird surveys. Three instances of agitated behaviour were observed, likely due to a nest nearby. Juvenile individuals were seen or heard on at least two occasions. Suitable breeding habitat for Canada Warbler is abundant in the Study Area, relative to other SAR. Confirmed breeding evidence is difficult to obtain; therefore, it is conservatively assumed that species, in addition to those observed in the field, are likely breeding in the LAA.

Seven of the ten SoCC observed during surveys are categorized as confirmed or probable breeders in the Study Area (Table 12.6). Common Gallinule, Philadelphia Vireo, and Solitary Sandpiper were not recorded in MBBA records for the atlas squares covering the Study Area. Boreal Chickadee was observed and heard vocalizing many times during breeding and migration seasons, indicating their use of the area for breeding and migration habitat.

Table 12.6 Summary of SAR and SoCC Recorded during the Breeding Bird Point Count Surveys in 2023 - 2025

Scientific Name	Common Name	NSESA	SARA	COSEWIC	S-Rank	No. of records	Breeding Evidence Category
Accipiter atricapillus	American Goshawk	-	-	-	S3S4	1	Confirmed
Falco sparverius	American Kestrel	-	-	-	S3B,S4M	1	Confirmed
Perisoreus canadensis	Canada Jay	-	-	-	S3	7	Confirmed
Cardellina canadensis	Canada Warbler	E	T	SC	S2S3B	66	Confirmed
Chaetura pelagica	Chimney Swift	E	T	T	S2S3B, S2S3M	15	Probable
Gallinula galeata	Common Gallinule	-	-	-	S1B	1	-
Chordeiles minor	Common Nighthawk	T	SC	SC	S3B	3	Probable
Coccothraustes vespertinus	Evening Grosbeak	V	SC	SC	S3B,S3N	1	Probable
Circus hudsonius	Northern Harrier	-	-	-	S3B, S4N	1	Probable
Contopus cooperi	Olive-sided Flycatcher	T	T	SC	S3B	13	Confirmed
Vireo philadelphicus	Philadelphia Vireo	-	-	-	S3?B,S4M	1	-
Tringa solitaria	Solitary Sandpiper	-	-	-	SUB,S3S4M	1	-
Leiothlypis peregrina	Tennessee Warbler	-	-	-	S3B,S5M	1	Probable
Gallinago delicata	Wilson's Snipe	-	-	-	S3B,S4M	1	Confirmed

E – Endangered, T – Threatened, SC – Special Concern, V – Vulnerable

Dark-eyed Junco breeding evidence was recorded on two occasions, with the nest itself observed once and parents feeding juveniles observed on another occasion. These instances occurred in two different years. The only other species in which juveniles were observed was Canada Warbler, a SAR, as previously described. Many species with confirmed or probable breeding status were observed singing or chipping in suitable breeding habitat in the Study Area, establishing territories, attracting mates, and defending nest sites for the breeding season.

12.2.5 Nightjar Surveys

A total of three species were recorded during nightjar surveys conducted in the Study Area in 2023 and 2024: Common Nighthawk, Barred Owl, and American Woodcock (Table I2 in Appendix I). Twelve Common Nighthawk observations were recorded, the only SAR detected. Common Nighthawk were also recorded in the Study Area during spring, fall, and breeding bird surveys (15 observations total).

12.2.6 Pileated Woodpecker

Pileated Woodpecker roosting, feeding, and possible former nesting cavities were observed and recorded in the Study Area during the execution of field programs. No active Pileated Woodpecker nesting activity was observed during field programs, nor were any nest cavities that appeared to be in recent or current use observed.

During breeding bird surveys, 11 individual Pileated Woodpeckers were recorded across all years (2023 to 2025), at eight different point count locations. During migration point counts, 29 Pileated Woodpeckers were recorded at 20 locations during the fall season and 12 were recorded at nine locations in the spring (from 2023 to 2025). During fall and spring passage migration watches, three individuals were recorded in total from 2023 to 2024.

12.3 Effects Assessment

12.3.1 Potential Effects and Mitigation

Measures were undertaken in the Project design to minimize potential direct and indirect impacts on bird habitat (e.g., wetlands) within engineering and design constraints. Detailed design of the Project and micrositing of WTGs will further avoid bird habitat, when practicable, and reduce potential interactions between the Project and birds.

The Project could impact birds through various interconnected pathways, both directly and indirectly. During construction, activities such as earthworks and vegetation clearing can lead to habitat loss and alteration. If these activities occur during the nesting season, these activities could kill, injure, or displace nesting birds, their young, or their eggs.

Project-related vehicle traffic poses a risk of mortality and injury due to collisions with birds. Collisions with WTG blades, towers, and transmission lines are possible during the operation and maintenance phase of the Project. Project activities can affect birds as indicated in Table 12.7; these potential effects do not consider the implementation of mitigation measures described herein.

Table 12.7 Potential Environmental Effects of the Project on Birds

Project Activity	Potential Environmental Effects		
	Habitat Loss/ Fragmentation	Direct Mortality and Injury	Sensory Disturbance
Construction			
Site Preparation	X	X	X
Access Roads Construction and Modifications	X	X	X
Material and Equipment Delivery and Storage	-	X	X
Infrastructure Installation	-	-	X
Restoration of Temporary Areas	-	-	X
Testing and Commissioning	-	X	X
Operation and Maintenance			
WTG Operation and Maintenance	-	X	X
Road Maintenance	-	X	X
Power Line and Substation Maintenance	-	X	X
Vegetation Management	-	X	X
Safety and Security	-	-	X
Decommissioning			
Removal of Infrastructure and Site Restoration	-	X	X

X = Potential Interaction
- = No Interaction

12.3.1.1 Habitat Loss and Fragmentation

The Project may result in habitat loss, degradation, and fragmentation for bird species in the LAA. Construction activities such as vegetation clearing and grubbing will result in a short-term and long-term loss of habitat. Vegetation clearing will occur in the PDA for the construction or installation of access roads, WTGs, transmission lines, and other Project infrastructure. For the purposes of the assessment, a conservative estimate of the habitat to be removed (i.e., the PDA) was used. This area is larger than the actual Project footprint.

Six SAR birds were observed during breeding bird surveys between 2023 and 2025: Canada Warbler (66 observations), Chimney Swift (15 observations), Olive-sided Flycatcher (13 observations), Common Nighthawk (three observations), Rusty Blackbird (two observations), and Evening Grosbeak (one observation). Over 400 ha (approximately 15%)

of the LAA is modelled as suitable breeding habitat for Olive-sided Flycatcher, over 300 ha (approximately 12%) for Canada Warbler, and nearly 300 ha (approximately 10%) for Common Nighthawk. However, much of this suitable habitat is avoided in the PDA layout, with 22.7 ha of Olive-sided Flycatcher habitat present in its boundaries, 18 ha of Canada Warbler habitat, and 19.5 ha of Common Nighthawk habitat.

The Project was designed to avoid and minimize interactions with high-quality habitat such as old-growth and mature forests, and interior forest habitat, with 12 of the 16 WTGs sited in areas previously disturbed through forestry activities or otherwise. WTGs were also sited to avoid wetlands to the extent possible. This is particularly advantageous for species typically associated with interior forest habitats (e.g., Evening Grosbeak) and wetlands (e.g., Canada Warbler), as the LAA has experienced heavy disturbance from forestry activities.

The impact of roads and trails on migratory birds is unclear. Some studies show that access roads and trails have a negative impact on bird nest survival, species richness, diversity, fitness, and by providing travel corridors for predators, thereby increasing predation (Kroeger et al., 2022; Khamcha et al., 2018; Summers et al., 2011; Pescador & Peris, 2007). Roads can also lead to habitat fragmentation (Quiles & Barrientos, 2024). Some research suggests that roads and trails may not have as much of an impact on birds as might be expected. For example, some studies show no significant effect of roads on nest predation (Ortega & Capen, 2002; Cull et al., 2025). In addition, other studies have shown that certain common and omnivorous bird species increase in abundance with exposure to roads and recreational trails, likely due to an increase in food sources (Cooke et al., 2020; Bötsch et al., 2018). Overall, these findings indicate that the effect of access roads on birds is variable and depends on factors such as habitat type, road type, and traffic intensity.

The Project will require approximately 28.5 km of access roads. To reduce habitat fragmentation and disturbance (e.g., clearing and ground alteration), 60% (17.1 km) of proposed access roads will be using pre-existing roads. However, these will require upgrades and clearing vegetation creates edges that can alter bird communities occupying these areas. The clearing needed for transmission lines and new access roads in the PDA will lead to loss of bird habitat for some species, but it will simultaneously provide habitat for edge-species and species that prefer open environments (e.g., Yellow-rumped Warbler, Pine Siskin, White-throated Sparrow).

Not all habitat alterations will be permanent, and the areas reclaimed during restoration will return to the site's pre-disturbance condition.

Potential Project effects related to habitat loss and fragmentation can be effectively mitigated through planning and management of construction and operation activities. The following key measures to mitigate the potential effects of the Project on bird habitat will be further detailed in a Project-specific EPP and will be implemented before and during construction.

- Site planning was undertaken to minimize habitat disturbance, reduce habitat loss and fragmentation, and use existing roads and previously disturbed areas (e.g., forestry clearcuts) where technically feasible. Further refinements to the PDA will be considered during final design to reduce disturbance to wetlands where possible.
- Vegetation clearing will be completed outside of the general nesting period for migratory birds. If clearing activities occur during the nesting period, procedures outlined in the Wildlife Management Plan, will be implemented. Vegetated buffers around wetlands and watercourses will be maintained to support connectivity for wildlife wherever possible.
- Cleared areas will be stabilized and allowed to revegetate naturally.
- Measures will be implemented to control and prevent the spread of invasive species.
- Work crews will recognize the working limits of the PDA and will refrain from entering surrounding habitat.
- The Proponent will develop and implement ESC procedures.
- The Proponent will develop and implement a Wildlife Management Plan.

12.3.1.2 Direct Mortality and Injury

Project construction including activities such as vegetation clearing and increased traffic may result in direct mortality and injury to birds. During the operational phase, birds may collide with WTGs and transmission lines, leading to injury and mortality.

Construction activities, such as vegetation clearing and grubbing, pose a high risk of increased mortality for birds. Without mitigation measures, there is a potential for nest destruction and subsequent mortality of nesting birds, young birds, and eggs, especially if these activities occur during the migratory bird nesting period. To address these risks, vegetation clearing will be scheduled outside of the general nesting period for migratory birds (e.g., mid-April to late August for Nesting Zone C3 (ECCC, 2023d)).

During the construction and decommissioning phases, there is an increased threat of birds colliding with vehicles due to higher levels of traffic and activity on site. This threat primarily arises from the transportation of materials, heavy machinery, and personnel to and from the PDA. This risk will be greater during periods of increased bird activity, including fall and spring migration, and the nesting period. To mitigate this risk, vehicle speed will be limited in the PDA. Project-related traffic associated with maintenance during the Project's operation is expected to be minimal.

The Project can result in a direct increase in mortality risk for birds during operation through collisions with transmission lines, WTGs, and collisions with other Project infrastructure. Transmission lines have the potential to harm, injure, or kill migratory birds through increasing risks of collision and electrocution. In Canada, annual bird mortality estimates from transmission line collisions are anywhere between 1 million and 229.5 million (Rioux et al., 2013). Larger birds with low maneuverability, such as Canada Geese and duck species, are particularly vulnerable (Quinn et al., 2011). The Project will only require a maximum of 150 m of new transmission line, located at the project substation and switchyard to connect into the existing NSPI transmission corridor. Vegetation management around the transmission infrastructure will be implemented to reduce the risk of electrocution to birds.

Mortality from WTG collisions at 43 Canadian wind farms was found to be an average of 8.2 (± 1.4) birds per WTG per year, with a large variation among wind farms, between 0 to 26.9 birds (Zimmerling et al., 2013). Additionally, data from five Atlantic Canadian wind projects (2008 to 2012) showed non-raptor WTG mortality at approximately 1.17 (± 1.01) birds per WTG, ranging from 0 to 7.09 birds, with no recorded raptor fatalities (Birds Canada, 2016).

Predicting collision risk between WTGs and nocturnally migrating birds using baseline radar and acoustic data remains challenging to achieve with confidence. The primary indicator of risk is the volume of birds migrating within the RSZ, although only a small fraction of these birds may collide with WTG rotors. Various models have been developed to estimate collision risk based on factors such as flight volume, species, rotor height, and RSZ. However, post-construction research suggests that these models often underestimate actual mortality rates, emphasizing the need for post-construction monitoring, especially following nights with unfavourable conditions.

During the 2023 fall monitoring period, radar data collected during the post-approval monitoring program for the Weavers Mountain Wind Energy Project indicated the majority of targets occurred between 250 and 1,000 m agl in altitude. Of this subset, the highest proportion occurred between 250 and 500 m agl. Similar results were found during the 2022 radar monitoring for the Weavers Mountain Wind Energy Project environmental assessment, which indicated the largest densities of birds during both spring and fall occurred over 250 m agl. These results suggest many birds avoid the RSZ during migration, although migration altitude is often influenced by temperatures and headwinds. An increase in migration activity occurred just prior to a sharp decrease in daily average temperatures in the fall of 2023. These findings may suggest that collision risk is low in the Study Area; however, the influence of unfavourable weather conditions is uncertain.

The acoustic data collected in spring and summer of 2023 during post-approval acoustic monitoring revealed evidence of several SoCC and SAR in the Study Area during spring migration and the migratory breeding season. Notably, Common Nighthawk were recorded several times during the month of June. This species was also observed several times during field programs. Given that Common Nighthawks engage in aerial displays to defend their territory during the breeding season, and are aerial insectivores that forage at varying heights, collision risk may be elevated for this species during their breeding window.

A post-construction mortality monitoring program will be developed in consultation with ECCC-CWS and NSDNR and implemented for two years. Carcass searches will be conducted to target periods of increased activity (e.g., migration and breeding) and periods following unfavourable weather conditions (e.g., rain and headwinds). Surveys will be designed to account for searcher efficiency and scavenger rates. Additionally, ongoing monitoring and adaptive management strategies will be implemented to assess and mitigate potential impacts on birds during all phases of the Project.

Potential Project effects related to direct mortality and injury can be effectively mitigated through planning and management of construction and operation activities. The following key measures to mitigate the potential risks of bird collision will be further detailed in a Project-specific EPP and will be implemented prior to and during construction and during operation and maintenance.

- Vegetation clearing will be completed outside of the general nesting period for migratory birds. If clearing needs to occur within this period, the guidelines to avoid harm to migratory birds (ECCC, 2023) and regulators will be consulted for guidance on developing additional mitigation measures.
- The Project-specific EPP will include emergency response protocols to protect birds from harm during accidents and/or malfunctions, including contacts of the nearest emergency wildlife rehabs. Bird mortality incidents of 10 or more birds in a single event, or of an individual SAR, will be reported to ECCC and/or NSDNR.
- The discovery of nests by staff will be reported to the environmental monitor at site and appropriate action or follow-up will be guided by the Project-specific EPP, or with guidance from ECCC.
- Guidance specific to minimizing impacts to birds will be captured in a Wildlife Management Plan. These will include guidelines to avoid harm to migratory birds, actions/steps to take should a nest or unfledged birds be discovered, and appropriate buffers based on disturbance activities.
- Vegetation management practices to enhance visibility for birds and reduce the risk of collisions will be implemented.
- Overhead power line installation, operation and maintenance will follow, at minimum, the NSPI nesting birds and vegetation management protocols (NSPI, 2023).
- Vegetation around the transmission poles and lines will be managed to reduce the risk of electrocutions with birds and other wildlife.
- A two-year post-construction mortality monitoring program will be developed and implemented in consultation with NSDNR and ECCC-CWS to assess the ongoing impact of WTGs on birds and inform adaptive management strategies.
- If post-construction mortality monitoring identifies significant annual bird mortality or significant bird mortality events, adaptive management strategies will be implemented, as outlined in the Adaptive Management Plan.

12.3.1.3 Sensory Disturbance

The Project has the potential to result in indirect effects to bird habitat through sensory disturbances, including noise, light pollution, dust, and vibrations. This disturbance may cause birds to abandon or avoid habitat and can lead to stress or other physiological effects. These effects pose the greatest risk during periods of migration and nesting.

The Project’s lighting infrastructure can present a risk to birds, particularly through attraction to lights during low-visibility conditions or night. Birds flying in these conditions are known to aggregate around artificial light, which can lead to disorientation and collisions (Adams et al., 2021; Lao et al., 2020). This risk is the greatest during migration periods, as artificial light can interfere with migration cues that birds use to navigate. Birds disoriented from artificial light sources may circle these lights, deplete energy reserves, and lead to exhaustion or force landings, which also increases their vulnerability to predation. Poor weather conditions exacerbate these effects, as they lower flight heights, potentially moving within the RSZ. Artificial light can also change birds' perceptions of habitat quality, resulting in selection or avoidance of illuminated areas (Adams et al., 2021).

To reduce disruptions to birds, seasonality will be considered when planning construction and maintenance activities. Only lighting essential to meeting safety and security needs during the Project activities will be used. For essential lighting, spill-over light will be minimized, side-shielded, and directed downwards to reduce the attraction of birds, where possible. Construction activities will be limited to daylight hours, where possible, and will avoid illuminating habitat adjacent to worksites. WTG and transmission lighting will be minimized where possible, while maintaining Transport Canada's requirements for aeronautical safety. With these mitigations, impacts on birds pertaining to lighting is expected to be low through the Project's lifespan.

Noise generated by Project activities can impact birds in various ways, particularly during sensitive periods, such as the nesting period. Noise can disrupt bird communication, directly impact the health of birds by triggering stress responses, and disrupt foraging and reproductive behaviours, potentially leading to decreased breeding success (Quinn et al., 2006; Mockford & Marshall, 2009; Mockford et al., 2011; Blickley et al., 2012). Noise disturbance can cause birds to avoid certain areas and potentially displacing them from their important habitats (Marques et al., 2020). Project noise may also mask environmental cues for birds, such as predator detection. Thus, careful planning and consideration of noise impacts is essential to minimize adverse effects on birds near the Project.

To reduce the risk of noise disturbance to birds, seasonality will be considered when planning very loud and random noise disturbance (e.g., blasting programs) during construction. Construction equipment and vehicles will be kept in good working order and loud machinery will be muffled.

Dust deposition during construction and decommissioning may cause birds to avoid or abandon habitat in the LAA. Impacts from dust generated from the Project are captured in Chapter 5 (Atmospheric Environment). Through the implementation of mitigation and management plans, these impacts are expected to be low.

Temporary sensory disturbance during construction and decommissioning is expected to have minimal impact on bird populations. This disturbance will be mostly restricted to daylight hours. There are no significant residual environmental effects expected.

Potential Project effects related to sensory disturbance can be effectively mitigated through planning and management of construction and operation activities. Effects of light, noise, and dust to birds in the LAA will be low and can be mitigated through strategies to reduce these effects. The following key measures to mitigate the potential effects of the Project on birds will be further detailed in a Project-specific EPP and will be implemented prior to and during construction.

- Seasonal construction restrictions or phased construction plans will be implemented to avoid sensitive bird periods (including the general nesting season) to the extent possible.
- Onsite lighting will be restricted during Project activities to minimize disturbance.
- The fewest number of site-illuminating lights possible will be used in the PDA.
- WTG lighting will not exceed the minimum standards in the Canadian Aviation Regulations (i.e., Standard 621, Section 12.2 and Figure 5.3 (Appendix A)).
- Site lighting will be designed to focus on human safety and security. It will be shielded downward to minimize light pollution to the surrounding environment and adjacent habitat.
- Movement detection lighting will be used on office structures, doors to WTGs, gates, etc., which will turn off when not in use.
- Blasting will be undertaken in accordance with regulatory requirements and will only be conducted by qualified blasting professionals.
- Construction equipment and vehicles will be kept in good working order and loud machinery will be muffled.
- To avoid attracting birds and/or predators to the PDA, the site will be kept clean of food scraps and garbage, transporting waste to an approved landfill on a regular basis.
- The Proponent will develop and implement Wildlife Management Plan.

12.3.2 Residual Effects

Activities associated with the Project may induce short to long-term impacts on birds in the PDA and LAA, primarily due to vegetation clearing and cutting; collisions with WTGs, transmission lines, vehicles, equipment, or infrastructure; and sensory disturbance.

Residual effects related to habitat loss during construction are predicted to be long-term, minor to moderate in magnitude, with this being a conservative estimate, assuming all habitat in the LAA is suitable and occupied. The extent of the effect will be local and will occur once during periods of low to moderate sensitivity (i.e., clearing will not occur within the general nesting period for migratory birds) and reversible.

Residual effects related to direct mortality and injury during the operation and maintenance phases are expected to be minor in magnitude, immediate (i.e., restricted to the PDA), occurring during times of moderate to high sensitivity, long-term, intermittent, and reversible.

Through careful detailed design of the PDA to avoid high quality habitat, and the implementation of post-construction monitoring and adaptive management planning, potential significant effects can be mitigated and are therefore not expected.

12.4 Monitoring

Onsite monitoring for all wildlife species will be conducted during site preparation and construction activities, including birds.

As outlined in Section 12.3.1.2, a post-construction mortality monitoring program will be developed in consultation with ECCC-CWS and NSDNR and implemented for two years. Carcass searches will be conducted to target periods of increased activity (e.g. migration and breeding) and periods following unfavourable weather conditions (e.g., rain and head winds). The radius searched around each WTG will be determined based on the height of the WTG (as this affects fall distance of fatalities) and field conditions. Surveys will be designed to account for searcher efficiency and scavenger rates. These results will be used to measure mortality rates for the Project.

The results of the post-construction mortality monitoring program will be submitted to the appropriate regulatory agencies as required. Additional surveys or mitigations may be identified in consultation with regulators following review of the results. An Adaptive Management Plan will be prepared in consultation with NSDNR and ECCC-CWS.

13 Socio-Economic Environment

13.1 Overview

Factors including population, economy, patterns of land and resource use, access to utilities and transportation, recreation, and health make up the socio-economic environment that could be influenced by the Project. The Project is expected to generate revenue for the Municipality of Pictou County, create regional employment, and help lower provincial carbon emissions. However, it may also impact other aspects of the socio-economic environment, such as recreational activities and land use. Additionally, effects on other VEC, such as air and water quality, could have implications for population or human health.

The Project will affect the socio-economic environment during its construction, operation, maintenance, and decommissioning. Existing roads will be used, when possible, but construction may temporarily disrupt recreational trails and traffic. WTGs will change the visual landscape in some areas during operation and maintenance. Stakeholder consultations have aimed to prevent impacts on communication and radar systems.

This chapter evaluates how the Project will affect the socio-economic environment, including possible impacts, ways to reduce them, and any remaining effects. Plans to limit negative impacts, such as a Project-specific Environmental Protection Plan and contingency plans like a Traffic Management Plan, will be created before construction begins. The Project is also expected to have positive economic benefits, such as creating jobs, providing training, investing in communities, supporting local businesses, and generating tax revenue.

The Project will provide economic, and social benefits to the Municipality of Pictou County, surrounding municipalities, and the Province of Nova Scotia. Locally, it will generate sustained revenue through municipal taxes, landowner royalties, and Benefits Agreements to various groups that will support community infrastructure, recreation, environmental initiatives, and social programs.

Additional benefits include educational bursaries, training and employment opportunities for local workers, Benefits Agreements with two Mi'kmaq communities, and benefits to underrepresented groups in the province. At the provincial level, the Project will support renewable-energy expansion, contribute to greenhouse gas reduction goals, attract private investment, and strengthen Nova Scotia's clean-energy workforce.

13.1.1 Regulatory Context

Assessment of the socio-economic environment considers the legislation, regulations, and guidelines or policies that are relevant to Project activities:

- *Crown Lands Act*
- *Electricity Act*
- *Environment Act*
- *Environmental Goals and Climate Change Reduction Act*
- *Forestry Act*
- *Mineral Resources Act*
- *Motor Vehicle Act*
- *Off-highway Vehicles Act*
- *Public Utilities Act*
- *Special Places Protection Act*
- *Trails Act*
- *Wilderness Areas Protection Act*
- *Wind Turbine Facilities Municipal Taxation Act*
- Canadian Aviation Regulations
- Municipality of the County of Antigonish Land Use By-law – Wind Turbine Development
- ECCC Guidelines for Wind Turbine and Weather Radar Siting
- A Proponent's Guide to Environmental Assessment (NSECC, 2025)
- Nova Scotia Class I Environmental Assessment Checklist (NSECC, 2025)
- Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025)
- Guidelines for Environmental Noise Measurement and Assessment (NSECC, 2023)

13.1.2 Boundaries

- **Human Health:** The LAA is defined as 2 km from the PDA to include the LAA for Air Quality (500 m as determined in Chapter 5 (Atmospheric Environment)), Groundwater (1 km as outlined in Chapter 6: Geophysical Environment), and 2 km for sensory disturbance.
- **Land Use and Value, Visual Landscape, and Recreation and Tourism:** The LAA is defined as 2 km from the PDA, where construction, operation and maintenance, and decommissioning may be visible and audible. An RAA of 5 km for these effects in consideration of other ongoing or planned activities.
- **Population and Economy, Electricity and Other Utilities, Communication and Radar Systems, and Transportation:** The LAA is defined as Pictou County and the RAA extends through the North Shore Region of Nova Scotia.

13.1.3 Assessment Methodology

The description of the existing environment is based primarily on publicly available online data sources such as the following:

- Statistics Canada (StatCan)
- Health Canada
- Non-government organizations, such as the Community Foundation of Nova Scotia (CFNS), the ATV Association of Nova Scotia (ATVANS), and the Snowmobilers Association of Nova Scotia (SANS)
- The Municipality of Pictou County
- Public and stakeholder engagement
- Aerial and topographic imagery
- Other federal and provincial government websites and publications
- The Nova Scotia Mineral Rights Online Registry System
- The Nova Scotia Civic Address File (NSCAF)
- Nova Scotia Geographic Data Directory

Input from public, Indigenous, community, and non-government organizations, collected as described in Chapter 3 (Consultation and Engagement), was also considered.

The following technical studies were also undertaken to support the effects assessment relevant to the socio-economic VECs:

- Visual Impact Assessment (Nortek 2026a; Appendix J)
- Shadow Flicker Analysis (Nortek, 2026b; Appendix K)
- Noise Assessment (Nortek, 2026c; Appendix D)

13.1.3.1 Visual Impact Assessment

The visual impact assessment provides graphics that illustrate how the public viewscape is expected to appear following construction of the Project. The visual simulations, completed by Nortek Resource Solutions Inc. (Nortek, 2026a, Appendix J), included Project WTGs and are presented as panoramic photocompositions (Nortek, 2026a, Appendix J). Viewpoints were partly selected due to public interest at certain locations. At each viewpoint, a zone of visual influence was calculated from existing LiDAR data to determine positions from which the Project may be visible. Professional grade cameras and lenses were used to obtain imagery at those pre-designated sites. Resulting images were produced using georeferenced images with camera/lens specific parameters to determine the orientation of each image. Model WTGs were then added to the image to depict the same scene after construction of the proposed Project WTGs (Nortek, 2026a, Appendix J).

13.1.3.2 Shadow Flicker Analysis

Shadow flicker is the alternation of shadow and light that occurs when a WTG is between the sun and a receptor. The sun shining through the spinning WTG blades causes this effect (NSECC, 2021). Nortek Resource Solutions Inc. (Nortek) (2026b) completed a shadow flicker assessment (Appendix K) using the method in the Environmental Assessment

Supplemental Checklist: Wind Energy Projects (NSECC, n.d.) A total of 22 receptors within 2 km of the PDA were identified and used in the analysis.

The shadow flicker analysis used the WindPro software package and included locations of the WTGs and nearby permanent and seasonal receptors. Shadow flicker assessments will include receptors within 2 km of the WTGs, as beyond this distance, the intensity of the shadow cast diminishes.

The analysis evaluated two conservative modelling scenarios: the theoretical worst-case scenario and the realistic scenario. The theoretical worst-case scenario makes the following key assumptions: the sun shines 100% of the time when it is above the horizon, the WTG rotor is always perpendicular to the sun, shadow flicker starts as the sun moves above three degrees from the horizon, shadows dissipate at a maximum distance from the blade as a result of atmospheric conditions and light diffusion, and that WTG rotor blades are constantly spinning. In contrast, the realistic case scenario incorporates site-specific wind conditions and monthly sunshine probabilities. In both cases, the conservative assumption that receptors are sensitive to shadow flicker in every direction (i.e., each receptor was assumed to have windows facing in all directions) was made.

13.1.3.3 Noise Assessment

The acoustic assessment for the Project evaluated potential sound effects on receptors in the vicinity of the Project using WTG-specific sound power data and spatial analysis. Modelling of operational sound levels was completed using the current version of WindPRO software. The noise assessment considered only one of the WTG options, the Nordex 163, as this WTG option has the highest maximum sound pressure level out of the three options under consideration for the Project (Table 2.3, Section 2.4.1). The model included the Nordex WTG specifications, hub height, a digital elevation model, and the location of identified receptors.

Sound propagation and attenuation was calculated in accordance with International Organization for Standardization (ISO) 9613-2: Acoustics—Attenuation of sound during propagation outdoors, Part 2: General method of calculation (ISO, 1996). The computer modelling predicted noise levels from operation of the Project and of WTGs in the Weaver's Mountain wind projects that are within 3 km of the PDA. Modelling included WTG sound emissions and environmental conditions known to influence noise propagation (e.g., ground attenuation, temperature, and humidity).

As described in Chapter 5 (Atmospheric Environment), Nortek (2026c) established an assessment area for the noise assessment as a 2 km buffer from the Project WTGs, based on provincial guidance (NSECC, n.d.). The assessment used a baseline acoustic value recommended by Health Canada, 35 dBA. This is considered to be the average baseline acoustic level in quiet, rural areas during the night (Health Canada, 2017).

13.2 Existing Environment

13.2.1 Population and Economy

Much of the information about the local and regional economy, such as demographics and employment data, presented in this section was garnered from the 2016 and 2021 Census reports available online from Statistics Canada (StatCan, 2023). This was supplemented through Proponent meetings with the Municipality of Pictou County.

The proposed Project lies within Pictou County census division, which comprises three rural census subdivisions (A, B, and C), the Town of Pictou, the Town of Westville, the Town of New Glasgow, the Town of Trenton, Fisher's Grant No. 24 Reserve, and Merigomish Harbour No. 31 Reserve. Between the past two census surveys, 2016 and 2021, Pictou County experienced a decline in population of 0.2%. In contrast, the population of the province grew by 5.2%. The population density per square kilometre in Pictou County was 15.4, whereas the province's population density was 18.4 (StatCan, 2025).

Table 13.1 Local Populations

Census Area	2021	Change from 2016 (%)	2021 Population Density (per km^2)
Pictou County Division	43,657	-0.2	15.4
Subdivision A	6,153	1.3	8.0
Subdivision B	6,137	-0.6	8.0
Subdivision C	8,386	-0.7	6.7
Town of Pictou	3,107	-2.5	388.7
Town of Westville	3,540	-2.4	248.6
Town of New Glasgow	9,471	4.4	951.3
Town of Trenton	2,407	-2.7	396.7
Fisher's Grant No. 24	449	-7.4	291.4
Merigomish Harbour No. 31	0	0	0
Nova Scotia Province	969,383	+5.0	18.4

StatCan, 2023

Per the 2021 census results, the average monthly shelter costs for rented and owned properties in Pictou County was $793, and $866, respectively. Between 2016 and 2021, the average monthly shelter cost for rented properties increased by 8.0 %, while for owned properties, it increased by 3.3%. The median after-tax income in 2020 was $34,200. Of the employed population in Pictou County, 99.2% reported speaking mainly English at their place of employment. In 2021, 3.7% of the population of Pictou County identified as Indigenous (StatCan, 2025).

Pictou County is situated in the North Shore Region of Nova Scotia. The largest employment industries of the region are healthcare and social services, wholesale and retail trade, manufacturing, and construction. Full-time employment in the North Shore Region is rising by 2.2%, while part-time positions are increasing by 5.4%. Employment gains have been observed in both healthcare and wholesale and retail trade sectors; however, there has been a decline in the manufacturing and construction industries (Nova Scotia Works, 2025). In Pictou County, sales, service, and trades-related jobs were the most in-demand for 2023. This illustrates a broader trend across the province, where service industries are experiencing job growth as they continue to recover from pandemic-related restrictions (Labour Market Information (LMI), 2023).

In Pictou County, of the 19,975 individuals over the age of 15 in the labour force, the employment was 49.8% in 2016 and 46.9 % in 2021. This represents a 2.9% reduction in employment. The largest areas of employment as of 2021 were retail trade, healthcare and social assistance (StatCan, 2021). Sectors that experienced the largest changes between 2016 and 2021 in Pictou County were 'agriculture/forestry/fishing/hunting' and 'professional, scientific and technical services'. Agriculture, forestry, fishing, and hunting experienced an increase in employment, seeing a 28.5% increase. Professional, scientific, and technical services experienced a 17.5% increase. The sectors that experienced the greatest decrease in employment between 2016 and 2021 were 'management of companies and enterprises' (-54.4%) and 'arts, entertainment and recreation' (-33.9%). This could reflect the COVID-19 pandemic, as many businesses were forced to close, and there were many health-restrictions imposed on recreation and entertainment (StatCan, 2021).

13.2.2 Land Use and Value

Land in and surrounding the PDA is remote, primarily forested, and interspersed with wetlands. Most of the lands are private, and the predominant industry in the area is commercial forestry. The land on which the PDA is situated is forestry land and is cyclically harvested.

In the region, there are several aggregate quarries, including the MacLellans Mountain Quarry, 26 km to the northwest of the Project, and the James River Quarry 9 km to the northeast of the Project, Brierly Brook Quarry 13 km to the northeast of the Project, and the Loch Katrine Quarry 19 km to the southeast of the Project. Brierly Brook gypsum quarry is located 14 km to the northeast of the Project (Figure 13.1). There are several mineral exploration licences in the LAA and surrounding area. (NSDNR, 2026) (Figure 15.1, Appendix A). Additionally, there is gold exploration being conducted by Northern Shield Resources at the Shot Rock Property, approximately 13 km northeast of the PDA (Figure 13.1).

To the north of the PDA is the Barneys River Nature Reserve (approximately 4 km away), a 567 ha Protected Area that protects old growth hardwood forest in the Barneys River watershed. It is accessible from public roads and is split between three disjunct parcels of land. The largest and southernmost parcel of land in the Barneys River Nature Reserve contains various trails that facilitate recreational activities such as hiking and cross-country skiing.

There is currently no active oil and gas production taking place in the PDA.
There are no civic addresses located in the PDA recorded in the NSCAF (Service Nova Scotia, 2026). The nearest civic address to the PDA is situated approximately 8 m from the northernmost access road (see Figure 13.1). However, all civic addresses are located more than 2 km from all proposed WTGs, the closest civic address to a WTG being approximately 2.1 km. Most of the LAA is uninhabited, likely as a large amount of the area is for forestry.

In Pictou County, homeowners estimated that the average value for their dwellings to be $195,800 in 2021, whereas in 2016, estimates averaged $169,816 (StatCan 2023, StatCan 2017).

13.2.3 Visual Landscape

The visual landscape of the PDA is mostly in the Pictou Antigonish Highlands Ecodistrict, and is characterized by rolling plateaus, forests, and river valleys. In the LAA, elevations range from 183 to 271 masl. Being in mountainous, fragmented terrain, high points of the PDA are visible from lower elevations including from the Garden of Eden Lake, Eden Cemetery, Weaver's Mountain Road, and the Riverview Raceway (Nortek, 2026a, Appendix J). The visual simulations captured photos of the area as it currently exists from various viewpoints (Appendix J).

13.2.4 Utilities

13.2.4.1 Energy

Although renewable energy provides 13% of Nova Scotia's electricity, much of the province's power still comes from fossil fuels (CanREA, 2021). Local governments like the Municipality of Pictou County have spent several years looking into the benefits of renewable energy. In Pictou County, community wind farms at Auld's Mountain and Pictou Landing were started through COMFIT, which guarantees a fixed rate for power sold over a set time period. These wind farms are owned by local individual investors using Community Economic Development Investment Funds or by local governments.

The NSPI website (NSPI, 2025) lists other wind power producers currently operating nearby in Antigonish and Pictou County that are owned or partially owned by NSPI and contribute to the provincial grid:

- Maryvale, Antigonish – four WTGs, 6 MW
- Fairmont, Antigonish – two WTGs, 2 MW
- Glen Dhu, Antigonish – 27 WTGs, 62.1 MW
- Pictou Landing, Pictou – one WTG, 1.6 MW
- Auld's Landing, Pictou – four WTGs, 6.4 MW

There are other wind producers listed for Pictou and nearby Antigonish County that are part of the community feed-in tariff program used for local infrastructure such as Avondale (one WTG, 1.7 MW) and Fitzpatrick (three WTGs, 150 KW).

An existing 230 kV NSPI transmission corridor crosses the southern portion of the PDA. The Project substation is located to the immediate south of this corridor, and the Project transmission line interconnection will be installed here (Figure 13.1).

13.2.4.2 Other Utilities and Waste Management

Rural residents in the area surrounding the PDA use domestic water wells and on-site wastewater disposal systems. Residents in the towns of New Glasgow, Stellarton, and Antigonish receive water from the Town of New Glasgow, the Town of Stellarton, and the Town of Antigonish Water Utilities, respectively.

The Town of New Glasgow's water supply is the Forbes Lake watershed, protected under provincial legislation as the New Glasgow – Forbes Lake Watershed Protected Water Area, approximately 29 km from the PDA. The New Glasgow Water Utility serves the Town of Westville, select customers in the Town of Trenton, and portions of the Municipality of Pictou County. The water supply for the Town of Stellarton is the East River, and the East River headwaters are approximately 10 km from the PDA. The distribution serves both the Town of Stellarton and the Riverton Community. The water supply for the Town of Antigonish is the James River Watershed, approximately 10 km from the PDA and is protected under provincial legislation as the James River Watershed Protected Water Area. The Brierly Brook Water Treatment Plant is the drinking water treatment facility for the Town of Antigonish (Town of Antigonish, 2026).

The Municipality of Pictou County is serviced by wastewater treatment plants located in the county.

The central solid waste facility for Pictou County is the Pictou County Solid Waste Management Facility, located in Mount William. The facility accepts municipal solid waste, organic materials, source-separated recyclables, construction and demolition debris, and select household hazardous waste (Pictou County Solid Waste, 2026).

13.2.5 Communication and Radar Systems

As described in Chapter 3 (Consultation and Engagement), stakeholders and regulators were contacted with information regarding WTG technical specifications and locations to determine potential concerns due to EMI caused by Project WTGs. The area of consultation for EMI varies by signal source, referred to in the RABC Guidelines (RABC & CanWEA, 2025). Confirmation was received from DFO, RCMP, DND, ISED, NAVCAN, Transport Canada, and NCS Managed Services that they did not expect interference by Project WTGs. Eastlink Inc. and Bell Canada acknowledged receipt (Chapter 3). An EMI analysis was conducted for the Project to determine whether any WTGs are located within RABC consultation zones for radar and radiocommunication systems (Appendix L). The analysis identified one WTG within the RABC consultation zone for a licensed point-to-point connection operated by Rogers Communications. The Proponent has been consulting with Rogers Communications regarding this potential interference. SWEB has identified an alternate WTG location approximately 60 m from the proposed location should relocation be required to reduce interference. The alternate location is within the PDA and is shown on Figure 2.1 and is expected to be confirmed after consultation with Rogers Communications concludes.

13.2.6 Transportation

13.2.6.1 Road Network and Project Access

The proposed PDA will include the existing Weaver's Mountain Road, and several existing unnamed forestry roads. All roads are unpaved. Several other roads intersect with the PDA, and are either abandoned, used for recreational activities, or for forestry operations.
The primary route to access the PDA during operation will be from the south of the PDA via Greens Brook Road. Delivery of WTGs is expected to flow through the existing Weavers Mountain Wind Energy Project site onto Weavers Mountain Road and into the PDA. At present, the routing for the Project construction may involve one or both of the aforementioned routes and/or an alternative route. The exact routing for construction will be agreed to between the Proponent and construction contractor(s) prior to start of construction.

The Province of Nova Scotia regularly conducts traffic counts along its 100 Series Highways, 1 to 99 Series Trunks, and 200/300 Series Routes, and makes the dataset available online. Data from the traffic count locations for the roads in the network closest to the PDA (Figure 13.3, Appendix A) are summarised in Table 13.2. Information from the province included the location and date of the count, and the average daily traffic (ADT) and annual average daily traffic (AADT). The AADT is more reflective of long-term average daily traffic conditions, and is the metric used in this assessment.

Table 13.2 NSDPW Traffic Count Summary for Nearby Roads

Road	Date	Description	ADT	AADT
Highway 7 (EB)	08-05-2023	1 km west of West River Bridge to Highway 104 (Exit 32)	2285	2370
Highway 7 (WB)	08-05-2023	1 km west of West River Bridge to Highway 104 (Exit 32)	2260	2350
Highway 347	27-07-2022	1.5 km south of Blanchard Road (Blue Mountain) to Garden of Eden South Line	735	590
Highway 104 (EB)	04-05-2020	2.26 km west of Pictou/Antigonish County line to exit 30 (James River Intersection/C)	3801	3970
Highway 104 (WB)	05-06-2017	2.26 km west of Pictou/Antigonish County line to exit 30 (James River Intersection/C)	3942	3610

EB = Eastbound
WB = Westbound

13.2.6.2 Alternative Transportation

The Cape Breton & Central Nova Scotia Railway (CBNS) operates a track running from Truro to Point Tupper. CBNS is a freight railroad that connects eastern Nova Scotia with the CN railway in Truro, a Class 1 railroad. The rail line is not used for passenger transportation. This rail line is approximately 7 km from the PDA (CN, 2023).

Most Pictou County residents travel by car; however, the Pictou County Transit (PCT) operates two bus routes in the region, one that provides hourly service in New Glasgow and Stellarton, and the other that provides regional connections between New Glasgow, Pictou, Pictou Landing First Nation, Trenton, and Westville. The first service limited to New Glasgow and Stellarton regions operate daily, with reduced hours of operation on Sundays. The second route operates from Monday to Saturday, with no service on Sundays. There is also a Maritime Bus terminal in New Glasgow, and another in the Town of Antigonish in Antigonish County. Maritime Bus provides courier and passenger transportation services to many connections in the Maritime provinces.

13.2.6.3 Airports

The two closest airports are located on the outskirts of New Glasgow: Thornburn Airport and Trenton Airport. The Thornburn Airport (28 km from the PDA) has one runway used for private aircraft; the Trenton Airport (32 km from the PDA) is a commercial airport (airport code CYTN) with one 1,615 m long runway used for private aircraft and public transportation, and is maintained year-round (Town of Trenton, 2025).

13.2.7 Recreation and Tourism

The private and Crown properties that constitute the LAA are used year-round for off-roading activities, particularly by ATVs and snowmobiles.

As described in Chapter 3 (Consultation & Engagement), the Proponent has engaged with various special interest groups pertaining to recreation in the area. These groups included the Pictou County ATV Club, the Positive Action for Keppoch Society, and the St. Mary's River Association.

The closest Provincial Park to the PDA is the Beaver Mountain Provincial Park, located roughly 4.6 km north of the PDA. This Provincial Park is managed for outdoor recreation and is 136 ha in size. There are roughly 6 km of managed paved and unpaved trails through the park, facilitating hiking, walking, picnicking, snowshoeing, and cross-country skiing. While the provincial park is split between Pictou and Antigonish counties, it is managed under agreement with the Municipality of the County of Antigonish (Province of Nova Scotia, 2013; Nova Scotia Parks, n.d.).

Keppoch Mountain, is another popular recreational area, located 7 km northeast of the PDA. The area is a former ski-hill converted to a recreational area with 40 km of non-motorized, multi-use wilderness trails. It is managed by a non-profit organization, the Positive Action for Keppoch society. The area has a clubhouse, bike repair and wash station, and hosts many events through the year, including runs, races, and hiking events.

There are several unmaintained wilderness hiking trails that intersect the LAA, including the Black Brook Falls trail, accessible from Black Brook Road. Additionally, there is a network of ATV and snowmobile trails that intersect with the LAA, and a warming shelter on the northeast shore of Indian Lake. Bear, deer, and other mammalian hunting or trapping may occur in the LAA. Fishing may also occur, as Indian Lake, located in the LAA, is listed under the province's recreational fishing inventory.

The LAA is a rural area; the nearest towns are Antigonish (20 km away, home to St. Francis Xavier University), Stellarton (32 km away), and New Glasgow (32 km away), all with numerous restaurants and businesses. Closer to the PDA on Route 7 to the east and Route 347 to the south, there are several painting, excavation, construction, and other local small businesses.

13.2.8 Human Health

This section describes the existing human health conditions in the LAA and provides context for assessing how the Project may affect public health, including social and environmental determinants.

Social and economic conditions that are contributing determinants of human health in a community, such as community demographics, landscape characteristics, and infrastructure, are described in the previous sections in this chapter. Human health also relies at least partially on several environmental factors. Ambient light and acoustic environments are described in Sections 5.2.3 and 5.2.4, respectively.

Both air and drinking water quality, previously discussed in this document (Chapter 5: Atmospheric Environment and Chapter 6: Geophysical Environment), can affect human health, with potential for adverse effects if unacceptable exposure to elevated chemical concentrations occurs. The potential for accidents and malfunctions, such as ice throw, and mitigation for such are discussed in Chapter 17 (Accidents and Malfunctions).

13.2.8.1 Air and Water Quality

As discussed in Chapter 5, Nova Scotia evaluates air quality against the CAAQS which were developed by the CCME to protect the health of all Canadians. Based on the 2022 air quality monitoring data, the most current available during the EA preparation, the CAAQS have been met in the northern air zone where the Project is located (NSECC, 2024).

The Nova Scotia Groundwater Atlas (NSECC, 2023b) has a limited amount of information available for registered wells, particularly for results of laboratory analysis. No registered wells that have undergone laboratory analysis were located in the PDA, nor in the LAA. Three of the registered wells closest to the PDA that have undergone laboratory analysis were reviewed; one approximately 5 km northeast (ID: NSDM119), the second approximately 6.5 km northeast (ID: NSDM890), and the third 8 km northeast (ID: REG2554). These wells are underlain by the same types of bedrock that influence groundwater quality in the PDA (Chapter 6: Geophysical Environment; Figure 6.2, Appendix A).

Health Canada lists maximum acceptable concentrations (MACs) for contaminants associated with risks to human health (Health Canada, 2025). Only one of the three wells reviewed included arsenic analytic results, and it did not have a concentration of arsenic that exceeds the MAC value for that parameter (Table 13.3). All three wells had analytical results for iron, and one of these exceeded the aesthetic objective for this parameter (REG2554). The exceedance of the aesthetic objective value is not a health concern but affects the palatability of the water; iron can also stain laundry and plumbing fixtures. Only one of the wells included analytical results for manganese, and it was below the MAC value for this parameter (Table 13.3).

Table 13.3 Well Water Quality

Parameter	MAC (mg/L)	REG2554	NSDM119	NSDM890
Arsenic	0.010	0.001	NA	NA
Iron	0.3*	0.48	0.13	0.02
Manganese	0.12	0.016	NA	NA

*Indicates an aesthetic objective
NA – Indicates parameter not sampled

Radon readily vaporizes from water and is therefore more of a health concern for release and concentration in indoor air than a concern for drinking water. Health Canada, therefore, does not list a MAC value for radon (Health Canada, 2025).

Effects and mitigation for changes specific to air quality and groundwater are presented in Chapter 5 (Atmospheric Environment) and Chapter 6 (Geophysical Environment) and are not further assessed here.

13.2.8.2 Healthcare and Emergency Response Services

The region lies within the Nova Scotia Health Authority's Northern management zone. The majority facility that services the Pictou area is the Aberdeen Hospital, located in New Glasgow. It is approximately 32 km from the PDA. There is also the St. Martha's Regional Hospital in Antigonish, approximately 21 km from the PDA (Figure 13.1). The nearest RCMP detachment offices are located in Stellarton (32 km from the PDA), and in Antigonish (19 km from the PDA) (Figure 13.1).

The Emergency Management Office is responsible for emergency planning and response in the province, including storm preparation and support, and administers the 911 phone system to dispatch paramedics and RCMP first responders. The closest three fire stations in the vicinity of the PDA are the Barney's River Fire Hall (10 km to the PDA), the Blue Mountain Fire Hall (14 to the PDA), and the East River Fire Hall (27 to the PDA).

13.3 Effects Assessment

13.3.1 Potential Effects and Mitigation

The results of environmental baseline studies as well as regulatory and public engagements were used to implement Project changes that minimize potential direct and indirect adverse impacts on the socio-economic environment, where reasonable. Direct and indirect effects of the Project on components of the socio-economic environment could occur through various interconnected pathways for the lifetime of the Project.

Most effects to the socio-economic environment will be positive. There will be employment opportunities and a stimulus to local businesses during all phases, and the Project will create a source of revenue to the Municipality of Pictou County during operation and maintenance. Access to natural resources and recreational activities will be affected; adversely during construction but positively overall during operation and maintenance with improved access in the LAA. Project activities can affect the socio-economic environment as indicated in Table 13.4 without implementation of mitigation measures described herein.

NSPI will own the majority of the facilities operating above 44 kV. The only equipment operating above 44 kV under the Proponent's ownership is the high voltage wind farm collection transformers (34.5/230 kV step up). The design and construction of these will be reviewed by NSPI, who will take ownership of the lines and the associated interconnection switching stations following construction.

Table 13.4 Potential Environmental Effects of the Project on the Socio-Economic Environment

Project Activity	Potential Interactions						
	Change in Population and Economy	Change in Land Use and Value	Change in Visual Landscape	Change in Utilities	Change in Transportation	Change in Recreation and Tourism	Change in Human Health
Construction							
Site Preparation	X	X	-	-	X	X	X
Access Roads Construction and Modifications	X	X	-	-	X	X	X
Material and Equipment Delivery and Storage	X	-	-	-	X	X	X
Infrastructure Installation	X	-	X	-	-	X	-
Restoration of Temporary Areas	X	-	-	-	-	X	X
Testing and Commissioning	X	-	-	-	-	-	-
Operation and Maintenance							
WTG Operation and Maintenance	X	X	X	X	-	X	X
Road Maintenance	X	X	-	-	X	X	X
Power Line and Substation Maintenance	X	-	-	-	-	-	-
Vegetation Management	X	-	-	-	-	-	X
Safety and Security	-	-	-	-	-	-	-
Decommissioning							
Removal of Infrastructure and Site Restoration	X	-	-	-	X	X	X

X = Potential Interaction

- = No Interaction

13.3.1.1 Population and Economy

During the planning and construction phases of the Project, the Proponent intends to engage local labour and skillsets. Local expertise in fields such as environmental science, engineering, archaeology, public relations, and land surveying has been and will continue to be leveraged during Project planning. Construction activities will also depend on local and regional labourers, equipment, and materials.

Staffing will be needed for the lifetime of the Project. An expected seven full-time equivalent positions for Nova Scotians will be created for the Agreement Term, which would include site maintenance, security, and WTG service technicians. During the construction phase, a staff of approximately 150 full-time equivalent positions for Nova Scotians will be needed. The influx of workers to the region will also contribute wealth back into the local economy through spending on goods and services such as restaurants, stores, and accommodations, during all Project phases. Given the number of wind projects already in operation in the province, it is expected that WTG specialists (such as those in WTG commissioning, crane operators, and/or specialized transport vehicle drivers) can be sourced regionally.

Local businesses will have the opportunity to provide construction materials, such as concrete, rebar, gravel, and construction equipment. The Proponent is working with the Pictou County Partnership (PCP), which initiates, leads and contributes to sustainable economic growth in the Pictou area, to connect with the local Nova Scotia Supply Community. The Proponent will continue to engage and collaborate with regional enterprise networks.

The Proponent has also committed to several direct benefits to members of the community.

- The Proponent will pay tax revenue of approximately $30 million throughout the Project's lifespan to the Municipality of Pictou County as per the provincial *Wind Turbine Facilities Municipal Taxation Act*. This is equal to an estimated $1.2 million in annual municipal taxes.
- Participating landowners will receive an annual lease payment throughout Project operation.
- The Proponent has signed a Benefits Agreement with Women in Renewable Energy (WiRE) and will support WiRE (and two other groups described below) with a community fund that will serve to fund bursaries for women in renewables.
- The Proponent has signed a Benefits Agreement with Scotia Winds of Change Foundation (WoC), a Not-for-profit Corporation that assists People of African Ancestry in Nova Scotia and helps to dismantle systemic racism. The Benefits Agreement will provide bursaries, peer-to-peer networking programs, mentoring, and apprenticeships to people of African ancestry living in NS in renewable energy, or a related field.
- The Proponent will continue to work with PAK to determine how best to support the organization in respect of the Project.

- The Proponent has signed Benefits Agreements with two First Nation communities in the province of Nova Scotia.

Overall, the economy of the Municipality of Pictou County will benefit from Project implementation.

13.3.1.2 Land Use and Value

Developing a wind facility will limit some land uses in the PDA, but new and upgraded roads may improve access across the LAA. Construction could temporarily disrupt forestry due to intermittent road closures, though alternative routes will remain available. While project-related clearing may reduce forested land during operation, this is expected to be balanced by increased lease revenue for private landowners. All the land leased for this Project is privately owned. Additionally, those using the area for harvesting natural resources may benefit from the road upgrades that will provide improved access and road conditions that will reduce wear on equipment. Approximately 17.1 km of existing roads will be included in the PDA and another 11.4 km will be constructed. There will be a low land use density of one WTG per 13.7 ha (i.e., one WTG per 541 acres) on average.

Research on wind projects and property values shows mixed results, often influenced by local demographics and perceptions of visual impact. Most studies found no major effect from large wind farms, though proximity to WTGs can lower individual property values, especially if community support is lacking (Vyn, 2015). One US study noted property values may drop during construction but rebound after operations start (Brunner and Schwegman, 2022).

A 2024 study (Brunner et al.) analyzed US WTG proximity and property values from 2005–2020. It found no change in urban home values beyond 2.4 km of WTGs. Homes within 2.4 km saw an 11% decrease in value, mainly in cities over 250,000 people. Rural areas with WTGs showed no effect on nearby property values. Given that the Pictou Subdivision C, the census subdivision in which the Project is located, had a population of 8,386 in 2021, and Pictou County, the census division, had a population of 43,657 in 2021, and that Project WTGs are located at least 1 km from each receptor, adverse impacts on property values as a result of the Project are unlikely.

Early consultation with the Municipality of Pictou County, as well as information gained through the EA process and public engagements resulted in commitments to promote positive effects to land use and value.

Potential Project effects related to land use and value can be effectively mitigated through planning and management of construction and operation activities. The following key measures to mitigate the potential effects of the Project land use and value will be further detailed in a Project-specific EPP.

- Access to the PDA uses mainly existing roads and the PDA has maximized use of existing gravel roads.

- The local public will be notified prior to construction.
- The Proponent will communicate Project activities and timing to local resource users and the public for the lifetime of the Project.
- The Proponent will continue to engage with local resource stakeholders about effects to resource use and the planned mitigation measures.
- Clearing will be minimized to the extent possible.
- An EPP will be implemented that includes procedures for waste removal.
- A Complaint Resolution Plan will be developed and implemented by the Proponent.
- Construction-related plowing will be limited to the extent possible, and when necessary, this work will be communicated to recreational users in advance.

13.3.1.3 Visual Landscape

People's impressions of WTGs are shaped by how they look, including aspects such as lighting, paint colour, and their visual contrast with the surrounding area (Sullivan et al., 2012). The way WTGs appear also depends on whether they are running. Research shows that moving WTGs usually cause less visual disturbance than those that remain still (Saidur et al., 2011). When the blades are spinning, they tend to blend into the scenery and become more difficult to notice from afar.

Hamza et al. (2022) found that public perception of WTGs has evolved over the past thirty years, with positive views toward WTGs in natural and seascape settings, but negative reactions when added to urban buildings. Age influenced perception, as younger people responded more favorably. This suggests that early exposure boosts acceptance.

Visual simulations of proposed WTG locations, conducted by Nortek (2026), show the number of WTGs visible from various points surrounding the Project. WTGs will be visible from four of the seven viewpoints included in the visual simulations: Garden of Eden Lake, Eden Cemetery, Weavers Mountain Road, and Riverview Raceway. WTGs will not be visible at the three other viewpoints included in the simulations: Laggan Cemetery, Keppoch, and Gunns Lake. Although WTGs will be visible from these viewpoints; landscape, topography, and tree cover will reduce the visibility of the WTGs from inhabited areas. Furthermore, as per the visual simulations, only a few WTGs will be seen at a time Nortek, 2026a, Appendix J).

13.3.1.4 Utilities

Utilities, such as local power lines, may be temporarily affected by construction of the Project. Construction of new roads and upgrades of existing roads leading to temporary disruptions will be mitigated by careful construction planning, notifications to local utility providers, and obtaining necessary permits and crossing agreements.

13.3.1.5 Communication and Radar Systems

An EMI analysis for the Project determined that one WTG falls within the RABC & CanWEA (2025) communication zone for a point-to-point connection (Appendix L). The point-to-point connection is licensed by Rogers Communications. Subsequently, the Proponent contacted Rogers to request assessment regarding potential interference from the WTG. The Proponent is still in discussions with Rogers Communications regarding this issue, and the WTG location will be adjusted slightly, should it be required to avoid interference with the point-to-point connection (see Figure 2.1).

13.3.1.6 Transportation

During construction, there will be an increase in traffic from crew commuters; trucks to transport soil, rock, and waste; and flatbed trailer trucks transporting construction equipment approaching from both the east and west. There may be traffic interruptions because of increased road users and slower moving vehicles.

Construction traffic will be distributed across the access points and not concentrated through just one route. The increase in traffic will be temporary, with the increased traffic conditions confined to peak construction periods over the approximate two-year construction phase (approximately 5% of the Project lifetime) and not permanent changes.

WTG components will be transported to the province via both transport and ships from the respective manufacturing locations. WTG components are expected to arrive at Sheet Harbour and/or the Port of Mulgrave and to be transported to site via Highway 104. From Highway 104, the site will be accessed via Beaver Mountain Road to Bouchard Road and onto the Weavers Mountain Wind Energy Project site where WTG components will be carried onto Weavers Mountain Road and south into the PDA.

A Traffic Management Plan will be developed to prepare for the delivery of WTG components. The Proponent is evaluating multiple entrances to determine which would have the least impact and spread out the Project vehicle traffic in the LAA to reduce traffic impacts at individual entrances to the PDA.

The following key measures to mitigate the potential effects of the Project on transportation resources will be further detailed in a Traffic Management Plan and will be implemented prior to and during construction:

- Permits for work in public roads and crossing agreements will be obtained with the Department of Public Works.
- A Special Move Permit will be procured for vehicles with weights or dimensions greater than those listed in the Weights and Dimensions of Vehicles Regulations under the Nova Scotia *Motor Vehicle Act*.
- The regional RCMP will be notified of equipment deliveries that require Special Move Permits expected to affect traffic.
- The local public will be notified of the expected equipment delivery schedule.
- Access to and from the Project should follow predefined travel routes. Multiple entrances are being evaluated to minimize effects.
- The routing of Project traffic through residential areas will be avoided during the peak traffic periods.

- Adequate safety signage, fencing, guardrails, and/or warning tape will be installed to indicate restricted Project areas to advise members of the public.
- Safety warnings and signage will be clearly posted to advise hikers, cyclists, snowmobilers, and other resource users of the Project activities.
- Onsite equipment and vehicles will operate only in the PDA.
- Project vehicles will abide by posted speed limits.
- A Complaint Resolution Plan will be developed prior to construction.

13.3.1.7 Recreation and Tourism

The effects that a wind farm may have on local recreation and tourism depend on the visibility of WTGs, the number of tourist attractions and tourists that frequent the area, and the area's degree of existing disturbance (Sæþórsdóttir et al., 2021), as well as perception of wind energy (Frantal and Kunc, 2011).

Some of the trails that cross the PDA (Figure 13.3) may need to be temporarily re-routed to avoid heavy equipment during all phases of the Project. Several designated off-highway vehicle routes managed by SANS and ATVANS travel though the lands in and adjacent to the Project. A detailed Traffic Management Plan will be developed to mitigate the potential for incidents, which is discussed further in Chapter 18 (Accidents and Malfunctions).

During construction, snowmobile and ATV users may temporarily lose access to sections of trail and need to adapt to detours during road upgrades and clearing. Such effects may occur during operation and maintenance as well, though to a lesser extent. As detailed in Chapter 3 (Consultation and Engagement), the Proponent has collaborated with local clubs to maintain trail access in the PDA for snowmobile and ATV users during Project operation by integrating considerations into layout design, construction methods, and operational strategies. For instance, winter operations may employ tracked vehicles to negate the necessity for plowing, unless there is a major mechanical failure on site or an emergency. Construction-related plowing will be limited to the extent possible, and when necessary, this work will be communicated to recreational users in advance. During the operation and maintenance phases, regular communication with snowmobile and ATV groups will remain a key priority to support ongoing shared access to the PDA.

As the PDA and surrounding area is remote, it is expected that the Project will have minimal impacts on other recreational activities, such as hunting, fishing, and/or hiking. New or improved access may be created with the construction of new roads and widening of existing roads.

Increased traffic on access roads may lead to temporary interruptions or detours to hikers due to re-routing to avoid areas of construction in the PDA, and to decrease the probability of traffic incidences (discussed further in Chapter 18: Accidents and Malfunctions).

The Proponent commits to keeping recreation spaces open to local users and working proactively with clubs to engage and communicate with the members. Changes to Project design in response to public engagement have occurred since the Project's inception, and the following key measures to mitigate the potential effects of the Project on recreation and tourism will be further detailed in a Project-specific EPP as well as a Traffic Management Plan and will be implemented prior to and during construction:

- Open engagement will be continued with the Project's CLC, the Pictou County ATV Club, the Positive Action for Keppoch Society, the St. Mary's River Association, the Pictou County Snow Riders, as well as the Antigonish Sno-Dogs These organizations will be notified regularly on Project activities that may affect trail use to minimize disturbance.
- Public notifications of construction and traffic disruption will be issued.
- Temporary detour and traffic control signage will be erected when and where necessary.
- The Traffic Management Plan will include community education and notification, as well as provision of escort vehicles for wide loads or vehicles that require increased turning radius to avoid disruption to tourism.

13.3.1.8 Human Health

Concerns about wind farms include sensitivities to nighttime lighting, noise, shadow flicker, EMF, vibrations, and visual impacts such as obstructed views and aesthetics (Health Canada, 2023; Health Canada, 2019; Health Canada, 2012). Some Nova Scotians report annoyance from WTGs, which is influenced by personal attitudes (Union of Nova Scotia Municipalities, 2015; Ellenbogen et al., 2012). Both Health Canada and the WHO recognize annoyance as an indicator of health effects that can impact quality of life. Risks from accidents or malfunctions, such as ice throw, structural damage, and fires, are covered in Chapter 17.

This Project was designed so that the nearest permanent dwellings are greater than 2 km from the proposed WTG locations, which exceeds the municipal and provincial requirements. Legislated requirements and best practices associated with shadow flicker and noise exposure are also met and WTG placements have been strategically located to minimize annoyance caused by visual aesthetics to the extent practical.

Despite the potential adverse effects of wind energy projects on human health, wind energy projects can ultimately promote positive effects to human health by displacing emissions from other higher impact energy sources.

Ambient Light

Except in National Parks and Dark Sky Preserves, there are currently no established guidelines in Nova Scotia or across Canada addressing outdoor light levels or their potential effects on human health. The Project's potential impacts on ambient light are evaluated in Chapter 5 (Atmospheric Environment). Key mitigation measures for managing potential human health effects related to changes in ambient light are outlined in Section 5.3.1.2, with additional details to be provided in the Project-specific Environmental Protection Plan (EPP), which will be implemented throughout all phases of the Project.

Acoustic Environment

The 2014 Health Canada study on the impacts of WTGs on community health and wellbeing found that self-reported instances of sleep disturbance, illnesses, chronic diseases, and stress were not affiliated with WTG noise exposure. Nonetheless, increasing WTG noise levels statistically correlated with increasing annoyance levels (Health Canada, 2025).

Health Canada (2023) and the Union of Nova Scotia Municipalities support WHO's recommendation for a nighttime noise limit of 40 dBA at the exterior of homes as being protective of sleep, general health, and does not exacerbate pre-existing medical conditions (Union of Nova Scotia Municipalities, 2015). The Project's noise assessment has adopted this value (Nortek, 2026c).

WTGs produce noise from two main sources, the motor and the wind passing over the blades. Low frequency noise is not usually heard by humans, but there is potential that it could make small vibrations more noticeable (Canadian Centre for Occupational Health and Safety, 2023). Low frequency noise has been used to describe frequencies less than approximately 30 hertz (Hz), the perception of which is often described as a feeling or pressure rather than something that is heard (Health Canada, 2021). Health Canada reports that scientific evidence on WTG noise and its health effects is limited and uncertain (Health Canada, 2019).

Changes to noise levels from baseline during all phases of the Project were assessed in the context of human health in Chapter 5 (Atmospheric Environment). In combination with natural and non-industrial anthropogenic sources, Nortek (2026c) determined that Project operation will comply with the permissible sound levels outlined in the provincial noise guidelines in both the LAA and the RAA (Appendix D). No tonal components were identified with WTG operation; therefore, the Project will not cause low frequency noise issues.

Potential noise effects during Project construction are short-term (expected to take less than two years) will vary based on the type of construction activities and the shifting proximity to receptors during this phase (Nortek, 2026c). The primary noise sources associated with construction will include blasting, trucks and other vehicles, backhoes and graders, cranes, and smaller equipment such as welding units as well as back-up alarms on mobile equipment. Noise levels at receptors during construction activities will depend primarily on the number, type, and proximity of noise sources. Construction noise levels will decrease as the distance between the receptors and construction activities increases and nighttime construction activities will be avoided as much as possible.

The key measures to mitigate the potential effects of the Project on human health as a result of changes to the acoustic environment are itemized in Section 5.3.1.3 and will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

Shadow Flicker

Shadow flicker occurs when sunlight passes through the blades of an actively rotating WTG and reaches an observer on the ground, resulting in flickering light. The distance of the shadow flicker depends on several factors, such as the time of day and season, as well as the location of the observer relative to the WTG (Ellenbogen et al., 2012). WTGs have also been known to produce glint (i.e., flashes of reflected light) when the WTG blades are reflective. However, modern WTG blades, including those proposed for the Project, are treated with a non-reflective coating to minimize glint.

Research indicates that shadow flicker from large WTGs generally does not occur beyond 1.4 km from the WTG (Ellenbogen et al., 2012). Additional findings show that shadow flicker becomes unnoticeable at distances greater than 15 rotor diameters from a WTG (Haac et al., 2022). A comprehensive review on WTGs and human health reported that by 2014, 60 peer-reviewed studies had examined their impact, with evidence suggesting that shadow flicker is unlikely to pose a health risk (Knopper et al., 2014).

NSECC standards stipulate a maximum of 30 hours of flicker over the course of a year or no more than 30 minutes per day, which coincides with the worst-case guidelines typically applied in other international jurisdictions (Koppen et al., 2017). The shadow flicker assessment (both worst-case and expected case) concluded the Project will comply with both the 30 hours per year limit and the 30 minutes per day limit at all 22receptors in the LAA (Nortek, 2026b Appendix K). Therefore, the Project is not expected to result in unacceptable shadow flicker effects.

A Complaint Resolution Plan will be developed and implemented by the Proponent (including an investigation process to confirm reported exceedances).

Electromagnetic Field Exposure

EMF is composed of invisible waves that travel through space and exert force on charged particles in the frequency range of 1 Hz to 3 kilohertz, which is outside the visible range of the electromagnetic spectrum. In Canada, electrical distribution has a frequency of 60 Hz (Health Canada, 2022), which is considered extremely low frequency EMF. Common sources of extremely low frequency EMF include household wiring, electrical appliances and household electrical products, power lines, transformer boxes, and electrical substations. The technical specifications for the WTGs selected for this Project list a frequency of 50 and 60 Hz for the electrical system and transformer.

There has been public perception that EMF exposure from WTGs can lead to adverse health effects (McCallum et al., 2014). Available scientific evidence suggests that EMF associated with the operation of WTGs is not likely to adversely impact human health (Knopper et al., 2014) and that EMF levels in the vicinity of WTGs are less than those produced by common household electrical devices (McCallum et al., 2014).

Health Canada, along with WHO, monitors scientific research on EMF and human health as part of its mission to help Canadians maintain and improve their health (Health Canada, 2012). International exposure guidelines for exposure to EMF have been established by the International Commission on Non-Ionizing Radiation Protection. Health Canada does not consider that any precautionary measures are needed regarding daily exposures to EMF. There is no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those just outside the boundaries of power lines (Health Canada, 2022). EMF exposures in Canadian homes, schools, and offices are far below these guidelines. Therefore, there is no indication that EMF levels from the Project WTGs, collector lines, or the associated transmission line will affect public health in the LAA.

The key measures to mitigate the potential effects of the Project on human health as a result of changes to the acoustic environment are itemized in Section 5.3.2 and will be further detailed in a Project-specific EPP to be implemented prior to and during construction.

The Proponent is committed to operating the Project in compliance with regulators. Key measures to mitigate the potential effects of the Project on human health as a result of changes to the acoustic environment or changes to ambient light levels are itemized in Section 5.3.1.3 and Section 5.3.1.2, respectively. The following additional measures to mitigate the potential effects of the Project on the human health, will be further detailed in a Project-specific EPP and will be implemented prior to construction:

- WTG blades will have a non-reflective coating to minimize blade glint.
- To minimize light diffusion, only the minimum amount of obstruction avoidance lighting will be placed on the WTGs as required by Transport Canada; this lighting system will operate in a synchronous manner
- Ground lighting, such as construction and security lighting, will be focused toward the ground to minimize visibility at a distance.
- A Complaint Resolution Plan will be submitted to NSECC. The plan will include an investigation process to confirm reported exceedances of noise and shadow flicker.

13.3.2 Residual Effects

13.3.2.1 Changes in Economy

Construction and decommissioning of the Project will provide medium-term employment opportunities for residents in the RAA and across Nova Scotia, where additional goods and services will be needed. During operation and maintenance, the Project will create long-term employment and training opportunities for Indigenous peoples and community members that may be employed by Project contractors. The Proponent will further support the local economy through long-term land lease agreements with property owners. As noted previously, the Project will also contribute benefits to underrepresented communities in Nova Scotia, an important tenant of the Green Choice Program. Annual tax payments will be made to the Municipality of Pictou County in accordance with the provincial *Wind Turbine Facilities Municipal Taxation Act*. The Project has provided support to the Positive Action for Keppoch Society and will continue to engage with the organization during the Project lifecycle. Overall, the Project is expected to provide sustained, long-term positive economic benefits to the community.

13.3.2.2 Changes in Land Use and Value

Drawing on initial stakeholder engagement and the Project's infrastructure planning, the positive impact on property values in the LAA is projected to be moderate over the duration of the Project. Long-term benefits are expected for individuals leasing their land to the Proponent (refer to PIDs in Chapter 1: Introduction), as well as for users of existing access roads supporting the natural resources industry. These changes are considered reversible following decommissioning. If landowners choose to retain constructed or upgraded access roads at decommissioning, enhanced access through the PDA will remain a permanent feature. Overall, the Project is not expected to result in significant effects on land use and property values.

13.3.2.3 Changes in Visual Landscape

Based on stakeholder engagement and changes made to the originally proposed design, the magnitude of change with respect to the visual landscape for those in the LAA is expected to be moderate in the LAA. WTGs will be visible continuing long-term through the lifetime of the Project, but this residual effect is reversible through decommissioning. The perception of WTGs is subjective among demographics, and individuals tend to be more receptive to wind farms in rural locations such as the Project area.

13.3.2.4 Changes in Transportation

There will be moderate and intermittent traffic disturbances in the LAA. Existing access roads are regularly used for slow-moving, off-road vehicles. Those roads will be upgraded to manage the turning radius needed for the expected trailer lengths, which will improve movement inside the LAA for the long-term, and those effects will be reversible.

Increased traffic in the RAA during construction and decommissioning is expected to be minor on an intermittent basis. WTG components will be transported mainly via the Trans-Canada Highway, which is already a high-traffic route capable of handling large transport vehicles. The specific route that construction vehicles will take has not yet been determined; however, it may be from the south via Greens Brook Road, or from the north via Weavers Mountain Road. The construction routing will be determined by the Project's EPC contractor prior to commencement of construction. Adverse effects during construction and decommissioning will be more apparent along these routes. Effects will be temporary during the construction phase.

The timing is considered to have a low effect on this VEC. A Traffic Management Plan will be developed prior to construction which will entail procedures to alert the public and transportation authorities and arrange escorts for wide-load vehicles during intermittent periods of infrastructural component deliveries to the PDA.

13.3.2.5 Changes in Recreation and Tourism

Recreational and tourism changes are expected to be moderate, occur over the medium-term, and mainly affect the LAA. During construction and decommissioning phases, trails may be occasionally rerouted where they coincide with the right-of-way of existing access roads or where temporary safety setbacks are needed. These impacts are considered moderate because the trails are used year-round. However, these effects are reversible. The Proponent has collaborated with several recreational organizations during the Project planning process to improve trail stability and enjoyment. This will continue this engagement to minimize disruptions. Public access to the site will remain open during operation and maintenance. Additionally, mitigation measures for noise and visual impacts will help further reduce effects on recreation and tourism.

13.3.2.6 Changes in Human Health

Changes in human health related to changes in air quality, groundwater water quality, ambient light, shadow flicker, and noise are assessed to be minor in magnitude in an LAA of up to 2 km, where there may be discernible noise, light, dust, and vehicle emissions during Project activities. These effects will be predominantly isolated to the construction and decommissioning phases, will occur intermittently, and Project-related changes in human health factors will be reversible. During the course of the Project, the Proponent will be responsive to public complaints as per a Complaint Resolution Plan to be submitted to NSECC prior to construction. Public safety in regard to accidents and malfunctions, such as ice throw, will be mitigated through remote monitoring and regular inspections by onsite staff during operation and maintenance as discussed in Chapter 17 (Accidents and Malfunctions).

13.4 Monitoring

Monitoring is not required for these VEC components, although the Proponent will be responsive to complaints.

14 Heritage and Cultural Resources

14.1 Overview

The assessment of Project effects on heritage and cultural resources considers sites of archaeological, historical, cultural, and architectural significance, as well as resources of social, cultural, or spiritual importance to Indigenous peoples.

WSP conducted an initial Archaeological Resources Impact Assessment (ARIA) for the Project in 2026. This initial assessment included a desktop review for existing and potential archaeological resources in the PDA and surrounding area, and a review of previous archaeological assessments in and adjacent to the PDA. While results from this preliminary evaluation are addressed in the following sections, a Heritage Research Permit was granted in January 2026 to conduct a field assessment for the ARIA. The ARIA field assessment will be completed upon snow melt in 2026, and results will be submitted to the Nova Scotia Department of Communities, Culture, Tourism and Heritage (NSCCTH) and the EA Branch of NSECC upon completion to meet regulatory requirements.

An MEKS was completed by Membertou Geomatics Solutions (MGS) between 2024 and 2025 to support the assessment of Indigenous cultural resources in the PDA and surrounding area. The MEKS included a desktop review, interviews with Mi'kmaw knowledge holders from surrounding Indigenous communities, and a field survey.

Ground disturbance and clearing activities during construction—including grubbing, excavation, and blasting—could damage archaeological and heritage resources and features in the PDA. During decommissioning of the Project, previously undisturbed archaeological and heritage artifacts may be moved, damaged, and/or buried deeper when infrastructure is removed and the ground graded.

Effects, mitigation measures, and residual effects on archaeological and heritage resources resulting from the Project are outlined in this chapter. Project-specific mitigation measures will be included in a Project-specific EPP and a Contingency Plan prior to construction to minimize adverse effects.

14.1.1 Regulatory Context

Assessment of heritage and cultural resources considers relevant provincial and federal legislation and guidelines:

- *Constitution Act, 1982*
- *Special Places Protection Act*
- *Heritage Property Act*
- *Cemeteries and Monuments Protection Act*
- NSCCTH (2014) Archaeological Resource Impact Assessment Guidelines
- Mi'kmaq Ecological Knowledge Study Protocol, 2nd Edition (Assembly of Nova Scotia Mi'kmaq Chiefs, n.d.)

14.1.2 Boundaries

The LAA and RAA boundaries are defined as follows for each subcomponent of the heritage and cultural resources VEC.

- **Archaeological Resources:** Effects to archaeological artifacts and features as a result of the Project will be isolated to the PDA for the lifetime of the Project.
- **Indigenous Cultural Resources:** The boundary of the LAA has been established as a 5-km radius of the PDA (MGS, 2026). The RAA is defined as the Mi'kma'ki districts Epekwitk aq Piktuk and Eskikewa'kik.

14.1.3 Assessment Methodology

14.1.3.1 Archaeological Resource Impact Assessment

Heritage and archaeological resources surrounding the PDA were initially identified by desktop review in early 2026. A complete ARIA, including a field component, will be completed upon snow melt in 2026. A Heritage Research Permit (A2026NS001) has been obtained as of January 2026 to complete this work.

The 2026 initial desktop review was based on research of the area, including environmental, archaeological, and historical context of the region, within which lies the PDA. As part of this initial review, the Maritime Archaeological Resource Inventory (MARI) was used to identify registered historic archaeological sites and precontact archaeological sites in and surrounding the PDA (WSP, 2026).

14.1.3.2 Mi'kmaq Ecological Knowledge Study

The MEKS was conducted by MGS in summer and fall of 2024, early 2025, and updated based on an updated Project layout early 2026. The interview component of the MEKS was conducted between June and December 2024, and the field site visits were conducted in October 2024. The MEKS was completed in accordance with the Mi'kmaq Ecological Knowledge Protocol, 2nd Edition. Both the field and interview components were completed in the LAA.

The MEKS approach has two primary components.

- Mi'kmaq Traditional Land and Resource Use Activities – This component considers past and present uses of the LAA using interviews with Mi'kmaq Knowledge Holders as the key source of information regarding Mi'kmaq use.
- A Mi'kmaq Significance Species Analysis – This component identifies species in the area and considers resources that are important to Mi'kmaq use (food/sustenance resources, medicinal/ceremonial plant resources, and art/tools resources). It also considers resource availability/abundance in the area and its surroundings, their use, and their importance with regards to the Mi'kmaq.

The field component of the MEKS consisted of site reconnaissance visits by MGS staff accompanied by a knowledge holder from Paq'tnkek First Nation. The reconnaissance site visits included capturing species or landmarks significant to the Mi'kmaq, and various species of interest were observed.

The interview component of the MEKS was conducted with Indigenous community members in Millbrook First Nation, Pictou Landing First Nation, and Sipekne'katik First Nation, given their proximity to the PDA. Individuals were selected for interviews based on their undertaking of traditional land use activities or based on their knowledge of the land and resources. The community members interviewed were provided with information on the Project and a map of the Project layout and LAA, and were then asked about Mi'kmaq use activities, including where the activities took place, when they took place, and how the type of resources was utilized. Other information collected during the interviews included traditional knowledge on species habitats, changes in species populations, and general information about the land related to its use. The interviews resulted in data reflecting the most recent Mi'kmaq traditional use in the area, as well as historic accounts, and will inform mitigation measures specific to Project activities in the PDA (MGS, 2026).

14.2 Existing Environment

14.2.1 Archaeological and Heritage Sites

A review of the MARI database revealed an absence of registered archaeological sites in or in proximity to the PDA. This may reflect a lack of archaeological investigation rather than an absence of archaeological sites. The review identified three precontact archaeological sites within approximately 25 km of the PDA, and 17 registered historical archaeological sites within approximately 20 km of the PDA. The precontact archaeological registered sites include lithic remains, a possible burial ground, and references to numerous unspecified earthworks, shell middens, and lithic tools and flakes. Many of these sites occur along watercourses and water features, as early peoples used these for transportation and sustenance (WSP, 2026).

Registered historical archaeological sites within approximately 20 km of the PDA mainly include the early Canadian National Railway line and railway stations. For example, two of these sites, located approximately 14 km northwest of the PDA, represent remains of historical Avondale and Barney's River train stations. These sites also include remains of an historical mill, and farm remains. Although initial research indicated no historical occupation in the Project area, the nearest habitations are approximately 2 km north of the PDA in the settlement of Marsh, and approximately 3 km northwest of the PDA in the settlement of Upper Barney's River. Additionally, an historical cemetery associated with a family homestead is located approximately 1.5 km west of the PDA, on the eastern shore of Brora Lake (WSP, 2026).

14.2.2 Indigenous Cultural Resources

The PDA is located in the Epekwitk aq Piktuk Mi'kmaq District, and touches on the Eskikewa'kik district atop the Keppoch Range drainage divide (MGS, 2026) Mi'kmaw and archaeological resources and features are mainly located in proximity to rivers and waterbodies, and present-day developments.

The MEKS highlighted the significant archaeological finds in the Merigomish Harbour, located approximately 23 km from the PDA. Merigomish Harbour represents an important area for early Mi'kmaq and remains an important area for Mi'kmaq today. Evidence of the early peoples span the length of its' mainland shores and the islands of Merigomish (MGS, 2026). Evidence from prehistoric refuse piles found along the shores of the Merigomish Harbour indicate that the early Mi'kmaq did not depend on a particular food source at the time, relying on a large variety of food sources, including fish, berries and nuts, and locally present mammals. These refuse piles also contained broken pottery, and tools of various materials and usage (MGS, 2026).

Mi'kmaq archaeological sites/finds in the LAA were mainly found near watercourses and waterbodies, and present-day development (MGS, 2026). An important travel corridor for the early Mi'kmaq was the corridor between Broadway and James River, as it linked the Merigomish Harbour and the Antigonish Harbour. The early peoples used a network of river valley travel routes that could be navigated most of the year, and by foot in the winter.

Interviews conducted with Mi'kmaq community members indicated that most species used in the Study Area are used for food/sustenance purposes (86%). The remainder of the species used in the Study Area are used for tools/art (5%), ceremonial purposes (4%), and medicinal purposes (5%) (MGS, 2024). The interviews also showed that hunting White-tailed Deer is the main activity for Mi'kmaq community members in the Study Area. Ruffed Grouse (referred to as 'Partridge' by community members), Moose, Snowshoe Rabbit, Beaver, Muskrat, and Otter have also been previously hunted by Mi'kmaq community members in the Study Area. Fish commonly caught by Mi'kmaq community members in the Study Area include Trout, Salmon, Mackerel, and Eel. Plant resources gathered by Mi'kmaq in the Study Area include Sweet Grass, Berries, Blueberries, and Black Ash (MGS, 2026).

Black Ash, an important medicinal plant and basket-making material for both early and present-day Mi'kmaq communities, was also reported to grow along the slopes of drainage cuts in the Pictou Antigonish Highlands (MGS, 2026).

14.3 Effects Assessment

14.3.1 Potential Effects and Mitigation

Changes were implemented for the Project to minimize potential direct and indirect impacts on heritage and cultural resources, where reasonable, while meeting engineering and design constraints.

Direct and indirect effects of the Project on heritage and cultural resources could occur through various interconnected pathways. During the construction phase, blasting and/or excavation will occur in some locations of the PDA, including excavation in some areas where drainage infrastructure will be installed to prevent flooding and ground subsidence. Fill will also be used in the PDA for developing access roads and WTG pads. These activities could damage artifacts unseen at the surface or underground in the PDA or could damage or obscure culturally significant Mi'kmaq resources. Restoration of the PDA during the decommissioning phase could also damage and/or move artifacts not previously disturbed. Similarly, heritage features, such as historical foundations, may be discovered in the PDA and Indigenous cultural resources could be disturbed. As indicated in Table 14.1, Project activities can affect heritage and cultural resources. These potential effects consider the detailed design of the Project, but not the mitigations outlined herein.

Table 14.1 Potential Environmental Effects of the Project on Heritage and Cultural Resources

Project Activity	Potential Environmental Effects
	Effects on Archaeological, Heritage, and Cultural Resources
Construction	
Site Preparation	X
Access Roads Construction and Modifications	X
Material and Equipment Delivery and Storage	-
Infrastructure Installation	X
Restoration of Temporary Areas	X
Testing and Commissioning	-
Operation and Maintenance	
WTG Operation and Maintenance	-
Road Maintenance	X
Power Line and Substation Maintenance	-
Vegetation Management	X

Project Activity	Potential Environmental Effects
	Effects on Archaeological, Heritage, and Cultural Resources
Safety and Security	-
Decommissioning	
Removal of Infrastructure and Site Restoration	X

X = Potential Interaction
- = No Interaction

Specific Project activities could adversely affect buried artifacts and archaeological or heritage features (including historical foundations and/or infrastructure) in the PDA.

- Site preparation involving earthworks could cause exposure of, or damage to, buried artifacts and heritage features.
- Site preparation activities, such as clearing and grubbing, can cause damage to surficial and unnoticed artifacts and features.
- Construction and upgrades of access roads will introduce new material that could further cover or compact buried artifacts and heritage features.
- Site drainage and erosion during operation and maintenance can result in exposure or damage to artifacts and features that were undisturbed during construction activities.
- Site restoration activities involving earthworks could cause exposure of, or damage to, buried artifacts and heritage features.

Specific mitigation measures will be developed based on the findings of the final ARIA, including field surveys. Mitigation measures will be included in the Project-specific EPP as well as in a Contingency Plan for response and communications should there be a suspected archaeological or heritage artifact or featured discovered during any phase of the Project life cycle.

Archaeological and heritage sites fall under the jurisdiction of the *Special Places Protection Act*, administered by NSCCTH and the Nova Scotia Museum. A Contingency Plan for discovery of artifacts and/or archaeological or heritage features will be established prior to construction activities. The plan will contain elements of the province's Generic EPP for the Construction of 100 series highways (Nova Scotia Department of Transportation and Public Works, 2007) for archaeological discovery response:

- A chain of communications will be established for reporting a discovery that includes the environmental monitor, the Proponent, the Project Archaeologist, and NSCCTH.
- Should a potential archaeological or heritage resource be encountered during construction, all work will be halted immediately at or near the location of discovery.
- Construction crews will flag off the area of concern, prevent public entry, and not attempt to move or remove any artifacts unless the integrity of those artifacts is threatened.
- The Project Archaeologist will conduct an initial investigation and, if necessary, report the findings to the relevant authorities. The Project Archaeologist will, at a minimum,

contact the Curator of Archaeology, Nova Scotia Museum, and the Coordinator of Special Places at NSCCTH.

- Work activities at that location will not recommence until approval is given by NSCCTH.
- Should human remains be encountered, work shall immediately stop, and the RCMP will be notified. If the resources are suspected to be of Mi'kmaq origin, KMK will also be contacted.

Based on the results of the MEKS, Deer and Trout harvesting are the favoured activity for the Mi'kmaq in the LAA, and the main traditional activity in the area is hunting and/or fishing for food. There were no concerns raised for any species identified in the MEKS report; however, an ongoing relationship with local Mi'kmaw communities will help to preserve traditional uses occurring in the PDA and LAA (MGS, 2026).

14.3.2 Residual Effects

14.3.2.1 Archaeological and Heritage Resources

After incorporating the results of the final ARIA and application of mitigation measures, the magnitude of effects on archaeological and heritage resources is assessed to be minor. The residual effect will be immediate and possibly irreversible. The potential for a significant effect on archaeological and heritage resources and knowledge can be mitigated through field investigations and development of a Discovery Plan for reporting revealed artifacts and features.

14.3.2.2 Indigenous Cultural Resources

Maintaining landscape integrity, restoring areas affected by erosion and sedimentation, and preserving ecological connections will minimize adverse effects on Indigenous cultural resources. Ongoing monitoring of hydrology, sediments, and species will support the early identification and management of unforeseen impacts. At the time of this assessment, KMK has not completed a review of the analysis on behalf of the Mi'kmaw of Nova Scotia. As a result, Mi'kmaw perspectives on Indigenous cultural resources may not be fully reflected. Residual effects on Indigenous cultural resources are uncertain but expected to be minor, given the results of the MEKS and the limited PDA. This uncertainty will be addressed through ongoing communication with local Mi'kmaw communities and KMK review.

14.4 Monitoring

Should high potential areas for encountering archaeological resources and/or features be identified in the PDA through the final ARIA, consultation with NSCCTH will determine if these areas warrant archaeological monitoring during construction activities. NSECC will be provided with the acceptance letter from NSCCTH prior to completion of any disturbance in newly proposed areas. Should KMK have any monitoring method recommendations, these will be implemented to ensure the ongoing ability of the Mi'kmaq to access and practice traditional activities in the LAA.

15 Consideration of Cumulative Effects

15.1 Overview

Cumulative environmental effects refer to the combined impact of multiple stressors on the environment over time. Rather than considering individual impacts in isolation, cumulative effects assessments look at the overall consequences of multiple overlapping human activities or undertakings on identified VECs.

The cumulative effects assessment identifies existing, planned, and reasonably foreseeable projects and activities for which environmental effects could overlap in time and space with those of the proposed Project. Where such overlap is recognized, the potential for cumulative effects and requirements for additional mitigation measures are discussed.

This EA's cumulative effects assessment examines how residual effects from the Project may interact with those from other activities impacting the LAA and RAA. It considers both the existing environment, already shaped by past cumulative impacts, and any additional effects resulting from this Project in combination with other ongoing or planned future projects and activities.

Other wind projects have already been constructed or are in stages of development in Pictou and adjacent Antigonish county. There are registered projects listed for EA under federal and provincial jurisdictions in the area. Residual effects of natural resource harvesting and other land use activities are evident in the RAA.

15.1.1 Regulatory Context

Assessment of the potential for cumulative environmental effects considers relevant provincial and federal legislation and guidelines:

- Nova Scotia *Environment Act*
- Nova Scotia EA Regulations
- A Proponent's Guide to Environmental Assessment (NSECC, 2025)
- Policy Framework for Assessing Cumulative Effects under the *Impact Assessment Act* (IAAC, 2023)

15.1.2 Boundaries

As outlined in Chapter 4 (Assessment Methods and Initial Screening), an RAA boundary has been established for VECs where potential effects of this Project may interact with those of other activities, resulting in cumulative effects. The boundaries of the RAAs are illustrated in Figure 15.1, Appendix A. While some residual effects have been identified, most are expected to be contained in the respective VEC's LAA and considered to be short-term with low significance. The following RAAs have been defined:

- Atmospheric Environment – 5 km from PDA
    - Air Quality - Nova Scotia's northern air zone assessed in the AQMS by ECCC
    - Ambient Light – 5 km
    - Acoustic Environment – 2 km from PDA
- Aquatic Environment – St. Mary's River and West River secondary watersheds
- Flora – Contiguous natural habitat areas
- Wetlands – 1 km surrounding PDA
- Terrestrial Wildlife – Concentration area occupied by the Pictou/Antigonish/ Guysborough Mainland Moose subgroup
- Bats – 5 km from PDA
- Birds – 5 km from PDA
- Population and Economy – North Shore Region of Nova Scotia
- Land Use and Value, Visual Landscape, and Recreation and Tourism – 5 km from PDA
- Electricity and Other Utilities – North Shore Region of Nova Scotia
- Communications and Radar Systems - North Shore Region of Nova Scotia
- Transportation – North Shore Region of Nova Scotia
- Indigenous Cultural Resources – Mi'kma'ki districts Epekwitk aq Piktuk and Eskikewa'kik

15.1.3 Assessment Methodology

The assessment of potential cumulative environmental effects generally follows the approach outlined in the *Policy Framework for Assessing Cumulative Effects under the Impact Assessment Act*, in the Practitioner's Guide to the *Impact Assessment Act* (Impact Assessment Agency of Canada (IAAC), 2023).

The cumulative effects assessment approach is similar to and builds upon the methods implemented in this EA to identify and evaluate the Project-specific environmental effects presented in Chapter 4 (Assessment Methods and Initial Screening).

The scope of the cumulative environmental effects assessment is based on the following:

- Identification of residual environmental effects of the Project that may occur even after implementation of avoidance and mitigation measures. It is the residual environmental effects of the Project that have potential to interact with effects of other projects or activities and result in a cumulative environmental effect.
- Identification of VECs that will be carried through the cumulative environmental effects assessment (i.e., those VECs that are likely to have residual environmental effects).

- Defining the spatial and temporal boundaries within which cumulative effects could occur. Boundaries are primarily based on ecosystem-centred spatial and temporal boundaries; where such boundaries are unclear or do not exist, activity-centred or administrative and technical boundaries are applied.
- Identification of other projects and activities that are considered in the cumulative environmental effects assessment. Past and existing projects and/or activities are identified based on evidence available from reliable resources, such as government databases or published reports. Future projects and activities are identified if they are registered or recently approved under the NSECC EA registry, identified in a publicly available development plan, or officially announced by a proponent.

Analysis of potential cumulative environmental effects follows a similar pathway of effects assessment that was used to evaluate the Project-specific environmental effects. Several resources were consulted to identify other activities and upcoming projects in the region whose environmental effects may interact with those of the Project:

- NSECC Environmental Assessment Project Data Viewer Gallery (NSECC, 2026)
- Canadian Impact Assessment Registry (IAAC, 2026)
- Public and Indigenous engagement
- Onsite field studies

The following definitions are used to describe the Project's contribution to cumulative effects (Table 15.1).

- **Low**: The Project is expected to contribute minimal change to cumulative effects when considered alongside the combined effects of other existing projects, undertakings, and activities in the RAA.
- **Moderate**: The Project is expected to contribute noticeable change to cumulative effects when considered alongside the combined effects of other existing projects, undertakings, and activities in the RAA, but does not compromise overall system(s) integrity.
- **High**: The Project is expected to contribute change to cumulative effects that significantly degrades overall system function and/or sustainability when considered alongside the combined effects of other existing projects, undertakings, and activities in the RAA.

The following definitions were used when describing the degree of cumulative effects of all projects, undertakings, and activities.

- **Low**: Cumulative effects from projects, undertakings, and activities in the RAA on the VEC are limited in extent and intensity, reflecting relatively low overall disturbance. The VEC remains largely intact and functional in the RAA.
- **Moderate**: Cumulative effects from projects, undertakings, and activities in the RAA on the VEC are evident and measurable. While the VEC remains functional in the RAA, localized or partial reductions in condition are apparent.
- **High**: Cumulative effects from projects, undertakings, and activities in the RAA on the VEC are widespread and pronounced. The VEC is already near or past acceptable

thresholds, such that further decline will threaten long-term viability or sustainability of the VEC.

15.2 Other Projects and Activities

15.2.1 Wind Projects

There are several other wind power projects that are currently operating, are under construction, are proposed to be developed or are in the planning phase. These developments in Antigonish and Pictou Counties are illustrated in Figure 15.1, Appendix A:

- Maryvale Wind Project, Antigonish County, four WTGs, Operational
- Glen Dhu Wind Power Project, Antigonish & Pictou Counties, 27 WTGs, Operational
- Fairmont Wind Project, Antigonish County, two WTGs, Operational
- Auld's Mountain Wind Farm, Pictou County, two WTGs, Operational
- Pictou Landing, Pictou County, one WTG, Operational
- Weaver's Mountain Wind Energy Project, Antigonish & Pictou Counties, 16 WTGs, Under construction
- Eigg Mountain Wind Project, Antigonish County, 22 WTGs, Proposed
- Limerock Wind Project, Pictou County, three WTGs, Operational
- McLellan's Brook Wind Energy Project, four WTGs, Operational

The Weaver's Mountain Wind Energy Project is the closest wind power project (currently under construction) to the Project and is located within Antigonish and Pictou counties. Its closest WTG will be approximately 2.5 km from the closest Project WTG. It has its EA approval, and it is expected that the construction phase (outlined in Strum, 2023) will overlap that of this Project. The Yellow Birch Wind Energy Project is proposed for Antigonish and/or Pictou Counties and is expected to be near the Project and the Weaver's Mountain project. The operation of Weaver's Mountain and the Project will overlap temporally for at least 20 years.

In nearby Guysborough County, other wind farms have also received approval under provincial EA legislation or are operational:

- Goose Harbour Lake Wind Farm Project, Guysborough County
- Setapuktuk Wind Project, Guysborough County
- Mulgrave Community Wind Power Project, Guysborough County

15.2.2 Past and Existing Land Use and Activities

Past and existing land use and activities are described in Chapter 13: Socio-economic Environment. The following sub-sections provide a brief synopsis of those that could result in cumulative environmental effects in combination with residual environmental effects of the Project.

15.2.2.1 Natural Resources Industry

As outlined in Chapter 13 (Socio-Economic Environment, Section 13.2.2), both historical and ongoing forest harvesting and mining activities have been documented in the Project RAA. These activities have resulted in notable forest loss and fragmentation. According to data from the Global Forest Watch tree cover loss tool (Global Forest Watch, 2026), significant portions of forest within the Project RAA have been harvested. Forestry operations have contributed substantially to the current landscape of the RAA, which is now characterized by fragmented forest patches, areas subjected to harvesting, and forestry roads that create edge environments. Figure 15.2 (Appendix A) provides an overview of forest loss observed between 2001 and 2025, as verified through satellite imagery, and Global Forest Watch Tree Cover Loss data (Global Forest Watch, 2026).

The Project RAA lies within areas that have undergone mineral exploration over the years, resulting in multiple abandoned mine openings and active quarries (Figure 15.2, Appendix A). There are several quarry expansion projects that have required environmental assessments in the RAA. The four closest to the PDA are the Loch Katrine Quarry Expansion Project (19 km), Brierly Brook Quarry Expansion Project (13 km), James River Quarry Expansion Project (9 km), and the MacLellans Mountain Quarry Expansion Project (26 km). Gold mining exploration is occurring approximately 13 km from the PDA on the Shot Rock Gold Property, by Northern Shield Resources Inc. The Shot Rock property is approximately 0.03 ha and has five exploration licences staked under the terms of the *Mineral Resources Act*. Four of these were issued in 2025 and expire in 2027, and one of them is pending.

Combined, these natural resource extraction activities have resulted in a highly visible cumulative effect of land disturbance (Figure 15.1, Figure 15.2, Appendix A) over the past two decades. The forestry and mining industries will persist and potentially increase during the lifetime of the Project.

15.2.2.2 Transportation

The Project RAA contains multiple existing public roads that access the nearby towns of New Glasgow, Stellarton, and Antigonish, dwellings that use existing roads that form portions of the PDA, Highway 7 to the east, Route 347 to the southwest, and the Trans-Canada highway to the north (Highway 104). Highway 104 serves as a major transportation corridor between Nova Scotia and New Brunswick and has undergone an extension of highway twinning over the past six years. In 2019, the twinning of Highway 104 between Sutherlands River and Antigonish received EA approval and subsequent construction began in 2020. Highway 104 frequently accommodates large volumes of traffic and is well-suited for the regular movement of heavy equipment and oversized loads. Highway 104 will serve as the primary transportation route to access the respective collector roads for the projects planned or under development (Figure 15.1, Appendix A).

15.2.2.3 Recreation and Tourism

A network of all-season trails used for hiking, ATVs, and snowmobiles has been established in the RAA and will continue to be used during the lifespan of the Project (Figure 13.3, Appendix A). These trails facilitate access to the RAA for hunting, fishing, and other recreational activities, and there is ATV and snowmobile use in the RAA (see Chapter 15: Socio-Economic Environment).

15.3 Cumulative Effects Assessment

15.3.1 Potential Cumulative Effects and Mitigation

Table 15.1 presents the expected interactions that may lead to cumulative effects of the Project in combination with other projects and activities that are described in Section 15.2. The project contribution to cumulative effects describes the individual contribution of the Project to cumulative effects in the RAA. The degree of cumulative effects of all projects and activities characterizes the combined effects of undertakings, projects, and activities across the RAA.

Table 15.1 Screening of Potential Cumulative Environmental Effects

VEC	Dominant Cumulative Effects Drivers	Dominant Spatial and Temporal Nature	Potential Cumulative Effects	Potential Interaction with Other Projects and Activities	Project Contribution to Cumulative Effects	Degree of Cumulative Effects of all Projects, Undertakings, and Activities	Mitigation
Air Quality	Proximity of projects with overlapping construction	Northern Air Zone, temporary	Construction, intermittently through operation and maintenance	Other construction and development activities in the Northern Air Zone	Low	Low	No additional mitigations
Ambient Light	Proximity of projects	5 km, long-term for WTG lights	Lighting from WTGs	Neighbouring wind facilities	Low	Low, no threshold exceedances	Conventional project-specific
Acoustic Environment	Proximity of projects	2 km, long-term	Construction and WTG noise	Neighbouring wind facilities, recreational activities, natural resource harvesting, traffic	Low	Low, no threshold exceedances	Conventional project-specific
Aquatic Environment	Connecting hydrology	St. Mary's River and West River secondary watersheds, short-term	Loss of instream and riparian habitat	Forestry, recreational activities, construction	Low	Low	Conventional project-specific
Flora	Connecting habitat	Contiguous natural habitat, long-term effects for habitat loss and rare species	Loss of habitat and introduction of invasive species	Forestry, recreational activities, Highway 104 twinning, neighbouring wind facilities	Low	Low	Conventional project-specific

VEC	Dominant Cumulative Effects Drivers	Dominant Spatial and Temporal Nature	Potential Cumulative Effects	Potential Interaction with Other Projects and Activities	Project Contribution to Cumulative Effects	Degree of Cumulative Effects of all Projects, Undertakings, and Activities	Mitigation
Wetlands	Connecting hydrology	1 km, long-term, and the possibility of some permanent direct loss of wetland habitat in the PDA	Loss of wetland habitat	Forestry, recreational activities, Highway 104 twinning.	Low	Low, wetland alteration permitting and restoration will be completed	Conventional project-specific
Terrestrial Wildlife	Connecting habitat	Pictou/Antigonish/Guysborough Mainland Moose subgroup concentration area, long-term	Behavioural disturbance and habitat loss	Forestry, recreational activities, off-highway vehicles (e.g., snowmobiles, all-terrain vehicles), Highway 104 twinning, neighbouring wind facilities	Low	High, Mainland Moose are endangered in Nova Scotia, and the loss of one or more breeding individuals is significant on the declining population.	Mitigation and monitoring across all wind projects in RAA
Bats	Mobile ecology	5 km, short to long-term effects	Collision and habitat loss	Forestry, neighbouring wind projects	Low	Low	Mitigation and monitoring across all wind projects in RAA
Birds	Mobile ecology	5 km, long-term	Collision and habitat loss	Forestry, recreational activities, neighbouring wind projects	Moderate	Low	Mitigation and monitoring across all wind projects in RAA
Population and Economy	Multiple contributors	North Shore Region of Nova Scotia, medium and long-term	Monetary benefits to residents and municipality	Multiple wind projects and natural resources industry	Moderate	Low	Positive effect; no mitigation required

VEC	Dominant Cumulative Effects Drivers	Dominant Spatial and Temporal Nature	Potential Cumulative Effects	Potential Interaction with Other Projects and Activities	Project Contribution to Cumulative Effects	Degree of Cumulative Effects of all Projects, Undertakings, and Activities	Mitigation
Visual Landscape	Multiple receptors	5 km, long-term	Change in vista	Multiple wind projects and natural resources industry	Low	Moderate	Conventional project-specific
Electricity and Other Utilities	Multiple users	North Shore Region of Nova Scotia, long-term	Strengthened grid resource and protection	Proponent agreements with NSPI.	Low	Low	Positive effect; no mitigation required
Transportation	Multiple users	North Shore Region of Nova Scotia, long-term	Traffic disruption	Forestry, Highway 104 twinning, neighbouring wind facilities	Low	Low	Conventional project-specific
Recreation and Tourism	Multiple users	5 km, medium-term	Disruption and possible trail detours	Forestry, Highway 104 twinning, neighbouring wind facilities	Low	Low	Conventional project-specific
Indigenous Cultural Resources	Combined areal span	Mi'kma'ki districts Epekwitk aq Piktuk and Eskikewa'kik, long-term	Facilitated access to hunting/ fishing areas	Forestry, neighbouring wind facilities	Low	Moderate	Review of MEKS by NSCCTH and KMKNO will determine if mitigation measures are required

15.3.1.1 Atmospheric Environment

The RAA for air quality comprises an extent of 5 km around the PDA; for air quality, the extent of Nova Scotia's northern air zone, which includes neighbouring wind projects.

Project construction will partially coincide with other wind facilities in Antigonish and Pictou counties. Individual Project effects for non-GHG emissions of noise, light, and dust are not expected to be significant. Noise modelling (see Chapter 5 Atmospheric Environment) included WTGs from other wind developments, namely Weaver's Mountain, within 3 km of proposed Project WTG locations. Noise modelling among the Project and this additional wind development determined that noise will not exceed provincial guidelines at Project receptors (Appendix D). Therefore, the potential for cumulative effects on the acoustic environment from the Project with neighbouring wind power projects is negligible.

The Project will help lower GHG emissions in Nova Scotia, supporting the province's climate goals. Through the Green Choice Program (Government of Nova Scotia, 2025), 11 large electricity customers can buy up to 100% of their power from renewable sources produced locally. This gives organizations a path to reduce their carbon footprint and show environmental leadership, while also attracting more investment in clean energy infrastructure in the province. The Green Choice Program is part of Nova Scotia's 2030 Clean Power Plan, which aims for 80% of the province's electricity to be sourced from renewables by the end of 2030. By adding the Project's renewable energy to Nova Scotia's grid, the province can cut its use of fossil fuels, decrease GHG emissions overall, and improve air quality and public health. The program also aims to make the grid more resilient, ensuring participating customers have dependable access to clean power. Together, these renewable projects help position Nova Scotia as a leader in Canada's shift to sustainable energy, advancing both provincial and national climate commitments.

The net effects of the renewable energy projects in Pictou County and surrounding areas will result in a positive cumulative effect to the atmospheric environment that needs no mitigation beyond that already outlined in Chapter 5: Atmospheric Environment.

15.3.1.2 Aquatic Environment

The RAA for the aquatic environment is the watersheds that overlap the PDA, the St. Mary's River and West River secondary watersheds. The effects of the Project are expected to be short-term changes in water quality and changes to fish habitat, localized to areas immediately in or adjacent to watercourses. Other projects and activities across the landscape, combined with the effects of this Project, could lead to changes in hydrology, increased sedimentation, and altered runoff patterns at the watershed scale. Mitigation measures, detailed Project design, and habitat restoration in accordance with watercourse permitting will be implemented, resulting in no significant or permanent impacts to the aquatic environment, and will limit contribution of the Project to cumulative effects in the RAA.

15.3.1.3 Flora

The RAA for flora is the contiguous habitat where fragmentation could result in loss of rare species and flora habitat as well as facilitate the introduction and spread of invasive species. With careful detailed design and micrositing of Project infrastructure to avoid sensitive habitats and active habitat enhancement efforts, effects on terrestrial flora are expected to be not significant. The Project, in combination with other projects and activities across the landscape, could lead to the loss of rare species, the loss of habitat, and an increased presence of invasive species. Vegetation around the WTG base and road edges will naturally regenerate, which will offset the long-term loss of vegetation following construction.

15.3.1.4 Wetlands

The Project is situated within an area of active forest management. Furthermore, the majority of the private land on which the Project is situated is forestry-owned and has undergone several cycles of harvesting for many years. Both current and historical forestry practices, as well as recreational off-road vehicle use within the RAA, have noticeably modified wetland habitats. Forestry operations have led to the reduction or alteration of wetlands, primarily through vegetation removal and soil compaction by equipment. Many wetlands in the LAA potentially affected by the Project have also been subject to prior harvesting activities. Any loss of wetland habitat from the Project will be offset through a compensation program. Remaining impacts are expected within the PDA, and maintaining local hydrology will limit long-term and contribution of the Project to cumulative effects in the RAA.

15.3.1.5 Terrestrial Wildlife (Mainland Moose)

The Project RAA for terrestrial wildlife incorporates the area occupied by the Pictou/Antigonish/Guysborough subgroup of Mainland Moose that is identified as Core Habitat in the Mainland Moose Recovery Plan (NSDNR, 2021). Forestry, ongoing natural resource extraction, renewable energy projects, electrical infrastructure development, road building, and recreational activities like ATV and snowmobile use have all contributed to fragmentation and habitat loss of Mainland Moose Core Habitat in the Pictou/Antigonish/Guysborough region. These activities contribute to fragmentation and habitat loss through forest clearing and road building that affect wildlife movement, while also increasing wildlife mortality and injury (from collisions), and creating sensory disturbances from an increase in light and noise. Forest clearing reduces cover habitat for thermoregulation and shelter needed for larger mammals; however, it can encourage foraging habitat through natural regeneration. Forest clearing and road construction can also allow a larger number of White-tailed Deer to access moose habitat, which heightens the risk of disease transmission. Increased accessibility to the forested areas of the RAA could make illegal moose poaching more prevalent (see Chapter 10: Terrestrial Wildlife).

The Provincial Recovery Plan for Mainland Moose states that the loss of any breeding individuals from a depressed population is significant (NSDNR, 2021). Therefore, cumulative effects across the area encompassing the Pictou/Antigonish/Guysborough subgroup of Mainland Moose that result in the loss of at least one breeding individual should be classified as high, before the implementation of mitigation strategies.

It is not expected that the Project alone will result in the loss of a breeding Mainland Moose, particularly after planned mitigation strategies, as discussed in Chapter 10 (Terrestrial Wildlife). These mitigations include utilizing existing roads/trails and lower quality moose habitat, where possible. Areas of particularly high-quality habitat for moose were avoided wherever possible, such as avoiding mature forest stands. Additionally, some WTG pads were strategically sited on previously disturbed areas.

Vegetated buffers around wetlands and watercourses will be maintained to support habitat connectivity, and cleared areas will be progressively replanted with native species of vegetation to mitigate the Project's impact on habitat fragmentation. Other wind developments in the area have also committed to similar mitigation strategies.

Although when considered individually, the Project and other wind projects in the RAA may not pose a significant threat to Mainland Moose, the cumulative effects from these projects in addition to existing and historic forestry operations, mineral resource extraction activities, road and trail construction, and recreational activities is expected to be high. These projects, undertakings, and activities have resulted in noticeable changes in Mainland Moose habitat across the RAA. Although recent evidence is limited, given the known risks that these projects, undertakings, and activities pose to Mainland Moose, it is probable that cumulative effects have led to the loss of some individuals. Based on available information, cumulative effects on Mainland Moose from projects, undertakings, and activities in the RAA exceed acceptable ecological and social limits. Reversibility of these cumulative effects would require a substantial amount of management and resources. The loss of Mainland Moose has been experienced on a regional scale, in the Pictou/Antigonish/Guysborough subgroup, and beyond, on a provincial scale.

To recover Mainland Moose across the RAA, significant effort and resources are needed. Post-construction monitoring efforts in the Project PDA and surrounding area, in addition to post-construction monitoring for other wind development projects can provide the province with data on moose activity and presence, which NSDNR could use for provincial population monitoring and recovery efforts.

Per EA Approval conditions, monitoring at wind farms in the RAA will be conducted for a minimum of two years once their respective WTGs become operational and the monitoring approach must be approved by NSDNR and ECCC-CWS. Monitoring efforts completed for the Project and for other wind projects in the RAA will provide a broader picture of residual effects on Mainland Moose for the regulatory agencies than that of a Project-specific program. Cumulative effects could also be detected through analysis of data collected through these monitoring programs.

15.3.1.6 Bats

The RAA for bats is an extent of 5 km around the PDA. Low levels of bat activity were detected in the LAA during baseline monitoring. Provincial and federal recovery strategies recognize anthropogenic disruptions as being additive effects to the challenges of WNS (discussed in Chapter 11: Bats). Ongoing natural resource industry and the development of renewable energy projects and electrical infrastructure in the region could increase the risks of collisions with WTGs and power lines, as well as habitat loss and fragmentation. Known hibernacula nearby suggest migration routes may cross the Project and other nearby wind farms.

After implementation of mitigation measures in the LAA during Project activities, effects are expected to be minor. Cumulative effects on bat populations of the RAA will be detected by monitoring plans to be approved by ECCC-CWS and NSDNR for the Project. Results of the post-construction monitoring program will be submitted to the appropriate regulatory agencies as required.

Additional surveys or mitigation measures may be identified in consultation with regulators following review of the results. Should post-construction monitoring indicate that further mitigation is needed, an Adaptive Management Plan will be prepared in consultation with NSDNR and ECCC-CWS.

15.3.1.7 Birds

The RAA for birds is an extent of 5 km around the PDA. Similar to the effects on other wildlife, clearing vegetation leads to a loss of habitat for some birds while simultaneously providing habitat for edge and open habitat favouring species. While ongoing natural resource industry and the development of renewable energy projects and electrical infrastructure in the area will continue to change habitat and potentially alter avian behaviour, fragmentation is already evident, and the existing environment is a cumulative result of two decades of forest clearing activities in the RAA.

A recent report states that that wind power projects have a relatively small impact on bird populations compared to those of other human-related hazards and the use of fossil fuel sources (Murphy and Anderson, 2019). The Project layout is carefully planned to avoid sensitive areas, make use of existing access roads, and place WTGs mainly in habitats that are already disturbed. With effective mitigation and ongoing monitoring, negative impacts on birds from this Project are expected to be minimal.

Through implementation of mitigation measures during Project activities, expected effects are expected to be minor to moderate. Cumulative effects on bird populations of the RAA will be detected by monitoring plans to be approved by NSDNR and ECCC-CWS for the Project and other nearby wind projects. Should post-construction monitoring indicate that further mitigation is needed, an Adaptive Management Plan will be prepared in consultation with NSDNR and ECCC-CWS. Monitoring efforts across nearby wind development projects will provide a broader picture of effects on birds for regulators than that of a Project-specific program.

15.3.1.8 Socio-economic Environment

For some socio-economic components, the RAA spans 5 km around the PDA; for others, cumulative effects may occur at the county or region level. The construction of the Weaver's Mountain and Eigg Mountain projects within a similar time frame, and within approximately 21 km of one another could create competition for equipment, labour, and material resources for construction and Project components. Traffic interruptions resulting from the transportation of WTG components could be cumulative if construction at other sites coincides with that of this Project, particularly on Highway 104 which will serve as the major transportation route for the WTG components. Although the Weaver's Mountain WTGs will be delivered in 2026, the Eigg Mountain WTG construction is proposed for 2028, overlapping temporally with the Project's construction. However, these potential effects, if they occur, will be isolated to the short-term construction phase.

The Project has been selected as part of the Green Choice Program and will contribute to greening the provincial grid by providing clean energy to Nova Scotia Power customers. As described in Chapter 1, the Green Choice Program will allow 11 of the largest energy consumers in the province to obtain up to 100% of their energy from renewable sources, including provincial government, hospitals, public schools, and post-secondary institutions. This initiative will help to reach the province's green energy targets and reduction of GHG emissions (Government of Nova Scotia, 2025). These goals include generating 80 % of the provincial grid by renewables by 2030, eventually leading into a net-zero emissions future by 2050 (NSDNR, 2023).

In addition to green energy benefits and contribution to the provincial energy and emissions targets, the economic contributions to the Municipality of Pictou from the Project will include the following (as outlined in 15.3.1.1):

- $30 million in municipal taxes through the lifetime of the Project, over $1.2 million annually
- Annual landowner payments for hosting Project infrastructure
- Funding and other support for under-represented groups (WiRE and Scotia WoC)
- Continued support for The Keppoch through the exploration of funding opportunities.
- Employment of approximately 150 workers during the construction phase and a staff of seven (including part-time and full-time employees)

The net effects of these and other renewable energy projects in Pictou and the surrounding counties will result in a positive cumulative effect to the socio-economic environment of the province that needs no mitigation beyond that already outlined for the VEC's LAA.

15.3.2 Significance

The Project will result in some residual environmental effects similar those of other historic and/or current activities already evident in the area. Cumulative effects for this Project are not expected to be significant after proper planning and mitigation measures are established for this and other projects under development in the RAA. Monitoring programs described for biological VECs such as moose, birds, and bats will facilitate early detection of adverse effects and inform further mitigation, should it be necessary.

16 Effects of the Environment on the Project

Natural hazards are defined herein as environmental phenomena that may adversely affect the Project, including extreme weather events and other naturally occurring processes or disasters. Natural hazards have the potential to affect the Project components, schedule, and/or costs. The Project incorporates design measures to best resource and address existing environmental conditions as well as predicted future climate change impacts. All phases of the Project are subject to effects such as delays in construction and decommissioning as well as changes in power generation and requirements for infrastructure repairs during operation and maintenance.

The following sections outline natural hazards that could impact Project infrastructure.

16.1 Hurricanes, Tropical Storms, Extreme Winds, and Nor-easters

Nova Scotia is situated along the prevailing track of Atlantic storm systems moving up the eastern seaboard. Within the monitored historical period (1981 to 2024) available from the National Oceanic and Atmospheric Administration, the area within a radius of 60 nautical miles of Halifax has been impacted by several tropical storms and hurricanes in the past, for example, Hurricane Earl in 2010 (making land fall as a Category 1) and Hurricane Juan in 2003 (making land fall as a Category 2, with a record-breaking wind gust speed of 143 km/h). On September 24, 2022, Hurricane Fiona significantly impacted southeastern Nova Scotia. At landfall, it set a Canadian record for the lowest central pressure measured for a cyclone, with maximum winds near 157 km/h (Pasch et al., 2023). The storm resulted in thousands of downed trees and power lines across Atlantic Canada. Most recently, Hurricane Lee made landfall in southwestern Nova Scotia on September 16, 2023, as a tropical storm, with gusts of 117 km/h recorded at the Halifax Stanfield International Airport (Bauman, 2023).

Rising sea surface temperatures are likely to increase the intensity of hurricanes, and warmer waters may also enhance their moisture-holding capacity, leading to heavier rainfall during these events (Knutson et al., 2020).

Hurricanes and tropical storms that bring intense sustained winds, wind gusts, and extreme rainfall are expected to increase in intensity owing to climate change. There is a projected increase in the frequency of Category 4 and 5 hurricanes in the Atlantic, and the latitude of maximum intensity may move northward (Knutson et al., 2020; ClimateData.ca, 2024a). However, confidence level varies among researchers and uncertainty level is high in climate model projections.

Extra-tropical cyclones, in certain cases referred to as nor'easters, are most intense in Atlantic Canada between November and March (Plante et al., 2014). Historically, Nova Scotia has experienced high year to year variability in the frequency and intensity of winter storms. White Juan, an intense nor'easter in 2004, produced severe blizzard conditions and is notable as one of the most extreme winter storms in Atlantic Canada in recent history. Historical trends show overall decreases in days with heavy snowfall and highest 1-day snowfall in the region (Vincent et al., 2018). In addition, studies found the strongest nor'easters have become stronger, with both the maximum wind speeds and hourly precipitation rates increasing since the 1940s (Chen et al., 2025).

An increase in average temperatures could result in a larger percentage of winter precipitation to fall as rain rather than snow, resulting in reduced overall snowfall. However, extreme winter storms are still expected to occur in Atlantic Canada, owing to the potential northern shifting of storm tracks. Projections depict that intense high-impact snowfall events can be expected to continue to occur with warming surface temperatures; however, there is high uncertainty due to high year-to-year variability (McCray et al., 2023).

There is very high uncertainty in historical and projected trends of wind extremes in North America (Cannon et al., 2020). Cannon et al. (2020) found that extreme wind pressures could increase by 10% by the 2050s, and up to 20% by the 2080s across North America according to some climate models. Increases in extreme wind pressures could impact extreme design wind pressures (1 in 50 year) in the future.

Although WTGs are built to withstand high winds, operations are typically temporarily suspended at maximum wind speeds in the range of approximately 22 to 30 m/s (depending on the WTG model), which can be experienced during large storm events and extra-tropical cyclones; this may negatively affect energy production and revenue. Rapid changes to wind direction caused by storm events could cause potential yaw system stress, stress to blades due to changes in loading, and structural stress due to dynamic loading (Kapoor et al., 2020).

High wind loads can impose structural stress to other project infrastructure such as the operation and maintenance building and overhead power lines. Pressures from high wind loads on main structural systems and secondary building components (e.g., envelope) and exterior equipment (e.g., poles, lighting, mounted equipment) can result in damages and potential impacts to operations such as loss of primary power. The most frequent weather-related power outages in Nova Scotia are caused by downed trees and branches resulting from high winds and contacting power lines (NSPI, 2024). Typically, building infrastructure is designed to wind pressures of 1 in 50-year return period (NBCC, 2020). However, more frequent and intense storm events resulting in extreme high winds may result in an increased risk to infrastructure (Cannon et al., 2020).

Despite the relatively high elevation in the PDA, extreme precipitation could cause localized flooding conditions, leading to washout or scour of materials around equipment pads and access roads. This may result in damage to roads, ponding around the operation and maintenance building, potentially causing access restrictions and operational disruptions, and possible degradation of pad stability in severe conditions. Flooding is discussed in greater detailed in Section 16.2.

16.2 Flooding

16.2.1 Pluvial and Fluvial Flooding

Extreme precipitation can cause fluvial flooding (i.e., within and surrounding watercourses) and pluvial flooding (i.e., surface flooding caused by intense rainfall). Snowmelt, triggered by warm temperatures or rain-on-snow events, can generate surface runoff as well.

Significant runoff from extreme rainfall events can cause pluvial flooding if drainage systems are undersized or fail to perform as intended. This may result in erosion of access roads and ditches, increased scour around culverts and equipment pads, and disruption to operations by limiting site access or damaging the service building and other facilities. While above-ground equipment is typically mounted on raised concrete pads or poles and underground assets are designed to be weatherproof, localized water intrusion or corrosion of exposed components can still occur under extreme conditions. Prolonged or excessive surface water near access points, vaults, or joints can further increase the risk of water ingress and localized equipment damage.

Rising temperatures from climate change accelerate the water cycle and increase the capacity for atmospheric moisture, increasing both the frequency and intensity of precipitation events. Precipitation intensity is projected to increase by approximately 7% per degree of warming for temperatures below 12°C, and 14% per degree for temperatures above 12°C (Westra et al., 2014), leading to an increased risk of site flooding and increased runoff over time. Rising temperatures may increase snowmelt at the site; however, this effect could be partially offset by reduced snowfall and snow cover resulting from warmer winter conditions.

Previous studies conducted by CBCL across the province estimated projected increases in precipitation using the Clausius-Clapeyron method (Westra et al., 2014) of 10 to 15% for 2021 to 2050, 20 to 30% for 2041 to 2070, and 40 to 60% for 2071 to 2100. These projected increases are intended as general guidance only and can vary significantly depending on the climate-change scenario applied, the percentile of the model ensemble, downscaling method, and the geographic context. Rainfall projections were not developed for the specific PDA.

16.2.2 Coastal Flooding

Coastal flooding was considered for the PDA; however, due to the significantly high elevation of the LAA (from approximately 183 to 271 masl) compared to sea level rise estimates, the site was determined to not be vulnerable to coastal flooding.

16.3 Extreme Temperatures

Climate change is expected to have the following general effects on extreme temperatures in Atlantic Canada (Cohen et al., 2019):

- Extreme high temperatures will increase in frequency and intensity
- Heatwaves will become more frequent, longer and more intense
- Extreme low temperatures will become less severe and frequent

According to ClimateData.ca (2025), the average minimum temperature (coldest temperature of the 24-hour day) at the PDA is projected to increase by approximately 4 to 7°C by 2050s (2041-2070), and by 4 to 11°C by 2080s (2071-2100), These projections are based on the Coupled Model Intercomparison Project Phase 6 global climate models (GCMs) under different emissions scenarios, as reported in the latest IPCC Assessment Report (AR6).

Extreme temperatures can impact WTG performance when conditions exceed the WTGs' design limits. The design temperatures of the proposed WTG include -30°C to +40°C for the Nordex N163 and Vestas V162) (Nordex, 2025; Vestas, 2026) and -20°C to +40°C for the Enercon W160 (Enercon, 2020). As discussed in Chapter 5 (Atmospheric Environment), heat extremes have historically not reached 40°C according to climate normals (1991 to 2020) obtained from the Collegeville station. According to this data, extreme low temperatures have exceeded -30°C, but only for approximately 8 hours during the 30-year period.

According to ClimateData.ca (2025), there are zero days projected to be below -30°C from years 2020 to 2080s. Across all future periods, no days are projected to exceed 40°C (ClimateData.ca, 2025). Therefore, low temperatures are not expected to be an increasing risk to WTG operation.

Extreme temperatures can create operation and maintenance hazards for personnel, increasing the risk of heat-related illnesses (e.g., heat stroke) or cold-related conditions (e.g., hypothermia). These conditions can also lead to higher operation and maintenance costs due to increased energy use for cooling buildings, with costs expected to rise as climate extremes intensify.

16.4 Average Wind

While storm-related winds are expected to increase in strength and frequency (refer to Section 16.1), there has been evidence for minor decreasing mean wind speeds in North America (–0.084 m/s per decade) during the period of 1979 to 2018 (Intergovernmental Panel on Climate Change (IPCC), 2021) as a result of climate change. This 'stilling' tendency has possibly been reversing after 2010 and the global mean surface winds strengthened, although the robustness of this reversal is unclear given the short period of study and interannual variability (IPCC, 2021).

Historically, average surface wind speeds exhibit both decreasing and increasing trends depending on regions or seasons in Canada (Cannon et al., 2020). There is very high uncertainty in historical and projected trends for wind in North America. While uncertainties remain, current climate projections do not identify declining local wind resources as a likely factor affecting energy production over the Project's 25-year operational period.

16.5 Snowfall and Snow Cover

Warming temperatures are expected to result in an overall decrease in snowfall, more precipitation falling as rain instead of snow, changes in snow density (i.e., wetter snow), and a shortening snow season caused by late snowfall and early snowmelt. However, years with high snow fall and snow cover are still expected to occur.

Historically, the area of the site has experienced minor increases in maximum snow water equivalent (SWEmax) but decreases snow cover fraction (Mudryk et al., 2018). Based on the factors described above, both SWEmax and snow cover fractions are projected to decrease over time, leading to smaller snow loads compared to the baseline. The 1-in-50-year snow load, used in design of infrastructure such as roofs, is expected to decrease by approximately 40% in the mid-term and 65% in the long-term.

Changes in snow cover have already been observed, including a measured decline in annual snow cover extent across Canada from 1972 to 2021. It is expected that climate change will continue to impact the formation, duration, depth, and quality of snowpacks over time. Impacts to snowpack conditions may lead to an increased frequency of inactive trails, temporary closures, and maintenance.

As climate change progresses, average and minimum winter temperatures and winter precipitation are projected to increase, reducing snow cover duration through more frequent snowmelt events, later onset of snowfall, and earlier spring melt. Increased winter rainfall, including rain-on-snow events, is expected in the Project region (NSECC, 2022), which can alter snowpack, accelerate melt, and affect runoff regimes, potentially impacting the condition of access roads and trails. Potential impacts to snowpack conditions due to increased winter rainfall include the following:

- Increased flood conditions and pooling of water on trails
- Increased melting, thinner snowpack, and decreased snow retention
- Increased frequency of wet, slushy, or icy conditions

A heavy snowfall event can reduce access to the site and result in high snow loads on the operation and maintenance building causing structural loading and falling snow and ice. Snow can present risks to the WTG and substation and collector line operation when melt events leads to ice formation/ accretion (See Section 17.6). Snow loads, however, are projected to decrease over time due to climate change, resulting in a reduction of snow load risks to the Project.

16.6 Icing

Atmospheric icing is the accumulation of ice on exposed surfaces caused by meteorological conditions. Ice accretion is dependent upon air temperature, wind speed, surface shape, and liquid water content of the air (Canadian Renewable Energy Association (CanREA), 2020). Icing is most likely to occur between temperatures of -4°C and 2°C.

Atmospheric icing on surfaces, including WTGs, generally occurs under two conditions: in-cloud icing (rime or glaze) and precipitation icing (freezing rain or wet snow). The following describes ice build-up on WTGs.

- Rime ice is in-cloud icing where water droplets form a rime on the blades (see Section 16.3 Extreme Temperatures for temperature projections with climate change).
- Glaze ice is caused by freezing rain or wet in-cloud icing and forms a smooth layer of ice that is strongly adhered to the blades at temperatures between 0 and -6°C.
- Wet snow is partly melted snow crystals with high liquid water content that become sticky and are able to adhere to the surface of the WTG blade and occurs when the air temperature is between 0 and 3°C.

According to the Canadian Highway Bridge Design Code, the area of the site is in a heavy to extreme ice zone, with an average nominal ice thickness of 31 to 45 mm. According to the International Energy Agency's (IEA's) five icing classes, where Class 1 has the lowest risk and Class 5 the highest, the Project is located in a Class 2 area, meaning meteorological icing is expected only about 0.5 to 3% of the year (approximately 2 to 10 days), based on the VTT Wind Power Icing Atlas (2024).

A decreasing trend in the frequency of freezing rain was reported over the past decade compared to earlier time periods in the Atlantic provinces (Groisman et al., 2016). Projections depict decreases in the 1 in 20-year ice accretion thickness by approximately 25% in the mid-term and 50% in the long-term (Cannon et al., 2020).

The duration of rotor icing strongly differs for a WTG blade at standstill compared to that of a rotating WTG whose flow velocity and vibration reduces ice incubation time (IEA Wind, 2017). Therefore, ice is more likely to form on other Project infrastructure such as above-ground power lines, building, roads, towers, nacelles, hubs, and the meteorological tower.

Ice accretion on rotor blades reduces the aerodynamic performance of the WTG, which can result in production losses. Blade icing also increases vibrations and fatigue loads that can reduce WTG lifespan, leading to measurement and control errors that cause mechanical and/or electrical failures. Structural damage as a result of icing and other environmental effects are discussed in Section 17.5 Structural Damage. Ice accretion in the study area is projected to decrease over time due to climate change, leading to a corresponding reduction of associated in risks to project components, although ice accretion events are still projected to occur over the project life. The Proponent is exploring the potential inclusion of an anti-icing or de-icing system for the Project's operational period. Both systems can help mitigate blade damage through reducing ice accumulation on WTG blades during periods of colder temperatures.

Heavy or prolonged precipitation events combined with freezing temperatures can cause ice to form/accumulate on access roads, creating hazardous conditions. Using salt to melt ice may create pooled saltwater, which can infiltrate underground electrical infrastructure and potentially cause short circuits in components such as insulators (NSPI, 2024). Although underground equipment is generally sealed and rated to withstand moisture and short-duration flooding, prolonged exposure or high-salinity water can still compromise these systems. Salted roads can also cause arcing when wind-driven salt is blown onto overhead wires, although this scenario is considered unlikely. Both situations have the potential to result in equipment damages and power outages and disruptions to operation and maintenance.

Ice shedding is most likely to occur when there is ice accumulation on the blades that becomes subject to milder temperatures (usually at and above 0°C) that prompt melting (CanREA, 2020). The risks of ice throw to human health and safety may lead to temporary shutdowns of individual WTGs. Ice throw and ice shed hazards are considered accidental events described in more detail in Chapter 17 (Accidents and Malfunctions). The inclusion of an anti-icing or de-icing system on the WTG unit can significantly reduce the likelihood of ice accumulation and therefore ice throw.

16.7 Wildfires

Historically, the Maritime Provinces have generally experienced low wildfire occurrences, particularly compared to other parts of Canada (e.g., western regions). Fire season is described by the NS *Forests Act* as the period of greatest fire risk, listed as March 15 to October 15 inclusive for Antigonish County (NSDNR, 2021). Uncontrolled wildfires can be caused by natural occurrences such as lightning strikes, human negligence or by accident, and sparks from equipment including ATVs and chainsaws. Fire origins are most associated with anthropogenic causes within populated areas. Only 3% of fires in the province are started by lightning; 97% are started by human activity, much of which is arson (NSDNR, 2021). While uncontrolled fires usually begin in residential areas, most land damaged by wildfire is Crown land.

As the climate warms, higher temperatures and shifting precipitation patterns are expected to increase potential evapotranspiration and contribute to drier conditions. These changes can increase fuel availability, lengthen the fire season, extend fire spread duration, and result in more frequent and intense wildfires (Flannigan et al., 2013; Wang et al., 2015; Wotton et al., 2017). Overall, it is projected that the number and extent of wildfires may increase, and the proportion of days in fire season with the potential for unmanageable fires will increase.

Inherently, wildfires pose significant risks to human health and safety, can cause extreme damages and loss of Project infrastructure, destruction or blockage of access roads and transportation. These risks are projected to increase over time with climate change, thereby elevating the overall likelihood and consequences of wildfire-related impacts. Refer to Section 18.6 for more information on Fires.

16.8 Lightning

Lightning can directly strike WTGs, potentially causing fires and structural damage. Due to their height, ground-based fire suppression is often ineffective, and WTG fires resulting from a lightning strike can lead to total structural loss (New Brunswick Department of Energy, 2008).

Climate warming is expected to increase atmospheric moisture and convective available potential energy (CAPE), enhancing the potential for more intense convective storms. As a result, the frequency and/or intensity of thunderstorms and lightning may increase, although changes are dependant on local atmospheric conditions and storm dynamics (Climatedata.ca, 2024b). Lepore et al. (2021) found that with each degree Celsius increase in global temperature, the frequency of environments favourable for severe weather could rise by 5% to 20%. This increase is more pronounced in the Northern Hemisphere’s higher latitudes, where it is primarily driven by a substantial rise in CAPE.

Lightning strikes pose a significant risk to project infrastructure due to the high elevation and exposed nature of WTGs. Direct strikes can cause blade damage, degrade or destroy Project electrical components such as converters, transformers, substations, and cables, and increase the likelihood of equipment failure, unplanned downtime, higher operation and maintenance costs, and fire risk. While grounding systems and surge protection substantially reduce these risks, even properly protected equipment can experience damage from high-energy strikes. Climate change is projected to increase the conditions favourable to the formation of thunderstorms and associated lightning strike potential, which in turn increases lightning-related risks to the project over time. Refer to Section 17.6 for more information on Fires.

16.9 Seismic Activity

As outlined in Section 6.2.1 (Topography and Seismicity), the Hollow Fault and Browns Mountain Fault extend in a northeast–southwest direction across the Ecodistrict, about 5 km south of the PDA, with several smaller faults extending perpendicular to both and overlapping the LAA. The fault series is not, however, located near the edges of tectonic plates.

Nova Scotia is considered to have a relatively low risk for earthquakes that have the strength of magnitude (MN) 5 or more that is associated with causing damages to infrastructure (NRCan, 2021). There has not been an earthquake of 5 MN or more centred in Nova Scotia since 1855. There have been reports of seismic events felt in the region, such as the 2.6 MN event felt in Dartmouth in March 2020, a 3.0 MN near Yarmouth in 2016, and a 3.6 MN near Digby in 2015 (CBC News, 2020).

16.10 Sinkholes and Subsidence

Sinkholes are ground depressions that form when underlying soluble bedrock, such as limestone or gypsum, dissolves over time, creating subsurface cavities in karst terrain. If these cavities collapse, they can cause sudden ground failure, potentially damaging buildings, roads, and other infrastructure. As discussed in Section 6.2, the LAA lies entirely in areas of low-risk karst, and there are no reported sinkholes within 5 km of the LAA.

Human activities that result in water table decline (such as groundwater extraction) and changes to surface water drainage patterns are two primary causes of land subsidence. Project operations and maintenance do not rely on groundwater or surface water resources; therefore, the Project is not expected to contribute to water table decline or drainage alterations that could induce subsidence.

Climate change may increase sinkhole risk in karst regions by altering precipitation patterns and groundwater dynamics. More intense rainfall can enhance infiltration and bedrock dissolution, while also increasing subsurface erosion that weakens overlying soils. In addition, prolonged drought followed by heavy rainfall can cause significant groundwater fluctuations, reducing subsurface support and increasing the likelihood of cavity collapse. It is noted that the PDA is situated within an area characterized by low karst development potential.

16.11 Management and Adaptation

The following section outlines management and adaptation strategies included in the Project to mitigate risks of the natural hazards outlined in Section 16.1 to 16.10. Project components and design have considered the existing environment and the need to adapt to climate change.

The following natural hazards, as outlined in Sections 16.1 through 16.10 may pose a risk to the project infrastructure and operations:

- Hurricanes, tropical storms, nor-easters and high winds
- Pluvial and fluvial flooding
- Extreme temperatures
- Average wind
- Snowfall and snow cover
- Icing
- Wildfires
- Lightning
- Seismic activity
- Sinkholes and subsidence

Extreme weather events such as hurricanes, tropical storms and nor-easters could bring extreme winds and precipitation to the site. Such weather events are expected to intensify in future years due to climate change, therefore, associated risks to Project components are expected to increase. Extreme temperatures, ice accretion, and snow load could also impact Project components. Climate change is expected to affect extreme temperatures in future years by increasing both extreme high and extreme low temperatures. Ice accretion and snow accumulation are expected to reduce with climate change. Therefore, Project risks associated with extreme high temperatures are expected to increase in future years due to climate change; however, risks associated with low temperature, ice accretion and snow load are expected to reduce. To mitigate risks to the Project arising from these events the following have been considered in the design or will be undertaken during operation and maintenance.

- The WTG models proposed for this Project will be manufactured to withstand extreme weather conditions (i.e., extreme winds and ice accretion) to prevent structural damage. Vibration sensors in the WTGs detect conditions that can lead to damage of rotating blades, such as ice accumulation or high winds, and trigger auto-shutdown of the WTG.

- The Nordex N163 and Vestas V162 proposed WTGs can withstand temperatures of -30°C to +40°C without damage (Nordex, 2025; Vestas, 2026), and Enercon E160 ranges from -20°C to +40°C (Enercon, 2020). Even with increasing extreme temperatures over time, according to projections, 40°C is not expected to occur at the site over the life of the Project.
- All proposed WTGs have ice detection system options (Enercon, 2020; Nordex, 2022; Vestas, 2026), and Nordex N163 and Vestas V162 WTGs have anti-icing systems (AIS), options which uses meteorological ice sensors, power deviation warnings, and weather forecasts to heat blades prior to potential icing, thus mitigating the risk of imbalance, vibration, and structural stress caused by icing (Nordex, 2022; Vestas, 2026).
- To prevent damage to overhead power lines and power interruptions during extreme weather, the power corridor RoW will be kept clear of trees. Furthermore, the Proponent will explore alternative overhead collection materials that are resistant to damage from ice accumulation.
- The overhead electrical systems and operation and maintenance building are designed to comply with relevant Standards (NBCC Section 4.1.6 and Section 4.1.7 for building snow and wind load design and CSA C22.3 for overhead systems for wind pressure).
- Snow clearing and de-icing will be completed as part of normal operation and maintenance procedures to reduce snow and ice related risks on Project access roads.

Extreme precipitation can cause pluvial and/or fluvial flooding which could impact Project components. Risks associated with flooding are expected to increase in future years due to climate change due to projected increases in precipitation. To mitigate risks to the Project arising from these events the following measures will be undertaken.

- Effective drainage infrastructure, such as culverts, will be sized and installed during construction to prevent surface water pooling around foundations and access roads for both new and existing crossings.
- Surface water management measures may require upgrades and maintenance over time to accommodate increasingly severe precipitation events and will be considered during site restoration at the time of decommissioning.
- An ESC Plan and a Surface Water Management Plan will be developed for the site.
- An EPP with erosion control measures will be developed prior to the beginning of construction activities.

Wildfires could also impact Project components and are expected to cause increased risk to the Project over time due to climate change. More information on fires is found in Section 18.6 under Accidents and Malfunctions. To mitigate risks to the Project arising from these events the following measures will be undertaken.

- The provincial fire indices, which are updated twice daily online during fire season, will be monitored.
- Project activities will be restricted and/or suspended during any phase of the Project should NSDNR mandates require.
- To prevent spread of fire to Project components during operation and maintenance, areas around the structures will be kept clear of scrub, low brush, and long grass.

- Burning will be prohibited on site. Should a fire be observed by onsite staff, it will be reported immediately to the NSDNR hotline 1-800-565-2224 or 911 emergency services.
- Road improvements will facilitate ground access for emergency responders.

Seismicity and sinkholes and subsidence could also impact Project components. To mitigate risks to the Project arising from these events the following measures have been or will be undertaken.

- A seismic survey has been completed and results provided in the draft geotechnical report indicate that the site is expected to be either Class A or Class B as defined in the National Building Code of Canada (final report pending), and that either class is favourable for the development of this Project (Strum, 2023).
- Operation and maintenance staff will report signs of subsidence to the Proponent and be cognizant of activities that can lead to water accumulation.
- Earthworks during decommissioning will incorporate grading that will not contribute to risks of subsidence and sinkholes in the restored areas.

17 Accidents and Malfunctions

Accidental events and malfunctions are unplanned events with a low probability for occurrence. Although unlikely, an accidental event or malfunction can cause significant adverse environmental effects and have the potential to affect one or more of the VECs identified in Table 4.1 in Chapter 4 (Assessment Methods and Initial Screening). The following accidents and malfunctions were identified as having the potential to occur during construction, operation and maintenance, and/or decommissioning of the Project:

- Transportation-related accidents
- Erosion control malfunctions
- Hazardous materials spills
- Ice throw
- Structural damage
- Fires

The Proponent has established a stringent health, safety, environment, and quality system that is integrated into every project and addresses spill and accident prevention, personal protective equipment (PPE), and emergency response.

A Project-specific EPP will be developed prior to the commencement of Project activities; EPP components are outlined in Chapter 2 (Project Description). The EPP will include a contingency plan that will provide emergency response measures for accidental occurrences. NSECC has a generic guide for developing contingency plans (NSECC, 2021). Through the Project contingency plan, staff will be informed of the appropriate communication channels, including contact information that is readily accessible to field crews and site environmental monitors.

17.1 Transportation-related Accidents

Accidents and malfunctions of vehicles and heavy equipment have the potential to adversely affect the environment and pose human health and safety risks. Traffic accidents that result in vehicular damage can result in injuries and/or damages to infrastructure that force activity shutdowns and use provincial emergency response resources. A Traffic Management Plan will be developed prior to the construction phase and posted on the

Project website. Mitigation measures to prevent transportation-related accidents will be considered for both public roads and Project access roads. Municipality of Pictou County.

- Special weather statements and warnings issued by ECCC will be considered before driving.
- Speed limits will be established and enforced on Project access roads.
- Speed limits will be adhered to on public roads.
- Cell phone use while driving will be prohibited.
- Should the site be snow-covered, site personnel are to drive only on known terrain.
- Appropriate training for onsite personnel will be provided that includes site safety protocols and emergency response procedures.

17.2 Erosion Control Malfunctions

Malfunctions of drainage infrastructure may occur during any phase of the Project, leading to runoff and discharge to nearby waterbodies. Overwhelmed drainage networks can be eroded and cause subsidence on the site. Runoff can produce elevated levels of total suspended solids that can adversely affect the aquatic environment, particularly fish and fish habitat.

ESC measures are particularly important to prepare for spring runoff and extreme or prolonged rainfall events. The Project will be designed and constructed to consider both typical and extreme weather functionality. An ESC Plan and a Surface Water Management Plan will be developed and implemented by the Proponent. As part of the EPP, a contingency plan will be included that addresses emergency response to malfunctions that can damage roads, cause pooling around foundations, and/or lead to drainage into waterbodies. Damaged and/or poorly functioning drainage components will be reported to the Proponent if observed by on-site personnel during the operation and maintenance phase. Proper sloping and drainage will also be considered during decommissioning.

The contingency plan will be implemented in the event of an erosion control malfunction. Contingency measures recommended by the NSDPW's Generic EPP for the Construction of 100 Series Highways (NSDPW, 2007) are applicable to this Project.

- Conduct staff training (e.g., tailgate safety and environmental meetings to inform staff of potential problems and hazards).
- Plan and practice storm alertness measures, outlining conditions for work stoppages, pre-storm staff meetings, inspections, and preventative maintenance of ESC measures such as covering highly erodible surfaces, emptying of settlement ponds, and proactive measures to ensure critical ESC measures near watercourses will withstand storm runoff, seasonal impacts, and wind.
- Confirm availability of equipment and operators that can be mobilized on short notice to install/repair berms, dams, diversion ditches, catchment ponds, and turbidity curtains.
- Stockpile ESC materials, including quantities and locations for strategic placements of:

- ESC blankets/matting and staples (or tarps/plastic sheeting)
  - Sandbags, clear stone
  - Water pumps and hoses
  - Turbidity curtains
- Implement typical approaches for temporary control of water flow and erosion until new ESC measures can be implemented, such as excavation of cross ditches to divert runoff away from surface water bodies and into catchment ponds or vegetated areas; excavation of temporary water storage areas; berm construction; bank stabilization, and deployment of backup turbidity curtains. Approaches will vary depending on season, and the contractor will indicate approaches for summer (low flow periods), spring-fall (high flow periods), and frozen ground (high-flow periods).
- Develop standard protocols for notification of failures to the Proponent, NSDPW, and NSECC/DFO inspectors.
- Develop standard protocols for incident and near miss reporting to the Proponent and NSECC to provide documentation of the failure (a Near Miss Report details failures that did not result in the loss/release of sediment), the intention being to identify the cause and help prevent future occurrences.

17.3 Hazardous Materials Spills

A spill involving hazardous materials could result in significant adverse environmental effects, depending on its size and location. Accidental releases of POL or other hazardous substances can contaminate soil and migrate through the unsaturated zone into local groundwater systems, potentially allowing the contaminant plume to spread within the groundwater LAA. Spilled materials may also reach surface water or wetlands through runoff, and volatile compounds can disperse into the air. These pathways can degrade wildlife habitat and may also pose risks to human health.

Since POL on site will primarily be those associated with the operations of vehicles and heavy equipment, as well as the WTG nacelles, there is a low probability for occurrence of a large POL release. The magnitude will be limited to the volume of POL contained by the equipment. Depending on the WTG model selected, the platform may use an electric motor drive for pitching the WTG blades, as opposed to a hydraulic ram pitch system. This engineering shift has eliminated the potential release of hydraulic fluid and provides a more environmentally friendly solution.

Standard operating procedures developed by the Proponent for other renewable resource projects include protocols for spill response and the requirement of onsite spill kits.

Fuel and hazardous materials spill response will be included in a contingency plan to be developed as part of the Project-specific EPP. Spills will be reported immediately by onsite personnel to the NSECC using their 24-hour emergency response hotline: 1-800-565-1633.

As a reference, the NSDPW (2007) Generic EPP provides guidelines for waste management as well as the handling and storage of POL.

- Hazardous material containers will be properly labeled in compliance with the requirements of the Workplace Hazardous Materials Information System (WHMIS).
- Onsite personnel will have training in WHMIS, transportation of hazardous goods, spill response, and site-specific procedures.
- Safety Data Sheets (SDS) will be available for all hazardous materials in use or stored on site.
- The environmental monitor will be responsible for monitoring the operating condition of the equipment used on site to ensure that it is in good working condition.
- Hazardous materials will be handled only by site personnel who are trained and qualified in the handling of these materials, and only in accordance with manufacturer's instructions and government regulations.
- Waste hazardous materials will be separated, stored, transported, and handled in accordance with regulatory requirements and disposed of at an approved hazardous recycling or disposal facility.
- Equipment used will be mechanically sound with no oil or gas leaks. The environmental monitor will regularly check equipment for leaks and leaks will be repaired immediately.
- There will be no fuelling, storage, washing, or servicing of vehicles within 30 m of a watercourse, drainage ditch, areas with a high-water table, or exposed and shallow bedrock.
- There will be designated refuelling and POL storage areas, each located a minimum of 30 m from any waterbody or environmentally sensitive feature. Storage and refuelling procedures must meet the Nova Scotia Petroleum Management Regulations under Sections 25 and 84 of the *Environment Act*.
- Fuel storage areas will be clearly marked and/or barricaded to prevent damage from vehicles.
- Spill clean-up materials shall be accessible and maintained in the designated areas of fuel and chemical storage as well as heavy equipment vehicles.

17.4 Ice Throw / Shed

WTGs can produce ice throw or ice fall (shed) during certain weather conditions. Although the likelihood of ice striking a person or vehicle is very low, maintaining appropriate setback distances from non-participating property boundaries and roadways is important to further reduce risk. The level of potential public safety risk depends on the size of ice fragments, how far they may travel, and the chance of someone being present within the landing area. The mechanisms and conditions associated with blade icing are described in Section 16.6 (Icing).

In recent years there have been several peer-reviewed papers where field studies of ice throw in the Nordic states have demonstrated that most ice pieces of the size that could cause serious injury or fatality are thrown within the tip height of the WTG (Lunden, 2017;

Bredesen et al., 2017). In 2017, Swedish researchers published the findings of their IceThrower study (Lunden, 2017). This involved icing WTG blades in the field and then determining the area where ice was thrown surrounding the WTG. This study showed that 75% of the ice thrown was found within one rotor diameter distance from the WTG tower and only 1% of very small fragments were identified beyond 1.5 times the rotor diameter distance (which was the same as the total height of the WTG). This is the basis of the common setback of 1.1 times the total height of a WTG to roads and non-participating property lines. This distance has become an almost universal setback across North American jurisdictions to protect non-participating property owners and vehicles on roads.

The WTGs proposed to be used at the Project (Nordex 163, Vestas V162, or Enercon E160) will have a maximum total height (including hub height and rotor radius) of 200 m. Based on the IceThrower study this would predict that 99 % of ice thrown from the Nordex or other WTGs under consideration would be less than 200 m, or the tip height of the WTG. Only 1% of ice thrown would be beyond this distance and would be of a size that would likely not cause serious injury or death.

CanREA currently recommends a formula to predict maximum distance for ice throw (CanREA, 2020):

$[dt = 1.5 * (D + H)]$, where:
dt = Maximum throwing distance (m)
D = Rotor diameter (m)
H = Hub height (m)

At maximum, the Project WTGs will have a hub height of 118 m (Nordex), 119 m (Vestas), or 114 m (Enercon) and a rotor diameter of 163 m (Nordex), 162 m (Vestas), or 160 m (Enercon). Using the CanREA (2020) formula, the maximum ice throw distance of very small fragments of ice is estimated to be 422 m for Nordex and Vestas, and 411 m for Enercon. However, it should be noted that this formula does not include consideration of gravity, aerodynamic drag, WTG specifications, operational mode, and site topography (IEA, 2022). Should those factors be considered, it is predicted that ice throw that could be dangerous to health would be within 220 m (1.1 x tip height).

The Project WTGs, in accordance with the Municipality of Pictou County Land Use By-law, are set-back 1,000 m from dwellings, a minimum of 300 m from public roads, and at least two times the height of the WTG from external property lines. This effectively means that no ice throw will reach dwellings and that the risk to traffic on public roads is negligible.

IEA recommends mitigation measures to reduce the risk of ice throw from WTGs (IEA, 2018). The Proponent has committed to follow the IEA recommendations below, as well as other key safety measures:

- During meteorological conditions that would be conducive to icing, WTGs can be temporarily shut down. The Proponent is exploring the inclusion of an anti-icing or de-icing system for the WTG units which will greatly reduce or fully mitigate the potential for ice accumulation; by extension, this will alleviate the likelihood of ice throw resulting from the Project during operation.

- Ice build-up on WTG blades during operation causes them to vibrate. This vibration triggers automatic imbalance sensors in the WTGs, and they are automatically shut down to avoid damage to the WTGs and avoid throwing ice.
- Signage placed on trails near WTGs.

The largest risk to onsite work crews is ice shed/fall of the ice from blades to the base of the tower. CanREA's (2020) *Best Practices for Wind Farm Icing and Cold Climate Health & Safety* recommends mitigation that applies to initial approaches by onsite maintenance personnel to investigate both ice throw and blade breakage that will protect occupational safety. In addition, the Project will develop a site-specific Health and Safety Plan and training to protect worker safety.

- Observe with binoculars whether the WTG is iced before entering the throw zone.
- Remotely turn the nacelle to face opposite side of the access door.
- If necessary, shut down the WTG and those near the route to your destination.
- Park vehicles outside throw zones.

The Project is not proposed to be gated; therefore, the public will be able to continue to use the area for recreational purposes. There will be signs posted at WTG access road entrances that warn during winter that icing conditions can occur and that individuals should remain away from the WTGs. In addition, information sessions with the local snowmobile clubs and recreational users will be held to communicate the risks of approaching WTGs during icing conditions. The probability of an individual being struck by ice is extremely low given automatic shutdown of WTGs during icing conditions and appropriate setback distances. Therefore, this does not pose a significant risk to individuals. As noted above, the Proponent is exploring the inclusion of an anti-icing or de-icing system for the WTG units which will mitigate the potential for ice accumulation and ice throw at the Project during project operations.

17.5 Structural Damage

Extreme weather, manufacturing faults, and WTG blade wear can lead to fatigue loads that can reduce WTG lifespan through various means, including blade damage and breakage. Extremely cold weather can induce additional blade fatigue, such as brittle material fracture and nonuniformities on the surfaces (Algolfat et al., 2023). Most accidents are caused by natural causes such as lightning and high winds, although some may be attributable to manufacturing defects, such as air bubbles (Bošnjaković et al., 2024). Effects of wind, lightning, and icing are discussed in Chapter 16 (Effects of the Environment on the Project).

Damage to WTG blades results in increased or irregular vibrations (Algolfat et al., 2023). Blade damage can cause the blades to break and their parts to fly off, posing danger to people, animals and other objects in the vicinity, including other Project infrastructure. Studies show that blade components are flung within 700 m from the base WTG structure at rotational speeds of 70 m/s (Bošnjaković et al., 2024). To maintain durability, sustainability, and public safety, the WTGs chosen for this Project will be shut down at speeds exceeding 26 m/s (Nordex), 24 m/s (Vestas), or 28 m/s (Enercon).

The WTG selected for this Project contains vibration sensors that will detect these conditions and trigger auto-shutdown of the WTG. Poor management, monitoring, and maintenance can lead to severe structural damage that has been reported for some wind facilities. The WTG models under consideration for the Project are equipped with certified safety systems that continuously monitor operational parameters and automatically stop the WTG and set it to a safe state when specified thresholds are exceeded (e.g., high wind conditions). The Proponent and the selected WTG supplier will be providing monitoring services to the Project 24/7 throughout the Project's operational phase. This monitoring will help to mitigate issues at the Project site, as well as proactively address environmental and operational risks to the units. Based on the Proponent's longstanding experience in operating wind energy projects in the province and elsewhere in Canada, the United States, and Europe, specific attention is paid to ensuring WTGs are equipped and coated with corrosion-resistant materials to support WTG longevity.

Total WTG collapse or structure failure is also rare. If a WTG tower fails it falls within tip height of the WTG. Rogers and Costello (2022) modelled the probability of blade failure and impact on roads:

> *Results for these example turbines show that the typical setback of 1:1 x tip height is generally sufficient at reducing risk to extremely low levels (between 1 impact in 1 million years and 1 impact in 10 million years) for roads in rural areas which tend to be lightly traveled.*

Therefore, given the setback distances to roads and homes (1,000 m for residences and 300 m for public roads), it is unlikely that structural failure of WTGs or blades would significantly impact public health.

The Proponent recognizes that strict monitoring and regular structural inspection is necessary for wind production facilities and will promptly repair/replace damaged parts, and prevent operation of iced WTG rotors, for the sustainability of the Project. During operation and maintenance, the Proponent will implement the following measures:

- Ensure replacement parts share the same temperature rating as the original components.
- Use POL appropriately rated for the climate to avoid thickening in the generators, gearboxes, motors, gears, etc.
- Remove frost from high voltage circuits prior to energizing.

- Routinely perform system inspection and calibration procedures.
- Monitor ECCC weather forecasts for warnings and special weather statements.
- Be prepared to quickly employ remote shutdown of the system during high-risk conditions, such as extreme weather events, or when there are indications of equipment malfunction.
- Shut down individual WTGs with worn or damaged equipment until replaced or repaired.
- Develop and implement a Contingency Plan.

17.6 Fires

Project construction, operation and maintenance, and decommissioning activities that may accidentally cause a fire include the following:

- Sparking equipment or hot vehicular exhaust
- Refuelling
- Vehicle accidents
- Other human activities

Accidental fires may have serious adverse effects such as habitat loss, mortality to wildlife and vegetation, atmospheric emissions, and damage or loss of property. In addition, there is potential for fire suppressant chemical runoff during firefighting (NSDPW, 2007).

Flammable materials used in WTGs such as fiberglass-reinforced polymers, foam insulation, wires, and the POL needed to lubricate mechanical components of the nacelle can fuel such accidental fires.

The WTG models under consideration for this Project have lightning/surge protection based on the electromagnetic compatibility compliant lightning protection zone concept, which comprises the implementation of internal and external lightning/surge protection measures under consideration of the International Electrotechnical Commission standard 61400-24. The nacelle components are equipped with an automatic lubrication system that prevents friction in the rotors and cools the gearbox.

Guidance for mitigation measures and contingency plans for fire prevention is available in the NSDPW generic EPP (NSDPW, 2007) and will be specifically addressed in the Project EPP.

As outlined in Chapter 16 (Effects of the Environment on the Project), the Nova Scotia Fire Index will be monitored during construction, operation and maintenance, and decommissioning activities. An area around each WTG base will be grubbed to act as a fire break. Onsite personnel will have fast access to fire suppressant equipment and PPE. Flammable chemicals/POL will be stored at a designated fuelling and hazardous material storage site with secondary containment.

If there is a fire, emergency response procedures at both local and provincial levels will begin with a 911 call. The environmental monitor must promptly report any fires to the NSDNR through their 24-hour emergency hotline: 1800-565-2224. All onsite personnel will be instructed to clear access roads of vehicles or other obstacles that could hinder emergency crews. Local fire departments will not attempt to extinguish WTG fires; instead, they will secure a perimeter around the base of the WTG to let the fire burn out safely and prevent it from spreading to nearby vegetation. The Proponent will give fire departments detailed access information, educational resources about the Project, and a guided site tour.

Mitigation measures recommended by the Canadian Electricity Association (2020) will be implemented to prevent and control fires near electrical infrastructure applicable to this Project.

- Staff will be trained on how to use extinguishers safely and effectively.
- Onsite personnel will be trained on procedures for extinguishing small nacelle fires.
- The Proponent will replace wood components (e.g., power poles) that have deteriorated due to wear and/or pose a risk as an ignition source if they are subject to weather conditions that exceed their operating design standards.
- Power lines will be regularly inspected to identify lines that require rebuilds. Old lines will be replaced as needed to preserve safety and meet new operating standards and fire mitigation standards.
- RoWs will be regularly maintained through vegetation management to prevent vegetation or other material coming in contact with transmission and distribution lines, reducing ignition risk.
- Fuel hazards (e.g., tree trimmings, slash) will be removed from RoWs.
- RoWs and other open spaces will be gravel, mineral soil, frequently mowed grass, or maintained vegetation (e.g., ground-cover, shrubs) to act as firebreaks—an obstacle to the spread of a fire.
- Animal deterrents may be installed around the substation to reduce wildlife contact with equipment that can trigger fires.
- Hazardous materials within the substations will be protected by following WHMIS standards.
- A contingency plan will be developed and implemented.

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APPENDIX A

Figures

APPENDIX B

Greenhouse Gas Emissions Calculations

APPENDIX C

Consultation and Engagement Tables

APPENDIX D

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APPENDIX E

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WESP-AC Functional Scores and Summary Tables

APPENDIX I

Bird Tables

APPENDIX J

Visual Simulations

APPENDIX K

Shadow Flicker Report

(high-resolution visuals can be viewed on the NSECC website:
https://novascotia.ca/nse/ea/projects.asp)

APPENDIX L

EMI Analysis

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