ENVIRONMENTAL ASSESSMENT REGISTRATION DOCUMENT

Aulds Cove Wind Project

Prepared for: Green Current Renewable Energy Development Inc.

strum CONSULTING

December 2025

GREENCURRENT
Renewable Energy Development Inc.

December 11, 2025

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

Dear Mr. McInnis,

Re: Environmental Assessment Registration Document
Aulds Cove Wind Project

Please find enclosed the Environmental Assessment Registration Document for the Aulds Cove Wind Project.

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

Sincerely,

Peter Archibald
Chief Executive Officer

EXECUTIVE SUMMARY

Green Current Renewable Energy Development Inc. (GCRED) is proposing to construct and operate the Aulds Cove Wind Project (the Project) near the communities of Aulds Cove, Mulgrave, Grosvenor, and Frankville, Guysborough County, in Nova Scotia. The Project is located in Guysborough County and is an onshore wind farm consisting of up to 21 wind turbines, access roads (11.9 km of new and 2.7 km of existing roads), a substation, electrical collection system, transmission line (100 m), an operations and maintenance building, and temporary laydown yard.

The renewable power generated from the Project will be transmitted to the Nova Scotia Power grid and it will provide enough generating capacity to provide upwards of 50,000 homes with clean energy. The Project therefore supports Nova Scotia's Clean Power Plan, which aims for 80% renewable electricity by 2030 and a 90% reduction in greenhouse gas emissions from electricity compared to 2005 levels.

The Project is considered a Class I Undertaking under Schedule A of the Nova Scotia Environmental Assessment Regulations, N.S. Reg. 26/95, and therefore, requires the registration of an Environmental Assessment Registration Document. The Environmental Assessment Registration Document has been completed in accordance with the requirements outlined in A Proponent's Guide to Environmental Assessment, the Nova Scotia Class I Environmental Assessment Checklist, and the Environmental Assessment Supplemental Checklist: Wind Energy Projects.

The following valued components were identified and evaluated as part of this environmental assessment based on provincial guidance, desktop analysis, and subsequent field studies:

- Atmosphere and air quality
- Climate change
- Sound
- Shadow flicker
- Geophysical environment
- Surface water, fish, and fish habitat
- Wetlands
- Terrestrial vegetation communities and flora
- Terrestrial fauna
- Bats
- Avifauna
- Economy
- Land use and value
- Recreation and tourism
- Archaeological resources

The results of the assessment indicated that the Project, with the implementation of mitigation and monitoring measures, will not result in significant adverse residual effects. The Project will have a positive residual effect associated with the reduction of greenhouse gas emissions through producing clean and renewable energy for Nova Scotians.

GCRED will continue to engage and collaborate with local communities, the Mi'kmaq of Nova Scotia, and government representatives to ensure that any potential concerns identified in association with the Project are addressed and mitigated.

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LIST OF ABBREVIATIONS

%	Percent
µg/m^3	Micrograms per cubic meter
µm	Micrometres
AAQMS	Ambient air quality monitoring station
AAQS	Ambient air quality standards
ACCDC	Atlantic Canada Conservation Data Centre
AIS	Anti-icing system
AMO	Abandoned mine opening
AQHI	Air quality health index
ARD	Acid rock drainage
ARIA	Archaeological Resource Impact Assessment
ATV	All-terrain vehicle
B	Breeding season
BMP	Best management practices
CanREA	Canadian Renewable Energy Association
CBA	Community benefits agreement
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CEA	Cumulative effects assessment
CEO	Chief Executive Officer
CEPA	*Canadian Environmental Protection Act* (Canada, 1999)
CH_4	Methane
CMT	Cognitive Marine Tracker
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPUE	Catch per unit effort
CSD	Census subdivision
CWS	Canadian Wildlife Service
dBA	A-weighted decibels
DBH	Diameter at breast height
DEM	Digital elevation model
DFO	Fisheries and Oceans Canada
DMA	Davis MacIntyre & Associates Ltd.
DND	Department of National Defence
DWC	Diurnal watch count
EA	Environmental Assessment
EARD	Environmental Assessment Registration Document

ECCC	Environment and Climate Change Canada
EMI	Electromagnetic interference
EP	Eel pot
ESA	*Endangered Species Act* (Nova Scotia, 1998)
ESRI	Environmental Systems Research Institute
FAC	Facultative
FACW	Facultative Wetland
FEC	Forest ecosystem classification
FN	Fyke net
FP	Floodplain
FWAL	Freshwater aquatic life
GCDWQ	Guidelines of Canadian Drinking Water Quality
GCRED	Green Current Renewable Energy Development Inc.
GHG	Greenhouse gas
GIS	Geographic information system
GPS	Global positioning system
H_2S	Hydrogen sulphide
ha	Hectares
HADD	Harmful alteration, disruption, or destruction
HPA	High potential area
HSI	Habitat suitability index
Hz	Hertz
IBA	Important Bird Area
ID	Identification
IH	Intolerant hardwood
kHZ	Kilohertz
km/h	Kilometres per hour
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
KMKNO-ARD	KMKNO Archaeological Research Division
kWh/year	Kilowatt-hours per year
LAA	Local assessment area
LED	Light emitting diode
LiDAR	Light detection and ranging
LIT	Long-lived intermediate tolerant
LT	Late-successional
M	Migration
m/s	Metres per second
m^2	Square metres
MARI	Maritime Archaeological Resource Inventory
masl	Metres above sea level
MBCA	*Migratory Bird Convention Act* (Canada, 1994)

MBS	Migratory Bird Sanctuaries
MEKS	Mi'kmaq Ecological Knowledge Study
MET	Meteorological
MHz	Megahertz
MODG	Municipality of the District of Guysborough
MT	Minnow trap
MW	Megawatt
MW	Mixedwood
N	Non-breeding season
N_2O	Nitrous oxide
nBTs	number of biological targets
NI	Non indicator status
NL	Plants that are not listed
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NSAQR	Nova Scotia Air Quality Regulations
NSCCTH	Nova Scotia Communities, Culture, Tourism and Heritage
NSECC	Nova Scotia Environment and Climate Change
NSNC	Nova Scotia Native Council
NSNR	Nova Scotia Natural Resources
NSPI	Nova Scotia Power Incorporated
NSPW	Nova Scotia Public Works
O&M	Operations and maintenance
O_3	Ozone
OBL	Obligate
OGPI	Old-growth potential index
OHV	Off-highway vehicle
OLA	Nova Scotia Office of L'nu Affairs
PC	Point count
pH	Potential of hydrogen
PHP	Port Hawkesbury Paper
PID	Property identifications
PM	Particulate matter
PM_{10}	Particulate matter 10 micrometres or less in diameter
$PM_{2.5}$	Particulate matter 2.5 micrometres or less in diameter
ppb	Parts per billion
PPE	Personal protective equipment
PWA	Protected Water Area
RAA	Regional assessment area
RABC	Radio Advisory Board of Canada

ROW	Right-of-way
SAR	Species at risk
SARA	*Species at Risk Act* (Canada, 2002)
SCADA	Supervisory control and data acquisition
SMP	Special management practice
SO_2	Sulphur dioxide
SOCI	Species of conservation interest
SP	Spruce pine
S-Rank	Subnational rank
STE	Serrated trailing edge
SU	Southern upland
tCO_2e	Tonnes of carbon dioxide equivalent
TDS	Total dissolved solids
TH	Tolerant hardwood
TNS	Tourism Nova Scotia
TSP	Total suspended particulate
UNHI	Unknown high frequency bats
UNLO	Unknown low frequency bats
UPL	Upland
UTM	Universal Transverse Mercator
VC	Valued components
WAM	Wet areas mapping
WD	Wet deciduous
WESP-AC	Wetland Ecosystems Services Protocol – Atlantic Canada
WM	Wet mixedwood
WSS	Wetland of Special Significance
µS/cm	Microsiemens per centimeter

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1.0 PROPONENT DESCRIPTION

Green Current Renewable Energy Development Inc. (GCRED, the "Proponent") is a Nova Scotia owned and operated renewable energy development company focused on delivering clean, reliable, and locally sourced power for the province. The ownership team has a long history of successful development, construction, and operation of wind energy projects in Nova Scotia dating back to 2004. The Proponent is proposing to construct and operate the Aulds Cove Wind Project (the "Project"), an onshore wind farm of up to 147 megawatts (MW) consisting of up to 21 wind turbines. The Project will connect to the Nova Scotia Power Incorporated (NSPI) transmission system and will support the province's transition to renewable electricity while strengthening local energy security.

The Proponent is headquartered in rural Southwest Mabou and is supported by an ownership team of engineers and business professionals with more than 80 years of combined experience in Nova Scotia's renewable energy sector. GCRED is committed to developing high-quality projects that provide long-term community benefits, support regional economic activity, and help advance Nova Scotia's clean-energy future.

GCRED retained Strum Consulting to undertake required technical studies, manage technical subconsultants, and undertake regulatory engagement, which have all contributed to the preparation of the Project's Environmental Assessment Registration Document (EARD). Strum Consulting is an independent multi-disciplinary team of consultants with extensive experience undertaking Environmental Assessments (EAs) throughout Atlantic Canada.

Contact information for the Proponent and their consultant is provided in Table 1.1.

Table 1.1: Proponent and Consultant Contact Information

Proponent Information	
Project Name	Aulds Cove Wind Project
Proponent Name	Green Current Renewable Energy Development Inc.
Chief Executive Officer (CEO)/Principal	Leonard van Zutphen, President Peter Archibald, CEO
Proponent Contact Information for the Environmental Assessment (EA) Registration	Peter Archibald, CEO GCRED 902-631-4441 peter@greencurrentenergy.ca
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Consultant Information	
Name of Consultant	Strum Consulting
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2.0 PROJECT INFORMATION

2.1 Project Introduction

The Proponent is proposing to develop, construct, and operate an up to 147 MW wind project in Guysborough County, near the communities of Aulds Cove, Grosvenor, Frankville, and the town of Mulgrave, Nova Scotia (Drawing 2.1). The center of the Project is located at UTM coordinates (zone 20N) 619360, 5053277. The Project will consist of up to 21 turbines and associated infrastructure, including access roads, electrical collection system, substation, operations and maintenance (O&M) building, and a construction laydown area. The location of the Project was selected based on several factors, including proximity to existing electrical and civil infrastructure, and suitable wind speeds. The Project will interconnect to the existing NSPI transmission system through a substation located approximately 100 m from lines that connect mainland Nova Scotia with Cape Breton Island.

The Project will be developed on a combination of privately owned and provincial Crown lands with most Project infrastructure to be located on privately held parcels secured through long-term lease agreements with participating landowners (Drawing 2.1). For Project components that overlap Crown parcels, the necessary land use agreements will be finalized following EA approval.

Upon approval of the EA, construction activities are proposed to begin in Q3 2026 and once constructed, the Project is expected to be operational for a minimum of 25 years.

2.2 Purpose & Need for the Undertaking

The Project is driven by a strong combination of environmental, economic, and government policy objectives. Wind energy provides clean electricity without fossil fuel combustion, thus reducing greenhouse gas (GHG) emissions and improving local air quality. As part of the Clean Power Plan released in fall 2023, the Government of Nova Scotia set targets for producing 80 percent (%) renewable energy by 2030 and cutting GHG emissions from electricity by 90% (relative to 2005 levels). As the province moves to phase out coal-fired power plants in support of both provincial and federal climate goals, the Project will help Nova Scotia meet its renewable energy target.

In addition to GHG reductions associated with electricity generation, the Project will also enhance local energy security by harnessing a reliable resource that has no fuel cost, which over the long term protects electricity ratepayers from volatile energy prices. Incorporating electricity generated from multiple wind projects into the provincial electrical grid can also improve grid reliability and reduce risks from centralized outages, making the system more resilient.

Beyond the environmental benefits of the Project, the Proponent is also committed to sharing economic opportunities with local communities throughout the development and lifespan of the Project. The Project will generate significant economic activity through construction jobs, long-term operations, community benefit agreements, and local tax revenues for communities.

Engagement with local groups is underway to ensure community input in the Project's development.

2.3 Regulatory Framework

2.3.1 Federal

A federal impact assessment is not required for the Project as it is not located on federal lands or listed as a physical activity that constitutes a designated project as listed in the Physical Activities Regulations under the *Impact Assessment Act* (Canada, 2019).

Federal approval, permit, notification, and compliance requirements for the Project are provided in Table 2.1. Electromagnetic interference (EMI) and radio communication stakeholders have been contacted. The EMI consultation process and status is described further in Section 6.

Table 2.1: Federal Regulatory Requirements

Requirement	Regulatory Body	Status/Comments
Fisheries Act (Canada, 1985b)	Fisheries and Oceans Canada (DFO)	Compliance legislation - there is currently no expectation that an authorization under the *Fisheries Act* will be required. If, during the detail design phase, the Project is determined to have potential to cause a harmful alteration, disruption or destruction of fish habitat or accidental death of fish, the Proponent will submit a Request for Project Review to DFO.
Species at Risk Act (SARA) (Canada, 2002)	Environment and Climate Change Canada (ECCC), and DFO	No SARA permits were acquired for field assessments and none are expected to be required based on Project design.
Migratory Bird Convention Act (MBCA) (Canada, 1994)	ECCC	Compliance legislation - the requirement to obtain an MBCA permit is not anticipated.

2.3.2 Provincial

The Project is subject to a Class I EA as defined by the Environmental Assessment Regulations, N.S. Reg. 26/95 under the *Environment Act* (Nova Scotia, 1995b). As such, this submission has been prepared in accordance with:

- A Proponent's Guide to Environmental Assessment (NSECC, 2025a).
- The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009)
- Nova Scotia Class I Environmental Assessment Checklist (NSECC, 2025d)
- Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c)

Other potentially applicable regulatory requirements, including provincial approvals, permits, notification, and compliance for the Project along with their status are provided in Table 2.2.

Table 2.2: Provincial Regulatory Requirements

Requirement	Regulatory Body	Status/Comments
Watercourse Alteration Permit Wetland Alteration Permit	Nova Scotia Environment and Climate Change (NSECC)	Alteration applications will be submitted to NSECC in accordance with the Activities Designation Regulations following EA approval. Locations requiring alteration are described in Sections 7.3.1 and 7.3.2.
Endangered Species Act (ESA) (Nova Scotia, 1998)	Nova Scotia Natural Resources (NSNR)	Compliance legislation – the requirement to obtain an ESA permit is not anticipated.
Use of Crown lands	NSNR	Crown land use agreements to be finalized following EA approval, as required.
Notification of blasting (if required)	NSECC, Nova Scotia Health and Safety	To be confirmed following geotechnical investigations.
Overweight/Special move permit Access permit Work within highway right-of-way (ROW) Use of ROW for pole lines	Nova Scotia Public Works (NSPW)	Permits to be applied for before mobilizing oversize vehicles on public roads or commencing work within a highway ROW.
Elevator lift license	Nova Scotia Labour, Skills and Immigration	Application to be filed prior to erection of the wind turbines.
Archaeology Field Research Permit	Nova Scotia Communities, Culture, Tourism and Heritage (NSCCTH)	NSCCTH Permit A2025NS124 was obtained to complete the archaeology assessment (Section 9).
Nova Scotia Temporary Workplace Traffic Control Manual	NSPW	Compliance for the use of provincial roads during the construction, operation, and decommissioning phases of the Project.

2.3.3 Municipal

Municipal approval, permit, notification, and compliance requirements for the Project are provided in Table 2.3.

Table 2.3: Municipal Requirements

Requirement	Regulatory Body	Status/Comments
Building Permit and Development Agreement	Municipality of the District of Guysborough (MODG)	Property and dwelling setbacks to be determined through Development Agreement process.
Land Use By-law and Municipal Planning Strategy	MODG, Town of Mulgrave	Permission to construct within the Municipal Water Supply Area of the Town of Mulgrave
Noise Control By-Law	MODG	Compliance with schedule restrictions for construction activities. By-law includes provisions to permit construction activities during specific hours if a Building Permit has been issued.

2.4 Funding

The Project is privately funded through GCRED. There are no public fundings sources to disclose at this time.

3.0 DESCRIPTION OF THE UNDERTAKING

3.1 Geographical Location

The Project is located within Guysborough County, near the communities of Aulds Cove, Grosvenor, Frankville, and the Town of Mulgrave, Nova Scotia (Drawing 2.1). It is primarily located on private lands [1,183.6 hectares (ha)], with six Crown land parcels included in the Study Area (170.3 ha). The Project is centered at UTM coordinates (zone 20N) 619360, 5053277.

A Study Area was established for the Project based on land parcels [i.e., property identifications (PIDs)] that are included in the development area (Table 3.1; Drawing 2.1). The Study Area represents the boundaries of where field data were collected.

Table 3.1: Land Parcels Within the Study Area

Property Identification (PID)	Landowner
35050665	Crown
35053867	Crown
35212380	Crown
35212398	Crown
35212406	Crown
35219369	Crown
35015379	Green Current Owned
35203835	Green Current Owned
35203843	Green Current Owned
35203850	Green Current Owned

Property Identification (PID)	Landowner
35222132	Green Current Owned
35222140	Green Current Owned
35222157	Green Current Owned
35222165	Green Current Owned
35222264	Green Current Owned
35222330	Green Current Owned
35239813	Green Current Owned
35003086	Private
35003128	Private
35014992	Private
35015106	Private
35015114	Private
35015130	Private
35015155	Private
35015171	Private
35015239	Private
35015353	Private
35015361	Private
35015429	Private
35050673	Private
35050731	Private
35053859	Private
35124445	Private
35173137	Private
35204502	Private
35204510	Private
35211796	Private
35211804	Private
35211812	Private
35211846	Private
35211853	Private
35211861	Private
35216951	Private
35216969	Private
35216977	Private
35216985	Private
35219252	Private
35222256	Private
35222322	Private
35224906	Private
35224914	Private

Property Identification (PID)	Landowner
35228279	Private
35228287	Private
35228295	Private
35228469	Private
35231943	Private
35231950	Private
35236835	Private
35238666	Private
35238732	Private
35239672	Private
35239680	Private
35240001	Private
35240019	Private
35240159	Private
35240738	Private
35240746	Private
35240753	Private

Within the Study Area, the Assessment Area represents the physical footprint of the Project where direct physical disturbance is expected to occur (i.e., the Project Footprint), plus a buffer to allow design flexibility. For this Project, the buffer includes a 150 m radial area around each turbine, a 25 m buffer on either side of the centerline for the road layout, and a 20 m buffer on either side of collector lines (Drawing 3.1).

The Project Footprint includes the physical footprint where direct disturbance is expected to occur. This includes a 90 m by 120 m area surrounding turbines, a 25 m wide corridor for road construction/widening, and a 10 m wide corridor for collector lines (Drawing 3.1). The area planned for the Project substation is also included in the Project Footprint; the Project Footprint for the substation is the same as the Assessment Area associated with it, as the whole area is likely to be required for the building and associated infrastructure. The Project Footprint also includes the entire laydown area, an irregularly shaped area in the Project's eastern extent. This land has already been cleared for use as a laydown for the Goose Harbour Lake Wind Farm Project, which was under construction at the time of EA submission. No further clearing or development of this area is required or proposed for the Project, but the area is included in this EA for completeness of the Project's total footprint.

Finally, a Clearing Footprint was also established for the Project, which includes the areas where vegetation clearing may be required to facilitate construction activities, including temporary laydown areas, transmission line corridors, and increased area at turns along roads to facilitate turbine blade transportation during construction (Drawing 3.1). The Clearing Footprint includes a 130 m by 160 m rectangular areas around turbines, a 35 m wide corridor for roads, a 20 m corridor for collector lines, and a 35 m corridor for the transmission line from

the substation. It also includes the substation location and the laydown area (the area for the latter of which has already been cleared). Note that buffers were not always applied evenly on all sides of Project components (e.g., to maximize avoidance of sensitive features). Parts of the Clearing Footprint that do not overlap the Project Footprint will be allowed to revegetate during operations. The areas of the Study Area, Assessment Area, Project Footprint, and Clearing Area are provided in Table 3.2.

Table 3.2: Areas of Study

Area of Study	Area in Hectares
Study Area	1,416.7
Assessment Area	213.2
Project Footprint[(1)]	64.1
Clearing Footprint[(2)]	95.9

[(1)]Area is a conservative estimate of the permanent footprint of the Project. Following the detailed design, the area will be refined.
[(2)]Area is a conservative estimate of the footprint where vegetation clearing will take place during construction.

3.1.1 Siting Considerations

As part of the Project planning process and prior to the completion of field studies, a constraints analysis was undertaken that considered potential effects to the environment, nearby residents, and sociocultural resources. The analysis incorporated the following:

- Results of a topographic mapping, aerial imagery, light detection and ranging (LiDAR) imagery, and manual search for potential receptors.
- Locations of known (or having the high potential for) species at risk (SAR), sensitive habitat, and old growth policy forest to maximize avoidance.
- Locations of known protected areas, significant habitats, wildlife sites, provincial parks, and reserves to ensure avoidance.
- Review of regulated setbacks and separation distances (Table 3.3).

The initial constraints analysis was followed by a comprehensive field program that included biophysical and socioeconomic assessments, as well as engagement with the Mi'kmaq of Nova Scotia, local communities, stakeholders, and government agencies. The results of the field program and engagement inputs were incorporated into the Project design; through this process, several iterations of the Project layout were considered for development before a Project layout was finalized for the purposes of this EA (Drawing 3.2). Changes to the Project layout occurred due to the identification of biophysical constraints during either desktop or field assessments, socioeconomic constraints, or otherwise. Examples of constraints that resulted in layout changes include the results of operational sound modelling, the discovery of bat maternity roost activity, and the identification of SAR flora. Greater detail is provided in the relevant chapters that follow (Sections 5 to 9).

Table 3.3: Summary of Minimum Setbacks and Separation Distances

Setback Category	Distance	Relevant Regulators / Stakeholders
Watercourses	30 m from watercourses, where possible, or otherwise where authorized by NSECC	NSECC
Wetlands	30 m from wetlands, where possible, or otherwise where authorized by NSECC	NSECC, NSNR
Wetlands of Special Significance (WSS)	30 m from WSS, to be determined in consultation with NSECC or otherwise where authorized by NSECC	NSECC, NSNR
Important Habitat Features - Old Growth Forests and Talus Slopes	100 m limited development buffer where possible on Crown land	NSNR
Protected Areas	To be determined in consultation with NSECC and NSNR, as appropriate	NSECC, NSNR
Rare Plants and Lichens	Species-specific (Section 7.4.1)	NSNR
Residences	To be determined through a Development Agreement with MODG and in consultation with landowners	MODG, Proponent Commitment
External Property Boundaries	To be determined through a Development Agreement with MODG	MODG
Public Roads	To be determined in consultation with NSPW and through a Development Agreement with MODG	NSPW, MODG
Shadow Flicker	As necessary to meet shadow flicker guidelines based on shadow flicker modelling	NSECC
Sound/Noise	As necessary to meet sound / noise guidance based on sound modelling	NSECC

3.2 Project Proximity to Other Areas

3.2.1 Towns or Cities

The Project is situated near the communities of Aulds Cove (2.8 km), Grosvenor (4.4 km), Frankville (4.8 km), and the Town of Mulgrave (5.3 km) (Drawing 2.1).

3.2.2 Mi'kmaq Communities

The nearest Mi'kmaq communities are Paqtnkek-Niktuek No. 23 and Welnek No. 38 (19.6 and 22.8 km from the Project, respectively) (Drawing 3.3). Chapel Island No. 5, Whycocomagh No. 2, and Malagawatch No 4. are between 44.0 and 53.8 km from the Project.

Additional details on the Mi'kmaq of Nova Scotia are provided in Section 5.

3.2.3 Other Known Developments

Other known developments near the Project include the Mulgrave Community Wind Farm, located southeast of the Project; the under-development Goose Harbour Lake Wind Farm Project, directly south; the Point Tupper Wind Farm, east of the Project across the Strait of Canso in Richmond County; and the Setapuktuk Wind Project, southeast of the Project (which received EA approval in November 2025 (NSECC, 2025f; Strum Consulting, 2025), but is not yet under development). The closest distance between these projects and the proposed turbine locations for the Project are outlined in Table 3.4.

Table 3.4: Wind Developments Located near the Project

Project	Project Status	Shortest Distance Between Turbines (km)	Direction
Mulgrave Community Wind Farm	Operational	0.5	Southeast
Goose Harbour Lake Wind Farm	Under Development	1.7	South
Point Tupper Wind Farm	Complete	10.8	East
Setapuktuk Wind Project	Proposed	6.6	Southeast

GCRED has engaged with Port Hawkesbury Paper (PHP), the proponent of the under-development Goose Harbour Lake Wind Farm Project (see Section 6.2.4).

In addition to nearby wind project developments, the Martin Marietta – Porcupine Mountain Quarry is approximately 1.9 km from the Project.

3.2.4 Water Supplies

A portion of the Study Area coincides with the Municipal Water Supply Area for the Town of Mulgrave (Drawing 3.3). The watershed has not been designated as a Protected Water Area (PWA) under Section 106 of the *Environment Act* (Nova Scotia, 1995b) and permission to construct within the Municipal Water Supply Area will be sought from the Town of Mulgrave. Within the Municipal Water Supply Area, water for the Town of Mulgrave is withdrawn from Grants Lake, which is within 30 m of the Study Area.

The Landrie Lake Watershed PWA is the nearest PWA to the Project. It is located 8.9 km east of the Project across the Strait of Canso, in Richmond County, Cape Breton.

3.2.5 Parks and Protected Areas

The Hulburt Brook Nature Reserve, pending designation, is located approximately 8.8 km southwest of the Project center (Drawing 3.3). The proposed Nature Reserve is 162.0 ha and protects old forest of sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), and American beech (*Fagus grandifolia*). The closest turbine to Hurlburt Brook Nature Reserve is 5.5 km to the northeast. Cape Breton Highlands National Park, the nearest national park to the Project, is approximately 119 km to the northeast.

3.2.6 Important Bird Areas

The nearest Important Bird Area (IBA) to the Project, Pomquet Beach Region (NS009), is 23.9 km to the west on the Northumberland shore of Antigonish County, Nova Scotia (Drawing 3.3).

3.3 Physical Components

The Project includes the following physical components (Drawing 3.1):

- Turbines
- Turbine pads
- Access roads
- Electrical collector lines
- Substation
- Operations and maintenance building
- Laydown yard
- Meteorological (MET) towers

A mobile batch plant, located on private lands adjacent to the Study Area, will be used to supply concrete for the Project.

3.3.1 Turbines

The Proponent is proposing to construct up to 21 wind turbines, each with an individual generating capacity up to 7.0 MW (Table 3.5). The final selection of a turbine model for the Project has not yet been made; however, for the purposes of the EA, the Proponent has selected the Nordex N163 6.X 7000 wind turbine generator as it is representative of the operating specifications of models being considered for the Project. Each turbine is comprised of a foundation, tower, rotor and blades, nacelle (including the rotor shaft and brake and gearbox system), and a cleared pad surrounding the turbine for construction purposes.

Table 3.5: Turbine Technical Specifications

Turbine Component	Turbine Specifications for Nordex N163 6.X 7000
Rated Capacity	7.0 MW
Rotor Diameter	163.0 m
Blade Length	81.5 m
Hub Height	118.0 m
Total Turbine (Tip) Height	199.5 m
Cut-In Wind Speed	3 metres per second (m/s)
Cut-Out Wind Speed	Up to 26 m/s
Number Of Blades	3
Swept Area	20,867 square metres (m^2)
Rotor Speed (Variable)	Variable

Turbine Component	Turbine Specifications for Nordex N163 6.X 7000
Generator	6-pole doubly-fed induction
Brake System	Aerodynamic brake plus disc brake
Remote Monitoring	Supervisory Control and Data Acquisition (SCADA)

3.3.2 Turbine Pads

The construction of each wind turbine requires a large level work area for storage of turbine components, cranes, and safe operation. Turbine pads will remain in place until decommissioning and may be used throughout Project operations to accommodate the cranes required to complete repairs or replacement of various turbine components.

3.3.3 Road Layout

The total length of access roads proposed for the Project is 14.6 km. This total includes 11.9 km of new roads that will be built for the Project and 2.7 km of existing roads (Drawing 3.1). All roads will be constructed or upgraded as required to safely transport turbine components, provide appropriate turning radii, and support construction activities in compliance with local and provincial guidelines/requirements. During the civil design process for the road layout, consideration will be given to minimize adverse impacts to known locations of sensitive habitats, such as wetlands and watercourses, as well as rare species.

Highway 344 (Marine Drive, between Aulds Cove and the Town of Mulgrave) is the main arterial road leading to the Project, with access to the Study Area via Old Mulgrave Road.

3.3.4 Substation, Power Collection Systems, and Transmission

The Project consists of (Drawing 3.1):

- New overhead medium-voltage electrical cabling (34.5 kilovolt) connecting turbines to the substation.
    - 2.7 km following existing roads.
    - 11.5 km following proposed roads.
    - 2.0 km that follows routes not along existing or proposed roads.
- A substation to gather and step up the produced energy to meet grid voltage on approximately 2.3 ha of land.
- An approximately 100 m long interconnection from the substation to connect the Project with neighbouring NSPI transmission infrastructure. For public safety, the substation will be surrounded by a chain link fence.

3.3.5 Operations and Maintenance Building

The Project will require an O&M building, which will mainly consist of an electrical room, workshop, SCADA room, parts room, conference room, and office spaces. The O&M building will be constructed on approximately 1 ha of land within the laydown yard (Drawing 3.1). The precise size and location of the building will be determined during the detail design phase.

3.3.6 Laydown Yard

An existing laydown yard (used for the Goose Harbour Lake Wind Farm Project), approximately 250 m x 390 m, will be used for the Project to temporarily store equipment and assemble infrastructure.

3.3.7 Meteorological Towers and LiDAR Units

A MET tower and two LiDAR units have been installed within the Study Area for the purpose of monitoring wind and other atmospheric conditions (operational since August 2024). It is expected that these units will be removed and replaced with a permanent MET tower and LiDAR unit. The LiDAR unit will be located within the Assessment Area with the precise location determined during the detail design phase.

3.4 Project Phases

The Project will include three phases:

- Site preparation and construction (15 months, tentatively starting Q2 2026)
- Operations and maintenance (approximately 25 years, tentatively starting Q3 2027)
- Decommissioning (less than one year duration, at Project end of life)

Activities and requirements associated with each phase are discussed in the following sections.

3.4.1 Site Preparation and Construction

Site preparation activities include:

- Completing land surveys for placement of roads, turbines, and associated infrastructure.
- Completing geotechnical investigations.
- Demarcating boundaries of environmentally sensitive features and applying appropriate buffers.
- Installing erosion and sedimentation control measures
- Clearing of trees, grubbing, excavating, grading, and compacting local and potentially imported materials for construction.

General construction activities include:

- Access road construction.
- Laydown area and turbine pad construction.
    - Completion of foundation excavation and construction, including blasting, if required.
    - Preparation of materials and storage (e.g., aggregate crusher and storage areas).
- Transportation of turbine components, equipment, and materials.
    - Establishment of site traffic control measures.

- Turbine assembly.
- Management of site waste and dust.
- Construction and connection of collection system, substation, and transmission lines.
- Removal of temporary works and site restoration.
- Commissioning.

Clearing activities are anticipated to occur between the months of October and April (i.e., outside of the bird nesting window, where possible). General construction is anticipated to occur year-round.

Access Road Construction

Approximately 2.7 km of the existing road network will be re-used as part of the Project and approximately 11.9 km of new road construction will be required to provide direct access to the turbines. Access roads will have a 6 m to 12 m wide road surface and will be up to 25 m wide (including ditching).

During construction, roads will be maintained with additional gravel or periodic grading. Aggregate material for road construction will be supplied from permitted sources located adjacent to the Study Area. Any material removed for road construction will be stored or disposed of in accordance with regulations and best practices for road construction. Any material stored on-site will be managed with appropriate erosion and sedimentation control measures or re-used. To the extent possible, road construction will only occur during daytime hours as will be outlined in the Development Aermit.

The following equipment is typically used during road upgrading and construction:

- Excavators
- Dump trucks
- Bull dozers
- Rollers
- Graders
- Crusher
- Light trucks

Turbine Pad Construction

Turbine pad construction may include:

- Installation of erosion and sedimentation control measures.
- Removal of vegetation and site grading.
- Removal of overburden and soils.
- Blasting/chipping of bedrock (to be determined, based on geotechnical conditions and foundation design).
- Pouring and curing of concrete pads (complete with reinforcing steel; for turbine foundation).

- Placement of competent soils to bring area to grade.
- Compaction of soils.
- Excavation for electrical conduits and fibre optic communication trenches.

The turbine tower foundations will be approximately 28 m diameter (typical for a 7 MW wind turbine) and extend to a depth of 3 m below grade. Foundations will be backfilled (underground) with the exception of the concrete pedestal which will extend up to 1 m above ground to support the wind turbine tower structure.

Each turbine pad (which includes a turbine laydown and construction area and crane pad) is expected to be approximately 90 m by 120 m The exact arrangement of each turbine pad will be designed to suit the specific requirements of the turbine and the surrounding topography during the detailed design process. Turbine pads will be located within the 150 m radius included around turbines in the Assessment Area.

Construction of a typical turbine pad (from clearing to final preparation for erecting of the turbine) can take between one to four months, depending on weather, soil, and construction vehicle availability/access. The following equipment may be used for turbine pad construction:

- Excavators
- Dump trucks
- Bull dozers
- Rollers
- Graders
- Crusher (not required if a local quarry can supply gravel sizes)
- Concrete trucks and pumper trucks
- Light cranes
- Light trucks

Transportation of Turbine Components, Equipment, and Materials

Throughout the Study Area, existing roads are variously accessible by passenger vehicles (public roads), truck/sport utility vehicles, and other vehicles designed for rough dirt roads and tracks. The Study Area is frequented by commercial users, primarily related to forestry activities, as well as the public and recreational users year-round, including landowners, snowmobiling and all-terrain vehicle (ATV) use, and hunting during the fall.

The center of the Project is located approximately 3.2 km southwest of Highway 344. The primary road running east-west through the Study Area is Old Mulgrave Road, which begins outside of the Study Area at an intersection with Highway 4 near Monastery, and ends near the Town of Mulgrave where Old Mulgrave Road turns into Mill Street. Access to the Study Area is possible from Frankville via Havre Boucher Road which connects with Old Mulgrave Road in the western portion of the Study Area. O'Briens Road provides additional access to the northern portion of the Study Area.

The transportation route to deliver turbine components to the Project is subject to the final turbine technology provider, who will undertake a comprehensive logistics study to determine the transportation route from the receiving and unloading port. The primary access route during the operational lifespan of the Project is expected to be via an existing road that connects Highway 344 to Old Mulgrave Road near the laydown area and the off-site quarry. This road is referred to as the "Zutphen Connector". This route is also already in use to bring vehicular traffic and turbine components to the Goose Harbour Lake Wind Farm Project, which is currently under construction.

The following permits and considerations are expected to be required for the transportation of tower components:

- Work Within Highway Right of Way Permit (NSPW).
    - Required if installing access to sites from the roadway, erecting structures within 100 m of the highway or removing access signs and guard rails.
- Over-Weight Moves Special Move Permit (Service Nova Scotia and Internal Services).
    - Required to transport oversized and overweight components. In some cases, due to the size and weight of the components, some may only be transported on Sundays.
- Provincial road weight restrictions will also need to be considered, especially spring weight restrictions, for heavier equipment and materials that will be transported to the Project.
- Access points will be designed with proper height and width to accommodate large trucks and will adhere to commercial stopping sight distances.

Different volumes and types of traffic will be generated throughout the Project's lifecycle. During the construction phase, trucks and other vehicles will be frequently visiting the area resulting in increased vehicular sound and air emissions (see Sections 7.1.1 and 7.1.3 for assessment and mitigation related to air quality and sound). During construction, most days will have 50 to 75 per day, with a few days potentially requiring up to 100 trucks. Outside of the construction phase, the Project will only require technicians to access the site to perform regular maintenance/equipment checks. Provincial road weight restrictions will be considered, especially spring weight restrictions, for heavier equipment and materials that will be transported to the Project. Decommissioning will require a similar amount of traffic to the tower component delivery and construction.

The public road portion of the transportation route may require road modifications to provide access to the Project within the Study Area, especially at some intersections where turns will need to be widened to allow movement of long turbine components. The transportation route for the Project to the Study Area is expected to be the same as the route used for the Goose Harbour Lake Wind Farm Project, such that new modifications outside of the Study Area specifically for the Project are not expected.

Road modifications and upgrades to the transportation route may include the removal of signage and guardrails, upgrades to roads and overhead wires, and removal of branches and signs if conflicts arise. Notices will be installed in public areas to inform residents of signage removal or road infrastructure alterations, as well as notify relevant municipal government staff of construction scheduling and safety measures. Any necessary upgrades to public roads will be completed with consultation with NSPW.

Public access to roads and trails in the area will not be restricted by the Project with the exception of fencing surrounding the substation and temporary restrictions at active construction sites due to safety considerations. In such circumstances, signs will be posted, and physical barriers such as cones, candle sticks, t-posts and rope will be erected. In addition, transportation will avoid travel through urban areas, to the extent possible, during high traffic times.

Turbine Assembly

The wind turbine assembly includes tower sections, the nacelle, the hub, and three-blade rotors. The tower sections will be erected in sequence on the turbine foundation, followed by the nacelle, hub, and blades. All sections will be delivered by specialized transportation equipment, and the pieces will require a crane for removal from the vehicle at each of the prepared turbine pads or staging areas as required. Turbine erection will depend on weather, specifically wind and lighting conditions. Typical assembly duration per turbine is expected to be between two and five days, and between three and five turbines will be delivered and erected per week. The following equipment is expected to be used for turbine assembly:

- Main crane unit
- Assembly cranes
- Manufacturer’s support vehicles

Construction and Connection of Power Collector System, Substation, and Transmission Lines

The following equipment is expected to be used during the grid connection process:

- Excavators and/or back hoes
- Concrete trucks and pumper trucks
- Assembly cranes
- Bucket trucks
- Light cranes
- Light trucks

Removal of Temporary Works and Site Restoration

Once construction has been completed, all temporary works will be removed, and the site will be appropriately graded. The following equipment is expected to be used in this process:

- Excavator and/or backhoe
- Grader

- Hydroseeder
- Light trucks

Commissioning

The turbines will undergo a series of tests for mechanical, electrical, and operational controls prior to unit start-up sequence. Once the start-up sequence has been initiated, another series of performance checks for safety systems will be completed. When the turbines have cleared all tests, the commissioning of the units can begin.

Commissioning includes performance testing. These performance tests will be completed by qualified wind turbine technicians. Additional testing may also be required for transformers, power lines, and substation components; all of which will be performed by qualified engineers and technical personnel.

3.4.2 Operations and Maintenance

The lifespan of the Project is estimated to be a minimum of 25 years. During this time, roads will be used to access the turbines by staff and maintenance personnel. The roads will be maintained with additional gravel and grading, as required. During the winter months, all roads will be plowed, sanded, and/or salted to allow for safe access, as necessary.

A Vegetation Management Plan will be initiated to ensure that access roads and turbine locations remain clear of vegetation (as required for safe operation). Timing of vegetation management will depend on site specific conditions and requirements by the Proponent and/or their operations and maintenance contractors.

Due to the potential for public access to the wind farm, signage will be affixed and maintained on all access roads to provide essential safety information such as emergency contacts and telephone numbers, speed limits, and the hazards associated with being near turbines (i.e., ice throw/shedding). These signs will be maintained during the life of the Project. No gates to restrict access are proposed; however, fencing will be required around the substation for public safety.

Maintenance will conform to manufacturer equipment specifications, industry best management practices (BMPs), and standard operating procedures. Scheduled maintenance work will be carried out on a periodic basis. Maintenance work may require the use of a variety of cranes for brief periods of time for replacement of blades or other turbine repairs. The most common vehicle during maintenance work will be light/medium pickup trucks.

3.4.3 Decommissioning

Prior to decommissioning, NSECC and MODG will be provided with decommissioning plans for review and compliance with the Project's EA conditions. Generally, the decommissioning phase will follow the same steps as the construction phase (in the reverse order):

- Dismantling and removal of the turbines.
- Decommissioning the turbine foundations as per the conditions of the land lease agreements.
- Removal, recycling (where possible), and disposal of power collection system, conductor, and poles.
- Removal of all other equipment and reinstatement and stabilization of land.
- Access roads will either be removed or remain in place as per lease agreements with landowners.

According to the Canadian Renewable Energy Association (CanREA) (CanREA, n.d.), up to 90% of wind turbine blades can be recycled. Additional components, such as steel from the towers, copper cables, and electrical equipment, can also be recycled or reused. Materials that cannot be recycled can sometimes be reused in other applications, such as filler in construction materials. Recent innovations in fibreglass recycling have used various chemical and mechanical means to prepare the material for reuse in other applications (Power Technology, 2024). At the time of decommissioning, it is anticipated that newer technologies will allow for a greater amount of recycling or reuse of the end-of-life turbine materials. Any material that cannot be recycled or reused, will be sent for final disposal at an approval disposal facility.

Decommissioning is expected to take less than one year to complete.

3.5 Project Schedule

The Project schedule, from EA registration to Project decommissioning, is presented in Table 3.6.

Table 3.6: Project Schedule

Project Activity	Timeline
EA Registration	Q4 2025
Post-EA Environmental Monitoring Programs	2026
Geotechnical Assessment	Q1-Q2 2026
Detailed Engineering Design	Q1-Q3 2026
Clearing	Q2 2026
Construction	Q3 2026 to Q3 2027
Commissioning	Q3 2027
Operation	Q4 2027
Decommissioning	2052

4.0 PROJECT SCOPE & ASSESSMENT METHODS

As a Class 1 EA, this Registration Document and supporting studies have been developed to meet all requirements under Section 9(1A) of the Environmental Assessment Regulations, N.S. Reg. 93/2025. As such, this submission has been prepared in accordance with:

- A Proponent's Guide to Environmental Assessment (NSECC, 2025a)
- Nova Scotia Class I Environmental Assessment Checklist (NSECC, 2025d)
- Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c)
- The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009)

Over the past several years, Strum has engaged with provincial and federal regulatory bodies for input and advice on the assessment and reporting on wind projects. In addition, Project team members (the Proponent, Consultant, and sub-consultants) have engaged with the following regulatory bodies to provide input and advice into the EA scope and planning for the proposed Project:

- ECCC – Canadian Wildlife Service (ECCC-CWS)
- NSCCTH
- NSECC
- NSNR
- NSPW
- Nova Scotia Office of L'nu Affairs (OLA)
- MODG
- Town of Mulgrave

4.1 Assessment Scope & Approach

EA is a planning tool used to predict the environmental effects of a proposed project, identify measures to mitigate adverse environmental effects, and predict the significance of any effects after the application of mitigation measures.

The EA focuses on Valued Components (VCs). VCs are specific components of the biophysical and socioeconomic environments that, if altered by the Project, may be of concern to the regulators, stakeholders, Mi'kmaq of Nova Scotia, and/or the public. The scope of the EA for this Project includes:

- Identify VCs that the Project may interact with (by activity and phase) within established spatial and temporal boundaries.
- Establish the existing conditions for VCs.
- Identify potential interactions between the Project and the VCs.
- Assess the potential effects that could occur from the interaction.
- Identify mitigation measures to reduce or eliminate those effects.

- Evaluate the significance of the environmental effects after the implementation of mitigation measures using VC-specific criteria.
- Identify monitoring or follow-up programs to verify predictions and/or evaluate the need to implement adaptive management.

4.1.1 Identification of Valued Components

The following VCs were identified based on the experience of the Project Team and through engagement with regulators, stakeholders, the Mi'kmaq of Nova Scotia, and the public:

- Biophysical environment
  - Atmosphere (weather, climate, air quality, GHGs, sound, shadow flicker)
  - Geology, hydrogeology/groundwater
  - Surface water, fish and fish habitat
  - Wetlands
  - Terrestrial vegetation communities, flora, and fauna
  - Bats
  - Avifauna
- Socioeconomic environment
  - Economy, land use, recreation, and tourism
  - Archaeological and cultural resources

4.1.2 Spatial & Temporal Boundaries

4.1.2.1 Spatial Boundaries

Spatial boundaries are considered separately for each VC and are typically based on natural system boundaries or administrative/political boundaries, as appropriate. The following spatial boundaries have been established for the effects assessment:

- Local Assessment Area (LAA): The area which represents the maximum extent of predicted or measurable direct and/or indirect effects of the Project. The LAA is VC-specific and defined in each VC chapter.
- Regional Assessment Area (RAA): The area provides a broader context for assessing Project-specific effects. The RAA is further reaching than the extent of indirect effects, but not so wide-ranging that the effects within the LAA are not detectable. This area will be used to support the assessment of cumulative effects, accidents and malfunctions, and elsewhere as appropriate. The RAA varies between VCs and will be defined (where necessary) in each VC chapter.

Additional boundaries were also identified for the purpose of field data collection and to describe the area containing Project infrastructure. As detailed in Section 3.1, a Study Area was established based on land parcels (i.e., PIDs) that are included in the development area (Table 3.1; Drawing 2.1). In the early stages of the Project, the Study Area served as boundary within which high-level studies were conducted with the goal of minimizing effects on VCs. The Study Area comprises two main sections, a larger eastern section and a smaller western section. These two sections are connected by a stretch of the Old Mulgrave Road that is also

within the Study Area, although delineation of the Study Area around this connecting section of road is based on a buffer of the road and not PIDs.

Based on analyses of the Study Area, an Assessment Area was established within which more detailed field investigations were conducted. The Assessment Area represents the physical footprint of the Project where the direct physical disturbance is expected to occur (i.e., the Project Footprint), plus a buffer to allow design flexibility. For this Project, the buffer included a 150 m radius area for each turbine, a 25 m buffer on either side of the centerline for the road layout, and a 20 m buffer on either side of collector lines. Additionally, the Assessment Area includes the entire, already-cleared laydown area (Drawing 2.1), which was cleared for use as part of the neighbouring Goose Harbour Lake Wind Farm Project. Finally, an area designated for substation installation is included in the Assessment Area.

Where appropriate, the Assessment Area and Study Area are identified as the LAA and RAA for specific VCs in the individual VC chapters.

4.1.2.2 Temporal Boundaries

The temporal boundaries of the assessment are related to the major phases of the Project and are used for assessing the anticipated duration of environmental effects. The temporal boundaries in Table 4.1 apply to all VCs unless otherwise stated in the individual chapters.

Table 4.1: Temporal Boundaries

Project Phase	Temporal Boundary
Site Preparation and Construction	15 months (tentatively starting Q2 2026)
Operation and Maintenance	Approximately 25 years (tentatively starting Q3 2027)
Decommissioning	> 25 years

4.1.3 Species at Risk

(NSECC, 2009)In evaluating the potential effects of the Project on wild species, special consideration is given to SAR, which include those species listed under SARA (Canada, 2002) and/or ESA (Nova Scotia, 1998). Consideration is also given to species of conservation interest (SOCI), which, for the EA Registration Document, includes species that are:

- Assessed as Endangered, Threatened, or Special Concern by the Committee on the Status of Endangered Wildlife in Canda (COSEWIC) that are not already listed under SARA.
- Have a subnational rank (S-Rank) of S3, S2, or S1 (or a combination thereof) from the Atlantic Canada Conservation Data Centre (ACCDC).

SAR and SOCI species and their supporting habitat are identified in individual VC chapters, as appropriate.

4.1.4 Biophysical Assessment Components and Timing

The biophysical field components of the EA were initiated in fall 2024 and continued until October 2025. The field components, survey timing, and surveyors that completed the assessments are outlined in Table 4.2.

Table 4.2: Biophysical Assessment Components, Timing, and Surveyors

Survey		Date	Surveyor(s)
Vegetation Classification		Various (completed during, vascular plant, lichen, old growth, and wildlife surveys)	Strum Botanists/Biologists
Vascular Plant Surveys	Rare Plant Surveys	June 23 to 26, 2025	Strum Botanists
Lichen Survey		March 24 to 26, and September 22, 2025	Strum Lichenologist
Old Growth Forest Surveys		August 6 to 8, 2025	Strum Biologists
Wildlife Surveys	Incidental Observations	All biophysical surveys	All Surveyors
	Bat Acoustic Monitoring	August 21 to November 1, 2024; March 27 to September 15, 2025	Strum Biologists
	Winter Tracking Surveys	February 5 to 13, 2025	Strum Biologists
	Spring Pellet Group Inventory Surveys	March 30 and April 1, 2025	Strum Biologists
	Trail Cameras	April to September, 2025	Strum Biologists
Avian Surveys	Spring Migration	Round 1: March 25, 26, 28 and April 2-3, 2025 Round 2: April 15 to 17, 2025 Round 3: May 21 to 23, 2025	Strum Biologists
	Breeding Bird	Round 1: June 3 to 6, 2025 Round 2: June 30 and July 2, 2025	
	Nightjar	Round 1: June 2 and 3, 2025 Round 2: June 30 and July 2, 2025	
	Fall Migration	Round 1: August 22 and 23, 2024; August 11, 2025 Round 2: September 25 and 26, 2024; September 15, 2025 Round 3: October 23 and 24, 2024; October 6, 2025	
	Acoustic & Radar Monitoring	Acoustic: August 21 to November 25, 2024; March 27 to September 9, 2025 Radar: August 21 to November 25, 2024; April 23 to August 9, 2025	
Wetland and Watercourse Evaluations		June 23 to September 25, 2025	Strum Biologists

Survey		Date	Surveyor(s)
Fish and Fish Habitat Assessment		Electrofishing: June 11 to 13, 2025 Trapping: June 11 to 12, 2025	
Species at Risk	Incidental	All biophysical surveys	All Surveyors

Minor layout modifications made to the Project following the 2025 field season resulted in changes to the Assessment Area and associated Clearing and Project Footprint areas. While desktop review and incidental observations provide an indication of likely conditions, the following portions of the Assessment Area have not been fully assessed:

- Modified road and electrical collector connections to Turbine 16 to avoid identified constraints within nearby wetlands.
    - While not delineated, wetland has been observed overlapping the Assessment Area associated with the collector line to Turbine 16 and is likely continuous with delineated wet areas to the north.
    - Based on past assessments, wetland is not expected within the Assessment Area associated with the road connecting Turbine 16 to the road network.
    - Mapped watercourses intersect with both the planned road and collector lines connecting Turbine 16 to the road and electrical networks – these have not been field verified or delineated.
- Addition of the short interconnection between the substation and existing infrastructure to facilitate a connection to the Nova Scotia power grid.
    - This area has not been previously searched.
    - There are no mapped watercourses in this small area, but this will be field verified.

The Proponent commits to the completion of assessments in newly added areas prior to the commencement of Project activities in those areas.

4.1.5 Approach to Receptors

The Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c) requires:

a) Modeling to show that operational noise at permanent and seasonal receptors (within 2 km) will not exceed 40 A-weighted decibels (dBA).
b) Modelling to show 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.

Potential receptors (including sensitive receptors such as schools, daycares, and senior residences) located within 2 km of the Assessment Area were identified using geographic information system (GIS) data from the Nova Scotia Topographic Database (GeoNOVA, 2025a) and aerial imagery. This work was conducted by Nortek Resource Solutions Inc. ("Nortek") and the completeness of the database verified at Strum through extensive review of a variety of databases and desktop resources to detect potential additional receptors.

Each potential receptor was field assessed to determine whether the building was habitable or not, as judged by the apparent maintenance status of the building. Receptor verification was completed by Nortek (see Section 7.1.3). Buildings with broken windows, ingress for animals, or other clear signs of neglect demonstrating abandonment were deemed non-habitable. Additionally, active industrial or commercial buildings were classified as non-habitable. Buildings and other features in this category are not considered within this EA and are collectively classified as non-receptor features (Drawing 4.1). Verified receptors were further divided into two categories based on their involvement with the Project. Property and/or building owners with whom the Proponent has an agreement are classified herein as participating receptors and are excluded from operational sound and shadow flicker modelling, as they are participants in the Project. All remaining receptors are classified as non-participating receptors.

As required by NSECC, all non-participating permanent and seasonal receptors within a 2 km radius of any wind turbine are included in the sound and shadow flicker studies. Following exclusion of non-receptor features and participating receptors, 19 non-participating receptors are included in sound and shadow flicker baseline and effects assessments.

4.2 Potential Project-Valued Component Interactions

The potential interactions between the Project and the VCs, by phase, are presented in the individual VC chapters (Sections 7 to 9), following a description of existing conditions. Where an adverse effect on a VC is identified, strategies for avoidance, mitigation, or compensation are proposed. Where possible, mitigation measures are incorporated into Project design to eliminate or reduce potential adverse effects.

4.3 Effects Assessment Criteria

The significance of the effects after mitigation is determined using defined criteria. Most criteria will be the same for all VCs (Table 4.3); however, the magnitude criteria are VC-specific and are provided in the individual chapters.

Table 4.3: Effects Assessment Criteria

Rating Criteria	Rating
Magnitude The amount of change in measurable parameters or the VC relative to existing conditions.	**VC-specific as outlined in individual chapters.**
Geographic Extent[(1)] The geographic area in which an effect occurs.	**LAA:** The area where direct and/or indirect Project-related effects can be predicted or measured for assessment unless impacts are widespread. **RAA:** The area providing broader context for assessing Project-specific effects (if/where applicable).
Likelihood[(1)] Refers to the probability of the impact occurring.	**Unlikely:** Expected to occur with a low degree of certainty. **Possible:** Expected to occur with a low to medium degree of certainty.

Rating Criteria	Rating
	Likely: Expected to occur with a medium to high degree of certainty. **Almost Certain:** Expected to occur with a high degree of certainty.
Frequency Identifies how often the residual effect occurs and how often in a specific phase.	**Single Event:** Occurs once. **Intermittent:** Occurs occasionally or intermittently during one or more phase of the Project. **Continuous:** Occurs continuously.
Duration The time required until the measurable parameter or VC returns to its existing condition, or the potential residual effect can no longer be measured or otherwise perceived.	**Short Term:** Residual effect restricted to no more than the duration of the construction phase and/or decommissioning phase. **Medium Term:** Residual effect extends through the operation, maintenance, and ends before, during, or shortly after the decommissioning phase. **Long Term:** Residual effect extends throughout the Project's lifecycle and beyond the decommissioning phase.
Reversibility Describes whether a measurable parameter or the VC can return to its existing condition after the activity ceases.	**Reversible:** The residual effect is likely to be reversed after the activity is completed. **Irreversible:** The residual effect is unlikely to be reversed. **Partially Reversible:** The residual effect is likely to be partially reversible after the activity is completed.

(1)Criteria used for describing context of the effect; however, these criteria do not factor directly into the significance definition.

If, based on the criteria in Table 4.3, a residual effect is identified, its significance is then evaluated based on the criteria in Table 4.4.

Table 4.4: Definition of Significant Residual Environmental Effect

Magnitude	Duration	Frequency	Reversibility	Significance
Negligible	All	All	All	Not significant
Low	All	All	All	Not significant
Moderate	All	Single Event Intermittent	All	Not Significant
	Long Term	**Continuous**	**Irreversible**	**Significant**
High	Short term Medium Term	Once Intermittent	Reversible Partially Reversible	Not significant
	Medium Term **Long term**	**All**	**Irreversible**	**Significant**

4.4 Monitoring & Follow-Up

Follow-up programs and monitoring, in some cases developed in conjunction with regulators, may be recommended to verify predictions and/or assess effectiveness of mitigation measures and the need to implement adaptive management. Follow-up programs and monitoring are presented, as necessary, in individual VC chapters.

5.0 MI'KMAQ OF NOVA SCOTIA

The Mi'kmaq are the founding people of Nova Scotia and currently live throughout the province, including 13 Mi'kmaq communities (OLA, 2015). The Project is located within the Mi'kmaq territory called Eskikewa'kik, which means "skindresser's territory" (MDCC, 2025b).

The provinces of Nova Scotia, New Brunswick, and Prince Edward Island, and the Gaspé Peninsula in Quebec, are founded on land historically occupied by the Mi'kmaq. The earliest evidence of the Mi'kmaq of Nova Scotia indicates that the ancestors of the Mi'kmaq have existed on the land for more than 11,000 years (MDCC, 2025a).

The Mi'kmaq of Nova Scotia have established Aboriginal and Treaty rights, including the right to fish for a "moderate livelihood" which flows from the Peace and Friendship Treaties, and Aboriginal rights to hunt, fish, and gather for food, social, and ceremonial purposes, more broadly referred to as "traditional" purposes. Mi'kmaq rights are communal rights and therefore shared amongst all members of the Mi'kmaq Nation in Nova Scotia.

The Crown has a duty to consult with the Mi'kmaq of Nova Scotia, which is achieved in accordance with the Mi'kmaq-Canada-Nova Scotia Consultation Terms of Reference. Per Supreme Court of Canada instruction and subsequent guidance from governments [such as the Updated Guidelines for Federal Officials to Fulfill the Duty to Consult (INAC, 2011) and the Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia (OLA, 2012)], the Crown may delegate procedural aspects of consultation to proponents. However, the duty to consult, and ultimate decision-making authority, remains with the Crown. The results of the Proponent's Mi'kmaq of Nova Scotia engagement program and EA development is expected to be considered by the provincial government in the EA decision-making process.

For the purposes of consultation, 11 of the 13 Mi'kmaq communities are represented by the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), which reports to the Assembly of Nova Scotia Mi'kmaq Chiefs. Currently, Millbrook First Nation and Sipekne'katik First Nation represent their own communities in consultation through their elected Chiefs and Councils.

Additionally, the Nova Scotia Native Council (NSNC) is the self-governing authority that represents Mi'kmaq and Aboriginal people living off reserve in Nova Scotia throughout traditional Mi'kmaq territory.

The nearest Mi'kmaq community to the Project is the Paq'tnkek Mi'kmaw Nation on the Paqtnkek-Niktuek Reserve (No. 23) with a population of 372 individuals (Statistics Canada, 2023). Paq'tnkek is located approximately 20 km west of the Project on mainland Nova Scotia. Other, more distant communities include Potlotek First Nation on the Chapel Island Reserve (No. 5) (population 405; approximately 54 km northeast), and We'koqma'q First Nation on the Whycocomagh Reserve (No. 2) (population 877; approximately 44 km northeast); both communities are on Cape Breton Island.

The nearest known Mi'kmaq placenames to the Project are Matuesuatp which means "Porcupine Head", Tui'knek which means "at the out flow", and Tepkiso'katik which means "at the separation place" (T'an Weji-sqalia'tiek, n.d.). These placenames correspond to the areas of Cape Porcupine, Mulgrave, and Pirates Harbour located along Highway 344.

5.1 Engagement

As an integral component of any project development activity in Nova Scotia, the Proponent has engaged with, and will continue to engage with throughout the life of the Project, Nova Scotia Mi'kmaq communities.

The Proponent initiated engagement with the nearest First Nation, Paq'tnkek, in December 2022 to introduce the Project during an in-person meeting. This was followed up in 2024, once more details were known, with a presentation and discussion with the Chief and council members. KMKNO and We'koma'q First Nation were also engaged in 2024 with meetings by phone or teleconference, to share details of the Project. The Proponent had discussions with both Paq'tnkek and We'koma'q about potential investment or partnership opportunities and agreed to follow up once the Project's funding model was more complete. Engagement activities are summarized in Table 5.1.

Table 5.1: Engagement with the Mi'kmaq of Nova Scotia

First Nation / Organization	Representative(s)	Communication Details
First Nations		
Paq'tnkek First Nation and Bayside Development	Chief Cory Julian Rose Paul	December 12, 2022 – Project introduction and initial discussion of the Project. August 23, 2024 – Discussion of current Project details and opportunities for Paq'tnkek First Nation.
We'koqma'q First Nation	Gioia Usher Kyle Usher John MacNeil	April 25, 2024 – Project introduction and discussion of potential financial partnership with the We'koqma'q First Nation. Phone call on November 10, 2025 – Provided current Project details and continued the discussion of possible investment and/or Project partnership.

First Nation / Organization	Representative(s)	Communication Details
Sipekne'katik First Nation	Primary contact per website	December 1, 2025 – Project introduction and site map provided, with offer to discuss further or provide more information upon request.
Millbrook First Nation	Primary contact per website	December 1, 2025 – Project introduction and site map provided, with offer to discuss further or provide more information upon request.
Organizations		
KMKNO	Tracy Menge Patrick Butler	Virtual meeting on March 26, 2024 – Project introduction and initial discussion of the Project. Provided current Project information for review. April 29, 2024 – Email to KMKNO providing current Project information.
Native Council of Nova Scotia	Contact form through website	December 1, 2025 – Project introduction, with offer to discuss further or provide more information upon request.

5.1.1 Review of Concerns

Key areas of interest identified through engagement were related to the following:

- Partnership opportunities

The Proponent will continue to engage with the Mi'kmaq of Nova Scotia and will resume discussions about partnerships when the Project's financial model and when partnership opportunities are clearer.

5.1.2 Ongoing Engagement

GCRED is committed to on-going and meaningful engagement with the Mi'kmaq of Nova Scotia and will provide regular updates and seek feedback throughout the life of the Project. The Proponent will continue to engage with the Mi'kmaq of Nova Scotia to provide information about the Project and the opportunity to share concerns or other comments about the Project before breaking ground and throughout the Project's life.

5.2 MEKS

A Mi'kmaq Ecological Knowledge Study (MEKS) presents a thorough and accurate understanding of the Mi'kmaq of Nova Scotia's use of the land and resources within an area. It is a report of gathered, identified, and documented ecological knowledge which is held by individual Mi'kmaq people. In addition, a MEKS report provides information on proposed Project activities that may impact the traditional land and resources of the Mi'kmaq. The MEKS for this Project is currently under development by Membertou Geomatics Solutions and is geographically scoped to include an evaluation of the Study Area.

The MEKS will consist of two major components:

- Mi'kmaq Traditional Land and Resource Use Activities
  - Considers both past and present uses of the area.
  - Uses interviews as the key source of information regarding Mi'kmaq use.

- A Mi'kmaq Significant Species Analysis
  - 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).
  - Considers resource availability/abundance in the area (along with adjacent areas or in other areas outside), their use, and their importance, with regards to the Mi'kmaq.

The MEKS will consider the land and water areas in which the proposed Project is located to identify what Mi'kmaq traditional use activities have occurred or are currently occurring within the "Study Area"; and what Mi'kmaq ecological knowledge presently exists with respect to the area. This process will be completed in accordance with the Mi'kmaq Ecological Knowledge Protocol, 2nd Edition ("Protocol"), which was established by the Assembly of Nova Scotia Mi'kmaq Chiefs and speaks to the process, procedures, and results that are expected of a MEKS. Per the Protocol, a copy of the MEKS will be provided to KMKNO for review. All MEKS' must be reviewed by KMKNO on behalf of the Assembly to ensure consistency with the Protocol. KMKNO will review the MEKS and advise if the requirements have been met, or if the MEKS must be amended. When this review is completed by KMKNO, a copy of the MEKS will be provided directly to the required reviewers under separate cover. It is expected that the MEKS for the Project will be completed in 2026.

5.3 Commitments to the Mi'kmaq of Nova Scotia

The Proponent is committed to the following mitigation measures to reduce the Project's impact on traditional practices and Mi'kmaq archaeological features (if identified), as follows:

- Offer to provide the Mi'kmaq of Nova Scotia an opportunity to walk the site prior to clearing to document sensitive sites and harvest traditional plants.
- Halt work during construction if archaeological deposits or human remains are encountered. The Proponent will immediately contact NSCCTH and the KMKNO Archaeological Division.
- Offer to provide a tour of the Project to the Mi'kmaq of Nova Scotia, once constructed.
- Develop a Mi'kmaq Communication Plan.
- Develop a Complaint Resolution Plan.
- Continue to engage with the Mi'kmaq of Nova Scotia for the life of the Project.

6.0 ENGAGEMENT

The Proponent is committed to meaningful engagement with government, the public, stakeholders, and the Mi'kmaq of Nova Scotia. To date, the Project Team has participated in meetings, delivered presentations and hosted two Open House events in Aulds Cove and Tracadie.

Associated presentations, posters, and meeting agendas/minutes are provided in Appendix A.

Engagement related to EMI is described in Section 6.3.

6.1 Engagement with Government Departments, Agencies, and Regulators

6.1.1 Regulatory Engagement

The Project Team has met with government entities and officials representing provincial and municipal jurisdictions (Table 6.1) to open lines of communication about the Project and ensure all regulatory requirements are met.

Table 6.1: Government Meetings and Events

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, Comments
Provincial Government		
NSNR	NSNR Staff	August 14, 2023 – Project introduction and discussion of the lease approval process in the Study Area. Throughout EA process – Strum staff contacted NSNR regarding various VC-related questions, as detailed in individual VC chapters
NSPW	Basil Pitts Dan MacEachern Darcey MacBain	April 9, 2024 – Project introduction and initial discussion on conditions and potential upgrading of public roads. October 14, 2025 – Discussion about Project infrastructure and layout review with instructions for after EA approval to prepare and submit a Traffic Plan for component delivery and Working Within the Right of Way Application for collector system in right of way and driveways.
NSECC – EA Branch	NSECC Staff	September 9, 2025 – Strum staff provided a Project introduction, preliminary EA submission timeline, and offer to provide information as requested. November 27, 2025 – Strum staff provided additional Project and EA information with a request for information about submission details.
Municipal Government		
Antigonish County	Councilor Harris McNamara	November 8, 2025 – GCRED received email with feedback on the Project, including various concerns about Project planning and a request for further community engagement opportunities as the Project continues.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, Comments
MODG Staff	Gordon MacDonald Sean O'Connor Shawn Andrews Debbie Torrey	July 11, 2023 – Project introduction and initial discussion about development in the Study Area. October 22, 2025 – Discussion about a potential Project presentation to municipal council and the development of a Development Agreement
Municipality of the Town of Mulgrave	Ron Chisholm Dave Gray	October 23, 2025 – Discussion on compensation for the Town for transportation of Project components through the Town, and on building within the Town water supply watershed.

6.1.2 Review of Government Concerns

Discussion with provincial regulators focused on Project infrastructure location, infrastructure siting and design, and provincial processes. All regulators highlighted the importance of sharing Project information early and in as much detail as possible.

The Project Team has engaged with the municipal planner, economic development staff, councillors, and the Warden throughout the development of the Project. No concerns were brought forward to date from planning staff. Municipal councillors voiced community concerns related to land use, general environmental impact, and community engagement. The Proponent is committed to negotiating a community benefits agreement (CBA) with nearby affected communities, the establishment of a community liaison committee (CLC), and to ongoing engagement with community members.

The Proponent is also committed to ongoing engagement with municipal staff, councillors, and other elected officials about the Project in general, and in the production of a Development Agreement for the Project. The Development Agreement will establish Project-specific rules and guidelines regarding setbacks, various emissions limits and restrictions, and more, following the EA process.

Engagement with government officials will continue through development, construction, and operational phases of the Project.

6.2 Public and Stakeholder Engagement

The Project Team has been involved in formal engagement activities with the public and stakeholders to ensure the community was made aware of the Project and given opportunity to receive information, ask questions, and share local knowledge.

Engagement with the public and stakeholders will continue through development, construction, and operational phases of the Project. Table 6.2 summarizes engagement with stakeholders.

Table 6.2: Stakeholder Meetings and Events

Community/Stakeholder Organization	Engagement
Melford Railway Company Inc.	2023 – 2024 - General discussions of the Project and specific discussions of land purchase.
Participating landowners	June 4, 2024 – Provided an update on the Project status. August 20, 2024 – Provided further Project updates. October 24, 2025 – Provided additional Project updates and notice of the upcoming open house sessions.
Tracadie and District Volunteer Fire Department	November 4, 2025 – In-person discussion of the Project and key safety characteristics.
Aulds Cove Fire Department	November 5, 2025 – In-person discussion of the Project's extent and key safety characteristics, including fire fighters' concerns about site access and overstretched resources.
Members of the public	October 28, 2025 – Correspondence with a resident of Aulds Cove who was looking for more Project information, especially the details of where the Project will be located. October 29, 2025 – Correspondence with a local resident who was looking for more information about the Proponent and the Project. November 13, 2025 – Correspondence with a local resident who wishes to meet in-person, tour the Study Area, and discuss various concerns.

6.2.1 Digital Communications

A dedicated email inbox was set up in October 2025, (info@greencurrentenergy.ca) for members of the public and others to reach the Proponent with questions, comments, concern, or otherwise. The email inbox is actively monitored by the Proponent. The Proponent has invited the public to reach out and engage via this email address through flyers, posters, and on material at the open houses.

6.2.2 Public Open House Events

Two open houses were held on November 4 and 5, 2025. Materials associated with the open houses including advertising materials, attendance logs, and comment cards are provided in Appendix A. A summary is provided in Table 6.3 and the following sections.

Table 6.3: Summary of Open Houses

Open House Number	Open House Date	Location	Number of Public Attendees[1]	Exit Surveys Completed
1	November 4, 2025	Tracadie & District Fire Hall	57	13
2	November 5, 2025	Aulds Cove Fire Hall	59	14
Total			**116**	**27**

[1]Only those attendees who sign in when entering the venue are counted; however, both Open Houses had more attendees who were not counted.

The objective of these engagement sessions was to update the community about fieldwork findings, present Crown land allocation, and gather community feedback to inform the Project design. The Project Team presented 16 posters, answered questions, and took feedback from the local community and various stakeholders.

Sign-in sheets were available for participants to provide their contact information and enable follow up. Exit surveys were also available for participants to provide anonymous feedback.

Both open houses were advertised primarily through mail-drops at neighbouring residences, with posters also posted in local businesses and public gathering spaces. Local municipalities were also informed and recommended to spread the advertisement, and local Facebook pages helped raise awareness of the open houses.

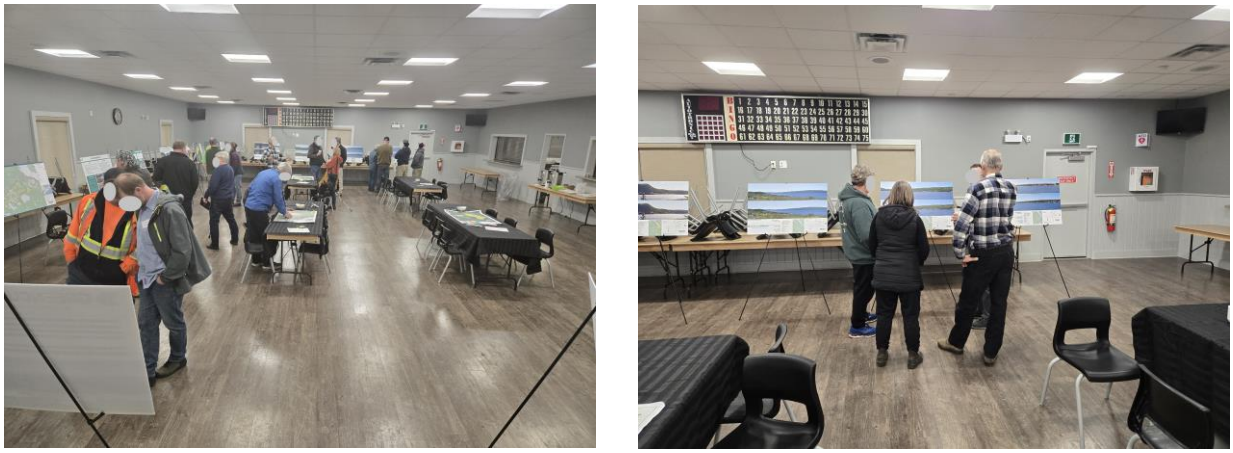

Figure 6.1: Open House #1 (Tracadie)

Figure 6.2: Open House #2 (Aulds Cove)

6.2.3 Review of Concerns

Issues and concerns raised by the public have been grouped into broader categories and reference to the relevant section of the EA in which the concern is addressed have been noted (Table 6.4).

Table 6.4: Comments Received from the Public

Key Issues	Proponent Response	Section of EA
Socioeconomic Impacts		
Will there be benefits to towns and municipalities not directly within the MODG?	Yes, GCRED is committed to sharing economic opportunities with the local community, both within the MODG and surrounding areas, throughout the development and lifespan of the Project via the use of local skills and labour where possible. GCRED will maximize local content where appropriate. To this end, GCRED will hold a job fair prior to the start of construction to engage with local community members and service providers and identify suitable candidates and/or businesses to support construction phase employment and service providers. All local community members and businesses within and near MODG, Mulgrave, and Antigonish County are welcome.	Section 8.1
Will wind turbines be noisy?	NSECC requires sound levels of no more than 40 dBA outside of a home. For context, 40 dBA is equivalent to the sound of a quiet library. Sound modelling results of the Project indicate that all non-participating receptors will fall below the 40 dBA threshold. GCRED will implement a Complaint Resolution Plan to investigate and mitigate (if required) noise-related complaints.	Section 7.1.3
Concerns about shadow flicker caused by turbines.	NSECC requires that a receptor or residential dwelling receive less than 30 hours of shadow flicker per year or 30 minutes per day. Shadow flicker results based on realistic weather and climate conditions indicate that no non-participating receptors will exceed the threshold of 30 hours per year, while modelling limitations make assessment of realistic daily estimates infeasible.	Section 7.1.4
Concerns visual impact of turbines.	Photo renderings of what the Project will look like from specific vantage points and viewsheds have been prepared for this EA. The topographic features of the area help limit views of the Project from up close, while it remains visible from viewpoints further away.	Section 8.2

Key Issues	Proponent Response	Section of EA
Will there be impacts on neighbouring property values?	Based on extensive literature reviews of past research on the potential effects of wind projects on adjacent property values, sale prices of homes near wind energy facilities are not significantly different from those attained for homes sited away from wind energy facilities. Some research also suggests that sale prices may rebound after decommissioning and reclamation.	Section 8.2
Environmental Impacts		
How will this impact wildlife and wildlife habitat, vegetation communities, SAR, waterbodies, and areas of scientific or natural interest?	A full desktop review and extensive field surveys have been completed to identify the presence of wildlife and wildlife habitat, vegetation communities, SAR, waterbodies, and areas of scientific or natural interest. Project infrastructure has been sited to avoid sensitive features. Impacts to watercourses/waterbodies have been reduced by minimizing watercourse crossings and maintaining setbacks where possible. Additional permitting will be required to support watercourse crossings and BMPs will be followed during culvert installations. GCRED has also committed to the development and implementation of a Terrestrial Habitat and Wildlife Management Plan, Erosion and Sediment Control Plan, Surface Water Management Plan, Contingency Plan, and Complaint Resolution Plan.	Sections 7.3.2 7.4.1 7.4.2 7.4.3 7.4.4 7.4.5
Will there be any potential impact to nearby waterbodies and groundwater use?	The NSECC Well Logs Databased identified 92 water wells within 2 km of the Study Area, with no wells located within the Study Area. Mitigation and monitoring will occur including pre-blast surveys, if blasting is required. The Project design has been optimized to minimize interactions between the Project and watercourses. No waterbodies will be directly impacted by the Project. GCRED has committed to the development and implementation of an Erosion and Sediment Control Plan, Surface Water Management Plan, and Contingency Plan, which will help identify and mitigate risks to waterbodies and watercourses.	Sections 7.2.4.4 7.3.2
General		
How will roads be built or improved?	Approximately 2.7 km of Project roads are existing roads that will be used as part of the Project and may require upgrades. Approximately 11.9 km of new roads are required. Clearing activities because of road construction will occur between October and April (i.e., outside of the bird nesting window), where possible.	Section 3.4.1

Key Issues	Proponent Response	Section of EA
Will there be cumulative effects from having many large wind projects nearby each other?	Cumulative effects were built into the predictive modelling and assessment of sound and shadow flicker. A cumulative effects assessment (CEA) for other VCs, where there is the potential for spatial and temporal interactions, was also completed.	Sections 13.2 13.3

6.2.4 Ongoing Engagement

GCRED is committed to continuing to work to address any concerns raised by stakeholders and members of the public over the duration of the Project. Public engagement will likely be largely facilitated through the CLC, which will be established to provide members of the public with the opportunity to meet at regular intervals throughout the Project's lifespan and discuss its effects.

6.3 Electromagnetic Interference Engagement

The rotating blades and support structures of wind turbines can interfere with various types of electromagnetic signals emitted from telecommunication and radar systems (RABC & CanWEA, 2020).

EMI created by a wind turbine can be classified into two categories: obstruction and reflection. Obstruction occurs when a wind turbine is placed between a receiver and a transmitter, creating an area where the signal is weakened and/or blocked. Reflection is caused by the distortion between a raw signal and a reflection of the signal from an object. Scatter is a sub-category of reflection caused by the rotor blade movement.

The EMI assessment identified point-to-point, broadcast systems, radar, navigation, and communications systems susceptible to the effects of windfarm interference. The specific characteristics of a wind turbine will influence the type and magnitude of the interference. Other factors that influence interference include blade dimension and design, tower height, diameter of the supporting tower, as well as the material used for blade and tower construction.

6.3.1 Assessment Guidelines

The Radio Advisory Board of Canada (RABC) and CanREA developed guidelines for assessing the EMI potential from a wind turbine development: Technical Information and Coordination between Wind Turbines and Radiocommunication and Radar Systems; hereafter referred to as the RABC Guidelines (RABC & CanWEA, 2020). These guidelines outline a consultation-based assessment protocol that establishes areas, called "consultation zones", around transmission systems, based on the type and function of the system.

6.3.2 Assessment Methods

Consultation is generally the best method of notification, and this process typically begins with a letter distribution to those parties affected by the development. A summary of the RABC Guidelines for determining consultation zones can be found in Table 6.5.

Table 6.5: RABC Guidelines – Recommended Consultation Zones

Systems	Consultation Zone
Point-to-Point Systems above 890 megahertz (MHz)	**1 km**
Broadcast Transmitters (AM, FM, and TV stations)	AM station: **5 km** for omnidirectional (single tower) antenna system **15 km** for directional (multiple towers) antenna system FM station: **2 km** TV station: **2 km**
Over-the-Air Reception (TV off-air pickup, consumer TV receivers)	Analog TV Station (NTSC): **15 km** Digital TV (DTV) station (ATSC): **10 km**
Cellular Type Networks, Land Mobile Radio Networks, and Point-to-Point Systems below 890 MHz	**1 km**
Satellite Systems (Direct to Home, Satellite Ground Stations)	**500 m**
Air Defence Radars, Vessel Traffic Radars, Air Traffic Control Radars, and Weather Radars	Department of National Defence (DND) Air Defence Radar: **100 km** DND or NAV Canada Air Traffic Control Primary Surveillance Radar: **80 km** DND or NAV Canada Air Traffic Control Secondary Surveillance Radar: **10 km** DND Precision Approach Radar: **40 km** Canadian Coast Guard (CCG) Vessel Traffic Radar System: **60 km** Military or Civilian airfield: **10 km** ECCC Weather Radar: **50 km**
Very High Frequency OmniRange	**15 km**

To conduct an EMI assessment, the following information regarding turbine design and placement is generally required to complete notifications:

- Turbine Universal Transverse Mercator (UTM) coordinates
- Number of turbines
- Ground elevation
- Tower/hub height of each turbine
- Nacelle height
- Rotor diameter
- Turbine blade sweep diameter (or length of blades)
- Turbine base diameter
- Substation/converter location coordinates and height(s) along with new transmission line(s) to connect to a grid.

Response time and feedback from the various organizations vary and can take several weeks. If turbine type, layout or design changes, many organizations will need to be re-consulted prior to proceeding.

6.3.3 EMI Engagement Summary

Engagement with relevant government and community stakeholders was completed and results are provided in Table 6.6. The notification letters sent and associated responses received are provided in Appendix A.

Table 6.6: EMI Engagement Summary

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, Comments
Federal Government		
CCG	Wind Farm Coordinator	September 23, 2025 – EMI notification letter sent via email. September 26, 2025 – Letter of non-objection received.
DND	Military Air Defence and Air Traffic Control; Military Radio communication users	September 23, 2025 – EMI notification letter sent via email. October 17, 2025 – Letter of non-objection received.
ECCC	Weather Radar Coordinator	September 23, 2025 – EMI notification letter sent via email. September 23, 2024 – Acknowledgement email received. October 15, 2025 – Letter of non-objection received.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, Comments
Innovation, Science, and Economic Development Canada	Nova Scotia District Office	September 23, 2025 – EMI notification letter sent via email. September 23, 2025 – Acknowledgement email received. October 6, 2025 – Letter of non-objection received.
NAV Canada	Land Use Specialist	October 3, 2025 – EMI notification letter sent via email. November 18, 2025 – Check in email sent by Project Team. November 18, 2025 – NAV Canada confirmed review in progress.
Royal Canadian Mounted Police	Wind Farm Coordinator	September 23, 2025 – EMI notification letter sent via email. September 24, 2025 – Letter of non-objection received.
Community Stakeholders		
Bell Canada	Wireless Network Core and Engineering Team	September 23, 2025 – EMI notification letter sent via email. September 23, 2025 – Acknowledgement email received. November 18, 2025 – Check in email sent by Project Team. November 18, 2025 – Acknowledgement email received. December 10, 2025 – Non-objection received.
Eastlink	Manager Customer Experience	September 23, 2025 – EMI notification letter sent via email. September 23, 2025 – Acknowledgement email received.
Fire Service Association of Guysborough	Deputy Chief Administrative Officer, MODG	September 23, 2025 – EMI notification letter sent via email. November 24, 2025 – Check in email sent by Project Team.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, Comments
		November 24, 2025 – Acknowledgement email received.
Aulds Cove Volunteer Fire Department	Aulds Cove Fire Department	September 23, 2025 – EMI notification letter sent via email. November 24, 2025 – Check in email sent by Project Team.
Mulgrave Fire Department	Mulgrave Fire Department	September 23, 2025 – EMI notification letter sent via registered mail. September 23, 2025 – Letter received by Canada Post.
Port Hastings Volunteer Fire Department	Fire Chief	November 24, 2025 – EMI notification letter sent via registered mail. November 25, 2025 – Letter received by Canada Post.
Port Hawkesbury Fire Department	Fire Chief	November 24, 2025 – EMI notification letter sent via email.
Rogers Communications Canada Inc.	Rogers Communications Canada Inc.	September 23, 2025 – EMI notification letter sent via registered mail. September 23 – Letter received by Canada Post.
Seaside Communications	Customer Support	September 23, 2025 – EMI notification letter sent via email. September 23, 2025 – Acknowledgement email received.

7.0 BIOPHYSICAL ENVIRONMENT

7.1 Atmospheric Environment

7.1.1 Atmosphere and Air Quality

7.1.1.1 Overview

The assessment of the atmospheric environment included a review of weather, climate, and air quality data.

7.1.1.2 Regulatory Context

Relevant legislation includes:

- *Environment Act* (Nova Scotia, 1995b)
- Air Quality Regulations (Nova Scotia, 2020)

7.1.1.3 Assessment Methodology

The assessment was completed through a review of the following resources:

- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- ECCC Weather and Climate Data (ECCC, 2025c)
- NSECC Ambient Air Quality Data (NSECC, n.d.)

7.1.1.4 Assessment Results

Weather and Climate

Nova Scotia's climate is quite varied and is largely governed by coastal influences and elevation (Davis & Browne, 1996). The Study Area is located primarily within the Mulgrave Plateau Ecodistrict (360), with a small extension of the St. George's Bay (520) Ecodistrict protruding from the north (Drawing 7.1). These ecodistricts are typically cool and humid with strong coastal winds (Neily et al., 2017).

To assess the local climate, weather data (1995 to 2024) were obtained from the three Port Hawkesbury MET stations [Climate Station Identifications (ID): 8204491, 8204495, and 8204495] (Table 7.1), the stations closest to the Study Area (ranging from 3.9 to 5.3 km). While the MET stations are near the Project, this data may not exactly represent the conditions observed within the Study Area.

Table 7.1: Climate Data from the Port Hawkesbury MET Stations (1995 to 2024)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature (°C)													
Daily Avg.	-4.6	-5.3	-2.2	3.1	8.3	13.9	18.7	18.6	14.9	9.7	4.3	-0.7	6.6
Daily Max.	-0.7	-1.1	2.0	7.3	13.4	19.0	23.8	23.6	20.0	14.0	8.0	2.7	11.0
Daily Min.	-8.4	-9.5	-6.3	-1.2	3.1	8.7	13.6	13.6	9.9	5.2	0.6	-4.0	2.1
Extreme Max.	17	13.6	23.7	27.1	31	34	38	34	33	26.5	23.2	16	26.4
Extreme Min.	-23	-27.4	-21.7	-13.5	-6	-3	3.5	2.5	-1.5	-5.3	-13.1	-18.5	-10.6
Precipitation (mm)													
Precipitation	111.6	100.7	79.9	104.2	86.3	111.8	91.3	91.0	104.1	139.7	143.8	127.7	1,292.2

Source: (ECCC, 2025c)

Between 1995 and 2024, the mean annual temperature was 6.6°C, with a mean daily maximum of 11.0°C and a mean minimum of 2.1°C. The coldest months were January and February, with mean daily averages of -4.6°C and -5.3°C, respectively. July and August were the warmest, averaging 18.7°C and 18.6°C, respectively. The MET stations did not consistently

record mean annual snowfall or annual rainfall throughout the entire 30-year period. Therefore, these data were not compiled, and instead, total precipitation was analyzed. The highest levels of precipitation occurred in October and November (139.7 mm and 143.8 mm, respectively) (ECCC, 2025b).

Wind speed and direction data were also obtained from the Port Hawkesbury MET stations (Table 7.2).

Table 7.2: Wind Data from the Port Hawkesbury MET Station (2010 to 2024)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Hourly Speed [km per hour (km/h)]	111	105	109	94	78	83	76	91	91	98	102	117
Most Frequent Direction	NW	NW	NW	NW	NW	NE	NE	NE	NW	NW	NW	NW

Source: (ECCC, 2025b)

From 1995 to 2009, no wind data were recorded at the MET stations. However, from 2010 to 2024, maximum hourly wind speeds recorded at the Port Hawkesbury MET station (Climate Station ID 8204495) ranged from 76 km/h in July to 117 km/h in December. The prevailing wind direction recorded was from the northwest and northeast. Wind may occur in all directions; however, the direction during calm wind flows (≤ 29 km/h) is not recorded at the MET station (ECCC, 2025b).

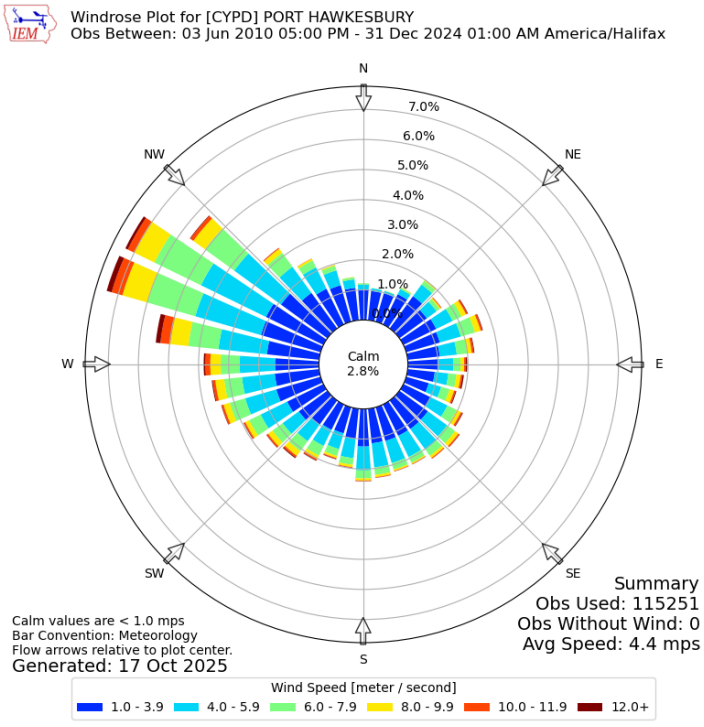

Figure 7.1: Windrose Plot for Port Hawkesbury MET Station (CYPD) – June 3, 2010, through December 31, 2024 (ISU, 2025)

The windrose plot for the Port Hawkesbury MET station (CYPD) illustrates the wind directions from 2010 (the earliest time at which wind data were recorded at this station) to 2024 (Figure 7.1). Wind speeds above 12 m/s (43.2 km/h) occurred most frequently from the northwest (ISU, 2025).

Air Quality

The Government of Nova Scotia has legislated Air Quality Regulations (NSAQR) (Nova Scotia, 2020) under the *Environment Act* (Nova Scotia, 1995b). The ambient air quality standards (AAQS) published in the NSAQR set the maximum permissible ground-level concentration limits (Table 7.3).

Table 7.3: Summary of Regulations Pertaining to Ambient Air Quality in Nova Scotia

Contaminant	Averaging Period	Regulatory Threshold [micrograms per cubic metre (µg/m^3)][(1)]
Carbon Monoxide (CO)	1-hour	34,600
	8-hour	12,700
Hydrogen Sulphide (H_2S)	1-hour	42
	24-hour	8
Nitrogen Dioxide (NO_2)	1-hour	400
	24-hour	-
	Annual	100
Ozone (O_3)	1-hour	160
Sulphur Dioxide (SO_2)	1-hour	900
	24-hour	300
	Annual	60
Total Suspended Particulate (TSP)	24-hour	120
	Annual	70[(2)]

[(1)] Nova Scotia AAQS (Air Quality Regulations, N.S. Reg. 8/2020).
[(2)] Geometric mean.

Nova Scotia monitors air quality at eight ambient air quality monitoring stations (AAQMSs) throughout the province (NSECC, n.d.). Measured parameters vary by location and may include the following:

- SO_2
- CO
- Nitrogen oxides (NO_x)
- Nitric oxide (NO)
- NO_2
- Fine particulate matter (particulate matter 2.5 micrometres or less in diameter; $PM_{2.5}$)
- Ground-level O_3
- TRS

The NO_2, O_3, and $PM_{2.5}$ values from seven of the eight AAQMSs are used to calculate a score on the Air Quality Health Index (AQHI) (ECCC, 2025a; NSECC, n.d.). The AQHI is a scale from 1 to 10+, whereby scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+) (ECCC, 2025a).

The closest AAQMS to the Project with available data is the Port Hawkesbury station, 5.1 km southeast of the Study Area. The baseline maximum ambient air quality conditions observed at the Port Hawkesbury AAQMS from 2020 to 2024 were compared to the current NSAQR (Table 7.4).

Table 7.4: Maximum Ambient Air Quality Conditions Observed at Port Hawkesbury (2020 to 2024)

Parameter	Averaging Period	O_3 (ppb)[3]	SO_2 (ppb)	NO_X (ppb)	NO (ppb)	NO_2 (ppb)	$PM_{2.5}$ (ug/m^3)	TSP (ug/m^3)	CO (ppb)	H_2S (ppb)
Port Hawkesbury AAQMS 2020 to 2024	1-hour	92.5	89.7	139.1	93.9	49.3	64.6	-	-	-
	24-hour	47.6	15	41	21.2	19.7	20.1	-	-	-
	Annual[2]	29.4	0.7	4.2	1.6	2.4	5.4	-	-	-
Nova Scotia AAQS Schedule A[1]	1-hour	82	340	-	-	210	-	-	30,000	30
	24-hours	-	110	-	-	-	-	120	-	6
	Annual	-	20	-	-	50	-	70[4]	-	-
Fraction of Nova SCotia AAQS Schedule A	1-hour	113%	26%	-	-	23%	-	-	-	-
	24-hours	-	14%	-	-	-	-	-	-	-
	Annual	-	4%	-	-	5%	-	-	-	-

Source: (NSECC, n.d.)
[1]Current Nova Scotia AAQS (Air Quality Regulations, N.S. Reg. 8/2020).
[2]Annual averages calculated based on the maximum averaged 24-hour values over a single calendar year.
[3]Parts per billion.
[4]Geometric mean.

Existing air quality conditions (i.e., baseline data; 2020 to 2024) indicate that most of the measured contaminants are well below their respective Nova Scotia AAQS Schedule A limits. The maximum hourly concentration of O_3 exceeded AAQS on three occasions (hours) during the 5-year period (113% of maximum). The reported AQHI typically scores “Low” for risk at all times of the year (ECCC, 2025a).

7.1.1.5 Effects Assessment

Project-Atmospheric Interactions

Project activities will interact with the atmospheric environment through fugitive dust and exhaust emissions from light- and heavy-duty equipment (Table 7.5), primarily during the construction phase. There are no air emissions associated with the operation of the wind

turbines, as the generation of wind power offsets power that would otherwise be generated from fossil fuels.

Table 7.5: Potential Project-Atmospheric Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	-
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for the atmospheric environment is a 200 m buffer surrounding the Assessment Area (Drawing 7.2). This distance is selected as it represents the distance beyond which effects to air quality are considered sufficiently diffuse to no longer represent a potential impact to humans. The RAA for atmospheric is not applicable.

Assessment Criteria

The assessment criteria provided in Section 4.3 apply to the atmospheric environment. The VC-specific definition for magnitude is as follows:

- Low: Air quality is expected to remain less than or equal to the maximum permissible ground-level concentrations as defined by the NSAQR
- High: Air quality is expected to exceed the maximum permissible ground-level concentrations as defined by the NSAQR

Effects

Fugitive dust emissions consist of particulate matter (PM) and may be generated from open-air activities (e.g., moving earth/disturbing soil, wind erosion, increased traffic). Fugitive dust emissions are composed mainly of soil minerals, but can also contain salt, pollen, spores, and tire particles. PM is measured as TSP and is defined as the mass of airborne particles having a diameter of less than 44 micrometres (µm). There are two forms of PM that pose the greatest concern for human health: PM with a diameter of 10 µm or less (PM_{10}) and $PM_{2.5}$.

Depending on its composition, concentration, and proximity to a human receptor, fugitive dust can affect lung and heart functions when it enters the atmosphere. Particulate matter has been linked to premature death (people with lung and heart disease), non-fatal heart attacks, irregular heartbeat, aggravated asthma, decreased lung function, and increased respiratory symptoms such as irritation of the airways, coughing, or difficulty breathing. People with underlying lung and heart disease, children, and the elderly are the most susceptible to particulate pollution exposure (US EPA, 2024b).

Fugitive dust may also affect visibility and cause environmental damage. Fine particles are the leading cause of reduced visibility in many cities, national parks, and wilderness areas. In addition, fugitive dust particles can be carried over long distances (via wind), deposited in other locations, and within surface water features. Some of the potential effects of particulate deposition may include the following (US EPA, 2024b):

- Increasing lake and stream acidity
- Altering coastal water and large river basin nutrient balance
- Depleting soil nutrients
- A variety of effects on flora (described further in Section 7.4.1)
- Affecting ecosystem diversity
- Contributing to acid rain effects

Anticipated sources of fugitive dust emissions from the Project will be primarily associated with the Project's construction and may include the following activities:

- Soil disturbance during site preparation (i.e., clearing/grubbing, grading, etc.)
- Wind erosion from soil or rock stockpiles during grading
- Increase in traffic on roadways from travel by Project personnel (to/from the site)
- Management of on-site materials transfers (i.e., loading/unloading)

To assess the potential effects of fugitive dust emissions, permanent and seasonal receptors were identified through a review of aerial imagery with manual verification (Section 4.1.5) and the potential for interactions with fugitive dust emissions was assessed. Fugitive dust travel distance is influenced by several factors, including the height at which the dust is released, wind conditions, and particle size. Under standard conditions, fugitive dust particles above 30 µm settle out within 100 m of the emission source. Other finer particles have a slower settling velocity and may travel further (US EPA, 1995). The LAA is well vegetated, which will likely

help to reduce the travel distance of fugitive dust emissions from the Project Footprint (US EPA, 2014).

The closest non-participating receptor is approximately 673 m from the Project Footprint. Therefore, the nearest non-participating receptor is beyond the extent to which fugitive dust emissions are expected to travel or pose an impact. A single, seasonal, participating receptor is located within the LAA, within approximately 40 m of the Old Mulgrave Road, which was recently upgraded for the neighbouring Goose Harbour Lake Wind Farm Project. No further upgrades are required to the Old Mulgrave Road; however, the Project Footprint associated with Turbine 11 is located approximately 90 m to the south of the receptor. The Proponent will implement construction mitigation measures (e.g., wet stockpiles or roadways), as required, to minimize potential effects to this receptor related to fugitive emissions. Fugitive dust emissions are considered short-term (construction) and intermittent.

In addition to fugitive dust, construction may increase combustion residuals and/or exhaust tailpipe emissions, primarily PM, NO_x, SO_2, and CO from vehicles (i.e., travel by Project personnel, transport/delivery activities) and heavy equipment. Exhaust emissions are primarily anticipated to be associated with road construction and upgrades within the Project Footprint. The US EPA (2014) determined that most roadway emissions meaningfully impact baseline air quality within the first 200 m (approximately) from the emission source. Therefore, exhaust emissions are not anticipated to impact the baseline beyond the extent of the LAA, and as such, impacts to local non-participating receptors are not anticipated. The single participating receptor within the LAA will be subjected to emissions from Project-related activities throughout its lifespan, especially during construction and decommissioning. These emissions will be similar to those already caused by hauling for construction of the Goose Harbour Lake Wind Farm Project. Emissions will primarily originate along the established Old Mulgrave Road, in addition to those related to the construction of Turbine 11. Overall, exhaust emissions are considered short-term and intermittent.

Mitigation

Measures to minimize and mitigate the creation and emission of pollutants, including fugitive dust and exhaust emissions, will be implemented for the Project (particularly for the construction phase). General mitigation measures for fugitive (dust) emissions include:

- Minimize the footprint of disturbance to the extent practicable.
- Conduct grading and site preparation in phases to minimize disturbed soil areas until just prior to construction activities.
- Stabilize exposed soil surfaces by sloping or using vegetation, stone, soil, or geotextiles to prevent dust and airborne particles.
- Compact and/or ridge disturbed soil to prevent dust formation.
- Consider ceasing dust-generating construction activities during dry periods (i.e. summer) when winds are high, where practical.
- Wet aggregate and soil stockpiles with water to control dust, as required.
- Design storage areas and material stockpiles with prevailing wind directions in mind.

- Wet roadways and heavy traffic areas with water or other approved dust suppressant technologies to minimize airborne emissions, as required.
- Post and maintain speed limits for on-site transportation and mobile equipment.
- Tie down, cover, and/or store loose site materials and/or products prior to inclement weather and wind events to prevent materials from becoming airborne.
- Wash down vehicles and equipment using hoses and water to remove accumulated mud/dirt on undercarriages, tracks, or wheel wells.
- Require that Project personnel adhere to all safety protocols and wear appropriate personal protective equipment (PPE) in the event of significant fugitive emissions events (i.e., windstorms, dust storms).

General mitigation measures for exhaust emissions include:

- Require that equipment meets all applicable provincial and air quality regulations and emissions standards.
- Maintain engines and exhaust systems according to the manufacturer's specifications and the recommended maintenance schedule.
- Remove malfunctioning equipment and/or equipment generating excess amounts of smoke, odour, or noise from service until an assessment and necessary repairs can be completed.
- Remove construction equipment with improperly functioning emissions control systems from service.
- Restrict the idling of equipment where feasible.

Monitoring

Given the low impacts, no monitoring is required.

Conclusion

The predicted residual effects of the Project on the atmosphere and ambient air quality (after mitigation) are characterized in Table 7.6.

Table 7.6: Atmosphere and Air Quality Residual Effects

Effect Detail	Fugitive Emissions	Exhaust Emissions
Magnitude of Effect	**Low:** Some fugitive emissions are anticipated, but they are expected to remain below the maximum permissible ground-level concentrations.	**Low:** Some exhaust emissions are anticipated, but they are expected to remain below the maximum permissible ground-level concentrations.
Geographic Extent of Effect	200 m buffer of the Assessment Area	200 m buffer of the Assessment Area
Frequency of Effect	**Intermittent:** Effects may occur during the Project's construction, operation, and decommissioning phases, but only intermittently.	**Intermittent:** Effects may occur during the Project's construction, operation, and decommissioning phases, but only intermittently.
Duration of Effect	**Short Term:** Effects are mainly confined to the construction and decommissioning phases.	**Short Term:** Effects are mainly confined to the construction and decommissioning phases.

Effect Detail	Fugitive Emissions	Exhaust Emissions
Reversibility of Effect	**Reversible**	**Reversible**
Significance Level	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible		

7.1.2 Climate Change

The effects of the Project on climate change are addressed in terms of GHG emissions per NSECC's A Proponent's Guide to Environmental Assessment (2025a) and the Guide to Considering Climate Change in Project Development in Nova Scotia (2011d).

7.1.2.1 Overview

Climate change refers to long-term, detectable changes in weather patterns and conditions, often including alterations to temperature and precipitation regimes. Climate change typically involves changes in average conditions and variability. GHGs from anthropogenic sources are the main contributors to climate change. Since GHGs disrupt natural heat transfer processes within the Earth's atmosphere, a build-up of these gases has enhanced the natural greenhouse effect. These human-induced enhancements are especially of concern since ongoing GHG emissions have the potential to warm the planet to levels that have yet to be experienced (ECCC, 2019c).

The effects of the Project on climate change are described in terms of GHG emissions from wind energy produced by the Project.

The impacts of climate change on the Project are assessed separately under Section 11.1.

7.1.2.2 Regulatory Context

The climate change assessment considered the following Acts and Regulations:

- *Environment Act* (Nova Scotia, 1995b)
- Greenhouse Gas Emissions Regulations (Nova Scotia, 2009)
- *Environmental Goals and Sustainable Prosperity Act* (Nova Scotia, 2012)
- *Canadian Environmental Protection Act* (Canada, 1999)
    - Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations (Canada, 2010)
    - Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations (Canada, 2013)
    - Ozone-depleting Substances and Halocarbon Alternatives Regulations (Canada, 2016)

7.1.2.3 Assessment Methodology

The objectives of this assessment include the following:

- Establish Project related GHG sources.
- Quantify baseline and Project-generated GHG emissions.
- Mitigate and minimize GHG generation from Project-related activities.

Sources of GHG emissions were identified through a review of Project phases, components, and equipment.

Project-generated GHGs were quantified in accordance with the specifications described in the International Standard ISO 14064 (2019), and using published values found in the literature (sources provided in applicable sections that follow) and emission factors published in the NSECC Standards for Quantification, Reporting, and Verification of Greenhouse Gas Emissions (2018).

The determination of climate change impacts was completed based on estimated construction impacts (e.g., shipments and materials) and the current Nova Scotia energy grid. Where detailed construction methodologies are not yet determined, reasonable estimates for construction materials, suppliers, and transportation distances were used. Furthermore, the Nova Scotia energy grid is expected to decarbonize to meet its net-zero emission targets. This will involve the development of additional renewable energy or low-carbon intensity electrical generation projects (NSECC, 2022a). These renewable energy targets were not included in the baseline GHG emission calculations. All emissions, unless otherwise stated, are reported in tonnes of carbon dioxide equivalent (tCO_2e).

7.1.2.4 Assessment Results

Sources of Greenhouse Gas Emissions

The main GHGs of concern include:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous oxide (N_2O)
- Halocarbons
- Water vapour

GHGs may be natural or anthropogenic in origin, except halocarbons, which are human-made (ECCC, 2019a). The following subsections describe the GHGs and their contributors (sources) as anticipated during each Project phase. However, during the operations phase, GHG emissions will be limited to maintenance activities (e.g., transportation and materials). Where these activities are intermittent and short-term, the GHG contributions from operations are negligible and are not considered further.

Carbon Dioxide

The primary source of anthropogenic CO_2 is burning carbon-containing fossil fuels (i.e., coal, oil, and natural gas) and deforestation/land clearing activities.

Site preparation and construction for the Project will include several activities that are likely to produce CO_2; including, but not limited to:

- Use of heavy equipment (excavators, dozers, cranes, etc.).
- Use of light-duty vehicles and equipment (pick-up trucks, generators, etc.).
- Land clearing, including the decay of cut foliage (which slowly releases CO_2).
- Cement production heats limestone, which releases CO_2 (ECCC, 2019a).

Methane

Primary sources of anthropogenic CH_4 include landfills, sewage, and the incomplete combustion of fossil fuels with insufficient oxygen (ECCC, 2019a). The Project's construction phase requires different heavy- and light-duty equipment, contributing to CH_4 emissions.

Nitrous Oxide

The primary sources of anthropogenic N_2O are related to the use of nitrogen-based synthetic fertilizers and manure. These sources have added significant amounts of reactive nitrogen to Earth's ecosystems. Other contributors include the release of N_2O into the atmosphere during the combustion of fossil fuels and biomass (e.g., trees or wood-based fuels) and from some industrial sources (ECCC, 2019a).

The Project's construction phase requires heavy- and light-duty equipment, which can contribute to N_2O emissions. Land restoration activities (i.e., fertilizers) following construction will also contribute to N_2O emissions. Overall, the production of N_2O in association with this Project is anticipated to be minimal, in relation to other sources of GHGs.

Halocarbons

Halocarbons are a group of synthetic chemicals containing a halogen group (e.g., fluorine, chlorine, and bromine) and carbon (ECCC, 2019a). They are typically used in refrigerants, fire-extinguishing agents, and solvents (ECCC, 2013). There are various industrial sources, but the main contributor is aluminum production (US EPA, 2024a).

During the construction phase, the primary source of halocarbon emissions would likely be accidental releases or leaks (losses) associated with coolants in air conditioning units found in vehicles, portable construction buildings (i.e., trailers), and equipment. Fire-extinguishing agents (containing halocarbons) may also be used in the event of an emergency which requires a fire-fighting response. Overall, halocarbon release is anticipated to be minimal and not considered further.

Water Vapour

Water vapour is the most important naturally occurring GHG. Human activities do not directly influence the amount of water vapour in the atmosphere, as it is a function of the atmosphere's

temperature. The atmosphere can hold approximately 7% more water vapour for every additional degree Celsius in air temperature. When the air becomes saturated with water vapour, the water vapour condenses and falls as rain or snow, leading to climate change effects (i.e., variations in weather patterns).

As climate-warming gases (i.e., CO_2, CH_4, N_2O) increase in the atmosphere, the temperature rise increases water evaporation from the Earth's surface and increases the atmospheric water vapour concentrations. This increased water vapour, in turn, amplifies the warming from the initial GHGs, causing the cycle to repeat and temperatures to keep rising (ECCC, 2019a).

Project activities contributing to GHG emissions are not expected to affect water vapour concentrations in the atmosphere, and this is therefore not considered further.

Quantification of the GHG Baseline Conditions

The GHG baseline is a reference to sources, sinks (removing), and reservoirs (storing) occurring in the Project's absence and is used to compare pre- and post-Project conditions. The baseline demonstrates the quantity of carbon dioxide equivalent (CO_2e) emitted from current electricity production methods for the same electrical generating capacity as the Project.

The baseline sources are related to emissions generated from electricity currently produced in Nova Scotia from coal, oil, natural gas, and wind. There are no sinks and reservoirs attributed to the baseline scenario.

The Project consists of up to 21 turbines capable of generating as much as 147 MW of renewable energy. Based on the wind turbine design capacity and an anticipated net capacity factor of 45.1% (provided by the Proponent), the Project will be capable of producing approximately 608,417,040 kilowatt-hours per year (kWh/year). The Project's lifespan is estimated at a minimum of 25 years.

Quantifying GHGs in terms of tCO_2e requires using current electricity-generating practices. For the third quarter of the year 2025 (latest available data), electricity generated in Nova Scotia by NSPI (the leading producer) was produced from the following fuel sources (NSPI, 2025):

- Coal (36%)
- Natural Gas (12%)
- Wind (15%)
- Renewable Imports (20%)
- Hydro (7%)
- Non-Renewable Imports (4%)
- Biomass (3%)
- Oil (2%)
- Other Renewables (1%)

A large amount of electricity generated for use in Nova Scotia comes from coal, natural gas, and oil, cumulatively accounting for 50% of the energy mix. Renewable sources (biomass, wind, renewable imports, hydro) account for 46%, and the remaining 4% consists of non-renewable imports.

For the purpose of this assessment, the non-renewable energy imports are distributed amongst coal (+1%), natural gas (+2%), and oil (+1%). Therefore, the fractions used for this assessment were coal at 37%, natural gas at 14%, and oil at 3%. Renewable energy (locally sourced and imported) was lumped together, and for this assessment, renewables were considered as wind energy at 46%.

Table 7.7 summarizes the GHG emission factors for the different types of electricity generated in Nova Scotia.

Table 7.7: Electricity Fuel Source Emission Factors

Electricity Fuel Source	Emission Factor (tCO_2e/kWh)
Coal	0.00105
Natural Gas	0.00044
Oil	0.00111
Wind	0

Source: (EIA, 2023)

Given the current electricity generation methods and the fuel source emission factors (Table 7.7), Table 7.8 summarizes the baseline GHG emissions. Baseline emissions are defined here as the quantity of CO2e emitted from the current electrical grid for the same electrical generating capacity as the Project.

Table 7.8: Baseline Quantification Summary

Electricity Fuel Source	Electricity Generation (kWh/year)	Emissions (tCO_2e)
Coal	225,114,305	236,413.02
Natural Gas	85,178,386	37,258.35
Oil	18,252,511	20,239.34
Wind	279,871,838	0
Total	**608,417,040**	**293,910.71**

The total calculated annual GHG emissions generated in Nova Scotia for the same electrical capacity as the Project (based on Q3 2025 data) is **293,910.71 tCO_2e.**

Detailed CO_2e calculations are provided in Table 1 (Appendix B).

GHG Emissions Quantification – Construction Phase

Access Roads

The construction and upgrading of new and existing roads will require the removal of vegetation and overburden, creating fugitive dust and GHG emissions. However, fugitive dust and GHG contributions from these activities, which are temporary and short-term, represent a small incremental addition to the overall Project emissions and therefore were not quantified. Section 7.1.1 discusses fugitive dust and air emissions as they relate to the Project.

Laydown Areas

Laydown areas are intended to store equipment temporarily, the turbine pad foundation, and the crane pad. Construction activities and equipment associated with developing laydown areas may generate fugitive dust and GHG emissions. However, an existing laydown area from the existing Goose Harbour Lake Wind Farm Project will be reused for this Project. This will reduce fugitive dust and GHG emissions. Additionally, a vegetation management plan will be initiated to restore the lost flora and reduce dust resuspension while maintaining access and clearances to the turbine.

Turbine Foundation

A concrete tower foundation and pedestal will be required for each wind turbine. As such, the Project will require a large quantity of concrete and steel to be produced and delivered to each wind turbine location.

The Proponent provided the anticipated materials to construct each tower foundation, including 1,000 m^3 of concrete and 146 tonnes of steel (rebar and anchor cage) per foundation. The concrete will be provided to the Project by a local batch plant located approximately 1.2 km from the Study Area. The steel supplier has not been identified at this stage of the Project; as such, for this assessment, transportation distances are based on a nearby steel supplier located approximately 47.5 km from the Study Area. The quantification of the GHG emissions requires the following inputs:

- The vehicle size and fuel type used to transport the materials.
- The distance travelled to and from the concrete/steel supplier to the wind turbine sites.
- The freight and weight associated with each trip (to and from each turbine location).
- The quantity of concrete and steel produced for the wind turbine bases.

Heavy-duty diesel concrete trucks and heavy-duty haulers will be required to transport concrete and steel to the Project. Given that the turbine locations are scattered across the Project's extent, transportation distances range from approximately 1 km to 8 km.

It is assumed that each concrete truck will carry approximately 9 (m^3)[1] of concrete per delivery for a total of 112 deliveries per wind turbine. Similarly, it is assumed that each heavy hauler would carry no more than 38 tonnes of steel per truck, for a total of 4 trucks per turbine pad.

[1] $1{,}000\ m^3 \div 9\ \frac{m^3}{truck} = 112\ trucks$

A single one-way trip from the concrete batch plant to any given turbine would range between approximately 2 km and 9 km. However, the cumulative one-way distance from the concrete batch plant to all wind turbines is approximately 151 km. Similarly, the cumulative one-way distance travelled from the steel supplier to every turbine is approximately 1,171 km.

Table 7.9 summarizes the GHG emission factors for the different components used for concrete- and steel-related activities.

Table 7.9: Concrete Manufacturing and Transportation Emission Factors

Component	Emission Factor
Concrete Production	$3x10^{-4}$ tCO_2e/kg
Concrete Truck/ Heavy-Duty (Diesel) with Freight	$1.35x10^{-4}$ $tCO_2e/tonne{\cdot}km$
Concrete Truck/ Heavy-Duty (Diesel) without Freight	$1.106x10^{-3}$ tCO_2e/km
General Steel Production	1.5 $tCO_2e/tonne$

Sources: (Hammond & Jones, 2011; Squared Consultants Inc, 2025)

Given the travelling distances, the quantity of concrete and steel required for the Project, and the emission factors (Table 7.9), the CO_2e emissions for constructing all the tower foundations and pedestals are expected to be approximately **19,762.11 tCO2e**.

Detailed CO_2e calculations are provided in Table 2 (Appendix B).

Turbine Production

The Project will require wind turbines to be manufactured and delivered to the Project Area. For the purposes of this EA, the Proponent has selected the Nordex N163 6.X 7000 turbine.

To quantify GHG contributions from the turbines during the construction phase, the following items were assessed:

- The turbine materials and quantity.
- The turbine transportation distances from the manufacturer to the intended wind turbine laydown.
- The vehicle size and fuel type used to transport the wind turbines.

For quantification purposes, the assessment assumed the following:

- Manufacturing Material: Steel
- Manufacturing Location: Nordex, Chennai, India
- Nearest US Shipping Port: Chennai, India
- Nearest Nova Scotia Shipping Port: Strait of Canso Superport, Nova Scotia

Wind turbines are typically made up of 12 principal components (Electrical Academia, 2018):

- Blade (three)
- Drive train
- Gearbox
- Generator
- Hub
- Nacelle
- Rotor
- Speed shafts (low and high)
- Tower

According to the National Renewable Energy Laboratory (Mone et al., 2017), the total weight of manufacturing material is equivalent to approximately 120,000 kg/MW. Given the Project's wind turbine model capacity of 7.0 MW, the total weight of a wind turbine is assumed to be approximately 840,000 kg.

The GHG emission factor for wind turbine manufacturing is provided in Table 7.9 (general steel).

Given the steel required to produce the wind turbines for the Project and the emission factor (Table 7.9), the CO_2e emissions from the manufacturing of all the wind turbines are expected to be approximately **27,720.00 tCO2e.**

Nordex SE has manufacturing facilities in multiple countries, including an onshore turbine manufacturing plant in Chennai, India (Nordex SE, 2019). For this assessment, Project turbines are assumed to be manufactured at this location, then will travel to the Port within Chennai by heavy diesel hauler (transport), where they will be shipped via diesel cargo vessel to the Strait of Canso Superport, Nova Scotia. Table 7.10 summarizes the transportation distances from the manufacturer to the Project.

Table 7.10: Wind Turbine Transportation Distances

Origin	Destination	Distance (km)
Chennai, India	Port of Chennai, India	49 (Land)
Port of Chennai, India	Strait of Canso Superport, Mulgrave, Nova Scotia	21,400 (Marine)
Strait of Canso Superport, Mulgrave, Nova Scotia	Aulds Cove Wind Project	Varied (Land)

To determine the travel distance for a wind turbine, the following assumptions were made:

- Each component will be individually transported via a single diesel heavy hauler.
    - 12 components per turbine to travel from the manufacturing facility in Chennai, India, to the Port in Chennai.

    - 12 components per turbine to travel from the Strait of Canso Superport, Mulgrave Port, Nova Scotia, to the turbine location (distance will vary from one turbine location to another).
- Each wind turbine (in its entirety) will be transported via a single diesel cargo vessel (marine)

Based on the land distance from the manufacturer to the individual wind turbine location, the total land transportation distance for all turbines is approximately **15,532 km**. The total marine transportation distance associated with getting the wind turbines from India to the Strait of Canso Superport, Mulgrave, Nova Scotia, is approximately **470,800 km**. The distances travelled consider travel from the manufacturer to the Project Footprint only; an equivalent return distance is not considered, as the hauling companies would have commitments with other clients, and those GHG emissions would not be attributable to the Project.
GHG emission factors for the different components of wind turbine transportation are provided in Table 7.11.

Table 7.11: Wind Turbine Transportation Emission Factors

Component	Emission Factor (tCO_2e/tonne·km)
Heavy Duty Truck (Diesel) with freight	$1.35x10^{-4}$
Marine Cargo and Container Vessel (Diesel) with Freight	$1.51x10^{-5}$

Sources: (Squared Consultants Inc, 2025; US EPA, 2025)

Given the land transportation distances required to deliver the wind turbines to the Project and the emission factors (Table 7.11), the CO_2e emissions from land transportation of all wind turbines are expected to be approximately **146.78 tCO_2e**. In addition, the marine transportation distances required to deliver the wind turbines from India to Canada is **5,971.63 tCO_2e.**

Detailed CO_2e calculations are provided in Table 2 (Appendix B).

Operations Phase

Following the construction phase, the turbines will be operational, and the reduction of GHG emissions will begin. Based on the wind turbine design capacity, the Project will be capable of producing approximately 608,417,040 kWh/year. Therefore, the renewable energy produced will offset power production from fossil fuels and more intense generation methods described under baseline conditions (Section 7.1.2.5).

According to Padey et al. (2012), maintenance activities are the only contributors of GHGs during the operations phase. The maintenance typically includes replacing approximately 15% of the nacelle components and one blade during a wind turbine's lifetime. According to a submission by Number Three Wind LLC (2018) to the New York State Department of Public Services, a wind turbine blade weighs 18,688 kg, while the nacelle weighs 76,204 kg. This replacement rate is equivalent to approximately 18,688 kg of blade material and 11,431 kg of nacelle material. Assuming these components are fabricated of steel, the total emission from the replacement material for all the Project's wind turbines is **993.93 tCO_2e** (Appendix B).

7.1.2.5 Effects Assessment

Project-GHG Interactions

Project activities will emit GHGs during all phases of the Project (Table 7.12).

Table 7.12: Potential Project-GHG Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	-
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for GHG emissions is the province of Nova Scotia. The RAA for GHG emissions is the global environment.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply to Project-related GHG contributions. The VC-specific definition for magnitude is as follows:

- Positive: Project is expected to reduce GHG emissions.
- Negative: Project is expected to increase GHG emissions.

Effects

The Project is expected to have a net positive effect on the GHG environment (Table 7.13).

Table 7.13: Project GHG Emission Summary

Component	Emissions (tCO_2e)
Baseline	
Electricity Generated from Coal	236,413.02
Electricity Generated from Natural Gas	37,258.35
Electricity Generated from Oil	20,239.34
Electricity Generated from Wind	0
Total	**293,910.71**
Construction Phase	
Foundation Production and Transportation	19,762.11
Wind Turbine Manufacturing	27,720.00
Wind Turbine Transportation	6,118.41
Total	**53,600.52**
Operations Phase	
Electricity Generated from Wind	0
Wind Turbine Maintenance	993.93[(1)]
Total	**993.93**

The values in this table may differ from those presented in Appendix B due to rounding errors; however, these errors are negligible and do not change their representation.
[(1)]Project lifespan emissions (single event)

As mentioned, the current GHG emissions for the quantity of electricity required by the Project, using NSPI's conventional generation methods, amount to **293,910.71 tCO_2e**.

The Project's construction phase will generate the most GHGs from the manufacturing and transportation of the wind turbine, as well as the production and transport of the concrete and steel for the tower foundation and pedestal. The total GHG emission contributions from the construction phase are **53,600.52 tCO2e**.

The operations phase will generate GHGs from the wind turbines' maintenance (i.e., part replacements) as a one-time (Project lifespan) occurrence of **993.93 tCO_2e**.

Following Project commissioning, the annual GHG emission reduction is expected to be **293,910.71 tCO2e**. A one-time **993.93 tCO2e** may be subtracted from any annual reduction; however, the annual reduction rate will be applied for the Project's lifespan (25+ years). The Project is anticipating a 0.18-year[(2)] payback period to offset the construction-related GHG emissions. Following this period, the Project will positively offset GHG emissions that would typically be emitted from conventional production methods using prevailing generation methods in Nova Scotia.

The GHG emission reduction over the Project's lifespan (25 years) is up to **7,347,767.63 tCO_2e**. Annual Project emissions reduction defaults to the same value for each year the Project

2 $\frac{Construction\ Emissions}{Offset\ Emissions} = \frac{\mathbf{53{,}600.52}\ tCO2e}{\mathbf{293{,}910.71}\ tCO2e/year} = 0.18\ years$

is in operation (0% change in baseline and Project emissions). However, emissions reductions are anticipated to change from year to year due to externalities, such as changes in energy fuel sources, grid emissions factors, or other factors that may affect reductions resulting from the Project. The emission projections described in this assessment (annual and Project lifespan) do not account for the provincial commitment to remove coal from the energy grid by 2030 and for provincial GHG emissions (including the grid) to be net-zero by 2050 (NSECC, 2022a). As such, this lifespan emissions reduction is a rough estimate of a best-case GHG reduction scenario over the Project's lifetime.

The assumptions considered in this assessment propose a conservative estimate of GHG emissions, which may be lower if turbine and steel supplier locations are closer to the Project and manufacturing materials are less than assumed. The exact value of GHG emissions which will be offset by the Project is difficult to determine accurately. Despite this uncertainty, the Project will offset GHG emissions and have a positive effect on climate change.

Mitigation

Mitigation measures to reduce the Project's contributions to GHG emissions, reducing the overall impact on climate change, include:

- Use of locally sourced materials, where possible, to reduce CO_2, CH_4, and NO_x emissions associated with transport.
- Incorporate the shortest construction/transport routes where possible to minimize the use of fossil fuels during construction.
- Recover and recycle construction and demolition waste, where possible.
- Minimize clearing to the greatest extent possible.
- Plan construction activities to reduce the double handling of materials, reducing GHG emissions associated with heavy equipment operations.
- Require Project equipment to meet all applicable provincial and air quality regulations and emissions standards.
- Require that engine and exhaust systems are maintained according to the manufacturer's specifications and applicable maintenance schedule.
- Remove malfunctioning equipment or equipment generating excess amounts of smoke, odour, or noise from service until an assessment and necessary repairs can be completed.
- Remove improperly functioning construction from operation.
- Require regular equipment maintenance to maintain good operations and fuel efficiency.
- Require preventative maintenance and inspections (e.g., leak testing) of equipment containing coolant (i.e., air conditioning units).
- Train Project personnel (as appropriate) in the proper disposal of halocarbon-containing materials.
- Dispose of halocarbon-containing substances at an approved hazardous waste facility per applicable regulations and in compliance with local requirements.

- Require that trucks removing waste from or bringing materials to the Project are filled to the maximum allowable capacity where practical (dependent on the truck size and load weight) to reduce transportation requirements and limit the number of trips.
- Implement an anti-idling policy to limit GHG emissions from vehicles and equipment and limit the use of fossil fuels, where feasible.

Monitoring

No monitoring programs are proposed.

Conclusion

The predicted residual effects of the Project on Climate Change (after mitigation) are characterized in Table 7.14.

Table 7.14: Climate Change Residual Effects

Effect Detail	Net Reduction of GHG Emissions
Magnitude of Effect	**Positive:** Net effect of the Project will be a reduction in GHG emissions.
Geographic Extent of Effect	Nova Scotia
Frequency of Effect	**Continuous:** Effects will occur continuously during operation.
Duration of Effect	**Medium Term:** Effects are expected throughout the operation phase.
Reversibility of Effect	**Irreversible**
Significance Level	Positive effect, significance not evaluated.
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High, Positive **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible	

7.1.3 Sound

7.1.3.1 Overview

The assessment of sound considered both construction and operational noise generated from the Project.

During construction, heavy equipment, machinery, and light vehicles will emit sound to the surrounding environment from activities associated with the development of wind turbine pads, roads, the connection to the electrical grid, along with the subsequent assembly and commissioning of wind turbines. To quantify potential impacts, noise levels of equipment anticipated for the Project's construction were used to calculate noise levels at set distances from the Project Footprint in consideration of nearby receptors.

During the Project's operational phase, wind turbines will emit sound to the surrounding environment from mechanical equipment operation and the turbines' interaction with the surrounding air (aerodynamic sound). Detailed sound modelling was completed to quantify the potential impacts of turbine-generated noise on nearby receptors.

7.1.3.2 Regulatory Context

Sound level thresholds are regulated through a variety of municipal and provincial regulatory instruments (Table 7.15). Limits identified in the Guidelines for Environmental Noise Measurement and Assessment (NSECC, 2023b) are not listed as they apply to activities that are regulated under the Activities Designation Regulations, which this Project is not.

Municipal by-laws are generally established to protect the peace and tranquility of communities. For those referenced in Table 7.15, provisions are in place to permit construction activities during specific hours if a Building Permit has been issued.

Table 7.15: Summary of Sound Level Regulations and Guidelines

Regulated By	Regulation/Guidance	Sound Level (dBA)	Hours / Duration
For Residential Receptors			
NSECC	Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c)	≤ 40	During the operation of wind turbines at the exterior of a receptor
MODG	MODG Noise Control By-Law (MODG, 2011)	≤ 65	06:00 to 23:00
		≤ 55	23:00 to 06:00
For Occupational Safety			
Workplace Health and Safety Regulations & Canadian Centre for Occupational Health and Safety	Noise – Occupational Exposure Limits in Canada (CCOHS, 2024)	85	8-hour maximum

7.1.3.3 Desktop Review

Aerial imagery and field observations were used to identify nearby sources of sound and characterize the ambient sound within the Study Area.

The Study Area falls mostly within a rural/residential area. Sources of sound levels include those associated with residential activities, vehicle traffic along nearby highways and secondary roads, a nearby major quarry, construction associated with the neighbouring Goose Harbour Lake Wind Farm Project, and the natural environment. The Study Area is close to Highway 344 and is bisected by Old Mulgrave Road. Both roadways are travelled daily by vehicular traffic emitting different levels of sound. Health Canada estimates quiet rural communities as having baseline sound levels of approximately 45 dBA (2017). However, several developments and other activities in or near the Study Area also contribute to ambient

sound levels, including those that may increase sound levels above what is defined by Health Canada:

- Porcupine Mountain Aggregate Quarry and Bulk Coal Handling Facility (1.9 km away from Study Area)
- Goose Harbour Lake Wind Farm Project (5.9 km away from Study Area)
    - Frequent truck traffic down Old Mulgrave Road bringing supplies for construction, through the Study Area.
- Active forestry (throughout and surrounding the Study Area)

Sounds associated with these activities include operation of heavy machinery, tree felling, logging trucks, etc. Recreational and local traffic also exists within the Study Area, increasing ambient sound levels from cars, ATV, dirt bikes, etc. Lastly, in addition to anthropogenic sources, there are also natural sources of sounds originating from wildlife, wind, water, and vegetation.

7.1.3.4 Assessment Methodology

Construction Sound

The assessment of construction sound includes a discussion of expected noise sources and a qualitative assessment of potential effects to permanent and seasonal receptors (as defined in Section 4.1.5).

Sound levels and impacts from blasting activities are not included in this assessment as blasting requirements have not been confirmed. If blasting is determined to be required during construction, the Proponent will apply for any required permits and approvals. Any potential impacts, mitigation, and subsequent required monitoring will be described in a Project-specific Blasting Plan.

Operational Sound

The operational sound assessment was completed through a combination of desktop studies and modelling with the following objectives in mind, per guidelines including the Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c):

- Identify non-participating receptors within 2 km of turbines (see Section 4.1.5 for approach and receptor classification and Appendix C).
- Identify existing operational turbines within 3 km of the Project.
- Identify and assess comprehensive sound levels at the exterior of identified potential receptors, including cumulative effects from neighbouring turbines (within 3 km), if present.
- Propose mitigation of Project generated sound on nearby receptors, if required.

A review of pending and completed EAs for wind projects was conducted to identify any existing operational turbines within 3 km of the Project. At the time of the production of this

report, the neighbouring Goose Harbour Lake Wind Farm Project to the south of the Project is projected to have four operational turbines constructed in 2026 within 3 km of a turbine for this Project. As such, all proposed turbines from the Goose Harbour Lake Wind Farm Project were included in operational sound modelling. Additionally, there are three existing turbines east of the Project. All of these turbines are owned by the same party, and an EA for the largest turbine (McCallum Environmental Ltd., 2014) was approved in 2014 (NSECC, 2014). The smaller two turbines located adjacent to the larger turbine were not subject to an EA as their generating capacity is below the regulatory trigger. These three turbines are also included in operational sound modelling.

Environmental noise modelling was completed using WindPRO v 4.1.292 by EMD International A/S, which utilizes the ISO 9613-2 calculation methods in modeling environmental noise exposure of the wind turbine model proposed for the development (in this case, the Nordex N163 6.X 7000 turbine). The noise modelling also used other variables from ISO 9613-2 including an ambient air temperature of 10°C and 70% relative humidity, which result in the greatest propagation of noise through the atmosphere. A wind speed of 10 m/s and reference height of 10 m were selected for the model. The model calculated an energy sum between the background noise level (35 dBA recommended from Health Canada), and the modeled noise exposure level for each non-participating receptor (Section 4.1.5).

The full power mode for the Nordex N163 6.X 7000 turbine produces a maximum noise level of 108.6 dBA. To reduce the Project's overall noise profile and noise levels at receptors, all turbines are planned to use the serrated trailing edge (STE) option, which uses modified rotor blades to reduce noise output. Turbines operating at full power mode using STE rotor blades produce a maximum noise level of 106.6 dBA. Turbines were modelled using the STE option in the full power mode.

A full description of the methods employed in sound modelling can be found in the Noise Impact Assessment completed for the Project by Nortek (Appendix C).

7.1.3.5 Assessment Results

Construction Sound

During construction activities, sound will be generated by the operation of equipment and heavy machinery such as cranes, backhoes, excavators, dump trucks, graders, and transportation vehicles. A summary of sources and anticipated volumes of sound produced during the Project's construction is found in Table 7.16.

Table 7.16: Decibel Limits of Construction Equipment Required for the Project

Equipment	Average Noise Level Ranges (in dBA)
Road, Transmission Line, Strait Crossing Connection, Substation and Turbine Pad Development	
Backhoe	85 to 104[(1)]
Concrete Truck/Pump	103 to 108[(2)]
Dozer	89 to 103[(1)]
Dump Truck	84 to 88[(1)]
Excavator	97 to 106[(2)]
Harvesting Equipment (log truck, manual faller, etc.)	85 to 103[(3)]
Roller	95 to 108[(2)]
ATV	97[(4)]
Loaders	88[(3)]
Pickup Trucks	95[(4)]
Tracked Drilling Units	91 to 107[(5)]
Tracked Dump Truck/Decks	91[(6)]
Tracked Man Lift/Bucket Machines	85[(6)]
Tracked Radial Boom Derricks/Cranes	93 to 98[(2/6)]
Turbine Assembly	
Crane	78 to 103[(1)]
Handheld Air Tools	115[(2)]
Compressor (drilling, pneumatic tools, etc.)	85 to 104[(7)]

[(1)](WorkSafe BC, 2019)
[(2)](Transport Scotland, 2018)
[(3)](WorkSafe BC, 2016)
[(4)](Oregon State Parks, n.d.)
[(5)](The Driller, 2005)
[(6)](SCE, 2015)
[(7)](IHSAO, 2022)
Measurements shown are relevant to the decibel level ranges within close proximity (i.e., less than 15 m)

Based on the results in Table 7.16, the range of decibels anticipated for the Project's construction activities will be between 78 dBA and 115 dBA (from a single piece of equipment within 15 m from the source).

Assuming that sound attenuates at the standard rate of 6 dBA per doubling in distance from a given point source, approximate sound levels experienced at incremental distances during construction activities for the Project are shown in Table 7.17 (WKC Group, 2024). The attenuation rate of sound does not consider local landscape (e.g., topography, trees, surface hardness) or buildings, and therefore, is considered a "worst-case" scenario for sound levels produced by a single piece of equipment.

Table 7.17: Attenuation of Construction Related Sounds

Case	Example Equipment Type	Sound Level @ 15 m (dBA)[1]	Point Source Sound Levels (dBA) at Incremental Distances					
			50 m	100 m	200 m	500 m	1,000 m	2,000 m
Minimum	Crane	78	67.5	61.5	55.5	47.5	41.5	35.5
Median	Pickup/ATV	96	85.5	79.5	73.5	65.5	59.5	53.5
Maximum	Handheld Air Tools	115	104.5	98.5	92.5	84.5	78.5	72.5

[1]Approximate point source sound levels, based on data collected in Table 7.16. Combined sound levels produced by multiple pieces of equipment operating simultaneously is not included in the assessment.

Operational Sound

Of the 19 potential, non-participating receptors within 2 km of a proposed turbine location, none exceed 40 dBA when using full power mode and STE rotor blades. The highest predicted sound level at a potential receptor is 39.9 dBA when ambient sound levels are included. Results of the sound modelling are shown on Drawing 7.3 and the full report including methods and results are found in Appendix C.

Low Frequency Sound

Low frequency sound refers to sound at frequencies between 20 hertz (Hz) and 200 Hz. According to Health Canada communications, during operation of large industrial objects such as wind turbines, low frequency sound may cause vibrations in buildings. Health Canada recommended using the Finland low frequency model to conduct the analysis. A generic 1/3 octave low frequency noise curve was used to model power levels. The power levels were entered into a Finland low frequency model in WindPRO software to produce the maximum dBA at each non-participating receptor. The results of the analysis indicated that low frequency noise at 63 Hz, the critical frequency as determined through the model, was lower than 47.0 dBA, the Finnish low frequency noise limit, at all non-participating receptors. Therefore, low frequency sound is not expected to be a concern. The Finland low frequency model results along with a literature review of low frequency/infrasound is provided in Appendix C.

7.1.3.6 Effects Assessment

Project-Sound Interactions

Project activities will interact with the acoustic environment during all phases of the Project. Sound related to the decommissioning phase is not addressed separately because sound levels are expected to be comparable to construction levels (Table 7.18).

Table 7.18: Potential Project-Sound Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	X
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for sound includes a 2 km buffer of turbine locations (Drawing 7.3).

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for sound. The VC-specific definition for magnitude is provided for construction and operational sound as follows:

Construction Sound

- Low: Project activities to be completed in accordance with relevant MODG bylaws and permitting.
- High: Project activities predicted to exceed relevant MODG bylaws and permitting.

Operational Sound

- Low: Measurable sound levels predicted at the exterior of a residential dwelling are below the criteria in the Environmental Assessment Supplemental Checklist: Wind Energy Projects (i.e., ≤ 40 dBA).
- High: Sound levels predicted to exceed the criteria in the Environmental Assessment Supplemental Checklist: Wind Energy Projects at the exterior of a residential dwelling (i.e., > 40 dBA).

Effects

Construction Sound

The median sound level from construction is comparable to sound produced by pick-up trucks (96 dBA), which is already a common source of sound along the nearby Highway 344, which abuts the Study Area, or Old Mulgrave Road, which bisects it.

During construction of the Project, sound pressure levels above 55 dBA at receptors can result in disruptions of sleep during nighttime hours, while sounds above 65 dBA may cause annoyance and disturbance during daytime hours. Sounds produced during construction can exceed these thresholds at receptors located within proximity to activities at some locations within the Project Footprint. Most construction activities are expected to occur between 07:00 and 21:00 (generically referred to as 'daytime hours') and are considered a temporary source of noise generated by the Project. Based on the desktop review:

- No non-participating receptors are located within 500 m of construction activities, which would otherwise result in median/continuous sound levels above 65 dBA during daytime hours.
- Seven receptors are located within 1 km of construction activities, which may result in median/continuous sounds between 55 dBA and 65 dBA during daytime hours.
- Four participating receptors are located within 500 m of construction activities, which will, at times, result in median/continuous sound levels above 65 dBA during daytime hours. One such receptor is located along Old Mulgrave Road, and three are long the shore of Summers Lake. The property along Old Mulgrave Road will continue to be subjected to noise associated with hauling along the Project as they are currently for the neighbouring Goose Harbour Lake Wind Farm Project. All four of these receptors will be subjected to noise associated with the construction of only one turbine within their respective 500 m buffer, representing a relatively short-lived disturbance. These property owners have, through their participation in the Project, given consent to reasonable noise levels necessary for the Project that exceed the 65 dBA threshold. Furthermore, a Building Permit with MODG is expected to be issued for the Project, which will contain provisions to permit construction activities during specific hours that may result in noise levels above the MODG bylaw. The Proponent will complete construction in accordance with the requirements outlined in the Building Permit.

Sound levels within the Study Area are a collection of anthropogenic and natural sources, as described in Section 7.1.3.3. This location was selected for its high wind speeds, contributing to baseline sound levels due to moving air and vegetation. Furthermore, the median sound level from construction is comparable to sound produced from an ATV or pick-up truck, which is already a common source of sound within the Study Area, as are logging trucks and harvesting equipment. Therefore, most Project-related construction sound will be consistent with existing sound levels. Activities producing higher levels of sound, such as blasting (if required), or handheld air tools, will be less frequent and last for short durations.

Operational Sound

Modelled sound levels (ambient and generated sound) do not exceed 40 dBA at any non-participating receptor when running all turbines with the STE option. Therefore, all non-participating receptors comply with the NSECC guidance for operational sound.

Mitigation

To minimize sound and the potential disturbance of receptors during construction, the following general mitigation measures will be implemented, as required:

- Adhere to any construction noise-related conditions as part of municipal permitting.
- Use noise suppressants (e.g., mufflers) on vehicles/equipment, where possible.
- Limit unnecessary vehicle idling.
- Maximize construction activities within the recommended daytime hours of 07:00 to 21:00 and avoid nighttime construction activities wherever possible.
- Follow the guidelines and requirements in the Blasting Safety Regulations, if determined necessary based on geotechnical studies. Mitigation and monitoring for potential blasting will be included in a Project-specific Blasting Plan, as required.
- Maintain equipment in good working order as recommended by the manufacturer.
- Develop and implement a Complaint Resolution Plan.

To minimize disturbance from sound during operation, the following mitigations will be implemented:

- Equip every turbine with STE rotor blades to reduce the turbines' sound level.
- Complete regular maintenance of turbines to ensure they are in good working order and continue to comply with sound level standards.
- Update modelling if the turbine model or layout changes prior to construction to ensure compliance with the Environmental Assessment Supplemental Checklist: Wind Energy Projects.
- Develop and implement a Complaint Resolution Plan.

The Project's Complaint Resolution Plan will consider complaints related to sound and outline a process to investigate complaints. Mitigation to resolve complaints, if determined to be necessary, will be completed on a case-by-case basis in consultation with the affected complainant. If necessary, noise monitoring will be included as part of this process to evaluate ambient and operational noise in areas of concern.

Monitoring

No monitoring programs are proposed.

Conclusion

The predicted residual effects of the Project on construction and operational noise (after mitigation) are characterized in Table 7.19.

Table 7.19: Sound Residual Effects

Effect Detail	Construction Noise	Operational Noise
Magnitude of Effect	**Low:** Construction activities are anticipated to comply with municipal by-laws and permitting.	**Low:** Operational sound is predicted to comply with the criteria in the Environmental Assessment Supplemental Checklist: Wind Energy Projects.
Geographic Extent of Effect	2 km buffer of turbine locations	2 km buffer of turbine locations
Frequency of Effect	**Intermittent:** Effects are anticipated during both the construction and decommissioning phases, and rarely during operation.	**Continuous:** Effects are anticipated throughout operations, although there may be temporary lapses during calm conditions while rotors are not spinning.
Duration of Effect	**Short Term:** Effects are expected throughout construction and decommissioning, but generally not during operations or after decommissioning.	**Medium Term:** Effects are expected throughout operations but end at the start of decommissioning and not continue.
Reversibility of Effect	**Reversible**	**Reversible**
Significance Level	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible		

7.1.4 Shadow Flicker

7.1.4.1 Overview

Shadow flicker can occur when rotating blades cast flickering shadows during times of direct sunlight. The magnitude of shadow flicker is determined by the position and height of the sun, wind speed and direction, geographical location, time of year, cloud cover, turbine hub height and rotor diameter, and proximity to the turbine.

For shadow flicker to occur, the following criteria must be met:

- The sun must be shining and not be obscured by clouds/fog.
- The source turbine must be operating.
- The wind turbine must be situated between the sun and the shadow receptor.
- The wind turbine must be facing approximately towards, or away from, the sun such that the rotational plane of the blades (i.e., rotor plane) is roughly perpendicular to the azimuth of incident sun rays. For this to occur, the wind direction would have to be parallel to the azimuth of the incident sun rays throughout the day.

- The line of sight between the turbine and the shadow receptor must be clear. Light-impermeable obstacles, such as topographic features (e.g., hills), vegetation, tall structures, etc., will prevent shadow flicker from occurring at the receptor.
- The receptor must be close enough to the turbine to be in the shadow cast.

7.1.4.2 Regulatory Context

The Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c) (Nova Scotia, 2025)requires that a receptor or residential dwelling, respectively, receive less than 30 hours of shadow flicker per year or 30 minutes of shadow flicker per day.

7.1.4.3 Assessment Methodology

The shadow flicker assessment was completed through modelling to achieve the following objectives:

- Identify non-participating receptors that may experience shadow flicker from the Project's operation (see Section 4.1.5 for approach and receptor classification).
- Quantify the expected duration and frequency of shadow flicker for non-participating receptors over a calendar year and during the modelled worst day.
- Assess if applicable guidelines are expected to be met.
- Propose mitigation should shadow flicker levels exceed the guideline levels.

A review of pending and completed EAs for wind projects was conducted to identify any existing operational turbines within 3 km of the Project. At the time of the production of this document, there are three existing operational turbines within 3 km of the Project and an additional four planned as part of the neighbouring Goose Harbour Lake Wind Farm Project. These turbines are expected to be operational in 2026. As such, the turbines from the Goose Harbour Lake Wind Farm Project and the existing three neighbouring turbines that are part of the Mulgrave Community Wind Power Project were included in shadow flicker modelling.

An analysis was conducted using the WindPRO version 4.0.424 software package under "worst-case" modelling or Assessment Scenario A, which is the most conservative approach and assumes that all the criteria listed in Section 7.1.4.1 are always met. Worst-case modelling assumes conditions that are impossible to occur in practice but provides a starting point for assessing potential shadow flicker issues. Assessment Scenario A assumes the following conditions are met:

- The sun is shining from sunrise to sunset (i.e., no cloud obstruction).
- The rotor plane is always perpendicular to the line from the turbine to the sun.
- The turbine is always operating.
- The receptor building is a "greenhouse", having windows on all exterior surfaces.
- The line of sight between the turbine and receptor is clear, not obstructed by shadow impermeable features or structures.

A second scenario was developed to account for more realistic conditions. Unlike Assessment Scenario A, which assumed continuous sunshine, Assessment Scenario B used the average daily sunshine hours recorded at the closest weather station to the Study Area available in WindPRO, the Charlottetown weather station (Table 7.20) for daily sunshine hours. Assessment Scenario B is still conservative as it includes the remaining criteria listed above.

Table 7.20: Sunshine Data Used for the Assessment Scenario B

Month	Average Daily Sunshine (Hours)
January	3.37
February	4.18
March	4.42
April	5.04
May	6.34
June	7.54
July	7.95
August	7.19
September	5.76
October	3.98
November	2.63
December	2.31

Source: Charlottetown Weather Station (closest available WindPRO weather station to the Study Area)

7.1.4.4 Assessment Results

Under Assessment Scenario A, 10 non-participating receptors receive some shadow flicker (total hours > 0). Of these, six exceed 30 hours of shadow flicker per year and/or 30 minutes of shadow flicker on the worst day. Appendix D provides detailed results for all non-participating receptors within 2 km of the turbines. Since Assessment Scenario A is based on highly conservative assumptions, the modelled conditions are unlikely to occur in real-world situations.

Under the more realistic assumptions in Assessment Scenario B, 10 non-participating receptors are anticipated to receive some shadow flicker (total hours > 0), with no receptor meeting or exceeding the threshold of 30 hours per year (Table 7.21). The receptor receiving the highest annual shadow flicker exposure is Receptor H.

Table 7.21: Potential Receptors Impacted by Shadow Flicker – Assessment Scenario B

Receptor ID[(1)]	Duration (hh:mm) of Shadow Flicker per Year[(2)]
C	13:57
D	13:11
E	15:40
F	11:09
H	24:57

Receptor ID[1]	Duration (hh:mm) of Shadow Flicker per Year[2]
K	06:08
M	06:16
N	02:18
Q	18:28
R	22:13

[1]Receptor ID corresponds to labelling in Appendix D.
[2]WindPRO is unable to calculate minutes of shadow flicker per day for Assessment Scenario B; therefore, only hours per year are presented.

7.1.4.5 Effects Assessment

Project-Shadow Flicker Interactions

Project activities only interact with shadow flicker during wind turbine operations (Table 7.22).

Table 7.22: Potential Project-Shadow Flicker Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	-
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	-
Access Road Upgrading and Construction	-
Laydown Area and Turbine Pad Construction	-
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	-
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	-
Decommissioning	
Infrastructure Removal	-
Site Reclamation	-

Assessment Boundaries

The LAA for shadow flicker includes a 2 km buffer of turbine locations (Drawing 7.4). The RAA is not applicable for shadow flicker.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for shadow flicker. The VC-specific definition for magnitude is as follows:

- Low: Measurable shadow flicker levels predicted at the exterior of receptors are below the criteria in the Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c).
- High: Measurable shadow flicker levels at receptors predicted to exceed the criteria in the Environmental Assessment Supplemental Checklist: Wind Energy Projects.

Effects

Assessment Scenario B predicts that all non-participating receptors will experience less than 30 hours of shadow flicker per year. This is still considered a conservative assessment because the scenario still assumes the following:

- Wind turbines are always in operation (i.e., rotors always spinning) vs estimated operation of the turbines 30% to 40% of the time.
- A clear line of sight, with no screening by topographic features (e.g., hills), trees, outbuildings, or other local structures that would prevent a turbine's shadow from falling on receptors.
- The rotational plane of the blades is always perpendicular to the azimuth of the sun rays.

Mitigation

Modelling will be updated if the turbine model or layout changes prior to construction to ensure compliance with the Environmental Assessment Supplemental Checklist: Wind Energy Projects (Nova Scotia, 2025; NSECC, 2025c).

The Proponent will develop a Complaint Resolution Plan, which will consider complaints related to shadow flicker and outline a process to investigate complaints. Mitigation to resolve complaints, if determined to be necessary, will be completed on a case-by-case basis in consultation with the affected complainant.

Monitoring

No monitoring programs are proposed.

Conclusion

The predicted residual effects of Project-generated shadow flicker on non-participating receptors are characterized in Table 7.23.

Table 7.23: Shadow Flicker Residual Effects

Effect Detail	Shadow Flicker
Magnitude of Effect	**Low:** Measurable shadow flicker is expected but within regulatory compliance at non-participating receptors.
Geographic Extent of Effect	2 km buffer of turbine locations
Frequency of Effect	**Intermittent:** Effects may occur whenever the turbine rotors are spinning.
Duration of Effect	**Medium Term:** Effects are expected throughout the operational phase of the Project.

Effect Detail	Shadow Flicker
Reversibility of Effect	**Reversible**
Significance Level	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible	

7.2 Geophysical Environment

7.2.1 Overview

The assessment of the geophysical environment included a review of topography, surficial geology, bedrock geology, and hydrogeology/groundwater.

7.2.2 Regulatory Context

Relevant legislation includes:

- *Environment Act* (Nova Scotia, 1995b)
- Sulphide Bearing Material Disposal Regulations (Nova Scotia, 1995c)

If blasting is required for construction, groundwater wells within 800 m must undergo an assessment in accordance with NSECC's Procedure for Conducting a Pre-Blast Survey (1993).

7.2.3 Assessment Methodology

The desktop assessment was completed through a review of the following resources:

- Aerial imagery and topography
- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- Nova Scotia Geoscience Atlas (NSNR, 2021e)
- Mineral Resource Land-Use Atlas (NSNR, 2021d)
- Nova Scotia Groundwater Atlas (NSNR, 2024b)
- Nova Scotia Karst Risk Map (Drage, 2019)
- Well Logs Database (NSECC & NSNR, 2022)
- Nova Scotia Pumping Test Database (NSNR, 2022c)
- Nova Scotia Groundwater Observation Well Network (NSECC, 2015a)
- Potential for Radon in Indoor Air (NSNR, 2009)

The determination of impacts on the geophysical environment was completed based on available desktop information, without field invasive assessments (e.g., geotechnical reports). Furthermore, the well logs database is limited and cannot accurately determine exact well locations or their presence.

7.2.4 Assessment Results

7.2.4.1 Topography

The Study Area is located primarily within the Mulgrave Plateau Ecodistrict (360), with a small extension of the St. George's Bay (520) Ecodistrict protruding from the north (Drawing 7.1). The Mulgrave Plateau is located west of the Strait of Canso and northwest of Chedabucto Bay in Antigonish and Guysborough counties. The ecodistrict consists of a till plain with gentle to moderate elevation changes, having a mean elevation of 130 m above sea level (masl). The Mulgrave Plateau is separated by the Chedabucto Fault, but both sides have similar levels of hummocky terrain with extensive pockets of imperfectly drained soils. Steep slopes are also found within this ecodistrict along the edges of elevated plateaus (which rise to approximately 200 masl) (Neily et al., 2017). Within the Study Area specifically, elevations range from approximately 21 masl to 159 masl (Drawing 7.5).

7.2.4.2 Surficial Geology

Surface geology of the Mulgrave Plateau consists predominately of near-surface/exposed bedrock with thin overlying deposits of glacial till. Scattered areas of thicker till are also found within the Mulgrave Plateau Ecodistrict but are primarily associated with drumlin formations. Soils vary depending on the parent material and underlying bedrock present but generally range from stony to gravelly to clay loams (Neily et al., 2017).

Within the Study Area specifically, surficial geology predominantly consists of a stony till plain dating back to the Quaternary Period (concentrated in the central portion of the Study Area). The plain consists of 2 m to 20 m of stony/sandy material derived from local bedrock sources, deposited at the base of melting ice sheets. Stony till plains provide rapid drainage due to stoniness and have poor acid rain buffering capacity. Factors, including shallowness and a high-water table, often affect construction (Stea et al., 1992). Other surficial features present within the Study Area include (Drawing 7.6):

- Exposed bedrock
- Silty drumlin
- Silty till plain
- Organic deposits

Areas of exposed bedrock and/or bedrock overlain by a thin discontinuous layer of till were formed from glacial scouring, erosion, and/or non-deposition. These features result in exposed ridges of hard rock (NSNR, 2021e).

Silty drumlins comprise silty till with a thickness of 4 m to 30 m that is derived from distant sources (including red clay). These features formed from material deposited at the base of melting ice sheets and provide moderate drainage due to stoniness. In addition, silty drumlins have calcareous bedrock components, which provide good acid rain buffering capacity (NSNR, 2021e).

Silty till plains are composed of a stony, sandy material (with a thickness of 3 m to 30 m) derived from local and distant sources that were deposited at the base of receding/melting ice sheets. These surficial features have moderate drainage and moderate to good buffering capacity for acid rain from transported calcareous bedrock components (NSNR, 2021e).

Organic deposits (i.e., wetlands/peatlands) develop because of topographic depressions collecting and/or storing surface water, along with the infilling of ponds/watercourses with vegetation (NSNR, 2021e).

Soils across the Study Area are reflective of sedimentary rock presence. In the Mulgrave Plateau (360) the soils are derived from glacial till and their textures are medium to medium course. In the St. George's Bay Ecodistrict (520), soils are generally derived from glacial till, with some glaciofluvial-derived soils, and are fine to medium textured (Neily et al., 2017).

No records of colluvial deposits, which are loosely consolidated surficial sediments deposited at the base of a slope and susceptible to rockfall, were identified.

7.2.4.3 Bedrock Geology

The bedrock is uniform within the Study Area, comprising the Horton Group ($D\text{-}_{E}C_{H}$) (Drawing 7.7). The Horton Group formed during the Devonian to early Carboniferous Period and is generally composed of sandstone, siltstone, conglomerate, and shale (NSNR, 2021e).

In Nova Scotia, several bedrock formations are known to contain acid generating rock (sulphide minerals such as pyrite, pyrrhotite) that, when disturbed, can result in the production of acid rock drainage (ARD). ARD occurs when sulphide-bearing rocks are disrupted and exposed to air or water, producing sulphuric acid and metal oxides that are subsequently mobilized/leached through freshwater systems (NSNR, 2021a). Based on provincial risk mapping, there are no sulfide-bearing slates or formations recorded within the Assessment Area or the larger Study Area (NSNR, 2021d). The presence/absence of sulphide-bearing minerals and the likelihood of ARD will be confirmed following the results of the geotechnical evaluation.

A review of the Nova Scotia Karst Risk Map (based on provincial geology maps, sinkhole occurrence data, LiDAR data and hydrogeological databases) indicated that the Study Area is within a "Medium Risk" region (Drawing 7.8). The Horton Group contains less than 10% of the sinkholes in the Nova Scotia Sinkhole Database (Drage, 2019).

No mineral occurrences were identified within the Study Area; however, a small portion of the southwest corner of the Study Area overlaps with an active exploration license (EL: 56959), which expires in 2027 (NSNR, 2021d) (Drawing 7.7).

A review of the NSNR potential for radon in indoor air risk mapping found that the Study Area is primarily in a "Medium Risk" zone for radon in indoor air, with some sections of "Low Risk" identified in the southern and eastern parts of the Study Area (NSNR, 2009) (Drawing 7.9).

However, there is no indoor air pathway for radon gas to accumulate.

7.2.4.4 Groundwater Quality and Quantity

The Study Area is within the sedimentary bedrock region (NSNR, 2021e). Wells located in sedimentary bedrock typically have higher dissolved solids, hardness, and well water yields as the rock tends to be more fractured, and water can flow through the rock itself. Naturally occurring trace metals such as iron, arsenic, and manganese can be found in all groundwater regions; however, they are more often associated with plutonic and metamorphic groundwater regions (Kennedy & Drage, 2009).

A review of the groundwater risk mapping indicated that the Study Area is in a “High Risk” zone for arsenic and manganese in bedrock wells (Drawing 7.10 & 7.11). The Study Area is considered a “Low Risk” for uranium in groundwater (Drawing 7.12) (Kennedy, 2021; Kennedy & Drage, 2020, 2017).

Groundwater Wells

An assessment of nearby groundwater wells was conducted using the NSECC Well Logs Database (NSECC & NSNR, 2022). This database contains records of well locations and characteristics within the province, dating back until approximately 1920. The database was reviewed to identify groundwater wells that may exist within proximity of the Study Area; however, there are significant limitations associated with the spatial accuracy of this database. For the purposes of this assessment, any groundwater wells that had a spatial uncertainty of greater than 1,000 m were not considered/assessed.

A total of 92 water wells were identified within 2 km of the Study Area using the NSECC Well Logs Database (NSECC & NSNR, 2022) (Drawing 7.13). The identified wells are predominantly located along Highway 344 (Marine Drive), and are either used for domestic (76), commercial (4), industrial (2) or unspecified purposes (10). A summary of well statistics is provided in Table 7.24.

Table 7.24: Summary of Water Well Records within 2 km of the Study Area

	Drilled Date (year)	Well Depth (m)	Bedrock Depth (m)	Static (m)	Yield (litres per minute)	Elevation (masl)
Minimum	1960-06-15	13.7	0.6	0.9	1.4	0.2
Maximum	2009-05-15	111.5	22.5	28.9	272.4	132.6
Average	-	41.8	5.8	5.4	39.1	37.6

Source: (NSECC & NSNR, 2022)

No groundwater wells were identified within the Study Area. Four drilled wells are within 800 m of the Project Footprint. Detailed characteristics of water wells identified within 800 m of the Project Footprint can be found in Appendix E. If blasting is required within 800 m of a well, the Proponent will conduct pre-blast surveys as per requirements under NSECC’s Procedure for Conducting a Pre-Blast Survey (1993).

The NSNR Pumping Test Database provides long-term yields for select wells throughout the province and includes details on well construction and pumping tests, as well as the interpreted hydrogeological properties. The nearest pumping test wells located on the mainland (Pumping Test ID: GUY-7.1 and GUY-7.2) are in Mulgrave along Highway 344, just east of the Study Area, and were completed in 1967 for Acadian Fisheries Ltd. These wells were drilled to a depth of 121.9 m below surface and had a static water level of 40.7 m and 44.3 m, and a safe long-term yield of 661.3 litres per minute and 5,036 litres per minute, respectively (NSNR, 2022c).

NSECC maintains the Nova Scotia Groundwater Observation Well Network (NSECC, 2015a) to monitor groundwater levels, water quality, evaluate impacts of human activities, and evaluate long-term water trends. The nearest active provincial observation well to the Study Area is Monastery (#028) located 9.4 km west of the Study Area, near Monastery, Nova Scotia. This well was drilled in 1976 to a depth of 158.4 m through the Canso Group bedrock formation and is currently active. In 2024, the average annual water level was 12.8 masl, and the annual water level fluctuation was approximately 1.5 m. The average depth to water in this well is 11.2 m below the top of casing (NSECC, 2015a).

The groundwater atlas also contains the Nova Scotia Chemistry Well Database (NSNR, 2024b), which identified three chemistry wells within 2 km of the Study Area. All the identified wells are located in the sedimentary groundwater region, with a single exceedance of the aesthetic objective for total dissolved solids (TDS), against the Guidelines of Canadian Drinking Water Quality (GCDWQ) (Health Canada, 2025). This exceedance was recorded in 2017, and is an exceedance as compared to the 2025 GCDWQ. The Chemistry Well Database is a compilation of various federal, provincial, and municipal groundwater quality sources, including registered drinking water supplies, government buildings, and municipal potable water supply wells.

7.2.5 Effects Assessment

Project-Geophysical Interactions

Project activities will primarily interact with the geophysical environment during earth-moving activities (Table 7.25).

Table 7.25: Potential Project-Geophysical Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X

Project Phase	Potential for Interaction
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	-
Vegetation Management	-
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for the geophysical environment is an 800 m buffer of the Project Footprint (Drawings 7.10 to 7.13). The RAA is not applicable.

Assessment Criteria

The assessment criteria provided in Section 4.3 apply to the geophysical environment. The VC-specific definition for magnitude is as follows:

- Low: No geologic hazards are present within the Study Area; impacts to the quality/quantity of groundwater wells are not anticipated.
- Moderate: Risk mapping indicates a “Moderate” or “High Risk” of a geologic hazard(s) within the Study Area (or a known occurrence is identified) but the hazard(s) is anticipated to be mitigated with routine measures; impacts to the quality/quantity of groundwater wells are possible if blasting is required (wells are located within the LAA).
- High: Risk mapping indicates a “Moderate” or “High Risk” of a geologic hazard(s) within the Study Area (or a known occurrence is identified) which cannot be mitigated with routine measures; impacts to the quality/quantity of groundwater wells are anticipated if blasting is required (wells are located within the Project Footprint).

Effects

The geophysical environment will be disturbed within the Assessment Area during the site preparation and construction phase, and again during infrastructure removal and site reinstatement. During these phases, potential impacts related to the geologic environment are primarily due to the presence and subsequent disturbance of geologic hazards including:

- Karst topography
- Arsenic or manganese containing bedrock (mapping identified uranium containing bedrock within the Assessment Area to be low risk. Therefore, uranium risk not assessed further.)
- Mineral occurrences

The Assessment Area was categorized as having “Medium Risk” regarding the presence of karst. Turbine pads and sites for other infrastructure will be assessed as part of geotechnical investigations; if karst topography or other constructability limitations are encountered, the recommendations of the geotechnical investigation will be followed.

Construction activities, primarily blasting (if required), have the potential to impact the quality and quantity of surrounding groundwater supply depending on the proximity to drinking water wells and extent of disturbance caused by construction activities.

Disturbance of arsenic or manganese containing bedrock can cause mobilization within groundwater and subsequently degrade nearby groundwater well quality. Risk mapping shows the LAA is primarily situated in a region that has a “High Risk” for arsenic and manganese. Arsenic is considered the most prevalent naturally occurring groundwater contaminant in the province and is normally treatable using conventional treatment systems (Kennedy & Drage, 2016, 2017). Manganese exceedances in wells are common in Nova Scotia, with the highest rates occurring in the metamorphic groundwater region (Kennedy, 2021). (NSNR, 2021d)

In addition to water quality, groundwater quantity can also potentially be impacted if blasting activities (as required) alter local hydrogeological flow regimes, resulting in a possible reduction of well yield.

Four wells were identified by the NSECC Well Logs Database (NSECC & NSNR, 2022) within 800 m of the Project Footprint (i.e., the LAA), where blasting activities (if required) would be anticipated. There are 10 non-participating, seasonal receptors (e.g., cabins) and four participating receptors within the LAA and may have associated groundwater wells not identified in the wells logs database. A Pre-blast Survey will be completed for all well users within 800 m of any blasting that is determined to be required. The requirement for blasting and pre-blast surveys will be confirmed and assessed further during geotechnical investigations and during detailed engineering design.

Potential impacts to nearby groundwater well quality because of arsenic and manganese are not anticipated based on:

- Construction activities will primarily consist of clearing, grubbing, and grading within the surficial layer. Contact with/disturbance of groundwater is not anticipated.
- If blasting is required, blasting monitoring and mitigation plans will be developed in compliance with regulatory guidelines.

Mitigation

The following mitigation measures are recommended to minimize impacts to the geologic environment:

- Conduct blasting (if required) in accordance with provincial legislation and subject to terms and conditions of applicable permits.

    - Conduct pre-blast surveys for wells within 800 m of blasting activities, which may include ground-truthing for nearby well locations.
        - If demonstrable changes in groundwater quantity or quality to a well are detected due to Project activities, an alternative water supply, of equal or better quantity/quality than that impacted, will be provided to the landowner.
    - Require that all blasts are conducted and monitored by certified professionals.
    - Notify landowners (within 800 m) in advance of any blasting activities.
    - Recover and revegetate exposed soils or bedrock as required to minimize erosion and sedimentation following blasting.
- Assess for elevated sulphide potential in bedrock during pre-construction geotechnical surveys. If identified, develop a site-specific mitigation plan for sulphide bearing materials in accordance with the Sulphide Bearing Material Disposal Regulations, N.S. Reg. 57/95 and in consultation with relevant regulatory departments.
- Store excavated soils temporarily next to the excavation until it is needed for backfilling, if required. Any remaining excavated material will be used on-site or removed and sent to an approved facility.
- Limit the Project Footprint and disturbed areas to the extent practical.
- Install, monitor, and maintain erosion and sedimentation control measures as determined based on the Project Erosion and Sediment Control Plan.

Monitoring

If blasting activities are required to construct the Project (to be confirmed during geotechnical investigations), groundwater wells within 800 m of blasting activities will be monitored as per the Procedure for Conducting a Pre-Blast Survey (NSECC, 1993).

If geologic hazards are identified within the Assessment Area (and/or Study Area) during geotechnical investigations, a site-specific mitigation plan will be developed.

No additional monitoring programs are proposed at this time in relation to the geophysical environment.

Conclusion

The predicted residual effects of the Project on the geophysical environment (after mitigation) are characterized in Table 7.26.

Table 7.26: Geophysical Environment Residual Effects

Effect Detail	Encountered Geologic Hazard	Change to Groundwater Quality or Quantity
Magnitude of Effect	**Moderate:** Risk mapping shows the potential for geologic hazards in the Study Area.	**Moderate:** Groundwater wells located within 800 m of the Project Footprint.
Geographic Extent of Effect	800 m buffer of the Project Footprint	800 m buffer of the Project Footprint
Frequency of Effect	**Continuous:** If present, effects may occur continuously.	**Intermittent:** Effects may occur during blasting (if required).
Duration of Effect	**Short Term:** If present, effects limited to construction and decommissioning.	**Short Term –** Effects are possible throughout construction (if blasting is required).
Reversibility of Effect	**Partially Reversible**	**Partially Reversible**
Significance Level	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible		

7.3 Aquatic Environment

7.3.1 Surface Water, Fish, and Fish Habitat

7.3.1.1 Overview

The objective of the aquatic assessment was to inform the Project's design and collect the information necessary to assess baseline biophysical data and potential impacts to surface water and fish and fish habitat resulting from the Project. This was accomplished using the following approach:

- Identify surface water and fish and fish habitat within the Study Area through desktop-based resources (e.g., aerial imagery, mapping tools, existing databases, and previous studies) (Drawings 7.14).
- Identify representative habitats to survey for fish (Drawing 7.15).
- Traverse the entirety of the Assessment Area to ground truth surface water features and characterize any identified features (Drawings 7.15).
- Use the information collected to inform the Project design when possible (e.g., avoid/minimize impacts to surface water).
- Use the information collected to identify potential impacts and inform mitigation and management practices.

7.3.1.2 Regulatory Context

Under the *Environment Act* (Nova Scotia, 1995b), NSECC has the authority to promote the sustainable management of water resources in Nova Scotia. More specifically, per section 5A of the Activities Designation Regulations (Nova Scotia, 1995a), the alteration of a watercourse or the flow of water within a watercourse is an activity that requires an approval from NSECC, or a notification to NSECC if the work will be completed in accordance with the Nova Scotia Watercourse Alterations Standards (NSECC, 2015c).

The *Environment Act* (Nova Scotia, 1995b, Section 3be) defines a watercourse as:

(i) the bed and shore of every river, stream, lake, creek, pond, spring, lagoon or other natural body of water, and the water therein, within the jurisdiction of the Province, whether it contains water or not, and
(ii) all groundwater

Using this guidance, watercourses were identified and described throughout the Assessment Area to support the description of fish habitat, and effects to regulated watercourses which may require provincial approval. While groundwater is included in the regulatory definition of a watercourse under the *Environment Act* (Nova Scotia, 1995b), this section focuses on surface water features in the context of fish habitat. In addition to the above-mentioned definition, the watercourse parameters listed in the Guide to Altering Watercourses (NSECC, 2015b) were used to aid in determining the presence of a watercourse.

The *Fisheries Act* (Canada, 1985b) is the primary federal legislation governing the conservation and protection of fish and fish habitat in Canada. The *Fisheries Act* prohibits any work, undertaking, or activity that results in the harmful alteration, disruption, or destruction (HADD) of fish or fish habitat, as well as the deposit of deleterious substances into waters frequented by fish, unless such activities are authorized through appropriate regulatory approvals.

The *Fisheries Act* defines the following:

Fish:

> "(a) parts of fish, (b) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (c) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals"

Fish Habitat:

> "waters frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas"

Section 34.4(1) of the *Fisheries Act* (Canada, 1985b) states that "No person shall carry on any work, undertaking or activity, other than fishing, that results in the death of fish", and Section

35(1) states that “No person shall carry on a work undertaking or activity that results in the harmful alteration, disruption or destruction of fish or fish habitat”. Under Section 35(2) of the *Fisheries Act* (Canada, 1985b), authorization may be granted for a proposed work, undertaking or activity that may, respectively, result in the death of fish or the harmful alteration, disruption, or destruction of fish habitat.

If an alteration to a watercourse or waterbody is required, or impacts to fish and fish habitat are expected, a review under the DFO Request for Review process may be required. DFO review typically occurs through the provincial watercourse alteration application process.

7.3.1.3 Desktop Review

The objective of the desktop review was to identify potential fish communities, as well as watercourses and waterbodies located within the Study Area and within 5 km of its boundaries. The evaluation also determined the Study Area’s location within primary and secondary watershed boundaries.

The desktop review included a query of the following resources and databases:

- Nova Scotia 1:10,000 Primary Watersheds (NSECC, 2011a)
- 1:10,000 Secondary and Shore Direct Watershed of Nova Scotia (NSECC, 2011b)
- CanVec Database – Hydrographic Features (NRCan, 2023)
- Wet Areas Mapping (WAM) Database (NSECC, 2022b)
- Nova Scotia Topographic Database – Water Features (GeoNOVA, 2025b)
- Natural Watershed Municipal Surface Water Supply Areas, Restricted and Limited Use Lands Database (NSNR, 2007)
- NSNR Significant Species and Habitats Database (NSNR, 2024e)
- Aquatic Species at Risk Map (DFO, 2025a)
- Canadian Rivers Institute distribution (Gautreau & Curry, 2020)
- ACCDC Data Report (ACCDC, 2025b)

Watercourses and Waterbodies

The Study Area is within the Tracadie River primary watershed (1DS). Furthermore, the Study Area overlaps with seven secondary watersheds: Tracadie River (1DS-4), Little Tracadie River (1DS-5), Havre Boucher Brook (1DS-6), Mill Creek (1DS-7), Shore Direct (1DS-SD13), Shore Direct (1DS-SD12), and Shore Direct (1DS-SD11) (Drawing 7.14).

A review of the federal CanVec Database – Hydrographic Features (NRCan, 2023) identified 18 watercourses and nine waterbodies within or adjacent to the Study Area. Of these, three watercourses and seven waterbodies are named:

- Barry’s River
- Little Tracadie River
- Wrights River
- Chisholms Lake

- MacMillans Lake
- Mary Lake
- Matties Lake
- Morrisons Lake
- Summers Lake
- Tracadieur Lake

There are 196 watercourses within 5 km of the Study Area including 13 that are named. An additional 70 waterbodies were identified within a 5 km buffer of the Study Area, of which 20 are named (Table 7.27).

Table 7.27: Named Watercourses and Waterbodies Within the Study Area and a 5 km Buffer

Secondary Watershed	Name	Distance (km)[1]
Watercourses		
Little Tracadie River (1DS-5)	Little Tracadie River	0.0
	Millers Brook	2.3
Havre Boucher Brook (1DS-6)	Wrights River	0.0
Mill Creek (1DS-7)	Barrys River	0.0
Shore Direct (1DS-SD8)	Colin Chisholm Brook	1.6
Shore Direct (1DS-SD11)	MacAskills Brook	2.2
Shore Direct (1DS-SD12)	McNairs Brook	0.9
	Murray Brook	0.1
Shore Direct (1ER-SD1)	West Brook	4.9
Shore Direct (1FA-SD8)	Horton Brook	4.6
Tracadie River (1DS-4)	Anna Wallaces Brook	2.9
	East Branch Tracadie River	1.2
	Tates Brook	4.9
Waterbodies		
Havre Boucher Brook (1DS-6)	Dans Lake	1.5
	Harveys Lake	0.3
	Tracadieur Lake	0.0
Mill Creek (1DS-7)	Chisholms Lake	0.2
	Grant Lake	0.1
	Macmillan Lake	0.0
	Mary Lake	0.0
	Matties Lake	0.0
	Morrisons Lake	0.0
	Summer Lake	0.0
Shore Direct (1FA-SD7)	Embrees Pond	4.4

Secondary Watershed	Name	Distance (km)[1]
Shore Direct (1FA-SD8)	Horton Lake	4.5
	Long Pond	1.7
St. Francis Harbour River (1ER-3)	Dead Raven Pond	2.5
	Hopes Lake	3.1
	Hopes Lake	4.5
	Sunset Lake	4.9
	West Lakes	3.7
Tracadie River (1DS-4)	Archies Lake	4.9
	Guthros Lake	1.1

[1]Measurement from the nearest point of the Study Area.

The elevation within the Study Area ranges between approximately 21 masl to 159 masl (Drawing 7.5). Moderate elevation changes within the center of the Study Area have developed a watershed divide, typically driving water north and south out of the Study Area.

The Study Area overlaps the Mulgrave Municipal Water Supply Area to the south (Drawing 3.3). The Mulgrave Municipal Water Supply Area is a 2,094-ha surficial water supply area managed by the Town of Mulgrave Water Utility, which supplies raw water to PHP and drinking water to the Town of Mulgrave. Four waterbodies (along with their associated tributaries) are located within this Water Supply Area including: Grant Lake, Mary Lake, Summers Lake, and Matties Lake. Grant Lake is a constructed reservoir where drinking water is pulled and treated by the Mulgrave Water Treatment Plant (located east of Grant Lake) or transported via pipeline across the Strait of Canso to PHP. Summers Lake and Matties Lake are also constructed reservoirs which control recharge of Grant Lake located downstream. Although the Town of Mulgrave's water supply is well established, it is not designated as a PWA under the *Environment Act* (Nova Scotia, 1995b).

Throughout the Assessment Area, WAM data indicates that groundwater ranges from 0 m to > 33 m (Drawing 7.16). WAM results generally aligned with the locations of watercourses identified using topographic mapping and highlighted the potential for additional watercourses throughout the Assessment Area (NSECC, 2022b).

Potential Fish Community

The NSNR Significant Species and Habitat Database available on the Provincial Landscape Viewer (NSNR, 2024e) does not contain any polygons within the Study Area pertaining to aquatic freshwater and marine species.

Furthermore, the Aquatic Species at Risk Map (DFO, 2025a) identified no records of critical habitat within the Study Area. The map is a federal database showing the distribution of SAR and their associated critical habitat within Canadian waters.

An unpublished dataset from the Canadian Rivers Institute shows the following species as potentially present within the Tracadie River (1DS) primary watershed:

- Alewife (*Alosa pseudoharengus*, S3B)
- American eel (*Anguilla rostrata,* S3N)
- Atlantic tomcod (*Microgadus tomcod*, S5B)
- Banded killifish (*Fundulus disphanus*, S5)
- Brook trout (*Salvelinus fontinalus,* S3)
- Brown trout (*Salmo trutta*, SNA)
- Ninespine stickleback (*Pungitius pungitius,* S5)
- Rainbow trout (*Oncorhynchus mykiss*, SNA)
- White perch (*Morone americana*, S5)
- White sucker (*Castostomus commersoni,* S5)

The ACCDC data report for the Project (2025b) identified 10 fish and four aquatic invertebrate SAR or SOCI within 100 km of the Study Area. ACCDC also identified four observations of marine mammals within 5 km of the Study Area and three additional marine mammal observations within 100 km of the Study Area (Table 7.28; Drawing 7.14; Appendix F).

Table 7.28: Aquatic SAR/SOCI Identified Within 100 km of the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Fish					
Atlantic Salmon - Eastern Cape Breton population	*Salmo salar* pop. 4	Endangered	-	-	S1
Atlantic Salmon - Nova Scotia Southern Upland population	*Salmo salar* pop. 6	Endangered	-	-	S1
Atlantic Salmon – Gaspe Southern Gulf of St. Lawrence population	*Salmo salar* pop. 12	Special Concern	-	-	S1
Atlantic Salmon	*Salamo salar*	-	-	-	S1B,S1N
Atlantic Sturgeon – Maritimes Population	*Acipenser oxyrinchus* pop. 2	Threatened	-	-	S2S3N
American Eel	*Anguilla rostrata*	Threatened	-	-	S3N
Alewife	*Alosa pseudoharengus*	--	-	-	S3B
Striped bass - Southern Gulf of St. Lawrence Population	*Morone saxatilis* pop. 1	Special Concern	-	-	S2S3N
Striped Bass	*Morone saxatilis*	-	-	-	S2S3B,S2S3N

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Brook Trout	*Salvelinus fontinalis*	-	-	-	S3
Aquatic Invertebrates					
Brook Floater	*Alasmidonta varicosa*	Special Concern	Special Concern	Threatened	S3
Eastern Pearlshell	*Margaritifera margaritifera*	-	-	-	S2
Tidewater Mucket	*Atlanticoncha ochracea*	-	-	-	S1
Triangle Floater	*Alasmidonta undulata*	-	-	-	S2S3
Marine Mammals (Within 5 km)					
Leatherback Sea Turtle: Atlantic Population	*Dermochelys coriacea* pop. 2	Endangered	Endangered		S1S2N
Harbour Porpoise	*Phocoena phocoena* pop. 1	Special Concern			S4
Humpback Whale	*Megaptera novaeangliae* pop 2	Not At Risk			S3
Atlantic White-sided Dolphin	*Lagenorhynchus acutus*	Not At Risk			S3S4
Marine Mammals (Within 100 km)					
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered	Endangered		S1
Fin Whale - Atlantic population	*Balaenoptera physalus* pop. 1	Special Concern	Special Concern		S2S3
Long-finned Pilot Whale	*Globicephala melas*	Not At Risk			S2S3

Source: (ACCDC, 2025b)

Impacts to the marine environment are not expected, therefore these species are not discussed further in this report.

7.3.1.4 Field Assessment Methods

The results of the desktop review were used to inform Project design (e.g., avoid/minimize impacts to waterbodies and watercourses). Given that the Project will avoid all waterbodies, field assessment efforts were focused on potential Project-watercourse interactions, such as intersections between access roads and watercourses where existing crossing structures may need replacement or new structures installed.

Watercourse Assessments

Watercourse delineations were completed in conjunction with wetland delineations between June and September 2025.

Desktop-identified watercourses, along with WAM data and predicted flow data, were provided to field staff to guide the identification and assessment of watercourses within the Assessment Area. Confirmed watercourses were delineated to their termination point or to the boundary of the Assessment Area. The watercourses were characterized using Strum's baseline delineation form, which records the following general survey details:

- Date and time
- Flow regime (perennial, intermittent, ephemeral)
- Habitat types (riffle, pool, run, etc.)
- Flow characteristics (direction, velocity, etc.)
- Physical characteristics (width, length, depth, entrenchment)
- Substrate composition
- Cover types and compositions
- Bank stability
- Photographs and coordinates

This information was collected and georeferenced using Survey123, an Environmental Systems Research Institute (ESRI) application for creating, sharing, and analyzing data. Information collected on watercourses was also used to guide further freshwater species assessments (i.e., fish and herpetofauna).

Watercourses were classified into four main types (Table 7.29), consistent with the definitions provided by Buttle et al. (2012).

Table 7.29: Watercourse Types

Watercourse Type	Channel Width	Channel Definition	Bed and Banks	Flow Seasonality
Large permanent	Average width approximately > 5 m	Defined channel	Defined bed and banks	Year-round flow
Small permanent	Average width approximately 2 m to 5 m	Defined channel	Defined bed and banks	Year-round flow
Intermittent	Average width approximately < 2 m	Defined channel	Defined bed and banks	Seasonal water flow
Ephemeral	No defined channel		No defined bed and banks	Seasonal water flow

In accordance with current regulatory guidelines, fish habitat was identified as any aquatic feature contiguous with a fish-bearing system, whether it is located within a watercourse, wetland, or waterbody. Where habitat was present within a channelized watercourse flowing through a wetland, it was assessed in the context of the watercourse. If habitat was located outside a defined channel, it was assessed in the context of the wetland, based on fish accessibility or the presence of open water features. No waterbodies were identified within the Assessment Area.

Electrofishing Surveys

Electrofishing is a standard fish capture technique used to collect juvenile and adult fish from watercourses and waterbodies. The method involves submerging an anode and cathode in the water and passing an electrical current through the water to attract and immobilize fish for capture.

Electrofishing surveys were conducted in June 2025 in five watercourses across five of the seven secondary watersheds that intersect the Study Area to assess fish species presence and relative abundance. Two watercourses were within the Gulf Region and were fished under DFO Scientific License #SG-RHQ-25-015. The remaining three watercourses were within the Maritimes Region and were fished under DFO Scientific License #360444.

DFO's Interim Policy for the Use of Backpack Electrofishing Units (DFO, 2003) was reviewed and followed by all members of the electrofishing crew. This policy outlines requirements for standard equipment, safety, training, and emergency procedures. Each crew consisted of two individuals, including a qualified crew lead as defined by the Policy. The crew lead is responsible for operating the backpack electrofisher according to their training and the Policy, and for communicating safety policies and electrofishing procedures to the crew member.

Fish sampling was conducted using a Halltech Battery Backpack Electrofisher (HT-2000) with un-pulsed direct current. A crew member walked alongside the electrofisher operator to net any stunned fish using a D-frame landing net (1/8" mesh). Captured fish were held in a live well containing ambient stream water, shaded from the sun, and regularly monitored for signs of stress. At the conclusion of each pass, fish in the live well were identified (species confirmation), photographed, and measured for length. After recuperating, all fish were released back into the watercourse. As part of the assessment, field staff made notes of any fish observed but not caught, along with any points of concern such as obstructions to fish passage (e.g., elevated culverts, waterfalls, etc.).

Qualitative electrofishing surveys followed an open-site, single-pass methodology over a 100 m reach, without the use of barrier nets. This approach aligns with methods described in The Salmonid Field Protocols Handbook (Johnson et al., 2007), which cites multiple studies supporting the effectiveness of single-pass electrofishing for assessing species richness (Simonson & Lyons, 1995) and relative abundance (Kruse et al., 1998). Species abundance was estimated using catch per unit effort (CPUE) indices, standardized to 300 seconds of effort (Scruton & Gibson RJ, 1995). Prior to sampling, water temperature (< 22°C), potential of

hydrogen (pH), and conductivity were measured using a water quality pen to confirm suitable conditions and minimize stress on captured fish.

Watercourses identified during desktop review for electrofishing surveys are as follows (Drawing 7.15):

- Little Tracadie River [Little Tracadie River secondary watershed (1DS-5)]
- Unnamed tributary to Summers Lake [Tracadie River secondary watershed (1DS-4)]
- Wrights River [Havre Boucher Brook secondary watershed (1DS-6)]
- Unnamed tributary to Barry's River [Mill Creek secondary watershed (1DS-7)]
- Murray Brook [shore direct secondary watershed (1DS-SD13)]

These five locations were selected based on suitability of the habitat to conduct electrofishing surveys (i.e., deep enough to submerge the anode), location within secondary watersheds that intersect the Study Area, fish habitat potential, and access considerations. Two of the seven watersheds that intersect the Study Area (shore direct 1DS-SD12 and 1DS-SD11) were not surveyed because there was no connectivity between watercourses within the watersheds and watercourses identified within the Study Area during desktop review. All five reaches are third order (or higher) watercourses with connectivity to first- and second-order watercourses located within the Study Area. Fish species caught within these watercourses are assumed to be present upstream to the first or second order watercourses within the Study Area.

Trapping Surveys

Supplemental trapping surveys were conducted on June 11 and 12, 2025 in Grant Lake, which is outside of and located approximately 50 m south of the Study Area. Grant Lake is within the Mill Creek secondary watershed (1DS-7), which overlaps the largest portion of the Study Area. Trapping was conducted to supplement the electrofishing data collected in unnamed tributary to Barry's River. Eight minnow traps, two eel pots, and one fyke net were used to capture and record fish presence. Minnow traps have a 3 cm wide opening, a diameter of 22 cm, a length of 20 cm, and a mesh size of 7 mm. Eel pots have an 8 cm wide opening, a width of 32 cm, a length of 63 cm, and a mesh size of 25 mm. These traps allow fish to swim inside through funnels that guide them from a large opening near the outside of the trap to a narrow opening close to the center of the trap. Fyke nets have a 40 cm wide opening, a ring diameter of 73 cm, a wing width of 73 cm, a length of 195 cm, and a mesh size of 20 mm. These traps are a hoop net that trap fish inside mesh enclosures. The mesh wings guide fish into the fyke net opening, where they pass through a series of tunnels towards the back of the net. The locations of fish traps deployed within the Study Area are shown on Drawing 7.15.

In-Situ Water Quality

Water quality parameters were measured in-situ during watercourse assessments and fish collection surveys by Strum personnel using a Hannah Combo pH/Conductivity/TDS Probe at the time of the sampling event/survey. Parameters recorded include water temperature (°C), pH, and conductivity [microsiemens per centimeter (µS/cm)]. Results were analyzed using the Canadian Council of Ministers of the Environment (CCME) Guidelines for the Protection of Freshwater Aquatic Life (FWALs).

7.3.1.5 Field Assessment Results

There were 15 watercourses identified within the Assessment Area during field assessments (Drawing 7.17A to 7.17I): perennial (5), intermittent (9), and ephemeral (2) features ranging in channel width from 0 m to 8.2 m. Characteristics presented are limited to the extent of the watercourse contained within or overlapping the Assessment Area (Table 7.30). Representative photographs are provided in Appendix G.

Table 7.30: Watercourse Characteristics within the Assessment Area

WC#*	Flow	Velocity (m/s)	Length (m)	Channel Width Range (m)	Depth (m) Range	Substrate	Habitat Types	Bank Stability
WC1	Small Perennial	< 0.05	332	1.4-2.6	0.08-0.20	Dominant: Muck/Detritus Sub-dominant: Rubble, Boulder	Flat, Riffle-run	Moderate
WC2	Intermittent	0.00-0.05	376	0.9-1.3	0.00-0.12	Dominant: Muck/Detritus Sub-dominant: Rubble, Boulder	Flat, Riffle-run	Moderate
WC3	Intermittent	0.00-0.05	41	0.5-0.7	0.00-0.10	Dominant: Muck/Detritus	Pool, Riffle, Run	Moderate
WC4	Intermittent	0.00	80	0.4-1.0	0.00-0.18	Dominant: Muck/Detritus, Clay/Mud Sub-dominant: Sand	Run, Flat	Moderate
WC5	Ephemeral	0.00	512	0-0.8	0.00-0.07	Dominant: Muck/Detritus	Run, No Defined Channel	Moderate
WC6	Intermittent	< 0.05	116	1.5-2	0.20-0.47	Dominant: Muck/Detritus	Flat	Low
WC7	Intermittent	0.00-0.22	49	0.6-1.2	0.00-0.12	Dominant: Rubble, Muck/Detritus Sub-dominant: Gravel, Silt	Flat	Low
WC8	Small Perennial	0.05-0.07	56	0.5-1.2	0.03-0.80	Dominant: Muck/Detritus Sub-dominant: Silt, Clay/Mud	Riffle, Pool	High
WC9	Intermittent	0.03-0.10	59	0.9-2.6	0.07-0.20	Dominant: Boulder, Rubble Sub-dominant: Cobble, Gravel, Silt	Riffle-run	Moderate
WC10	Intermittent	0.00-0.10	38	1.6-2.1	0.01-0.10	Dominant: Boulder, Muck/Detritus Sub-dominant: Rubble, Cobble, Clay/Mud	Riffle-run, Pool	Moderate
WC11	Intermittent	< 0.05	71	1-1.5	0.07-0.29	Dominant: Muck/Detritus Sub-dominant: Rubble, cobble	Pool	Low
WC12	Ephemeral	0.01	34	0.4-1.0	0.08-0.19	Dominant: Muck/Detritus Sub-dominant: Rubble, Sand, Silt, Clay/Mud	Flat, Riffle-run	High

WC#*	Flow	Velocity (m/s)	Length (m)	Channel Width Range (m)	Depth (m) Range	Substrate	Habitat Types	Bank Stability
WC13	Small Perennial	0.05-0.06	183	2.1-2.8	0.15-0.17	Dominant: Cobble Sub-dominant: Rubble, Silt, Caly/Mud, Muck/Detritus	Riffle-Run, Cascade, Step pool	High
WC14	Large Perennial	0.11-0.15	51	5.1-8.2	0.08-0.17	Dominant: Boulder Sub-dominant: Rubble, Cobble, Gravel, Sand	Riffle-Run, pool	High
WC15	Large Perennial	0.09-0.10	32	1.2-2.3	0.03-0.12	Dominant: Gravel Sub-dominant: Rubble, Cobble, Sand, Silt, Clay/Mud	Riffle-Run, pool	High

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Perennial or permanent features see flow for the majority, if not the entirety of the year. Their continuous flow is often attributed to their direct connection to stable sources of water, including lakes and groundwater springs (US EPA, 2013). Small permanent features include streams, brooks, and creeks. These features are often first- and second-order streams fed by springs, groundwater, and run-off, and often act as tributaries to larger features, creating larger permanent features at their confluence. Large permanent features often exhibit lower flow path gradients, larger channel dimensions, and an increased flow (US EPA, 2013). Five watercourses were categorized as perennial.

Flow in intermittent watercourse features can vary throughout the year, either due to changes in their water source in other abiotic factors such as temperature or geological properties (Buttle et al., 2012). Intermittent watercourses are often first- and second-order streams fed by lakes, wetlands, springs, groundwater, and run-off. They are often episodic and flow more prominently following rainfall events and snowmelt conditions. Intermittent flow can occur underground as well as above the water table, along the surface. These features also differ in that they can observe partial channelization but will often enter below the surface (Buttle et al., 2012). Eight watercourses were categorized as intermittent.

Ephemeral features are often surface water flows and only present following snowmelt periods or rainfall events. These conditions are the sole sources of stream flow present in many of these features and as a result, their flow is always observed above the water table near the surface. In Nova Scotia, and within the Study Area, ephemeral conditions can also be observed between and within wetlands, which are sometimes referred to as wetland corridors. Two watercourses were categorized as ephemeral.

Several of the identified watercourses within the Assessment Area showed evidence of alteration resulting from anthropogenic development activities throughout the last century. For example, some watercourses have been disrupted through the installation of culverts to facilitate forestry activities and other land uses within the Study Area. Forestry activities have also indirectly impacted watercourses through a decrease in evapotranspiration, a decrease in shaded areas, and an increased displacement of organic material and sediment through surface erosion and overland flow.

Electrofishing Surveys

Qualitative electrofishing was conducted on five watercourses during summer 2025 by certified Strum field staff (Table 7.31; Drawing 7.15).

Table 7.31: Electrofishing Survey Results

Site	Secondary Watershed	Survey Date	Coordinates (UTM)		Fish Species Collected		Electrofishing Effort (Seconds)	Catch Per Species	Total Catch
			Easting	Northing	Common Name	Scientific Name			
Site 1 (Little Tracadie River)	Little Tracadie River (1DS-5)	2025-06-12	612947	5054295	-	-	2,109	0	0
Site 2[(1)]	Tracadie River (1DS-4)	2025-06-12	616810	5051253	-	-	1,304	0	0
Site 3 (Wrights River)	Havre Boucher Brook (1DS-6)	2025-06-12	617316	5056097	Brook Trout	*Salvelinus fontinalis*	1,808	1	4
					Atlantic Salmon	*Salmo salar*		3	
Site 5	Mill Creek (1DS-7)	2025-06-11	620742	5054975	Brook Trout	*Salvelinus fontinalis*	1,786	12	12
Site 6 (Murray Brook)	1DS-SD13	2025-06-13	622969	5052612	Brook Trout	*Salvelinus fontinalis*	1,982	28	28

[(1)]Due to hazardous conditions, wading was unsafe to do. Fishing was conducted on the banks.

The electrofishing surveys resulted in 41 brook trout and three Atlantic salmon being caught across the five assessed watercourses (Table 7.31, Drawing 7.15). Brook trout was observed in three of the five secondary watersheds that were electrofished. Atlantic salmon were present in one of the five assessed watersheds. Brook trout individuals caught were representative of various life stages and sizes. Representative photographs of fish species captured within the Study Area are provided in Appendix G.

Trapping Surveys

Trapping was conducted within Grant Lake, located just outside the Study Area, by certified Strum field staff during summer 2025 field surveys (Drawing 7.15, Table 7.32).

Table 7.32: Trapping Survey Results

Location	Secondary Watershed	Survey Date	Trapping Location		Fish Species Collected		Catch Per Species	Total Catch Per Trap Type[(1)(2)]	Total Effort Per Trap Type (hours)	CPUE (per trap)	CPUE (per species)
			Easting	Northing	Common Name	Scientific Name					
Site 4 (Grant Lake)	Mill Creek (1DS-7)	2025-06-11	620983	5052372	White Sucker	*Catostomus commersonii*	1	MT (8) = 3 EP (2) = 0 FN (1) = 1	MT = 161 EP = 40.6 FN= 19.4	MT = 0.018 EP = 0.0 FN = 0.051	0.004
					Brook Trout	*Salvelinus fontinalis*	1				0.004
					Northern Redbelly Dace	*Chrosomus eos*	2				0.009

[(1)]MT- Minnow trap, EP – Eel pot, FN – Fyke net
[(2)]The number in parentheses indicates the number of each trap type set.

In total, the trapping surveys resulted in the capture of three species and four individual fish. Northern redbelly dace were the most abundant species, accounting for (50%) of the total catch. The highest CPUE per trap type was 0.051 in the fyke net. The highest CPUE per species was 0.009 for northern redbelly dace. Representative photographs of fish species captured within the Study Area are provided in Appendix G.

Priority Species

The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) was used to identify priority species and habitat associated with the Project. SAR and SOCI within 5 km of the Study Area and those observed during field surveys and their respective habitat associations were compared to the habitat present within the Study Area. Only those aquatic SAR or SOCI, and their respective habitats, with potential to interact with the Project have been designated as Project-specific priority species. Interactions may include removal or disturbance of a SAR or SOCI and/or their associated habitat. Priority species include:

- American eel
- Atlantic salmon [Southern Upland (SU) and Gaspé-Southern Gulf of St Lawrence populations]
- Brook trout

American Eel

The American eel is assessed as Threatened under COSEWIC and ranked S3N by ACCDC (2025c). American eel are not listed under SARA. American eel are a migratory species with life stages in freshwater, estuary, and marine environments (COSEWIC, 2012). Though much is still unknown about the American eel, several studies have shown a temperature preference of around 16.7°C (Blakeslee et al., 2018). American eel spawning occurs in the marine environment at the Sargasso Sea and only once during their lifespan. American eel larvae, known as leptocephali, drift westward towards the coast, where they grow into glass eels and begin to migrate inland to freshwater habitats for maturation (COSEWIC, 2012). Within freshwater habitats, this species of eel is typically found in rivers and lakes, and will readily burrow into mud, sand, fine gravel, cobble, and woody debris. Within marine environments, American eels are commonly associated with protected shallow waters containing submerged vegetation (e.g., eelgrass) and woody debris (COSEWIC, 2012).

The closest ACCDC observation of American eel is 14.6 ± 0.01 km from the Study Area (ACCDC, 2025). American eel was not captured within the Study Area during the 2025 electrofishing surveys. However, the species is likely present within watercourses in the Study Area due to its presence within the primary watershed and observed suitable habitat found within the Study Area.

Atlantic Salmon

The Atlantic salmon – Nova Scotia SU population is assessed as Endangered by COSEWIC and ranked S1 by ACCDC (2025c). SU Atlantic salmon are not currently listed under SARA.

SU Atlantic salmon are a genetically distinct population of Atlantic salmon that occupy rivers in both the Eastern Shore and South Shore, draining into the Atlantic, as well as Bay of Fundy Rivers south of Cape Split (DFO, 2013).

The Atlantic salmon – Gaspe Gulf of St Lawrence Population is assessed as Special Concern by COSEWIC ranked S1 by ACCDC (2025). The St Lawrence population is not currently listed under SARA and are a genetically distinct population of Atlantic salmon that occupy rivers along the western shore of Nova Scotia, draining into the Northumberland Strait and the Gulf of St Lawrence.

In general, the freshwater habitat preference of Atlantic salmon includes clear, well-oxygenated waters in streams with bottoms of gravel, cobble, and boulder. Atlantic salmon prefer cool waters, with spawning typically observed in the 4.4 to 10°C range, and growth typically observed in the 5 to 19°C range (US Fish and Wildlife Service, 2021a). As temperatures rise above 23°C, habitat potential decreases, and Atlantic salmon will search for deeper and cooler waters. Riffles, rapids, and pools are also necessary components for various life stages, with the preferred depth being in the 10 to 40 cm range (US FWS, n.d.). Furthermore, Atlantic salmon prefer a circumneutral pH ranging from 6.5 to 7.5 (MDEP, 2022).

Atlantic salmon species undertake long feeding migrations to the ocean as older juveniles and adults and return to freshwater streams to reproduce. Marine habitat features for both SU Atlantic salmon and the Gulf of St Lawrnce populations have not been identified due to the vast spatial and temporal variations (DFO, 2013). SU Atlantic salmon smolts migrate seaward from rivers during May-July and adults return to the rivers in the late fall to spawn (COSEWIC, 2011). Smolts from the Gulf of St Larwence population head to marine waters in spring and early summer (DFO, 2025b).

Atlantic salmon were captured within the Study Area during the 2025 electrofishing surveys (Drawing 7.15).

Brook Trout

Brook trout are not listed under federal (SARA) or provincial (ESA) legislation as a SAR; however, they are ranked S3 by ACCDC (2025c). This species of trout is typically found in cold, clear, and well oxygenated rivers and lakes with plenty of shade and gravel substrate (US FWS, 2009). They prefer water temperatures that do not exceed 20°C, though adult fish can tolerate temperatures of up to 25°C for short periods of time. Furthermore, despite being able to reproduce in waters with a pH as low as 4.5, they do best in a pH range of 5.0 to 7.5 (MDNR, 2012).

Brook trout are a migratory species that migrate further inland to rivers and lakes during the fall months to spawn. Sea-run Brook trout may spend April to June in marine environments, but migration to marine habitat does not always occur year to year, with some Brook trout never entering marine environments (DFO, 1988). In Nova Scotia, Brook trout are considered the number one sportfish, with approximately 2 million trout stocked within the province on an annual basis (NSFA, 2005).

Brook trout were captured within the Study Area during the 2025 electrofishing surveys (Drawing 7.15).

In-Situ Water Quality

Water quality results are reported and discussed as it relates to the chemical characteristics required for suitable fish habitat. Where applicable, water quality sampling results are measured against the CCME and FWAL guidelines. Summaries of water quality measurements are presented in Table 7.33. Water quality measurement locations coincide with fish collection locations, shown on Drawing 7.15. The results generally provide a snapshot of in-situ water quality from select aquatic features in July 2025.

Table 7.33: Results of the In-situ Water Chemistry Analysis Complete for Fish Collection within the Study Area

Site	Sampling Dates	Water Temp (ºC)	pH	Conductivity (µS/cm)
Site 1 (Little Tracadie River)	2025-06-12	18.5	5.6	52
Site 2	2025-06-12	17.5	5.4	54
Site 3 (Wrights River)	2025-06-12	15.6	5.5	40
Site 4 (Grant Lake)	2025-06-11	17.3	6.4	30
Site 5	2025-06-11	17.4	5.6	73
Site 6 (Murray Brook)	2025-06-13	12.5	6.3	77

Water temperature affects the metabolic rates and biological activity of aquatic organisms, thus influencing the use of habitat by aquatic biota. There are no CCME guidelines related to temperature and aquatic biota. Temperature preferences of fish vary between species, as well as with size, age, and season. All temperatures recorded are considered within the suitable temperature range for cold-water fish species (< 20 ºC).

The CCME FWAL guidelines suggest a range of pH from 6.5 to 9.0 is suitable within freshwater habitat to support aquatic health. Kalff (2002) indicates that the loss of fish populations is gradual and depends on fish species, but decline is evident when pH is < 6.5. Kalff (2002) further states that a 10 to 20% species loss is apparent when pH < 5.5. Nova Scotia typically has more acidic freshwater systems with pH ranging from 5 to 9. Surface water features within the Study Area were found to be temperate with pH ranging from 5.4 to 6.4, with an average pH of 5.8. All the sampled sites exhibited pH levels below the recommended CCME range for FWAL (6.5 to 9), and Site 2 exhibited pH so low to expect species loss (< 5.5).

Conductivity is often used as the baseline for detecting potential sources of pollution and changes in water quality. Significant changes in these parameters could indicate that a discharge or some other source of pollution has entered the aquatic resource. Conductivity levels measured within the Study Area are considered typical for Nova Scotia (NSSA, 2014).

7.3.1.6 Effects Assessment

Project-Surface Water, Fish, and Fish Habitat Interactions

Project activities, primarily those that involve earth-moving, vegetation removal, and road construction have the potential to impact watercourses, fish, and fish habitat (Table 7.34). These potential impacts could include direct alteration, such as habitat loss, or changes to water quality or quantity and/or displacement of sediment.

Table 7.34: Potential Project Interactions with Surface Water, Fish, and Fish Habitat

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	-
Vegetation Management	X
Decommissioning and Rehabilitation	
Infrastructure Removal	-
Site Reclamation	X

Assessment Boundaries

The LAA for watercourses includes the Assessment Area. The RAA includes the secondary watersheds that intersect the Study Area (Drawing 7.14).

Assessment Criteria

Assessment criteria provided in Section 4.3 also apply to watercourses. The VC-specific definition for magnitude is as follows:

- Negligible: No loss of fish or fish habitat. No expectation for altered hydrology or impact to fish.
- Low: Small loss of fish or fish habitat, with minimal potential for altered hydrology or impact to fish.
- Moderate: Moderate loss of fish or fish habitat. Altered hydrology expected but can be managed with routine measures. Impacts to fish will only be experienced by individuals rather than entire populations and can be managed with routine measures.

- High: High loss of fish or fish habitat. Altered hydrology expected that would be challenging to manage with routine measures. Impacts to fish will be experienced by entire populations and cannot be managed with routine measures; the population's life history is permanently altered.

Effects

Habitat Loss

The Project design has been optimized to minimize interactions between the Project and watercourses and wetlands that may support fish and fish habitat. However, in areas where watercourse/wetland interactions are unavoidable, there is a potential for habitat loss.

Watercourse alterations have the potential to impact fish habitat. The removal of overhanging vegetation from stream banks decreases shade/cover for fish resulting in increased vulnerability to predators. Likewise, the removal of instream cover, such as coarse woody debris or edge habitat (e.g., undercut banks) can have a negative effect on both fish and aquatic invertebrate habitat (MTO, 2009). Furthermore, alterations to channel morphology including altered substrate composition and interference with sediment transport can also result in aquatic habitat degradation.

A total of 15 watercourses were identified within the Assessment Area. As a conservative measure, all watercourses identified are presumed to be accessible to fish, even though there may be seasonal restrictions with the intermittent watercourses.

Watercourses and waterbodies are avoided to the greatest extent practicable in the Project's layout. The predicted direct impact to fish habitat involves road crossings at 10 of the 15 watercourses within the Assessment Area. Three of these watercourses contain pre-existing crossings that have declined in efficiency since being installed. Therefore, some areas will see improved hydrology and fish passage with the upgraded crossings.

A summary of the watercourses identified to be directly affected by the Project (i.e., new road crossing or upgrading in existing crossing) is provided in Table 7.35.

Table 7.35: Direct Effect Summary

Watercourse	Watercourse Type	Existing Alteration Present?	Forecasted Alteration
WC1	Small Perennial	None observed.	Structure to be installed for road crossing.
WC3	Intermittent	Yes, metal culvert at road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC5	Ephemeral	None observed.	Structure to be installed for road crossing.
WC6	Intermittent	None observed.	Structure to be installed for road crossing.

Watercourse	Watercourse Type	Existing Alteration Present?	Forecasted Alteration
WC7	Intermittent	Yes, metal culvert at road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC8	Small Perennial	None observed.	Structure to be installed for road crossing.
WC9	Intermittent	None observed.	Structure to be installed for road crossing.
WC10	Intermittent	Yes, metal culvert at road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC11	Intermittent	None observed.	Structure to be installed for road crossing.
WC12	Ephemeral	None observed.	Structure to be installed for road crossing.

If required, seven out of the 10 forecasted alterations would involve upgrades associated with new roads. Three alterations would potentially be an upgrade to the current road crossing. The Proponent will obtain approval under the NSECC watercourse alteration process (NSECC, 2015b) and DFO will review the application to determine whether the crossing will result in a HADD of fish habitat. Based on Strum's experience with culvert design, crossing construction, monitoring, and mitigation implementation, it is anticipated that standard design and construction practices can be applied to avoid a HADD determination in the above instances (Table 7.35). No additional direct impacts to watercourses, waterbodies, or wetlands supporting fish habitat are expected.

Erosion and Sedimentation

Sediment mobilization within aquatic environments can cause shifts in ecological integrity, including changes to plant species composition, the distribution of primary and secondary producers, and the habitat suitability for vulnerable species (Tilman et al., 1997). Erosion and sedimentation can occur throughout the lifecycle of the Project, including during construction efforts, routine road maintenance, and daily traffic. However, the highest potential for these effects is related to the construction and upgrading of access roads, and the installation or upgrading of crossing structures. The alteration or removal of riparian vegetation can also result in bank instability and erosion, further exasperating these effects (MTO, 2009).

Fish Injury or Mortality

Based on work conducted for nearby projects, blasting is not anticipated but cannot be ruled out. If required, blasting may result in sensory disturbance to fish, impacting fish behaviour, spawning grounds, and migration patterns. The detonation of explosives near watercourses can produce post-detonation shock waves which involves a rise to a high peak pressure and then a subsequent fall to below ambient hydrostatic pressure. This pressure deficit can cause impacts in fish (Wright & Hopky, 1998). An overpressure in excess of 100 kilopascals can result in effects on fish including damage to the swim bladder in finfish, and potential rupture

and hemorrhage to the kidney, liver, spleen and sinus venous. It is also possible that fish eggs and larvae can be damaged (Wright & Hopky, 1998). The degree of damage is related to the type of explosive, size, and pattern of the charges and the distance to the watercourse, depth of water within the watercourse, and species, size and life stage of the fish.

Sublethal effects have also been observed including changes in fish behaviour as a result of noise produced during blasting (Wright & Hopky, 1998). Should blasting be required, guidance outlined by Wright and Hopky (1998) will be used to develop a Blasting Management Plan. The Blasting Management Plan will be designed to ensure that appropriate setback distances are maintained, or mitigations are implemented to protect fish and fish habitat from the potential impacts of blasting.

Changes in Surface Water Quantity and Quality

Changes to the amount of flow can alter channel morphology, increase flood potential, cause erosion, and disrupt habitat characteristics that support vulnerable species (MTO, 2009) .

These impacts could result from:

- Alteration of bank or channel grades for road development.
- New or upgraded watercourse crossings.
- Compaction of soil from the heavy machinery required for turbine assembly.
- Alteration of channel beds to facilitate the removal and replacement of preexisting infrastructure (e.g., collapsed culverts).

Changes in surface water quality can arise from alterations to the surrounding environment and can include an increase in water temperature from decreased shade, an increase in pollutants from machinery and infrastructure, and the mobilization of sediments (MTO, 2009). Given the dynamic nature of channeling water, effects on water quality can quickly spread throughout different reaches of the respective watershed.

Although there will be no direct Project-waterbody interactions, approximately 286.2 ha (13.7%) of the Mulgrave Municipal Water Supply Area overlaps with the Study Area (Drawing 7.14). The overlapped area includes new road (and associated electrical collector lines) and four turbine locations. Conversations with various municipal officials and staff indicated that development within the Mulgrave Municipal Water Supply Area will be reviewed as part of municipal Development Agreement processes.

Mitigation

The following mitigative measures will be implemented to avoid and mitigate any potential effects on watercourses. In addition, the Proponent will develop and implement a Surface Water Management Plan, Erosion and Sediment Control Plan, and a Contingency Plan. Planning will include specific consideration of the protection of the Mulgrave Municipal Water Supply Area in consultation with the Town of Mulgrave Water Utility.

As required, all work completed under the provincial watercourse alteration notification process will be done in accordance with the Nova Scotia Watercourse Alterations Standards and will be executed by a certified Watercourse Alteration Installer/Sizer. For work requiring a watercourse alteration approval, specific and detailed mitigation will be developed and submitted to NSECC as part of the application process.

The following mitigation measures will be implemented:

Habitat Loss

- Educate Project personnel on the sensitivity of aquatic habitat.
- Flag watercourses and avoid impacts to the watercourse and adjacent riparian habitat to the extent possible.
- Obtain watercourse alteration approval from NSECC and adhere to the terms and conditions of the approval, as required.
- Require that the crossing is installed by a certified Watercourse Alteration Installer/Sizer, and designed to avoid any permanent diversion, restriction or blockage of natural flow, such that the hydrologic function of the watercourse is maintained.
    - Follow BMPs during culvert installation (e.g., installation in the dry and following appropriate timing windows, where possible).
- Require that Project activities (fueling included) or removal of vegetation not be conducted within 30 m of any delineated or mapped watercourse, without authorization from NSECC.
- Allow for natural vegetation along the watercourse edge and above the ordinary high-water mark to facilitate the stabilization of the area, and restoration of fish habitat.
- Conduct any work within the bed of a watercourse between June 1 and September 30 to avoid sensitive periods in the life cycles of fish, to better control water flow, and to allow for a faster vegetation period (NSECC, 2015b)
    - Consult with NSECC and DFO if work is required outside of appropriate timing windows.
- Complete a fish rescue, as required, during instream work requiring isolation of flow.

Altered Hydrology

- Plan any construction activities that may impact stream banks and substrate to align with low-flow periods.
- Design necessary alterations in a way that maintains the natural grade of the watercourse, to ensure the hydroperiod remains as it was pre-alteration.
(1998)

Erosion and Sedimentation

- Develop a site-specific Erosion and Sediment Control Plan during the detailed design phase.
    - The plan will target the disturbance to banks (as required) and adjacent land, and will address the type of control structures, proper installation techniques, grading, maintenance and inspection, timing of installation, and vegetation.

Blasting

- Develop a Blasting Plan, if blasting is required, that is informed by the guidance provided in Wright and Hopky (1998).

Changes in Surface Water Quantity

- Develop and implement a Surface Water Management Plan.
    - Integrate water management systems including diversion and collection ditches, roadside drainage channels, vegetated swales, and stormwater retention ponds, as directed by the Surface Water Management Plan.
- Design any necessary alterations in a way that maintains the natural grade of the watercourse, to ensure the hydroperiod remains as it was pre-alteration.
- Fit any watercourse crossings with appropriately sized infrastructure, as prescribed by a certified Watercourse Alteration Installer/Sizer.

Changes in Surface Water Quality

- Maintain 30 m vegetated buffers around watercourses, to the extent possible.
- Integrate outlet protection features to dissipate flow velocities and decrease erosion at the outflow.
- Require that if concrete is to be used, it is pre-cast and cured for at least one week prior to use at a crossing site (NSECC, 2015b).
- Use untreated, rot-resistant timber (e.g., hemlock, tamarack, juniper, or cedar) below the ordinary highwater mark to avoid the leaching of toxic preservatives into waterways (NSECC, 2015b).
- Use rock material that is clean, coarse granular, non-ore-bearing, non-watercourse-derived, and non-toxic to aquatic life (NSECC, 2015b).

Monitoring

For crossings subject to provincial notification requirements, visual monitoring will be completed during the installation process to ensure the work is conducted in accordance with the Nova Scotia Watercourse Alteration Activity Standards (NSECC, 2015c). If the crossing requires an approval, monitoring will be determined as part of the permitting process.

A watercourse monitoring plan, if required as part of the permitting phase, may include hydrological, sediment, and stability assessments upstream, downstream, and at the crossing of the watercourse.

Conclusion

The predicted residual effects of the Project (after mitigation) are characterized in Table 7.36.

Table 7.36: Surface Water and Fish and Fish Habitat Residual Effects

Effect Detail	Habitat loss	Erosion and Sedimentation	Fish Injury or Mortality	Changes to Water Quality and Quantity
Magnitude of Effect	**Low:** A small loss of fish habitat.	**Low**: Minimal potential for impact to fish.	**Negligible:** No loss of fish expected.	**Low:** Minimal potential for altered hydrology or impact to fish.
Geographic Extent of Effect	Assessment Area	Assessment Area	Assessment Area	Assessment Area
Frequency of Effect	**Single Event:** Effects may occur during initial construction.	**Intermittent:** Effects may occur during initial construction and during operations.	**Single Event:** Effects may occur during initial construction.	**Intermittent:** Effects may occur during initial construction and during operations.
Duration of Effect	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning.	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning.	**Short Term:** Effects are expected only during the construction phase.	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning.
Reversibility of Effect	**Partially Reversible**	**Partially Reversible**	**Partially Reversible**	**Partially Reversible**
Significance Level	Not Significant	Not Significant	Not Significant	Not Significant

Effects Assessment Ratings (Refer to Table 4.3 for definitions)

Magnitude: Negligible, Low, Moderate, High
Frequency: Single Event, Intermittent, Continuous
Duration: Short Term, Medium Term, Long Term
Reversibility: Reversible, Irreversible, Partially Reversible

7.3.2 Wetlands

7.3.2.1 Overview

Wetland assessments were conducted to identify and delineate wetland habitat so that impacts to wetland area and function could be avoided and minimized, to the extent possible. This was achieved by using the following approach:

- Identify wetland habitat in the Study Area using desktop resources.
- Ground-truth and delineate wetland habitat within the Assessment Area.
- Complete functional assessments for delineated wetlands within the Assessment Area.
- Identify the potential for and confirm the presence of WSS within the Assessment Area.
- Use the results to refine the Project design to avoid/minimize impacts to wetlands, to the extent possible.

7.3.2.2 Regulatory Context

The Nova Scotia Wetland Conservation Policy (NSECC, 2019) outlines a policy goal of no loss of WSS and no net loss in area and function for other wetlands. Wetlands are considered WSS based on the wetland having significant species or species assemblages, high levels of biodiversity, significant hydrological value, or high social or cultural importance. Under this policy, the following wetlands are considered WSS:

- All salt marshes.
- Wetlands that are within or partially within a designated Ramsar site, Provincial Wildlife Management Area (Crown and provincial lands only), 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 the Nova Scotia Eastern Habitat Joint Venture program.
- Wetlands known to support at-risk species as designated under SARA or ESA.
    - This applies only to the portion of the wetland directly supporting species designated as Threatened and/or Endangered (M. Gorman, 2023)
- Wetlands in designated PWAs as described within Section 106 of the *Environment Act,* S.N.S. 1994-95, c. 1 (Nova Scotia, 1995b).

Additionally, a wetland can be determined to be a WSS based on its functional assessment score (discussed further in Section 7.3.2.4).

As per Section 5 of the *Environment Act* (Nova Scotia, 1995b), approval from NSECC is required to alter a wetland. Nova Scotia considers a wetland alteration to be any activity that may affect wetland function and habitat. Such activities include, but are not limited to, excavating, flooding, infilling, or draining (Nova Scotia, 1995b).

7.3.2.3 Desktop Review

A desktop review was conducted to identify the location and extent of potential wetlands within the Study Area. The following sources were reviewed:

- Nova Scotia Wetlands Inventory (NSNR, 2021h)
- WSS Database (NSECC, 2020b)
- Nova Scotia Hydrographic Network (ODNS, 2024)
- WAM Database (NSECC, 2022b)
- Nova Scotia Digital Elevation Model (DEM) (GeoNOVA, 2024b)
- Provincial Landscape Viewer (NSNR, 2024d)
- Satellite and aerial imagery

The Nova Scotia Wetlands Inventory (NSNR, 2021h) includes 41 wetlands within the Study Area, which are classified as: swamp (33), marsh (four), bog or fen (two), and water (two). The wetlands range in size from 0.1 ha to 83.3 ha (Drawing 7.18). Of the 46 wetlands in the

inventory, five are identified as potential WSS based on prior observations of SAR. These wetlands were further investigated during field assessments for presence or absence of SAR.

The Nova Scotia Hydrographic Network (ODNS, 2024) was used in conjunction with the WAM Database (NSECC, 2022b) and DEM Layer (GeoNOVA, 2024b) to further assess the distribution of confirmed and potential wetland habitat within the Study Area. These sources identified potential wet areas and predicted flow based on the assumed depth-to-water generated from digital elevation data (Drawing 7.16). The depth-to-water ranged from 0 m to > 10 m from the surface across the Study Area, with the majority of the Study Area being well to moderately-well drained.

The Provincial Landscape Viewer (NSNR, 2024d) was reviewed to confirm the presence of both wetlands and WSS. The results show that there are no polygons related to protected areas or significant species' habitat within the Study Area. The results showed no additional wetlands beyond the polygons identified in the NSNR Wetland Inventory.

7.3.2.4 Field Assessment Methodology

General

Wetland field assessments were completed within the Assessment Area from June 23 to September 25, 2025. Wetland assessments included wetland delineation and wetland functional assessments and were completed in conjunction with watercourse assessment surveys (Section 7.3.1).

To accompany wetland field surveys, a list of SAR and SOCI known to occur within the region of the Project was compiled to help with incidental identification. Details of any incidental SAR or SOCI observations are captured under their respective reporting sections, as applicable to the species observed.

Field Delineations

Strum ecologists surveyed the Assessment Area, delineating and characterizing each wetland identified in accordance with the U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987). Wetland boundaries were determined by confirming the following:

- Presence of hydrophytic (water loving) vegetation.
- Presence of hydrologic conditions which result in periods of flooding, ponding, or saturation during the growing season.
- Presence of hydric soils.

A positive indicator must typically be present for all three parameters to definitively identify any given site as a wetland (Environmental Laboratory, 1987). Field staff walked meandering transects throughout the landscape to look for wet areas. When wetlands were identified, the boundary was flagged, a wetland determination form was completed, and the spatial boundaries were recorded on iPads using the ESRI software Survey 123.

Identification of Hydrophytic Vegetation

Hydrophytic vegetation is defined as the sum of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produces permanent or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present (Environmental Laboratory, 1987). Hydrophytic vegetation should be the dominant plant type observed in wetland habitat (Environmental Laboratory, 1987).

Dominant plant species observed in each wetland were classified according to indicator status (probability of occurrence in wetlands), in accordance with the U.S. Fish and Wildlife Service National List of Vascular Plant Species that Occur in Wetlands: NE Region (Region 1) (US FWS, 1988) (Table 7.37). These indicators are used as this region most closely resembles the flora and climate regime of Nova Scotia.

Table 7.37: Classification of Wetland-Associated Plant Species

Plant Species Classification	Abbreviation(1)	Probability of Occurring in Wetland
Obligate	OBL	> 99%
Facultative Wetland	FACW	66-99%
Facultative	FAC	33-66%
Facultative Upland	FACU	1-33%
Upland	UPL	< 1%
No indicator status	NI	Insufficient information to determine status
Plants That Are Not Listed (assumed upland species)	NL	Does not occur in wetlands in any region.

Source: (US FWS, 1988)
(1)A '+' or '-' symbol can be added to the classification to indicate greater or lesser probability, respectively, of occurrence in a wetland.

If the majority (> 50%) of the dominant vegetation at a data point is classified as OBL, FACW, or FAC, then the location of the data point is considered to be dominated by hydrophytic vegetation.

Identification of Hydric Soils

A hydric soil is formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper layer (USDA NRCS, 2003). Indicators of the presence of hydric soils include soil colour (gleyed soils and soils with bright mottles and/or low matrix chroma), aquic or preaquic moisture regimes, reducing soil conditions, sulfidic material (odour), soils listed on the hydric soils list, iron and manganese concretions, organic soils (histosols), histic epipedons, high organic content in the surface layer of sandy soils, and organic streaking in sandy soils.

During field surveys, soil pits were excavated to a minimum depth of 40 cm or until (auger) refusal. The soil in each pit was then examined for hydric soil indicators. The matrix colour and mottle colour (if present) of the soil were determined using Munsell Soil Colour Charts.

Determination of Wetland Hydrology

Wetland habitat, by definition, either periodically or permanently has a water table at, near, or above the land surface. To be classified as a wetland, a site should have at least one primary indicator or two secondary indicators of wetland hydrology (some common indicators are presented in Table 7.38). Wetland habitat is assessed for signs of hydrology via visual observations across the area and through the assessment of soil pits.

Table 7.38: Example Indicators of Wetland Hydrology

Examples of Primary Indicators	Examples of Secondary Indicators
Surface Water	Oxidized Root Channels in the Upper 30 cm
Saturation	Local Soil Survey Data
Sediment Deposition	Dry Season Water Table
Drainage Patterns	Stunted or Stressed Plants
Water-stained Leaves	Drainage Patterns
Sparsely Vegetated Concave Surfaces	Surface Soil Cracks
Hydrogen Sulfide Odor	Moss Trim Lines

Source: As identified in the Nova Scotia Wetland Delineation Data Form (NSECC, 2011c) which has been adapted from the U.S. Army Corps of Engineers form for Northeast-North Central Supplement for use in Nova Scotia (Environmental Laboratory, 1987)

Functional Assessments

Wetland functional assessments (in-season) were completed for all field-delineated wetlands identified within the Assessment Area. Functional assessments were completed using the Wetland Ecosystems Services Protocol – Atlantic Canada (WESP-AC) evaluation technique Version 3.4 (Adamus, 2025). The WESP-AC process involves the completion of three forms: a desktop review portion (Office Form) that examines the landscape level aerial conditions to which the wetland is situated, and two field forms identifying biophysical characteristics of the wetland (Field Form) and stressors to the wetland (Stressors Form). The process serves as a rapid method for assessing individual wetland functions and values. WESP-AC addresses multiple specific functions that wetlands may provide, presented in Table 7.39 (WESP-AC Version 3.4).

Table 7.39: WESP-AC Version 3.4 Function Parameters

Grouped Wetland Function	Specific Wetland Functions
Hydrologic Function	Surface Water Storage
Water and Climate Protection	Sediment and Toxicant Retention and Stabilization
	Phosphorus Retention
	Nitrate Removal and Retention
	Wildlife Resistance
	Carbon Stock Preservation
Aquatic Support	Stream Flow and Temperature Support
	Organic Nutrient Export
	Aquatic Primary Productivity

Grouped Wetland Function	Specific Wetland Functions
Aquatic Habitat	Anadromous Fish Habitat
	Resident and Other Fish Habitat
	Waterbird Feeding Habitat
	Waterbird Nesting Habitat
	Amphibian Habitat
Transition Habitat	Raptor and Wetland Songbird Habitat
	Pollinator Habitat
	Keystone Mammal Habitat
	Native Plant Habitat

Source: (Adamus, 2025)

In addition to the grouped wetland functions above, WESP-AC also measures the following specific wetland functions; however, these are only evaluated by their benefit scores:

- Cultural & Recreational Importance
- Wetland Sensitivity
- Wetland Stressors

For each wetland evaluated, the WESP-AC process calculates the overall score for the grouped wetland functions and the specific wetland functions listed in Table 7.39. One score each is provided for function and benefit. Scores are ranked as “Lower”, “Moderate”, or “Higher”, allowing for analysis of the wetland as compared to calibrated baseline wetland scores in Nova Scotia to date. A “Higher” WESP-AC score means that wetland has a greater capacity to support those processes as compared to other wetlands in the province. A “Higher” WESP-AC score in both the function and benefits category means the wetland supports the natural ecosystem functions and provides services with potentially societal importance.

Additionally, the WESP-AC process assesses the wetland’s WSS status based on the functional assessment results. The grouped wetland functions outlined in Table 7.39 are further combined into “supergroups” for habitat (Aquatic Habitat and Transition Habitat) and support (Hydrologic, Water & Climate Protection and Aquatic Support) functions. WSS designation is dependent on a certain combination of “Moderate” and “High” scores within these groups.

The WESP-AC functional evaluation approach recognizes that full delineation of wetlands extending beyond a given study area may not always be feasible (e.g., property ownership, access constraints) or necessary to conduct a valid assessment (NBDELG, 2021) (Adamus, 2025). Instead, WESP-AC allows for delimitation of a portion of a wetland, called the assessment area, which can be assessed separately. The accompanying Office Form then considers the broader landscape characteristics and functions that extend beyond the assessment area and/or study area boundary.

7.3.2.5 Field Assessment Results

General

Field surveys identified 87 field-delineated wetlands, either partially or fully within the Assessment Area (Drawings 7.17A to 7.17I). Detailed wetland characteristics and a photograph log of each wetland are provided in Appendix H.

Of the 87 identified wetlands, the most prominent wetland type was swamp (76). The Canadian Wetland Classification System (NWWG, 1997) defines a swamp as a wetland characterized by the dominance of woody vegetation in which the water table is typically at or near the surface or inundates the soil for a significant portion of the growing season. Swamps are often associated with poorly drained or saturated soils and they provide important habitat for various plant and animal species adapted to wet conditions. Swamps can be further sub-divided into treed swamps or shrub swamps, depending on their physiological makeup.

Of the identified swamps, 53 were classified as treed swamps. Treed swamps are characterized by the presence of trees as the dominant vegetation [diameter at breast height (DBH) > 7.5 cm] and an environment that is not as waterlogged as other wetland types, such as shrub swamps or marshes. These wetlands typically experience their highest hydroperiod during spring and fall precipitation events (NSNR, 2018b). As a result, treed swamps provide deciduous trees [e.g., red maple (*Acer rubrum*) and yellow birch] and coniferous trees [e.g., black spruce (*Picea mariana*) and balsam fir (*Abies balsamea*)] the opportunity to establish themselves and adapt to the inconsistent inundation periods (NSNR, 2018b). Typical species composition of the identified treed swamps consisted of cinnamon fern (*Osmundastrum cinnamomeum*), New York fern (*Thelypteris noveboracensis*), creeping snowberry (*Gaultheria hispidula*), bunchberry (*Cornus canadensis*), northern starflower (*Lysimachia borealis*), yellow bluebead lily (*Clintonia borealis*), speckled alder (*Alnus incana*) red spruce (*Picea rubens*), balsam fir, red maple and yellow birch.

An additional 23 of the identified swamps were classified as shrub swamps. Shrub swamps are dominated by shrubs and small woody plants (< 7.5 cm DBH, > 1 m tall) with a denser understory and tend to form in permanently or seasonally flooded areas where the surface is moist from ground saturation. Trees may be present but are less dominant than in treed swamps. In many cases, shrub swamps eventually transition into treed swamps via succession (NSNR, 2018b). The typical species composition of shrub swamps identified within the Assessment Area included three-seeded sedge (*Carex trisperma*), bunchberry, goldthread (*Coptis trifolia*), hairy flat-top white aster (*Doellingeria umbellata*), mountain holly (*Ilex mucronata*), northern wild raisin (*Viburnum nudum var. cassinoides*), speckled alder, red maple, yellow birch, black spruce, and balsam fir.

Four bogs were observed within the Assessment Area. These wetlands are characterized by their poor drainage, accumulation of peat, and dense coverage of either *Sphagnum* moss or graminoids (NSNR, 2018b). Bogs typically have a high water table and receive most of their water from precipitation, resulting in nutrient-poor, acidic environments (NWWG, 1997). This

acidity is further compounded due to the release of organic acids that result from the decomposition of *Sphagnum* spp. Typical species composition of the bogs identified within the Assessment Area included small cranberry (*Vaccinium oxycoccos*), round-leaved sundew (*Drosera rotundifolia*), Labrador tea (*Rhododendron groenlandicum*), leather leaf (*Chamaedaphne calyculata*), pitcher plant (*Sarracenia purpurea*), northern wild raisin, tamarack (*Larix larcinia*) and black spruce. Trees, when present, were often stunted and scattered throughout.

Of the remaining wetlands, six were classified as wetland complexes, consisting of treed/shrub swamp and bog/treed swamp complexes in which areas containing treed swamp, shrub swamp, and/or bog were present in one contiguous wetland. Finally, one wetland was classified as a vernal pool. Vernal pools are wetlands that often occur in natural depression within (or near) forests and may lack a clear inlet or outlet.

Functional Assessments – Version 3.4

None of the 87 field-delineated wetlands met the criteria for WSS, as determined by the Functional WSS Interpretation Results within the WESP-AC spreadsheet calculator. A summary of WESP-AC results is provided in Table 7.40.

Table 7.40: Summary of WESP-AC Version 3.4 Assessments for Wetlands within the Assessment Area

WL ID	Hydrologic Group		Water & Climate Protection Group		Aquatic Support Group		Aquatic Habitat Group		Transitional Habitat Group		Average Function	Average Benefits	WSS[1]
	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits			
WL1	8.62	6.82	9.48	1.26	1.46	4.23	3.43	0.34	8.73	1.45	6.34	2.82	**No**
WL2	6.49	6.88	6.37	1.26	5.91	5.21	3.43	0.36	8.82	1.44	6.20	3.03	**No**
WL3	8.62	7.05	9.44	1.25	1.23	4.50	3.65	0.44	8.53	1.53	6.29	2.95	**No**
WL4	5.00	7.53	3.24	3.60	6.57	7.17	8.32	6.29	8.92	1.55	6.41	5.23	**No**
WL5	8.62	6.43	9.48	1.55	1.63	3.63	1.84	0.85	8.08	1.56	5.93	2.80	**No**
WL6	7.44	6.82	8.88	1.54	1.48	4.40	5.21	2.32	8.56	7.00	6.31	4.42	**No**
WL7	6.25	7.39	9.38	1.24	0.95	5.08	5.69	2.21	8.60	1.44	6.17	3.47	**No**
WL8	6.25	7.28	9.38	1.24	0.95	4.96	5.69	2.21	8.60	1.44	6.17	3.43	**No**
WL9	6.25	7.28	9.48	1.24	1.07	4.94	5.57	2.19	8.55	1.43	6.18	3.42	**No**
WL10	8.62	6.03	9.56	1.29	1.27	3.21	2.01	0.43	8.53	8.49	6.00	3.89	**No**
WL11	7.44	6.99	9.25	1.25	1.34	4.35	2.74	0.58	8.10	1.51	5.77	2.94	**No**
WL12	8.62	7.28	9.43	1.24	1.75	4.96	5.78	2.20	8.68	1.44	6.85	3.42	**No**
WL13	7.44	6.15	9.37	1.29	2.26	3.41	2.80	0.44	8.37	1.42	6.05	2.54	**No**
WL14	6.28	6.15	9.71	1.52	2.31	3.75	4.25	3.21	9.10	1.47	6.33	3.22	**No**
WL15	6.28	7.26	9.96	2.28	2.03	3.55	1.99	0.64	8.93	1.57	5.84	3.06	**No**
WL16	6.25	7.62	3.71	2.74	4.00	5.37	2.21	0.43	7.40	8.49	4.71	4.93	**No**
WL17	7.44	6.82	9.27	1.26	0.58	4.17	2.74	0.49	8.36	1.44	5.68	2.84	**No**
WL18	7.44	6.65	9.24	1.27	0.58	3.95	2.43	0.48	8.47	1.45	5.63	2.76	**No**
WL19	5.31	7.67	8.95	2.41	0.90	4.12	3.17	0.29	8.13	1.37	5.29	3.17	**No**
WL20	8.62	6.88	9.38	1.26	0.58	4.29	3.41	0.35	8.57	1.42	6.11	2.84	**No**
WL21	7.44	6.82	9.23	1.26	1.34	4.22	3.32	0.34	8.40	1.40	5.95	2.81	**No**
WL22	8.62	6.71	9.50	1.26	2.31	3.98	2.26	0.46	8.69	1.46	6.28	2.77	**No**
WL23	7.44	8.26	9.35	2.75	0.84	4.86	2.63	0.28	8.09	1.36	5.67	3.50	**No**
WL24	6.49	8.26	9.10	3.09	0.80	4.91	2.97	0.30	8.34	1.41	5.54	3.59	**No**
WL25	8.62	7.44	9.38	1.26	-0.08	5.08	5.18	2.33	8.75	1.49	6.37	3.52	**No**
WL26	7.44	7.22	9.24	1.24	0.58	4.67	3.49	0.34	8.42	1.40	5.83	2.97	**No**
WL27	7.44	6.05	6.01	1.25	4.93	5.97	4.79	2.25	7.82	1.36	6.20	3.38	**No**
WL28	7.44	6.77	9.46	1.26	1.80	4.07	2.65	0.44	7.99	1.39	5.87	2.79	**No**
WL29	7.44	7.28	9.15	1.24	1.34	4.97	5.81	2.20	8.37	1.42	6.42	3.42	**No**
WL30	7.44	7.28	9.15	1.24	1.34	4.97	5.81	2.20	8.37	1.42	6.42	3.42	**No**
WL31	8.62	7.16	9.53	1.25	1.75	4.81	5.61	2.16	8.21	1.38	6.74	3.35	**No**
WL32	7.44	7.28	9.33	1.24	1.33	4.95	5.70	2.18	8.49	1.44	6.46	3.42	**No**
WL33	8.62	7.50	9.37	1.53	0.23	5.22	5.98	2.18	8.67	7.00	6.57	4.69	**No**
WL34	8.62	8.21	9.34	1.72	0.28	5.04	4.84	2.31	8.80	1.50	6.38	3.76	**No**
WL35	7.08	6.77	9.06	1.63	-0.10	4.12	3.09	0.30	8.55	1.45	5.54	2.85	**No**
WL36	8.62	7.50	9.44	1.23	1.70	5.18	5.57	2.28	8.70	1.44	6.81	3.53	**No**

WL ID	Hydrologic Group		Water & Climate Protection Group		Aquatic Support Group		Aquatic Habitat Group		Transitional Habitat Group		Average Function	Average Benefits	WSS[1]
	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits			
WL37	8.62	10.29	9.45	2.28	1.35	4.85	5.47	2.16	8.50	1.41	6.68	4.20	**No**
WL38	4.52	11.11	8.77	2.21	0.81	5.62	1.81	3.14	6.99	9.21	4.58	6.26	**No**
WL39	7.04	6.43	9.32	11.73	4.08	4.08	3.96	1.05	9.84	1.46	6.85	4.95	**No**
WL40	7.44	7.50	9.23	1.23	1.34	4.96	3.32	0.34	8.40	1.40	5.95	3.09	**No**
WL41	7.44	7.44	9.72	1.23	0.58	4.91	3.41	0.34	8.44	1.41	5.92	3.07	**No**
WL42	2.44	8.21	3.65	2.20	5.47	6.67	6.41	4.30	8.97	1.53	5.39	4.58	**No**
WL43	8.62	6.54	9.22	11.73	1.04	3.92	3.36	0.49	8.54	8.49	6.16	6.23	**No**
WL44	6.72	7.16	9.75	1.39	1.94	5.57	6.15	3.72	8.97	1.55	6.71	3.88	**No**
WL45	8.62	6.43	9.14	11.73	0.13	3.76	3.10	0.48	8.66	8.49	5.93	6.18	**No**
WL46	8.62	7.44	9.26	11.73	1.35	3.78	2.74	0.45	7.99	8.49	5.99	6.38	**No**
WL47	7.44	6.37	5.40	11.73	5.45	4.94	3.78	0.30	8.14	1.33	6.04	4.93	**No**
WL48	8.62	10.38	5.18	2.61	4.74	5.83	4.20	2.30	8.31	1.45	6.21	4.51	**No**
WL49	8.62	8.03	9.43	2.70	0.55	4.75	4.42	2.31	8.15	1.44	6.23	3.85	**No**
WL50	8.62	8.12	9.47	2.11	1.05	4.91	4.96	2.28	8.22	1.43	6.46	3.77	**No**
WL51	8.62	8.08	9.47	2.11	0.99	4.86	5.00	2.28	8.14	1.42	6.44	3.75	**No**
WL52	7.44	8.12	9.37	2.77	1.49	4.86	4.58	2.24	7.87	1.45	6.15	3.89	**No**
WL53	7.44	7.50	9.26	1.23	0.92	5.19	5.62	2.19	8.51	1.42	6.35	3.51	**No**
WL54	5.23	7.05	5.48	1.73	5.68	6.64	6.77	4.32	9.53	10.00	6.54	5.95	**No**
WL55	8.62	8.12	9.45	2.11	0.71	4.86	4.64	2.23	8.13	1.46	6.31	3.76	**No**
WL56	8.62	7.39	9.32	11.73	0.12	5.09	5.84	2.18	8.65	1.43	6.51	5.56	**No**
WL57	8.62	7.44	9.35	11.73	0.33	5.13	5.62	2.19	8.80	1.46	6.54	5.59	**No**
WL58	7.44	7.22	9.21	11.73	1.23	4.64	3.32	0.31	8.21	1.39	5.88	5.06	**No**
WL59	8.62	7.44	9.46	11.73	1.60	5.17	5.67	2.20	8.91	1.45	6.85	5.60	**No**
WL60	8.62	7.44	9.33	11.73	1.07	5.13	5.62	2.19	8.79	1.46	6.69	5.59	**No**
WL61	8.62	7.39	9.44	11.73	1.70	5.02	5.23	2.16	8.65	1.43	6.73	5.55	**No**
WL62	8.62	7.39	9.44	11.73	1.18	5.10	5.95	2.20	8.89	1.46	6.82	5.58	**No**
WL63	7.44	7.39	9.28	11.73	0.64	4.84	3.32	0.35	8.59	1.43	5.85	5.15	**No**
WL64	7.44	7.28	9.23	1.24	1.34	4.65	2.66	0.48	8.36	1.43	5.81	3.02	**No**
WL65	5.14	7.94	9.88	3.18	2.16	6.20	7.22	5.07	9.14	1.59	6.71	4.80	**No**
WL66	8.62	7.50	9.44	1.23	1.70	5.18	5.57	2.28	8.70	1.44	6.81	3.53	**No**
WL67	7.44	8.17	9.21	11.73	1.38	4.82	3.21	0.32	8.34	1.39	5.92	5.29	**No**
WL68	7.44	7.94	8.95	2.06	0.53	4.71	5.43	2.13	8.49	1.40	6.17	3.65	**No**
WL69	7.44	8.03	9.24	11.73	0.90	4.60	3.14	0.27	8.03	1.37	5.75	5.20	**No**
WL70	7.44	7.05	9.06	1.25	0.43	4.66	5.41	2.15	8.38	1.39	6.14	3.30	**No**
WL71	5.22	7.11	9.89	1.39	0.56	5.83	6.80	4.59	9.30	1.63	6.35	4.11	**No**
WL72	3.71	7.22	3.55	11.73	5.25	7.23	7.80	4.32	9.41	1.57	5.94	6.41	**No**
WL73	7.44	7.22	9.09	1.24	-0.08	4.84	5.22	2.33	8.41	1.44	6.02	3.41	**No**

WL ID	Hydrologic Group		Water & Climate Protection Group		Aquatic Support Group		Aquatic Habitat Group		Transitional Habitat Group		Average Function	Average Benefits	WSS[1]
	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits	Function	Benefits			
WL74	8.03	7.16	8.69	1.25	0.39	4.77	5.22	2.33	8.28	1.44	6.12	3.39	**No**
WL75	1.66	7.22	4.68	11.73	7.35	8.37	8.43	4.57	9.56	1.56	6.34	6.69	**No**
WL76	8.62	8.12	5.31	2.39	5.22	5.98	4.97	2.31	8.55	1.45	6.53	4.05	**No**
WL77	8.62	8.12	9.50	2.74	1.56	4.71	2.75	0.47	8.25	1.43	6.14	3.49	**No**
WL78	8.62	7.39	9.30	11.73	0.82	5.09	5.82	2.19	8.62	8.45	6.64	6.97	**No**
WL79	8.62	7.33	9.46	11.73	1.46	4.77	3.29	0.34	8.61	1.43	6.29	5.12	**No**
WL80	8.62	7.33	6.28	1.24	4.54	5.75	4.57	2.32	8.64	1.48	0.00	3.62	**No**
WL81	7.44	7.33	9.22	4.57	-0.07	4.99	5.65	2.15	8.56	1.41	6.16	4.09	**No**
WL82	8.62	7.28	9.47	4.57	0.93	4.98	6.78	2.22	8.90	1.48	6.94	4.11	**No**
WL83	7.44	7.33	6.45	1.24	4.88	5.58	5.71	2.19	8.34	1.14	6.56	3.50	**No**
WL84	8.62	8.21	9.33	11.73	0.51	5.08	5.22	1.97	8.94	1.37	6.52	5.67	**No**
WL85	7.44	7.38	9.11	4.57	0.58	4.98	6.01	2.19	8.48	1.41	6.32	4.11	**No**
WL86	7.44	7.33	9.36	4.57	0.77	4.91	4.36	2.34	8.57	1.48	6.10	4.13	**No**
WL87	7.44	7.33	9.34	4.57	0.43	5.05	6.10	2.19	8.48	1.41	6.36	4.11	**No**
Average Score	7.47	7.42	8.70	4.16	1.73	4.93	4.57	1.77	8.53	2.24	6.12	4.10	
Average Rating[2]	Moderate	Higher	Higher	Moderate	Lower	Moderate	Moderate	Lower	Higher	Lower			

[1]WSS determination as dictated by the Functional WSS Interpretation Results within the WESP-AC spreadsheet calculator
[2]Ratings are represented by colours, where red corresponds to a “Lower” rating, yellow corresponds to a “Moderate” rating, and green corresponds to a “Higher” rating.

Hydrologic Group

The hydrologic group evaluates the effectiveness of a wetland to store or delay the downslope movement of surface water. However, the model does not account for wetland size, and in turn, the ability of larger wetlands to store more water than smaller wetlands. Wetlands that have the highest benefit scores within this group tend to be located within developed areas, where water storage is more valuable to reduce flood risks.

The majority of the wetlands had a moderate hydrologic function score (55.2%), and a moderate hydrologic benefit score (75.9%).

Water and Climate Protection Group

The water quality group is compiled from four different functions: sediment and toxicant retention and stabilization; phosphorus retention; nitrogen removal and retention; and carbon stock preservation. The main function of this group is to evaluate the wetland's potential to intercept, retain, and filter sediments, particulates, and organic matter. Similar to the hydrologic group, the wetlands that have the higher benefit score in this regard include those that do not have a surface water outlet and instead are isolated from flowing surface water. This model also does not account for wetland size and as such, larger wetlands do not necessarily score higher than small wetlands, although size may factor into this function.

The majority of wetlands had higher (85.1%) functional water and climate protection scores, and the majority (71.3%) had lower water and climate protection benefit score; however, 20 wetlands received benefit scores greater than 10, indicating that these wetlands raw benefits scored greater than any of the calibration wetlands used in the WESP-AC protocol.

Aquatic Support Group

The aquatic support group comprises four individual functions: stream flow and temperature support; aquatic primary productivity; and organic nutrient export. The main function of this group is to determine the wetland's ability to support ecological stream functions that promote habitat health. Wetlands lying adjacent to or containing flowing water score higher than those that do not (e.g., isolated wetlands). Additionally, headwater wetlands are crucial for supporting stream flow during the dry season by contributing to water flow via groundwater input and storage capacity. Headwater wetlands provide stream flow and cooling functions due to their typically limited exposed surface water, insulating properties and groundwater water storage and retention time. Treed swamps can also provide aquatic support through groundwater discharge (e.g., seeps) and vegetation shading.

The wetland scores for the aquatic support functional group were shown to be lower (83.9%), and most wetlands (93.1%) had a moderate aquatic support group benefit score.

Aquatic Habitat Group

The aquatic habitat group is compiled from five different functions: anadromous fish habitat; resident and other fish habitat; amphibian habitat; waterbird feeding habitat, and waterbird nesting habitat. Wetlands that have the higher functions within this group include those that are

adjacent to or contain water features with potential habitat characteristics (e.g., in-stream cover, aquatic vegetation, etc.).

The wetlands scores were majority moderate (59.8%) for aquatic habitat functional score, while aquatic habitat group benefit scores were mostly lower (91.2%).

Transition Habitat Group

The transition habitat group comprises three different functions: songbird, raptor, and mammal habitat, native plant habitat, and pollinator habitat. The main function of the collective group is to evaluate the wetland's ability to support healthy habitat for birds, mammals, and native plants. The Study Area has a mix of remote habitat and fragmented or disturbed habitat.

All but two wetlands scored higher on transition habitat function (97.7%), while most wetlands (88.5%) scored lower on transition habitat group benefit.

Wetlands of Special Significance

A review of SAR observations identified through plant, lichen, and avifauna breeding surveys was completed and compared to field delineated wetlands to identify potential WSS based on the presence of SAR species. A total of 17 field-delineated wetlands were determined to be potential WSS, several of which appear to be hydrologically connected. Of these, four coincide with wetlands identified as potential WSS in the provincial WSS database (NSECC, 2020b)

Six of the wetlands were determined to be potential WSS based on the confirmed presence of black ash (*Fraxinus nigra*), a Threatened species under ESA (S-Rank S1S2) in a field-delineated wetland. A seventh was determined to be a potential WSS based on the presumed continuation of a field-delineated wetland into an area containing black ash.

A total of 11 wetlands were determined to be potential WSS based on the confirmed presence of avifauna species during breeding bird season listed as Endangered or Threatened under SARA and/or ESA with habitat requirements tied to wetlands: Canada warbler (*Cardellina canadensis*; SARA Threatened, ESA Endangered, S-Rank S3B) and olive-sided flycatcher (*Contopus cooperi*; SARA Special Concern, ESA Threatened, S-Rank 3SB). One of the wetlands where Canada warbler was observed also contained black ash. No wetlands met the criteria for WSS as determined by the WESP-AC Functional WSS Interpretation Results.

Due to the location-sensitive nature of SAR observations, wetlands IDs for potential WSS will be provided to NSECC directly. Flora and avifauna SAR are discussed further in Sections 7.4.1 and 7.4.4.

7.3.2.6 Effects Assessment

Project-Wetland Interactions

Project activities, primarily those that involve ground disturbance or vegetation removal, have the potential to impact wetlands through habitat removal, disruptions to hydrology, and/or displacement of sediment (Table 7.41).

Table 7.41: Potential Project Interactions with Wetlands

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	X
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	-
Vegetation Management	X
Decommissioning and Rehabilitation	
Infrastructure Removal	-
Site Reclamation	X

Assessment Boundaries

The LAA for wetlands is the Assessment Area. The RAA is the boundary of secondary watersheds that intersect with the Study Area (Drawing 7.14).

Assessment Criteria

Assessment criteria provided in Section 4.3 apply to wetlands. The VC-specific definitions for magnitude are as follows:

- Negligible: No direct loss of wetland habitat or alteration to wetland functions expected.
- Low: Direct loss of wetland habitat, but overall wetland functions remain intact.
- Moderate: Direct loss of wetland habitat and impact to wetland functions, but wetland area loss will not impact the hydrology of the watershed. Where WSS are impacted, adequate general SAR habitat is prevalent elsewhere within the RAA.
- High: Direct loss of wetland habitat and impact to wetland functions; and wetland area loss will affect the hydrology of the watershed and the impacted wetland areas are part of a WSS that provides unique SAR habitat within the RAA.

Effects

Effects to wetlands include both habitat loss and changes in wetland functionality and can occur throughout the life of the Project. Effects might be direct (e.g., habitat loss through infilling) or indirect (e.g., changes to functionality due to hydrologic shifts). Effect-specific active management, mitigation, and long-term monitoring are required to eliminate, mitigate, or otherwise manage the magnitude of these direct effects.

Habitat Loss

Habitat loss may occur both directly (i.e., excavation or infilling) and indirectly (i.e., altered hydrology or canopy cover) as a result of the Project (Trombulak & Frissell, 2000). Loss of habitat can fragment wildlife corridors, potentially isolating species and lowering species richness. Habitat loss can also disrupt vital habitat characteristics that support vulnerable species, including rare lichens. Further, the removal or infilling of wetland habitat can impact the hydroperiod of neighbouring wet areas, resulting in farther reaching impacts on habitat characteristics (Mitsch & Gosselink, 2000).

Direct loss is most likely to occur during Project construction through infilling or excavation of wetland habitat. The Project Footprint was designed to optimize the placement of Project infrastructure to avoid and minimize loss of wetland area and function, to the greatest extent possible. A summary of the wetlands identified within the Assessment Area (Drawings 7.17A to 7.17I) and how they may be affected by the Project is provided in Table 7. 42. The estimate of potential alteration was evaluated by the Project Footprint boundary.

Table 7.42: Habitat Alteration Potential for Field-Delineated Wetlands within the Assessment Area

Wetland ID	Wetland Type	Delineation Extent	Delineated Area (m^2)	Estimated Area of Potential Impact (m^2)	Activity
WL1	Treed Swamp	Full	4,441	2,321	Turbine pad
WL3	Treed Swamp	Partial	4,596	168	Turbine pad
WL4	Complex (Treed Swamp, Bog)	Partial	11,264	1,323	Road construction
WL5	Treed Swamp	Partial	12,534	939	Road construction
WL6	Treed Swamp	Partial	8,069	3,422	Road construction
WL7	Treed Swamp	Partial	4,246	375	Turbine pad
WL12	Shrub Swamp	Partial	5,568	3,129	Road construction
WL15	Treed Swamp	Full	1,391	793	Road construction and turbine pad
WL18	Treed Swamp	Partial	1,969	1,047	Road construction
WL19	Treed Swamp	Partial	996	463	Road construction
WL20	Treed Swamp	Partial	2,229	1,295	Road construction
WL21	Treed Swamp	Partial	5,498	1,382	Road construction
WL22	Treed Swamp	Partial	1,736	979	Road construction
WL23	Bog	Partial	3,762	1,883	Road construction
WL24	Treed Swamp	Partial	466	139	Road construction
WL27	Bog	Full	526	527	Turbine pad
WL30	Treed Swamp	Partial	4,130	2,215	Road construction
WL31	Treed Swamp	Partial	9,571	940	Road construction

Wetland ID	Wetland Type	Delineation Extent	Delineated Area (m^2)	Estimated Area of Potential Impact (m^2)	Activity
WL32	Shrub Swamp	Partial	316	242	Turbine pad
WL33	Bog	Partial	31,283	2631	Road construction and turbine pad
WL34	Shrub Swamp	Partial	2,823	240	Road upgrades
WL35	Treed Swamp	Partial	14,886	1,481	Turbine pad
WL36	Treed Swamp	Partial	844	487	Road construction
WL37	Complex (Bog, Treed Swamp)	Partial	3,966	222	Road construction
WL38	Treed Swamp	Partial	7,760	10	Collector line
WL42	Shrub Swamp	Partial	580	225	Road upgrades
WL44	Treed Swamp	Partial	7,974	4,411	Road construction
WL48	Treed Swamp	Partial	1,246	441	Road upgrades
WL50	Bog	Partial	1,072	279	Road upgrades
WL51	Treed Swamp	Partial	742	132	Road upgrades
WL52	Treed Swamp	Partial	1,395	200	Road upgrades
WL55	Shrub Swamp	Partial	483	153	Road upgrades
WL58	Treed Swamp	Partial	4,700	83	Road construction
WL59	Treed Swamp	Partial	755	349	Road construction
WL60	Shrub Swamp	Partial	627	400	Road construction
WL61	Treed Swamp	Partial	2,043	1,153	Road construction
WL62	Treed Swamp	Partial	25,832	3,728	Road construction and turbine pad
WL63	Treed Swamp	Partial	1,734	868	Road construction
WL64	Treed Swamp	Partial	4,096	2,111	Road construction
WL65	Shrub Swamp	Partial	2,241	572	Road upgrades
WL66	Treed Swamp	Partial	14,664	4,926	Road construction
WL68	Treed Swamp	Partial	4,007	1,955	Road construction
WL73	Treed Swamp	Partial	2,715	1,381	Road construction
WL74	Shrub Swamp	Partial	2,359	431	Road construction
WL75	Treed Swamp	Partial	18,537	2,362	Road construction
WL76	Shrub Swamp	Partial	1,252	661	Road construction
WL77	Complex (Bog, Treed Swamp)	Full	3,085	1,347	Road construction
WL78	Treed Swamp	Partial	12,307	3,230	Road construction
WL80	Complex (Treed Swamp, Shrub Swamp)	Partial	7,761	1,616	Road construction

Wetland ID	Wetland Type	Delineation Extent	Delineated Area (m^2)	Estimated Area of Potential Impact (m^2)	Activity
WL82	Complex (Treed Swamp, Shrub Swamp)	Partial	6,701	706	Turbine Pad
WL83	Treed Swamp	Full	478	479	Turbine Pad
WL84	Shrub Swamp	Full	1,697	992	Road construction
Total Estimated Area of Potential Impact				63,844	

The results of the field assessments indicate that there is potential for 52 field delineated Project-wetland interactions comprising partial and complete infills to facilitate Project development for a total of 6.3 ha.

Approximately 11.9 km of new road being constructed and approximately 2.7 km of previously existing road being utilized. Eight potential wetland alterations are associated with upgrades to existing roads (if determined to be required during the detailed design phase) and 35 of the potential alterations are associated with the construction of new roads. A total of 12 potential alterations stem from the construction of turbine pads (n=11) or collector lines (n=1). Impacts to WL38 (a treed swamp) associated with collector lines will be minimized by limiting alterations to the area required for the placement of two collector line poles (estimated 5 m^2 per pole). Vegetation clearing will be required outside of the alteration area to facilitate pole and collector line placement, and to ensure access is maintained.

During the detailed design phase, efforts will be made to microsite turbines and collector line infrastructure further away from wetlands to avoid impacts. In areas where wetland alteration is unavoidable, the detailed design phase, where possible, will refine the layout so that wetland crossings will occur along wetland edges or narrow portions of the wetland and will configure infrastructure in a way to impact as little of the wetland as possible. Furthermore, any necessary wetland crossings will be designed to avoid any permanent diversion, restriction or blockage of natural flow, such that the hydrologic function of the wetland is maintained. Specific details of the crossings will be finalized during the detailed design phase and will be included in the application for wetland alteration.

Provincial wetland data obtained from the Nova Scotia Wetlands Inventory (NSNR, 2021h) was used to estimate the total amount of wetland habitat within the 20,847.8 ha RAA. An estimated 1,236.8 ha of wetland habitat was identified, which equates to approximately 5.9% of the RAA. Field delineated wetland habitat that may be directly impacted by the Project comprises approximately 6.6 ha, or < 0.1% of the total area within the RAA and 0.5% of the potential wetland habitat within the RAA. Mitigations for loss of wetlands will ensure that the provincial wetland policy of no net loss of wetland habitat and function will be upheld.

A total of 17 wetlands were identified as potential WSS due to the presence of avifauna and/or flora SAR. Of the seven wetlands identified as potential WSS based on the presence of black ash, vegetation clearing may be required in two wetlands to facilitate the installation of collector lines. Poles to support collector lines will be placed outside of wetland containing black ash and no impacts to wetland hydrologically, connectivity, or function are expected to occur. The remaining five wetlands containing black ash will be avoided, such that no wetland alteration permitting is expected in any wetlands containing black ash.

Anticipated alterations to the 11 potential WSS identified based on the presence of avifauna (Canada warbler and olive-sided flycatcher; one of which also contains black ash) include: road upgrades (two), placement of collector lines (one), and new road and/or turbine pad development (seven). Habitat modelling for Canada warbler and olive-sided flycatcher (described further in Section 7.4.4.10) suggests that habitat within the Clearing Footprint is not unique to the area, with additional areas of suitable breeding habitat for these species present in the Assessment Area (LAA) and surroundings. Final determinations of impacts to potential WSS will be made at the permitting stage.

Where practical, a potential WSS will be avoided through the detailed design process. If the detailed design process requires unavoidable impacts to WSS, the proposed impacts will be minimized and consider, where practical, avoiding portions of the wetlands that provided suitable habitat for the respective SAR bird species.

Indirect Loss

Indirect losses to wetlands generally occur as a result of construction but the effects become noticeable during the operation of the Project. Indirect loss of wetland habitat occurs through disruption of the hydrology of a wetland through the redirection of surface and subsurface water to a wetland. The hydrology of a wetland is one of the most important aspects of its overall structure and function. Project infrastructure located within or near a wetland can result in changes in the quantity and timing of water flow, potentially affecting species composition, water treatment capacity, and nutrient export (Mitsch & Gosselink, 2000). Additionally, disruptions to hydrology in one area may reduce the hydrological connectivity to other areas, causing impacts that may extend into neighbouring wetlands.

Indirect loss may be mitigated through surface water management to ensure that pre-existing hydrologic sources are continuing to feed into a wetland. As hydrologic impacts are not immediately identified, long-term monitoring is required to evaluate wetland changes post-alteration and are included within the wetland alteration approval process. Often shifts in hydrology on a project site do not result in direct loss, but rather a change in the wetland type and function. Surface water management for the Project will consider the location of wetlands not directly impacted by the Project, and hydrology will be maintained in partially altered wetlands.

Changes to Wetland Functionality

Changes to wetland functionality may be caused through habitat loss, as discussed above, or through other Project activities that may release dust, sediment or invasive species into the wetland, thus shifting its ecological, chemical, and hydrological profiles.

Erosion and Sedimentation

Erosion and sedimentation can occur throughout the lifecycle of the Project, including during construction efforts, daily traffic, routine road and collector line ROW maintenance. The accumulation of sediment within wetland environments can cause shifts in ecological integrity, including the plant species composition and subsequent nutrient retention potential, hydrological storage capabilities, and habitat suitability for vulnerable species (Tilman et al., 1997). Additionally, the use of road salt for winter maintenance may result in indirect adverse effects on microbial and vegetative wetland communities, including detrimental salinity levels and increased soil erosion due to salt-damaged vegetation (Jones et al., 2017).

Dust

The potential for dust deposition will likely be highest during the construction phase, though the risk will be present throughout the Project's lifecycle. Dust primarily impacts vegetative health, with particle size influencing the scale of the impact (Farmer, 1993). Smaller particulate matter can result in clogged pores, hindering vital biochemical processes including photosynthesis, respiration, and transpiration; and larger particulates can result in lacerations in plant tissues, thus jeopardizing the health of the plant (Farmer, 1993).

Invasive Species

The colonization of invasive species can result in detrimental impacts on wetland environments, including alterations to evapotranspiration rates, infilling from reduced decomposition rates, and ultimately a reduction in the complexity of the wetland and its subsequent species richness (Zedler & Kercher, 2004). The creation of roadways can act as a vector for invasive species, with the potential for seed dispersal increasing with both vehicular and animal traffic. Further, with many invasive species being partial to disturbed soils, routine maintenance of roadways can provide ideal conditions for their establishment (Trombulak & Frissell, 2000).

Compaction

Compaction can hinder both the vegetative and hydrological structure of a wetland, with a loss of pore space restricting root growth and groundwater infiltration (Duiker, 2004). This impacts the absorption of moisture and nutrients, thus impacting the ecological integrity of the wetland and the ecosystem services it provides. Further, compaction can decrease percolation rates, resulting in prolonged periods of saturation, and increasing the potential for flooding (Duiker, 2004).

The temporal and spatial extent of indirect effects such as erosion and sedimentation, dust, invasive species, and compaction can be far reaching, but are often foreseeable, and research based, standardized BMPs can be implemented to mitigate the resulting outcomes. Changes

to wetland functionality can be assessed through long-term wetland monitoring to identify biological, hydrologic and physical shifts within a wetland.

Mitigation Measures

The following specific mitigative measures will be implemented to avoid and mitigate any potential effects on wetlands.

Direct Habitat Loss

- Clearly mark wetlands to avoid interference with wetland habitat to the extent possible.
- Avoid impacts to wetlands to the extent possible.
    - Where wetland impacts are unavoidable, wetland alterations will be completed in accordance with the NSECC Wetland Conservation Policy (2019). The wetland alteration process will occur during the permitting stage, which includes a requirement to compensate for lost wetland habitat and functions.
        - Adhere to the terms and conditions of the wetland alteration approval.
    - For wetlands along the collector line corridors, orient placement of lattice towers and support poles in dry areas adjacent to wetlands thus allowing transmission cables to span wetlands, to the extent possible.
    - If temporary access roads are required within wetlands, appropriate mitigations, including the use of swamp mats, will be implemented to prevent disturbance.
    - Design wetland crossings to occur at the narrow portion of the wetland or the wetland's edges, to the extent possible.
    - Swamp mats and hand clearing may be used to limit impacts outside of the alteration area.

Indirect Habitat Loss

- Design wetland crossings to avoid permanent diversion, restriction or blockage of natural flow, such that hydrologic function of wetlands will be maintained.

Erosion and Sedimentation

- Develop a site-specific Erosion and Sediment Control Plan during the detailed design phase.
    - The plan will address the type of control structures, proper installation techniques, grading, maintenance and inspection, timing of installation, and revegetation.
- Limit the area of exposed soil and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover).
- Use the existing roads and access routes to the fullest extent feasible.
- Avoid travel through wetlands.
    - If travel through wetlands is required, use swamp mats and if possible, time work to occur during frozen ground conditions and/or travel through the drier portions of the wetland.
- Direct run-off from construction activities away from wetlands.
- Maintain existing vegetation cover, where possible.

Dust Deposition

- Use water or an approved dust suppressant to control dust on roads, as required.
- Establish site speed limits to minimize dust generation.

Invasive Species

- Use quarried, crushed materials for road construction to reduce the introduction of invasive vascular plant species.
- Clean and inspect work vehicles prior to use to prevent the introduction and/or spread of invasive/non-native species.

Compaction

- Require that wetland delineation tape is in place and visible to avoid unnecessary compaction within wetlands.
- Hold pre-construction site meetings to educate staff on the sensitivity of wetlands.
- Avoid travel through wetlands.
    - If travel through wetlands is required, use geotextile matting and time work to occur during frozen ground conditions, or travel through the drier portions of the wetland, to the extent practicable.

Monitoring

A site-specific post-construction wetland monitoring plan will be developed to facilitate adaptive management and contribute to the safeguarding of ecological integrity and environmental stability. The plan will be provided to NSECC as part of the permitting process and will likely consist of detailed monitoring and general spot checks. Detailed monitoring typically includes vegetative, hydrological, and soil assessments within the wetland habitat adjacent to the infill site. Spot checks typically involve a general overview of vegetative, hydrological, and soil conditions, focusing on evidence of significant hydrologic alterations and sedimentation.

Conclusion

The predicted residual effects of the Project on wetlands (after mitigation) are characterized in Table 7.43.

Table 7.43: Wetland Resources Residual Effects

	Habitat Loss	Changes in Wetland Function
Magnitude of Effect	**Moderate:** Direct loss of habitat, including that of WSS, but wetland area loss will not impact the hydrology of the watershed. Where WSS are impacted, adequate general SAR habitat is prevalent elsewhere within the RAA.	**Low:** Project activities have low potential for changes to wetland function with the implementation of mitigation measures.
Geographic Extent of Effect	Assessment Area	Assessment Area

	Habitat Loss	Changes in Wetland Function
Frequency of Effect	**Single Event:** Effects will occur once, during initial ground disturbance or vegetation clearing for the Project.	**Single Event:** Direct effects resulting from construction activities will occur once, and indirect effects to weltand function will be mitigated through the use of controls.
Duration of Effect	**Medium Term:** Residual effects will extend until wetlands are restored during decommissioning and/or compensated for following construction.	**Medium Term:** Residual effects may extend through the operation and maintenance phase of the Project.
Reversibility of Effect	**Partially Reversible**	**Partially Reversible**
Significance Level	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible		

7.4 Terrestrial Environment

7.4.1 Terrestrial Vegetation Communities and Flora

7.4.1.1 Overview

The vegetation community and flora assessment was completed using a combination of desktop and field studies to achieve the following objectives:

- Develop a preliminary understanding of the landscape features, vegetation communities, and flora species within and near the Assessment Area using desktop resources.
- Undertake field surveys to document the range of vegetation communities and flora present within the Assessment Area, with a focus on sensitive and/or uncommon communities and flora SAR and SOCI (and their supporting habitat).
- Use the information collected during field studies to iteratively update the Project design to avoid or minimize interactions between vegetation communities, flora SAR and SOCI, and Project components.
- Apply mitigation techniques including construction, and operational management practices to minimize the Project's effects on vegetation communities and flora SAR and SOCI (including supporting habitat).

7.4.1.2 Regulatory Context

Several laws and regulations provide protection for vegetation communities and rare flora in Nova Scotia. Species that are listed as Endangered or Threatened receive individual protection from harm and destruction under SARA and/or ESA, including protection of habitually occupied spaces.

For certain rare and sensitive lichen species, special management practices (SMPs) have been established to limit disturbance to individuals and their supporting habitat on Crown land, as outlined in the At-Risk Lichens–Special Management Practices (NSNR, 2018a). For example, limitations to the type and extent of land development are prescribed within protected and/or restricted zones around the occurrence of certain rare lichens. Additional regulations aim to protect important landscape features such as wetlands (described in Section 7.3.3) that support many plant and lichen SAR and SOCI in Nova Scotia.

The Silvicultural Guide for the Ecological Matrix (McGrath et al., 2021) and An Old-Growth Forest Policy for Nova Scotia (NSNR, 2022a) make recommendations on and regulate forestry and forest management practices on provincial Crown land and offer BMPs for forests on private land. The publications provide direction for maintaining forest ecological integrity and identifying and preserving old-growth forests. Old-growth forest stands are defined in Nova Scotia as “area(s) where 20% or more of the basal area is in trees greater than or equal to the reference age for that forest (ecosystem classification vegetation) type” (NSNR, 2022a). The Old-Growth Forest Policy requires no net loss of old-growth forests on Crown land and stipulates development limitations within 100 m of confirmed old-growth stands.

Finally, the *Environment Act* (Nova Scotia, 1995b) supports and promotes the protection, enhancement, and use of the provincial environment while maintaining ecosystem integrity and sustainable development. The *Biodiversity Act* (Nova Scotia, 2021) provides for the stewardship, conservation, sustainable use, and governance of biodiversity of Nova Scotia.

7.4.1.3 Desktop Review

Several databases were referenced as part of the desktop review to provide an initial understanding of the landscape characteristics, vegetation communities, and flora species present within and near the Assessment Area. The following references were included in the desktop review:

- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- Provincial Landscape Viewer (NSNR, 2024d)
- Nova Scotia Forest Inventory (NSNR, 2021f)
- WAM Database (NSECC, 2022b)
- Nova Scotia Wetland Inventory (NSNR, 2021h)
- Canopy Height Model (GeoNOVA, 2024a)
- Old-Growth Policy Layer (NSNR, 2024c)
- Old-Growth Potential Index (NSNR, 2023)
- ACCDC Data Report (ACCDC, 2025a)
- Boreal Felt Lichen Habitat Layer (NSNR, 2012)
- MTRI Vole Ears (*Erioderma mollissimum*) and Extant Boreal Felt Lichen (*Erioderma pedicellatum*) GIS Databases (MTRI, 2019a, 2019b)
- SARA Critical Habitat Layers (ECCC, 2025b)

Landscape Characteristics

The Study Area falls within the Nova Scotia Uplands and Northumberland/Bras D'Or Ecoregions of Nova Scotia (Drawing 7.1). The Nova Scotia Uplands Ecoregion (97% of the Study Area) covers 19.8% of the province and is characterized by summits and plateaus, an abundance of rivers and streams, and uneven-aged forests exhibiting old-growth characteristics (Neily et al., 2017). The Northumberland/Bras D'Or Ecoregion (3% of the Study Area) covers 15.2% of the province, including all lands north of the Cobequid Hills on mainland Nova Scotia. Much of the ecoregion is at low elevation (25 to 50 masl) with rolling topography also present in some areas. Wetlands are abundant in this ecoregion due to level terrain.

The majority of the Study Area lies within the Mulgrave Plateau Ecodistrict (360) (97% of the Study Area) (Drawing 7.1), which is the most easterly physiographic feature in mainland Nova Scotia. This ecodistrict is comprised of two plateaus, approximately 200 masl that are divided by the Milford Haven River (Neily et al., 2017). Non-coastal areas in the ecodistrict are characterized by relatively level to hummocky, imperfectly drained soils, with the eastern portion generally much wetter than the west. This ecodistrict contains a variety of forest types, including red spruce and eastern hemlock (*Tsuga canadensis)* dominated riparian zones, mixed wood forests growing in deep, rich soils, and open woodlands occurring on shallow soils. There are also many large, treeless wetlands. Forested areas on imperfectly drained soils are likely within the spruce pine forest group, and are subject to frequent disturbance from wind, fire, and senescence, which limits the potential for the development of old-growth conditions. Tolerant hardwood forests, however, experience gap dynamics and are more likely to become uneven-aged stands with old-growth forest characteristics.

A small portion of the Study Area coincides with the St. Georges Bay Ecodistrict (520) (3% of the Study Area), which extends inland to the Mulgrave Plateau Ecodistrict from the shoreline of St. George's Bay (Drawing 7.1) (Neily et al., 2017). Elevations are between 30 to 60 masl and increase with distance from the coast. Soils are dominated by moderately and imperfectly drained loams. The presence of gypsum bedrock in some areas results in unique overlying vegetation communities. Approximately 60% of the landscape is composed of a matrix forest of tolerant hardwoods (tolerant hardwood forest group). Other forests include yellow birch-dominated mixed woods (middle and lower slopes), and large patches of black spruce on nutrient-poor sites. Natural stand-level disturbance is rare in this ecodistrict; however, the area has an extensive history of agriculture and forestry.

The NSNR Wetlands Inventory (NSNR, 2021h) indicates that wetlands, which are known to support a variety of vegetation communities and flora species, are present throughout the Study Area, particularly the southern portion, where several "swamps" and one "bog or fen" are located (Drawing 7.19). Detailed characterizations of wetlands are provided in Section 7.3.2.

Vegetation Communities

The desktop assessment of vegetation communities included the use of geospatial data to understand the abundance and distribution of major land cover types (vegetation communities and disturbed areas) within various Project boundaries. The land cover model was developed

using data from the Nova Scotia Forest Inventory (NSNR, 2021f), WAM Database (NSECC, 2022b), and Canopy Height Model (GeoNOVA, 2024a), which were reclassified, combined, and reviewed for accuracy against high-resolution aerial imagery (dated July 2022). The resulting layer depicts polygons of generalized land cover types (Drawing 7.20A to 7.20I). Note that while the land cover model provides a useful general picture of land cover types, the accuracy of the model is limited by the geospatial data used as inputs. For example, field studies found extensive evidence of forest harvesting that does not appear to be represented in the model inputs, which may result in an underestimation of the extent of cutover areas. The extent of each land cover type within the Clearing Footprint (the area to be cleared for construction and the placement of Project infrastructure), the LAA (the Clearing Footprint plus a 100 m buffer), and the RAA (the Study Area plus a 5 km buffer on mainland Nova Scotia) is provided in Table 7.44. Further discussion of the LAA and RAA are provided in Section 7.4.1.7.

Table 7.44: Modelled Land Cover Types within the Clearing Footprint, LAA, and RAA

Land Cover Type	Clearing Footprint		LAA		RAA	
	ha	%	ha	%	ha	%
Hardwood Forest	30.1	31.4	104.3	22.7	2,280.1	15.2
Hardwood Wet Forest	0.7	0.7	5.3	1.2	208.6	1.4
Mixedwood Forest	17.6	18.3	78.4	17.1	4,405.2	29.4
Mixedwood Wet Forest	1.9	2.0	23.2	5.1	750.6	5.0
Softwood Forest	9.0	9.4	59.7	13.0	2,495.5	16.6
Softwood Wet Forest	3.3	3.5	36.0	7.8	694.2	4.6
Shrub/Alders	-	-	-	-	115.0	0.8
Open Wetland	2.8	2.9	20.9	4.6	906.8	6.0
Cutover[(1)] Upland	17.6	18.4	73.5	16.0	794.4	5.3
Cutover[(1)] Wetland	1.4	1.5	6.8	1.5	101.4	0.7
Urban/Developed	2.0	2.1	5.5	1.2	860.1	5.7
Open Areas	9.4	9.8	45.1	9.8	931.3	6.2
Water	-	-	0.0	0.0	450.2	3.0
Total	95.9	100.0	458.8	100.0	14,993.4	100.0

[(1)]Cutover class represents harvested and/or windthrow/dead forest areas as identified in the provincial Forest Inventory database. Source: Landcover types predictions derived from provincial WAM Database (NSECC, 2022b), Canopy Height (GeoNOVA, 2024a), and Forest Inventory Data (NSNR, 2021f).

The land cover classification indicates that hardwood (31.4%) and mixedwood (18.3%) forests are the dominant forest cover types within the Clearing Footprint. Much of the Clearing Footprint consists of disturbed land cover types, including an estimated 19.9% cutover area (cutover uplands and wetlands combined) and an additional 2.1% of land classified as urban/developed (which may include treated forest stands). Open areas, which include barrens, old field/agricultural land, and disturbed open areas, make up a further 9.8% of the Clearing Footprint. Overall, the land cover types within the Clearing Footprint are comparable to the LAA. Relative to the RAA, the Clearing Footprint contains a lower amount of softwood forest (9.4% of the Clearing Footprint compared to 16.6% of the RAA), and a higher proportion of cutover area (6.0% of the RAA).

Old-growth forest stands hold high ecological and cultural value and are known to support high levels of biodiversity (NSNR, 2022a). To identify areas with elevated potential for encountering old-growth forests within the Assessment Area, the Old-Growth Policy layer (NSNR, 2024c) and Old-Growth Potential Index (OGPI) layer provided by NSNR (2025c) were reviewed. The Old-Growth Forest Policy layer is a database of stands protected under the Old-Growth Forest Policy, whereas the OGPI is a desktop tool intended to guide forest management and land use decisions. The OGPI ranks forest stands from 0 to 11 based on their height in comparison to stands with the same tree cover and ecological site conditions. Stands ranking seven or higher are included in the resulting layer due to their elevated potential to be old growth.

The nearest area protected under the Old-Growth Forest Policy is approximately 1 km southwest of the Study Area boundary (Drawing 7.19). The review of the OGPI layer identified four forest polygons with an old-growth potential rank ≥ 7 that overlapped or were within 100 m of the Assessment Area on Crown land. These stands (ranked ≥ 9) were selected for field assessments as described in Section 7.4.1.5.

Flora Species

An ACCDC report (ACCDC, 2025b) was prepared for the Project to identify known occurrences of SAR and SOCI within 5 km of the Study Area. No records of flora SAR or SOCI in the report are located within the Study Area. There are 14 records of 11 vascular flora SOCI in the surrounding 5 km (Table 7.45; Drawing 7.19; Appendix F). Three records of three lichen SOCI are also present within 5 km of the Study Area, as well as records of two lichen SAR: seven of blue felt lichen (*Pectenia plumbea*; SARA Special Concern, ESA Vulnerable, S-Rank S3) and two of frosted glass-whiskers (*Sclerophora peronella,* Atlantic population; SARA Special Concern, S-Rank S3S4).

Two of the blue felt lichen records are located approximately 1 km south of the Study Area, near Grant Lake, and one is 600 m northeast of the Study Area. All other blue felt lichen records occur greater than 2 km away. The two records of frosted glass whiskers are approximately 3 km southwest of the Study Area.

The complete ACCDC data report for the Project, which includes species records within 100 km of the Study Area, is provided in Appendix F.

Table 7.45: ACCDC Flora SAR and SOCI Records Within 5 km of the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Vascular Plants					
American Beech	*Fagus grandifolia*	-	-	-	S3S4
Balsam Groundsel	*Packera paupercula*	-	-	-	S3S4
Farwell's Water Milfoil	*Myriophyllum farwellii*	-	-	-	S2S3
Great-Spurred Violet	*Viola selkirkii*	-	-	-	S3S4

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Hidden-scaled Sedge	*Carex cryptolepis*	-	-	-	S3
Hooker's Orchid	*Platanthera hookeri*	-	-	-	S3
Large Purple Fringed Orchid	*Platanthera grandiflora*	-	-	-	S3
Maidenhair Spleenwort	*Asplenium trichomanes*	-	-	-	S3S4
Northern Comandra	*Geocaulon lividum*	-	-	-	S3S4
Yellow Ladies'-tresses	*Spiranthes ochroleuca*	-	-	-	S3?
Yellow Lady's-slipper	*Cypripedium parviflorum* var. *pubescens*	-	-	-	S2
Non-Vascular Plants					
A Moss	*Anacamptodon splachnoides*	-	-	-	S2
Blue Felt Lichen	*Pectenia plumbea*	Special Concern	Special Concern	Vulnerable	S3
Frosted Glass-whiskers Lichen	*Sclerophora peronella* (Atlantic pop.)	Special Concern	Special Concern	-	S3S4
Shaggy Fringe Lichen	*Anaptychia palmulata*	-	-	-	S3S4
Tattered Jellyskin Lichen	*Scytinium lichenoides*	-	-	-	S3
Woodland Owl Lichen	*Solorina saccata*	-	-	-	S3

Source: (ACCDC, 2025b).

Several geospatial resources were reviewed to further assess the potential for encountering rare lichens within and near the Assessment Area. Following the direction of the At-risk Lichens - Special Management Practices (NSNR, 2018a), a boreal felt lichen (*Erioderma pedicellatum*, Atlantic population; SARA and ESA Endangered, S-Rank S1) habitat layer provided by NSNR (2012) was reviewed for areas within 100 m of the Assessment Area identified as having high potential for boreal felt lichen occurrence. The habitat layer for the species was derived from a geospatial model that considered known boreal felt lichen occurrences alongside the species' habitat preferences [e.g., occurrence on balsam fir trees within or adjacent to peatlands that are in close proximity (< 30 km) to the Atlantic Ocean (Cameron & Neily, 2008)]. Boreal felt lichen potential habitat features identified through this review were used to inform the approach for rare lichen surveys. No records of boreal felt or vole ears lichen (*Erioderma mollissimum*, SARA and ESA Endangered, S-Rank S1) were identified in the rare lichen databases maintained by MTRI (2019a, 2019b) within 5 km of the Study Area.

Finally, no critical habitat areas were identified within 5 km of the Study Area during a review of federal critical habitat layers for flora SAR (ECCC, 2025b).

7.4.1.4 Field Assessment Methods

Vegetation Community Assessments

An inventory of terrestrial vegetation communities was completed during various field studies in 2024 and 2025 (terrestrial flora surveys, old-growth assessments, and pellet group surveys). Vegetation communities were classified according to the Forest Ecosystem Classification (FEC) for Nova Scotia (Neily et al., 2023) at 30 vegetation community assessment points within or directly adjacent to the Assessment Area. Observations of the following were recorded if encountered:

- Landscape features such as watercourses, wetlands, and caves/mine shafts
- Forest stands noted as having old-growth potential
- Vegetation communities known to serve as habitat for rare flora or that provide important lifecycle functions for moose, birds, bats, and insects

Wetland characteristics and terrestrial habitat for fauna are described in Sections 7.3.3, 7.4.2, 7.4.3, and 7.4.4, as applicable.

Old-Growth Forest Assessments

Old-growth forest assessments were completed on August 7 and 8, 2025, in four forest stands identified in the desktop review as overlapping or within 100 m of the Assessment Area on Crown land and having an OGPI rank $\geq$ 7. Field biologists with demonstrated experience conducting old-growth forest assessments travelled to pre-determined, semi-random sample plots within each stand to conduct a rapid assessment for old-growth conditions. Rapid assessments included confirming the presence of long-lived intermediate-tolerant (LIT) or late-successional (LT) tree species (an attribute of old-growth forests) and collecting evidence of human or natural disturbances resulting in drastically altered stand composition (e.g., harvesting and blowdown; indicating that the stand is not old growth).

Where a rapid assessment was inconclusive or indicated potential for old-growth conditions, Part 1 of the old-growth scoring procedure was employed, as defined by NSNR (2024f). At each plot, a tree core was collected from one LIT/LT tree representative of the top 20% basal area for the plot and characteristic of the identified FEC vegetation type. Tree cores were processed and analyzed to determine the ages of the sampled trees which were then used to determine if stands met the criteria for old-growth status.

Flora Surveys

Plant and lichen surveys were completed in the Assessment Area in 2025 as follows:

- Vascular flora surveys: June 23 to 26, 2025
- Lichen surveys: March 24 to 26 and September 22, 2025

The field assessment strategy for vascular flora and lichens was informed by a review of land cover data and aerial imagery. Intelligent meandering transects were completed on foot within all major land cover types, including wetlands, upland forests, open areas, and forestry trails to develop a list of flora species within and near the Assessment Area. More time was spent surveying in areas more likely to support SAR and SOCI, including mature forests, wetlands, and flooded areas. Targeted lichen surveys were conducted in areas of suitable habitat up to 100 m outside of the Assessment Area. Potential boreal felt lichen habitat polygons on Crown land were assessed up to 100 m beyond the Assessment Area, and polygons on private land were assessed if they directly overlapped with the Assessment Area. A total of 24 potential habitat polygons were surveyed for boreal felt lichen.

Upon encountering flora SAR or SOCI, specimens were georeferenced, counted (when possible), photographed, and a description of their habitat was recorded. When unknown species were encountered, surveyors took photos and samples (when appropriate) to verify identification with guidebooks and/or experts as required. In addition to the prior knowledge of the surveyors, the study team used keys and descriptions from various print and electronic resources. Non-vascular flora (primarily mosses) were recorded incidentally during flora surveys. Incidental observations of flora SAR and SOCI were also recorded during other biophysical surveys (e.g., wetland determinations, fauna surveys) within the Assessment Area, if observed.

7.4.1.5 Field Assessment Results

Vegetation Communities

Each of the land cover types identified through desktop review (Table 7.44) were observed within the Assessment Area during field studies in 2025. Historic and ongoing forestry operations in the Study Area have resulted in extensive modifications to natural habitat conditions. Current forest habitat conditions include stands that have been subject to various timber harvesting treatments and other silvicultural interventions. Due to the extent of forestry activities in the Assessment Area, there are very few areas that have remained untouched by these types of interventions. The most natural and minimally-disturbed stands are found adjacent to watercourses, wetlands, and lakes in the Study Area.

A total of 24 of the vegetation community assessment points fell within the Assessment Area (the remainder in the immediate vicinity). Five upland forest groups were identified, comprising 14 different vegetation types (Table 7.46). Two wet forest groups were also identified, comprising two wet deciduous vegetation types and two wet mixedwood vegetation types. Disturbed vegetated areas were largely composed of young hardwood or dense monocultural softwood stands and harvested wetlands. Representative points for these vegetation communities are shown in Drawings 7.20A to 7.20I.

Table 7.46: Vegetation Types Identified During Biophysical Surveys

Community Type	Forest Group[(1)]	Vegetation Types
Upland Communities	Spruce Pine (SP)	SP6 (Black spruce – Balsam fir / Blueberry)
		SP7 (Black spruce / Lambkill – Wild raisin – Mountain holly)
	Mixedwood (MW)	MW2 (Red spruce – Red maple – White birch / Goldthread)
		MW3 (Hemlock – Yellow Birch / Evergreen wood fern)
		MW7 Balsam fir – Red maple / Wood sorrell – Goldthread)
	Floodplain (FP)	FP1 (Sugar maple – White ash / Ostrich fern – Wood goldenrod)
	Intolerant Hardwood (IH)	IH6 (White birch – Red maple / Sarsaparilla – Bracken)
		IH7 (Red maple / Hay-scented fern – Wood-sorrel)
	Tolerant Hardwood (TH)	TH1 (Sugar maple / Wood fern – Hay-scented fern)
		TH1a (Yellow birch variant)
		TH2 (Sugar maple / New York fern – Northern beech fern)
		TH5 (Beech / Sarsaparilla / Leaf litter)
		TH7 (Yellow birch – White birch / Evergreen wood fern)
		TH8 (Red maple – Yellow birch / Striped maple)
Wetland Communities	Wet Deciduous (WD)	WD1 (White ash / Sensitive fern – Lady fern)
		WD3 (Red maple / Sensitive fern – Lady fern / Sphagnum)
	Wet Mixedwood (WM)	WM1 (Red maple – Balsam fir / Wood aster / Sphagnum)
		WM3 (Red maple – Black spruce / Lambkill / Cinnamon fern / Sphagnum)
-	-	Cutover/Open Areas

[(1)]FEC (Neily et al., 2023)

The forest groups and vegetation types identified within and near the Assessment Area are described in detail within the following subsections.

Spruce Pine Forest Group

Vegetation types within the SP forest group are dominated by black spruce and pine species with an understory often composed of ericaceous shrubs. This group frequently occurs in areas of shallow, nutrient-poor soils. Soils are often very to excessively stony, especially when associated with granitic glacial till deposits. Herbaceous cover is low and dependent on light availability.

Mixedwood Forest Group

The MW forest group comprises early to late successional vegetation types and these can be difficult to characterize due to variation of tree species composition. This group is dominated by a mixture of hardwood and softwood species and occurs in upland settings. Early successional stages often consist of red maple, white birch (*Betula papyrifera*), and balsam fir, and late successional stages comprise yellow birch, red spruce, and/or eastern hemlock (Neily et al., 2023). Herb and bryophyte diversity are often high and extensive.

Floodplain Forest Group

The FP forest group occurs on riparian floodplains that are enriched by alluvial sediments. Canopies are usually dominated by hardwood species including sugar maple, red maple, red oak (*Quercus rubra*), white ash (*Fraxinus americana*), ironwood (*Ostrya virginiana*), balsam poplar (*Populus balsamifera*), and black cherry (*Prunus serotina*), and have understories characterized by high species richness. FP forests offer a diverse range of microhabitats for wildlife and have high biodiversity value; plant species diversity in these forests is the highest of all forest groups in Nova Scotia (Neily et al., 2023).

Intolerant Hardwood Forest Group

The intolerant hardwood (IH) forest group is typically comprised of early to mid-successional communities with a range of soil and site conditions. Moisture and nutrient regimes range from dry to moist and poor to rich. This forest group is dominated by hardwoods such as red maple, white birch, grey birch (*Betula populifolia*), trembling aspen (*Populus tremuloides*), and large-tooth aspen (*Populus grandidentata*).

Tolerant Hardwood Forest Group

The TH forest group is classified as mid- to late-successional hardwood stands generally composed of a closed canopy dominated by sugar maple, beech, yellow birch, red maple, and with balsam fir as a significant understory species. The shrub layer in TH vegetation types can be extensive and will show high diversity and abundance of ferns. Most TH sites contain soils ranging from fresh to moist. Due to the fertile soils of the TH group, rare plants are often associated with this group (Neily et al., 2023).

Wet Deciduous

Forest stands in the WD forest group have water at or near the ground surface throughout most of the growing season, and partly open to closed canopies that are often dominated by red maple. Nutrient availability is moderate to high, with white ash present in areas of elevated soil richness. Natural disturbance within this group can arise from fluctuating water levels, windthrow, and insects and disease. WD forests provide habitat for a wide array of wildlife, including wood turtles, Mainland moose, lichens, and various avifauna.

Wet Mixedwood Forest Group

The wet mixedwood (WM) forest group occurs in areas where water is present at or near the ground surface during most of the growing season. Canopies are partly open to closed, and are dominated by red maple, spruce, and balsam fir, with the prevalence of white ash correlated with nutrient availability. The shrub layer generally contains regenerating tree species, winterberry (*Ilex verticillata*), mountain holly, and speckled alder (Neily et al., 2023). Several uncommon flora and bird species, as well as a variety of amphibians find suitable habitat conditions within this forest group.

Cutover/Open Areas

The FEC guide focuses on “natural” communities and does not describe human-disturbed landscapes as they are often dynamic and unpredictable. Vegetation communities in disturbed

landscapes such as cutblocks and ROW clearings were placed in the cutover and open area group. These communities were observed to be widespread throughout the Assessment Area. The community structures of cutover and open areas varied but were often dominated by species such as woolgrass (*Scirpus cyperinus*), soft rush (*Juncus effusus*), three-seeded sedge, bent grasses (*Agrostis* spp.) and a variety of species in the aster family (*Asteracea* spp.). Regenerative shrub and tree species such as black spruce, red spruce, balsam fir and red maple were common in these communities, occurring in both upland and wetland settings.

Summary of Vegetation Types

The Assessment Area is comprised of several vegetation types within the SP, TH, IH, FP, MW, WD, and WM forest groups (Drawings 7.20A to 7.20I). The vegetative communities identified within the Assessment Area are common in the surrounding landscape and the province.

Upland vegetation types FP1, TH1, TH1a, TH2, and TH8 are known to support rare plants due to fertile soils and later successional stages. Wetland vegetation types, WM1, WM3, WD1 and WD3, which are also known to support rare plants and lichens, are considered separately in Section 7.3.3.

Evidence of past forestry activity was observed across the Study Area, and several of the vegetation community points captured the presence of cutovers and early-successional forests that clearly followed human disturbance. Vegetation types IH6, IH7, and MW7 are considered early- to-mid successional forests that follow disturbances such as harvesting or windthrow. These early- to mid-successional forests, often predominantly with single layered canopy structures, are considered less complex compared to mature or late-successional forests where the flora and fauna species diversity and tree vertical complexity are often higher. Regardless, early- to mid-successional forests' vegetation communities provide a variety of ecological services to generalist species, particularly for species that rely on dense understory cover and abundant browse, such as snowshoe hare (*Lepus americanus*), white-tailed deer (*Odocoileus virginianus*), and shrub-nesting birds including the chestnut-sided warbler (*Setophaga pensylvanica*) and common yellowthroat (*Geothlypis trichas).*

Old-Growth Forest Assessments

The four forest stands assessed for old-growth status were within the Nova Scotia Uplands Ecoregion and the Mulgrave Plateau Ecodistrict (360) and had predominantly deciduous canopies comprised of red maple, yellow birch, and balsam fir (Table 7.47, Appendix I).

Table 7.47: Results of Old-Growth Forest Assessments

Stand ID	Stand Size (ha)	Plot #	Species Cored[1]	DBH[2] (cm)	Height (m)	Age (years)	FEC VT[3]	Old-Growth Reference Age (years)	Avg. Age of Cored Trees	Old-Growth Status
C021-01103	18.9	1	RM	36.5	20	123	TH9	140	105.2	Not old growth
		2	RM	30.9	15	81	TH8			
		3	YB	39.6	16	119	TH1a			
		4	RM	28	18	89	IH6*			
		5	RM	21.4	15	95	IH6*			
		6	YB	21.2	12	135	TH8			
		7	YB	24.2	16	82	TH8			
		8	RM	26.9	15	105	IH6*			
		9	YB	27.8	14	118	TH8			
C021-01522	4.5	1	RM	21.1	14	56	TH8	140	89.7	Not old growth
		2	YB	23.4	17	89	TH8			
		3	RM	32.3	16	124	TH8			
C021-01524	8.6 (14.6)	1	RM	19.7	11	--	MW12*	NA	NA	Ineligible for old-growth status
		2	RM	22.0	14	--	MW7*			
		3	RM	13.2	10	--	IH6*			
		4	RM	18.3	13	--	IH6*			
		5	--	--	--	--	--			
C021-01562	7.1	1	RM	22.5	15	75	IH6*	125	99.0	Not old growth
		2	RM	27.1	14	68	MW7*			
		3	RM	36.1	14	109	MW7*			
		4	YB	25.3	16	111	TH8			
		5	RM	40.9	19	132	MW2			

[1]RM = red maple, YB = yellow birch
[2]DBH = diameter breast height
[3]VT = FEC (2023) vegetation type: TH = tolerant hardwood forest; IH = intolerant hardwood forest; MW = mixed wood forest
* VT is not eligible for old-growth status

None of the assessed forest stands meet the requirements to be considered old growth (Table 7.47, Drawing 7.21). One stand contained only early- to mid-successional vegetation types (C021-01524; IH6, MW12, MW7) at four of the five plots, making it ineligible for old growth status. According to guidance provided by NSNR (2024f), at least 30% of a stand's assessed plots must be of an eligible vegetation type. The fifth plot was not assessed. Additional plots were originally established in a contiguous portion of this stand that extended into private property but were ruled out through rapid assessment as this portion of the stand contained only regenerating trees and did not meet old-growth forest characteristics. The remaining three assessed stands were determined not to be old growth based on the results of tree-ring analyses (the average age of trees cored in each stand was less than the corresponding old-growth reference age).

Flora Surveys

A total of 197 vascular plant species, plus 27 lichen and 15 bryophytes species were identified during field surveys in 2025 (Appendix J). One vascular plant SAR, black ash, and two lichen SAR, blue felt lichen and frosted glass-whiskers lichen, were identified in the Study Area. Two vascular plant SOCI were also identified: American beech (S-Rank S3S4) and yellow lady's-slipper (*Cypripedium parviflorum* var. *pubescens*; S-Rank S2). Black ash and Loesel's twayblade (*Liparis loeselii*; S-Rank S3S4), a vascular plant SOCI, were identified within the Assessment Area (Drawing 7.17A to 7.17I; Table 7.48). No evidence of boreal felt lichen was observed during surveys of potential habitat polygons. Potential for interactions between the Project and terrestrial vegetation communities and flora individuals will be discussed in Section 7.3.2.6.

Table 7.48: Flora SAR and SOCI Observed in the Study Area and Assessment Area

Common Name	Scientific Name	COSEWIC Status[1]	SARA Status[1]	ESA Status[2]	NS S-Rank[3]	No. of Individuals in Study Area / Assessment Area
Vascular Plants						
American Beech	*Fagus grandifolia*	-	-	-	S3S4	NA[4] / NA[4]
Black Ash	*Fraxinus nigra*	Threatened	-	Threatened	S1S2	29 / 23
Loesel's Twayblade	*Liparis loeselii*	-	-	-	S3S4	0 / 1
Yellow Lady's-slipper	*Cypripedium parviflorum* var. *pubescens*	-	-	-	S2	30+ / 0
Lichens						
Blue Felt Lichen	*Pectenia plumbea*	Special Concern	Special Concern	Vulnerable	S3	1 host tree / 0

Common Name	Scientific Name	COSEWIC Status[1]	SARA Status[1]	ESA Status[2]	NS S-Rank[3]	No. of Individuals in Study Area / Assessment Area
Frosted Glass Whiskers Lichen	*Sclerophora peronella* (Atlantic pop.)	Special Concern	Special Concern	-	S3S4	1 host tree / 0

Source: [1](ECCC, 2024); [2](NSNR, n.d.); [3](ACCDC, 2025c).
[4]As the species is relatively widespread throughout the Study Area, not all occurrences were recorded.

Descriptions of Priority Species

The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) was used to identify any priority species and habitat associated with this Project. All terrestrial flora SAR and SOCI and their respective habitat associations identified within the Study Area through desktop review and field inventory were initially considered. Only those terrestrial flora SAR and SOCI, and their respective habitats, with potential to interact with the Project have been designated as Project-specific priority species. Interactions may include removal or disturbance of a SAR or SOCI and/or their associated habitat.

American Beech

American beech was assigned an S-Rank of S3S4 in March 2022. Although historically a common tree species in the province, the health of American beech trees has been affected by beech bark disease in Nova Scotia. Beech bark disease has reduced the potential for the species to mature into an overstory tree, and its ecological role has thus shifted to that of an understory or intermediate species (NSNR, 2021c). The species was observed in several locations within the Study Area, suggesting that it is not habitat-limited in this area. Several beech-dominated stands (including VP29 on Drawing 7.20I) were observed during flora surveys, and cankers associated with beech bark disease were evident on many trees.

Black Ash

Black ash (ESA Threatened, S-Rank S1S2) is a slow-growing, broad leaf deciduous tree found primarily in moist habitats, including riparian areas adjacent to watercourses and within wetlands that have poorly drained peat or muck soils. The species is tolerant of short-term seasonal or annual hydrological fluctuations, and its habitat represents a specific, narrow niche where individuals will not be out-competed by either more flood-tolerant species [e.g., alders (*Alnus* spp.)] or upland species (e.g., red maple) (COSEWIC, 2018a; Tardif & Bergeron, 1992, 1999). Habitat requirements for black ash are thus defined by a stable hydrological regime averaged over years that provides adequate soil moisture and conditions where competition is limited. A key threat to this species is habitat loss and the alteration of wet habitats resulting in hydrological changes. Research and data show that the decline in black ash in Nova Scotia can be partially attributed to habitat destruction, disease, and changing environmental conditions (COSEWIC, 2018a; NSNR, 2015; Zinck, 1998). The arrival of the invasive emerald ash borer beetle in Nova Scotia poses a significant threat to the species (CFIA, 2025; NSNR, 2015).

Black ash was designated as Threatened under ESA in 2013 (Nova Scotia, 2017), which grants individual protection to black ash trees from harm or destruction. The criteria to identify core habitat for the species has been described, and has been mapped for known occurrences of black ash (NSNR, 2021b). No areas of core habitat have been designated (granted legal protection) through legislation. A total of 29 black ash trees (and several additional dead trees) were identified during field assessments in seven field-delineated wetlands, 23 of which are in the Assessment Area.

Loesel's Twayblade

Loesel's Twayblade (S-Rank S3S4) is a small green orchid between 15 and 20 cm tall (Roland et al., 1998). This species is found throughout Canada and eastern United States. Loesel's twayblade prefers open wetlands, fens, and peat meadow habitats with minimal canopy cover (Roland et al., 1998). One occurrence of Loesel's twayblade was observed in a field-delineated wetland in the Assessment Area.

Yellow Lady's-slipper

Yellow lady's-slipper (S-Rank S2) is an orchid with bright yellow flowers that grows 20 to 45 cm tall. It is found in a range of habitats including forests, fields, open, and wet areas (Ontario Wildflowers, n.d.). One occurrence of yellow lady's-slipper consisting of 30+ individuals was observed in a wetland outside of the Assessment Area.

Blue Felt Lichen

Blue felt lichen is listed as Special Concern under SARA and Vulnerable under ESA (S-Rank S3) and was designated as Nova Scotia's provincial lichen in 2022 (CBC News, 2022). The species is limited to Atlantic Canada and northeastern Maine (NatureServe, 2024), and just under half of the North American population of the lichen occurs in Nova Scotia. Blue felt lichen requires mature hardwood or mixed wood forests with high humidity, where several successional stages are present. Air pollution and acid rain are major threats to the survival of this species, and many areas of Nova Scotia currently receive acid deposition greater than the critical load for blue felt lichen. The construction of roads and clearing associated with wind farm development are also considered threats to this species due to potential loss of individuals during vegetation clearing and impacts to habitat suitability (COSEWIC, 2010). The At-Risk Lichens – Special Management Practices (NSNR, 2018a), which apply on Crown land, recommend that lands within 100 m of occurrences of blue felt lichen be managed for minimal disturbance.

One blue felt lichen occurrence consisting of eight thalli on a mature yellow birch tree was observed on Crown land within the Study Area (outside of the Assessment Area). The Project Footprint was specifically adjusted following identification of this species to ensure the 100 m setback outlined in the At Risk Lichens – Special Management Practices is maintained (NSNR, 2018a).

Frosted Glass-whiskers Lichen

Frosted glass-whiskers lichen (S-Rank S3S4) is a minute stubble lichen that occurs on the heartwood of mature tress (ECCC, 2011). The species is very rare across its range, and Nova Scotia has the most substantial population (COSEWIC, 2014). The At-Risk Lichens – Special Management Practices (NSNR, 2018a), which apply on Crown land, recommend that lands within 100 m of occurrences of frosted glass-whiskers lichen be managed for minimal disturbance.

One occurrence of frosted glass-whiskers lichen was found on the heartwood of a red maple tree in a mature tolerant hardwood forest. The observation is located outside the Assessment Area on private land, over 100 m from the Clearing Footprint.

Non-Native Flora

There were 15 non-native plant species encountered during field surveys within and near the Assessment Area (Table 7.49). Of these, five species are considered invasive in Nova Scotia (NSECC, 2012):

- Colt's foot (*Tussilago farfara*)
- Common St. John's wort (*Hypericum perforatum)*
- Creeping buttercup (*Ranunculus repens*)
- Glossy buckthorn (*Frangula alnus*)
- Multiflora rose (*Rosa multiflora*).

Table 7.49: Non-Native Flora Encountered within Assessment Area

Common Name	Scientific Name	Exotic Status[(1)]
Black Knapweed	*Centaurea nigra*	Widespread
Canada Thistle	*Cirsium arvense*	Widespread
Colt's Foot	*Tussilago farfara*	Widespread
Common Eyebright	*Euphrasia nemorosa*	Widespread
Common Hawkweed	*Hieracium lachenalii*	NA
Common Ragwort	*Senecio vulgaris*	NA
Common St.John's-wort	*Hypericum perforatum*	Widespread
Creeping Buttercup	*Ranunculus repens*	Widespread
Field Bindweed	*Convolvulus arvensis*	NA
Glossy Buckthorn	*Frangula alnus*	Locally common
Multiflora Rose	*Rosa multiflora*	Uncommon
Oxeye Daisy	*Leucanthemum vulgare*	NA
Smooth Bedstraw	*Galium mollugo*	Widespread
Tansy Ragwort	*Jacobaea vulgaris*	NA
White Sweet-Clover	*Melilotus albus*	Widespread

[(1)]As described in the WESP-AC guide supplementary information (Adamus, 2018)

7.4.1.6 Sensitive Flora Habitat Modelling

Following the completion of the desktop review and field assessments for the Project, a sensitive flora habitat model was developed by Strum to identify areas within and surrounding the Study Area with elevated potential to serve as habitat for rare flora species. The model was developed by considering the range of SAR and SOCI plant species and their associated habitat preferences that may be present in the Study Area (e.g., species identified in the desktop review and field assessments).

Though plants vary greatly in their distribution and are rarely bound to a quantifiable set of criteria, some notable landscape characteristics are strongly associated with certain rare flora in Nova Scotia. Alluvial floodplains are a subset of wetlands that have rich, moist soils suitable for several rare plant species, including black ash (NSNR, 2015). Calcareous surficial geology, commonly characterized by limestone and/or barrens, creates more alkaline soil conditions preferred by rare flora such as orchids (NSNR, 2020). Specifically, exposed volcanic bedrock including talus slopes are known to be important for rare flora as well (Haines & Vining, 1998; Hinds, 2000). Thus, these habitats, along with the preferred south-facing slopes, were the primary targets of the modelling exercise.

Given the differing habitat preferences of rare species known to occur in the Study Area, several spatial layers were created to represent sensitive habitats for those species of flora. The habitat characteristics observed to be preferred by several rare species were considered. Some species, however, are generalists and it is therefore challenging to predict the habitats where they will occur.

Modelling was completed using LiDAR (GeoNOVA, 2024b) and surficial geology (Stea et al., 1992). LiDAR was used to identify canopy height (more mature forests), surface water (floodplains), and directional exposure, while surficial geology was referenced to identify talus slopes, barrens, and calcareous soils. The final model layer depicts areas greater than 1,000 m^2 (0.1 ha) where one or more of these conditions exist.

Although the potential sensitive flora habitat model was not formally validated using desktop records or field observations, several flora SAR and SOCI occurred within or directly next to areas classified as potential sensitive habitat. A total of 452.9 ha of modelled potential sensitive flora habitat was identified within the Study Area (Drawing 7.22), 19.5 ha of which falls within the Clearing Footprint.

7.4.1.7 Effects Assessment

Project-Terrestrial Vegetation Community and Flora Species Interactions

Project activities, primarily those that involve earth-moving and/or vegetation removal, have the potential to impact terrestrial vegetation communities and flora (Table 7.50). These activities could result in the loss of vegetation communities, the loss of flora individuals and impacts to associated habitat, and effects associated with the creation of edge habitat.

Table7.50: Potential Project Interactions with Terrestrial Vegetation Communities and Flora Species

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	-
Vegetation Management	X
Decommissioning and Rehabilitation	
Infrastructure Removal	-
Site Reclamation	X

Assessment Boundaries

The LAA for terrestrial vegetation communities and flora is a 100 m buffer of the Clearing Footprint (Drawing 7.23). This area was selected to assess the direct and indirect impacts of vegetation clearing and edge effects on vegetation communities and flora. The RAA is the Study Area plus a 5 km buffer (mainland Nova Scotia only). This area was selected for the RAA to contextualize the impacts to terrestrial vegetation communities and flora within the broader landscape.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply to terrestrial vegetation communities and flora species. The VC-specific definition for magnitude is as follows:

- Negligible: No loss of unique vegetation communities; no loss of terrestrial flora SAR or SOCI individuals; no alteration to habitat known to support terrestrial flora SAR or SOCI expected.
- Low: Small loss of unique vegetation communities; small loss of or effects on habitat supporting terrestrial flora SAR or SOCI; no terrestrial flora SAR or SOCI individuals lost.
- Moderate: Moderate loss of unique vegetation communities; small loss of or effects on terrestrial flora SAR or SOCI individuals (and associated habitat) that do not have legislated protection status, but their populations remain largely intact.

- High: High loss of unique vegetation communities; high loss of or effects on the habitat that supports terrestrial flora SAR or SOCI that do have legislated protection status and/or loss of an entire population of terrestrial flora SAR or SOCI.

Effects

Project activities have the potential to have direct and indirect impacts on vegetation communities and flora, including:

- Loss or alteration of unique vegetation communities
- Loss of flora SAR or SOCI and impacts on supporting habitat
- Edge effects

Loss of Alteration of Unique Vegetation Communities

Impacts to vegetation communities will occur as a result of vegetation clearing and ground disturbance required for the placement of Project infrastructure during the site preparation and construction phase (e.g., road development, collector line corridors, turbine pads). A total of 95.9 ha of land is expected to be cleared, approximately one third of which will be allowed to revegetate throughout the lifespan of the Project. Although allowing for revegetation will reduce the duration and area of vegetation loss, the composition of newly established vegetation communities will differ from pre-clearing conditions. The vegetation types identified during field assessments for the Project are common to the region and the province, and the Project is not expected to impact unique or uncommon vegetation communities. Based on the results of field assessments, no impacts to old-growth forests are expected.

To quantify the impacts of the Project on vegetation communities, the land cover model was used to determine the amount of each land cover type expected to be lost due to vegetation clearing relative the amounts available in sounding areas. Within the Clearing Footprint, the main land cover types are hardwood (30.1 ha) and mixedwood (17.6 ha) forests, and cutover uplands (17.6 ha). This amounts to 28.9% and 22.4% of the amount of hardwood and mixedwood forest cover modelled within the LAA, and 1.4% and 0.4% of the amount modelled within the RAA. The estimated area to be cleared in each land cover class relative to the amount available in the LAA and RAA is shown in Table 7.51.

Table 7.51: Modelled Land Cover Types within the Clearing Footprint as a Percentage of the Amount Available within the LAA and RAA

Land Cover Class	Hectares Cleared for the Project	Percentage of Amount Available in the LAA	Percentage of Amount Available in the RAA
Hardwood Forest	30.1	28.9	1.4
Hardwood Wet Forest	0.7	12.4	0.3
Mixedwood Forest	17.6	22.4	0.4
Mixedwood Wet Forest	1.9	8.3	0.3
Softwood Forest	9.0	5.2	0.4
Softwood Wet Forest	3.3	9.3	0.5

Land Cover Class	Hectares Cleared for the Project	Percentage of Amount Available in the LAA	Percentage of Amount Available in the RAA
Shrub/Alders	0.0	-	-
Open Wetland	2.8	13.5	0.3
Cutover[1] Upland	17.6	24.0	2.3
Cutover[1] Wetland	1.4	21.0	1.5
Urban/Developed	2.0	36.90	0.3
Open Areas	9.4	20.8	1.1
Water	0.0	-	-
Total	95.9	21.9[2]	0.6[2]

[1]Cutover class represents harvested and/or windthrow/dead forest areas as identified in the provincial Forest Inventory database (NSNR, 2021f).
[2]Percentage of land cleared for the Project relative to the total size of the LAA and RAA.
Source: Landcover types predictions derived from provincial WAM Database (NSECC, 2022b), Canopy Height (GeoNOVA, 2024a), and Forest Inventory Data (NSNR, 2021f).

Given that the land cover classes observed in the Clearing Footprint are abundant within the LAA and RAA, no loss of unique or uncommon vegetation communities is expected, and considering that forest stands have already been influenced by prior anthropogenic activities (e.g., historical forestry operations), the overall loss of vegetation communities due to the Project is considered low.

Loss of Flora SAR or SOCI and Impacts on Supporting Habitat

Activities requiring ground disturbance and vegetation clearing during the site preparation and construction phase have the potential to impact flora SAR and SOCI individuals. Throughout the planning phase of the Project, information from the desktop review and the results of subsequent field surveys were used to iteratively update the layout of Project components to maximize avoidance of field-observed SAR and SOCI and their associated habitat.

American Beech

Numerous occurrences of American beech, including several beech-dominated stands, were observed during field assessments. The presence of abundant American beech at several locations suggests that the species is not likely to be habitat limited in this area, and the ACCDC data report (ACCDC, 2025b) also indicates that American beech are present within the RAA.

Black Ash

A total of 29 black ash trees were identified during field surveys within or adjacent to seven field-delineated wetlands, all of which are located on private land. Of the individuals observed, 23 are in the Assessment Area, and none are in the Clearing Footprint. The six trees identified outside of the Assessment Area are in wetlands that intersect, or are presumed to intersect, with the Assessment Area [four individuals were observed in a wetland that is believed to be contiguous with a wetland that overlaps the Assessment Area and Clearing Footprint based on a review of the WAM Database (NSECC, 2022b)].

The black ash trees recorded during field assessments were generally observed to be in poor condition, with many trees partially defoliated, having multiple dead canopy branches (nine individuals), or consisting of sprouting stumps. Evidence of forest harvesting was observed within and adjacent to six wetlands associated with black ash observations, and eight dead trees (stumps) were also noted during field surveys.

All black ash specimens will be avoided by the Project, and detailed micrositing of the Clearing Footprint has been undertaken to minimize impacts to black ash habitat. Of the seven wetlands containing black ash, five are avoided by the Clearing Footprint. The remaining two wetlands will be spanned by collector powerlines, such that some vegetation clearing may be required in wetlands hosting black ash, but the poles required to support the collector lines will not be placed within these wetlands.

Direct impacts to black ash habitat will be limited to vegetation clearing within two wetlands in areas away from black ash specimens. During the detailed design phase of the Project, continued effort will be made to limit Project activities (including vegetation clearing) within and adjacent to wetlands containing black ash. This includes micrositing any infrastructure that requires excavation as far from host wetlands as possible to avoid subsurface hydrologic impacts to these wetlands. Surface water flows that influence the existing hydrological regimes of the host wetlands will not be impacted through purposeful Project infrastructure siting.

The locations of black ash occurrences and associated wetlands will be provided directly to NSNR (due to location sensitivity).

Loesel's Twayblade

One occurrence of Loesel's twayblade was observed in a field-delineated wetland associated with a turbine pad. The occurrence is within the Clearing Footprint and is expected to be lost during vegetation clearing for the Project.

Yellow Lady's-slipper

One occurrence of yellow lady's-slipper was observed during field assessments, consisting of 30+ individuals The observation was recorded in a wetland outside of the Assessment Area and Clearing Footprint, and no impacts to this occurrence are expected.

Blue Felt Lichen

One occurrence of blue felt lichen (eight thalli) was observed during field assessments on Crown land, and the Assessment Area was redesigned to its current configuration to ensure the 100 m buffer recommended in the At-Risk Lichens – Special Management Practices (NSNR, 2018a) is maintained. The occurrence is approximately 190 m from the Clearing Footprint and no impacts to individuals or supporting habitat are expected.

Frosted Glass-whiskers Lichen

The occurrence of frosted glass-whiskers lichen observed during field assessments is located on private land and is > 100 m from the Clearing Footprint. No impacts to individuals or supporting habitat are expected.

Sensitive Flora Habitat

To quantify the impacts of the Project on rare flora habitat that may not be directly captured through field assessments, the sensitive flora habitat model developed for the Project (described in Section 7.4.1.6) was used to determine the amount of modelled sensitive flora habitat within the Clearing Footprint. Approximately 19.5 ha of modelled sensitive flora habitat is within the Clearing Footprint for the Project, which represents 16.1% of the amount modelled within the LAA, and 0.5% of the amount modelled within the RAA. As visible in Drawing 7.22, the Project largely avoids several large, contiguous areas of modelled sensitive flora habitat within the RAA.

Edge Effects

Vegetation clearing for the Project will create new edge habitat that will alter the environmental conditions experienced by vegetation communities and flora individuals near the Clearing Footprint. This will occur during the construction phase when land is cleared for road development and infrastructure placement. Effects associated with the creation of edge habitat (i.e., edge effects) can include changes in microclimate conditions such as light, moisture, and temperature (Braithwaite & Mallik, 2012; Hamberg et al., 2009). These factors can cause shifts in vegetation community composition as species better adapted to new conditions may outcompete those suited to interior forests (Hamberg et al., 2008). Similarly, the creation of edge habitat may create opportunities for the introduction and spread of invasive species and dust, and/or accidental compaction by vehicles and equipment. These effects also have the potential to result in altered vegetation community composition and to impact the growth of flora individuals.

The edge effects associated with the Project will occur within the LAA. The creation of new edge habitat will primarily be related to the development of linear features, including access roads and collector line corridors. Approximately 11.9 km of new roads will be built for the Project, with additional area to be cleared for the small number of collector lines constructed away from roadsides. The length of new roads and overall disturbance required for the Project is being minimized through the careful optimization of the layout of Project components that results in an overall more compact Project Footprint that makes use of less total land area. A portion of the area surrounding the Clearing Footprint already consists of existing cutovers, roads, and other open areas, such that edge effects associated with the Project's development will not occur throughout the entire LAA.

Altered Habitat Conditions

Forest edges, generally adjacent to clearings or disturbances, are exposed to stronger winds, more light exposure, and drier conditions than interior forest areas. These areas are often vulnerable to both natural and anthropogenic disturbances and may have altered vegetative structure and composition compared to forest interiors. For instance, tree mortality is higher along a forest edge due to windthrow, and edges are more directly exposed to pollutants, changes in humidity, light, and sound (Boudreault et al., 2008). Changes in the composition of understory plants are also possible due to altered microclimate and soil properties (Hamberg et al., 2008).

Multiple studies have shown that edge effects relating to drying of plant material can be observed from 15 m to 70 m (Gauslaa et al., 2019). Lichens and non-vascular plants are especially sensitive to edge effects and changes in air quality due to being unable to regulate and maintain their water content (Boudreault et al., 2008; Nash, 2008). Edge effects from activities such as forest harvesting can have a negative impact on lichens that extends up to 50 m into the forest (Rheult et al., 2002). In some cases, this can result in the death of individual lichens. The occurrences of lichen SAR observed during field assessments are located > 100 m from the Clearing Footprint (outside the LAA) and are expected to be negligibly impacted by the creation of edge habitat.

Dust Deposition

Dust deposition may impact flora within the Assessment Area when fugitive dust is generated by road traffic on unpaved areas, crushing material, and blasting (if required for the Project). Dust from unpaved areas has been found to change the pH of lichen substrates (i.e., the tree bark they are attached to) and impact individual health and species richness (Degtjarenko, 2016). The effects of dust on flora may depend on the duration of exposure; one study found that lichens along a gravel road were unaffected within two years, but significant changes to the communities were observed after 10 years (Farmer, 1993). Vascular plants may be impacted by dust through reductions in photosynthesis and leaf diffusion (Thompson et al., 1984).

The spread of fugitive dust is influenced by several factors, including the height at which the dust is released, wind conditions, and particle size. Under standard conditions, fugitive dust particles above 30 µm settle out within 100 m of the emission source. Other finer particles have a slower settling velocity and may travel further (US EPA, 1995). It is expected that impacts to vegetation communities and flora relating to dust deposition will be greatest during the site preparation and construction phase (short-term duration) within the 100 m surrounding the Clearing Footprint (the LAA). Site traffic will be greatly reduced during the operational and maintenance phase of the Project.

Invasive Species

Terrestrial flora, particularly rare native flora, may be at risk due to threats from invasive species (BCMECCS, 2018). Non-native species, often introduced to a landscape accidentally by humans, can become invasive when they cause harm to the environment, economy, or human health through rapid reproduction and out-competing of native species (Rutledge et al., 2024). Industrial projects can lead to the introduction of invasive species in two main ways:

- Revegetation of cleared land with non-native seed mixes.
- Increased access to remote areas with equipment carrying seeds, spores, or other reproductive materials from non-native species.

The construction of new roads and subsequent increase in vehicle traffic on access roads associated with the operation and maintenance of the wind farms can lead to the introduction or spread of non-native species, some of which are invasive. Within the Study Area,15 non-

native vascular plant species observed, of which five are considered invasive in Nova Scotia. This suggests that mitigation strategies to minimize the risk posed by invasive species are warranted.

Mitigation

To minimize the effects of the Project on terrestrial vegetation communities and flora, the following mitigation measures will be implemented:

Loss or Alteration of Unique Vegetation Communities

- Minimize overall area to be altered by maximizing the use of previously disturbed areas (i.e., clearcuts), where possible.
- Allow for natural revegetation wherever possible to promote continued growth of terrestrial vegetation communities and flora.
- Avoid disturbance to important habitat features identified during desktop and field assessment (e.g., wetlands and mature forests) by micro-siting, where possible.

Loss of Flora SAR or SOCI and Impacts on Supporting Habitat

- Continue to avoid flora SAR and minimize interactions with supporting habitat during the design phase.
- Ensure that Project personnel are aware of confirmed locations of the black ash and are familiar with identifying characteristics to avoid accidental losses during vegetation clearing.
- Consult with NSNR and NSECC if unexpected flora SAR are encountered during construction activities.
- Develop and implement an Erosion and Sediment Control Plan.

Edge Effects

- Minimize the development of linear features through the compact design of the Project layout.
- If seed mixes are used to aid in revegetation, only use native seed mixes.
- Ensure equipment is cleaned periodically to prevent the introduction and/or spread of non-native species.
- Minimize the application of herbicides to only being used in locations where conventional brushing and clearing is not practical.
- Implement speed limits to reduce dust emissions.
- Use dust suppressants (e.g., water trucks) when required.

Monitoring

No monitoring programs specific to terrestrial vegetation communities and flora are proposed.

Conclusion

The predicted residual effects of the Project on terrestrial vegetation communities and flora (after mitigation) are characterized in Table 7.52.

Table 7.52: Terrestrial Vegetation Communities and Flora Residual Effects

Effect Detail	Loss of Alteration of Unique Vegetation Communities	Loss of Flora SAR or SOCI and Impacts on Supporting Habitat	Edge Effects
Magnitude of Effect	**Low:** Small loss of unique vegetation communities	**Moderate:** Small loss of SOCI individuals (and associated habitat)	**Low:** Small effect to habitat supporting terrestrial flora SAR and/or SOCI due to edge effects.
Geographic Extent of Effect	100 m buffer of the Clearing Footprint	100 m buffer of the Clearing Footprint	100 m buffer of the Clearing Footprint
Frequency of Effect	**Single Event:** Effects may occur during initial site preparation and construction	**Single Event:** Effects may occur during initial site preparation and construction	**Single Event:** Effects may occur during initial clearing and ground disturbance, and during operations
Duration of Effects	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning
Reversibility of Effect	**Partially Reversible**	**Partially Reversible**	**Partially Reversible**
Significance Level	Not Significant	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible			

7.4.2 Terrestrial Fauna

7.4.2.1 Overview

The terrestrial fauna assessment was completed using a combination of desktop and field assessments to achieve the following objectives:

- Identify significant species and habitat supporting SAR or SOCI within/near the Study Area using desktop resources.
- Determine the likelihood of SAR and SOCI occurring in the Study Area.
- Use data from targeted surveys as well as incidental observations for different taxa of terrestrial fauna to document the presence of species within the Study Area, particularly SAR and SOCI.
- Use the information collected through field studies to update the Project design, as necessary, to avoid or minimize interactions between Project infrastructure and

confirmed locations of terrestrial fauna SAR and SOCI or the habitats that are known to support terrestrial fauna SAR or SOCI.
- Apply mitigation, construction, and operational management practices to minimize effects to terrestrial fauna.

7.4.2.2 Regulatory Context

Several laws and regulations provide protection for terrestrial fauna (i.e., mammals and herpetofauna, lepidopterans, and odonates) and their habitats in Nova Scotia:

- *Species At Risk Act* (Canada, 2002)
- *Canadian Environmental Protection Act* [CEPA, (Canada, 1999)]
- *Canada Wildlife Act* (Canada, 1985a)
- *Endangered Species Act* (Nova Scotia, 1998)
- *Wildlife Act* (Nova Scotia, 1989b)
- *Biodiversity Act* (Nova Scotia, 2021)
- *Environment Act* (Nova Scotia, 1995b)

ESA and SARA prohibit harm to SAR listed as Endangered or Threatened along with their habitually occupied spaces and core/critical habitat. The *Canada Wildlife Act* (Canada, 1985a) provides a framework for the creation of protected wildlife areas, and the *Wildlife Act* (Nova Scotia, 1989b) provides policies and programs for wildlife to maintain diversity of species at levels of abundance to meet specific management objectives. The *Wildlife Act* (Nova Scotia, 1989b) includes a clause for the protection of den/habitation of a furbearer [48(3)] and prohibits harm to the nest of a (bird or) turtle [51(a)]. The *Biodiversity Act* (Nova Scotia, 2021) provides a framework for the creation of Biodiversity Management Zones used for conservation and sustainable biodiversity values. Lastly, CEPA and the *Environment Act* (Nova Scotia, 1995b) both provide measures for the protection of the environment and pollution prevention.

7.4.2.3 Desktop Review

Prior to undertaking the terrestrial field assessment, a detailed desktop review of known fauna observations and potential habitat for terrestrial fauna was completed to support the survey design. The following databases were reviewed:

- ACCDC Data Report (ACCDC, 2024)
- NSNR Significant Species and Habitat Database (NSNR, 2024e)
- SARA and ESA Recovery Documents
- SMP Layers

Additionally, habitat modelling for mainland moose (*Alces alces americana*) was conducted to further characterize the suitability of moose habitat within and near the Study Area.

Mammals

The ACCDC data report (2025b) indicates that no terrestrial mammal SAR or SOCI (excluding bats; see Section 7.4.3) have been identified within 5 km for the Study Area. The complete

ACCDC data report for the Project, which includes records of SAR and SOCI within 100 km of the Study Area, is provided in Appendix F.

The NSNR Significant Species and Habitat Database (NSNR, 2024e) does not contain any polygons relating to terrestrial fauna within 5 km of the Study Area on mainland Nova Scotia.

Mainland Moose

The nearest record of mainland moose identified in the ACCDC data report is 11.4 km from the center of the Study Area (ACCDC, 2025b), and the Study Area and Assessment Area partially overlap lands identified as core habitat in the provincial Recovery Plan for the Moose (*Alces alces americana*) in Mainland Nova Scotia [the "Mainland Moose Recovery Plan", (NSNR, 2021g)]. Approximately 22,300 km^2 of core habitat has been identified for mainland moose in Nova Scotia, with most occurring in the Pictou/Antigonish/Guysborough, Tobeatic, and Cumberland/Colchester regions. Core habitat is considered to represent areas that meet the habitat and landscape connectivity requirements of mainland moose, and that is essential for the long-term survival and recovery of the species (NSNR, 2021g). These lands are not currently designated under ESA.

Based on mapping included in the Mainland Moose Recovery Plan, the habitat suitability index (HSI) of the core habitat overlapping the Project is classified as "4, 5, or 6" and meets the road density criteria to be considered a priority area for conservation and management within core habitat (NSNR, 2021g). Approximately 10,503 km^2 of priority area has been identified on Mainland Nova Scotia.

Mainland Moose Habitat Suitability Modelling

Mainland moose habitat suitability modelling was conducted by Strum based on methodology established in the Mainland Moose Recovery Plan (NSNR, 2021g). Modelling was completed using the following data sources:

- Provincial Forest Inventory Database (NSNR, 2021f)
- Provincial Roads and Railroads Database (GeoNOVA, 2024c)
- Provincial Wet Area Mapping Database (NSECC, 2022b)

The model assesses known moose habitat types in relation to a series of mapped positive and negative influences. Positive inputs include attributes such as proximity to parks and protected areas, proximity to watercourses, forestry cover types, and suitable habitat areas (e.g., areas that, based on land cover characteristics, provide summer and/or winter forage, summer and/or winter cover, and/or meet requirements for calving habitat). Negative inputs include the calculated distance to human development features, distance to harvested area, and road density.

The model output illustrates habitat availability and quality in relation to land cover types and uses (e.g., anthropogenic disturbances), based on the weighting of positive and negative inputs. It is a grid of 5 ha hexagons expressing habitat suitability ranging from -3 to 5

(methodologically the lowest and highest habitat suitability scores). For descriptive purposes, this range was divided into discrete bins that describe habitat on a scale from “poor” to “best”. Areas classified as “fair” or better provide at least one habitat type requirement for the mainland moose. Habitat designated as “best” provides multiple habitat types for the species while being minimally impacted by negative factors such as roads or conflicting land-uses. Scores greater than 4.01, while mathematically possible, are ecologically infeasible due to the unique characteristics of different mainland moose habitat types.

The mainland moose habitat suitability model identified that the Clearing Footprint primarily consists of habitat categorized as “fair” (57.9%) or “better” (24.3%), with no areas of “best” habitat identified (Table 7.53; Drawing 7.24). This indicates that much of the land to be cleared for the Project meets at least one habitat requirement for mainland moose. Overall, the proportional distribution of quality habitat within the Clearing Footprint is similar to the LAA (a 5 km buffer of the Study Area on mainland Nova Scotia), with the exception of “poor” habitat, which is higher in the LAA (30.3%) than the Clearing Footprint. Further discussion of the LAA is provided in Section 7.4.2.6, below.

Table 7.53: Moose Habitat Suitability Model Weighting Scheme

Habitat Suitability Score Range	Habitat Suitability Category	Clearing Footprint		LAA	
		ha	%	ha	%
< 0	Poor	9.8	10.2	4,535.5	30.3
0	Neutral	7.4	7.7	695.0	4.6
0 to 1.35	Fair	55.7	57.9	6,345.9	42.4
1.36 to 2.68	Better	23.3	24.3	2,882.0	19.3
2.69 to 4.01	Best	0.0	0.0	506.6	3.4
Total		**96.1**	**100.0**	**213.2**	**14,965.0**

Herpetofauna

Data from the ACCDC (2025b) indicates that occurrences of two SAR and one SOCI herpetofauna have been recorded within 5 km of the Study Area (Table 7.54, Drawing 7.17A to 7.17I). One record of four-toed salamander (*Hemidactylium scutatum*), a SOCI, is within the Assessment Area, and two are on Cape Breton Island. One occurrence of snapping turtle (*Chelydra serpentina*), a SAR, has been recorded outside of the Study Area, near Mulgrave. The ACCDC data report indicates that a location sensitive herpetofauna SAR, wood turtle (*Glyptemys insculpta*), has also been recorded within 5 km of the Study Area. Communication with NSNR confirmed that no occurrences of wood turtle have been recorded within the Study Area (S. Spencer, NSNR SAR Biologist, Personal Communications, October 9, 2025).

Table 7.54: ACCDC Herpetofauna SAR and SOCI Recorded Within 5 km of the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank	Nearest Recorded Occurrence (km)[1]
Four-toed Salamander	*Hemidactylium scutatum*	-	-	-	S3	1.9 ± 0.5
Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	Vulnerable	S3	6.1 ± 1.8
Wood Turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened	S2	6.0 ± 0.01

Source: (ACCDC, 2025b)
[1]Distance measured from the center of the Study Area.

No records relating to herpetofauna were identified within 5 km of the Study Area on mainland Nova Scotia in the NSNR Significant Species and Habitat Database (NSNR, 2024e), and no wood turtle SMP buffered streams were identified in this area in the SMP review.

Invertebrates

The ACCDC data report contains one record of an invertebrate SAR within 5 km of the Study Area (Table 7.55; Drawing 7.17A to 7.17I). This record, relating to yellow-banded bumble bee, was observed approximately 7.7 km from the center of the Study Area on Cape Breton Island.

Table 7.55: ACCDC Invertebrate SAR Recorded Within 5 km of the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank	Nearest Recorded Occurrence (km)[1]
Yellow-banded Bumble Bee	*Bombus terricola*	Special Concern	Special Concern	Vulnerable	S3	7.7 ± 0.01

Source: (ACCDC, 2025b)
[1] Distance measured from the center of the Study Area

7.4.2.4 Field Assessment Methods

Mammals

Winter tracking and pellet surveys were conducted to assess the presence and distribution of mainland moose and other mammals across the Study Area. Surveys were designed to cover all relevant habitat types present in the Study Area, including roadways, wetlands, various forested habitats, riparian areas along watercourses and waterbodies, and previously disturbed areas (e.g., clearcuts). In addition to targeted mammal surveys, incidental observations of terrestrial mammal SAR or SOCI activity were recorded during other biophysical surveys (i.e., wetland assessments) if observed. A series of trail cameras were also deployed across the Study Area to capture the presence of wildlife without interference from human disturbance (Table 7.56; Drawing 7.25). The combination of survey approaches used for the Project provides a broad perspective of terrestrial mammal activity within the Study Area.

Table 7.56: Terrestrial Mammal Assessment Survey Information

Survey Type	Transect/Trail/ Camera ID	Dates Completed/Deployed (2025)	Transect Length (km)
Winter Tracking	WTPT-1	February 5, 7,11 and 13	1.2
	WTPT-2	February 5, 7,11 and 13	1.2
	WTPT-3	February 5, 7,11 and 13	1.4
	WT-4	February 5, 7,11 and 13	1.2
	WTPT-5	February 5, 7,11 and 13	1.2
	WTPT-6	February 5, 7,11 and 13	1.4
	WT-7	February 5, 7,11 and 13	1.1
	WTPT-8	February 5, 7,11 and 13	1.0
	WTPT-9	February 5, 7,11 and 13	0.8
	WTPT-10	February 5, 7,11 and 13	1.5
Pellet Surveys	WTPT-1	March 30 and April 1	1.2
	WTPT-2	March 30 and April 1	1.2
	WTPT-3	March 30 and April 1	1.4
	PT-4	March 30 and April 1	1.4
	WTPT-5	March 30 and April 1	1.2
	WTPT-6	March 30 and April 1	1.4
	PT-7	March 30 and April 1	1.4
	WTPT-8	March 30 and April 1	1.0
	WTPT-9	March 30 and April 1	0.8
	WTPT-10	March 30 and April 1	1.5
Trail Cameras	TC-A	April to September	-
	TC-B	April to September	-
	TC-C	April to September	-
	TC-D	April to September	-
	TC-E	April to September	-
	TC-F	April to September	-
	TC-G	April to September	-

The methods used for winter tracking and pellet surveys were adapted from recommendations provided by NSNR Wildlife Division (NSNR, 2022d). As recent, intact, tracks in fresh snow allow for the most accurate track identification, surveys were completed within five days of snowfall of 10 cm or more. This timeline allowed sufficient time for animals to leave their tracks, and limited opportunities for tracks to deteriorate or disappear because of excessive snowfall, melting, wind, or rain. Care was also taken to ensure surveys were not completed during rain or snow events. Winter wildlife tracking surveys were completed in one round, in February 2025, as weather conditions for additional rounds were not met. Pellet surveys were completed in two rounds in March and April 2025, after snow had melted completely, revealing animal droppings that had been preserved in the snow over the winter.

Surveys were conducted along pre-determined transects (n=10) covering a range of representative habitats within the Study Area, with priority given to habitats where mainland moose were expected to be active during the winter, if present. Transects ranged from 0.8 km to 1.5 km in length. The transect layout was designed in consideration of safe access, topography, and land cover using the Nova Scotia Forest Inventory (NSNR, 2021f) to ensure representative habitats within the Study Area were assessed. Transect lengths and locations were adjusted between winter tracking and pellet surveys as additional information was gathered about the distribution of relevant habitats in the Study Area (to maximize coverage). Sections of trails and roads were also surveyed opportunistically, and any observations of interest were recorded. All survey tracks were recorded using ESRI Field Maps, and any changes to transects in the field were made such that the new course was similar in length to the planned transect and covered similar or improved habitat types.

During surveys, transects were travelled by foot. While slowly travelling along a transect, an approximately 4 m wide area centered on the transect line was scanned for any sign of animal activity, including tracks, pellets/scat, browse, dens, or animal sightings. All suspected activity from terrestrial mammal SAR or SOCI, including mainland moose, was recorded and photos relating to habitat and animal sign were taken. Observations and signs of white-tailed deer were also recorded as the presence and abundance of deer may influence habitat use by, and the potential spread of disease to mainland moose. The activity of non-SAR or non-SOCI mammals was recorded only if the observation was found to be particularly unusual or interesting (e.g., evidence of predator-prey interactions). All observations were recorded and georeferenced in the field using an ESRI Survey123 form. Upon completion of each transect, a general description of the transect including overall tracking conditions, different habitats encountered, and abundance of each species was recorded.

Concurrently, and in addition to wildlife surveys, trail cameras were deployed at various locations across the Study Area from April 2025 to September 2025 (Table 7.56). Locations were selected to include various habitat types, and to capture additional information from locations previously found to have signs of wildlife. Large mammals commonly use old roads, trails, or natural corridors such as riparian zones to travel throughout a landscape, and thus cameras were placed in these areas to capture their movements. Trail cameras were visited regularly to replace storage cards and batteries. All photos were then assessed for signs of wildlife.

Herpetofauna

Targeted surveys for herpetofauna were not conducted; however, incidental observations of herpetofauna SAR and SOCI, or signs thereof (e.g., nests, eggs, shell fragments) were recorded during biophysical assessments, if observed.

Invertebrates

Targeted surveys for invertebrate species were not conducted; however, any incidental observations of invertebrate SAR or SOCI during other field surveys were documented if observed. Obligate habitats for SAR invertebrates were also recorded if observed incidentally

or during flora surveys – specifically, this refers to observations of milkweed (*Asclepias* spp.), which is an obligatory food source and breeding habitat for the monarch butterfly.

7.4.2.5 Field Assessment Results

Mammals

Nine terrestrial mammal species were identified during field assessment either by sighting individuals or signs thereof, including both targeted surveys and incidental observations conducted within the Study Area (Table 7.57). White-tailed deer and snowshoe scat was most frequently observed during pellet group assessments, with observations recorded along seven of the 10 transects (Drawing 7.17A to 7.17I). Potential tracks were incidentally observed for mainland moose within the Assessment Area in October 2025; however, due to poor track conditions, positive identification distinguishing between mainland moose and white-tailed deer could not be confirmed. No additional signs of mainland moose were observed in the vicinity and no SAR or SOCI mammals were positively identified during 2025 field assessments.

Table 7.57: Summary of Mammals or Mammal Signs Observed in the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
American Black Bear	*Ursus americanus*	-	-	-	S5
American Porcupine	*Erethizon dorsatum*	-	-	-	S5
Bobcat	*Lynx rufus*	-	-	-	S5
Eastern Coyote	*Canis latrans*	-	-	-	S5
North American Beaver	*Castor canadensis*	-	-	-	S5
Raccoon	*Procyon lotor*	-	-	-	S5
Red Squirrel	*Tamiasciurus hudsonicus*	-	-	-	S5
Snowshoe Hare	*Lepus americanus*	-	-	-	S5
White-tailed Deer	*Odocoileus virginianus*	-	-	-	S5

A total of four species were recorded by trail cameras (Table 7.58, photo log provided in Appendix K). White-tailed deer were the most frequently detected mammal across the Study Area, as documented by five of six cameras.

Table 7.58: Summary of Trail Camera Results

Trail Camera	Animals Observed	Number of Observations[(1)]
TC-A	Snowshoe Hare	1
	White-tailed Deer	2
TC-B	Eastern Coyote	2
	Snowshoe Hare	1
	White-tailed Deer	6
TC-C	White-tailed Deer	2

Trail Camera	Animals Observed	Number of Observations[1]
TC-D	Bobcat	1
	Eastern Coyote	13
	White-tailed Deer	5
TC-E	-	0
TC-F	White-tailed Deer	3
TC-G	Snowshoe Hare	1
	White-tailed Deer	6

[1]Number of observations adjusted based on likelihood of photos belonging to the same animal; a general rule of one hour between photos was applied to consider photos of the same species to be separate observations.

Herpetofauna

No incidental observations of herpetofauna SAR or SOCI were recorded during field assessments. Additional non-SAR or SOCI herpetofauna species such as frogs (green frog; *Lithobates clamitans*) and snakes (garter snake; *Thamnophis sirtalis*) were observed in various habitats (wetlands and watercourse) within the Study Area.

Invertebrates

No incidental observations of invertebrate SAR or SOCI were recorded during field assessments. No milkweed plants were observed during flora surveys, indicating a possible lack of suitable habitat for monarch butterflies.

Priority Species

The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) was used to identify priority species and habitats associated with the Project for the effects assessment. All terrestrial fauna SAR and SOCI and their respective habitat associations identified within the Study Area through desktop review and field assessment were considered. No SAR or SOCI fauna were identified during 2025 field assessments. Due to the overlap of core habitat within the Study Area, mainland moose is considered a priority species. Four-toed salamander, a herpetofauna SOCI, is also a priority species due to the inclusion of a record of occurrence within the Assessment Area in the ACCDC data report (ACCDC, 2025b).

Mainland Moose

Mainland moose is a SAR listed as Endangered under ESA with an S-Rank of S1 [highest priority (ACCDC, 2025c)]. Threats to mainland moose include habitat loss and fragmentation, particularly resulting from industrial activities; and loss of habitat connectivity due to the increased placement and density of roads (NSNR, 2021g). The Study Area has previously been and continues to be subject to the abovementioned threats because of historical and current land-uses, including forestry activities and recreation. Renewable energy projects were described as a medium level threat in the Mainland Moose Recovery Plan (2021), as the nature of wind projects is such that the construction and/or expansion of roads and loss of forested habitat is typically required.

No definitive evidence of mainland moose was observed during winter tracking surveys, pellet surveys, trail cameras, or incidentally throughout 2025 field assessments. However, portions of the Assessment Area and Study Area intersect with core habitat identified for the species. Based on these factors, it is reasonable to assume that mainland moose may use available habitat within the Assessment Area.

Four-toed Salamander

Four-toed salamander is a herpetofauna SOCI with an S-Rank of S3 [vulnerable (ACCDC, 2025c)]. The species occurs in damp, mossy areas, including peat bogs, swamps, and vernal pools. In Nova Scotia, they have primarily been recorded in the south-central mainland and on Cape Breton (NS Museum of Natural History, n.d.). The main threat to the species throughout its range is habitat conversion and fragmentation. Pollution, including road salt, also poses a threat as pollutants are readily absorbed through their skin (Canadian Herpetological Society, 2025).

One record of four-toed salamander was identified in the ACCDC data report (2025b) as occurring within the Assessment Area. No observations of four-toed salamander were recorded during field surveys; however, the species only emerges above ground at night and nests under dense moss cover, such that opportunities for incidental encounters were likely limited.

7.4.2.6 Effects Assessment

Project-Terrestrial Fauna Interactions

Project activities, primarily those that involve earth-moving or vegetation removal, have the potential to impact terrestrial fauna (Table 7.59).

Table 7.59: Potential Project Interactions with Terrestrial Fauna

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access road upgrading and construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	X
Removal of Temporary works and Site Restoration	X
Commissioning	X
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X

Project Phase	Potential for Interaction
Decommissioning and Rehabilitation	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for the terrestrial fauna includes a 5 km buffer of the Study Area, including only the contiguous mainland (Drawing 7.23; terrestrial fauna and associated habitat on Cape Bretton Island are not included in this assessment). This distance was selected based on the home ranges and short distance migrations of species between habitat types. The RAA for terrestrial fauna is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for terrestrial fauna. The VC-specific definition for magnitude is as follows:

- Negligible: No loss of fauna habitat or impact to fauna through sensory disturbance or injury/mortality.
- Low: Small loss of habitat supporting fauna and low impacts to fauna through sensory disturbance or injury/mortality.
- Moderate: Moderate loss of fauna habitat and/or moderate impacts to fauna through sensory disturbance or injury/mortality, but these impacts will only be experienced by individuals rather than entire populations.
- High: High loss of fauna habitat or high impact to fauna through sensory disturbance or injury/mortality that would impact fauna on a population scale.

Effects

Habitat Loss and Fragmentation

Habitat for terrestrial fauna may be lost or fragmented from activities requiring vegetation clearing and ground disturbance. The estimated Clearing Footprint for the Project consists of 96.1 ha of land that will be cleared during the construction phase. Approximately one third of this area will be allowed to naturally revegetate over the lifespan of the Project.

The loss and/or alteration of habitat for terrestrial fauna can have a variety of species-specific impacts, including the loss of refugia, altered predator-prey interactions, and changes in forage availability. To the extent possible, the Project will avoid sensitive habitats, such as mature forests, wetlands, and watercourses (i.e., areas regularly frequented by terrestrial fauna), and maintain vegetated buffers, to reduce the overall impacts to fauna habitat.

Habitat fragmentation, which refers to the division of suitable habitat into smaller, and more isolated areas, has the potential to cause changes in how fauna move and migrate across the landscape. The potential for habitat fragmentation to occur due to the Project is primarily related to the development of linear features such as roads and collector line corridors.

Species of terrestrial fauna can be expected to respond differently to fragmentation. For example, generalists, such as black bears and coyotes, tend to be more adaptable to altered habitats and favour edge habitats or open corridors than species with specific habitat requirements. Evidence of animal road use in the Study Area was recorded during wildlife surveys and by trail cameras (Table 7.57 and Table 7.58), suggesting that linear features such as roads currently facilitate access within and through the Study Area. It is expected that terrestrial fauna will continue to use Project roads post-construction.

Mainland Moose

The southwestern portion of the Project Study Area coincides with core habitat identified for mainland moose in the Mainland Moose Recovery Plan (NSNR, 2021g) (though not legislatively protected under Section 16 or 18 of ESA). Within core habitat, areas are ranked as having high or low suitability based on a combined HSI and road density scores. Scores of 4 to 9 meet the suitability requirements (with higher scores reflecting higher suitability), and scores of three or below do not. The core habitat area overlapping the Study Area has an HSI/roads criteria value of 4 to 6. As shown in Figure 5 of the Mainland Moose Recovery Plan (NSNR, 2021g), this identified pocket of suitable habitat is 40,000 ha in size (four, 10 km by 10 km hexagons). It extends throughout much of the LAA.

Habitat loss and fragmentation have been identified as keys threats to mainland moose (NSNR, 2021g). Habitat loss and reduced habitat quality may result in behavioural changes, including from reduced opportunities for thermoregulation, loss of overwintering areas, loss of adequate sources of food, reduced space for mating, and reduced protection for calves. The habitat suitability model for mainland moose developed as part of the desktop review (described in Section 7.4.2.3) provides a useful reference for quantifying the impacts of the Project on suitable moose habitat. The model suggests that the Clearing Footprint for the Project primarily consists of areas with “fair” suitability for mainland moose (55.6 ha, 57.9% of the total Clearing Footprint), with 23.3 ha (24.3%) of suitable habitat (“better” or “best” suitability categories) expected to be cleared for the Project (none of which is categorized as “best”). The suitable habitat within the Clearing Footprint represents < 1% of the 3,388.6 ha modelled within the LAA, suggesting that the amount suitable habitat to be cleared for the Project is low.

On a broad scale, habitat fragmentation is a major concern for the longevity of mainland moose, as the species is already highly localized to three areas of the province (NSNR, 2021g). Road placement and road density are the main drivers of reduced habitat connectivity, and road construction is defined as one of the main activities likely to result in destruction of important moose habitat (NSNR, 2021g). It is expected that 11.9 km of new road construction will be required for the Project, with 2.7 km of existing roads being used. Much of the Study Area and Assessment Area have been previously disturbed by forestry activity such that the Project is not expected to fragment large areas of intact forest habitat. While road development may result in some degree of habitat fragmentation within the Study Area and LAA, the compact turbine layout developed for the Project and proximity to existing roads has limited the overall length of roads that are required, minimizing this impact in the process.

Four-toed Salamander

Habitat loss and fragmentation are two of the main threats to four-toed salamander (Canadian Herpetological Society, 2025), a species that primarily resides in damp areas including wetlands. Approximately 6.6 ha of wetland habitat is expected to be directly impacted by the Project, some of which may include suitable habitat for four-toed salamander. Wetlands and wet areas are abundant within the LAA (described in Section 7.3.2.6) such that the magnitude of the effect is expected to be low.

In addition to direct habitat loss, salamander species have been shown to be sensitive to the creation of edge habitat associated with forest roads (Marsh & Beckman, 2004). Forest edges often have increased light levels, higher temperatures, and reduced humidity relative to interior forest conditions (Braithwaite & Mallik, 2012; Hamberg et al., 2009). Edge habitat will be created adjacent to the Clearing Footprint as a result of vegetation removal for Project infrastructure and may result in decreased habitat suitability for four-toed salamanders.Marsh & Beckham (2004) found edge effects to impact salamander abundance and activity at distances < 20 m, up to 80 m into intact forest. The potential impacts of the Project on four-toed salamander due to habitat loss and fragmentation will be reduced by maximizing avoidance of wetlands and maintaining vegetated buffers to the extent possible.

Injury and Mortality

The risk of injury and mortality to terrestrial fauna due to the Project is mainly related to the development and use of roadways. A variety of small and large terrestrial mammals are known to use the roadways within the Study Area (as evidenced by first-hand accounts by field staff and winter tracking/pellet survey results; described in Section 7.4.2.5). Most roads within the Study Area are currently used for forestry activities and for recreation by ATV, snowmobile, and dirt bike users; however, the Project will result in increased road traffic within the Study Area and LAA. The potential effects of increased road traffic on terrestrial fauna will be greatest during the construction phase when the greatest number of Project personnel will be travelling to and from the site. During the operations phase, the Project will only require a small number of technicians to access the site to perform regular maintenance and equipment checks.

Road traffic and the development of gravel roads pose unique risks for herpetofauna, as some species are attracted to exposed gravel areas for nesting. This recognized ecological trap is known to increase the risk of traffic-related mortality for species such as wood turtle (ECCC, 2020). Some herpetofauna, such as salamanders and snakes, may also face elevated road collision risk due to daily movements for foraging or seasonal migrations (Wills, 2021). No herpetofauna SAR or signs thereof, including wood turtles, were observed during field assessments. Mitigation measures will be employed to minimize risk if herpetofauna SAR are observed, especially during sensitive windows (nesting).

Uniquely, swarming and migrating insects are susceptible to mortality from collisions with wind turbines. There are a number of hypotheses as to whether, or why, these insects are attracted to wind turbines (Jansson et al., 2020; Long et al., 2010; Rydell et al., 2010). Questions remain in the literature concerning how this tendency affects mortality rates; whether insect fatalities at

wind turbines contribute to population-level declines; and how fatalities are impact ecological functions (Voigt, 2021). No significant effects to invertebrate SAR are expected from the Project based on current insect population and ecology research and a lack of confirmed invertebrate SAR within the Study Area.

Mainland Moose

In addition to potential risks of injury and mortality common to all terrestrial fauna species, mainland moose may also be impacted by the effects of disease and poaching.

Disease

Problematic native species have been identified as a pervasive threat to mainland moose due to their potential to spread debilitating disease. Specifically, white-tailed deer are hosts for brainworm (*Parelaphostrongylus tenuis*) and winter tick (*Dermacentor albipictus*), both of which cause mortality in moose and are thought to be regulators of population abundance and distribution (NSNR, 2021g). A possible concern associated with developments is their potential to cause indirect effects on mainland moose by increasing access to the site by white-tailed deer and therefore, increasing the chances of disease spreading to mainland moose.

There are no records of deer over-wintering within the immediate vicinity of the Study Area in NSNR Significant Habitat Database (NSNR, 2024e); however, signs of white-tailed deer were observed throughout the Study Area during field assessments and directly observed by trail cameras. Despite this, it is unlikely that the new and upgraded roads will increase access for white-tailed deer as they already have existing access to the Study Area. As such, effects to mainland moose from disease due to the Project are expected to be negligible.

Poaching

Poaching, which is a threat to all terrestrial mammal species, but especially those with unstable populations, has been identified as a potential threat facing mainland moose in the species' Recovery Plan (NSNR, 2021g). Increased human access to a given area (e.g., through land clearing and road development) has the potential to increase the risk of poaching for rare, sought-after animals. The Study Area is already highly accessible to the public, including local hunters and recreational users. Due to the pre-existing access to the Study Area, effects to mainland moose from poaching due to the Project are expected to be negligible. Furthermore, the increased presence of staff within the Project may act as a deterrent to poaching.

Four-toed Salamander

As with all small species of terrestrial fauna, four-toed salamander has the potential to be impacted by wildlife-vehicle collisions due to being poorly visible to road users. However, as salamanders are primarily active at night when vehicle traffic associated with the Project will be low, wildlife-vehicle collisions are expected to pose a negligible risk to four-toed salamanders. Four-toed salamander may be indirectly impacted by road use through the application of road salt during winter driving conditions, as road salt is readily absorbed through their skink (Canadian Herpetological Society, 2025). The use of road salt for the Project will be limited to periods where it is required to ensure safe access is maintained.

Sensory Disturbance

The Project may induce sensory disturbance in terrestrial fauna during all Project phases through the production of noise, the use of anthropogenic lighting, and the elevated presence of human activity in the LAA. Many species have sensitive windows for breeding and birthing, and small disruptions during these periods may reduce reproductive success in a population. Lovich and Ennen (2013) stress the importance of turbine siting relative to the needs of wildlife to minimize effects. The iterative Project design process has prioritized avoidance and minimizing interactions with important wildlife habitat such as wetlands and mature forest, which will reduce sensory disturbance in these areas.

Elevated sound levels have the potential to alter patterns of activity, stress levels, immune response, reproductive success, risk of predation, communication with conspecifics and antipredator predator behaviours, and hearing damage in fauna species (Lovich & Ennen, 2013; Rabin et al., 2006). The auditory capabilities of fauna species vary (Shannon, McKenna, et al., 2016), with sound levels above 55 dBA during the day and 45 dBA at night-time shown to cause physiological stress and behavioural changes in wildlife (Environment Canada, 2009). Similarly, a literature review conducted by Shannon et al. (2016) found that an increase in stress and decrease in reproductive success in terrestrial mammals has the potential to occur at sound levels ranging from 52 to 68 dBA.

The sound levels produced by the Project will be highest during construction. The median sound level during the construction phase is estimated to be 96 dBA, comparable to a pick-up truck, an already common source of noise along roads within and near the Study Area. Although blasting is not expected to be required, associated sound levels would exceed other construction-related sources if it is determined at a later stage that blasting is necessary for the Project. During the operations phase, predicted noise levels above 45 dBA are expected to be localized around turbines, generally between 250 m and 400 m from turbines depending on their arrangement (Drawing 7.4), such that sensory disturbance to terrestrial fauna due to noise will be low within the LAA.

Artificial lighting has the potential to impact wildlife by causing disorientation or altering attraction/avoidance of an area (Longcore & Rich, 2004). During the construction phase, lighting will be restricted to the amount required to ensure the safety of Project personnel, and construction activities will be limited to daytime hours (07:00 to 21:00) when feasible. Lighting during the operations phase will be minimal and turbine lighting at night will be restricted to navigation hazard lights mounted on the turbine nacelles.

Mainland Moose

As with other species of terrestrial fauna, mainland moose may experience sensory disturbance related to noise, lighting, and human activity generated by the Project. The general effects described above would pose a particular concern for mainland moose where they coincide spatially and temporally with sensitive life history events due to the low population size of the species.

Mainland moose breeding season takes place between September and October, with calving generally occurring in late May to early June, where one to two calves are born. Cows may require specific habitat types for calving, such as secluded islands, peninsulas, and shorelines. Seclusion is an important factor for protecting calves from predators. The cow and calf or calves remain together for one year until the calf or calves become mature enough for independence (NSNR, 2021g).

With limited desktop and field data supporting mainland moose activity within the Study Area (described in Section 7.4.2.5), neither presence, age, nor sex diversity can be confirmed. An analysis of mainland moose habitat quality within the LAA has shown that large areas of suitable habitat exist outside the Assessment Area that will not be directly impacted by the Project. Mitigation measures will be implemented to minimize impacts; however, the amount of "best" quality habitat remaining within the LAA (506.0 ha) and the extent of pre-existing linear features and historical forestry across the landscape indicate that the magnitude of Project-related impacts to mainland moose life history will be low.

Four-toed Salamander

The degree to which four-toed salamander may experience sensory disturbance due to the Project is difficult to assess due to a lack of published information. Other salamander species have, however, shown physiological responses to artificial lighting (G. Perry et al., 2008), and salamanders may also be impacted by anthropogenic noise (e.g., through disruptions in the production and detection of vocal signals) (Simmons & Narins, 2018). The effects of sensory disturbance to four-toed salamanders are expected to be low due to reduced levels of Project activity during the night when the species is active (applicable to all Project phases).

Mitigation

To address the abovementioned effects to terrestrial fauna, the Proponent will develop and implement a Terrestrial Habitat and Wildlife Management Plan. Additionally, the following mitigation measures will be implemented:

Habitat Loss and Fragmentation

- Minimize overall area to be cleared by using previously altered areas (i.e., clearcuts) and optimizing the Project layout.
- Minimize habitat fragmentation and isolation by using pre-existing roads and previously altered areas where possible during the design phase.
- Support landscape connectivity by maintaining vegetated buffers around wetlands and watercourses, where possible.
- Road construction and upgrades will be designed to maintain surface water flow and avoid any permanent diversion, restriction, or blockage of natural flow, which may impact connectivity for species of herpetofauna.
- Allow for natural revegetation in Clearing Footprint as possible to limit the effects of habitat loss and fragmentation.
  Continue to review habitat modelling results, field survey results, and guidance from NSNR through the detail design phase. This continual review will be used to further reduce Project impacts on terrestrial fauna.

Injury and Mortality

- Design the Project Footprint to minimize total road length and use pre-existing roads where possible.
- Install traffic signs to alert road users of speed limits and the presence of wildlife in the area.
    - Inform all Project-related staff working on the site of dangers to wildlife and create awareness around wildlife hotspots.
- Minimize Project-related traffic to reduce chances of wildlife collisions and traffic-related stress to wildlife.
- Prohibit harassment and feeding of wildlife by Project personnel.

Sensory Disturbance

- Maintain all equipment and machinery on site so that a level of good working condition is kept, reducing noise and vibration emissions.
- Use noise controls (e.g., mufflers) on machinery, equipment, etc. during the construction and operation phase.
- Limit use of lights to the amount necessary to ensure safe operation.
- Install motion activated lights on-site infrastructure to reduce insect attraction.

Monitoring

Project-specific monitoring activities for terrestrial fauna are not being proposed.

Conclusion

After mitigations, residual effects to terrestrial fauna have been assessed, including habitat loss and fragmentation, injury and mortality, and sensory disturbance. Based on the assessment, residual effects to terrestrial fauna are characterized as shown in Table 7.60.

Table 7.60: Terrestrial Fauna Residual Effects

Effect Detail	Habitat Loss and Fragmentation	Injury and Mortality	Sensory Disturbance
Magnitude of Effect	**Low:** Small loss of habitat supporting fauna	**Low:** Low impacts to fauna through injury and mortality	**Low:** Low impacts to fauna through sensory disturbance
Geographic Extent of Effect	5 km buffer of the Study Area	5 km buffer of the Study Area	5 km buffer of the Study Area
Frequency of Effect	**Single Event:** Effects expected to occur during construction phase	**Intermittent:** Effects are expected during all phases	**Intermittent:** Effects are expected during all phases
Duration of Effect	**Medium Term:** Effects will end following decommissioning	**Medium Term:** Effects will end once decommissioning is complete	**Medium Term:** Effects will end once decommissioning is complete
Reversibility of Effect	**Partially Reversible**	**Partially Reversible**	**Reversible**

Effect Detail	Habitat Loss and Fragmentation	Injury and Mortality	Sensory Disturbance
Significance Level	Not Significant	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible			

7.4.3 Bats

7.4.3.1 Overview

A desktop review and field studies were undertaken to gather information on bat species and associated habitat in the Study Area. Objectives were as follows:

- Assess observations, species diversity, and habitat utilization of bats within the Study Area during the active bat period (spring to fall).
- Use the information collected to inform and refine the Project design (i.e., avoid/minimize impacts to SAR and SOCI and their habitats).
- Use the information collected to inform mitigation and management practices.

7.4.3.2 Regulatory Context

There are seven species of bats documented in Nova Scotia, of which four are resident species that reside in the province year-round and three are migratory species that overwinter in the southern United States. Resident species include the little brown myotis (*Myotis lucifugus*), northern myotis (*Myotis septentrionalis*), tri-colored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*). Migratory species include the eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*).

The three resident species (the little brown myotis, northern myotis, and tri-colored bat) are protected federally and provincially under SARA and ESA. These three species were listed as Endangered under ESA on July 11, 2013, and were designated Endangered under Schedule 1 of SARA on November 26, 2014. The designation of these species under SARA and ESA was driven by the emergence of white-nose syndrome (a disease caused by the fungus *Geomyces destructans*), which was first detected in Canada in 2010 and led to a 90% population decline in Nova Scotia by 2013 (COSEWIC, 2013). All three migratory bat species were assessed by COSEWIC as Endangered in May 2023 (COSEWIC, 2023), but are not currently listed under SARA or ESA. The big brown bat is also not listed under SARA or ESA.

7.4.3.3 Desktop Review

A desktop review of publicly available resources was conducted to identify previously recorded and potential hibernacula, bat habitat, and bat sightings within or near the Study Area. Databases and online resources referenced as part of this desktop review include:

- Terrestrial Habitat Mapping
- Locations of Known Bat Hibernacula in Nova Scotia (Moseley, 2007)
- Nova Scotia Geoscience Atlas – Abandoned Mine Openings [AMOs, (NSNR, 2024a)]
- NSNR Significant Species and Habitats Database (NSNR, 2024e)
- ACCDC Data Report (ACCDC, 2025b)

Terrestrial Habitat Modelling

Terrestrial habitat modelling was conducted within the LAA for bats (a 5 km buffer around the Study Area) to provide an estimate of potential maternity roosting and foraging habitat within and near the Study Area (Drawing 7.26). This modelling used the following publicly available data sources:

- A LiDAR derived canopy height model (Fisher et al., 2006; Rijal et al., 2012)
- Crown land harvest archives (NSNR, 2025a)
- Provincial landcover mapping (NSNR, 2025b)
- Provincial old growth potential mapping (NSNR, 2025c)

Suitable maternity roosting habitat consists of mixedwood or hardwood stands with a height of at least 15 m [indicating a DBH of ≥ 30 cm (Rijal et al., 2012)] which have a potential old growth rank of 8 or higher. Suitable foraging habitat consists of a 30 m buffer of edge features, including the edges of wetlands, lakes, roads, barrens, brush (e.g., shrubland), and forest harvests (COSEWIC, 2013; Jantzen & Fenton, 2013).

A limitation of this model is that substantial harvesting has taken place within and near the Study Area in recent years which is not reflected in datasets incorporated into this model. For this reason, the habitat model developed is considered to overestimate suitable maternity roosting habitat, as some habitat included in the model is likely to have been harvested and thus is no longer suitable to support maternity roosting. Conversely, for the same reason, the model may underestimate availability of foraging habitat for bat species which prefer to forage along harvest edges, as newly created forest edges resulting from recent forestry may not be captured. As some modelled maternity roosting habitat may no longer have the capacity to support maternity roosting due to harvesting, all maternity roosting habitat henceforth referred to as “suitable” should be considered “potentially suitable”.

Based on the results of the terrestrial habitat modelling, suitable habitat availability within the LAA and Project Footprint was evaluated (Table 7.60).

Table 7.60: Availability of Suitable Habitat within the LAA and Project Footprint

Habitat Type	Area Within the LAA [ha (%)]	Area Within the Clearing Footprint [ha (%)]
Suitable Maternity Roosting Habitat	1,789.5 (9.3%)	4.0 (4.2%)
Suitable Foraging Habitat	5,376.1 (28.1%)	34.7 (36.2)
Total Area	**19,154.7 (100%)**	**95.9 (100%)**

A review of land cover classification and aerial imagery indicates that at least 18% of the Clearing Footprint and 16% of a 100 m buffer on the Clearing Footprint (the Terrestrial Vegetation Communities and Flora LAA) has been recently harvested or is classified as developed (Section 7.4.1.6). In contrast, less of the Bat LAA (which corresponds with the Terrestrial Vegetation Communities and Flora RAA) is noted as being cutover, at least 5% (Table 7.44). Correspondingly, there is a greater proportion of suitable maternity roosting habitat within the Bat LAA than within the Clearing Footprint (Table 7.60).

Locations of Known Bat Hibernacula

Moseley (2007) provides an overview of known and recorded bat hibernacula located within Nova Scotia. This research indicates two known hibernacula within a 100 km radius of the Study Area (Table 7.61).

Table 7.61: Known Bat Hibernacula within 100 km of the Study Area

Hibernaculum	Distance from Study Area[1]	Direction
Hirschfield Galena Prospect	59.6 km	Southwest
McLellan's Brook Cave	85.8 km	West

Source: (Moseley, 2007)
[1]Measured to the nearest edge of the Study Area.

No known hibernacula are located within 25 km of the Study Area per the recommended buffer provided in the NSECC Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021). The nearest recorded hibernaculum to the Study Area is Hirschfield Galena Prospect, located 59.6 km to the southwest near Glenelg, Nova Scotia. This hibernaculum is an abandoned mine adit with a surveyed length of 215 m suspected to support approximately 200 to 300 bats. The next nearest hibernaculum is McLellan's Brook Cave, located 85.8 km to the west near McLellan's Brook, Nova Scotia. This is an 85 m long dissolutional stream cave with associated observations of *Myotis* species around the cave but no records of underground bat activity. It should be noted that these hibernacula were assessed prior to the onset of white-nose syndrome in Nova Scotia; therefore, populations of bats using these habitats may vary from original estimates.

Abandoned Mine Openings

According to the British Columbia Ministry of Environment and Climate Change Strategy, Ecosystems Branch (2019), AMOs may serve as overwintering bat habitat if they have a depth greater than 30 m. Mine openings must also be of a suitable type (i.e., shafts, slopes, or adits) and remain accessible to bats (i.e., not flooded or ponded and not having an intact fill, cap, or plug) to provide suitable habitat. Based on a review of the AMO Database (NSNR, 2024a), there are no recorded AMOs located within the Study Area.

A total of 51 AMOs are documented within 25 km of the Study Area (NSNR, 2024a). Of these, six are potentially open/dry mine shafts, slopes, or adits with an original depth that could potentially support overwintering habitat for resident bat species (Drawing 7.27, Table 7.62). The remainder were not considered potential bat overwintering habitat as they were

characterized as unsuitable opening types, shallow in depth, infilled, capped, plugged, ponded, or flooded.

Table 7.62: AMOs with Potential to Support Overwintering

Name	Location	Commodity	Opening Type	Original Depth (m)	Approximate Distance to Study Area[(1)]
Breton Coal Company Main Shaft	Port Malcolm (Caribou Cove)	Coal	Shaft	90	11.5
Unnamed	Port Malcolm (Caribou Cove)	Coal	Adit	40	11.6
J.A. Campbell Seacoal Bay Level	Port Malcolm (Caribou Cove)	Coal	Adit	106	11.9
Tidewater Fuel & Navigation Company Basin Slope	Whiteside (Coal Brook)	Coal	Slope	160	21.2
Tidewater Fuel & Navigation Company No. 2 Slope	Whiteside (Coal Brook)	Coal	Slope	35	21.6
Finlayson Maple Brook Level	Maple Brook (River Denys)	Coal	Adit	30	21.8

Source: (NSNR, 2024a)
[(1)]Measured to the nearest point of the Study Area

Significant Species and Habitat Records

The NSNR Significant Species and Habitats Database (NSNR, 2024e) contains 117 unique species/habitat records pertaining to bats and associated habitat within a 100 km buffer of the Study Area. These consist of:

- 13 “Species of Concern” records relating to caves.
- Six “Other Habitat” records relating to unclassified bats (four) and caves (two).
- 98 “Species at Risk” records relating to tri-colored bat (one), silver-haired bat (two), eastern red bat (two), hoary bat (six), northern myotis (seven), little brown myotis (12), *Myotis* species (22), and unclassified bat species (46).

One species at risk record relating to an unclassified bat is located within the Study Area. According to a representative of NSNR, there is no core or critical habitat for bats within the Study Area (S. Spencer, personal communication, October 9, 2025).

ACCDC Records

The ACCDC Data Report (ACCDC, 2025b) completed for this Project indicates six bat species and one genus of concern recorded within 100 km of the Study Area (Table 7.63, Appendix F). According to the ACCDC Report, a “bat hibernaculum or bat species occurrence” is known to exist within the ACCDC Study Area (ACCDC, 2025b). A representative of NSNR confirmed that this record is a species occurrence, and there is no core habitat or critical habitat for bats within or near the Study Area (S. Spencer, personal communication, October 9, 2025).

Table 7.63: Bat Species Recorded within a 100 km Radius of the Study Area

Common Name	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	Endangered	S1
Northern myotis	*Myotis septentrionalis*	Endangered	Endangered	Endangered	S1
Tri-colored bat	*Perimyotis subflavus*	Endangered	Endangered	Endangered	S1
Silver-haired bat	*Lasionycteris noctivagans*	Endangered	-	-	SUB,S1M
Eastern red bat	*Lasiurus borealis*	Endangered	-	-	SUB,S1M
Hoary bat	*Lasiurus cinereus*	Endangered	-	-	SUB,S1M
Bat species	*Vespertilionidae sp.*	-	-	-	S1S2
Bat species not big brown bat	*Vespertilionidae sp. not Eptesicus*	-	-	-	S1S2

Source: (ACCDC, 2025b)

7.4.3.4 Field Assessment Methods

Passive acoustic monitoring was completed between August 21 and November 1, 2024 (encompassing the late summer and fall active bat seasons) and March 27 and September 15, 2025 (encompassing the spring and summer active bat seasons).

Monitoring locations targeted a combination of turbine locations and ideal bat habitat features such as wetlands, lakes, open areas, and forested roadsides. Ideal habitat features within the Study Area were identified using a combination of aerial imagery and accumulated knowledge from field studies. Monitoring locations were also selected to prioritize site coverage, access considerations, and low-clutter environments (e.g., forest with an open understory, cleared areas, open water) that would allow for higher accuracy in species identification (Drawing 7.28).

Acoustic monitoring was conducted using Song Meter Mini Bat detectors from Wildlife Acoustics. The detectors were programed to monitor from 30 minutes before sunset to 30 minutes after sunrise to correspond with peak bat activity. Global positioning system (GPS) points and supplementary information (i.e., habitat descriptions and photographs) were collected for each detector upon deployment.

Monitoring was conducted with the use of 10 detectors deployed within the Study Area (Table 7.64; Drawing 7.28). Detector BAT7 was moved between the 2024 and 2025 monitoring periods to provide better Study Area coverage as the Project underwent layout changes (recorded as BAT7a in 2024 and BAT7b in 2025).

Table 7.64: Monitoring Periods for Detectors (2024 and 2025)

Detector ID	Detector Location (UTM)	Habitat Description	Monitoring Duration	Number of Monitoring Nights	Number of Recordings[(1)]
BAT1	618130, 5051914	Lake edge within uneven-age mixedwood forest	August 23 – November 1, 2024 April 30 – September 15, 2025	167	610
BAT2	617669, 5053420	Edge of regenerating mixedwood forest adjacent to clearing	August 22 – September 26, 2024 March 27 – September 15, 2025	155	908
BAT3	619263, 5052714	Edge of regenerating mixedwood forest adjacent to wetland along dirt road	August 22 – November 1, 2024 April 3 – September 15, 2025	190	1,866
BAT4	619264, 5054130	Edge of regenerating softwood forest along dirt road	August 21 – September 25, 2024 March 27 – May 1, 2025	43	289
BAT5	622003, 5053163	Edge of young hardwood forest adjacent to large cleared area and an operating turbine	August 22 – November 1, 2024 March 27 – May 2, 2024	81	8,768
BAT6	616525, 5052544	Edge of uneven-age hardwood forest adjacent to clearing	August 23 – October 14, 2024 March 27 – September 15, 2025	185	5,949
BAT7a	618792, 5051490	Lake edge	August 22 – November 1, 2024	71	173
BAT7b	617725, 5051317	Edge of regenerating hardwood forest adjacent to clearing	April 3 – July 29, 2025	107	185
BAT8	620158, 5054448	Wetland edge within uneven-age mixedwood forest	August 21 – September 25, 2024 March 27 – June 15, 2025	42	460
BAT9	619587, 5053405	Edge of uneven-age mixedwood forest with abundant harvested patches	August 22 – September 27, 2024 March 27 – June 11, 2025	104	5,232
BAT10	621221, 5054437	Lake edge within uneven-age mixedwood forest	August 22 – November 1, 2024 March 27 – July 27, 2025	158	2,869
Survey Total				**1,303**	**27,309**

[(1)]This column refers to the total number of recordings (including noise), not the number of recorded bat passes.
Note: not all detectors were deployed and/or retrieved on the same days, and all detectors depleted their batteries at unanticipated rates at different times during the monitoring period. This resulted in data loss during the month of August 2025 (with no data collected between July 31 and September 8, 2025). Data were also lost from BAT4, BAT8, and BAT9 at other times in 2025 due to battery depletion. Additionally, BAT5 was accidentally destroyed during vegetation clearing which took place in the area sometime in August. These factors are reflected in the varied number of monitoring nights at different detectors.

The Nova Scotia Guidance for Bird and Bat Surveys Pre- and Post-Construction Surveys and Monitoring – Wind Energy (NSNR, 2022b) recommends a minimum of two to three detectors for sites of 10 or fewer turbines, with an additional detector for every additional five turbines. This Project proposes up to 21 turbines and employed the use of 10 detectors. Additional detectors, exceeding the recommendations outlined in Nova Scotia guidance, were integrated into the monitoring program as a proactive measure to mitigate potential data gaps arising from common external factors, including technical malfunctions, loss of detectors, and accelerated battery depletion.

Acoustic monitoring data were processed using Kaleidoscope Pro software from Wildlife Acoustics, complementary to the detectors used. Spectrograms produced by the software based on audio file inputs were analyzed for bat generated ultrasonic vocalizations and speciated when possible, first by the automatic identification feature of Kaleidoscope Pro and then manually by a trained biologist.

Due to their similarity, the calls of Nova Scotia's two resident *Myotis* species (little brown myotis and northern myotis) can be difficult to reliably distinguish from one another (O'Farrell & Gannon, 1999), so these calls were not identified to the species level. In addition, bat generated calls were identified as unknown if the recording was within the correct frequency range for bats but was unable to be speciated based on the quality or length of the recording. Unknown calls between 20 kilohertz (kHz) and 35 kHz were labelled as unknown low frequency bats (UNLO) and unknown calls between 35 kHz and 120 kHz were labelled as unknown high frequency bats (UNHI).

Incidental Observations

In addition to passive acoustic monitoring, incidental observations of bats and bat habitat (e.g., roost trees) were also recorded via Survey123 (Esri, 2024) throughout the administration of other field surveys within the Study Area.

7.4.3.5 Field Assessment Results

Over the course of the 2024 and 2025 monitoring periods, 27,309 files were recorded by acoustic detectors, of which 755 were determined to be bat-generated ultrasound (Table 7.65). The remaining files were determined to be caused by extraneous noise from sources such as insects, birds, vegetation, wind, or precipitation. Recorded bat passes may belong to the same or a different individual bat; for example, a bat foraging near a detector may be recorded several times throughout the night and/or over multiple nights. Therefore, the number of detections should not be interpreted as the number of individuals living or foraging in each area. The following species and species groups were recorded during the acoustic survey:

- *Myotis* species
- Eastern red bat
- Hoary bat
- Silver-haired bat
- UNLO
- UNHI

Table 7.65: Results of the Passive Acoustic Bat Survey (2024 and 2025)

Detector ID	*Myotis* spp.	Eastern Red Bat	Hoary Bat	Silver-haired Bat	UNLO	UNHI	Bat Passes per Detector
BAT1	73	3	11	3	2	62	154
BAT2	10	0	2	1	1	7	21
BAT3	18	0	47	3	7	11	86
BAT4	7	0	7	0	1	6	21
BAT5	12	0	30	0	4	5	51
BAT6	32	2	29	2	4	4	73
BAT7a	15	1	0	2	0	0	18
BAT7b	20	7	39	0	1	6	73
BAT8	3	0	2	0	0	7	12
BAT9	2	2	0	0	0	1	5
BAT10	135	2	26	20	21	37	241
Passes per Species	**327**	**17**	**193**	**31**	**41**	**146**	**Survey Total 755**

Approximately 43% of total bat passes were attributed to resident species (all *Myotis* species). About 32% of recorded bat passes were determined to be migratory species, with about 80% of these recordings being hoary bats. The remaining 25% of bat passes were unable to be attributed to a species or species group, although 78% of which were high-frequency species. *Myotis* species were the most detected species at BAT1, BAT2, BAT6, BAT7a, and BAT10. All of these detectors were deployed at lake edges or edges of cleared areas. All detectors deployed at lake edges (BAT1, BAT 7a, and BAT10) detected more *Myotis* species than any other species or species group. These detectors likely recorded feeding activity of the little brown myotis, as this species prefers to forage in open areas, especially over water (ECCC, 2015).

Hoary bats were the most detected species at BAT3, BAT5, and BAT7b. These detectors were each deployed along a road or larger cleared area surrounded by young forest, with BAT3 also being in close proximity to a wetland. Hoary bats may have been detected at higher rates at these detectors because they are known to prefer foraging in open areas, and have been found to be either unaffected by or attracted to foraging in harvested areas (COSEWIC, 2023).

Myotis species and hoary bats both represented the highest number of bat passes at BAT4 (seven passes recorded for each species), and *Myotis* species and eastern red bats shared the highest number of bat passes at BAT9 (two passes recorded for each species). As eastern red bats do not display strong foraging preferences and each of these detectors recorded low activity levels, it is difficult to draw conclusions concerning why these species were detected in these locations within the Study Area.

Throughout the entirety of passive acoustic monitoring (a cumulative 1,303 detector nights), 755 bat passes were detected, resulting in an average of 0.58 bat passes per detector night

across the Study Area (Table 7.66). BAT10 had the highest number of bat passes per detector night overall and for resident species. BAT7b had the highest number of migratory bat passes per detector night.

Table 7.66: Bat Passes Per Detector Night

Detector ID	Number of Bat Passes	Number of Detector Nights	Bat Passes Per Detector Night		
			Resident	Migratory	Total[(1)]
BAT1	154	167	0.44	0.10	0.92
BAT2	21	155	0.06	0.02	0.14
BAT3	86	190	0.09	0.26	0.45
BAT4	21	43	0.16	0.16	0.49
BAT5	51	81	0.15	0.37	0.63
BAT6	73	185	0.17	0.18	0.39
BAT7a	18	71	0.21	0.04	0.25
BAT7b	73	107	0.19	0.43	0.68
BAT8	12	42	0.07	0.05	0.29
BAT9	5	104	0.02	0.02	0.05
BAT10	241	158	0.85	0.30	1.53
Total	**755**	**1,303**	**0.25**	**0.18**	**0.58**

[(1)]The number of total bat passes per detector night may not equal the sum of resident and migratory bat passes per detector night as the total also includes unknown species.

All detectors recorded some bat activity, with varying levels of activity and different species compositions being recorded at each location. BAT9 recorded the fewest bat passes per detector night. This detector was in a partially harvested section of uneven aged mixedwood forest toward the center of the Study Area. This detector was deployed 53 m from the nearest edge of the Assessment Area (a proposed road) and 232 m from the edge of the nearest proposed turbine area.

Detector BAT10 recorded the most bat passes, with 1.53 bat passes per detector night and 241 total bat passes. Detector BAT1 was the only other detector to record more than 100 bat passes (154 bat passes with an average of 0.92 bat passes per detector night). Both BAT1 and BAT10 recorded mostly *Myotis* species and unknown high-frequency species, and both detectors were deployed in uneven-age mixedwood forest at lake edges. Detector BAT1 was deployed 218 m from the nearest proposed turbine area and detector BAT10 was deployed approximately 1 km from the nearest proposed turbine. BAT10 (which recorded the highest total bat passes and highest average passes per detector night) is the farthest detector from the Assessment Area and from a proposed turbine location.

Detectors BAT3, BAT5, BAT7b, and BAT10 all recorded higher numbers of migratory bat passes per detector night than the Study Area average of 0.18. Three of these detectors were located along the southern portion of the Study Area, and three were deployed adjacent to

young forests regenerating after harvesting. One of these detectors (BAT5) was in proximity to an existing, active wind turbine.

More bat passes per night were detected in 2024 than in 2025. Throughout the 2024 monitoring, 272 bat passes were detected over 72 monitoring nights, with an average of 3.8 bat passes per night (Table 7.67). In 2025, 483 bat passes were detected over 172 monitoring nights, with an average of 2.8 bat passes per night (Table 7.67). Monitoring was conducted in the same locations (except for BAT7) using the same equipment over the 2024 and 2025 monitoring periods; the difference in the level of recorded activity between the two monitoring periods may be attributed to inter-year or seasonal variability in local population, habitat use patterns, or behaviours.

Table 7.67: Comparison of 2024 and 2025 Monitoring Results

Monitoring Year	Number of Resident Bat Passes	Number of Migratory Bat Passes	Total Number of Bat Passes[(1)]	Number of Monitoring Nights	Number of Bat Passes Per Night
2024	95	124	272	72	3.8
2025	232	117	483	172	2.8

[(1)]The number of total bat passes may not equal the sum of resident and migratory bat passes as the total also includes unknown species.

Bat activity was analyzed monthly for the 2024 and 2025 monitoring periods (Figure 7.2). Activity began in March for migratory species (one bat pass) and in May for resident species. Activity ended in October for resident species while extending into November for migratory species. Overall recorded bat activity peaked in June 2025, with relatively high activity also occurring in August and September 2024. Resident species activity matched overall trends, but peaks in the recorded activity of migratory species occurred in September and May.

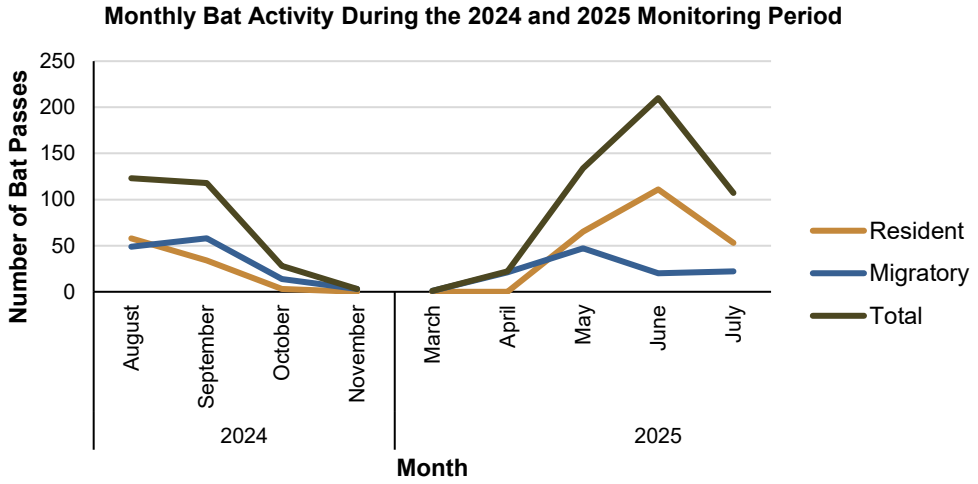

Figure 7.2: Bat Activity per Month During 2024 and 2025 Monitoring
Note: Data from August and September of 2025 were excluded from this analysis as not enough data were collected during this time to draw any reliable conclusions. Also, unknown bats were not included independently in this figure but are included in the total number of bat passes.

Bat passes were also analyzed by hour throughout the night for both monitoring periods (Figure 7.3). Hourly bat activity was observed to begin after 18:00 and increase steadily to a peak around 22:00 before decreasing between 22:00 and 23:00. Activity then remained relatively consistent from 23:00 until 3:00 before decreasing until dawn, with the last activity occurring before 7:00.

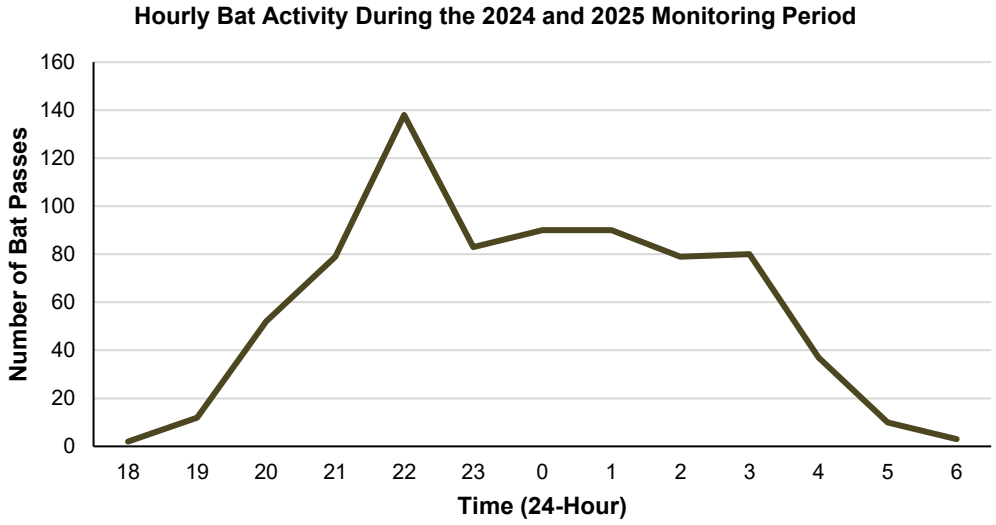

Figure 7.3: Bat Activity per Hour During 2024 and 2025 Monitoring

Factors that may influence the distribution of nightly bat activity include species presence and abundance, environmental conditions, foraging location, time of year, competition and resource partitioning, and/or diet (Fern et al., 2018; K. M. Gorman et al., 2021). The results of passive acoustic monitoring show peak activity around two to three hours after sunset (assuming an average sunset time of approximately 19:30 throughout the monitoring period) and a return to roosts approximately 8-10 hours after sunset. The observed peak in activity occurring at this time is consistent with existing literature, though the recorded return to roosts occurs later in the morning than indicated by previous research (Agosta et al., 2005).

Incidental Observations

Two bat roosts were observed incidentally during other biophysical surveys within the Study Area. Both roosts are large diameter hardwood trees, identified as roosts by the presence of guano at the base of hollows within the trunks. The roosts are in the vicinity of Morrisons Lake and the closest acoustic monitor is BAT10, which recorded more bat passes than any other detector during the monitoring period (Drawing 7.28). Additionally, these roosts are located over 1 km from the nearest edge of the Assessment Area and 1.2 km from the edge of the nearest proposed turbine. As no individuals were observed, it could not be confirmed whether these are active roost trees or by which species the roosts had been used.

Priority Species

The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) was used to identify any priority species and habitat associated with this Project. All bat SAR and SOCI, and their respective habitat associations identified within the LAA through desktop review and field assessments were considered. Only those bat SAR and SOCI with potential to interact with the Project have been designated as Project-specific priority species. Interactions may include removal or disturbance of a SAR or SOCI and/or their associated habitat. These priority species include:

- Little brown myotis
- Northern myotis
- Tri-colored bat
- Hoary bat
- Eastern red bat
- Silver-haired bat

Little brown myotis

The little brown myotis is the most common species in Nova Scotia and is likely ubiquitous in the province (Broders et al., 2003). During the day, the little brown myotis will roost under rocks or in buildings, trees, wood piles, and caves, often congregating in tight spaces (Fenton & Barclay, 1980). As a non-migratory species, the little brown myotis hibernates from September to early or mid-May in abandoned mines or caves (Fenton & Barclay, 1980; Moseley, 2007). *Myotis* species were detected in the Study Area during passive acoustic monitoring. ACCDC (2025b) indicates that the nearest record of little brown myotis is 8.5 ± 0.1 km from the Project-specific ACCDC Study Area centroid.

Northern myotis

The northern myotis, once considered uncommon throughout Nova Scotia (Moseley, 2007), is likely ubiquitous in forested regions of the province (Broders et al., 2003). This species is widely distributed in the eastern United States and Canada and is commonly encountered during swarming and hibernation (Caceres & Barclay, 2000). During the day, northern myotis shows a preference for roosting in trees; however, the habitat preferences of females may vary according to their reproductive status (Garroway & Broders, 2008). Females appear to prefer shade-tolerant broadleaf deciduous trees over coniferous trees, whereas males tend to roost alone in coniferous or mixedwood stands in mid-decay stages (Broders & Forbes, 2004). The northern myotis is also non-migratory and typically associated with the little brown myotis during hibernation, being found in caves or abandoned mines alongside this species (Moseley, 2007). Hibernation of the northern myotis is thought to begin as early as September and can last until May (Caceres & Barclay, 2000). *Myotis* species were detected in the Study Area during passive acoustic monitoring. ACCDC (2025b) indicates that the nearest record of northern myotis is 8.9 ± 1.8 km from the ACCDC Study Area centroid.

Tri-colored bat

Approximately 10% of the tri-colored bat's range is in Canada and the species is considered rare in Nova Scotia (COSEWIC, 2013). Documented observations of the tri-colored bat predominantly occur in the southwestern region of the province, especially during summer (Broders et al., 2003). The tri-colored bat can be found in a variety of habitats but typically forages in covered riparian areas and around open bodies of water. Hibernation begins in September and extends to early or mid-May, occurring in abandoned mines or caves with high humidity and above freezing temperatures (COSEWIC, 2013). ACCDC (2025b) indicates that the nearest record of tri-colored bat is 51.0 ± 0.01 km from the ACCDC Study Area centroid.

Hoary bat

Hoary bats have the widest range among all native terrestrial mammals within the Western Hemisphere and are found across Canada and the United States (COSEWIC, 2023). As a result, hoary bats travel long distances (i.e., across the continent) during migratory periods, residing in coastal regions of Mexico and the United States during winter and migrating north in the spring. Hoary bats can be found roosting in the foliage of trees or shrubs in hardwood or softwood forests of any age, but they prefer mature stands with abundant canopy cover and open flight space below. During lactation, females prefer to roost within the sheltered side of coniferous trees in mature forests (Klug et al., 2012). Foraging habitat for hoary bats is associated with open areas containing patches of trees such as fields, grasslands, or wetlands, though they tend to avoid heavily disturbed habitats such as transportation corridors, urban developments, and mines. Migration is thought to occur across coastal and/or large open areas (COSEWIC, 2023). The hoary bat was detected in the Study Area during passive acoustic monitoring.

Eastern red bat

Eastern red bats are typically found east of the Rocky Mountains in Canada and the United States and in northeastern Mexico (COSEWIC, 2023). This species can travel thousands of kilometres during spring and fall migrations. Eastern red bats roost in similar habitat to hoary bats (described above), often alone or with pups. Maternity roosts for this species are typically found in large diameter trees that reach or exceed the height of the surrounding canopy. Foraging habitat for eastern red bats includes both open and forested habitats as well as forest edges. This species typically avoids heavily disturbed habitats such as transportation corridors, urban developments, or mines. Migration is thought to occur across coastal and/or large open areas (COSEWIC, 2023). The eastern red bat was detected in the Study Area during passive acoustic monitoring.

Silver-haired bat

The silver-haired bat is also widely distributed across Canada and the United States, extending from southern portions of the Northwest Territories and British Columbia east to Nova Scotia (COSEWIC, 2023). The silver-haired bat undertakes long distance migrations, residing in coastal regions of British Columbia and throughout the United States and Mexico during the winter and travelling north in the spring. Silver-haired bats typically roost in cavities or under the bark of large, decaying trees. Maternity roosts are usually small and found in decaying

broadleaf deciduous trees or in buildings. Foraging habitat is not well characterized, but is usually associated with forests, including forest edges and openings. Little is known about migration requirements for this species (COSEWIC, 2023). ACCDC (2025b) indicates that the nearest record of silver-haired bat is 54.5 ± 0.01 km from the ACCDC Study Area centroid. The silver-haired bat was detected in the Study Area during passive acoustic monitoring.

7.4.3.6 Effects Assessment

Project-Bat Interactions

Project activities, primarily those that involve vegetation clearing and turbine operation, have the potential to impact bats and bat habitat (Table 7.68). These activities could result in habitat loss and accidental injury or mortality. Other Project activities during construction and operation which cause increased noise and light may also impact bat behaviours.

Table 7.68: Potential Project Interactions with Bats

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	-
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	-
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning and Rehabilitation	
Infrastructure Removal	-
Site Reclamation	X

Assessment Boundaries

The LAA for bats includes a 5 km buffer of the Study Area (Drawing 7.29). As most bats forage within 5 km of their roosting sites (Balzer et al., 2023; ECCC, 2015), this area should capture roosting habitat of most bats foraging within the Study Area. The RAA does not apply.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for bats. The VC-specific definition for magnitude is as follows:

- Negligible: No measurable loss of habitat supporting bats and loss of individuals is not expected.
- Low: Low loss of habitat supporting bats and loss of individuals is not expected.
- Moderate: Moderate loss of habitat supporting bats and/or minimal loss of individuals is expected.
- High: High loss of habitat supporting bats and/or loss of individuals at a level which may cause population level impacts is expected.

Effects

Potential impacts to bat species from the Project's construction and operation include:

- Habitat fragmentation and/or loss.
- Direct and/or indirect injury or mortality.
- Sensory disturbance (e.g., lighting, noise, human activity).

Habitat Fragmentation and/or Loss

Vegetation clearing required for construction can result in the loss of bat habitat or disrupt corridors between important habitat features, such as foraging and roosting habitat (Reusch et al., 2022; Segers & Broders, 2014). This may impede movement, foraging, flight activity, and habitat use (ECCC, 2015). Harvesting and the creation of cleared areas can also reduce landscape-level habitat quality and result in increased predation risk as bats travel across open areas (Slough et al., 2023).

One study by Segers & Broders (2014) found that bat species respond differently to landscape alteration for wind farm development. Some bat species prefer edge habitat over both open clearcuts and intact interior forest, as edge habitat can provide good foraging habitat (Hein et al., 2008). Little brown myotis have been shown to benefit from edge habitat created during harvesting and road construction, preferring to forage in cut areas and road rights-of-way over intact forest (Segers & Broders, 2014; Slough et al., 2023). Harvesting can also create foraging habitat suitable for hoary bats and eastern red bats (COSEWIC, 2023). Suitable habitat for northern myotis may be positively or negatively affected following vegetation clearing as different research suggests this species may prefer to forage in forested areas or in forest edge habitat, such as along woods roads (COSEWIC, 2013; Segers & Broders, 2014). Silver-haired bats can experience a reduction in roosting habitat due to some forestry practices (COSEWIC, 2023). Pregnant and lactating female bats have been shown to be particularly sensitive to habitat degradation as their foraging ranges are more constricted due to decreased energy and caring for young (Henry et al., 2002; Segers & Broders, 2014).

The results of passive acoustic monitoring showed that *Myotis* species and hoary bats were the most detected species within the Study Area, accounting for about 43% and 26% of detections in 2024 and 2025, respectively. According to a study by Perry and Thill (2007), hoary bats prefer to roost in unmanaged mixedwood stands with an overstory age of more than 50 years. During lactation, females tend to roost in large coniferous trees of old forests (Klug et al., 2012). Similarly, *Myotis* species have been found to prefer mature forests with tall, large

diameter trees for maternity roosting (ECCC, 2015). Through old-growth field surveys detailed in Section 7.4.1.5, none of the surveyed potential old-growth forest stands were confirmed as old-growth, ranging from 90 to 105 years of average stand age. Note that, despite not meeting the threshold to be considered old-growth, these stands are still older than the minimum age preferences of some bat species (R. W. Perry & Thill, 2007). Although stands not surveyed are likely to be younger than surveyed stands, these data indicate that some suitable over-day roosting habitat does exist within the Study Area. In addition, following the identification two bat roosts during field surveys, the Project Footprint was changed substantially to avoid these areas, including the removal of six turbines in the vicinity of this confirmed habitat. These design changes resulted in a buffer of more than 1 km between the observed roosts and the nearest Project infrastructure.

Only 4.0 ha (approximately 2.8%) of suitable maternity roosting habitat within the Study Area will be directly impacted by construction of the Project, leaving 136.5 ha of suitable maternity roosting habitat available within the Study Area (Table 7.69). Based on a visual review of aerial imagery, a portion of this habitat appears to have been previously harvested and thus would not support maternity roosting. Although some suitable foraging habitat (e.g., edges of wetlands that fall within the Clearing Footprint) will be removed during Project construction, this will also create edge habitat suitable for foraging. A net total of approximately 44 ha of suitable foraging habitat will be gained due to the increase in forest edge habitat associated with the construction of new roads, representing an increase of 8% within the Study Area (Table 7.69). Newly created foraging habitat was calculated using a 30 m buffer of roads which will be constructed in association with the Project (consistent with modelling discussed in Section 7.4.3.3).

Table 7.69: Availability of Suitable Habitat in the Study Area Pre- and Post-Construction

Habitat Type	Area of Habitat Pre-Construction (ha)	Area of Habitat Post-Construction (ha)	Percent Change (%)
Suitable Maternity Roosting Habitat	140.5 ha	136.5 ha	-1%
Suitable Foraging Habitat	542.8 ha	587.0 ha	+8%

Based on the habitat mapping completed for the Project, 136.5 ha of the Study Area will remain available in the Study Area as suitable roosting habitat, and an additional 1,785.5 ha in the LAA (Table 7.69 and 7.60).

In addition to changes in habitat availability, habitat fragmentation may occur within the Study Area due to the construction of new roads. Some bat species, especially migratory species, may avoid high-traffic roads due to an increase in noise pollution (COSEWIC, 2023). A study by Fensome & Mathews (2016) found that 79% of bats crossed a two-lane rural road through forested habitat when vehicles were absent, but this decreased to 59% when vehicles were present. Construction of the Project will cause road density to increase in the Study Area, with 11.9 km of new roads being built in association with the Project; however, traffic is not expected to be heavy within the Study Area at night (when bats are active) and some roads will

be through areas which are currently unforested. These factors should reduce the barrier effect of roads within the Study Area.

Impacts to bats because of habitat fragmentation and loss are anticipated to be minimal. This is based on existing disturbance and habitat fragmentation within the Study Area (described in detail in Section 7.4.1.3), the Project's maximized use of previously cleared areas, and avoidance of features such as wetlands and mature forests which may provide bat habitat. Habitat fragmentation and loss will be primarily associated with newly constructed roads and clearing for turbine pads.

Injury or Mortality

Wind project-related bat injuries and mortalities are increasingly becoming a concern, as some researchers have highlighted that turbines could have a greater impact on bats than birds (Barclay et al., 2007). Bats have a slower life cycle than birds, resulting in impacts to population dynamics when mortalities occur (Wellig et al., 2018). This is especially prominent where populations are already small, either naturally or due to the impacts of white-nose syndrome (ECCC, 2018a).

Bat injuries and mortalities can result either from direct collision with turbine blades or from barotrauma, which is caused by the sudden decrease in air pressure following rotating blades (ECCC, 2015). Bats tend to collide with spinning turbine blades, and do not typically collide with stationary blades or towers (Arnett et al., 2008). Bats may collide with blades due to their inability to detect or avoid blades moving at high speeds, which can be up to 300 km/h at the tip of the blade (Wellig et al., 2018).

Research suggests that bats may be attracted to wind turbines because wind turbines attract insects due to their light colour and because they are often built in high places that coincide with insect hill-topping behaviours (Guest et al., 2022). Swarms of insects that can occur near wind turbines provide foraging opportunities for bats, especially migratory species that rely on stopover sites to feed during their migrations (Arnett et al., 2008; Guest et al., 2022). One study also found that bats actively forage near turbines during operation (Horn et al., 2008). During the study, researchers observed bats approaching non-rotating and rotating blades, repeatedly investigating turbine elements, following or becoming trapped by blade-tip vortices, and colliding with turbine blades (Horn et al., 2008). Wind turbines may also attract bats because they can be perceived as potential mating sites or roost trees or because of their movement and sound (Guest et al., 2022; Wellig et al., 2018). Some research suggests that bats may exhibit attraction to or avoidance of wind turbines depending on inter-individual and interspecific variation (Reusch et al., 2022).

Bat activity and use of habitat within the Study Area was assessed through passive acoustic monitoring. Bat species identified during monitoring include *Myotis* species (i.e., little brown myotis and/or northern myotis), hoary bat, silver-haired bat, and eastern red bat. Migratory species accounted for approximately 32% of recorded bat passes within the Study Area. Long distance migrating bats, including the eastern red bat, hoary bat, and silver-haired bat,

comprise most of the reported mortalities from wind turbines due to their higher flight elevations and long migration distances (Arnett et al., 2008; ECCC, 2015; Parisé & Walker, 2017). In the COSEWIC Assessment and Status Report on the Hoary bat, Eastern red bat, and Silver-haired bat (2023), wind energy development was determined to have a high to very high impact, with these three species comprising approximately 75% to 80% of bat fatalities associated with wind turbines. A review of mortality studies at wind farms between 1996 and 2006 found that mortality consistently peaked during fall migration, between mid-summer and autumn (Arnett et al., 2008).

Myotis species have relatively low fatality rates compared to other species due to their lower flight elevations and short migration distances (ECCC, 2015); nevertheless, in the Recovery Strategy for Little Brown Myotis, Northern Myotis, and Tri-colored Bat, collisions and barotrauma from wind turbines were listed as a high level of concern in areas impacted by white-nose syndrome (like Nova Scotia), with localized seasonal impacts in the spring, summer, and fall (ECCC, 2015). *Myotis* species accounted for approximately 43% of recorded bat passes during the 2024 and 2025 monitoring period.

To reduce the potential for bat mortality associated with wind turbines, scientific literature recommends that wind turbines be strategically sited away from bat habitats such as mature forests, wetlands, and waterbodies (Reusch et al., 2022; Roeleke et al., 2016). The Project has been strategically sited in an area that has an extensive history of harvesting and disturbance with little remaining intact mature forest (described in detail in Section 7.4.1.3). The selection of turbine locations also prioritized avoidance of identified roosting trees along with features such as lakes, wetlands, watercourses, and old growth forests to the extent possible. Additional opportunities to increase avoidance and minimization of interactions with these features will be reviewed during the detailed design phase.

Other Project activities that have the potential for injury or mortality to bats include vegetation removal, blasting during construction, and increased vehicle traffic. Potential exists for bats to be harmed during vegetation clearing if they are roosting in vegetation as it is being cleared. This risk can be mitigated by planning to conduct vegetation clearing between November 1 and April 30 while bats remain in hibernation underground. Injury and/or mortality is also possible if a hibernaculum is heavily disturbed while occupied. Construction activities, such as blasting or the use of heavy machinery, could potentially cause a hibernaculum to collapse (ECCC, 2015). No known hibernacula are located within 25 km of the Study Area (Moseley, 2007), and no AMOs with potential to support bat hibernation are located within 10 km of the Study Area (NSNR, 2021e). Additionally, the ACCDC report and personal communication with NSNR (S. Spencer, personal communication, October 9, 2025) indicate no known hibernacula within 5 km of the Study Area.

Increased traffic, associated with the construction of new roads and upgrading of existing roads within the Study Area, may also pose a risk to bats. Low-flying species, such as *Myotis* species, account for the majority of recorded vehicle-related mortality events, with juveniles being particularly vulnerable due to their reduced maneuverability and preference to forage in low-clutter habitats (Fensome & Mathews, 2016; Lesiński, 2007). Mortality is likely to be higher

in areas where roads intersect good habitat, such as watercourses or forest edges (Fensome & Mathews, 2016; Lesiński, 2007; Medinas et al., 2013). Traffic volumes on roads within the Study Area are not expected to be high at night, thus roads are unlikely to pose a high risk to bats.

Sensory Disturbance

Noise and light will be generated during all phases of the Project. During construction, decommissioning, and reclamation, noise and light will be generated by heavy equipment and may be generated by blasting if required. Note that blasting is not currently anticipated, but geotechnical studies may identify areas where blasting could be necessary. Noise associated with construction will typically occur during daylight hours; therefore, sensory disturbance should be limited to roosting bats. During operations, noise and light will be generated by wind turbines.

Construction noise (e.g., heavy equipment, blasting, and pile-driving) may disrupt or deter bats, particularly those species that roost nearby, potentially causing roost abandonment; however, bats are well adapted morphologically, physiologically, and behaviourally to avoid acoustic trauma (CDT, 2016). Since bats are often exposed to the exceptionally loud sounds of their own echolocation signals (approximately 110 dB) they have evolved protective mechanisms to prevent sensory overload and damage to the auditory system (CDT, 2016). These mechanisms include behavioural avoidance, changing the shape and orientation of the pinnae, closing the cartilaginous fold in the outer ear canal, the tympanic reflex, and resonance absorption (Wever & Vernon, 1961). While these mechanisms are very effective in achieving protection from constant noise exposure (i.e., in the case of wind turbines), it is speculated that these mechanisms also can prevent overexposure from sudden, unexpected anthropogenic noise shocks (e.g., blasting). The typical lack of construction activity during the nightly active bat period (30 minutes before sunset to 30 minutes after sunrise) further limits any potential masking effects in the ultrasonic ranges.

Sensory disturbance associated with lighting during the construction, operations, and decommissioning phases of the Project may also impact bat behaviour. During construction and decommissioning, lighting will be a temporary source of sensory disturbance. A study by Seewagen et al. (2023) found that, while white floodlights had no significant impact on migratory species including the eastern red bat and hoary bat, little brown myotis was impacted within at least a 75 m radius and experienced a loss of foraging habitat. This risk can be mitigated by using motion activated lighting.

The impacts of necessary noise and light associated with the Project on bat behaviour and movements are anticipated to be low. This is based on the morphological adaptations and behavioural patterns of bats as well as the timing of activities that have potential to cause sensory disturbances outside of active bat periods (i.e., when bats are roosting or hibernating). Impacts will be limited to the Study Area, as only those bats roosting or foraging within areas undergoing construction will be exposed to sensory disturbance caused by the Project.

Mitigation

To address the abovementioned effects on bats and bat habitat, the following mitigation measures will be implemented:

- Minimize the overall area to be cleared by utilizing pre-existing roads and previously altered areas (i.e., clearcuts) when possible.
- Maintain a 30 m vegetated buffer around wetlands and watercourses (where possible) to support connectivity and foraging habitat for bats.
- Plan clearing activities outside the active bat window (May 1 to October 31) where feasible.
- Install motion activated lights on infrastructure to reduce insect attraction and subsequent attraction of bats. Motion activated lighting is only applicable to ground-based infrastructure (i.e., at doorways and substations) as turbine lighting at the top of individual turbines is regulated by Transport Canada.
- Employ noise controls (e.g., mufflers) on machinery, equipment, etc. during the site preparation and construction phase.
- Avoid potential bat habitat (i.e., mature forests, riparian areas, and wetlands) to the greatest extent possible.
- Revegetate roadsides and cleared areas to minimize habitat loss to the greatest extent possible.
- Develop and implement a Surface Water Management Plan to support appropriate drainage and minimize standing water (limiting insect breeding and subsequent attraction of bats) near turbines.
- Develop and implement a Terrestrial Habitat and Wildlife Management Plan.

Monitoring

The Proponent is committed to completing a second year of the baseline bat monitoring program, prior to operations, per requirements of the Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c).

A detailed Post-Construction Bat Monitoring Plan will be developed and submitted to NSECC and NSNR for review. Monitoring activities may include:

- Post-construction bat mortality monitoring.
- Adaptive management/contingency plan if post-construction monitoring identifies significant bat mortality, developed in consultation with NSNR.

Conclusion

After mitigations, residual effects to bats have been assessed, including habitat fragmentation and/or loss, injury or mortality, and sensory disturbance. Based on this assessment, residual effects to bats are characterized as shown in Table 7.70.

Table 7.70: Bats and Bat Habitat Residual Effects

Effect Detail	Habitat Fragmentation and/or Loss	Injury or Mortality	Sensory Disturbance
Magnitude of Effect	**Low:** Low loss of suitable bat habitat is expected (about 0.1% of suitable habitat available within the LAA).	**Moderate:** Minimal loss of individuals is expected.	**Low:** Low impacts to habitat usage (i.e., effective habitat loss) due to sensory disturbance is expected.
Geographic Extent of Effect	5 km buffer of the Study Area	5 km buffer of the Study Area	5 km buffer of the Study Area
Frequency of Effect	**Once:** Effects may only be associated with clearing during construction.	**Intermittent:** Effects may occur seasonally between dusk and dawn during operations and temporarily during construction.	**Continuous:** Effects may occur sporadically during construction and decommissioning but may be constant (though spatially limited) during operations.
Duration of Effect	**Long Term:** Though minimal (impacting about 0.1% of suitable bat habitat in the LAA), effects are expected to extend past Project decommissioning	**Medium Term:** Effects will end following decommissioning.	**Medium Term:** Effects will end following decommissioning.
Reversibility of Effect	**Partially Reversible**	**Irreversible**	**Reversible**
Significance Level	Not Significant	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible			

7.4.4 Avifauna

7.4.4.1 Overview

A desktop review, field program, and habitat modelling were undertaken to gather information on avian species and associated habitat in the Study Area. Objectives were as follows:

- Assess observations, species richness, and habitat utilization of avifauna within the Study Area, year-round.
- Use the information collected to inform and refine the Project design (i.e., avoid impacts to SAR, SOCI, and their habitats).
- Assess migratory bird activity and assess the risks that the Project poses to migratory birds.
- Use the information collected to inform mitigation and management practices.

7.4.4.2 Regulatory Context

The Project has potential to interact with avifauna species that may be protected under several federal and provincial legislations. Applicable federal and provincial laws and regulations relating to the protection of avifauna include:

- *Species at Risk Act* (Canada, 2002)
- *Migratory Bird Convention Act* (Canada, 1994)
- Migratory Birds Regulations (Canada, 2022)
- W*ildlife Act* (Nova Scotia, 1989b)
- *Endangered Species Act* (Nova Scotia, 1998)

The *Migratory Bird Convention Act* (MBCA) protects all migratory birds while they are present in Canadian jurisdiction, including on land, in the air, and on the water. The Migratory Birds Regulations (Canada, 2022) protect the nests of species listed under Schedule 1 of MBCA for a set period, depending on the species. Nests of species listed under Schedule 1 can be registered under the Abandoned Nest Registry to begin a waiting period, after which the nest can legally be removed. Under the provincial *Wildlife Act*, it is illegal to destroy or disturb bird nests or eggs without a permit. ESA and SARA prohibit harm to listed SAR along with their habitually occupied spaces and designated core and/or critical habitat, as defined by each of these Acts.

The Project is also guided by policies, guidelines, and standards that provide guidance on the development of the Project and related survey design. These guidance documents and policies include:

- ECCC-CWS (Atlantic Region) – Wind Energy & Birds EA Guidance Update (ECCC-CWS, 2022)
- Wind Turbines and Birds - Updated Guidance for EA and Monitoring (ECCC, 2018)
- Wind Turbines and Birds - A Guidance Document for EA (ECCC-CWS, 2007b)
- Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (ECCC-CWS, 2007a)
- Nova Scotia Wetland Conservation Policy (NSECC, 2019)
- The Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009)
- Various NSNR SMPs and ECCC SAR Management Plans

7.4.4.3 Desktop Review

Desktop information was used to gain insight into protected avifauna habitats, species utilization of the area, and to identify SAR or SOCI potentially occurring within or near the Study Area, using the following sources:

- IBAs (2025)
- ACCDC (2025c)
- Maritimes Breeding Bird Atlas (MBBA) (2025)

- Canadian Wildlife Service Waterbird Colony Database (Atlantic Region) (Wilhelm & Mahoney, 2017)
- Canadian Wildlife Service Migratory Bird Sanctuaries (MBS) (ECCC, 2021)
- NSNR Significant Species and Habitats Database (2024e)
- eBird (2025a)
- Nova Scotia Parks and Protected Areas (NSECC, 2020a)
- Critical Habitat for SAR National Dataset (ECCC-CWS, 2025)

The Study Area features a variety of habitat types, including mixedwood, hardwood, and softwood forest, harvested land, and wetlands. As a result of intensive historical harvesting, the Study Area features many regenerating harvest areas and young stands dominated by early successional species. It also features human-made features including a transmission line, road infrastructure, and existing wind turbine infrastructure. While most of the Study Area consists of young forest, there are four more-mature forest stands within the Study Area, though these were not determined to qualify for old-growth status through assessment (Section 7.4.1.3). Mature forested habitats are of significant importance to cavity-nesting birds (e.g., woodpeckers, owls, various waterfowl species), and species like chimney swift (*Chaetura pelagica*) which use large hollow trees for nesting and roosting (Neily & Parsons, 2017). There are several lakes fully or partially within the Study Area (Mary Lake, Tracadieur Lake, MacMillan's Lake, and Morrison's Lake) and several others adjacent to the Study Area (Summers Lake, Mattie's Lake, and Grant Lake) that could provide breeding and stopover habitat for resident and migratory waterfowl (Drawing 7.30). Wetland complexes associated with those lakes also provide habitat for wetland-dependent species.

The Study Area is located near the Strait of Canso, and this coastal proximity suggests there is potential for the migratory movement of shorebirds, seabirds, and waterfowl through the area. In particular, there are records of breeding colonies of common tern (*Sterna hirundo*), great black-backed gull (*Larus marinus*), great blue heron (*Ardea herodias*), double-crested cormorant (*Nannopterum auritum*), American herring gull (*Larus smithsonianus*), and common eider (*Somateria mollissima*) along the Strait of Canso (Wilhelm & Mahoney, 2017). Large numbers of birds are regularly drawn to the Strait of Canso, potentially due to the Canso Causeway creating a barrier to fish passage and trapping schools of migrating fish as they attempt to navigate through the Strait. Notably, Atlantic saury (*Scomberesox saurus*) attempting to migrate through the Strait of Canso during fall and early winter are known to form dense aggregations as they become trapped by the causeway (G. Pohle et al., 1992), providing ample feeding opportunities for seabirds. While the Strait of Canso experiences high levels of bird movement throughout the year, the Project is separated from the Strait by Cape Porcupine, a steep, rocky outcrop. Previous avian studies in this area have suggested that Cape Porcupine may serve as a barrier to birds travelling within the Strait, funneling shorebirds along the Strait rather than inland (McCallum Environmental Ltd., 2013).

Important Bird Area: Pomquet Beach Region (NS009)

The closest IBA is the Pomquet Beach Region (NS009), a series of barrier beaches northeast of Antigonish (IBA Canada, 2025). This IBA is located just under 23.9 km northwest of the

Study Area (Drawing 7.30). The Pomquet Beach Region provides feeding habitat for migrating shorebirds and supports local breeding populations of great blue heron, osprey (*Pandion haliaetus*), and bald eagle (*Haliaeetus leucocephalus*) (IBA Canada, 2025). Historically, it has supported one of Nova Scotia's most stable breeding populations of federally and provincially Endangered piping plovers (*Charadrius melodus*).

ACCDC Report

S-Ranks from ACCDC were used to determine whether a species is a SOCI, based on the time of year in which the species was observed. Species ranks may differ depending on whether a species is observed in the breeding season (B), the non-breeding season (N), or during migration (M). American robin (*Turdus migratorius*), for example, is ranked S5B,S3N, indicating that this species is considered a SOCI in Nova Scotia during its non-breeding (wintering) season but not during its breeding season.

The ACCDC report for the Project (ACCDC, 2025b) contains records of 12 avian SAR (Table 7.71) and 40 avian SOCI (Appendix F) within 5 km of the Study Area.

Table 7.71: Avian SAR Recorded within 5 km of Study Area

Species	Scientific Name	COSEWIC	SARA	ESA	NS S-Rank
Barn Swallow	*Hirundo rustica*	Special Concern	Threatened	Endangered	S3B
Barrow's Goldeneye - Eastern Population	*Bucephala islandica* pop. 1	Special Concern	Special Concern	-	S1N,SUM
Bobolink	*Dolichonyx oryzivorus*	Special Concern	Threatened	Vulnerable	S3B
Canada Warbler	*Cardellina canadensis*	Special Concern	Threatened	Endangered	S3B
Common Nighthawk	*Chordeiles minor*	Special Concern	Special Concern	Threatened	S3B
Eastern Wood-pewee	*Contopus virens*	Special Concern	Special Concern	Vulnerable	S3S4B
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	Vulnerable	S3B,S3N,S3M
Harlequin Duck	*Histrionicus histrionicus* pop. 1	Special Concern	Special Concern	Endangered	S2N
Horned Grebe – Western Population	*Podiceps auritus*	Special Concern	Special Concern	-	S3N,SUM
Ivory Gull	*Pagophila eburnean*	Endangered	Endangered	-	SNA
Olvie-sided Flycatcher	*Contopus cooperi*	Special Concern	Special Concern	Threatened	S3B

Species	Scientific Name	COSEWIC	SARA	ESA	NS S-Rank
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Endangered	S2B

Source: (ACCDC, 2025b)

Within the Study Area, there are four records of olive-sided flycatcher (*Contopus cooperi*), three records of Canada warbler (*Cardellina canadensis*), and one record of rusty blackbird (*Euphagus carolinus*). Within the Assessment Area, there are three records of olive-sided flycatcher and one record of Canada warbler. There is a lack of suitable nesting habitat within the Study Area for bobolink (*Dolichonyx oryzivorus*) and barn swallow [*Hirundo rustica* (i.e., grasslands, agricultural fields, and anthropogenic structures)], although barn swallow may venture into the Study Area to forage over lakes and wetlands. Barrow's goldeneye (*Bucephala islandica* pop. 1), harlequin duck (*Histrionicus histrionicus* pop. 1), and horned grebe (*Podiceps auritus*) are known to winter in Nova Scotia, but these species are generally found within coastal waters and are not anticipated to use the Study Area. Ivory gull (*Pagophila eburnean*) is an arctic species that is considered a rare vagrant in Nova Scotia and is unlikely to occur in or near the Study Area.

The ACCDC report also contains one record of a "location sensitive" SAR:

- Peregrine falcon (*Falco peregrinus* pop. 1): Listed as Vulnerable by ESA and ranked S1B, SUM by ACCDC. Peregrine falcons are likely present in the area due to the expanse of coastline, as well as large lakes, for foraging, along with intense topography that may be suitable for nesting outside of the Study Area (i.e., areas with exposed rock, quarries).

Avian SAR and SOCI records within 100 km of the Study Area are provided in (Appendix F).

Maritimes Breeding Bird Atlas Results

The Study Area is located within MBBA squares 20PR25 and 20PR15 (Birds Canada, 2025). Records from the first (1986 to 1990) and second (2006 to 2010) editions of the MBBA within these squares are as follows:

- For map square 20PR25, the first atlas contains records of 36 possible, 30 probable, and 21 confirmed breeders. The second atlas contains records of 36 possible, 18 probable, and 46 confirmed breeders.
- For map square 20PR15, the first atlas contains records of 51 possible, 7 probable, and 16 confirmed breeders. The second atlas contains records of 54 possible, 22 probable, and 25 confirmed breeders.

Between the two squares there were 15 avian SAR recorded (Table 7.72).

Table 7.72: Avian SAR Recorded within MBBA Squares 20PR25 and 20PR15

Species	Scientific Name	COSEWIC Status	SARA Status	ESA Status	NS S-Rank
Barn Swallow	*Hirundo rustica*	Special Concern	Threatened	Endangered	S3B
Bank Swallow	*Riparia riparia*	Threatened	Threatened	Endangered	S2B
Bicknell's Thrush	*Catharus bicknelli*	Threatened	Threatened	Endangered	S1B
Bobolink	*Dolichonyx oryzivorus*	Special Concern	Threatened	Vulnerable	S3B
Canada Warbler	*Cardellina canadensis*	Special Concern	Threatened	Endangered	S3B
Chimney Swift	*Chaetura pelagica*	Threatened	Threatened	Endangered	S2S3B,S1M
Common Nighthawk	*Chordeiles minor*	Special Concern	Special Concern	Threatened	S3B
Eastern Whip-poor-will	*Antrostomus vociferus*	Special Concern	Threatened	Threatened	S1?B
Eastern Wood-pewee	*Contopus virens*	Special Concern	Special Concern	Vulnerable	S3S4B
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	Vulnerable	S3B,S3N,S3M
Olvie-sided Flycatcher	*Contopus cooperi*	Special Concern	Special Concern	Threatened	S3B
Peregrine Falcon – Anatum/Tundrius Population	*Falco peregrinus* pop. 1	-	-	Vulnerable	S1B,SUM
Piping Plover	*Charadrius melodus*	Endangered	Endangered	Endangered	S1B
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Endangered	S2B
Short-eared Owl	*Asio flammeus*	Threatened	Special Concern	-	S1B

Source: (ACCDC, 2025b; Birds Canada, 2025)

A full list of species recorded within these two squares is presented in Appendix L.

CWS Waterbird Colony Database

The CWS Waterbird Colony Database (Atlantic Region) (Wilhelm & Mahoney, 2017) contains records of 12 waterbird colonies within 25 km of the Study Area (Drawing 7.30):

- A common tern colony located at Long Pond, 2.0 km northeast of the Study Area.
- A tern (*Sterna* sp.) colony located at Hefferman Pond, 5.7 km northeast of the Study Area.
- A tern (*Sterna* sp.) colony located along a barachois near Havre Boucher, 6.5 km north of the Study Area.
- A tern (*Sterna* sp.) colony located near Cape Jack, 10.1 km north of the Study Area.

- Colonies of common tern, unspecified tern (*Sterna* sp.), great blue heron, double-crested cormorant, American herring gull, great black-backed gull, and common eider, near Inhabitants Bay and leading into Chedabucto Bay. These colonies are located between 13 and 24 km southeast of the Study Area, and these species likely travel within the Strait of Canso to forage.

NSNR Significant Species and Habitats Database

The NSNR Significant Species and Habitats Database (NSNR, 2024e) contains five records relating to avifauna within 5 km of the Study Area, as follows:

- One record relating to common loon (*Gavia immer*) habitat in the southeastern portion of the Study Area, likely relating to nearby Morrison's Lake and Grant Lake.
- One record relating to migratory bird habitat at Archie's Pond, a small saline pond located 380 m north of the Study Area, along the Strait of Canso.
- One record relating to the common tern colony at Long Pond, along the Strait of Canso.
- One record relating to a bald eagle nest in Port Hastings.
- One record relating to rusty blackbird habitat approximately 4.5 km south of the Study Area.

eBird

The Canso Causeway is a notable birding location with data regularly submitted at two hotspots: one on the Mainland side and one on the Cape Breton side (eBird, 2025a, 2025b). These hotspots have 114 and 97 species recorded, respectively. Large congregations of birds, primarily seabirds, have been recorded at these locations over the years, including:

- Black-legged kittiwake (*Rissa tridactyla*, 220 on October 25, 2024)
- Bald eagle (100 on November 16, 2021)
- Northern gannet (*Morus bassanus*, 500 on October 21, 2018)
- Common eider (400 on November 9, 2019)
- American herring gull (800 on November 7, 2017)
- Bonaparte's gull (*Chroicocephalus Philadelphia*, 265 on September 27, 2019)
- Double-crested cormorant (500 on August 28, 2020)
- Black scoter (*Melanitta americana*) (750 on October 17, 2023)

These high numbers are generally seen in the fall and are often associated with the migration of Atlantic saury, which provide a food source for waterfowl and shorebirds.

Protected Areas

There are no protected areas, designated avian critical habitat areas, or migratory bird sanctuaries within 5 km of the Study Area. The closest protected areas are the pending Hurlburt Brook Nature Reserve, located 8.8 km southwest of the center of the Study Area, and the Tracadie River Wilderness Area, located a bit farther southwest [(8.4 km southwest from the Study Area boundary (Drawing 7.30)].

7.4.4.4 Field Assessment Methods

Several survey methodologies were employed to assess avian abundance and species diversity within the Study Area throughout the year. Prior to conducting field surveys, a preliminary desktop survey design [using provincial aerial imagery (e.g., Google Earth, NSECC, and NSNR), forestry, wetland, watercourse, depth-to-water, and topographic databases or GIS layers] was developed to target suitable habitat for avifauna species or groups of interest (e.g., migratory birds, breeding birds, shorebirds, waterfowl, and nightjars).

Since species have different habitat requirements for breeding and migratory purposes, a wide range of habitats were targeted, with a goal of achieving representative coverage of all major habitat types in the Study Area. Habitat types surveyed included wetlands, lakes, watercourses and riparian areas, harvested areas in varying stages of regeneration, softwood, hardwood, and mixedwood forest, and developed areas (e.g., transmission line corridors, roads, existing wind turbine infrastructure).

The following survey types were completed.

- Spring and fall migration point count (PC) surveys
- Spring and fall migration diurnal watch count (DWC) surveys
- Breeding bird point count surveys and area searches (June to July)
- Nightjar surveys (June to July)

Survey dates were selected to provide representative coverage across appropriate seasons and to ensure migratory bird abundance and species diversity was fully captured (e.g., early and late season migrants). Survey rounds were separated by a minimum of 10 days. A breakdown of survey type, dates, and rationale is described in Table 7.73.

Table 7.73: Overview of Avian Surveys Completed for the Project

Survey Type	Survey Rounds	Survey Locations	Dates	Rationale	Reference for Survey Dates and Methods
Spring migration	3	54 PC and 4 DWC	March 25, 26, 28 and April 2 to 3, 2025 April 15 to 17, 2025 May 21 to 23, 2025	Most migratory birds return to Canada to breed between late March and mid-May. Surveys were completed between late March and early June to capture both early and late season migrants, as well as early breeding activity.	Wind Turbines and Birds - A Guidance Document for EA (ECCC-CWS, 2007b)
Breeding bird	2	54 PC	June 3 to 6, 2025 June 30 and July 2, 2025	June is peak breeding season in Nova Scotia. Surveys were completed in early June and in late June / early July to capture early and late season breeders.	Maritimes Breeding Bird Atlas (Birds Canada, 2025)

Survey Type	Survey Rounds	Survey Locations	Dates	Rationale	Reference for Survey Dates and Methods
Nightjar	2	7	June 2 to 3, 2025 June 30 and July 2, 2025	The goal of these surveys was to understand the use of the land within the Study Area by common nighthawk and Eastern whip-poor-will. Suitable habitat for common nighthawk is thought to be present within the Study Area based on historical records.	Canadian Nightjar Survey Protocol (Knight et al., 2019)
Fall migration	3	54 PC and 4 DWC	August 22 to 23, 2024 (eastern portion of the Study Area) and August 11, 2025 (western portion of the Study Area) September 25 to 26, 2024 (eastern portion of the Study Area) and September 15, 2025 (western portion of the Study Area) October 23 to 24, 2024 (eastern portion of the Study Area) and October 6, 2025 (western portion of the Study Area)	Most migratory birds begin to migrate south for the winter months between August and September. Surveys began in mid-August and extended into late October to capture both early and late season migrants.	Wind Turbines and Birds - A Guidance Document for EA (ECCC-CWS, 2007b)

Spring and Fall Migration Point Count Surveys

Point count surveys were used as the primary means of assessing avian abundance and species diversity within the Study Area during spring and fall (Drawing 7.31). Fall 2024 migration surveys were completed for the eastern portion of the Study Area at 44 locations. Over the winter, the Project Footprint was expanded to include four additional turbines in the western portion of the Study Area. Therefore, 10 new locations were added to achieve appropriate coverage in this area. Spring migration surveys were completed for all 54 locations in spring 2025 and fall migration surveys were completed for the western portion of the Study Area in fall 2025.

Point count locations were spaced a minimum of 250 m apart to reduce the likelihood of double-counting individuals, as outlined in the document Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (ECCC-CWS, 2007a). Surveys were 10 minutes in duration, with the survey period beginning at or within half an hour of sunrise. Effort was made to complete surveys within five hours after sunrise to observe the most active time of day

for passerine species, although surveys may have extended later on certain mornings if bird activity remained high. Visual and auditory observations of birds were recorded during each survey, along with relevant behavioural information such as breeding evidence. The estimated distance and direction to target was recorded for each bird observed. Effort was made to conduct surveys when weather conditions were optimal (i.e., low winds and little to no precipitation). Incidental observations were recorded when notable species or behaviours were observed outside of the allotted point count survey duration and away from designated point count locations (e.g., while travelling through site). Incidental observations were also recorded by staff conducting other field assessments (e.g., wetlands, botany, lichens) throughout the Study Area. Habitat descriptions for the point count locations are found in Table 1 (Appendix L).

Spring and Fall Migration Diurnal Watch Count Surveys

Diurnal watch count surveys were completed to assess the daytime movements of migratory birds within and surrounding the Study Area. These surveys help capture the migratory movements of raptors, which tend to become more active in the late morning and early afternoon. Four locations were selected, overlooking notable habitat features and/or ideal vantage points with open, unobstructed views of the sky (Drawing 7.31). Two survey locations overlooked lakes (Grant Lake and Morrison's Lake) near the edge of the Study Area, as they were noted as potential stopover locations for migrating birds, particularly migratory waterfowl. Another location was situated in an open, regenerating clearcut in the southern portion of the Study Area, which provided a good vantage point of the sky. The final location was at Archie's Pond, north of the Study Area along the Strait of Canso. Archie's Pond was identified in the NSNR Significant Species and Habitats Database (NSNR, 2024e) as significant migratory bird habitat. Due to the coastal proximity of the Project, this location was selected to gather data on the migratory movements of seabirds and shorebirds through the Strait of Canso.

Diurnal watch count surveys were completed for 120 minutes per survey location in the late morning or early afternoon, on the same days as spring/fall migration point count surveys, and data were collected in 30-minute blocks. Details on the movements of birds were recorded, including bearing from the observer, distance and direction to the target, the direction that the target was moving, passing height, and any other behavioural notes. A spotting scope was used to aid in the identification of distant targets.

The absence of observable migration patterns or notable events during field surveys does not rule out such activity in the area. Radar and acoustic monitoring programs have a higher likelihood of detecting large migration events since they record data for longer periods of time, including at night. Many species migrate nocturnally and may therefore be missed or under-represented by field surveys conducted in the morning. The radar and acoustic monitoring programs are intended to help fill this gap.

Breeding Bird Surveys

Breeding bird surveys consisted of a combination of point count surveys and area searches. The methodology used during the breeding bird point count surveys was the same that was

used during the spring and fall migration point count surveys. The goal of these surveys was to assess the breeding activity and habitat utilization of birds within the Study Area during the breeding season.

Breeding bird area searches were conducted in the morning following the completion of the point count surveys. The area searches were meandering, non-standardized transects that focused on notable habitat features (e.g., wetlands, watercourses, and potential SAR habitat) or areas that could benefit from additional coverage. Birds observed during area searches were recorded in the same manner as the point count methodology but with a focus on identifying novel species, SAR and SOCI, and breeding evidence. Eight area searches (Drawing 7.31) were completed during June and July 2025, lasting for one to two hours, depending on bird activity.

During the point count surveys and the area searches, all signs of breeding behaviour (e.g., agitation, carrying food, nest building, the presence of a pair of birds in suitable nesting habitat) were documented. Breeding evidence codes from the MBBA (Birds Canada, n.d.) were used to determine breeding status based on field observations. Breeding evidence was described using the following four categories:

- Observed: The species was observed in its breeding season, but no breeding evidence was observed.
- Possible: Breeding is possible based on species' presence in suitable nesting habitat during its breeding season or based on the presence of a male singing in suitable nesting habitat in its breeding season.
- Probable: Breeding is probable based on strong indicators of breeding behaviour (e.g., nest building, agitated behaviour, the presence of a pair in suitable nesting habitat during the breeding season).
- Confirmed Breeding is confirmed based on the observation of behaviour which indicates the presence of an active nest (e.g., recently fledged young, a nest containing eggs or young, nest building behaviour, an adult carrying food, distraction display).

Nightjar Surveys

Common nighthawk (*Chordeiles minor*) and Eastern whip-poor-will (*Antrostomus vociferus*) are aerial insectivores belonging to the nightjar family, both of which are considered SAR under SARA and ESA. Both species are known to use a wide range of open to semi-open habitats for nesting, including forest openings, logged areas, fields, barrens, bogs, and burned areas (COSEWIC, 2018b; ECCC, 2018b). Based on desktop review, common nighthawk is likely to occur within the Study Area. Considering the location of the Project and Eastern whip-poor will's known breeding range, this species is unlikely to occur within the Study Area.

Two rounds of targeted nightjar surveys were completed in June and July 2025. Seven locations were selected in habitats suitable for nightjar nesting and/or foraging (Drawing 7.31). Habitats surveyed included open, disturbed areas, harvested areas in various stages of regeneration, wetlands, and waterbodies. For the safety of staff completing the surveys at

night, all survey locations were accessible by road. Per Knight et al. (2019), effort was made to separate survey locations a minimum of 1.6 km apart to avoid overlapping observations. Survey locations on the eastern side of the Study Area were spaced a minimum of 1.1 km apart to capture notable habitat features while still maintaining surveyor safety at night. Due to noise generated by the nearby Highway 104, the anticipated likelihood of double-counting individuals at these survey locations was low.

Surveys were completed between one hour before sunset and two hours after sunset, when nightjars are most active. Effort was made to conduct surveys when weather conditions were optimal (i.e., low wind and little to no precipitation) and moon phase was within seven days of a full moon to maximize visibility and the likelihood of detecting nightjars, as per Knight et al. (2019). Surveys were six minutes in duration and were passive, meaning no playback was used. During the survey period, surveyors recorded the number of nightjars observed as well as the behaviour of each individual (e.g., calling or wing-boom display). Details on survey conditions such as wind speed, noise level, cloud cover, precipitation, number of passing cars, and visibility of the moon were also recorded. Any other bird species observed (particularly novel species, SAR, and/or SOCI) were recorded as incidentals.

7.4.4.5 Field Assessment Results

Spring Migration Surveys

Three rounds of spring migration surveys, comprising of point count and diurnal watch count surveys, were completed between late March and late May 2025. Across all surveys, a total of 2,544 birds were observed, representing 81 different species (Tables 2 and 3, Appendix L).

A total of 1,870 birds were observed during spring migration point count surveys, representing 73 different species (Tables 2 and 3, Appendix L).
The most abundant species were:

- American robin
- Dark-eyed junco (*Junco hyemalis*)
- Black-capped chickadee (*Poecile atricapillus*)
- American crow (*Corvus brachyrhynchos*)

Avian SOCI individuals observed included:

- Boreal chickadee (*Poecile hudsonicus*; six)
- Canada jay (*Perisoreus canadensis*; seven)
- Pine siskin (*Spinus pinus*; two)
- Red crossbill (*Loxia curvirostra*; one)

Avian SAR observations were limited to three evening grosbeaks seen flying over a clearcut.

The point count locations with the highest number of individuals were PC17, PC4, PC6, PC35, and PC59 (Drawing 7.31). These locations predominantly featured lakes, disturbed areas, an existing wind turbine, and a transmission line corridor. A notable migration event included the observation of a flock of over 200 American robins moving through the Study Area in mid-April. Lakes within the Study Area (particularly Morrison's Lake, Grant Lake, and Summer's Lake) were observed in use as stopover habitat by waterfowl such as American black duck (*Anas rubripes*), ring-necked duck (*Aythya collaris*), hooded merganser (*Lophodytes cucullatus),* common loon, Canada goose (*Branta canadensis*), and common goldeneye (*Bucephala clangula*). Double-crested cormorants, which are known to be highly abundant in the Strait of Canso, were observed in the Study Area on two occasions, when single individuals were observed. Several observations of pileated woodpecker (*Drycopus pileatus*) were made. Pileated woodpecker nests are protected, regardless of nest activity, for at least 36 months under the Migratory Bird Regulations (Canada, 2022).

A total of 674 birds were observed during spring migration diurnal watch count surveys, representing 48 different species (Table 2 and 3, Appendix L). No avian SOCI or SAR were observed.

The most abundant species were:

- American herring gull
- Red-breasted merganser (*Mergus serrator*)
- Blue jay (*Cyanocitta cristata*)
- Canada goose
- Bald eagle

DWC1, located at Archie's Pond along the Strait of Canso, had the highest number of birds, with gulls, waterfowl, and seabirds comprising most of the observations (Drawing 7.31). DWC2, located at Morrison's Lake, had the highest species richness. Observations made at this location consisted largely of a variety of songbird and waterfowl species. Probable and/or confirmed breeding evidence was recorded at this location for belted kingfisher (*Megaceryle alcyon*), hooded merganser, and red-tailed hawk (*Buteo jamaicensis*). Grant lake (DWC3) was found to be supporting breeding American black-ducks, common loons, and spotted sandpipers (*Actitis macularius*), all of which had records of probable or confirmed breeding evidence.

Based on notes that were collected on flyover height, most birds (approximately 44%) observed in flight during spring migration surveys appeared to be flying at heights between 50 m and 100 m. Approximately 27% were found to be flying under 50 m, while 29% were flying at heights greater than 100 m.

2025 Spring Migration Surveys - Probable and Confirmed Breeding Evidence

Breeding evidence can be observed before the core breeding season begins, particularly for bird groups like waterfowl and raptors whose courtship often takes place throughout winter and

early spring. Observations of probable and confirmed breeding evidence, based on the Maritimes Breeding Bird Atlas (Birds Canada, n.d.) is provided below.

Confirmed Breeding Evidence:

- Young observed: American black duck and Canada goose.

Probable Breeding Evidence:

- Agitated behaviour: Black-and-white warbler (*Mniotilta varia*) and ovenbird (*Seiurus aurocapilla*).
- Courtship or display: Red-tailed hawk and ruffed grouse (*Bonasa umbellus).*
- Pair in suitable breeding habitat: American robin, bald eagle, belted kingfisher, blue-headed vireo (*Vireo solitarius)*, common loon, common merganser, hairy woodpecker (*Leuconotopicus villosus*), hooded merganser, red-breasted merganser, ring-necked duck, and spotted sandpiper.

2025 Breeding Bird Surveys

Two rounds of breeding bird surveys, comprising PC and area search surveys, were completed in June and July 2025. Across all surveys, a total of 2,866 birds were observed, representing 87 different species (Tables 4 and 5, Appendix L).

The most abundant species were:

- Magnolia warbler (*Setophaga magnolia*)
- White-throated sparrow (*Zonotrichia albicollis*)
- Common yellowthroat (*Geothlypis trichas*)
- American robin
- Black-and-white warbler

Avian SOCI individuals observed included:

- American kestrel (*Falco sparverius*; two)
- Bay-breasted warbler (*Setophaga castanea*; three)
- Blackpoll warbler (*Setophaga striata;* one)
- Boreal chickadee (four)
- Canada jay (four)
- Cape May warbler (*Setophaga castanea*; two)
- Common tern (two)
- Pine siskin (two)
- Spotted sandpiper (16)
- Scarlet tanager (*Piranga olivacea*; one)
- Tennessee warbler (*Leiothlypis peregrina*; one)
- Wilson's snipe (*Gallinago delicata*; three)

Avian SAR individuals observed included:

- Barn swallow (two)
- Canada warbler (36)
- Common nighthawk (two)
- Eastern wood-pewee (three)
- Olive-sided flycatcher (19)
- Rusty blackbird (two)

The barn swallow observation consisted of a pair of individuals observed foraging over Archie's Pond. Canada warbler was found to be abundant in wetland habitats throughout the Study Area, primarily in treed or shrub swamps that represent suitable breeding habitat. The common nighthawk observations were made near lake and wetland habitats, and one observation included an active nest. The eastern wood-pewee observations were all made in the same general area outside of the Assessment Area, near lakes and/or watercourses. Most of the olive-sided flycatcher observations were males singing in or near suitable breeding habitat (i.e., near wetlands and waterbodies, particularly wetlands featuring open water and snags for perching). The rusty blackbird observation was made in a treed swamp near the edge of a lake, outside of the Assessment Area, and consisted of an adult male with what was presumed to be a fledgling.

PC16, PC5, PC2, and PC43 had the highest numbers of birds overall, while PC23, PC16, and PC5 had the highest species richness (Drawing 7.31). The points with the highest bird counts and species richness were primarily located near lakes or wetland complexes. The wetland at PC5, a large open-water cattail marsh, was noted as being particularly active with waterfowl, shorebirds, and marsh birds. Sora (*Porzana Carolina*), spotted sandpiper, and Wilson's snipe were some of the notable species found to be using this wetland during the breeding season. This wetland was also noted by field staff as being suitable rusty blackbird habitat, and while a single male was observed incidentally in the wetland during late spring migration (late May), no rusty blackbirds were observed there during breeding bird surveys. Waterfowl such as ring-necked duck, American black duck, hooded merganser, Canada goose, wood duck (*Aix sponsa*), and common loon were frequently observed at lakes in and around the Study Area. A pair of common terns, a species known to breed along the Strait of Canso, were observed flying over Mary Lake in early June, suggesting that coastal species from the Strait may occasionally venture into the Study Area. Forest stands around PC15 were noted as supporting several species that favour mature deciduous habitat [i.e., scarlet tanager, veery (*Catharus fuscescens*) and eastern wood pewee]. This was the only location where scarlet tanager and veery were identified during field surveys, and eastern wood-pewee was exclusively observed near the eastern edge of the Study Area.

2025 Breeding Bird Surveys - Probable and Confirmed Breeding Evidence

Notes on breeding evidence were recording during all breeding bird surveys (Birds Canada, n.d.). For species with multiple indications of probable or confirmed breeding evidence, the highest level of breeding evidence is provided.

Confirmed Breeding Evidence:

- Young observed: American black duck, Canada goose, hooded merganser, ring-necked duck, rusty blackbird, and Wilson's snipe.
- Nest containing eggs: Common nighthawk and spotted sandpiper.
- Carrying food: Common yellowthroat.

Confirmed breeding evidence was recorded for two SAR, common nighthawk and rusty blackbird. An adult common nighthawk was observed performing a distraction display on its nest on July 3; this nest was located on a forestry trail leading down to a lake. A male rusty blackbird with a fledgling was observed on June 30, less than 150 m from where the common nighthawk nest was observed. This area is located over 500 m from the Assessment Area.

Probable Breeding Evidence:

- Agitated behaviour: Black-and-white warbler, Canada warbler, golden-crowned kinglet, olive-sided flycatcher, red-tailed hawk, red-winged blackbird.
- Courtship or display: Black-capped chickadee and ruffed grouse.
- Pair in suitable breeding habitat: Blue-headed vireo and common loon.
- Presumed territory: Alder flycatcher, American goldfinch (*Spinus tristis*), American redstart, blackburnian warbler, black-throated green warbler, chestnut-sided warbler, common grackle, common raven, common yellowthroat, dark-eyed junco, hermit thrush (*Catharus guttatus)*, magnolia warbler, mourning warbler (*Geothlypis philadelphia*), Nashville warbler (*Leiothlypis ruficapilla*), northern flicker, northern parula (*Setophaga americana),* palm warbler (*Setophaga palmarum),* purple finch (*Haemorhous purpureus)*, red-eyed vireo (*Vireo olivaceus*), Swainson's thrush (*Catharus ustulatus),* song sparrow (*Melospiza melodia*), swamp sparrow (*Melospiza georgiana*), tree swallow (*Tachycineta bicolor*), veery, white-throated sparrow, and yellow warbler (*Setophaga petechia*).

Probable breeding evidence was observed for two SAR, Canada warbler and olive-sided flycatcher. Canada warblers were observed showing signs of agitation on five occasions during the breeding season, primarily in forested wetland habitats. A male-female pair was observed on one occasion, and multiple males were observed singing back and forth (presumably competing for the same territory) on two occasions. An olive-sided flycatcher was observed showing signs of agitation on one occasion in a lacustrine wetland. On two occasions, olive-sided flycatchers were observed in the same location more than once during the breeding season, which suggests the establishment of a permanent territory.

2025 Nightjar Surveys

Two rounds of nightjar surveys were completed in 2025, one in early June and one in late June. One species of nightjar, common nighthawk (a SAR), was observed. Across all surveys, 11 individuals were observed, at four of the seven locations surveyed (Tables 6 and 7, Appendix L. The highest number of individuals was observed at Nightjar 4, a location that

featured forestry disturbance, trails, and several disturbed wetlands (Drawing 7.31). Wing-boom displays, which represent probable breeding evidence, were observed being performed at Nightjar 4, Nightjar 3, Nightjar 6, and Nightjar 7.

2024 and 2025 Fall Migration Surveys

Three rounds of fall migration surveys, comprising of point count and diurnal watch count surveys, were completed in 2024 for the eastern portion of the Study Area and in 2025 for the western portion of the Study Area. During these surveys, a total of 3,464 birds were observed, representing 105 different species (Tables 8 and 9, Appendix L).

A total of 2,605 birds were observed during fall migration point count surveys, representing 92 different species. The point count locations with the highest numbers of individuals were PC16, PC15, PC58, and PC57 (Drawing 7.31). Three of these locations featured lakes and/or wetlands, and one was situated on a transmission line corridor. The locations with the highest species diversity were PC46, PC13, PC47, PC50, and PC56, and all these locations were in proximity to lakes and/or wetlands. Notable migratory behaviours included the movement of large number of American robins, with several flocks of up to 50 individuals observed. Smaller flocks of other passerines like cedar waxwings (*Bombycilla cedrorum*) and American goldfinches were also frequently observed moving through the Study Area. Lakes in and around the Study Area appeared to provide stopover habitat for a variety of migratory and resident waterfowl species and were also attractive to raptors.

The most abundant species were:

- American robin
- Black-capped chickadee
- American goldfinch
- Blue jay
- Golden-crowned kinglet

Avian SOCI individuals observed included:

- American coot (*Fulica americana*; one)
- Black-backed woodpecker (*Picoides arcticus*; one)
- Black-billed cuckoo (*Coccyzus erythropthalmus*; one)
- Blue-winged teal (*Spatula discors*; two)
- Boreal chickadee (14)
- Canada jay (20)
- Cape May warbler (five)
- Pine siskin (26)
- Ruddy duck (*Oxyura jamaicensis*; nine)
- Solitary sandpiper (*Tringa solitaria*; three)

Avian SAR individuals observed included:

- Canada warbler (three)
- Evening grosbeak (six)
- Olive-sided flycatcher (one)
- Peregrine falcon (one)

The Canada warbler observations were all made in late August in or near wetland habitats. Considering this species was observed in the same three locations during the breeding season, these individuals likely represent local breeders that had yet to depart their breeding grounds. The evening grosbeak observations were made in late September and late October in mixedwood forest habitats. A single olive-sided flycatcher was observed in mid-August in wetland habitat, likely representing either a migrant or a local individual that had yet to depart its breeding grounds. The peregrine falcon observation was made in late August in the north-central portion of the Study Area and likely represents a migrant following the coast.

A total of 859 birds were observed during fall migration diurnal watch count surveys, representing 63 different species. DWC2, located at Morrison's Lake, was the location with both the highest number of individuals and the highest species diversity (Drawing 7.31). This lake appears to provide stopover habitat for a variety of waterfowl as well as hunting grounds for raptors. Movement of evening grosbeak and double-crested cormorant flocks were observed at this location in late September. DWC1, located at Archie's Pond along the Strait of Canso, also had high avian abundance and species diversity.

A variety of gulls, waterfowl, and seabirds were observed moving within the Strait of Canso. Several coastal species observed within the Strait of Canso [e.g., Bonaparte's gull, black-legged kittiwake, Leach's storm-petrel (*Hydrobates leucorhous*) and northern gannet] were not observed further inland or within the Study Area at any point, suggesting that they generally remain localized to the Strait. The most abundant species across all fall migration diurnal watch count surveys were double-crested cormorant, American herring gull, evening grosbeak, American crow, and American robin.
Avian SOCI individuals observed included:

- Black-billed cuckoo (one)
- Black-legged kittiwake (12)
- Boreal chickadee (three)
- Canada jay (one)
- Great cormorant (*Phalacrocorax carbo*; two)
- Leach's storm-petrel (four)
- Pine siskin (one)
- Semipalmated sandpiper (*Calidris pusilla*; 12)

Avian SAR observed were evening grosbeak (57) and peregrine falcon (one). The evening grosbeak observation consisted of a single migratory flock observed at DWC2 in late

September, and the peregrine falcon was observed at DWC1, moving through the Strait of Canso in late October.

Based on notes collected on flyover height, most birds (approximately 51%) observed in flight during fall migration surveys appeared to be flying at heights less than 50 m. Approximately 31% were found to be flying at heights between 50 and 100 m, while 19% were flying at heights greater than 100 m.

2025 Fall Migration Surveys - Probable and Confirmed Breeding Evidence

Breeding evidence can be observed after the core breeding season ends, particularly for birds that arrive later to their breeding grounds or those who lay more than one clutch of eggs. Observations of probable and confirmed breeding evidence, based on the Maritimes Breeding Bird Atlas (Birds Canada, n.d.), are provided below.:

Confirmed Breeding Evidence:

- Young observed: Common loon and ruffed grouse.

Incidental Observations

Incidental observations were collected by birders when notable species were encountered while travelling between designated survey locations, and by staff conducting various other field programs in 2024 and 2025. A total of 53 individuals were observed incidentally, representing 16 different species (Tables 10 and 11, Appendix L).

The most frequently recorded species (individuals) were:

- Common nighthawk (12)
- Canada jay (10)
- Hooded merganser (four)
- Ring-necked duck (four)

Avian SOCI observed were American kestrel (2) and Canada jay (10).

Avian SAR individuals observed included:

- Canada warbler (two)
- Common nighthawk (12)
- Olive-sided flycatcher (two)
- Rusty blackbird (three)

The Canada warbler observations were all made during summer 2025 in wetland habitats, predominantly in mixedwood treed swamps or shrub swamps that were likely providing suitable breeding habitat. The common nighthawk observations were made sporadically throughout the Study Area in summer 2025 and primarily represent individuals that were flying and/or foraging

overhead. Many of these observations were made near wetlands or waterbodies, likely due to increased insect abundance. The olive-sided flycatcher observations were both made in lacustrine wetlands during summer 2025. The rusty blackbird observations were all made during May 2025. One observation consisted of a male mixed in with a flock of common grackles in a beaver pond wetland, and another observation consisted of two adults in a treed wetland near the edge of a lake.

7.4.4.6 Field Assessment Results Summary

Across all seasons (i.e., spring/fall migration and breeding bird season) of avian baseline field surveys, 8,938 individuals representing 128 species were observed. Total effort of field survey time was approximately 102 hours.

Avian SAR identified during field surveys include:

- Barn swallow
- Canada warbler
- Common nighthawk
- Eastern wood-pewee
- Evening grosbeak
- Olive-sided flycatcher
- Peregrine falcon
- Rusty blackbird

Canada warbler, evening grosbeak, and olive-sided flycatcher were the most abundant avian SAR observed. Evening grosbeak was the most abundant due to an observed flock, while the other species were observed sporadically and in smaller numbers. The survey locations with the highest abundances and species diversity were predominantly located near lakes and wetland complexes. Lakes within the Study Area were noted as providing stopover and breeding habitat for a variety of waterfowl species. Several observations of pileated woodpecker were also made, and if any nests belonging to this species are identified, they will be protected for at least 36 months under the MBCA.

7.4.4.7 Avian Species at Risk Potential Habitat Modelling – Methods and Results

Avian SAR potential habitat modelling was completed to estimate the quality and quantity of habitat for the following species: Canada warbler, common nighthawk, eastern wood-pewee, evening grosbeak, olive-sided flycatcher, and rusty blackbird (Drawings 7.32A to 7.32F).

Avian SAR were selected based on desktop review (e.g., ACCDC data, MBBA data, etc.), field survey observations, acoustic observations, and potential presence of suitable habitat. For example, bobolink, barn swallow, and short-eared owl (*Asio flammeus*) were not included due to the lack of appropriate nesting habitat within the Study Area (i.e., grasslands, marshes, and anthropogenic structures such as buildings and bridges). Bobolink was only observed as a nocturnal migrant during acoustic data processing. Barn swallow breeding habitat would be situated away from Project infrastructure, although they may venture into the Study Area to

forage over wetlands and lakes. Peregrine falcon was also not included in the habitat modelling whereas their breeding/foraging habitat is limited to large lakes, the coastline, and areas like the quarry situated outside the northern border of the Study Area. Barrow's goldeneye, Harlequin duck, horned grebe, and ivory gull were not included since their ACCDC observations were limited to the Strait of Canso. Due to the drastic topographic change progressing into the Study Area and the movement of shorebirds and waterbirds along the Strait, it is not expected for Project infrastructure to impact any shorebirds or waterbirds (either individuals or colonies) present within the Strait of Canso.

The potential habitat modelling is based on habitat descriptions from ECCC recovery strategies and management plans, with a focus on breeding/nesting habitat. Potential habitat modelling may overestimate available habitat based on limits and constraints regarding GIS data and aerial imagery (e.g., outdated data, limits to modelling, etc.). The modelling methods and criterion for each species are summarized in Appendix M.

The models calculated the amount of predictive habitat within 5 km of the Study Area, Study Area, Assessment Area, and Clearing Footprint for each avian SAR (Table 7.74).

Table 7.74: Avian SAR Potential Habitat within Various Spatial Boundaries

Avian SAR	Potential Habitat in Clearing Footprint [ha (%)][(1)]	Potential Habitat in Assessment Area [ha (%)][(1)]	Potential Habitat in Study Area [ha (%)][(1)]	Potential Habitat within 5 km of the Study Area [ha][(1)]
Canada warbler	11.9 (12.4%)	38.4 (18.0%)	300.5 (21.2%)	2,617.0
Common nighthawk	25.2 (26.3%)	52.1 (24.6%)	269.4 (19.0%)	2,014.7
Eastern wood-pewee	3.1 (3.2%)	7.7 (3.6%)	113.9 (8.0%)	899.0
Evening grosbeak	3.2 (3.3%)	9.2 (4.3%)	123.3 (8.7%)	1936.8
Olive-sided flycatcher	19.7 (20.4%)	49.9 (23.4%)	374.2 (26.4%)	3,717.3
Rusty blackbird	4.0 (4.2%)	16.8 (7.8%)	123.1 (8.8%)	1,009.0

(1)Clearing Footprint is 95.9 ha, Assessment Area is 213.2 ha, Study Area is 1416.7 ha, and LAA is 19154.7 ha. LAA percentages are not shown given large portions of the LAA are water (i.e., large lakes and coastline).

7.4.4.8 Remote Monitoring Methods

Avian Radar System

Avian radar monitoring was undertaken during the 2024 fall and 2025 spring and summer monitoring periods to understand and measure the patterns of migrating birds over the Study Area. The monitor was deployed from August 21 to November 25 in 2024 and from April 23 to August 9 in 2025 at a central location directly northwest of Grant Lake within the Study Area (Drawing 7.33).

As a result of modifications to better improve the radar system in 2025, avian radar assessment results were analyzed through the Cognitive Marine Tracker (CMT) proprietary platform in 2025 instead of radR (2010) as used in the 2024 data. The CMT platform can detect BTs more consistently than the radR platform but has a shorter range of detections.

Notably, radR can detect targets flying up to an altitude of 3,000 m, while CMT can detect targets flying up to a distance of 500 m; this distance is sufficient given the rotor swept area of the wind turbines associated with the Project is 35 m to 200 m. Data from the 2024 monitoring period was converted to be compatible with the 2025 data, and both monitoring periods mainly focused on nighttime migratory activity.

Data analysis of radar results focused on assessing the number of targets moving through the Study Area and at what heights flyovers occurred, especially during the migration seasons. Assessment of migratory cues were also conducted to visualize potential weather and climatic conditions (i.e., wind speed, wind direction, temperature, lunar cycle) that may influence migratory patterns. Data analysis also assessed migratory bird density at various height bins comparable with altitudinal heights to demonstrate potential target interactions with turbines.

Detailed methods are provided in Appendix M.

Acoustic Assessment

Avian acoustic monitoring was deployed at five locations (i.e., GCBird 1 to GCBird5) across the Study Area to assess what bird species are present within the Study Area, including night flight call analysis during migration seasons (Drawing 7.33). Avian acoustic monitoring occurred during the same seasons as radar monitoring.

Data from GCBird4, the avian acoustic monitor closest to the avian radar monitor, was run through Nighthawk, a machine learning model that specializes in the detection of night flight calls. The output files were then verified by Strum ornithologists for acoustic verification.

Acoustic recordings from the remaining avian acoustic monitors were compiled by season with a few days chosen per monitoring season to undergo manual listening where peak night flight call timeframes were targeted (i.e., after sunset and before sunrise). The criteria for date determination included good weather conditions allowing for the least amount of noise interference to the recording files and dates not already chosen for field avian surveys. Both survey methods subsequently provided a snapshot of avian species present within the Study Area at each monitoring location and complimented field avian efforts in covering dates that were not surveyed during field assessment.

Detailed methods are provided in Appendix M.

7.4.4.9 Remote Monitoring Results

Radar Results

Data collected by the avian radar system during 2024 fall, 2025 spring, and 2025 summer monitoring periods were analyzed to provide the number of biological targets (nBTs) by date and by height (comparable with altitudinal height), while also factoring in the influence of possible migration cues associated with weather and climatic conditions. Data were also analyzed to determine target density within height bins and the percentage of potential targets

within the rotor swept area (i.e., risk zones of turbine interaction). A snapshot of radar results is provided below; detailed results of the radar monitoring period can be found in Appendix M

The 2024 fall monitoring period detected most biological targets (BTs) within the days between August 21 and 26, with some notable data on September 11, October 8 to 9, and November 1-2. Most detections occurred within the 250 m to 2,000 m height bins; however, the highest number detections occurred within the 500 m to 1,000 m height bin. Notably, a high number of detections were also detected at the 25 m to 50 m height bin during late August period.

The 2025 spring monitoring period detected the most BTs on April 16 and May 5. Most detections occurred within the 150 m to 500 m height bins, with the greatest number of BTs detected between 250 m and 500 m.

The 2025 summer monitoring period detected most BTs on July 6 and August 5. Most detections occurred within height bins between 150 m and 500 m, with the greatest number of BTs detected within the 250 m to 500 m.

Migratory Bird Density

ARS target density was calculated using the volume of airspace scanned in each height bin. These values were compared to the number of BTs at each height bin during the 2024 fall monitoring period, the 2025 spring monitoring period, and 2025 summer monitoring period (Table 7.75).

Table 7.75: Target Density – Fall 2024

Height Bin (m)	Airspace Scanned (km^3)	Number of BTs	Target Density (BT/km^3)
0-25	0.101	0	0
25-50	0.101	733	7224.4
50-100	0.204	32	157.2
100-150	0.204	16	78.3
150-200	0.205	6	29.2
200-250	0.206	8	38.8
250-500	1.052	369	350.8
500-1000	2.226	818	367.5
1000-1500	2.337	436	186.6
1500-2000	2.426	143	58.9
2000-3000	3.774	0	0
Total	**12.838**	**2561**	**199.6**

Most BTs were within the 500 to 1000 m height bin during the 2024 fall monitoring period (Figure 7.4). This is associated with a peak migration event observed on October 7 to 8 (nBTs = 353). Approximately 32% of BTs were detected within this range. Target density during the fall monitoring period peaked in the 25 to 50 m height bin with smaller peaks in the 250 to

500 m and 500 to 1000 m height bins. Overall, target density showed greater variation than target counts (Figure 7.4). No BTs were detected within the 0 to 25 m height bin, possibly due to the exclusionary zones created during data analysis to reduce external interference from unwanted targets (i.e., rain, insects, shrubs and trees).

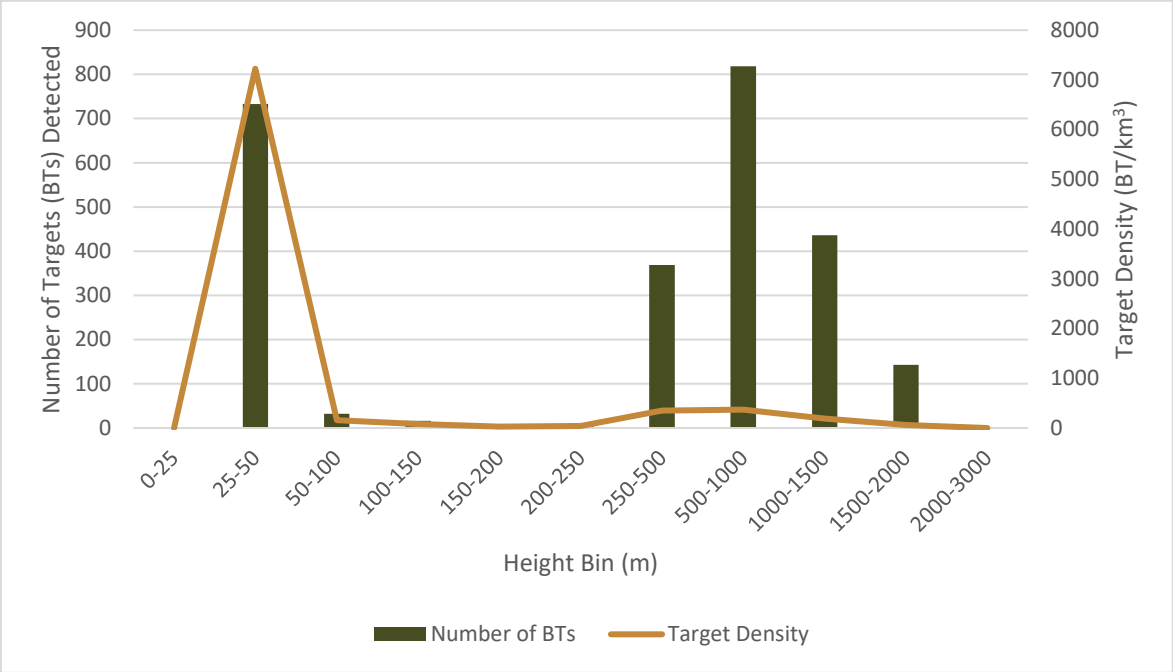

Figure 7.4: Targets Detected and Target Density – Fall 2024

During the 2025 spring monitoring period, the ARS detected the most BTs within the 250 m to 500 m height bin (Figure 18). BTs were detected within this height bin throughout the monitoring period with peak detections occurring on April 24 and April 26, 2025 (nBTs = 144 and 143 respectively). Approximately 33% of BTs (nBTs = 7,061) were detected within this height bin (Table 7.76).

Table 7.76: Target Density – Spring 2025

Height Bin (m)	Airspace Scanned (km^3)	Number of BTs	Target Density (BT/km^3)
0-25	0.102	1	9.9
25-50	0.102	750	7381.9
50-100	0.204	1070	5255.4
100-150	0.204	2754	13480.2
150-200	0.205	4981	24273.9
200-250	0.206	5022	24343.2
250-500	1.052	7061	6712.0
Total	**2.075**	**21639**	**10431.0**

The target density during this period shows similar variation to target counts with the number of detected targets increasing with the altitude scanned until the 250 to 500 m height bin (Figure 7.5).

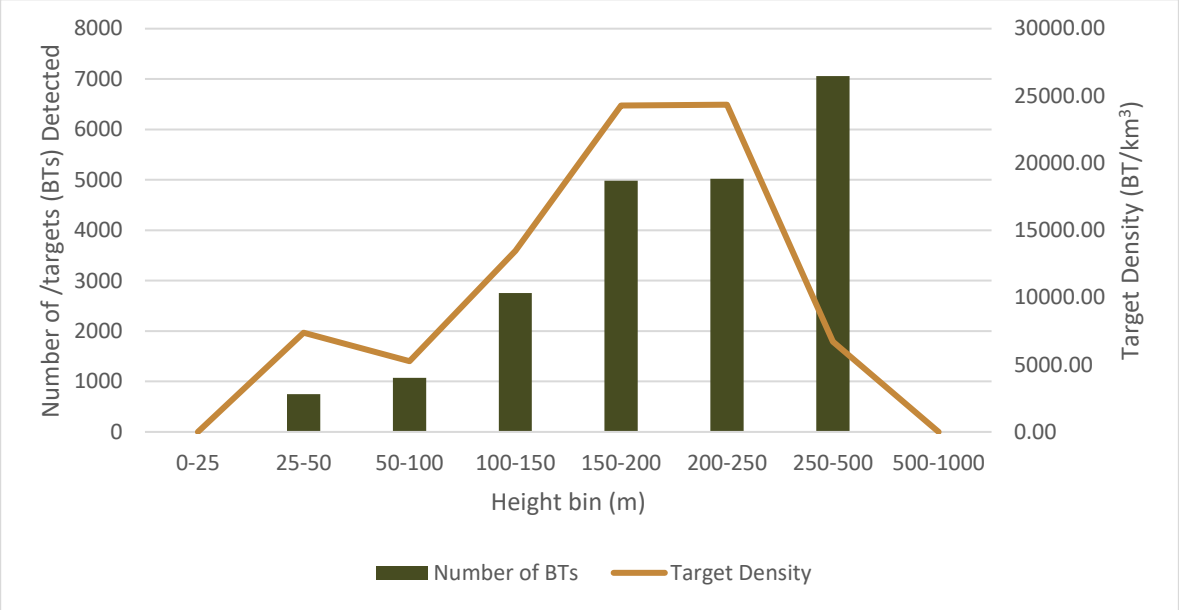

Figure 7.5: Targets Detected and Target Density – Spring 2025

Like the results from the 2025 spring monitoring period, during the 2025 summer monitoring period the ARS detected the most targets within the 250 m to 500 m height bin. Approximately 30% of BTs (nBTs = 3,467) were detected within this height bin (Table 7.77).

Table 7.77: Target Density – Summer 2025

Height Bin (m)	Airspace Scanned (km^3)	Number of BTs	Target Density (BT/km^3)
0-25	0.102	1	9.9
25-50	0.102	94	925.2
50-100	0.204	500	2455.8
100-150	0.204	1560	7635.8
150-200	0.205	3025	14741.7
200-250	0.206	2900	14057.2
250-500	1.052	3467	3295.6
500-1000	2.226	0	0
Total	**4.301**	**11547**	**2685.0**

The pattern of BT density during this period shows similar variation to target counts with the number of BTs increasing with the amount of airspace scanned until the 250 to 500 m height bin (Figure 7.6).

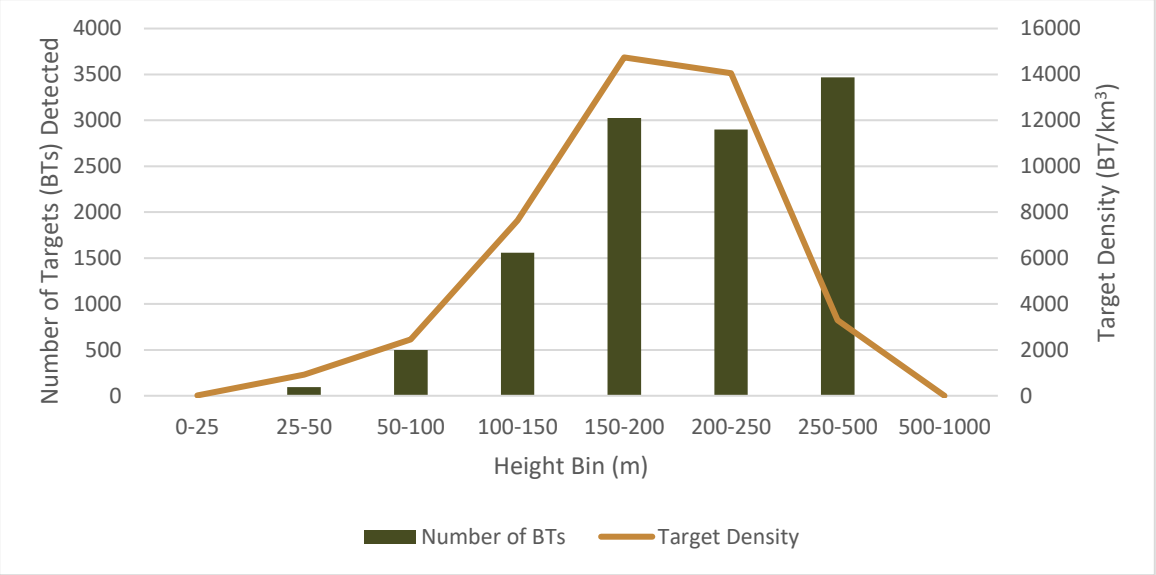

Figure 7.6: Target Count and Target Density – Summer 2025

Avian Interaction with the Project

BTs detected outside of the rotor swept area (i.e., risk zone) were per season:

- Fall 2024: 66% of targets, most of which were detected from August 21 to 26, 2024.
- Spring 2025: 56% of targets, most of which were detected in early to mid-April.
- Summer 2025: 55% of targets.
- Almost all the birds detected were flying during relatively low wind speeds.

Radar Results Summary

The ARS operated for approximately 690 hours during the 2024 fall migration season (i.e., August 21 to November 25) and approximately 1,115 hours during the 2025 spring migration and breeding bird seasons (i.e., April 24 to August 9).

The highest number of target detections during each season were:

- Fall 2024: mid-August to mid-September.
- Spring 2025: early April to mid-May.
- Summer 2025: late June to mid-July (potential post-breeding dispersal).

There were notably more targets detected during the 2025 monitoring period compared to the 2024 monitoring period. Detections were also more consistent in 2025 with targets being detected on each day during the monitoring period whereas in 2024 targets were only detected on 23% of the days monitored. While these results may be in part related to annual as well as seasonal variations in avian migration, they may also be due to the differences in the software used in the analysis of the data collected by the radar (analysis methods described in further detail in Appendix M). The data collected in 2025 were analyzed using the CMT processing

software which can detect a larger number of targets but has a lower detection range than the radR software used to analyze the data collected in 2024.

Despite the differences in analysis software, there are consistent trends in the data collected during all monitoring periods. Birds observed within and around the Study Area were most active in the hours shortly before sunrise and shortly after sunset. Detected birds generally flew during lower wind speeds, which was a potential reason that most BTs were not observed taking advantage of the available tailwinds. Birds migrating through the Study Area also appear to be influenced by temperatures with detections increasing as temperatures rose in the spring and fell in the fall.

Acoustic Results

Data collected by the avian acoustic monitors during the 2024 fall, 2025 spring, and 2025 summer/fall monitoring periods were analyzed to provide peak detection periods and presence of species within the Study Area. A snapshot of acoustic results is provided below; detailed results of the acoustic monitoring period can be found in Appendix M.

Nighthawk

During the 2024 fall monitoring period, positive detections (i.e., detections that were confirmed as positively identified by Nighthawk through verification) were highest in August and September, with detections decreasing in October and November (Figure 7.7). The decline in detections indicated the end of fall migration activity. The highest number of detections occurred from 05:00 to 08:00 and from 22:00 to 00:00.

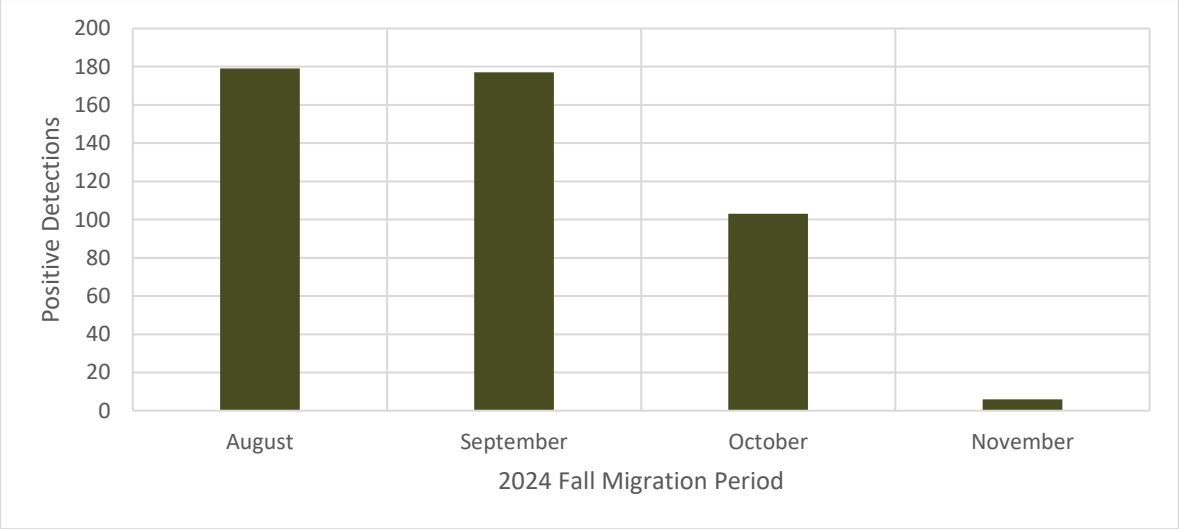

Figure 7.7: Positive Nighthawk Detections at GCBird4 During the 2024 Fall Monitoring Period

During the 2025 spring monitoring period, positive detections were highest in April and May, with detections relatively low in March and June (Figure 7.8). The highest number of detections occurred between 21:00 and 04:00, with little to no activity outside of those hours.

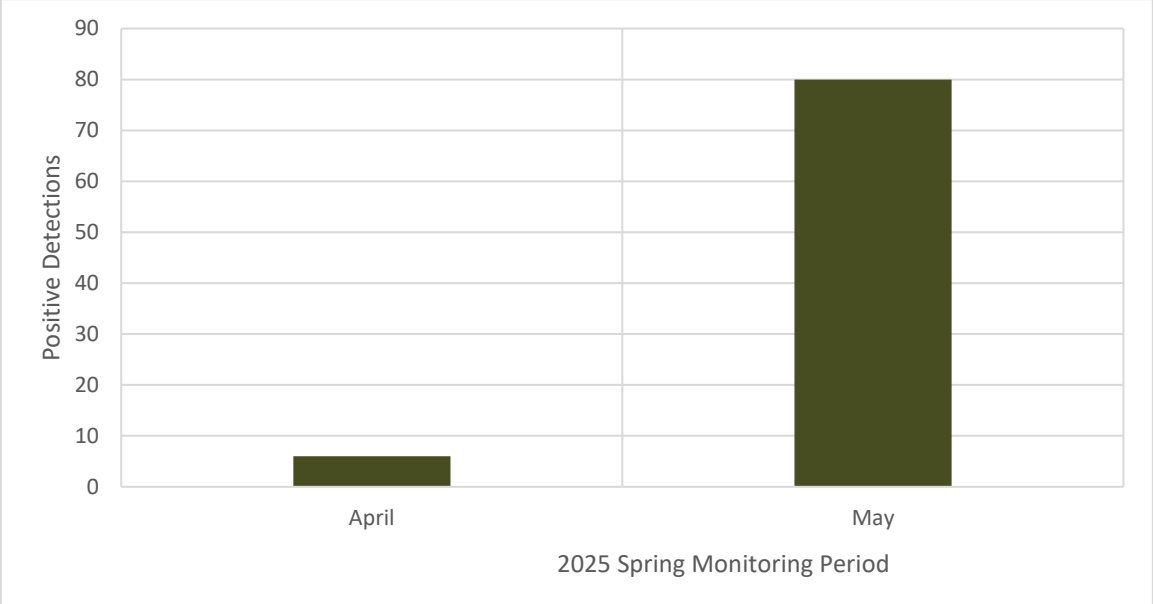

Figure 7.8: Positive Nighthawk Detections at GCBird4 during the 2025 Spring Monitoring Period

During the 2025 summer/fall monitoring period, positive detections were highest in August than in June or July, indicating higher night flight calls due to the beginning of fall migration (Figure 7.9). The low night flight calls in June and July are expected as birds are in peak breeding season. The highest number of detections between 21:00 and 00:00, with another smaller peak around the 04:00 timeframe.

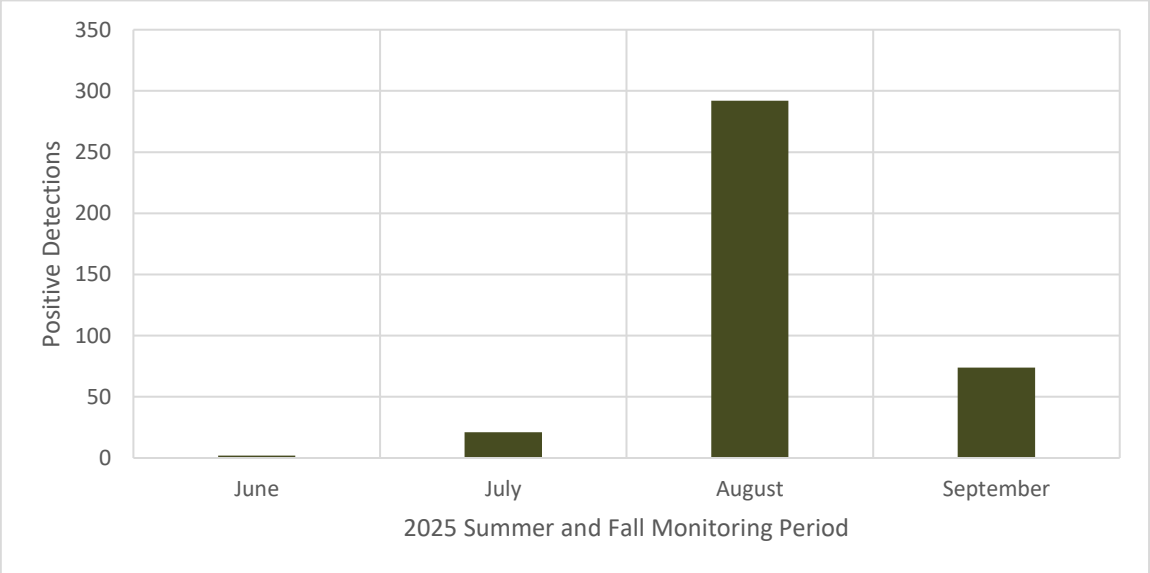

Figure 7.9: Positive Nighthawk Detections at GCBird4 during the 2025 Summer and Fall Monitoring Period

Across the three monitoring periods, Nighthawk was most successful at identifying American robin, black-and-white warbler, dickcissel (*Spiza americana*), Canada warbler, common yellowthroat, dark-eyed junco, hermit thrush, mourning warbler (*Geothlypis philadelphia*), northern parula, palm warbler, savannah sparrow (*Passerculus sandwichensis*) and white-throated sparrow. Canada warbler and bobolink were the only SAR species positively identified by Nighthawk across the monitoring periods.

Manual Listening

Across the three monitoring periods, the remaining monitors record approximately 56 unique species, two of which were an unknown woodpecker species and unknown warbler species. Efforts were made to ensure observations of birds were not repeated. Passerines accounted for most of the species heard, with some inclusions of shorebirds, raptors, and other land birds (i.e., woodpeckers). Species richness was highest during the 2024 fall monitoring period; with the spring and summer 2025 periods have lower species richness due to the monitors' cutoff schedule. Common nighthawk was the only SAR observed during this process across the monitoring periods.

Acoustic Results Summary

In total, five acoustic monitors recorded for approximately:

- 945 hours during 2024 fall migration (i.e., August 21 to November 11)
- 660 hours during 2025 spring migration (i.e., March 27 to June 10)
- 1,060 hours during the 2025 breeding bird and part of the fall migration season (i.e., June 10 to September 9).

The avian SAR detected by acoustic monitors were:

- Bobolink (fall 2024 – nocturnal aerial migrant).
- Canada warbler (spring 2025 and fall 2024 – nocturnal aerial migrant).
- Common nighthawk (summer and fall 2025 – presumed breeding).

7.4.4.10 Effects Assessment

Project-Avifauna Interactions

Project activities, primarily those that involve earth-moving or vegetation removal, or turbine interactions with avifauna in the airspace have the potential to impact avifauna (Table 7.78). These activities could result in habitat removal, edge effects, reductions in food availability, and avifauna-turbine interactions (i.e., sensory disturbance, injury, or mortality). Other Project related activities, including during construction and operation, may impact avifauna behaviours, such as increased light, noise, and traffic.

Table 7.78: Potential Project Interactions with Avifauna

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	X
Removal of Temporary Works and Site Restoration	X
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning and Rehabilitation	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

For the purposes of this assessment, the LAA for avifauna includes a 5 km buffer of the Study Area as well as the airspace that is directly surrounding the turbines to account for the rotor swept area (i.e., risk zone). The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for Avifauna. The VC-specific definition for magnitude is as follows:

- Negligible: No loss of avifauna habitat, no sensory disturbance impacts, and injuries or mortalities to avifauna are not expected.
- Low: Small loss of habitat supporting SAR and habitat sensitive avifauna, low sensory disturbances, and low risk of injuries and mortalities.
- Moderate: Moderate loss of habitat supporting SAR and habitat sensitive avifauna, moderate sensory disturbances, and moderate risk of injuries and mortalities on individual level rather than entire populations.
- High: High loss of habitat supporting SAR and habitat sensitive avifauna, high sensory disturbances, and high risk of injuries and mortalities that would be sufficient to impact species on a population scale.

Effects

Habitat Loss, Alteration/Fragmentation, and Edge Effect

Avian habitat loss and fragmentation will occur due to clearing for newly constructed roads (totaling 11.9 km in length, which includes 2.7 km of existing/upgraded roads), turbine pads, and the transmission line (totaling 0.1 km for transmission line and 18.2 km for collector lines) within the Clearing Footprint. This assessment used an estimate of clearing (95.9 ha) required to evaluate habitat impacts to avifauna. However, much of the area cleared represents a temporary impact that will be allowed to revegetate following construction. For example, vegetation under the proposed transmission line will be cleared during the construction phase, and a transmission line ROW buffer will be maintained throughout the Project's lifespan. The transmission line ROW area may shift vegetation community type; however, this does not represent a total loss of terrestrial habitat.

The Project Footprint prioritizes the use of previously disturbed areas, as well as adopting a highly optimized layout to minimize loss to sensitive habitats known to support avian species including wetlands and mature forests. Cutover uplands, when combined with urban/developed and cutover wetland land cover categories, account for 22% of the total impact area in the Clearing Footprint. Additionally, a portion of the open area land cover class was determined to also include disturbed areas such as harvests, secondary roads, and trails, suggesting that actual Project impacts to this class will be lower (and impacts to "disturbed" areas is higher).

In addition, throughout the course of the Project planning stage, the Project Footprint was shifted west to avoid an area of potential bat habitat observed near Morrisons Lake [near PC 23 (Drawing 7.31)]. Shifting the planned infrastructure west of this lake avoids portions of mature forest and various wetlands, as well as shifts the Project farther from the Strait of Canso, which is also beneficial for birds. This shift also avoids a wetland with a rusty blackbird observation.

Within the Clearing Footprint, habitat removal/fragmentation and increased edge areas may have the following effects:

- Increase in the number of habitat generalist species.
- Decrease in the number of habitat specialist species.
- Increase in aerial insectivores/foraging habitat (i.e., open and edge habitat).
- Increase in transitional and microhabitats.
- Increase in suitable habitat for common nighthawk, eastern wood-pewee, and olive-sided flycatcher (SAR).
- Decrease in suitable habitat for Canada warbler, evening grosbeak, and rusty blackbird (SAR).
- Increased avian predation.
- Increased nest predation and parasitism.

Habitat fragmentation has been shown to increase the number of habitat generalist species while also decreasing the number of habitat specialists. Habitat generalists have a higher

likelihood of surviving in smaller habitat patches in a mosaic landscape (e.g., a road network associated with a wind project) due to their ability to use various habitat patch types (Andrén, 1994). Bird species with different characteristics, such as habitat specialization, reproductive rates, and trophic guilds, may respond differently to edge effects. Interior-forest birds that prefer larger tracts of undisturbed forest or habitat specialists can be impacted by habitat fragmentation due to reduced connectivity (Andrén, 1994). For example, edge habitat may alter physical conditions like light, temperature (e.g., higher wind and sun exposure), and wind, which in turn influences vegetation structure and food availability, potentially impacting bird communities (Andrén, 1994).

Species that prefer low-light habitats (e.g., larger eyed birds like owls and thrushes) may be more sensitive to fragmentation, while other bird species such as insectivores (e.g., flycatchers, swallows, and nightjars) and understory foragers may thrive in fragmentated habitats (Andrén, 1994; Tittler et al., 2001). Examples of species that rely on interior-forest habitat, especially with regards to nesting, include certain thrush [e.g., Swainson's thrush and wood thrush (*Hylocichla mustelina*)] and warbler species [e.g., bay-breasted warbler and ovenbird].

The creation of edge habitat and open areas has the potential to attract aerial insectivores (Tittler et al., 2001). Some bird species benefit from forest edge habitat and have shown to return in subsequent years after an area is cleared due to the availability of foraging opportunities and other niche habitats (Tittler et al., 2001). Additionally, some species (e.g., blackbirds) can also tolerate forestry activities if their coniferous tree-dominant habitat with varying heights near waterbodies is maintained (C. Stacier, avian biologist and professor at Dalhousie University, personal communication 2018). Consequently, cleared areas create open spaces and edges within the forested environment, which may benefit certain bird species that favour edge or transitional habitats. These changes could potentially create favorable microhabitats within the Clearing Footprint, particularly for generalist bird species or those that readily adapt to disturbed environments.

For identified SAR, turbine pad and new road construction may create or reduce suitable habitat within the Clearing Footprint. Suitable breeding habitat for common nighthawk is anticipated to increase due to their affinity for disturbed habitats. Similarly, foraging habitat for eastern wood-pewee and olive-sided flycatchers may also increase as these species utilize edge habitat and clear-cuts for foraging. Alternatively, suitable habitat for Canada warbler, evening grosbeak, and rusty blackbird may decrease within the Clearing Footprint because of impacts to wetlands and forested habitats.

Approximately 6.4 ha of field delineated wetland inside the 213.2 ha Assessment Area, predominantly swamp habitat, may be directly impacted by the Project Footprint. Various Canada warbler, olive-sided flycatcher, and rusty blackbird observations occurred in wetlands within both the Assessment Area and Study Area, with Canada warbler having the most occurrences of the three species (i.e., nine observations within wetlands).

Although a decrease in suitable habitat for these SAR is anticipated, avian SAR potential habitat modelling results indicate that there is sufficient suitable habitat surrounding the Clearing Footprint and Assessment Area to maintain habitat functionality and use within the larger Study Area and LAA. If alternative suitable habitats are unoccupied, the affected species may choose those alternate habitat areas in lieu of the cleared area. However, this may increase competition for territory, nesting areas, and foraging for the affected species in the LAA (Chen & Wang, 2024). In addition to increased competition, habitat loss could alter migration patterns via reduction of stopover areas and negatively affect food availability and abundance (Chen & Wang, 2024).

Lastly, habitat fragmentation and increased edge areas may lead to increased predation (e.g., increase in raptor species) on birds. A study by Manolis, et al. (2002) found that distance to the nearest clear-cut was the best predictor of nest predation in multiple ground laying birds.

Overall, undisturbed avian habitats within the Study Area are not unique and are extensively present within the surrounding landscape of the LAA. It is expected that any birds using habitat that will be disturbed by Project activities will move to similar habitats within and adjacent to the Study Area. Although there will be habitat loss as a result of the Project, habitat functionality across the LAA is expected to remain intact.

In conclusion, habitat loss and fragmentation within the Study Area are anticipated to be moderate to low due to the smaller Project Footprint (i.e., highly optimized turbine placement model) as well as the high level of disturbed habitat existing within the Clearing Footprint (i.e., historical forestry activity) and prevalence of adequate habitat nearby within the LAA.

Avian Species at Risk Potential Habitat

Avian SAR potential habitat modelling was completed for Canada warbler, common nighthawk, Eastern-wood Pewee, evening grosbeak, olive-sided flycatcher, and rusty blackbird. Methods and results are in Section 7.4.4.7 (Table 7.74 and Drawings 7.32A to 7.32F).

Given the land cover composition of the Assessment Area (a mixture of disturbed and forested areas, as well as wetland and lake habitats), the proportions of suitable habitat for each species are as expected. This is especially true in the case of common nighthawk, which makes use of the types of disturbed habitats also being used for the Project. In all cases, except for common nighthawk, these species had higher percentages of potential calculated habitat within the Assessment Area and Study Area compared to Clearing Footprint. Based on these results, it can be noted that the modelled habitat within the Clearing Footprint is not unique and there is potential habitat for these species within the other spatial boundaries.

Differences in wetland preference and occurrence level of each wetland type in the area are likely the reasoning for the different potential habitat calculations for Canada warbler (e.g., treed swamps) and rusty blackbird (e.g., open swamps, marshes, and ponds). Eastern wood-pewee and evening grosbeak had the lowest calculation of potential habitat at each scale, likely due to forestry activity in the area and their preferences in habitat type. Common

nighthawk and olive-sided flycatcher had the highest calculation of potential habitat at the Clearing Footprint and Assessment Area scales, likely due to the prevalence of edge habitat and open areas associated with wetlands and forestry activity that they prefer (Drawings 7.32A to 7.32F).

Based on the modelled percentages of potential habitat at each scale, it is evident that habitat for each of these species is not unique to the Clearing Footprint or Assessment Area and is also present within the Study Area and LAA overall.

Sensory Disturbance – Light and Noise

Construction and operation activities for the Project, including increased traffic, noise, and lighting, have the potential to disturb bird species within the LAA.

Sensory disturbance may occur during all Project phases, though it will be more prevalent during construction (limited to daylight hours, when possible, during construction), with limited disturbance through operations (i.e., consistent and sporadic noise and lighting generated by traffic and facility operations). The noise and light will be concentrated in the Study Area but could also extend beyond it into the portions of the LAA that are near the Project Footprint.

Increased vehicular movement could lead to short-term displacement of birds, particularly ground-nesting or low-flying species within proximity to access routes. Traffic disturbance can be particularly stressful for species with established territories within the area, potentially prompting them to abandon nests or avoid otherwise suitable habitat. Overall, while these construction-related disturbances are temporary, they may cause localized changes in bird distribution and behaviour during the active phases of the Project.
Noise from heavy machinery and equipment can disrupt normal behaviours such as foraging, breeding, and resting, especially for sensitive species documented during breeding bird surveys. The sounds associated with construction, while temporary, may lead some birds to avoid areas near active construction zones, possibly altering their habitat use patterns during critical breeding or migration periods (Blickley & Patricelli, 2010; Marler et al., 1973; Shannon, Crooks, et al., 2016).

Birds can exhibit greater susceptibility to noise impacts as many species rely on vocal communication (Blickley & Patricelli, 2010). Avifauna may be displaced from areas adjacent to the Project from construction related noise. Impacts can also differ between acute and chronic noise sources. Chronic exposure may degrade auditory cues, feedback, and vocal development over time, which are important for predator/prey detection, communication, breeding, and orientation (Blickley & Patricelli, 2010; Marler et al., 1973; Shannon, Crooks, et al., 2016). A direct physiological impact causing a temporary decrease in auditory sensitivity can occur at acute noise levels above 93 dBA, while permanent damage to avian auditory systems is not recorded until 125 dBA to 140 dBA (Blickley & Patricelli, 2010). In one study, chicks exposed to 111 dBA for 48 hours were found to completely recover from hearing damage within 10 days (Saunders & Tilney, 1982). Ryals et al. (1999) found that birds lose hearing from hair cell loss and that these hairs can recover via regeneration allowing birds to regain hearing.

Certain bird species may not be impacted by sensory disturbances. A study of the impact of logging truck traffic on birds reported no observed effects on nesting at noise levels of 53 dBA (Grubb et al., 1998). It was also found that noise-tolerant species had increased nesting success and decreased nest predation through higher awareness and less flushing (Francis et al., 2009). The median sound level produced by construction equipment at 15 m from point source is comparable to sound produced from an ATV or pick-up truck (96 dBA), which is already a common source of sound within the Study Area, as are logging trucks and harvesting equipment. Therefore, impacts to auditory sensitivity may occur from acute noise on a short term and intermittent frequency during the construction phase, but levels will be consistent with existing sound levels in parts of the Study Area. The decibel limits of individual construction equipment required for the Project are not expected to be greater than 115 dBA, indicating permanent damage to avian auditory systems is not likely to occur. Blasting noise (if blasting is deemed necessary) may exceed this range but this activity will be sporadic in nature, only occurring during the construction phase of the Project, and is not anticipated to be required. A blasting plan and mitigation measures will be developed to lessen impacts during blasting if it is required.

A literature review conducted by Shannon et al. (2016) found that noise levels greater than 45 dBA have the potential to exhibit changes in avian song characteristics, reproduction, abundance, stress levels, and species richness. Sensory disturbance from noise levels associated with construction activities during the avian breeding season could result in abandonment of nests. If adjacent suitable habitat is not available, birds that have been displaced are not likely to nest until habitat becomes available which may result in a higher non-breeding population. According to avian SAR predicted habitat modelling results, adjacent breeding habitat will remain available for all SAR where breeding habitat may be impacted by the Project (Drawing 7.32A to 7.32F).

Based on the noise model developed for the Project (Drawing 7.3), predicted operational noise levels above 45 dBA are expected to be localized around turbines, generally between 250 m and 400 m from turbines, depending on the proximity and layout of each turbine with respect to others. Predicted noise levels at 40 to 44 dBA are only expected outside of the Study Area in a few cases, leading to a very low or negligible sensory disturbance impact within the LAA (i.e., only in portions within and potentially along the Study Area edge).

Lighting used during construction, particularly if activities extend into early morning or late evening hours, could also impact birds within the vicinity. Artificial lighting may disorient nocturnally active birds, increasing the likelihood of attracting them closer to construction areas. For light-sensitive birds, especially migratory and nocturnal species, this could temporarily alter natural behaviours or increase the risk of collisions with equipment or structures. Given the frequency of foggy conditions in portions of the Study Area that encroach on the coastline, light intensity may be amplified, further enhancing the potential for disturbance. Light sensory disturbance that can impact birds includes behavioural effects such as disorientation, avoidance, or attraction (Longcore & Rich, 2004). The nearest part of the Project Footprint to the coastline is within approximately 2.1 km.

Light attraction is a particular concern during nights with low visibility (e.g., low cloud cover or fog) and high winds. Lighting used during construction, particularly if activities extend into early morning or late evening hours, could also impact birds in the vicinity. Artificial lighting may disorient nocturnally active birds, increasing the likelihood of attraction to construction areas. For light-sensitive birds, especially migratory and nocturnal species, this could temporarily alter natural behaviours or increase the risk of collisions with equipment or structures (Longcore & Rich, 2004). Research has demonstrated that birds attracted to or congregating around lights often become disorientated and lose their sense of direction, ultimately disrupting migration (Adams et al., 2021).

Disoriented migratory birds are prone to circling light sources, which increases the potential for death by exhaustion or predation when forced to land in high-risk areas. In turn, these behavioural changes can affect the success of foraging, reproduction, and communication and can disrupt habitat connectivity through anthropogenic development (Bliss-Ketchum et al., 2016; Longcore & Rich, 2004). It has been known that exterior structures such as buildings and other floodlit structures can attract birds during the night and lead to mortality events. In addition, migratory birds during fall and spring are especially attracted to lighting on tall structures. Modifications and timing of use for lighting can be managed to limit impacts on birds (Bliss-Ketchum et al., 2016; Longcore & Rich, 2004).

At night, and especially during cloudy nights with low ceiling, artificial lighting can attract birds during migration. Lights that are known to increase disorientation include consistent white or red lights (Poot et al., 2008). Strobe lights or intermittent/flashing lights have been shown to decrease avian mortality as it interrupts the zone of influence that lighting on birds can have (Longcore et al., 2008). While continuous lighting can attract or disorient birds, especially nocturnal migrants, brief and low-frequency lights reduce the risk of such interactions.

For nocturnally active species that may be more sensitive to artificial lighting, the risk of attraction or disorientation remains low due to the limited light exposure. In the event of foggy or low-visibility conditions (e.g., heavy rain), the short, infrequent flashes will also reduce the overall light presence, limiting the potential for enhanced attraction effects.

Lighting associated with the Project will be minimal and turbine lighting at night will be restricted to Transport Canada required navigation hazard lights mounted on the turbine nacelles. As such, lighting is not expected to impact bird migration.

Upon completion of construction and throughout the lifespan of the Project, the lighting on-site will be minimized, and mitigation measures will be applied to limit the effects of lighting on birds [e.g., motion-activated lighting, shielding, light emitting diodes (LEDs), etc.].

Avifauna-Project Infrastructure Interactions – Injury and Mortality Risk

The radar and acoustic monitoring program provided quantifiable insights into the volume, movement patterns, and altitudes of birds moving through and within the Study Area, enabling a more precise understanding of collision risk relative to the Project's infrastructure.

Bird strikes are a primary concern when considering the interactions of avifauna with wind projects, as turbine blades spin at high speeds through the airspace frequented by a variety of species at all altitudes within the rotor swept area (i.e., 36.5 to 199.5 m). Bird strikes include instances when birds are struck by the rotating turbine blades, or birds collide with the turbine tower or nacelle structures, which can cause injury or mortality to birds. Collisions with transmission lines are also a concern for avian injury and mortality risk. Factors including species abundance, frequency of passage, species-specific flight behaviour, avoidance behaviours, differential use of areas within the Study Area, weather, and topography may all influence collision risk (De Lucas et al., 2008). Estimated bird mortality as a result of wind turbine collisions varies across Canada, with Zimmerling et al. (2013) estimating mortalities at 8.2 per turbine per year. Bird Studies Canada (2016) conducted a study to review mortality across Atlantic Canada and Ontario, showing mortality estimates in Atlantic Canada to be lower, at approximately 1.17 birds per turbine per year. Strum has conducted avian mortality monitoring across a variety of wind projects in Nova Scotia and New Brunswick, with an overall rate of approximately one observable mortality per turbine per year.

Based on radar data, over 50% of the birds migrating through the Study Area would be flying above the rotor swept area of the turbines (the risk zone) associated with the Project. Detections within the rotor swept area ranged from 34% for fall, 44% for spring, and 45% for summer. Peak detections occurred in mid-August to mid-September, early April to mid-May, and late June to mid-July. The highest number of detections within the rotor swept area occurred during August 21 to 26, 2024.

Radar data showed that birds within and around the Study Area were most active in the hours shortly before sunrise and shortly after sunset. Birds detected within and around the Study Area generally preferred to fly during lower wind speeds, which was a potential reason that most targets were not observed taking advantage of the available tailwinds. Birds migrating through the Study Area also appear to be influenced by temperature with detections increasing as temperatures rose in the spring and fell in the fall.

Based on the radar results showing a few peak detection nights, potential mortality events would likely be limited to a few events during the spring and fall migration periods. Both migration activity and flight heights will have an impact on potential collisions. Migration and flight behaviour is also influenced by weather (i.e., wind and temperature) and dependent on photoperiod and the lunar section, as discussed in the radar and acoustic baseline reporting.

The Study Area has a topographic change from inland towards the coast, which may lessen the concern for shorebirds and waterfowl. While the Strait of Canso experiences high levels of bird movement throughout the year, the Project is separated from the Strait by Cape Porcupine, a steep, rocky outcrop. Previous avian studies in this area have suggested that Cape Porcupine may serve as a barrier to birds travelling within the Strait, funneling shorebirds and waterfowl along the Strait rather than inland (McCallum Environmental Ltd., 2013).

Collisions with transmission lines are also a concern for avian injury and mortality risk. Based on studies, shield wires on transmission lines are most associated with bird collisions as they are the highest wires and are smaller in diameter which makes them more difficult to see (APLIC, 2012). Potential for collision increases when birds increase altitude to avoid more visible infrastructure (i.e., phase conductors), which can place them at the same altitude as shield wires (APLIC, 2012). Various studies of high collision rate transmission lines show that collision risk can reduce by 50% to 80% when these lines are marked, although this can vary based on location and environmental factors (Barrientos et al., 2011). Vibration dampers installed between line markers are also known to be effective on reducing bird collisions (APLIC, 2012).

Overall, studies on bird interactions with transmission lines have shown varying results. Rioux et al. (2013) noted that estimating bird mortality from collisions with powerlines is challenging due to a lack of studies and factors like carcass scavenging, which can limit results. The study estimates that mortality rates due to transmission line collisions in Canada range from 1 million to 229.5 million birds per year, although rates may vary considerably depending on factors like habitat type and line type. The study notes that waterfowl, grebes, shorebirds, and cranes appear to be particularly vulnerable to collision. As most transmission lines associated with the Project are inland and not near the coastline, this reduces concern of avian collisions. In addition, the interaction zone for transmission lines extends no higher than tall trees in the area, which is outside of the migratory pathway. Other studies have shown that individual bird losses from collisions are not biologically significant and are unlikely to impact species of birds that have large populations (APLIC, 2012).

Due to the Project siting the substation close to existing transmission line infrastructure, only a short 100 m long transmission line is required for the Project.

Upon completion of construction and throughout the lifespan of the Project, the navigation hazard lights on the transmission towers, designed to flash only a few times per minute at night, are expected to have minimal collision risk (via minimal sensory disturbance effects) for birds due to their low intensity and infrequent flashes. At night, and especially during nights of cloudy skies and low ceiling, artificial lighting can attract birds during migration. Lights that are known to increase disorientation include consistent white or red lights. Strobe lights or intermittent/flashing lights have been shown to decrease avian mortality as it interrupts the zone of influence that lighting on birds can have (Longcore et al., 2008). While continuous lighting can attract or disorient birds, especially nocturnal migrants, the brief and low-frequency nature of these lights reduces the risk of such disruptions.

An increase in road traffic during construction and wind turbine maintenance will increase the chances of mortality to avifauna species that use roadways, especially grouse species and similar species, as they are known to use roadways for travel and nesting (Madden & Perkins, 2017; Whitaker et al., 2010). Construction and increased road traffic particularly pose a risk to nests and unfledged nestlings. Outside of the construction phase, the Project will only require technicians to access the site to perform regular maintenance/equipment checks and

occasional larger-scale repairs. Considering the pre-existing traffic load (i.e., forestry and off-roading vehicles) and the minimal traffic that will be associated with Project operation, along with road traffic mitigations (e.g., speed limits), road traffic is expected to have a negligible or low effect on avifauna in the LAA.

Mitigation measures will reduce the risk of avifauna interactions with Project equipment and infrastructure, as well as management and monitoring plans (e.g., further radar and acoustic monitoring, which may result in adaptive management measures being taken if applicable).

Migration Disruption

Birds moving through the Study Area during migration seasons may encounter turbines and transmission lines as a new structural barrier. This could potentially lead to natural flight path alterations, which could in turn result in additional energy expenditure to avoid these obstacles. This is particularly relevant for species traveling at altitudes within the infrastructure height range, as they may need to navigate around or above the structures to avoid collisions.

The modified airspace could lead to temporary disorientation for birds unfamiliar with the infrastructure, especially during low visibility conditions such as fog or heavy rain, which are common in the region. Additionally, radar survey efforts have shown peaks in migration during fall and spring, with high-altitude movements in certain periods, indicating that while most birds seem to fly well above infrastructure height, there are episodic migration events where more birds could be affected. Thus, although overall disruption to migratory routes is likely minimal, specific conditions or migration events may increase the likelihood of navigational adjustments as birds travel through this altered environment.

Mitigation

The primary mitigation for avifauna is avoidance in the siting of infrastructure, including:

- Minimizing impacts to the terrestrial environment (e.g., limiting infrastructure impact).
- Avoidance, to the extent possible, of sensitive bird habitats, such as wetlands, waterbodies, interior forest, coastlines, etc. to reduce the impact of habitat changes. This includes a highly optimized turbine layout and siting Project infrastructure within areas with existing disturbances, such as existing roads and historically cleared areas, to the greatest extent possible.
- Avoidance of turbine placement within topographic funnels, such as within lake or river valleys, to reduce the likelihood of interactions with concentrated bird movements.

Mitigations to reduce effects on avifauna include:

- Adhere to ECCC guidelines/recommendations on clearing windows for nesting migratory birds (i.e., outside of the April 1 to September 30 nesting window), where possible. If vegetation and tree clearing activities during the nesting/breeding season cannot be avoided, nest sweeps will be conducted by a qualified avian biologist

  - Regulatory bodies (i.e., NSECC and NSNR) will be contacted, when necessary, to receive advice on construction buffers for any avian activity that must be avoided during the breeding bird season. When vegetation and tree clearing activities take place during the non-breeding bird season, the Proponent is aware of nests protected year-round under the 2022 update to the Migratory Bird Regulations (under the MBCA), which includes pileated woodpecker nests.
- Avoid disturbance of any ground- or burrow-nesting species should they initiate breeding activities within stockpiles or exposed areas during construction or operations, until chicks can fly, and the nesting areas are no longer being used. Exposed stockpiles will be limited or covered as much as possible during construction and operation phases.
- Manage borrow pits, stockpiles, and exposed sedimentation banks to reduce the attraction of burrow-nesters such as bank swallows [*Riparia riparia* (e.g., less than a 70 degree-slope)] as per ECCC BMPs and recommendations.
- Minimize use of herbicides within the transmission line ROW.
- Maintain compatible vegetation within the transmission line ROW.
- Allow natural revegetation of disturbed areas where vegetation suppression is not required during operations.
- Develop a site reclamation plan in accordance with engineering standards and in consultation with NSECC and NSNR.
- Minimize soil compaction along with the removal of hummocks, root masses, moss cover, ferns, and other ground vegetation that may provide good concealment of ground nests.
- Establish speed limits within construction areas for vehicles to mitigate the effect of vehicle-avifauna collisions. Traffic signs will be installed to alert road users of speed limits and the presence of wildlife in the area.
- Minimize, as much as possible, removal of large diameter decaying trees (> 40 cm DBH).
- Have designated garbage cans and pack out all waste to avoid attracting avifauna to the construction site. Maintain good housekeeping practices during construction to avoid indirectly feeding birds and potentially attracting nuisance wildlife.
- Develop and implement a Terrestrial Habitat and Wildlife Management Plan.
- Develop a spill response plan (within the Contingency Plan) and equip site machinery with spill kits and instruct site personnel on their use.
- Temporary lighting during construction will be minimized to the extent practicable and focused on the intended work area and shielded to minimize spillage.
- Minimize lighting, to the extent possible, including the use of LED lights (as they are less prone to light trespass in the surrounding environment), strobe lights, downward-facing lights, shielding to prevent light escaping above the horizontal plane, and motion-activated lighting when applicable (i.e., for employee safety).
- Install line markers on the powerlines as required by NAV Canada to increase visibility and reduce avian mortality risk.

- Follow Transport Canada requirements for navigational hazard markings and lighting on transmission lines, including the installation of strobe or intermittent/flashing lighting, to improve visibility and reduce avian mortality risk.
- Install perch guards on poles and bird diverters/deflectors on lines to limit transmission line interactions with birds.

Monitoring

A site-specific post-construction Terrestrial Habitat and Wildlife Management Plan will be developed in consultation with government regulators and other relevant parties.

A second year of bird surveys will be completed, prior to operations, per requirements of the Environmental Assessment Supplemental Checklist: Wind Energy Projects (NSECC, 2025c).

A detailed post-construction avian monitoring plan will be developed and submitted to NSECC and NSNR for review. Monitoring activities will include:

- Post-construction avian mortality/injury monitoring.
- Adaptive management (e.g., avian deterrents and turbine operations) if post-construction monitoring identifies significant avian injury or mortality rates, developed in consultation with NSNR.

Conclusion

The predicted residual effects of the Project on avifauna (after proposed mitigation and monitoring activities) are characterized in Table 7.79.

Table 7.79: Project-Avifauna Residual Effects

Effect Detail	Habitat Loss, Alteration/ Fragmentation, and Edge Effect	Sensory Disturbance – Light and Noise	Avifauna-Project Infrastructure Interactions – Injury and Mortality
Magnitude of Effect	**Low to Moderate:** Low to moderate loss of habitat supporting avian SAR and habitat-sensitive avifauna, depending on the species.	**Low:** Low sensory disturbances are expected.	**Moderate:** Avian use of the Study Area indicates a likelihood of interactions but recorded flight altitudes indicate effect is likely at the individual and not population scale.
Geographic Extent of Effect	5 km buffer of the Study Area	5 km buffer of the Study Area	5 km buffer of the Study Area
Frequency of Effect	**Single Event:** Loss of habitat occurs once during the construction phase (i.e., clearing and ground disturbance).	**Intermittent:** Intermittent during the construction, decommissioning, and operations phases.	**Intermittent:** May vary by Project phase, as well as seasonal differences (e.g., breeding, migration, and winter seasons).

Effect Detail	Habitat Loss, Alteration/ Fragmentation, and Edge Effect	Sensory Disturbance – Light and Noise	Avifauna-Project Infrastructure Interactions – Injury and Mortality
Duration of Effects	**Medium Term:** Effects will end following decommissioning.	**Medium Term:** Effects will end following decommissioning.	**Medium Term:** Effects will end following decommissioning.
Reversibility of Effect	**Partially Reversible**	**Reversible**	**Partially Reversible**
Significance Level	Not Significant	Not Significant	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible			

8.0 SOCIO-ECONOMIC ENVIRONMENT

8.1 Economy

8.1.1 Overview and Assessment Methodology

The assessment of the economy included consideration of local demographics, income, and businesses, as well as the economic contributions of the Project to the local economy through a review of the following resources:

- Census of Population – Statistics Canada (2023)
- Public mapping resources
- Economic data from the Proponent

8.1.2 Existing Environment

The Project is in Guysborough County, near the communities of (Drawing 8.1):

- Aulds Cove (approximately 3 km from the Project center to the center of the community boundary)
- Grosvenor (approximately 2 km west)
- Mulgrave (approximately 5 km southwest)
- Frankville (approximately 6 km north)
- East Havre Boucher (approximately 7 km north)
- Pirate Harbour (approximately 8 km southeast)
- Havre Boucher (approximately 8 km northwest)
- Port Hawkesbury (approximately 9 km east)

The Guysborough Municipal District census subdivision (CSD) corresponds with the MODG, as it will be referred to here, and excludes the Town of Mulgrave (“Mulgrave”). As the

southeastern portion of the Study Area falls inside the boundary of Mulgrave and thus outside of the MODG jurisdiction, the CSD for Mulgrave is also included in summary statistics. Population statistics for the province, MODG, and Mulgrave are summarized using the 2016 and 2021 Census of Population (Table 8.1). The population of the largely rural MODG has declined slightly between 2016 and 2021, contrary to the provincial trend. MODG has a much lower population density than the provincial population. Mulgrave has experienced more rapid population decline within its much smaller and more densely populated area.

Table 8.1: Population Characteristics in 2016 and 2021 for Nova Scotia, MODG, and Mulgrave

Population Statistics	Nova Scotia	MODG	Mulgrave
Population in 2021	969,383	4,585	627
Population in 2016	923,598	4,670	722
Population change from 2016 to 2021	+5.0%	-1.8%	-13.2%
Total private dwellings in 2021	476,007	3,043	316
Land area	52,824.7 km^2	2,115.2 km^2	17.8 km^2
Population density	18.4/km^2	2.2/km^2	35.2/km^2

Source: (Statistics Canada, 2023)

The age distribution in MODG reveals a median age of 58.4 years, over 10 years higher than the provincial median age of 45.6 (Statistics Canada, 2023). Further, 2021 age distribution statistics comparisons (Table 8.2) reveal that MODG has proportionally fewer people in both 0 to 14 and 15 to 64 years age groups, indicating fewer eligible people of working age or who will join the workforce within the next one or two decades. Mulgrave has proportionally fewer young people (0 to 14 years) than MODG, though a larger working-age population than MODG while still lower than the province. Mulgrave's retirement-age population (65+ years) is similarly proportionally larger than the provincial average, but smaller than MODG.

Table 8.2: Age Distribution in 2021 in Nova Scotia, MODG, and Mulgrave

Age Statistics	Nova Scotia	MODG	Mulgrave
0 to 14 years	136,710 (14.1%)	515 (11.2%)	60 (9.5%)
15 to 64 years	617,345 (63.7%)	2,455 (53.5%)	375 (59.5%)
65+ years	215,325 (22.2%)	1,615 (35.2%)	190 (30.2%)
Total Population	**969,380**	**4,585**	**630**

Source: (Statistics Canada, 2023)
Note that due to rounding, total percentage may be ±100%.

Median housing costs and median household total incomes in 2020 for MODG are compared to the provincial and national values (Table 8.3). This comparison shows that the median dwelling value in MODG is less than half of the provincial median, which itself is less than half the national median. Examining the relative value of median total income and median dwelling value across these jurisdictions demonstrates that housing is much more affordable for those on a median income in MODG than in Nova Scotia or Canada as a whole. This is corroborated by the percent of owner and tenant households spending over 30% of their income on shelter

costs, although this figure may be skewed by legacy homeowners or renters who either own their property outright or have longstanding leases lower than regional averages.

Table 8.3: Housing Costs (2021) and Median Individual Income (2020) for Canada, Nova Scotia, MODG, and Mulgrave

Housing and Income Statistics	Canada	Nova Scotia	MODG	Mulgrave
Median total income	$41,200	$38,000	$31,200	$32,400
Median dwelling value	$618,500	$250,000	$120,000	$120,000
Median total income as a % of median dwelling value	6.7%	15.2%	26.0%	27.0%
Median monthly shelter costs for owned dwellings	$1,498	$870	$400	$645
% of owner households spending 30% or more of its income on shelter costs	14.8%	9.7%	7.0%	0.0%
Median monthly shelter costs for rented dwellings	$1,209	$1,000	$552	$500
% of tenant households spending 30% or more of its income on shelter costs	33.2%	34.7%	22.0%	44.4%

Source: (Statistics Canada, 2023)

Most residents in MODG (98.6%) and all in Mulgrave (100%) use English as their first official spoken language (Statistics Canada, 2023). Because of this, all public outreach and communication for the Project has been and will continue to be in English. There is some knowledge of other languages, though no communication has been requested in other languages.

The nearest fire station to the Study Area is the Aulds Cove Fire Hall, approximately 4 km northeast of the Study Area on Highway 104. Mulgrave Fire Hall is also nearby, approximately 6 km southeast of the Study Area on Murray Street. There are two nearby fire departments on the Cape Breton Island near the Study Area, which include Port Hastings Volunteer Fire Department (approximately 6 km east) and Port Hawkesbury Fire Department (approximately 9 km southeast). On the western side of the Study Area, the Tracadie and District Volunteer Fire Department is 11.5 km west of the Study Area.

Health and emergency services in the area are accessible to Project workers if the need should arise. The closest location is the Guysborough Memorial Hospital, approximately 25 km southwest of the Study Area on Highway 16. There are two nearby health centre options on Cape Breton Island, the Port Hawkesbury Health Centre (approximately 10 km east) and the Strait Richmond Hospital (approximately 20 km east). Notably, the Strait Richmond Hospital does provide emergency services, which is another option for Project personnel.

Statistics indicate that the unemployment rate in 2021 for MODG and Mulgrave were 18.1% and 19.0%, similar rates that are both higher than the provincial and national unemployment rates (Table 8.4). The employment rates for MODG and Mulgrave were 38.0% and 41.6%, both lower than the provincial employment rate of 51.9% (Statistics Canada, 2023).

Table 8.4: Employment Statistics for Canada, Nova Scotia, MODG, and Mulgrave

Unemployment Statistics	Canada	Nova Scotia	MODG	Mulgrave
Employment rate	57.1%	51.9%	38.0%	41.6%
Unemployment rate	10.3%	12.7%	18.1%	19.0%

Source: (Statistics Canada, 2023)

The top six industries in both MODG and Mulgrave in 2017 were compared with the top industries in the province (Table 8.5), as categorized under the North American Industry Classification System (Statistics Canada, 2023). The highest proportion of workers in MODG fall into the "agriculture, forestry, fishing, and hunting" and "health care and social assistance" categories (21.6% and 12.5%, respectively). Other significant industries in MODG include "manufacturing," "retail trade," "educational services," and "construction" (Statistics Canada, 2023). The highest proportion of workers in Mulgrave fall into the "health care and social assistance" category (17.2%), with "accommodation and food services", "manufacturing" and "mining, quarrying, and oil and gas extraction" categories each accounting for 10.3% of the total employed labour force. Other significant industries in Mulgrave include "retail trade" and "transportation" (Statistics Canada, 2023).

Table 8.5: Top Industries for the Employed Labour Force in 2017 in MODG and Mulgrave Compared to Nova Scotia

Industry	MODG	Mulgrave	Nova Scotia
Accommodation and food services	50 (2.7%)	30 (10.3%)	30,010 (6.2%)
Agriculture, forestry, fishing and hunting	405 (21.6%)	10 (3.4%)	17,880 (3.7%)
Construction	145 (7.7%)	0 (0.0%)	35,720 (7.3%)
Educational services	145 (7.7%)	20 (6.9%)	38,425 (7.9%)
Health care and social assistance	235 (12.5%)	50 (17.2%)	70,595 (14.5%)
Manufacturing	165 (8.8%)	30 (10.3%)	31,210 (6.4%)
Mining, quarrying, and oil and gas extraction	20 (1.1%)	30 (10.3%)	3,065 (0.6%)
Retail trade	150 (8.0%)	25 (8.6%)	58,985 (12.1%)
Transportation And Warehousing	90 (4.8%)	25 (8.6%)	19,930 (4.1%)
Others	470 (25.1%)	70 (24.1%)	181,440 (37.2%)
Total Employed Labour Force 15 Years +	**1,875**	**290**	**487,260**

Source: (Statistics Canada, 2023)

The community of Port Hawkesbury is the closest economic centre, located approximately 9 km east from the Project center and offers a range of business services. Additionally, several businesses are located within the neighbouring communities of Aulds Cove, Mulgrave, Havre Boucher, and other smaller communities that provided supplemental services. Several nearby businesses may potentially supply or otherwise benefit (either directly or indirectly) from the Project. A list of such businesses within 10 km of the Project, excluding Port Hawkesbury due to the density of businesses there, was compiled (Table 8.6).

Table 8.6: Local Businesses within 10 km of the Project and Their Proximity

Business	Nearest Community	Approximate Distance to the Project[(1)]
Big Stop Aulds Cove	Aulds Cove	4 km
3 Square Restaurant	Aulds Cove	4 km
Petro-Canada	Aulds Cove	4 km
The Cove Motel & Restaurant	Aulds Cove	4 km
Mulgrave Machine Works Limited	Mulgrave	6 km
DSM Nutritional Products	Mulgrave	6 km
The Front Porch	Mulgrave	6 km
Bennett CW Cement Finishing	Havre Boucher	7 km
Arkson Fence Ltd. Cape Breton	Grosvenor	7 km
The Silver Birch Inn	Aulds Cove	4 km
Capeway Extended Stay Lodge	Port Hastings	6 km
Cape Breton Causeway Inn	Port Hastings	6 km
Fiddlesticks BnB	Port Hastings	6 km
Rest Ashored B and B	Havre Boucher	9 km
Gary's Groceries	Havre Boucher	8 km

[(1)]All distances were measured from the centre of the Study Area by a straight line and rounded to the nearest whole number.

Aside from the immediate area and associated businesses, the communities near the Project also rely on larger towns, including the town of Guysborough (approximately 19 km southwest of the Project). Antigonish, approximately 40 km northwest of the Study Area, also offers many shops and services to those living in communities near the Project. Many residents of the communities would commute daily to Guysborough, Port Hawkesbury, or Antigonish for employment purposes.

8.1.3 Effects Assessment

Project-Economy Interactions

Project activities have the potential to interact with the economy during all phases of the Project (Table 8.7).

Table 8.7: Potential Project-Economy Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	X
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X

Project Phase	Potential for Interaction
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	X
Removal of Temporary Works and Site Restoration	X
Commissioning	X
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for economy is MODG and Mulgrave (Drawing 8.1). The RAA for economy includes the entire province.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for the economy as well. The VC-specific definition for magnitude is as follows:

- Positive: Project is expected to have a positive effect on the economy.
- Negative: Project is expected to have a negative effect on the economy.

Effects

As outlined in the Wind Turbine Facilities Municipal Taxation Act (2006), MODG will receive tax revenues per MW on an annual basis, and the royalty increases as the Consumer Price Index rises. The Project is expected to enhance the community's economic development by providing tax revenues of approximately $1.21 million annually to MODG. As the Town of Mulgrave is not part of the MODG, it will not receive the municipal tax revenue generated by the Project. The Proponent is committed to providing infrastructure compensation to the Town of Mulgrave not tied to any other benefits agreements, although a formal agreement is not yet in place.

The Proponent is committed to sharing economic opportunities with the local community throughout the development and lifespan of the Project through the use of local skilled labour where possible. The Project Team has and will continue to engage the community, local businesses, and municipal staff and leaders to help identify Project-related opportunities and benefits for the local community.

The Proponent understands the importance of supporting local communities and the Project Team is committed to using as many local skills as possible. To this end, the Proponent will

hold a job fair prior to the start of construction to engage with local community members and service providers and identify suitable candidates and/or businesses to support the construction and operation phase employment and service providers. In alignment with these commitments, the Proponent has entered into discussions with MODG about the terms of a CBA that will be finalized following EA approval.

Potential work for the Project will include a wide range of backgrounds and specialties ranging from environmental services to general construction and including specialized work in the transportation and erection of turbines. Specifically, elements of job creation at different phases throughout the lifespan of the Project may include:

- Project Development: During the development phase of the Project, Nova Scotian professionals have and will continue to deliver services in a variety of areas, including civil and electrical engineering, geotechnical engineering, legal, environmental and biological surveys, archaeology, land and community relations, and many others. Dozens of professionals in Nova Scotia will render their services as part of the development of the Project.
- Construction: The construction phase of the Project will require a large workforce that will fluctuate throughout the construction phase. Much of the construction employment will come through subcontracting Canadian, and where possible, Nova Scotian construction firms and specialized service providers, prioritizing local people and subcontractors. The Project is estimated to require approximately 100 to 150 jobs of varying scope and duration throughout the approximately two-year construction period. The largest construction scopes of work are anticipated to be:
    - Civil installation, which includes land clearing, grubbing, road construction, and foundation installation, which includes:
        - Excavating
        - Rebar supply and installation
        - Anchor bolt supply and installation
        - Forming
        - Concrete supply and pouring
        - Grouting
    - Electrical installation, including transmission line, collector line and substation infrastructure installation, and connection to the NSPI, which includes:
        - Overhead installation
        - Cable terminations
        - Electrical testing
        - Instrument installation and testing
    - Turbine installation, requiring the offloading of turbine components, turbine erection, and commissioning, which includes:
        - Crane supply
        - Turbine component offload and erection
        - Mechanical works inside turbines
        - Electrical work inside turbines

- Operations and Maintenance: Operational wind projects require long-term operations and maintenance professionals to be located either on-site or within short driving distance of the Project. Up to 10 to 12 full-time and part-time jobs will be required during this phase. The employment associated with operations and maintenance is long-term, local, stable, and well-paying, requiring skillsets such as experience managing facilities, working on wind farms, or working with high-voltage systems. These jobs include:
    - Medium-voltage or high-voltage technicians/electricians
    - Wind technicians
    - Road maintenance workers
    - Vegetation management service providers
    - Facility maintenance tasks including administrative support, inventory/materials management, shipping, schedule, and coordination of maintenance inspections to accommodate the facility's operation (i.e., power collection system, electrical substation inspections, etc.)

In addition to the direct investments that the Project will bring to Nova Scotia's economy, the Project will also result in indirect and induced economic benefits that will be realized by local businesses, governments, communities, and residents. Workers that are directly involved with the development, construction and operations would contribute to the local economy by redistributing wealth to a variety of goods and services such as hotels, restaurants, and grocery stores) (NREL, 2016).

Mitigation Measures
The economic impact to the LAA and RAA is positive; therefore, no mitigation is proposed.

Monitoring
A specific monitoring program for the economy is not recommended.

Conclusion
The impacts to the economy are characterized in Table 8.8.

Table 8.8: Economy Residual Effects

Effect Detail	Economic Impact
Magnitude of Effect	**Positive:** Expected to have a positive impact on the economy.
Geographic Extent of Effect	MODG and Mulgrave, extending to the entire province
Frequency of Effect	**Continuous:** Occur continuously during the Project lifespan.
Duration of Effect	**Medium Term:** Effects are expected throughout operations and decommissioning.
Reversibility of Effect	**Irreversible**
Significance Level	Positive effect, significance not evaluated.
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High, Positive **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible	

8.2 Land Use and Value

8.2.1 Overview and Assessment Methodology

The assessment of land use and value was completed through a review of desktop resources and in consideration of feedback from public engagement to evaluate how the Project may interact with this VC. The following resources were reviewed:

- Nova Scotia property records
- Public mapping resources
- Literature review of property values and wind farms
- Visual renderings of the Project (Appendix N)

8.2.2 Existing Environment

The Study Area primarily consists of private lands (1,183.6 ha), with four Crown land parcels (170.3 ha) included in the Study Area (1,416.7 ha). Land around the Study Area is primarily used for forestry and recreation (recreational land use is discussed in Section 8.3). There are also residential properties in the surrounding area, with the closest non-participating receptor located 747 m to the closest turbine (T10). It is assumed that property values for these residential properties fall under similar values as listed in Table 8.3 in Section 8.1.2, but inflation may have increased actual property values.

There are several developments within 5 km of this Project, including the Goose Harbour Lake Wind Farm Project, the Auld's Cove Transmission Project, Auld's Cove Quarry Expansion, Rhodena Quarry Expansion, Martin Marietta Quarry Fines Storage Development Project, EverWind Strait Crossing Transmission Line Project, and Mulgrave Community Wind Power Project. The closest proposed development to this Project is the Goose Harbour Lake Wind Farm Project, which is adjacent to the Study Area, south of Old Mulgrave Road. The Goose

Harbour Lake Wind Farm Project is a wind development that received EA Approval in 2023 (NSECC, 2023a), and for which construction has already begun. The Auld's Cove Transmission Project is a high voltage transmission line spanning the Strait of Canso from Aulds Cove that received EA approval in 2016 and was constructed in 2017 (NSECC, 2016). The Mulgrave Community Wind Power Project is a small wind energy project consisting of a single turbine that received EA approval in 2013 (NSECC, 2013) and was constructed shortly thereafter. The three quarry developments are situated near Cape Porcupine (NSECC, 2025b).

While there are no public protected lands and parks within 10 km of the Study Area, there are two public protected land and parks within the MODG that are within 20 km of the Study Area (Drawing 3.4), including:

- Hurlburt Brook Nature Reserve, just over 10 km southwest of the Study Area, designation pending approval.
- Tracadie River Wilderness Area, approximately 13 km southwest of the Study Area.

There are no Mi'kmaq reserve lands within 10 km of the Study Area. Further consideration of Mi'kmaq resources is included in Section 5.0.

Based on a review of NSNR's Mineral Resource Land Use Atlas (2021d), there are no mineral exploration licenses within the Study Area or within 5 km of the Study Area boundary.

8.2.3 Effects Assessment

Project-Land Use and Value Interactions

Project activities have the potential to interact with land use and value during all phases of the Project (Table 8.9).

Table 8.9: Potential Project-Land Use and Value Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	X
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	X
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	X
Removal of Temporary Works and Site Restoration	X
Commissioning	X

Project Phase	Potential for Interaction
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	X
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for land use and value includes MODG and Mulgrave (Drawing 8.1). The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for land use and value as well. The VC-specific definition for magnitude is as follows:

- Negligible: No change in land value expected and surrounding land use can largely continue.
- Low: Small reduction in land value expected and/or minor limitations to surrounding land use.
- Moderate: Moderate reduction in land value and/or moderate limitations to surrounding land use.
- High: High reduction in land value and/or widespread limitation to surrounding land use.

Effects

Due to the nature of turbines being tall structures with small footprints, they are highly compatible with other land uses like agriculture, forestry, and ground-based recreation. The forestry activities that are ongoing in the area will not be disrupted by the Project. Upgraded and routinely maintained roads and infrastructure will improve access, limit weather-related access disruptions, and improve road conditions, which will reduce wear on vehicles and other industrial equipment. None of the existing and permitted users of the limited Crown land PIDs within the Study Area are expected to be impacted by the Project.

A 2017 study mentions that given the traditional energy industry's both direct and indirect impacts on conservation, wind energy can be seen as a complementary land use to conservation and protected areas (Wind Europe, 2017). Given the context of Nova Scotia where the traditional energy source has primarily been coal and other fossil fuels, increasing land use for wind energy can be seen as a positive step.

Visual Aesthetics

People living and working in the vicinity of wind projects express a wide range of perspectives on the visual aesthetics and social acceptability of large turbines (Kirchhoff et al., 2022). While regulations in Nova Scotia do not require aesthetic impact assessment, visual simulation

modelling was conducted to demonstrate expected Project visibility from several number of viewpoints (Appendix N).

The Project's visibility is often limited by the region's varied terrain. For instance, from many nearby communities and points of interest, such as the viewplane from Cove Hotel in Aulds Cove (Viewpoint 4A), from which the Project is largely hidden by the terrain. While more of the Project's turbines are visible from farther way, such as from the Celtic Shores Coastal Trail with a wide field of view from the Cape Breton side (Viewpoint 4B) and from the Havre Boucher Harbour with a wide field of view from the wharf (Viewpoint 4C), turbines appear very small due to the distance. There are also viewpoints near populated areas where large portions of multiple turbines are visible, such as the viewpoints in Port Hawkesbury (Viewpoints 4D, 4E, and 4F) and from the Cape Breton side of the Causeway (Viewpoint 4G). Overall, turbines are relatively visible from several viewpoints, but the area's terrain and other infrastructures help to reduce the overall visibility of the turbines, especially up close where they would otherwise appear largest.

Property Value

Potential effects on property value are often a concern of neighbouring residents due largely to anecdotal reports from appraisers of drastic declines in property values following the nearby installation of a wind energy facility (Gulden, 2011). Despite these concerns, many rigorous and statistically defensible studies have concluded that wind energy developments have had no significant effect on surrounding property values.

Prior to 2013, the most comprehensive study on the impact of wind farms on property values was completed by Hoen et al. (2009). This research analyzed data on nearly 7,500 sales of single-family homes situated within 16 km of 24 existing wind farms in the United States. Eight different hedonic pricing models failed to generate statistically significant evidence that property values for houses located within 16 km of wind farms are influenced by the developments. Subsequent research by the same researchers but employing additional analyses confirmed these results (Hoen et al., 2010).

A study by Hinman (2010) tracked property transactions in communities located close to a 240-turbine wind farm for an eight-year period that spanned pre-development and operation stages. Hinman found that before project approval, property values in the area decreased. This was attributed to a fear of the unknown effects that the development would have, an effect known as anticipation stigma. However, once the development became operational, property values recovered. This recovery was attributed to a greater understanding of the operational effects of the development. Anticipation stigma, however, was not detected in a similar study in Colorado (Laposa & Mueller, 2010), in which it was concluded that the announcement of a large wind energy development did not significantly reduce the selling prices of homes surrounding the proposed development.

The primary limitation of previous research on the effects of wind energy facilities on surrounding home values has long been the relatively small sample sizes (data sets) of

relevant home-sale data. The inability to account for the complexity of the various factors that affect property values has also been cited as a limitation of previous studies. Data had been limited for homes located within approximately 800 m of turbines, where impacts would be expected to be the largest but includes Hinman (2010) (sample size of 11) and Carter (2011) (sample size of 41). This is in part because setback requirements generally result in wind facilities being sited in areas with relatively few dwellings, limiting the number of sales transactions available to be analyzed (Hoen et al., 2013). Although these smaller data sets are adequate to examine large impacts (e.g., over 10%), they are less likely to reveal small effects with any reasonable degree of statistical significance.

A study published in August 2013 by Berkeley National Laboratory was conducted to address these gaps in data and included the largest home-sale dataset to date (Hoen et al., 2013). Researchers collected data from 51,276 home sales spanning 27 counties in nine states, related to 67 different wind facilities. These homes were within 16 km of 67 different wind facilities, and 1,198 of the sales analyzed were within 1.6 km of a turbine, giving a much larger dataset than previous studies had collected. The data span the periods well before announcement of the wind facilities to well after their construction (Hoen et al., 2013).

Two types of models were employed during the Hoen et al. (2013) study to estimate property-value impacts: (1) an ordinary least squares model, which is standard for this type of study, and (2) a spatial-process model, which accounts for spatial variability. These models allowed the researchers to control for home values before the announcement of a wind facility (as well as the post-announcement, pre-construction period), the spatial dependence of unobserved factors affecting home values, and value changes over time. A series of robust models was also employed to add an additional level of confidence to the study results (Hoen et al., 2013).

Regardless of model specification, the results of Hoen et al.'s (2013) study revealed no statistical evidence that home values near turbines were affected in the post-construction or post-announcement/pre-construction periods. Therefore, the authors concluded that if effects do exist, the average impacts are relatively small (within the margin of error in the models) and/or sporadic (Hoen et al., 2013).

A study analyzing more than 7,000 home and farm sales from 2002 to 2010 in the Melancthon Township and 10 surrounding counties found that Ontario's first and largest wind farm (133 turbines) had "no statistically significant effect" on property values. Further, the study found a lack of significant effect is similar across both rural residential properties and agricultural properties (Vyn & McCullough, 2014).

A more recent review based on housing and property values within specific radii of wind farms and other energy infrastructure by Brinkley and Leach (2019) found that while most energy infrastructure has an impact on nearby land values, renewable energy projects (including wind farms) do not have statistically significant impacts. These findings are based on seven individual studies of varying scales that all consider the value of property relative to the proximity to wind power, whether a single turbine or more (Brinkley & Leach, 2019).

In 2019, researchers at the University of California, Davis conducted an analysis of property values research in the energy sector. Their analysis found that studies on wind turbines and property values overwhelmingly find that wind turbines do not negatively impact property values at any point during their installment (ACPA, 2023). Similarly, a study of onshore wind energy projects in New England found that negative effects on property value were concentrated within 1 km of the project, were not significant beyond this threshold, and dissipated with time (Dong et al., 2023).

Research has consistently demonstrated that, in a variety of spatial settings and across a wide temporal scale, sale prices for homes near wind energy facilities are not significantly different from those attained for homes sited away from wind energy facilities.

Mitigation

The Project has been designed to minimize potential effects to land use and value through siting considerations and engagement with neighbouring landowners. As part of this process, the total number of turbines within the Project site was reduced from prior layout iterations to up to 21, reflecting feedback from stakeholders and the findings of desktop assessments, field studies, and modelling. The Project has adequate spatial and topographic separation from receptors to avoid nuisance interactions such as shadow flicker and operational noise.

No specific mitigation related to land use and value is recommended.

Monitoring

No specific land use and value monitoring programs are proposed. The Proponent will maintain ongoing communication with landowners to minimize impacts to nearby residential dwellings.

Conclusion

The impact to land use and value is expected to be negligible, as no change in land value expected and surrounding land use can largely continue and is therefore considered not significant.

8.3 Recreation and Tourism

An evaluation of the baseline conditions and potential Project effects on both recreation and tourism must be considered jointly. While some recreational opportunities may attract locals more often than tourists, and vice versa, the region's natural and cultural offerings are an asset to both groups. Recreational opportunities, therefore, should be understood to apply to both locals and people travelling intra-provincially, interprovincially, or internationally for leisure.

8.3.1 Overview and Assessment Methodology

The assessment of recreation and tourism was completed through a review of desktop resources and in consideration of feedback from public engagement to evaluate how the Project may interact with this VC. The following resources were reviewed:

- Nova Scotia Visitor Exit Survey (TNS, 2024)
- Literature review of wind farm impacts on tourism and recreation
- Review of local governments' tourism and recreation websites:
    - Guysborough County (TGS, 2024)
    - Municipality of the District of Guysborough (MODG, n.d.)
    - Town of Mulgrave (Mulgrave, 2025)

8.3.2 Existing Environment

The communities of Mulgrave, Pirate Harbour, Aulds Cove, Frankville, and Havre Boucher, as well as other communities near the Study Area, are home to a variety of primarily outdoor recreational activities. While outdoor opportunities are popular, indoor community or recreation centres are available, with some including outdoor infrastructure, such as in the nearby communities of Mulgrave, Port Hawkesbury, and Havre Boucher. Cape Jack beach is located approximately 11 km northwest of the Project and is frequented in the summer for picnics and swimming. Hartley's Falls is located approximately 8 km southeast of the Project and is another outdoor spot frequented by both locals and tourists. Cape Breton Island is nearby across the Strait of Canso from Aulds Cove, which is a popular tourist destination for those looking for outdoor recreation, cultural experiences, and scenic drives.

The region is known for its recreational offerings such as hiking, camping, and biking. Evidence of ATV or other off-highway vehicle (OHV) use was observed within the Study Area during biophysical assessments indicating opportunities for motorsport recreationalists within the Study Area. There are several notable hikes in the region, including some featured in Michael Hayne's popular Hiking Trails of Nova Scotia (2002), such as trails at Black Duck Cove, Chappel Gully, the Guysborough Nature Trail, Tor Bay, and more, however none are found within 5 km of the Study Area. Furthermore, there are no trails within the Study Area on the public trails repository AllTrails.com (n.d.), a popular and well-used source for information about hikes that is recommended by Hike Nova Scotia as the source for information about Nova Scotian trails.

Most game and furbearer hunting seasons in Nova Scotia start in the fall and have varying end dates by species. Deer hunting starts in September and October depending on the method of hunting and age of hunter (NSNR, 2024g). Additional approved hunting or trapping may occur within the Study Area per NSNR guidelines. Several fish species were confirmed in lakes and watercourses near the Study Area (see Section 7.3.1.6), and several waterfowl were also observed (see Section 7.4.1.8). There are numerous trails that lead to the edges of the lakes that could be used for fishing or waterfowl hunting in this area.

8.3.2.1 Cultural Attractions

Guysborough County has a rich history, dating back over 400 years, and offers museums and historical and cultural attractions including the Old Courthouse Museum in Guysborough. Music and theatre are popular in the area, with Mulgrave Road Theatre, a professional theatre company focused on the Atlantic Canadian experience located in Guysborough, as well as the Chedabucto Place Performance Centre for live performances of all types, also located in Guysborough (MODG, n.d.).

Guysborough is home to the Authentic Seacoast Company, who offer three unique accommodations that are themed on the region's history and attractions (Authentic Seacoast, n.d.). There are other accommodations options for tourists available in Guysborough and several in Port Hawkesbury, but none closer to the Project that can be found through online searches or tourism resources.

Many tourists pass near the area on Highway 104, a well-travelled highway spanning from Cape Breton to the New Brunswick border. There is also Highway 344, a scenic route that travels along the Strait of Canso and is part of Nova Scotia's Marine Drive scenic travel way (TNS, 2025). Motorists on this route are either travelling north towards Aulds Cove and Port Hawkesbury, or south towards Boylston and Guysborough.

8.3.2.2 Recreation and Tourism Trends

Tourism Nova Scotia's (TNS) 2019 visitor exit survey collected information on the reason for people's visits and activities that visitors undertook while in Nova Scotia (TNS, 2021). The top five main reasons for visiting Nova Scotia in 2019 among pleasure visitors were:

- For the scenery/natural landscape (22%)
- To visit a specific area or location in Nova Scotia (18%)
- For the seacoast and ocean (14%)
- To do a specific activity (8%)
- To experience Nova Scotia's culture (8%)

Of those who participated in outdoor activities, the most common were coastal sightseeing, visiting a beach, and hiking (TNS, 2021). No spatial data are available from this or other TNS research products regarding the places visited within province, which limits the understanding of tourism's impact on the communities around the Project. Additionally, no data were found on intra-provincial travel or local use of these resources. Given the high prevalence of minimally structured and uncommercialized activities (e.g. hiking and beach exploration), it is possible that visitors and tourists may access parts of the Study Area for such activities. However, it is more likely that visitors to the area seeking natural experiences would visit established destinations such as the previously mentioned Cape Jack Beach and Harley's Falls or traveling to Cape Breton.

8.3.3 Effects Assessment

Project-Recreation and Tourism Interactions

Project activities have the potential to interact with recreation and tourism during all phases if access is changed, is temporarily limited to facilitate work, or if changes to the visual environment impact the user's experience (Table 8.10).

Table 8.10: Potential Project-Recreation and Tourism Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	-
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	X
Turbine Assembly	X
Interconnection	-
Removal of Temporary Works and Site Restoration	-
Commissioning	X
Operations and Maintenance	
General Operation and Maintenance	X
Vegetation Management	-
Decommissioning	
Infrastructure Removal	X
Site Reclamation	X

Assessment Boundaries

The LAA for recreation and tourism is MODG and Mulgrave (Drawing 8.1). The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply for recreation and tourism as well. The VC-specific definition for magnitude is as follows:

- Negligible: No expected changes to recreation and tourism.
- Low: Small reduction in tourism expected and/or minor limitations to recreational use.
- Moderate: Moderate reduction in tourism and/or moderate limitations to recreational use.
- High: High reduction in tourism and/or widespread limitation to recreational use.

Effects

It is difficult to determine with certainty how tourists will react to a wind power development. Wind farms are objects of fascination for many who might see them as an attraction or at worst neutral in their tourism decisions. Others may find them intrusive in otherwise natural or rural spaces and choose other, less-developed areas for recreational opportunities. Although the Project is generally not excessively visible from nearby vantage points, some of the wind turbines proposed will be visible from several locations along Highway 344 or Highway 104 (Section 8.2). While it is not possible to predetermine recreationalists' response to the

presence of or the aesthetic qualities of the Project, we can examine the Project's direct impacts on recreational opportunities and the experiences sought after by locals and tourists alike.

Project construction may affect recreational activities such as the use of existing trails within the Study Area, especially where they facilitate access to nearby lakes and waterbodies with access points located within the Study Area. Trails noted to provide access to fishing and waterfowl hunting may be temporarily inaccessible for safety reasons. The Study Area will see the development of a new and upgraded road network that may intersect with and require temporary closure of roads and trails used by hikers, ATVs, snowmobiles, and other recreationalists while work is underway. Such closures will be temporary and limited to construction, with similar temporary closures during decommissioning.

A variety of research has attempted to understand the connection between wind energy development and tourism outcomes, both in terms of tourism demand and tourist experience. Most research finds that the effect of wind turbines on both demand and experience is neutral to slightly negative. Work in Portugal found a generally net neutral outcome of onshore wind farms, in which some tourists and residents expressed slightly negative to positive outlooks (de Sousa & Kastenholz, 2015). The researchers examined the potential for wind farms to become areas of tourism interest, which they concluded requires more investigation though may be practical. Alternatively, tourists in Iceland expressed negative views towards turbines from one project in particular (Sæþórsdóttir & Ólafsdóttir, 2020). The authors of this study found that further development in the region would put 'nature-based tourism' and wind energy in competition for land use, highlighting that the conflict between tourism and wind development is dependent on the prevailing type of tourism practiced in an area. In Germany, researchers found a negative relationship between turbines and tourism demand and highlighted a strong difference between the effect of onshore inland and onshore, coastal turbines (Broekel & Alfken, 2015). These authors, however, point to the need for greater study to determine if these relationships hold when examined at a greater scale. Finally, research in the Czech Republic finds a generally neutral attitude towards wind farms among regional visitors (Frantál & Kunc, 2011). The authors noted that interestingly, tourists had higher acceptance of turbines than residents.

From this scan of the literature, the potential effects of the Project on tourism demand and experience need to be understood in the context of the Project's features and the tourism demand in the area. The lack of structured recreational opportunities (i.e. established recreation providers) within or adjacent to the Study Area suggest that the Project is unlikely to affect recreational tourism to a substantial degree. It is more likely that the region's tourists seeking structured recreational activities already visit nearby Cape Jack Beach, Hartley's Falls, or Cape Breton Island. Less structured recreational activities, such as trail users, may be more affected by the Project. Some recreationalists, especially OHV riders, may benefit from the Project due to the increased road network allowing for greater access to trails. Enjoyment of the region's outdoor recreational activities is not expected to be impacted by the Project and Guysborough County will remain an area of interest for visitors from near and far.

The Proponent is committed to engaging with local recreational groups on the continued enjoyment of the region's recreational and tourism attractions, including addressing any safety considerations for recreational use of the Study Area. For Project and public safety, the substation will be fenced throughout operations, but this will only limit access to a small area within the Study Area and not restrict movement. As discussed above, the presence of turbines is highly compatible with most land-based recreation activities and is not expected to limit recreation opportunities, whether by locals or tourists.

Mitigation

The following mitigation measures are recommended:

- Limit trail, road, and areal closures to temporary periods within the construction and decommissioning phases.
- Work with local recreation groups during Project phases to ensure continued access to the Study Area for recreation, including ATV/OHV use, hunting, and trapping.
- Work with nearby landowners to ensure there is a positive relationship within the community.
- Work with CLC to understand activities in the area, including potentially any that may be unidentified, and to minimize impacts through Project scheduling and proactive communications.

Monitoring

No monitoring is proposed.

Conclusion

The impact to tourism and recreation are characterized in Table 8.11.

Table 8.11: Land Use and Value Effect Assessment

Effect Detail	Change in Recreation or Tourism
Magnitude of Effect	**Low:** Low direct impact on recreation and tourism activities.
Geographic Extent of Effect	MODG and Mulgrave
Frequency of Effect	**Intermittent:** Occur intermittently, only during activities that limit access.
Duration of Effect	**Medium Term:** Limits to recreation/tourism use within the Study Area will last through the decommissioning phase.
Reversibility of Effect	**Reversible**
Significance Level	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible	

9.0 ARCHAEOLOGICAL RESOURCES

9.1 Overview

An Archaeological Resource Impact Assessment (ARIA) was undertaken to identify areas of elevated potential to encounter archaeological resources within the Assessment Area. Davis MacIntyre & Associates Ltd. (DMA) was retained to conduct the ARIA, which was directed by Johanna Cole and completed in September 2025.

9.2 Regulatory Context

The *Special Places Protection Act* (Nova Scotia, 1989a) provides the province of Nova Scotia with a mandate to protect important archaeological, historical, and paleontological sites and remains, including those underwater. A permit is required for any archaeological or paleontological exploration or excavation in Nova Scotia. The permit system ensures that work is completed based on established standards by qualified applicants.

This ARIA was conducted in accordance with the terms of Heritage Research Permit A2025NS124, issued by the NSCCTH – Special Places Program.

As archaeological work can often result in findings or information that is confidential or sensitive, a summary of the results of the ARIA is provided in the EA, with the ARIA report provided directly to NSCCTH for review. It is understood that the findings and recommendations of the ARIA are considered “draft” until the reports are accepted by NSCCTH. The report for the Project has been submitted to NSCCTH and is currently under review.

9.3 Assessment Methods

The objectives of the ARIA were to:

- Evaluate archeological potential within the Assessment Area.
- Identify, delineate, and investigate (where recommended) areas considered to exhibit elevated potential for encountering archaeological resources.
- Provide detailed and accurate information on the results of the survey.
- Provide comprehensive recommendations so that appropriate archaeological resource management strategies can be devised.

To achieve these objectives, DMA designed an assessment strategy consisting of a historical background study [including engagement with the KMKNO Archaeological Research Division (KMKNO-ARD)], predictive modelling, and field reconnaissance.

The historical background study examined several resources to understand the environmental, archaeological, and historical context of the Assessment Area. The environmental context of the Assessment Area was examined to identify past and current environmental influences or conditions that may elevate archaeological potential (e.g., topography, local resources, and potential for agriculture). The archaeological context was examined to identify how people used

and occupied the surrounding landscape based on evidence from previously registered archaeological sites and past archaeological work conducted near the Project. The historical context was examined to identify how people used and occupied the local area based on evidence from published archival documents, ethno-historic records, local oral traditions, historic maps, local and/or regional histories, scholarly texts, and available property records. Specifically, the following resources were consulted:

- Historical maps, manuscripts, and other published literature from a variety of sources
- LiDAR and air photos
- The Maritime Archaeological Resource Inventory (MARI)
- Consultation with KMKNO-ARD regarding traditional Mi'kmaw land use

In Nova Scotia, MARI is maintained by the Nova Scotia Museum on behalf of NSCCTH. Reports from past archaeological assessments and academic research conducted near the Project provide archaeological context, which informs the interpretation and evaluation of any potential archaeological resources identified during the field component of the ARIA. Information about four previously surveyed archaeological sites provided additional context for understanding historical land use and archaeological resources in the Assessment Area. DMA noted that an overall lack of archaeological data in the vicinity of the Assessment Area was likely due to an absence of past archaeological surveys and/or poor site preservation due to historic land development.

In preparation for field surveys, a predictive modelling exercise was conducted to identify areas of elevated potential for encountering L'nuk heritage resources and landscapes within 25 km of the Assessment Area. The model was developed by incorporating information about paleoenvironmental and landscape change with known connections between Mi'kmaq and the use of waterways/waterbodies for travel and subsistence.

The field component of the ARIA involved an on-site visual examination of the Assessment Area between September 9 and 24, 2025. Parallel pedestrian transects were completed throughout the Assessment Area to visually assess archaeological potential at intervals of approximately 20 to 30 m (to maintain effective coverage). Survey effort was increased in areas expected to be impacted by the Project (i.e., by ground disturbance). During surveys, details of observations were documented in field notes, and photographs were captured with location and orientation information. A hand-held GPS unit was used to record coordinates and track logs.

During the field component, areas of elevated potential for the discovery of L'nuk resources were categorized by their relative likelihood of such finds. A high potential area (HPA) is associated with conditions that would be conducive to L'nuk settlements and use for resource gathering, where artefacts of prior use might be concentrated and later found.

Upon completion of the desktop and field assessment, analysis, and interpretation, the assessment results were summarized in the ARIA (submitted to NSCCTH under separate

cover). The ARIA includes recommendations for appropriate resource management strategies specific to each area of elevated potential.

9.4 Assessment Results

Two areas considered to exhibit high potential for encountering archaeological resources were identified during the field component of the ARIA led by DMA. The HPAs are in a portion of the Assessment Area that does not require ground disturbance, and both HPAs will be avoided.

9.5 Effects Assessment

Project-Archaeological Resource Interactions

Project activities could interact with archaeological resources during ground disturbance, including earth-moving activities, in the construction phase (Table 9.1).

Table 9.1: Potential Project-Archaeological Resources Interactions

Project Phase	Potential for Interaction
Site Preparation and Construction	
Land Surveys	-
Geotechnical Investigations	X
Placement of Sedimentation and Erosion Control Measures	-
Clearing and Grubbing	X
Access Road Upgrading and Construction	X
Laydown Area and Turbine Pad Construction	X
Transportation of Turbine Components	-
Turbine Assembly	-
Interconnection	-
Removal of Temporary Works and Site Restoration	-
Commissioning	-
Operations and Maintenance	
General Operation and Maintenance	-
Vegetation Management	-
Decommissioning and Rehabilitation	
Infrastructure Removal	-
Site Reclamation	-

Assessment Boundaries

The LAA for archaeological resources is the Clearing Footprint (Drawing 3.1). The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.3 apply to archaeological resources. The VC-specific definition for magnitude is as follows:

- Low: Activities have a low potential for encountering archaeological resources during ground disturbance.
- Moderate: Activities have a moderate to high potential for encountering archaeological resources during ground disturbance, but risk of harm to potential archaeological resources can be mitigated through appropriate actions and procedures.
- High: Activities have a moderate to high potential for encountering archaeological resources during ground disturbance, and the ARIA indicates a high potential for accidental and irrevocable loss of archaeological resources regardless of mitigative measures.

Effects

Impacts to archaeological resources could occur during activities requiring ground disturbance or vegetation clearing. New ground disturbance and vegetation clearing for the Project will be limited to the Assessment Area and will occur during the site preparation and construction phase. Ground disturbance will also occur during decommissioning but will be limited to areas cleared during construction.

Based on the results of the ARIA, Project activities are considered to have a low potential for encountering archaeological resources throughout most of the Assessment Area. The two HPAs identified within the Assessment Area are expected to be avoided by Project activities.

Mitigation

The following mitigation measures are recommended:

- Maintain avoidance of sites of high potential for archaeological resources in detail design.
- Conduct shovel testing if it is determined that HPAs cannot be avoided in accordance with the recommendations of DMA, and future requirements of NSCCTH following review of the ARIA.
- Develop a chance find procedure related to the potential unexpected discovery of archaeological items or sites, or human remains, during construction. This would include halting any work immediately upon discovery of suspected resources and contacting NSCCTH. If the resources are suspected to be of Mi'kmaq origin, the Executive Director of KMKNO would also be contacted.
- Conduct additional archaeological assessments in areas requiring vegetation clearing or ground disturbance that have not been previously assessed as part of the ARIA. The EA Branch will be provided with the acceptance letter from NSCCTH prior to conducting activities that would disturb newly proposed areas.

Monitoring

No monitoring programs are proposed.

Conclusion

The predicted residual effects of the Project on archaeological resources (after mitigation) are characterized in Table 9.2.

Table 9.2: Archaeological Resources Residual Effects

Effect Detail	Loss of Archaeological Resources
Magnitude of Effects	**Low:** Activities have a low potential for encountering archaeological resources during ground disturbance.
Geographic Extent of Effects	Clearing Footprint, should unlikely impacts to archeological resources occur
Frequency of Effects	**Single Event:** Should unlikely impacts to archeological resources occur, effects would occur once, during initial ground disturbance or vegetation clearing for the Project.
Duration of Effects	**Short Term:** Should unlikely impacts to archeological resources occur, they would be limited to the construction phase when new ground disturbance and vegetation clearing will occur.
Reversibility of Effects	**Irreversible:** Should unlikely impacts to archeological resources occur, the effects would not be reversible.
Significance Level	Not Significant
Effects Assessment Ratings (Refer to Table 4.3 for definitions) **Magnitude:** Negligible, Low, Moderate, High **Frequency:** Single Event, Intermittent, Continuous **Duration:** Short Term, Medium Term, Long Term **Reversibility:** Reversible, Irreversible, Partially Reversible	

10.0 EFFECTS OF THE UNDERTAKING ON THE ENVIRONMENT

10.1 Summary of Effects of the Undertaking on the Environment

Table 10.1 summarizes the results of the effects assessment for each VC.

Table 10.1: Effects of the Undertaking on the Environment Summary

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
Atmosphere and Air Quality	Fugitive Emissions	**Low:** Some fugitive emissions are anticipated, but they are expected to remain below the maximum permissible ground-level concentrations.	200 m buffer of the Assessment Area	**Intermittent:** Effects may occur during the Project's construction, operation, and decommissioning phases, but only intermittently.	**Short Term:** Effects are mainly confined to the construction and decommissioning phases.	**Reversible**	Not Significant
	Exhaust Emissions	**Low:** Some exhaust emissions are anticipated, but they are expected to remain below the maximum permissible ground-level concentrations.	200 m buffer of the Assessment Area	**Intermittent:** Effects may occur during the Project's construction, operation, and decommissioning phases, but only intermittently.	**Short Term:** Effects are mainly confined to the construction and decommissioning phases.	**Reversible**	Not Significant
Climate Change	Net Reduction of GHG Emissions	**Positive:** Net effect of the Project will be a reduction in GHG emissions.	Nova Scotia	**Continuous:** Effects will occur continuously during operation.	**Medium Term:** Effects are expected throughout the operation phase.	**Irreversible**	Positive effect, significance not evaluated.
Sound	Construction Noise	**Low:** Construction activities are anticipated to comply with municipal by-laws and permitting.	2 km buffer of turbine locations	**Intermittent:** Effects are anticipated during both the construction and decommissioning phases, and rarely during operation.	**Short Term:** Effects are expected throughout construction and decommissioning, but generally not during operations or after decommissioning.	**Reversible**	Not Significant
	Operational Noise	**Low:** Operational sound is predicted to comply with the criteria in the	2 km buffer of turbine locations	**Continuous:** Effects are anticipated	**Medium Term:** Effects are expected	**Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
		Environmental Assessment Supplemental Checklist: Wind Energy Projects.		throughout operations, although there may be temporary lapses during calm conditions while rotors are not spinning.	throughout operations but end at the start of decommissioning and not continue.		
Shadow Flicker	Shadow Flicker	**Low:** Measurable shadow flicker is expected but within regulatory compliance at non-participating receptors.	2 km buffer of turbine locations	**Intermittent:** Effects may occur whenever the turbine rotors are spinning.	**Medium Term:** Effects are expected throughout the operational phase of the Project.	**Reversible**	Not Significant
Geophysical Environment	Encountered Geologic Hazard	**Moderate:** Risk mapping shows the potential for geologic hazards in the Study Area.	800 m buffer of the Project Footprint	**Continuous:** If present, effects may occur continuously.	**Short Term:** If present, effects limited to construction and decommissioning.	**Partially Reversible**	Not Significant
	Change to Groundwater Quality or Quantity	**Moderate:** Groundwater wells located within 800 m of the Project Footprint.	800 m buffer of the Project Footprint	**Intermittent:** Effects may occur during blasting (if required).	**Short Term:** Effects are possible throughout construction (if blasting is required).	**Partially Reversible**	Not Significant
Surface Water, Fish, and Fish Habitat	Habitat loss	**Low:** A small loss of fish habitat.	Assessment Area	**Single Event:** Effects may occur during initial construction.	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning.	**Partially Reversible**	Not Significant
	Erosion and Sedimentation	**Low**: Minimal potential for impact to fish.	Assessment Area	**Intermittent:** Effects may occur during initial construction and	**Medium Term:** Effects may occur during all phases but will not extend	**Partially Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
				during operations.	beyond decommissioning.		
	Blasting	**Negligible:** No loss of fish expected.	Assessment Area	**Single Event:** Effects may occur during initial construction.	**Short Term:** Effects are expected only during the construction phase.	**Partially Reversible**	Not Significant
	Changes to Water Quality and Quantity	**Low:** Minimal potential for altered hydrology or impact to fish.	Assessment Area	**Intermittent:** Effects may occur during initial construction and during operations.	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning.	**Partially Reversible**	Not Significant
Wetlands	Habitat Loss	**Moderate:** Direct loss of habitat, including that of WSS, but wetland area loss will not impact the hydrology of the watershed. Where WSS are impacted, adequate general SAR habitat is prevalent elsewhere within the RAA.	Assessment Area	**Single Event:** Effects will occur once, during initial ground disturbance or vegetation clearing for the Project.	**Medium Term:** Residual effects will extend until wetlands are restored during decommissioning and/or compensated for following construction.	**Partially Reversible**	Not Significant
	Changes in Wetland Function	**Low:** Project activities have low potential for changes to wetland function with the implementation of mitigation measures.	Assessment Area	**Single Event:** Direct effects resulting from construction activities will occur once, and indirect effects to wetland function will be mitigated through the use of controls.	**Medium Term:** Residual effects may extend through the operation and maintenance phase of the Project.	**Partially Reversible**	Not Significant
Terrestrial Vegetation	Loss and/or Alteration of	**Low:** Small loss of unique vegetation	100 m buffer of the Clearing	**Single Event:** Effects may occur	**Medium Term:** Effects may occur	**Partially Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
Communities and Flora	Vegetation Communities	communities	Footprint	during initial site preparation and construction	during all phases but will not extend beyond decommissioning		
	Loss of Flora Individuals and/or Impacts to Flora Habitat	**Moderate:** Small loss of SOCI individuals (and associated habitat)	100 m buffer of the Clearing Footprint	**Single Event:** Effects may occur during initial site preparation and construction	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning	**Partially Reversible**	Not Significant
	Edge Effects	**Low:** Small effect to habitat supporting terrestrial flora SAR and/or SOCI due to edge effects.	100 m buffer of the Clearing Footprint	**Single Event:** Effects may occur during initial clearing and ground disturbance, and during operations	**Medium Term:** Effects may occur during all phases but will not extend beyond decommissioning	**Partially Reversible**	Not Significant
Terrestrial Fauna	Habitat Loss and Fragmentation	**Low:** Small loss of habitat supporting fauna	5 km buffer of the Study Area	**Single Event:** Effects expected to occur during construction phase	**Medium Term:** Effects will end following decommissioning	**Partially Reversible**	Not Significant
	Injury and Mortality	**Low:** Low impacts to fauna through injury and mortality	5 km buffer of the Study Area	**Intermittent:** Effects are expected during all phases	**Medium Term:** Effects will end once decommissioning is complete	**Partially Reversible**	Not Significant
	Sensory Disturbance	**Low:** Low impacts to fauna through sensory disturbance	5 km buffer of the Study Area	**Intermittent:** Effects are expected during all phases	**Medium Term:** Effects will end once decommissioning is complete	**Reversible**	Not Significant
Bats	Habitat Fragmentation and/or Loss	**Low:** Low loss of suitable bat habitat is expected (about 0.1% of suitable	5 km buffer of the Study Area	**Once:** Effects may only be associated with clearing during	**Long Term:** Though minimal (impacting about	**Partially Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
		habitat available within the LAA).		construction.	0.1% of suitable bat habitat in the LAA), effects are expected to extend past Project decommissioning		
	Injury or Mortality	**Moderate:** Minimal loss of individuals is expected.	5 km buffer of the Study Area	**Intermittent:** Effects may occur seasonally between dusk and dawn during operations and temporarily during construction.	**Medium Term:** Effects will end following decommissioning.	**Irreversible**	Not Significant
	Sensory Disturbance	**Low:** Low impacts to habitat usage (i.e., effective habitat loss) due to sensory disturbance is expected.	5 km buffer of the Study Area	**Continuous:** Effects may occur sporadically during construction and decommissioning but may be constant (though spatially limited) during operations.	**Medium Term:** Effects will end following decommissioning.	**Reversible**	Not Significant
Avifauna	Habitat Loss, Alteration/ Fragmentation, and Edge Effect	**Low to Moderate:** Low to moderate loss of habitat supporting avian SAR and habitat-sensitive avifauna, depending on the species.	5 km buffer of the Study Area	**Single Event:** Loss of habitat occurs once during the construction phase (i.e., clearing and ground disturbance).	**Medium Term:** Effects will end following decommissioning.	**Partially Reversible**	Not Significant
	Sensory Disturbance – Light and	**Low:** Low sensory disturbances are expected.	5 km buffer of the Study Area	**Intermittent:** Intermittent during the construction,	**Medium Term:** Effects will end following	**Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
	Noise			decommissioning, and operations phases.	decommissioning.		
	Avifauna-Project Infrastructure Interactions – Injury and Mortality	**Moderate:** Avian use of the Study Area indicates a likelihood of interactions but recorded flight altitudes indicate effect is likely at the individual and not population scale.	5 km buffer of the Study Area	**Intermittent:** May vary by Project phase, as well as seasonal differences (e.g., breeding, migration, and winter seasons).	**Medium Term:** Effects will end following decommissioning.	**Partially Reversible**	Not Significant
Economy	Economic Impact	**Positive:** Expected to have a positive impact on the economy.	MODG and Mulgrave, extending to the entire province	**Continuous:** Occur continuously during the Project lifespan.	**Medium Term:** Effects are expected throughout operations and decommissioning.	**Irreversible**	Positive effect, significance not evaluated.
Land Use and Value	Land Use or Value Change	The impact to land use and value is expected to be negligible, as no change in land value expected and surrounding land use can largely continue and is therefore considered not significant.					
Recreation and Tourism	Change in Recreation or Tourism	**Low:** Low direct impact on recreation and tourism activities.	MODG and Mulgrave	**Intermittent:** Occur intermittently, only during activities that limit access.	**Medium Term:** Limits to recreation/tourism use within the Study Area will last through the decommissioning phase.	**Reversible**	Not Significant

VC	Effect	Magnitude of Effect	Geographic Extent of Effect	Frequency of Effect	Duration of Effect	Reversibility of Effect	Significance Level
Archaeological Resources	Loss of Archaeological Resources	**Low:** Activities have a low potential for encountering archaeological resources during ground disturbance.	Clearing Footprint, should unlikely impacts to archeological resources occur	**Single Event:** Should unlikely impacts to archeological resources occur, effects would occur once, during initial ground disturbance or vegetation clearing for the Project.	**Short Term:** Should unlikely impacts to archeological resources occur, they would be limited to the construction phase when new ground disturbance and vegetation clearing will occur.	**Irreversible:** Should unlikely impacts to archeological resources occur, the effects would not be reversible.	Not Significant

Effects Assessment Ratings (Refer to Table 4.3 for definitions)

Magnitude: Negligible, Low, Moderate, High, Positive
Frequency: Single Event, Intermittent, Continuous
Duration: Short Term, Medium Term, Long Term
Reversibility: Reversible, Irreversible, Partially Reversible

11.0 EFFECTS OF THE ENVIRONMENT ON THE UNDERTAKING

The following sections examine how aspects of the external environment may impact Project infrastructure and operations, with a focus on extreme weather events and natural hazards. The Project is expected to be operational for a minimum of 25 years, such that the effects of climate change are highly relevant to the Project. Incorporating climate change and sustainability considerations into the Project's design will increase its resilience, and a series of mitigation and design strategies to minimize potential impacts have therefore been developed.

11.1 Climate Change

Climate change refers to a long-term, persistent change in average and extreme weather conditions. Contemporary climate change (i.e., since the beginning of the industrial period) is being caused by increases in GHG emissions associated with human activities. Warming temperatures, altered precipitation regimes, and sea level rise are three notable aspects of climate change with potential to impact Project operations.

11.1.1 Increased Air Temperature

A key aspect of climate change is global warming, which refers to the long-term rise in the Earth's average surface temperature, measured over 30 years, in comparison to preindustrial levels (IPCC, 2018). Air temperatures are an important driver of many environmental processes, including the intensity of severe weather events such as hurricanes (Gilford et al., 2024). Based on a range of emissions scenarios (Coupled Model Intercomparison Project Phase 6), median temperatures in the Study Area are expected to be 2.4°C warmer during the period 2041-2070 relative to the 1971-2000 baseline (ClimateData.ca, 2025).

Temperature increases associated with global warming may impact all phases of the Project as well as the comfort of on-site personnel. For example, the demand for cooling in construction vehicles will increase with warmer temperatures and may require Project personnel to take regular breaks to cool down and rehydrate. Warmer temperatures also have the potential to enhance the spread and abundance of disease vectors such as ticks (Bouchard et al., 2019), with associated increases in health risks. Longer and more intense heat waves under climate change may also increase the risk of forest fires (ECCC, 2019b), as described in Section 11.2.2.

The direct risks of increased temperatures to Project personnel will be managed by ensuring staff are trained to understand the importance of regular breaks, proper hydration, and unsafe working conditions.

11.1.2 Changes in Precipitation

Heavy rainfall events are a common, highly probable natural hazard in Nova Scotia that may be exacerbated by climate change. Although it is difficult to accurately forecast decadal-scale changes in rainfall events, future climate scenarios suggest that conditions will become "wetter" over the Project's lifespan. For example, total annual precipitation in the Study Area is expected to be 93 mm/y higher by 2041-2070 relative to the 1971-2000 baseline

(ClimateData.ca, 2025). Heavy rainfall events have the potential to impact construction and operations by increasing the risk of overland flooding which may temporarily restrict site access, overwhelm ditches and culverts, and require operational strategies to be implemented (e.g., sedimentation and erosion controls).

While the climate of the Study Area is expected to become wetter overall, prolonged periods of dry conditions are also expected to become more common (ClimateData.ca, 2025). Periods of dry conditions may impact Project operations (e.g., by limiting construction activities) if forest access is restricted due to increased wildfire risk (woods access restrictions). Droughts may also limit the ability to fight fires if water levels in nearby lakes and rivers are low. Drier-than-normal conditions may also cause an increase in fugitive dust emissions during construction that will require management via mitigations.

The Project will mitigate the risks of flooding and drought by:

- Developing and implementing a Surface Water Management Plan.
- Minimizing alterations to wetlands.
- Sizing culverts appropriately for anticipated increased precipitation events.
- Designing roadside ditches and water off-take infrastructure next to all roads to encourage rainwater drainage.
- Maintaining regular upkeep of surface water infrastructure.
- Allowing for natural revegetation of roadsides to absorb excess water.

11.1.3 Sea Level Rise

On a global scale, sea levels are currently rising because of warming air and ocean temperatures (via thermal expansion of ocean water and increased inputs of melting of sea ice/glaciers). Sections of the Atlantic coastline have been highlighted as some of Canada's most severely threatened areas from sea level rise and resulting impacts, with rising sea levels expected to amplify coastal flooding, erosion, and storm surge across the Atlantic region (ECCC, 2023). According to the National Oceanic and Atmospheric Administration (NOAA, n.d.), the relative sea level trends across Nova Scotia ranges from approximately 3.19 mm/y to 3.99 mm/y (based on data from 1895 to 2021).

The Project's Study Area is located at a sufficient elevation (21 to 159 masl) and distance from the coast (2.1 km) such that Project infrastructure is unlikely to be directly impacted by coastal flooding. Nearby access routes along the Strait of Canso, however, including highways and shipping routes, have the potential to be impacted by rising water levels, erosion, and coastal flooding, with possible disruptions to Project. The potential for site access to be restricted for Project personnel due to coastal flooding is low due to the availability of alternate access routes to the Study Area (described in Section 3).

11.2 Natural Hazards

Nova Scotia regularly experiences natural hazards, including severe weather events (e.g., blizzards, hurricanes) and wildfires. These events can lead to adverse outcomes such as

power outages, health-related emergencies, infrastructure damage, and road damage, thereby posing direct risks to infrastructure (Government of Canada, 2024). In addition to severe weather events and wildfires, a natural hazard that is unique to wind energy projects is the possibility of turbine icing.

11.2.1 Severe Weather Events

Hurricanes, blizzards, and other severe weather events are natural hazards that have the potential to impact the Project through direct effects to infrastructure and personnel, and through disruptions to site access. During severe weather events, safety risks may be elevated due to hazardous driving conditions, poor visibility, cold temperatures, and falling debris. Throughout the life of the Project, the safety of Project personnel will be managed by developing and implementing safe work procedures, and ensuring staff are trained in the use of PPE and understand unsafe work conditions.

High winds and lightning, which may be associated with heavy rainfall or hurricane conditions, may increase the risk of mechanical issues or electrical fires. To mitigate this risk, turbines will be monitored remotely and equipped with an automatic shutdown that will engage when wind thresholds are reached (i.e., cut-out speed). Turbines will also be designed with a built-in grounding system for lightning strikes. The Proponent will ensure site access is maintained in adverse conditions by clearing roads or providing vehicles that can traverse all conditions.

11.2.2 Wildfire

Wildfire poses a potential risk to the Project during all Project phases. A substantial portion of the Project Footprint is surrounded by forest cover and there is potential for naturally occurring and/or human-caused forest fires to damage Project infrastructure and elevate safety risks for Project personnel.

Fire is one of the sources of natural disturbance in Nova Scotia, with moderate to high severity fires impacting an estimated 0.17% to 0.4% of forested land per year (A. R. Taylor et al., 2020). Although it is challenging to precisely predict changes to fire regimes, modelling suggests wildfire risk in the Acadian forest region (which includes the Study Area) will increase moderately under climate change as a result of warmer and drier conditions (Whitman et al., 2015). In recent years, several large wildfires have occurred in Nova Scotia, which were exacerbated by prolonged dry periods (e.g., Upper Tantallon/Hammonds Plains fire in 2023, Long Lake fire in 2025).

The following operational and technological measures will be implemented:

- Develop and implement a Project-specific Contingency Plan that includes a fire safety plan. Circulate the plan to local fire departments for input and awareness.
- Engage with first responders on site access and availability of water resources for fire suppression.
- Ensure fire response equipment is available at the O&M building and that site personnel are trained in its use.

11.2.3 Turbine Icing

Turbine icing occurs when ice accumulates on the surface of turbine blades, a condition created by specific temperatures and levels of humidity or the presence of freezing rain. Icing occurs more frequently when turbine blades reach 150 m above ground where lower clouds may contain supercooled rain during the cold season (Seifert et al., 2003). Turbine icing may lead to ice throw or ice fall, and the distance and direction in which the ice is thrown/falls is dependent on factors such as wind speed, rotor speed, rotor azimuth, the position of the ice on the blade, and the characteristics of the ice itself.

The risk of injury or damage because of ice throw is present within the maximum throwing distance of ice from a turbine, as determined using the following equation (CanREA, 2020).

$$d_t = 1.5 * (D + H)$$

Where:
d_t = Maximum throwing distance (m)
D = Rotor diameter (m)
H = Hub height (m)

Based on the above equation and turbine model specifications (183.4 m rotor diameter and 130.0 m hub height), the maximum throwing distance associated with the Project's turbines is 470.1 m. Three participating receptors are within this distance, at 224 m, 393 m, and 433 m from their nearest turbines. There is minimal concern for potential hazards to human safety due to the seasonal use of these buildings, as they are unoccupied during winter months. The next nearest participating receptor is 661 m away from a turbine. The closest non-participating receptor to a turbine is receptor A at 747 m from Turbine 10 (Drawing 4.1), well beyond the maximum throwing distance calculated above.

Old Mulgrave Road winds through the Study Area, with the closest three turbines to the road being Turbine 11 (202 m), Turbine 12 (207 m), and Turbine 8 (208 m). Old Mulgrave Road is currently primarily used for accessing private properties along the route and serves as an emergency route between the Town of Mulgrave and Monastery. Old Mulgrave Road is not a main throughfare and is not commonly used by people travelling directly between these communities. Traffic volume on Old Mulgrave Road is not assessed as part of the provincial traffic count and therefore cannot be expressed quantitatively; however, with the exception of construction traffic associated with the Goose Harbour Lake Wind Farm Project, traffic tends to be very low.

Ice throw also presents a risk to maintenance workers who will frequent the Project throughout its operational lifespan. Such access may be required when icing is a factor, and possibly because of icing. Appropriate safety practices in line with safe work procedures will be developed and followed to ensure the highest degree of worker safety.

To reduce ice throw, the turbine blades are equipped with an advanced Anti-Icing System (AIS) that prevents ice accumulation on the aerodynamically active portions of the blades. The AIS system consists of both ice detection sensors and integrated blade heating elements. As soon as the sensors detect environmental icing conditions and the system predicts the danger of ice formation, the control unit automatically switches on the heating elements to pre-heat the blades to prevent icing of the rotor blades before it even occurs. While the AIS does not fully eliminate the potential for ice throw, it significantly reduces its likelihood, frequency, and severity of the icing event.

The AIS functions effectively under typical cold-weather conditions; however, during extreme events (e.g., heavy freezing rain, severe hoarfrost, or high-rate snow/ice accretion), the available heating capacity may be insufficient to prevent or immediately remove ice from the blades. Under such conditions, operational controls are applied, including temporary curtailment of the wind turbines where required, until icing is no longer detected and normal operating conditions return.

Additionally, the rotor hub, nacelle, and tower are unheated and may accumulate ice under freezing conditions. As with other tall structures, there is a risk of ice fall during winter weather, and ice originating from these components typically falls within the immediate turbine footprint. Standard operational procedures, including exclusion zones and maintenance protocols will be applied to manage worker and public exposure to potential ice fall.

To further reduce the risk of injury from ice throw or falling ice, mitigation measures to protect recreation users and site workers from ice throw or shedding will include:

- Continue engagement with local recreational users regarding the safe continued use of lands within the Study Area.
- Continue engagement with provincial and municipal officials to ensure concerns about access within and near the Study Area are addressed.
- Install signage illustrating and warning of potential hazards associated with ice throw and shedding around wind turbines, including on any recreational or logging trails or roads within the danger zone of ice throw or shedding.
- Equip staff and workers accessing the Study Area with necessary PPE and associated safety protocols and procedures to mitigate risk of injury and/or fatality, especially during potential icing conditions.
- Equip turbines with automatic shutdown procedures to avoid damage to the turbines and ice throw. Identification of icing and automatic shutdown can be triggered by factors such as temperature, anemometer (wind) speeds, and power curve comparison.

11.3 Summary of Effects

The environmental effects associated with climate change and natural hazards have the potential to affect all phases of the Project. Project location siting, design measures, and education of Project personnel will help to minimize many of the risks associated with these

factors. The mitigation measures described above will allow for both proactive and adaptive management of remaining risks, thus limiting the overall impact on the Project.

12.0 ACCIDENTS & MALFUNCTIONS

Without proper mitigation, accidents and malfunctions can interact with many VCs and potentially result in adverse effects. However, implementing preventative measures limits the probability of occurrence, and having appropriate response procedures in place reduces the magnitude of residual effects.

Accidents, malfunctions, and unplanned events considered for this Project include:

- Erosion and sediment control failure
- Fire
- General hazardous material spill
- Transportation-related incidents
- Structural damage
- Ice throw (addressed in Section 11.2.3)

The safety of on-site personnel is a vital Project component; however, it is not specifically considered in the EA as workplace occupational health and safety is regulated by the policies, procedures, plans, and codes of practice set in the *Occupational Health and Safety Act* (Nova Scotia, 1996). A site-specific Contingency Plan will be developed to address accidents, spills, and malfunctions.

12.1 Erosion & Sediment Control Failures

Failure of erosion and sedimentation controls may result in potential adverse effects on VCs (primarily during construction), most notably to watercourses, wetlands, and fish and fish habitat. Erosion and sedimentation controls may fail due to extreme weather conditions (e.g., flooding), improper installation, improper maintenance, and unforeseen accidents (e.g., collisions). Failure of these control measures may release sediment into the environment, impacting water quality and aquatic and terrestrial habitats.

Mitigation measures to limit the probability of an occurrence and reduce the magnitude and extent of potential effects include:

- Provide workers with training to properly install and repair erosion and sediment controls.
- Develop and implement an Erosion and Sedimentation Control Plan for all phases of the Project.
- Conduct regular monitoring of all erosion and sediment controls, and repair or replace as necessary.
- Develop and implement a Project-specific Contingency Plan that includes information on sediment and erosion control.

12.2 Fires

An accidental fire could potentially adversely affect the atmospheric environment (emissions), the terrestrial environment (vegetation and wildlife), and the socio-economic environment (land use and value) during all Project phases.

Fires in wind farms are most often caused by lightning strikes, mechanical and hydraulic faults, and electrical installation failure (You et al., 2023). Fires may also occur because of machinery use and construction activities. Publicly available data cannot provide exact statistics, but the rate of fire is estimated to be between 1-in-2,000 and 1-in-15,000, or between a 0.05% and 0.007% chance of fire (Krcmar, 2021), though this will be affected by the installation of fire mitigation technologies such as lightning protection systems. The height and remote nature of the turbines may make early detection and effective control of fires difficult. However, these factors also reduce the direct impacts of electrical fires on human health.

Various standards and guidelines have been implemented to minimize the chances of fires occurring in turbines and associated infrastructure. The turbines planned for use in the Project will include safety mechanisms, including lightning and surge protectors, and early fire detection and control systems. Conditions within turbine components, such as the gearbox, generator, and electrical systems will be continuously monitored, and if electrical currents or temperatures exceed pre-set threshold values, the turbine will enter a safe shutdown to prevent damage or fire. The turbine's SCADA system will allow for remote monitoring and rapid response if abnormal conditions are detected.

In addition to general safety protocols and training, a fire prevention and evacuation plan will be developed within the Project's Contingency Plan. Impacts on human health from electrical fires are therefore expected to be negligible. The Proponent is also committed to working with the local fire department (Aulds Cove Fire Hall) to provide site orientation, mapping, and a tour of the wind farm to familiarize them with the site, turbine locations, and the locations of other key infrastructure and safety features.

Mitigation measures to limit the probability of a fire occurring and reduce the magnitude and extent of potential effects include:

- Equip each turbine with integrated condition-monitoring and control systems that continuously track temperature, electrical load, vibration, and related parameters. When values deviate from set thresholds, the systems automatically alarm, notify remote operators, and initiate an appropriate response (fault management or safe shutdown), providing early warning of abnormal conditions – including those that can precede a turbine fire.
- Prohibit the use of campfires or other burning within the Study Area by staff and contractors.
- Dispose of all flammable waste regularly at an approved facility.
- Allow smoking in designated areas only.
- Equip heavy machinery with fire extinguishers.

- Require turbine technicians heading “up-tower” to carry a fire extinguisher.
- Ensure fire response equipment is available at the O&M building and that site personnel are trained in its use.
- Develop a Contingency Plan including fire safety plan. Circulate the plan to local fire departments for input and awareness.
- Continue to engage with first responders on site access and access to water.

12.3 General Hazardous Material Spills

Hazardous spills resulting from fuel (i.e., storage, refueling, operation of combustion vehicles) and other on-site chemicals may occur during the Project's construction and operations activities. Hazardous spills can adversely impact air, soil, surface water, groundwater quality, human health, and safety. In addition, hazardous spills may risk the health of aquatic, avian, and terrestrial wildlife. The severity of the impacts will depend on the nature of the hazardous material and the quantity spilled.

Mitigation measures to limit the probability of an occurrence and reduce the magnitude and extent of potential effects include the following:

- Develop spill prevention and response procedures within the Project’s Contingency Plan.
- Store all fuels, lubricants, and chemicals in designated containers and areas.
- Provide secondary containment in storage areas (where possible).
- Inspect equipment for fluid leaks.
- Locate fuel storage areas, refueling, and/or equipment lubrication a minimum of 30 m from any surface and groundwater feature (i.e., watercourse, wetland, well).
- Refuel machinery and equipment on an impervious surface, where possible. If this is not possible, require that the work is completed in a designated area, greater than 30 m from a watercourse, water body, or wetland.
- Ensure workers remain with equipment during refueling.
- Complete equipment servicing off-site, where possible. If this is not possible, require that the work is completed in a designated area, greater than 30 m from a watercourse, water body, or wetland.
- Store all dangerous goods in compliance with the Workplace Hazardous Material Information System.
- Equip mobile equipment with spill kits stocked with appropriate spill containment materials for the activities taking place, such as soaker pads, oil-absorbing materials, and containment booms.
- Locate stationary spill kits or spill drums at work areas using mobile equipment, hazardous fluids and/or in proximity to environmentally sensitive areas (i.e., wetlands or watercourses).
- Stock spill kits with the appropriate quantity and type of material for the anticipated product type(s) and volume(s) in use.
- Train site workers on site specific spill response requirements and equipment.

With the implementation of the above preventative measures, the likelihood of an accident or a malfunction is low. Appropriate response plans will be put in place to ensure any interactions with VCs from an accident or malfunction are limited and the effects can be quickly contained.

12.4 Transportation-related Incidents

Operator error or techno-mechanical malfunctions may occur during all stages of the Project's lifespan, although the type and intensity of vehicular traffic will vary depending on the Project phase. The construction and decommissioning phases will see the highest volume of traffic and largest vehicles both travelling to and on the site. On the site, especially where workers may be near light to heavy-duty traffic, there is a higher risk of incidents affecting human health (HSE, n.d.). During operation, vehicular access by technicians also presents risks that must be managed. While vehicular use has implicit risks that cannot be fully eliminated, an established Traffic Management Plan will ensure that these risks are mitigated to the highest degree possible and that they are understood by anyone accessing the Study Area.

Additionally, mitigation measures to limit the probability of an incident and reduce the magnitude and extent of potential effects include:

- Develop a Traffic Management Plan, outlining traffic management procedures.
- Assess site access routes, including structural integrity of bridges and culverts, baseline traffic levels and high-risk areas prior to construction.
- Install appropriate traffic signage and road markers to identify high-risk areas and communicate traffic rules and safety information.
- Conduct preventative vehicle inspections to ensure all mobile equipment is in good condition (breaks, light system, leaks absent).
- Develop and maintain roads according to the Erosion and Sedimentation Control Plan.
- Establish, post, and enforce speed limits on site.
- Require that public road speed limits are followed by Project vehicles.
- Require that drivers follow all laws and regulations pertaining to distracted (e.g., cell phone usage) and impaired driving on and off site.
- Require that only licensed individuals operate heavy equipment.
- Minimize traffic in school zones and on school bus routes during school hours and bus pick-up and drop-off times.
- Follow weather statements and alerts and adjust plans accordingly to avoid transportation in extreme weather conditions.
- Install signage where existing trails cross access roads to avoid potential interactions with trail users when heavy equipment is in use.
- Establish the following practices within the Study Area, to the extent feasible (HSE, n.d.):
    - Create clear, separate paths or zones for vehicles and pedestrians to reduce the risk of accidents.
    - Minimize vehicle movements.
    - Minimize reversing by providing adequate room to turn vehicles.

- Operate in appropriate weather and provide ample lighting and visibility aids (e.g. mirrors around tight turns).
- Ensure visitors are familiar with the Project Footprint or are accompanied whether in vehicles or on foot.

Detailed information regarding vehicle collision prevention and response procedures will be outlined in the Contingency Plan.

12.5 Structural Damage

Wind turbine damage up to and including failure may result from a variety of factors, both human and environmental, presenting risks to human health, infrastructure, and the environment. The most frequent causes of damage to turbines that may result in failure include damage from lightning, material fatigue over time, leading edge erosion, and damage from icing (Katsaprakakis et al., 2021). While damage by these mechanisms can occur despite quality design and operation, preventing failure or harm to human or environmental health is critical. This typically involves detecting damage before it can result in a complete failure, including partial or full blade detachment. Wind turbine structural health monitoring, through use of advanced sensors, can detect anomalies in performance and abnormal vibrations that might indicate an imbalance requiring further investigation (Algolfat et al., 2023).

Regular monitoring and inspections are essential for ensuring the continued structural integrity of all components of turbines (Enlitia, 2024), and the Proponent will implement mitigative actions to limit the probability of an occurrence and reduce the magnitude and extent of potential effects, including:

- Maintain sufficient lubrication in bearings, and keep seals clean to prevent excess friction and overheating.
- Maintain and test the lighting protection system and verify grounding integrity.
- Prepare and enact severe weather plans to reduce the risk of physical damage from flying debris or hail and minimize the risk that thermo-electric damage by lightning results in blade failure.
- Inspect and properly maintain turbine pitch, yaw, overspeed, and mechanical brake function.
- Check and change lubrication regularly in the turbine gearboxes to prevent excess heat and minimize wear; conduct oil sampling/analysis at regular intervals.
- Test SCADA/condition-monitoring sensors regularly to ensure that anomalous conditions are detected early and managed before they result in damage to turbines, other infrastructure, or harm to human health.
- Inspect blades (e.g., drone/rope access), maintain leading-edge protection, and repair surface defects to control blade erosion and fatigue.
- Implement ice detection/operating procedures (e.g., curtailment/shutdown) and establish temporary exclusion zones during icing events.

The separation of turbines from people and public roads also mitigates the risk to human health and public infrastructure in the highly unlikely event of failure.

13.0 CUMULATIVE EFFECTS

13.1 Overview

Cumulative effects are changes to environmental, social, and economic values caused by the combined effect of past, present, and potential future human activities and natural processes (Government of British Columbia, 2024). Concerns are often raised about long-term changes that may occur not only as a result of a single action but of the combined effects of each successive action on the environment (Hegmann et al., 1999). While a single undertaking might not cause significant adverse effects, multiple undertakings may result in incremental impacts, referred to as cumulative effects. These cumulative effects may potentially result in an overall impact to a VC of interest.

13.2 Cumulative Effects Assessment Methodology

The objective of the CEA is to evaluate potential changes to a VC that may result from the combined influence of the proposed Project and other past, present, or reasonably foreseeable future projects or activities. The CEA is conducted using publicly available information, with uncertainties clearly identified, and in accordance with the Cumulative Effects Assessment Practitioners Guide (Hegmann et al., 1999).

As outlined by Hegmann et al. (1999), the CEA scoping process involves the following steps:

- Selection of VCs to be included in the CEA.
- Determination of spatial and temporal boundaries for the CEA.
- Identification and description of other projects or activities within those boundaries.
- Confirmation of which VCs will proceed through the CEA analysis.

For those VCs selected for the CEA process, an analysis was conducted considering the residual effects of the Project on that VC, the effect of other activities or projects on that VC, and potential cumulative effects. Mitigation measures and proposed monitoring programs and follow-up are described, if cumulative effects are predicted. At this stage, the certainty in effects predictions was considered. It is not uncommon for data on effects of other projects or activities to be limited, increasing the uncertainty of the CEA predictions.

13.3 Selection of VCs for Evaluation in the CEA

The primary pathways of effects to the environment from the Project include the loss and alteration of forest and wetland habitats (and therefore effects to species that rely on those habitats), as well as potential bird and bat mortality resulting from interactions with wind turbines and transmission line infrastructure. Based on the effects assessment for each VC evaluated, no significant adverse residual effects were identified. Details of the effects assessment for each VC can be found in Sections 7, 8, and 9.

Table 13.1 summarizes the potential for VCs to have cumulative impacts with other undertakings in the area.

Table 13.1: Potential for Cumulative Effects on Identified VCs

VC	Cumulative Effects Assessed	Reasoning
Atmosphere and Climate Change	No	Residual positive impacts regarding GHG emissions from the use of renewable energy resources. Effects on climate change will be positive.
Sound	No	Cumulative effects were included in the operational sound modeling and considered in the effects assessment.
Shadow Flicker	No	Cumulative effects were built into the predictive modelling and considered in the effects assessment.
Geophysical Environment	No	The Project will not impact the geologic environment outside the LAA or interact with nearby industrial activities.
Surface Water, Fish and Fish Habitat	No	The Project is maximizing the use of existing disturbed areas to minimize impacts to watercourses. In accordance with provincial permitting requirements, appropriate mitigations will be incorporated into the design of new watercourse crossings, such that there is no significant residual effect, and direct effects are limited to the Project Footprint.
Wetlands	No	The Project has been designed with a compact layout that minimizes the overall disturbance footprint and maximizes the use of previously disturbed areas to reduce impacts to wetlands; however, some impacts to wetlands are required for the Project. In accordance with provincial permitting requirements, all impacted wetlands will be compensated for, such that there is no significant residual effect, and direct effects are limited to the Project Footprint.
Terrestrial Habitat	Yes	Habitat disturbance is expected through a large geographic area that may interact with habitat disturbance from nearby projects.
Terrestrial Flora	No	Avoidance of flora SAR with legislated protection status. The Project is maximizing the use of existing disturbed areas to minimize impacts to SAR and SOCI.
Terrestrial Fauna	Yes	Habitat disturbance is expected through a large geographic area that may interact with habitat disturbance from nearby projects.
Bats	Yes	The Project is predicted to have moderate and non-significant impacts to bats through habitat loss and potential mortality. Effects may interact with effects from nearby projects.
Avifauna	Yes	The Project is predicted to have moderate and non-significant impacts to birds through habitat loss and potential mortality. Effects may interact with effects from nearby projects.
Economy, Land Use, & Recreation/ Tourism	No	Residual impacts are anticipated to be low to negligible, or positive.
Archeology, Culture, & Heritage	No	Avoidance of archaeological, historical, or culturally significant areas.

The following VCs are assessed for cumulative effects:

- Terrestrial Habitat
- Terrestrial Fauna
- Bats
- Avifauna

13.4 Selection of Spatial and Temporal Boundaries

To identify other Projects for inclusion in the CEA, a 15 km buffer on the Study Area was selected as a conservatively inclusive boundary (Drawing 13.1). This buffer size is consistent with current best practices (Hegmann et al., 1999; IAAC, 2023) and with typical spatial scales used in Nova Scotia EAs for similar project types and remains sufficiently constrained for data analysis and meaningful analytical relevance.

For the CEA, Strum considered past projects as those registered, approved, or constructed within the past 10 years, selected from the Environmental Assessment Projects Dashboard (NSECC, 2025e). Reasonably foreseeable future projects are those which have been registered with an EA document through NSECC but have not been approved or constructed.

13.5 Other Undertaking in the Area

General land use is not accounted for as “other activities or projects” in the CEA. Nova Scotia’s landscape is a mosaic of intensive agricultural land, intact and disturbed forests, communities, and residential development. While these activities all affect the landscape and usage of the lands by humans and other species, there is not a meaningful way to determine or quantify the effect of these activities on various VCs. No meaningful data is available to support an assessment of cumulative effects associated with general land use. Furthermore, the existing land use was considered in the determination of residual environmental effects within each VC within the Project’s EARD, so no additional conclusions can be made through the lens of a CEA.

There are several industrial facilities, planned developments, and resource extraction operations in the immediate vicinity of the Project. Table 13.2 summarizes industrial activities/developments within approximately 15 km of the Project.

Table 13.2: Nearby Industrial Activities and Developments

Development	Project Type	Status of Activity	Activity Location	Distance to Study Area[1]	Terrestrial Fauna Pathway	Terrestrial Habitat Pathway	Avian Mortality pathway	Bat Mortality Pathway
Mulgrave Community Wind Power Project	Wind Development	Active	Within the Study Area	-	Yes	Yes	Yes	Yes
Goose Harbour Lake Wind Farm Project	Wind Development	Approved with Conditions	Goose Harbour Lake	0 km south (adjacent)	Yes	Yes	Yes	Yes
Auld's Cove Transmission Line	Transmission Line	Constructed	Aulds Cove	1.2 km northeast	No	No	Yes	Yes
Mulgrave Quarry Fines Storage Project	Aggregate Quarry and Bulk Coal Handling Facility	Active	Mulgrave	1.9 km east	No	No	No	No
NSPI Marine Terminal	Marine Terminal	Active	Point Tupper	7.5 km southeast	No	No	No	No
EverWind Point Tupper Green Hydrogen/Ammonia Project - Phase 1	Green Hydrogen and Ammonia Production	Approved with Conditions; Industrial Approval	Point Tupper	7.7 km east	No	No	No	No
EverWind Strait Crossing Transmission Line Project	Energy	Approved with Conditions	Strait of Canso	9.0 km southeast	No	No	Yes	Yes
Point Tupper Wind Farm	Wind Development	Active	Point Tupper	11.3 km southeast	No	No	Yes	Yes
Rhodena Quarry Expansion Project	Aggregate Quarry	Approved with Conditions	Rhodena	11.7 km northeast	No	No	No	No
Bear Head Energy Green Hydrogen and Ammonia Production, Storage and Loading Facility	Green Hydrogen and Ammonia Production	Approved with Conditions	Point Tupper	12.0 km southeast of study area	No	No	No	No

Development	Project Type	Status of Activity	Activity Location	Distance to Study Area[1]	Terrestrial Fauna Pathway	Terrestrial Habitat Pathway	Avian Mortality pathway	Bat Mortality Pathway
Rhodena Wind Project	Wind Development	Approved with Conditions	Rhodena	12.5 km north	No	No	Yes	Yes
Setapuktuk Wind Project	Wind Development	Approved with Conditions	Middle Melford	13.5 km southeast	Yes	Yes	Yes	Yes
Melford International Terminal	Marine Terminal	Approved with Conditions	Middle Melford	14.6 km southeast	No	No	No	No

[1]Distance to nearest point of the Study Area

13.6 Cumulative Effects Assessment

Cumulative effects for the Project were assessed by considering potential residual effects (as identified in VC sections) in relation to past, existing, and reasonably foreseeable future activities within the surrounding area (i.e., projects currently under regulatory review, approval, or construction).

Pathways to cumulative effects were found to be similar among terrestrial fauna and terrestrial habitat, and likewise between bird and bat mortality. Consequently, these VCs are grouped for the purposes of the CEA, such that terrestrial fauna and terrestrial habitat are collectively evaluated under Terrestrial Effects, and avifauna and bat mortality are collectively evaluated under Avian Mortality Effects.

When possible, the effects of assessed projects have been quantified; however, differences in available data, study boundaries, and assessment methodologies among projects limit the extent to which quantitative comparisons can be made. As such, the potential cumulative effects of these projects are evaluated primarily through a qualitative assessment.

13.6.1 Terrestrial Effects

Terrestrial impacts are discussed in terms of pathways for cumulative effects with the following nearby projects:

- Mulgrave Community Wind Project
- Goose Harbour Lake Wind Farm Project
- Setapuktuk Wind Project

Each of these assessed projects exhibit some degree of spatial and temporal overlap with the Project, with the exception of the Setapuktuk Wind Project. However, the Setapuktuk Wind Project is included in the terrestrial CEA because it adjoins the Goose Harbour Lake Project, establishing a direct terrestrial disturbance linkage to the Project's Study Area boundaries. Consequently, potential cumulative effects may occur among these four projects. Projects located across the Strait of Canso were excluded from the assessment because the Strait represents a substantial ecological barrier to terrestrial fauna movement.

The Mulgrave Quarry Fines Storage Project was screened out of the Project's terrestrial CEA. The EARD for the Mulgrave Quarry Fines Storage Project was submitted in 2010 and is an expansion of the existing Rodena Rock Quarry on Porcupine Mountain, which has been operational since 1999. The EARD identified potential loss of terrestrial habitat but concluded that the effects would not be significant, as no unique or critical habitat for rare or sensitive species was present, provided that the recommended mitigation measures were implemented. Additionally, Highway 344 bisects both the Project Study Area and the quarry expansion area, serving as a partial ecological barrier to terrestrial species movement. The quarry is further constrained by the Strait of Canso along its boundary, effectively isolating the site from the surrounding landscape. As such, the expansion footprint and associated mitigation measures are captured in the existing environmental record and baseline conditions for this region, and no incremental terrestrial effects on the Project's VCs are anticipated.

The Mulgrave Community Wind Project is a 2.35 MW single turbine development approved in 2014 and constructed in 2015. Two additional 50 kW turbines were also built in 2015; however, they were not included in the EARD despite being considered during early project discussions. The main turbine pad footprint is approximately 0.8 ha, excluding portions of the existing access road and temporary laydown area, and is located entirely within the Project's Study Area, where it was assessed as part of the designated Assessment Area. The EARD for the Mulgrave Community Wind Project did not quantify effects on terrestrial fauna or habitat, and no disturbance of wetlands was required for construction. Based on the assessment, any disturbance to terrestrial fauna or habitat is characterized as low and not significant.

The Goose Harbour Lake Wind Farm Project is a 130 MW wind development registered in 2023 and currently under construction. It is located directly south of the Project and northeast of the Setapuktuk Wind Project. The EA was approved based on the proposed construction of 29 wind turbines requiring approximately 65 km of roads (12 km of new roads and 53 km of upgrades to existing roads). The project had a Study Area of approximately 9,428 ha, and a Project Footprint of approximately 209 ha, representing a disturbance of approximately 2.2% of the Study Area. The impact to terrestrial fauna and habitat was described as low and not significant, representing a small loss of terrestrial habitat or habitat supporting fauna, with overall habitat functions and terrestrial fauna behaviour expected to remain intact.

The Setapuktuk Wind Project is a proposed wind farm with 54 wind turbines being developed to support the production of certified green hydrogen and ammonia in Nova Scotia. Located 13.5 km south of The Project, the Setapuktuk Wind Project encompasses a Study Area of approximately 8,880 ha, with a Project Footprint of roughly 273 ha, representing a disturbance of approximately 3.1% of the Study Area. This includes approximately 44 km of new road construction, widening and improvements to approximately 35 km of existing roads, substations and operations buildings, and turbine pad sites. Impacts to terrestrial fauna and habitat were not quantitatively assessed but were described as low, reflecting a minor loss of habitat without affecting overall habitat function or terrestrial fauna behaviour, and were considered not significant.

Although the Mulgrave Community Wind Project, Goose Harbour Lake Wind Farm Project, Setapuktuk Wind Project, and the Project are located adjacent to one another, each has a relatively small disturbance footprint within its broader Study Area, leaving substantial portions of intact and undisturbed forest across the landscape. Current and historical land-use in the region (i.e., forestry activities and recreational off-road vehicle use) has altered the landscape to its current state, such that modified and treated forest habitats are widespread and road networks are already established. The cumulative disturbance across the four projects within their combined Study Areas is estimated at approximately 2.7%, or roughly equivalent to 0.028 ha of disturbance per hectare of Study Area. This represents a conservative (i.e., overestimated) value, as each Project Footprint includes existing roads and previously disturbed areas within its calculations.

The cumulative effects of habitat fragmentation and wildlife interactions within these projects were also considered. None of the projects include infrastructure that would impede the movement of fauna across the landscape, such as pits, large berms, extensive fencing, or aboveground pipelines. As such, habitat connectivity and movement for fauna between the projects, adjacent undisturbed lands, and the Mulgrave Hills Nature Reserve are expected to be maintained. Across all four projects, approximately 158 km of total roads are associated with development, of which about 70 km represents new road construction. These roads are expected to support low traffic volumes – particularly during each Project's operational and maintenance phases – with similar usage compared with ongoing forestry activities in the area. Given these low traffic levels and speeds, the potential for wildlife-vehicle incidents and sensory disturbance is expected to be limited, particularly when compared to nearby provincial highways or residential roads. In addition, post-construction monitoring of mainland moose is anticipated for all projects, which will allow for qualitative comparisons of pre- and post-construction habitat use and to assess the potential effects of disturbance.

Overall, the Project employs an iterative design process that proactively avoids environmental constraints and uses existing road infrastructure where feasible. Combined with the limited spatial extent of new roads and project infrastructure, the low level of anticipated traffic, and the availability of undisturbed habitat across the landscape, no significant residual cumulative effects on terrestrial fauna or habitat are anticipated.

13.6.2 Avian Mortality

Avian mortality is discussed in terms of cumulative effects based on the Project's proximity to other projects including:

- Mulgrave Community Wind Power Project
- Goose Harbour Lake Wind Farm Project
- Setapuktuk Wind Project
- EverWind Strait Crossing Transmission Line
- Auld's Cove Transmission Line
- Point Tupper Wind Farm
- Rhodena Wind Project

Because avifauna are highly mobile and many species migrate across the regional landscape, projects within the 15 km buffer are considered to have potential spatial overlap with avifauna that may traverse or utilize habitats within multiple project areas. However, some projects within the buffer are located across the Strait of Canso and were generally excluded from the CEA unless they share similar pathways of effect or mechanism of interaction (i.e., other wind energy developments posing potential collision or displacement effects). This approach ensures that the assessment focuses on projects with the highest likelihood of contributing to cumulative (additive) effects on avifauna with the Project.

For the projects included in the assessment, cumulative effects were characterized using available data on avian mortality, habitat use, and operational characteristics of each project.

The purpose of this assessment is to evaluate whether each project's non-significant impacts result in a cumulative effect (additive) using publicly available data and stated thresholds of significance, if possible. Where quantitative data was limited, a qualitative approach was applied.

There are two transmission line projects – the EverWind Strait Crossing Transmission Line and the Auld's Cove Transmission Line – within the 15 km buffer, spanning the Straight of Canso at different locations. For both projects, effects to avifauna were determined to be not significant, with the cumulative effects for the EverWind Strait Crossing Transmission Line also being assessed as not significant when considering the Auld's Cove Transmission Line and other nearby developments.

The Mulgrave Community Wind Project EARD did not provide an estimate of avian mortality, but it was predicted that mortality would be low and not significant based on the project's small footprint, geographic setting, and avian usage of the Study Area. Post-construction mortality survey data is not publicly available.

The Point Tupper Wind Project consists of 11 wind turbines installed across the Strait of Canso, 11.3 km southeast of the Study Area. The Project was approved in 2008, and construction was completed by 2010. No estimates of avian mortality were provided in the EARD, and post-construction mortality surveys are not publicly available.

The Goose Harbour Lake Wind Farm Project is currently under construction and includes 29 wind turbines and ancillary infrastructure. While the EARD did present a summary of migratory bird interaction index (likely activity based on the fall 2022 migratory period which may correlate to increased mortality), no estimate of mortality was presented. Post-construction mortality monitoring is required as a condition of approval but has not yet been completed as turbines are not yet in operation. Similarly, the 54-turbine Setapuktuk Wind Project, located south of Goose Harbour Lake, did not include an avian mortality estimate in its assessment but will undertake post-construction mortality monitoring as required by its approval.

The Rhodena Wind Project is a proposed 42 MW wind project located near the communities of Creignish and Queensville, Nova Scotia. The project will consist of up to six turbines and ancillary infrastructure. No estimate of avian mortality was presented; however, the EARD referenced other wind farm studies in Atlantic Canada, from two sites in New Brunswick, three on Prince Edward Island, two in Newfoundland and Labrador, and one in Nova Scotia, and found an estimated average mortality rate of 1.17 birds/turbine/year and 0.26 bats/turbine/year (Bird Studies Canada, 2016b). This value does come with some uncertainty based on carcass removal by scavengers and searcher efficiency but notes that wind turbine collisions do exist but are likely low. The EARD concludes that the project's effects on bats and avifauna are expected to be low magnitude, within the LAA, of medium duration, intermittent, reversible, and not significant.

Given the proximity of nearby wind projects and transmission lines, there are likely additive effects to avian mortality. With the lack of publicly available post-construction mortality data, it is not possible to quantify whether any additive cumulative effects would result in a significant impact to avian mortality. Each project indicated that there is potential for avian mortality, though each deemed the effect to be not significant within the spatial boundaries of each respective EARD.

Wind projects requiring an EA in Nova Scotia are required to complete two years of post-construction mortality monitoring for birds and bats. In addition, it is expected that the Project will be required, as a condition of EA Approval, to develop an Adaptive Management Plan that includes a decision-making process to mitigate potential impacts to bird and bat species during operations. The plan and the monitoring results would be reviewed by NSECC, NSNR, and ECCC. NSECC will also receive the post-construction monitoring results from the Goose Harbour Lake Wind Project and Setapuktuk Wind Project. Recent wind EA conditions note NSECC's ability to require additional mitigation as part of adaptive management. Therefore, the potential for cumulative effects will be managed through future requirements for monitoring and adaptive management, as required.

13.7 Cumulative Effects Assessment Summary

The CEA applied a structured approach consistent with established guidance documents (Government of British Columbia, 2024; Hegmann et al., 1999) to identify relevant VCs, define appropriate spatial and temporal boundaries, and assess the combined influence of the Project and other existing or foreseeable activities. This process also incorporated an acknowledgment of uncertainties associated with data gaps and the limited availability of publicly available information for other developments.

Based on the CEA analysis, and given the limited extent of new infrastructure, low anticipated traffic volumes, and the continued availability of undisturbed habitat, no significant cumulative effects on terrestrial fauna or habitat are anticipated. Although potential cumulative effects on avifauna remain uncertain due to limited regional mortality data, mandatory post-construction monitoring requirements will provide a mechanism to detect and respond to any emerging cumulative impacts. Overall, the CEA indicates that cumulative effects for the relevant VCs are expected to be low and not significant and can be effectively managed through mitigation and ongoing monitoring.

14.0 CONCLUSION

In accordance with A Proponent's Guide to Environmental Assessment (NSECC, 2025a), the studies, regulatory assessments and VC evaluations described within this EA Report have been considered both singularly and cumulatively, for all phases of the Project.

The results of this assessment indicate that in consideration of the Project's mitigative and protection measures, adverse residual effects are anticipated to be not significant.

15.0 CLOSURE

This EA Report was completed by Strum Consulting, an independent, multi-disciplinary team of consultants with extensive experience with submission of EARDs for undertakings within Atlantic Canada. Curriculum vitae for EA Report contributors and Strum Project Team members are provided in Appendix O. A list of the Project Team and their associated roles is provided below.

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