RHODENA WIND PROJECT

Environmental Assessment Registration Document

Prepared for: ABO Energy Canada Ltd.

strum CONSULTING

October 30, 2024

Mr. Jeremy Higgins
Nova Scotia Department of Environment
and Climate Change
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October 30, 2024

Subject: Environmental Assessment Registration Document, Rhodena Wind Project

Dear Mr. Higgins,

Please find enclosed the Environmental Assessment Registration Document for the Rhodena Wind Project. The undersigned approves and accepts the contents, as submitted to Nova Scotia Environment & Climate Change, Environmental Assessment Branch.

Best regards,

Robin Reese
Managing Director
ABO Energy Canada Ltd.

EXECUTIVE SUMMARY

ABO Energy Canada Ltd. acknowledges that the Rhodena Wind Project is in Mi'kma'ki, the traditional and unceded territory of the Mi'kmaq people.

ABO Energy Canada Ltd. proposes to construct and operate the Rhodena Wind Project, a 42 megawatt (MW) wind development located near the communities of Creignish and Queensville, within the County of Inverness, Nova Scotia. The Project will consist of up to six wind turbines along with associated infrastructure, including access roads, substation, and interconnection lines. The development of this Project will support Nova Scotia in their target of producing 80% renewable energy by 2030, reducing the provinces dependency on coal generated electricity.

The Project is considered a Class I Undertaking under Schedule A of the Nova Scotia Environmental Assessment Regulations, NS Reg 26/95, and therefore, requires the registration of an Environmental Assessment Registration document. The Environmental Assessment Registration document has been completed according to methodologies and requirements outlined in A Proponent's Guide to Environmental Assessment, and has incorporated guidance from the Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia.

Several Valued Components were identified and evaluated as part of this assessment. Based on provincial guidance, desktop analysis, and subsequent field studies. Valued Components determined for assessment were as follows:

- Atmospheric Environment
- Geophysical Environment
- Aquatic Environment
- Terrestrial Environment
- Socioeconomic Environment
- Archaeological and Cultural Resources
- Human Health
- Electromagnetic Interference
- Shadow Flicker
- Visual Aesthetics
- Sound

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 also have a positive residual effect associated with the reduction of greenhouse gas emissions (i.e., production of renewable energy) and economic prosperity within Nova Scotia. The Project was also determined to not act cumulatively with nearby developments.

ABO Energy Canada Ltd. has, and 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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ACCDC	Atlantic Canada Conservation Data Centre
ACOA	Atlantic Canada Opportunities Agency
agl	Above ground level
APCFNS	Atlantic Policy Congress of First Nations Chiefs Secretariat
AQHI	Air Quality Health Index
ARD	Acid Rock Drainage
ARIA	Archaeological Resource Impact Assessment
ATV	All terrain vehicle
BCECC	British Columbia Ministry of Environment and Climate Change
BMP	Best Management Practices
°C	Degrees Celsius

CAAQS	Canadian Ambient Air Quality Standards
CanREA	Canadian Renewable Energy Association
CanWEA	Canadian wind energy association
CAO	Chief Administrative Officer
CCG	Canadian Coast Guard
CCME	Canadian Council of Ministers of the Environment
CDOT	California Department of Transportation
CEPA	Canadian Environmental Protection Act
CFO	Chief Financial Officer
CH_4	Methane
CLC	Community Liaison Committee
cm	Centimetres
CMIP6	Coupled Model Intercomparison Project Phase 6
CMM	Confederation of Mainland Mi'kmaq
CMT	Cognitive marine tracker
CNWI	Canadian Wetland Inventory
CO	Carbon monoxide
CONI	Common Nightjar
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CPC	Centre for Plant Conservation
CPUE	Catch Per Unit Effort
CWS	Canadian Wildlife Service
CYPD	Port Hawkesbury Airport
dB	Decibels
dBA	Decibels A (sound level)
DBH	Diameter at Breast Height
DC	Direct current
DFO	Fisheries and Oceans Canada
DNA	Deoxyribonucleic acid
DND	Department of National Defense
DWC	Diurnal watch counts
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EDPC	Eastern District Planning Commission
EMFs	Electromagnetic fields
EMI	Electromagnetic interference
EP	Eel Pot
EPP	Environmental Protection Plan
ERP	Emergency response plan
ESA	Endangered Species Act
ESA	Endangered Species Act
ESRI	Environmental Systems Research Institute
FAC	Facultative
FACU	Facultative Upland

FACW	Facultative Wetland
FEC	Forest Ecosystem Classification
FN	Fyke Net
FORNON	Forest/non-forest
FWI	Fire Weather Index
GCP	Green Choice Program
GHG	Green House Gas
GIS	Geographic Information System
GOC	Government of Canada
GPS	Global Positioning System
GR	General Resource
GR-1	General Resource
ha	Hectares
IBA	Important Bird Areas
ICNIRP	International Commission on Non-Ionizing Radiation Protection
IPCC	Intergovernmental Panel on Climate Change
ISED	Innovation, Science and Economic Development Canada
kg/MW	Kilograms per megawatts
Km	Kilometre
km/h	Kilometres per hour
KMKNO	Kwilmu’kw Maw-klusuaqn Negotiation Office
kPa	Kilopascal
kV	Kilovolt
kW	kilowatt
kWh/year	Kilowatt hour per year
LAA	Local Assessment Area
Lpm	Liters per minute
m	Metre
m/s	Metres per second
m^2	Metres squared
m^3	Cubic metres
MARI	Maritime Archaeological Resource Inventory
masl	Metres above sea level
MBBA	Maritime Bird Breeding Atlas
MBCA	Migratory Bird Conservation Act
MEKS	Mi’kmaq Ecological Knowledge Study
MFI	Mi’kmaq Forestry Initiative
mg/L	Milligram per liter
MHz	Megahertz
mm	millimetre
MOU	Memorandum of Understanding
mS/cm	Milisiemens per centimetre
MT	Minnow Trap
MTO	Ontario Ministry of Transportation

MTRI	Mersey Tobeatic Research Institute
MW	Megawatts
n	Number
N_2O	Nitrous oxide
NBDELG	New Brunswick Department of Environment and Local Government
NCEP	National Centers for Environmental Prediction
NFC	Nocturnal flight call
NI	No Indicator
NL	Not Listed
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrous oxide
NRCan	Natural Resources Canada
NREL	National Renewable Energy Laboratory
NREL	National Renewable Energy Laboratory
NS	Nova Scotia
NS AAQS	NS Ambient air quality standards
NSAQR	Nova Scotian Air Quality Regulation
NSCC	Nova Scotia Community College
NSCCTH	NS Communities, Culture, Tourism and Heritage
NSECC	Nova Scotia Environment and Climate Change
NSNRR	Nova Scotia Natural Resources and Renewables
NSPW	Nova Scotia Public Works
O_3	Ozone
OBL	Obligate
OLA	Office of L'nu Affairs
PC	Point count
pH	Potential of Hydrogen
PHP	Port Hawkesbury Paper
PID	Property Identification
PM	Particulate matter
PPE	Personal Protective Equipment
RAA	Regional Assessment Area
RABC	Radio Advisory Board of Canada
RCMP	Royal Canadian Mounted Police
RFP	Request for Proposals
rpm	Revolutions per minute
RSZ	Rotor swept zone
SANS	Snowmobilers Association of Nova Scotia
SAR	Species at Risk
SARA	Species at Risk Act
SCADA	Supervisory Control and Data Acquisition
SGEM	Nova Scotia Silvicultural Guide for the Ecological Matrix
SM3	Song Meter 3

SM4	Song Meter 4
SMPZ	Special Management Practice Zones
SO_2	Sulphur dioxide
SOCI	Species of Conservation Interest
SO_x	Sulfur oxides
SP1	Leading Species
S-Rank	Subnational rank
tCO_2e	Tonnes of carbon dioxide equivalent
tCO_2e/kg	Tonnes of carbon dioxide equivalent per kilogram
tCO_2e/tonne·km	Tonnes of carbon dioxide equivalent per Tonnes by kilometer
tCO_2e/year	Tonnes of carbon dioxide equivalent per year
TRS	Total reduced sulphur
TSP	Total Suspended Particulate
UK	United Kingdom
µm	Micrometres
UPL	Upland
US EIA	US Energy Information Administration
US EPA	US Environmental Protection Agency
USDA-NRCS	United States Department of Agriculture Natural Resources Conservation Service.
VCs	Valued Components
WAM	Wet Area Mapping
WESP-AC	Wetland Ecosystem Services Protocol – Atlantic Canada
WMA	Wskijnu'k Mtmo'taqnuow Agency
WSS	Wetlands of Special Significance
WT	Wind turbine
WTG	Wind turbine generators
YOY	Young of Year

LIST OF DRAWINGS

LIST OF APPENDICES

1.0 PROPONENT DESCRIPTION

ABO Energy Canada Ltd. (the Proponent) is proposing to develop, construct, and operate the Rhodena Wind Project (the Project). The Proponent is further partnering with Mi'kmaq communities to develop, construct, own, and operate the Project.

The Proponent retained Strum Consulting to support the development and submission of the Environmental Assessment (EA) Registration Document. Strum Consulting is an independent multi-disciplinary team of consultants with extensive experience in undertaking EAs throughout Atlantic Canada. Contact information for the Proponent and their consultant is included in Table 1.1.

Table 1.1: Proponent and Consultant Contact Information

Proponent Information	
Project Name	Rhodena Wind Project
Proponent Name	ABO Energy Canada Ltd.
Chief Executive Officer(s) / Principal(s)	Robin Reese Managing Director, ABO Energy Canada Ltd.
Mailing and Street Address	ABO Energy 200-2111 Maitland St. Halifax, NS B3K 2Z8
Website	ABO Energy | Renewables are our DNA Rhodena Wind (aboenergy.com)
Proponent Contact Information for the EA Registration	Jesse Cameron, Project Manager Phone: +1 (902) 439-8111 Email: jesse.cameron@aboenergy.com
Consultant Information	
Name of Consultant	Strum Consulting
Mailing and Street Address	Strum Consulting #210 – 211 Horseshoe Lake Drive Halifax, NS B3S 0B9
EA Contact	Heather Mosher, Senior Environmental Scientist Phone: 902-835-5560 Email: hmosher@strum.com

2.0 PROJECT INFORMATION

2.1 Project Introduction

The Proponent proposes to develop, construct, and operate the 42 MW Project located on predominantly private lands in the Municipality of the County of Inverness, near the communities of Creignish and Queensville, Nova Scotia (NS, Drawing 2.1). The approximate centre of the Project is located at 45.764814° N, 61.429811° W.

The Project will consist of up to six 7 mega-watt (MW) turbines, (Drawing 2.2), access roads, aboveground collector lines, interconnecting transmission system, a substation, and the associated infrastructure for the aforementioned facilities.

The Project location was selected based on a number of factors, including proximity to existing electrical and civil infrastructure, wind speed, and distances from nearest residences. The Project will interconnect to NS Power's transmission system through a direct line tap to the 138kV L-6537 transmission line, located approximately 10.2 km from the proposed substation.

The Study Area (including the land parcels on which the Project was proposed [Drawing 2.2 and Drawing 2.3] and further defined in Section 3.0) consists of both Crown and private lands. The turbines and substation are located on private lands, and supporting infrastructure (access roads, collector lines, and transmission line) are located on a mix of Crown land and private land. The Proponent has secured the land required through lease agreements on private properties and is currently working with the Nova Scotia Natural Resources and Renewables (NSNRR) to obtain an easement for infrastructure planned on Crown lands.

Upon approval of the EA Registration Document, construction activities are proposed to begin in Q2 2026 and once constructed, the Project is expected to be operational by Q1 2028 for a minimum of 25 to 30 years.

2.2 Purpose and Need for the Undertaking

As part of the Clean Power Plan released in fall 2023, the Government of Nova Scotia set targets of producing 80% renewable energy by 2030 and cutting greenhouse gas emissions produced from electricity by 90%. The development of wind energy is expected to be a significant part of achieving these goals. The Project has been proposed in support of this renewable energy target. Dependence on fossil fuels increases the vulnerability of Nova Scotians to rising international energy prices, weakens energy security, and takes valuable revenue out of the province, further leading Nova Scotia towards a preference for renewable energy (Province of NS, 2015). Negative impacts to human health (particularly in developing countries), and the environment, mainly in the form of climate change, are among the widely cited challenges associated with fossil fuel consumption around the world.

In its assessment report, "Climate Change 2022 - Impacts, Adaptation and Vulnerability", the United Nations Intergovernmental Panel on Climate Change (IPCC, 2022) provides a detailed synopsis of the impacts associated with climate change on both global and regional scales.

Evidence from all continents indicates that many biological systems and habitats are currently being affected by regional climate change. Ecological changes include changes to the thermal dynamics and quality of aquatic habitats, shifts in migratory timing and ranges of fauna and flora, changes in fish abundance, and increased risk of extinction and loss of forest habitat (IPCC, 2022). In North America specifically, the increase in ground, water, and atmospheric temperatures has resulted in direct mortality and redistribution of flora and fauna species. In addition, coastal flooding along with an increase in the frequency and intensity of extreme weather events will continue to impact the socioeconomic environment through displacement and / or damage to communities and economies (IPCC, 2022). Impacts of climate change are and will increasingly be felt across environmental, social, human health, and economic sectors (IPCC, 2022).

Canadian climate experts acknowledge that the debate has largely evolved from questions about the reality and causes of climate change, to what actions can be taken to adapt to the realities of a changing climate. As the second most important and fastest growing (along with solar) renewable energy source in Canada (NRCan, 2017), wind energy is a critical component of Canada’s renewable energy strategy. Wind energy is emission-free; with every megawatt of wind energy generated, greenhouse gas (GHG) emissions are reduced in comparison to previous levels associated with coal-related production (NSNRR, n.d). Numerous benefits can be expected from the transition to renewable energy, including:

- Long term stability in energy prices.
- Long term security in locally-sourced energy supply and decreased dependence on international markets.
- Creation of jobs and economic opportunities throughout the province.
- Community investment and economic return.
- Protection of human health and the environment.
- Educational opportunities for youth and the broader community about renewable energy technology, its benefits, and the role it will play in Nova Scotia’s energy future.

As part of this overall strategy, the Project will contribute to meeting Nova Scotia’s renewable energy target of 80% renewable by 2030 as outlined in the *Environmental Goals and Climate Change Reduction Act* (Government of NS, 2021; Government of NS, 2023) by producing enough energy to power over 13,600 Nova Scotian homes.

The Proponent is committed to sharing economic opportunities with the local community throughout the development and lifespan of the Project via the use of local skills and labour, and where possible, municipal tax revenue, and ongoing energy literacy/education. Consultation with local groups has been ongoing to support both community and Project development.

2.3 Regulatory Framework

2.3.1 Federal

Potentially applicable federal regulatory requirements including approvals, permits, notification, and compliance for the Project along with the current status are provided in Table 2.1.

Table 2.1: Federal Regulatory Requirements

Requirement/Permit	Regulatory Body	Application/Permit Status and Comments
Notification of Project	Royal Canadian Mounted Police (RCMP)	Notification was completed as part of the electromagnetic interference (EMI) consultation process. A letter of non-objection has been received. The EMI consultation process is described further in Section 10.2.
Aeronautical obstruction clearance Lighting design for navigational purposes	Transport Canada	Transport Canada aeronautical assessment, including lighting plan submitted to Transport Canada October 2024.
Operations Interference Clearance	Department of National Defence (DND)	Notification was completed as part of the EMI consultation process. A letter of non-objection has been received. The EMI consultation process is described further in Section 10.2.
Weather Radar Interference Approval	Environment and Climate Change Canada (ECCC), Meteorological Service of Canada	Notification was completed as part of the EMI consultation process. A letter of non-objection has been received. The EMI consultation process is described further in Section 10.2.
Land Use Approval	NAV CANADA	A land use submission was completed during the EMI consultation process. A letter of non-objection has been received. The EMI consultation process is described further in Section 10.2.
Fisheries Act Authorization	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 impact fish or fish habitat, the Proponent will submit a Request for Project Review to DFO.
Species at Risk Act (*SARA*) Permit	ECCC, DFO	No *SARA* permits were acquired for studies on site, as none were required.
Migratory Bird Convention Act (*MBCA*)	ECCC	Compliance legislation – there is no expectation that a *MBCA* permit will be required.

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, SOR/2019-285 under the *Impact Assessment Act*. No navigable waters were found within the Study Area to warrant any compliance under the *Canadian Navigable Waters Act.*

2.3.2 Provincial

The Project is subject to a Class I EA as defined by the Environmental Assessment Regulations, N.S. Reg. 328/2022 under the *Environment Act,* SNS 1994-95, c. 1. As such, this submission has been prepared in accordance with:

A Proponent's Guide to Environmental Assessment (NSECC, 2017).

- Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021).

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

Table 2.2: Provincial Regulatory Requirements

Requirement/Permit	Regulatory Body	Application / Permit Status and 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, N.S. Reg. 329/2022 following EA approval. Locations requiring alteration are described in Section 7.3.
Endangered Species Act, S.N.S. 1998, c. 11 (ESA),	NSNRR	Compliance legislation – there is no expectation that an ESA permit will be required.
Overweight/Special move permit Access permit Work within highway right-of-way Use of right-of-way for pole lines	Nova Scotia Public Works (NSPW)	Permits to be applied for before mobilizing oversize vehicles on public roads or commencing within a highway right-of-way
Crown Land Easement	NSNRR	Application be filed for Project components occurring on Crown lands.
Elevator lift license	NS Labour Skills and Immigration	Application to be filed prior to erection of the wind turbines
Archaeology Field Research Permit	NS Communities, Culture, Tourism and Heritage (NSCCTH)	Permit obtained to complete the archeology assessment (Heritage Research Permit A2022NS129).
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 Planning Strategies and Land Use By-laws exist in the Municipality of the County of Inverness for the development of Wind Power Projects. Municipal approval for 'Utility Scale Wind Turbines' (>100 kW production capacity) is only considered by development permit. The Project is located within the Municipal County of Inverness "General Resource (GR-1)" zone with as-of-right wind development, though development permitting must still occur (Table 2.3). The Proponent understands that the Municipality is undergoing updates to their Land Use By-laws and will follow the process current at the time the development permit application is planned to be filed.

Table 2.3: Municipal Regulatory Requirements

Requirement/Permit	Regulatory Body	Application/Permit Status and Comments
Development Permit	Municipality of the County of Inverness	Permit to be applied for after receipt of EA Approval and in advance of construction.

2.4 Funding

Equity funding for the Project has been secured. The Proponent is arranging debt financing. Commercial banks, along with additional funding sources, have been approached to participate in the Project as a lender. One of the leading Canadian banks and a well rated financial institution based in Germany with proven expertise in arranging and structuring debt financings in Canada, are engaged to lead the financing of the Project and have provided their support letters.

2.5 Structure of the EA Registration Document

An outline of the content of each section of the EA Registration Document is provided in Table 2.4.

Table 2.4: EA Registration Document Structure

Section	Content
Section 1	Proponent Description
Section 2	Project Information
Section 3	Description of the Undertaking
Section 4	Project Scope and Assessment Methodology
Section 5	Mi'kmaq of Nova Scotia
Section 6	Government and Public Engagement
Section 7	Biophysical Environment
Section 8	Socioeconomic Environment
Section 9	Archaeological Resources
Section 10	Other Considerations
Section 11	Effects of the Undertaking on the Environment – Summary
Section 12	Effects of the Environment on the Undertaking
Section 13	Accidents and Malfunctions
Section 14	Cumulative Effects Assessment
Section 15	Conclusion
Section 16	Closure
Section 17	References

3.0 DESCRIPTION OF THE UNDERTAKING

3.1 Geographical Location

The Project is located within the River Inhabitants Primary watershed, near the community of Creignish, in Inverness County, Cape Breton, NS (Drawing 2.1).

A Study Area used for the desktop assessment to inform field surveys and enable preliminary Project design included the boundaries of the land parcels (i.e., PIDs) on which the Project was proposed (Table 3.1, Drawing 2.2 and Drawing 2.3). An Assessment Area was subsequently established for detailed field investigations, which included the physical footprint of the Project where the direct physical disturbance is expected to occur (i.e., the Project Area), plus a buffer to allow design flexibility and assess for indirect effects beyond the direct effects within the Project Area. For this Project, the buffer included a 200 m radius from each turbine and a 25 m buffer on either side of the centreline for the road layout.

Table 3.1: Land Parcels within the Study Area

PID	Landowner	Land Use
50157627	Crown	Government
50167212	Crown	Government
50017136	Crown	Government
50017169	Crown	Government
50017029	Crown	Government
50010719	Private	Residential
50017292	Crown	Government
50016757	Crown	Government
50303916	Crown	Government
50014299	Private	Commercial
50167170	Crown	Government
50167733	Crown	Government
50016773	Crown	Government
50017151	Crown	Government
50303635	Crown	Government
50303627	Crown	Government
50167105	Crown	Government
50317767	Crown	Government
50017219	Crown	Government
50303817	Crown	Government
50016872	Crown	Government
50317775	Crown	Government
50305127	Crown	Government
50167881	Crown	Government
50317759	Crown	Government
50167089	Crown	Government
50305184	Crown	Government
50016302	Private	Residential

PID	Landowner	Land Use
50016724	Crown	Government
50016955	Crown	Government
50167071	Crown	Government
50305200	Crown	Government
50303692	Crown	Government
50016294	Private	Residential
50305218	Crown	Government
50305192	Crown	Government
50016963	Crown	Government
50017078	Crown	Government
50303742	Crown	Government
50016286	Private	Residential
50167063	Private	Residential
50167899	Crown	Government
50015551	Private	Commercial
50303965	Crown	Government
50014125	Private	Commercial
50017045	Crown	Government
50167923	Crown	Government
50017003	Crown	Government
50316454	Private	Residential
50015569	Private	Commercial
50017110	Crown	Government
50167055	Crown	Government
50167915	Crown	Government
50015585	Crown	Government
50305176	Crown	Government
50017433	Crown	Government
50015155	Private	Residential
50167022	Crown	Government
50305168	Crown	Government
50015171	Private	Residential
50332253	Private	Residential
50305358	Private	Residential
50016914	Crown	Government
50167907	Crown	Government
50167014	Crown	Government
50017177	Crown	Government
50015502	Private	Residential
50017516	Crown	Government
50017342	Crown	Government
50303676	Crown	Government
50304013	Crown	Government
50016997	Crown	Government
50015544	Private	Residential

PID	Landowner	Land Use
50167782	Private	Residential
50304005	Crown	Government
50016336	Crown	Government
50177195	Crown	Government
50177187	Crown	Government
50062843	Private	Residential
50006832	Crown	Government

The measured areas of the Study Area, Assessment Area, and Project Area are provided in Table 3.2.

Table 3.2: Measured areas of Study

Area of Study	Area (ha)
Study Area	4,011
Assessment Area	137
Project Area*	54

*Area is a conservative estimate of the permanent footprint of the Project Area and is subject to change upon final design. Temporary Project Area components are shown in Drawing 2.3 but not included in this calculation. Following the detail design, the area will be refined.

3.1.1 Siting Considerations

The Project is mostly sited on private lands that were previously partially disturbed by commercial forestry purposes. Project siting was completed in a multi-phased approach:

- Original siting was based upon a detailed constraints analysis, primarily consisting of a GIS exercise after considering land ownership, grid capacity and proximity, and wind speed to develop a preliminary layout. Siting considerations included:
    - Siting turbines at locations for efficient capture of wind energy and proximity to the Nova Scotia power grid.
    - Utilizing existing disturbed areas to the greatest extent practical.
    - Complying with regulated setbacks and separation distances (Table 3.3).
    - Avoiding interference with telecommunication and radar systems.
    - Avoiding known protected areas; field identified archaeological, cultural, and heritage resources, significant habitats; and wildlife sites, provincial parks, or reserves.
- The original layout included turbine placement on a combination of both private and Crown land. However, due to changes to the Green Choice Program (GCP), a renewable energy power purchasing program, the turbine placement was restricted to only private land to support NSNRR in achieving their 20% Crown land conservation targets. As a result, the Project was significantly downsized to accommodate a smaller buildable area.
- Further refinement to the proposed layout was completed based on the results of desktop studies, field assessments, and engagement with the Mi’kmaq of Nova Scotia,

government agencies, stakeholders, local communicates and special interest organizations.

As a result, many layout iterations were created and considered to reflect a growing knowledge of the Study Area, the constraints from the GCP, and surrounding community and environmental considerations before developing the current layout for the purposes of this EA.

The minimum setbacks and separation distances applied during the development, design, and siting of the Project are summarized in Table 3.3.

Table 3.3: Summary of Minimum Setbacks and Separation Distances

Feature	Distance	Relevant Regulators / Stakeholders
Watercourses	30 m from turbines where possible or otherwise authorized by NSECC (from tip of blade)	NSECC
Wetlands	30 m from turbines where possible or otherwise authorized by NSECC (from tip of blade)	NSECC, NSNRR
Wetlands of Special Significance	At least 30 m, to be determined in consultation with NSECC	NSECC, NSNRR
Important Habitat Features - Old Growth Forests + Talus Slopes	100 m limited development buffer where possible on Crown land	NSNRR
Protected Areas and Public Resources	To be determined in consultation with NSECC and NSNRR, as appropriate.	NSECC / NSNRR
Rare Plants and Lichens	Species-specific (Section 7.4.2)	NSNRR
Public Roads	300 m (1.5 x Turbine Height)	Health Canada
Powerlines	300 m from non-Project-related powerlines, except designated crossing locations (1.5 x Turbine Height)	NS Power
Shadow Flicker	As necessary to meet shadow flicker constraints based off shadow flicker modelling	NSECC
Sound / Noise	As necessary to meet sound / noise constraints based off sound modelling	NSECC
Adjacent Property Lines	128 m (10 m + height of turbine rotor)	Municipality of the County of Inverness
Residences	600 m (from base of structure)	Municipality of the County of Inverness

Feature	Distance	Relevant Regulators / Stakeholders
Turbine separation	200 m (height of tallest turbine)	Municipality of the County of Inverness
Watercourses + Public Highways	60 m (from base of structure)	Municipality of the County of Inverness
Coastlines	100 m (from base of structure)	Municipality of the County of Inverness

The Project Area also offers considerable development opportunities that were incorporated into the Project design to minimize potential effects to surrounding land uses, local residents, and environmental features. Project design considered the following:

- Using a site that has been previously disturbed by forestry activities (i.e., tree clearing and logging trails/roads are present throughout the Study Area).
- Working with local community groups and members of the public to understand any current land use, concerns and/or opportunities.
- Engaging with First Nations communities and conducting a MEKS to understand potential conflicts with traditional land use.
- Working with first responders when planning access road routes, to facilitate easier access to the Project in the event of an emergency.
- Working with local recreational organizations to continue to allow local access after the Project is constructed.

3.2 Physical Components

3.2.1 Turbines

The Project will be powered by up to six wind turbines, each rated at up to 7 MW; however, there are a range of other turbine models being considered. The nominal capacity of the Project is up to 42 MW. Each turbine is comprised of the 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. Specifications for the range of turbines under consideration are provided in Table 3.4.

Table 3.4: Turbine Technical Specifications

Turbine Component	Specifications	
	Primary Selection	Market Availability
	Nordex N163/6.X	Alternative Turbine Range
Rated Capacity	Up to 7 MW	4.5 – 7.0 MW
Rotor Diameter	163 m	150 – 180 m
Hub Height	118 m	110 – 140 m

Turbine Component	Specifications	
	Primary Selection	Market Availability
	Nordex N163/6.X	Alternative Turbine Range
Cut-in Wind Speed	3 metres per second (m/s)	3 metres per second (m/s)
Cut-out Wind Speed	up to 26 (m/s)	up to 26 (m/s)
Swept Area	20,867 square metres (m^2)	17,671 – 25,447 square metres (m2)
Rotor Speed	Variable	Variable
Generator	6-pole doubly-fed induction	6-pole doubly-fed induction[1]
Brake System	Aerodynamic brake plus disc brake	Aerodynamic brake plus disc brake
Remote Monitoring	Supervisory Control and Data Acquisition (SCADA)	SCADA
Lighting Requirements	Per Transport Canada Requirements	Per Transport Canada Requirements
Materials	Tubular steel tower with glass/carbon fibre reinforced plastic rotors	Tubular steel, concrete, or hybrid steel / concrete tower with glass/carbon fibre reinforced plastic rotors
Colour	Based on manufacturer specifications and regulatory requirements	Based on manufacturer specifications and regulatory requirements

3.2.2 Roads

The proposed access roads consist of both new and used roads. Two new access roads will extend from General Line Road, and a third access road that will extend from Rhodena Road. All roads will be constructed or upgraded, as required to safely transport the turbines, provide appropriate turning radii, and support construction activities in compliance with local and provincial guidelines/requirements. During the civil design process, consideration will be made to minimize adverse impacts to sensitive habitats, such as wetlands, watercourses and rare species, as well.

Transport to the site from Trans-Canada Highway 105 is currently proposed via General Line Road and/or Rhodena Road. A transportation plan will be completed in consultation with the turbine manufacturers and NSPW. Once the access route has been established, any necessary upgrades will be made in compliance with required permitting.

3.2.3 Substation and Power Collection Systems

The Project requires a substation that will be installed within a fenced yard and will include a step-up transformer, circuit breakers, relays, SCADA system, revenue meter, telecommunication equipment, control building, and support structures. The system connection at the substation will consist of a single span line tap to NS Power 138 kV transmission line L-

[1] Subject to change pending turbine model selected in final design.

6537, anticipated to be approximately 10.2 km from the substation's 138 kV dead-end structure. The new three breaker ring bus substation will be installed approximately 8 km from the 2C-Port Hastings Substation.

The Project's electrical collection system will bring power from the wind turbines to the substation. The collection system will be comprised of a series of 34.5 kV aboveground collector lines. Underground collector lines will connect turbines with the first standard pole, generally a run of less than 100 m, and will be installed in trenches. Aboveground components will include standard pole structures with associated guy wires, foundations, and groundings, all of which will generally be co-located with the access roads and will connect turbines to the substation.

3.3 Project Phases

The Project will include three phases:

- Site preparation and construction.
- Operations and maintenance.
- Decommissioning.

Activities and requirements associated with each phase are discussed in the following sections. Transportation of turbine components is addressed in Section 8.3.

3.3.1 Site Preparation and Construction

Site preparation activities include:

- Land surveys for placement of roads, turbines, and associated works.
- Geotechnical investigations.
- Placement of erosion and sedimentation control measures.
- Demarcating boundaries of environmentally sensitive features and applying appropriate buffers.
- Clearing of trees, grubbing, excavating, grading, and compacting for construction.

General construction activities include:

- Installation of access road infrastructure (upgrading existing and new construction).
- Laydown area and turbine pad construction.
- Transportation of turbine components, equipment, and materials.
- Site traffic control measures.
- Foundation excavation and construction, including blasting, if required.
- Materials preparation and storage (e.g., crusher and storage areas).
- Turbine and infrastructure assembly.
- Site waste and dust management.
- Construction of collection system and substation.
- Grid connection.

- Removal of temporary works and site restoration.
- Commissioning.

Access Road Construction

The Project will require the construction of approximately 4.75 km of new roads. General Line Road and Rhodena Road will serve as primary access roads to the site, with new roads required for turbine access. New roads are expected to be constructed to a standard carriageway width of 7 m plus ditches sloped at a ratio of 2:1 to accommodate proper drainage and culverts where required. There will be areas where the roadway width could increase to 11 m plus the width for ditches to accommodate cut and fill areas, wide turning radiuses, or areas where the assembly crane will transit between turbines during construction.

During the construction phase, Project roads will be maintained with additional gravel or periodic grading as needed. Aggregate material for road construction will be transported from off-site quarries and stored temporarily until used. Any material removed for road construction will be stored or disposed of in accordance with regulations for road construction. Any material stored on the site will be managed with appropriate erosion and sedimentation control measures or re-used.

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

- Excavators
- Feller buncher
- Dump trucks
- Bull-dozers
- Rollers
- Graders
- Aggregate crusher
- Light trucks

Laydown Area, Turbine Pad Construction, and Foundation Construction

General activities during the creation of the laydown areas (areas at the base of the turbines for the storage of equipment, as well as one general construction laydown area), turbine pad, and turbine foundation construction areas may include:

- Delineating work areas and installing erosion and sedimentation control measures.
- Removing of vegetation and site grading.
- Removing of overburden and soils.
- Blasting/breaking of bedrock (to be determined, based on geotechnical conditions and foundation design).
- Pouring and curing of concrete foundations (complete with reinforcing steel).
- Placing competent soils to bring area to grade.
- Compacting of fill or soils.

- Trenching and installing above ground electrical collector systems and fibre optic communication systems.

Depending on the turbine foundation requirements, foundations could be approximately 18 m in diameter and extend to a depth of 3 to 5 m below grade. Each turbine pad and laydown area at the base of the turbine is expected to be approximately 120 m by 120 m. Each turbine foundation, turbine pad, and crane pad will be designed to suit the specific requirements of the turbine and the geology and surrounding topography during the detailed design process.

The 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 access. The following equipment may be used for the laydown area and turbine pad construction:

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

Turbine Assembly

The wind turbine assembly includes installing the tower sections, the nacelle, the hub, and three-blade rotors. 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.

The tower sections will be erected in sequence on the turbine foundation, followed by the nacelle, hub, and rotor blades. Turbine assembly will require the use of cranes and tag lines. Erection will depend on weather, specifically wind and daylight conditions. Typical assembly duration per turbine is expected to be between two to five days. The following equipment is expected to be used for turbine assembly:

- Main crane unit
- Additional assembly cranes
- Tag line support vehicles
- Manufacturer’s support vehicles

Collection System and Substation Construction

The Project will connect to a new substation constructed near the closest available grid connection. The construction of a substation can take between eight to 10 months, depending on weather, soil, and construction vehicle access. The electrical collector system will be constructed in 2027 and can take between two and four months to complete.

The following equipment is expected to be used during the collector system and substation construction process:

- Excavator
- Backhoe
- Bucket trucks
- Light cranes
- Light trucks
- Hydrovac
- Directional Driller
- Telehandler
- Rollers

Removal of Temporary Works and Site Restoration

Once construction has been completed at each of the components listed in Section 3.2, temporary works, such as storage and laydown areas, will be removed, and the site will be appropriately graded and reseeded to restore these areas to their natural state. The following equipment is expected to be used in this process:

- Excavator and/or backhoe
- Grader
- Dump trucks
- Hydroseeder
- Grader
- Light trucks

Commissioning

The turbines will undergo a series of tests for mechanical, electrical, and control functions prior to initializing the 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, turbine commissioning can begin.

Commissioning includes performance testing which will be conducted in coordination with NS Power (as the electrical grid operator), to ensure that the generated electricity meets NS Power quality criteria. These performance tests will be completed by qualified wind power technicians and electrical utility (i.e., NS Power) employees. 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.

3.3.2 Operations and Maintenance

The lifespan of the Project is estimated to be a minimum of 25 to 30 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, as required for driving safety and to ensure access to all site locations in the event of an emergency.

A vegetation management plan will be created and followed prior to ensure that access roads and turbine locations will remain clear of vegetation during operations. Vegetation management will include removal and pruning. Timing of vegetation management will depend on site-specific conditions.

Due to the potential for public access to the wind farm, signage will be affixed and maintained on access roads to provide essential safety information such as emergency contacts and telephone numbers, speed limits, and the hazards associated with being in proximity to the turbines. These signs will be maintained during the life of the Project.

All turbines will be affixed with adequate lighting in compliance with NAV CANADA and Transport Canada requirements for aviation during their operational life.

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

3.3.3 Decommissioning

As noted above, the operational life of the Project is estimated to be a minimum of 25 to 30 years with the possibility of extension. A site decommissioning and reclamation plan is required for the Municipal Development Permit. NSECC will be provided with decommissioning plans for review prior to Project decommissioning. If operation of a specific turbine also ceases for two years during the operations and maintenance phase, the Proponent will notify NSECC of its plans to either remove the turbine, recommission or repower it.

Generally, the decommissioning phase will follow the same steps as the construction phase (in the reverse order) but will also include:

- Dismantling and removal of the turbines.
- Decommissioning of the turbine foundations as per the conditions of the land lease agreement.
- Removal, recycling (where possible), and disposal of collection system, conductor, and poles.
- Removal of other equipment, as required, and reinstatement and stabilization of land, where necessary.

- Access roads will either be removed or remain in place as per lease agreements with the landowner.

According to the Canadian Renewable Energy Association (CanREA, n.d.), up to 90% of wind turbine blades can be recycled. Additional components, such as the 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.

3.4 Project Schedule

Table 3.5 presents the Project schedule from EA registration to Project decommissioning.

Table 3.5: Project Schedule

Project Activity	Timeline[1]
EA Registration	Q4 2024
Additional Project Permitting	Q1 2025 to Q2 2026
Post-EA Environmental Monitoring Programs	Q1 2025 onward (as required)
Geotechnical Assessment	Q2 2025 to Q3 2025
Detailed Engineering Design	Q2 2025 to Q1 2026
Municipal Decision on Development Agreement	Q1 2025
Construction (including clearing, site preparation, and road work, component installations)	Q2 2026 to Q2 2027
Commissioning	Q4 2027
Operation	Q4 2027 to Q4 2057 (based on lifespan of 30 years)
Decommissioning	2058

[1] The Project schedule is based on professional estimates current at the time of the EA and may be subject to change as each activity progresses. The Proponent will keep NSECC informed on any revisions to the schedule in advance.

4.0 PROJECT SCOPE AND ASSESSMENT METHODOLOGY

As a Class 1 EA, this Registration Document and supporting studies have been developed to meet all requirements under Section 9(1A) of the Nova Scotia *Environment Act*. As such, this submission has been prepared in accordance with:

- A Proponent's Guide to Environmental Assessment (NSECC, 2017).
- Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021).

The Project Team contacted the following regulatory bodies to provide input and advice on the EA scope and planning:

- Canadian Wildlife Service (CWS)
- NSCCTH
- NSECC
- NSNRR
- Nova Scotia Office of L'nu Affairs
- DFO

4.1 Site Sensitivity

Potential wind farms are assigned a project risk category level, according to a matrix provided in the "Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia". This matrix considers the overall project size and the sensitivity of the project site. The category level then outlines guidance for the collection of baseline data and post-construction monitoring requirements.

As the total turbine height being considered for the proposed Project is greater than 150 m, the Project is automatically considered to have a category 4 risk rating.

4.2 Assessment Scope and 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 residual effects after the application of mitigation measures.

The EA focuses on Valued Components (VCs). VCs are specific components of the biophysical and human environments that, if altered by the Project, may be of concern to regulators, the Mi'kmaq of Nova Scotia, stakeholders, and/or the general 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 residual environmental effects using VC-specific criteria.
- Identify monitoring of follow-up programs to verify predictions and/or evaluate the need to implement adaptive management.

4.3 Identification of Valued Components

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

- Biophysical environment
  - weather, climate, air quality
  - geology, hydrogeology/groundwater
  - watercourses, fish and fish habitat
  - wetlands
  - flora, fauna, habitat
  - bats
  - avifauna
  - species at risk (considered in the appropriate VC chapter, as necessary)
- Socioeconomic environment
  - economy, land use, transportation, recreation and tourism
  - archaeological and cultural resources
  - human health
  - electromagnetic interference
  - shadow flicker
  - visual impacts
  - sound

4.4 Spatial and Temporal Boundaries

4.4.1 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:

- Project Area - the physical footprint of the Project, where the direct physical disturbance is expected to occur.
- Local Assessment Area (LAA) – the area where Project-related effects can be predicted or measured for assessment. The LAA is VC-specific and defined in each VC chapter.
- Regional Assessment Area (RAA) – includes the area established for context in the determination of significance of Project-specific effects. It is also the area in which accidents and malfunctions are assessed. The RAA is VC-specific and defined in each VC chapter.

As detailed in Section 3.0, a Study Area was established based on land parcels (i.e., PIDs) that are included in the development area (Table 3.1, Drawing 2.2). The intent of the Study Area was to first survey, using both desktop and field methods where appropriate, a broad area at a high-level to allow flexibility in the design to move infrastructure and minimize effects to VCs. An Assessment Area was subsequently established for detailed field investigations, which includes the physical footprint of the Project where the direct physical disturbance is expected to occur (i.e., the Project Area), plus a buffer to allow design flexibility and assess for indirect effects beyond the direct effects within the Project Area. For this Project, the buffer included a 200 m radius from each turbine, and a 25 m buffer on either side of the centreline for the road layout, to include road expansions as well as the collector and transmission lines required. Other laydown areas and proposed substation locations were also included in the Assessment Area.

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

4.4.2 Temporal Boundaries

The temporal boundaries in Table 4.1 apply to all VCs unless otherwise stated.

Table 4.1: Temporal Boundaries

Project Phase	Temporal Boundary
Site Preparation and Construction	18 to 24 months
Operation and Maintenance	25+ years
Decommissioning	25 to 30+ years

4.5 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 10), following a description of existing conditions. Where an adverse effect on a VC is identified, strategies for mitigation, avoidance, or compensation are proposed. Where possible, mitigation measures are incorporated into the Project design to eliminate or reduce potential adverse effects.

4.6 Residual 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 4.2); however, the magnitude criteria are VC-specific and are provided in the individual chapters.

Table 4.2: Residual 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 The geographic area in which a residual effect occurs	**Project Area –** residual effects are restricted to the Project footprint **Local Assessment Area –** residual effects extend into the local assessment area **Regional Assessment Area –** residual effects interact with those of projects in the regional assessment area
Timing and Seasonality Considers when the residual effect is expected to occur	**Not applicable –** seasonal aspects are unlikely to affect the VC **Applicable –** seasonal aspects may affect the VC
Duration The time required until the measurable parameter or VC returns to its existing condition, or the 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 **Medium term –** residual effect extends through the operation and maintenance phase

Rating Criteria	Rating
	Long term – residual effect extends beyond the decommissioning phase
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 phases of the Project **Continuous –** occurs continuously
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

If, based on the criteria in Table 4.2, a residual effect is identified, its significance is then evaluated. A residual effect is considered significant if the potential effect could threaten sustainability of a resource or result in a moderate to high change in baseline levels within the RAA. The effect is anticipated to last for a medium to long-term duration and will occur on a continuous basis. Research, monitoring, and/or recovery initiatives should be considered and may be required.

4.7 Monitoring and 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.

4.8 Assessment for Wild Species

The assessment for wild species (e.g. birds, mammals, fish, plants, etc.) was conducted in accordance with the Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2005). Special consideration of species at risk (SAR), listed under the *SARA* and the *Endangered Species Act*, S.N.S. 1998, c. 11 (*ESA*), along with 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) or 'S3', 'S2', or 'S1' from the Atlantic Canada Conservation Data Centre (ACCDC).

For SAR, said species and their dwellings are provided protection under *SARA*, *ESA*, and the *Biodiversity Act.*

Priority species were developed based on the SAR and SOCI identified through desktop review or field assessments that have the potential to interact with the Project through their presence, or the potential for presence, in the Study Area.

5.0 MI'KMAQ OF NOVA SCOTIA

The Project is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people who are the founding people of Nova Scotia and currently live throughout the province, including in 13 Mi'kmaq communities (OLA, 2015). The Proponent engaged with the Native Council of Nova Scotia to ensure engagement with Mi'kmaw people living off-reserve. The Project is located within the Mi'kmaq territory called Unama'kik, which means 'Mi'kmaw territory' (Parks Canada, 2023a).

The Mi'kmaq in 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 ancestors of the Mi'kmaq. The earliest evidence of the Mi'kmaq of Nova Scotia in the Maritimes Region indicates that the ancestors of the Mi'kmaq have existed on the land for more than 11,000 years (Mi'kmawey Debert Cultural Centre, 2024).

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. As 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 (Government of Canada, 2011) and the Proponents' Guide: The Role of Proponents in Crown Consultation With the Mi'kmaq of Nova Scotia (Office of Aboriginal Affairs, 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 are expected to be considered by the provincial government in the EA decision-making process.

For the purposes of consultation, 10 of the 13 Mi'kmaq communities are represented in consultation by Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO), which reports to the Assembly of Nova Scotia Mi'kmaq Chiefs. At this time, Membertou First Nation, Millbrook First Nation, and Sipekne'katik First Nation represent their own communities in consultation through their elected Chiefs and Councils.

The nearest Mi'kmaq community to the Project is the We'koqma'q community on the Whycocomagh Reserve (No. 2) with a population of 877 individuals (Statistics Canada, 2023). Whycocomagh is located approximately 37 km northeast of the Project. Other, further Mi'kmaq communities include Potlotek First Nation on the Chapel Island (No. 5) Reserve (population 405; 46 km east), Wagmatcook (population 691; 48 km northeast), and Eskasoni (population 3,521; 63 km northeast).

The nearest known Mi'kmaq placename to the Project Area is Paqasepekiaq which means "Something hangs on the water" (Mi'kmawey Debert Cultural Centre, 2024). This placename corresponds to the area known as Creignish.

5.1 Engagement

As an integral component of any project development activity in Nova Scotia, the Proponent prioritized early engagement with all 13 of the Nova Scotia Mi'kmaq communities, which initiated in 2021.

The Proponent notified the Mi'kmaq early in the development process, provided as much information as possible and continued outreach to provide Project updates, made contact with the Office of L'Nu Affairs and KMKNO, met with Mi'kmaq communities, completed a Mi'kmaq Ecological Knowledge Study (MEKS) with Membertou Geomatics Solutions, and documented the engagement process per steps one through six of the Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia (Office of L'Nu Affairs, 2012). Furthermore, the Proponent has also participated in three KMKNO-hosted events for First Nations participants to provide information on the Project and discuss job and procurement opportunities. The Proponent also presented the Project to Wskijnu'k Mtmo'taqnuow Agency Ltd. (WMA) in February 2024, the economic development organization that represents all 13 Mi'kmaw communities in the province.

In addition, the Proponent has also provided Project updates, opportunities for feedback, and invitations to many other Indigenous groups and associations in advance of the public open houses in 2022, 2023, and 2024. These groups included the Confederacy of Mainland Mi'kmaq, the Union of Nova Scotia Mi'kmaq, Unama'ki Institute of Natural Resources, the NS Native Women's Association, the Native Council of Nova Scotia, and the APCFNS.

The Proponent has partnered with Mi'kmaq communities close to the Project. All parties have signed a binding Memorandum of Understanding ("MOU") that outlines the terms of cooperation and ownership for the Project.

Table 5.1 summarizes engagement efforts with the Mi'kmaq of Nova Scotia, of which there was over 250 individual touchpoints.

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

First Nation / Organization	Representative(s)	Contact Details
First Nations		
Acadia First Nation	Chief Deborah Robinson Bruce Clarke Julian O'Connell Rachel Stevenson Glenda Macdonald	The Proponent has had ongoing engagement with Acadia First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided.

First Nation / Organization	Representative(s)	Contact Details
Annapolis Valley First Nation	Chief Gerald Toney	The Proponent has had ongoing engagement with Annapolis Valley First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, information sharing, and feedback were also provided.
Eskasoni First Nation	Chief Leroy Denny Michael Denny Steve Parsons	The Proponent has had ongoing engagement with Eskasoni First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, information sharing, and feedback were also provided. Invitations to the open houses were also provided. The Proponent also reached out to Eskasoni First Nation to get insight regarding sponsorship of the North American Indigenous Games (2023) and a community fishing derby (2024). Updates were provided in 2023 regarding plans for the upcoming EA submission, open houses, and outreach efforts. In May 2024, the Proponent met with Eskasoni First Nation to discuss the Project, including opportunities for partnership and future benefits (including capacity building etc.). During engagement efforts, no Project specific impacts have been identified. Interest in being part of the MEKS studies was expressed.
Glooscap First Nation	Chief Sidney Peters Gail Tupper Amanda Francis Charlotte Warrington Michael Peters Montanna Labradore	The Proponent has had ongoing engagement with Glooscap First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.

First Nation / Organization	Representative(s)	Contact Details
		The Proponent also hosted a virtual meeting in April 2024 with Glooscap First Nation Chief, Councilors and staff to discuss Project opportunities.
Glooscap First Nation	Chief Sidney Peters Gail Tupper Amanda Francis Charlotte Warrington Michael Peters Montanna Labradore	The Proponent has had ongoing engagement with Glooscap First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided. The Proponent also hosted a virtual meeting in April 2024 with Glooscap First Nation Chief, Councilors and staff to discuss Project opportunities.
L'sitkuk First Nation	Chief Carol Dee Potter	The Proponent has had ongoing engagement with L'sitkuk First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.
Membertou First Nation	Chief Terrance Paul	The Proponent has had ongoing engagement with Membertou First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.
Millbrook First Nation	Chief Robert Gloade	The Proponent has had ongoing engagement with Millbrook First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.

First Nation / Organization	Representative(s)	Contact Details
Paq'tnkek First Nation	Chief TMA Francis	The Proponent has had ongoing engagement with Paq'tnkek First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.
Pictou Landing First Nation	Chief Andrea Paul	The Proponent engaged with Pictou Landing First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided.
Polotek First Nation	Chief Wilbert Marshall	The Proponent has had ongoing engagement with Potlotek First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the open houses were also provided. The Proponent met virtually and in-person with Potlotek First Nation in 2024 to discuss the Project, opportunities, and partnerships.
Sipekne'katik First Nation	Chief Michael P Sack Cheryl Maloney	Engagement with Sipekne'katik First Nation was initiated in 2022 with an introduction to the Project and Proponent. Sipekne'katik First Nation responded and asked if the Proponent would like to do a presentation as part of pre-engagement efforts. A virtual presentation was provided to Sipekne'katik First Nation in March 2022 which provided an overview of the Project and submission to the provincial Rate Base Procurement Program. A series of Project mailouts/pamphlets outlining Project information and website information were also distributed; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations

First Nation / Organization	Representative(s)	Contact Details
		for further engagement, collaboration, and feedback were also provided. The Proponent also had a virtual meeting with Sipekne'katik First Nation in August 2023 to discuss the Project.
Wagmatcook First Nation	Chief Norman Bernard Donald Hanson	The Proponent has engaged with Wagmatcook First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. In 2023, the Proponent met with Wagmatcook First Nation and We'koqma'q First Nation to discuss the Project and submission to the GCP. Wagmatcook and We'koqma'q expressed interest in the Project, with both communities seeking more information on wind energy and financial aspects. Eskasoni had made the introductions to Wagmatcook and We'koqma'q. The Proponent presented to Wagmatcook First Nation Chief and staff in Cape Breton virtually in April 2024 to share updates on the Project and seek any feedback. In May and June 2024, the Proponent held meetings with Wagmatcook First Nation to discuss the Project, including opportunities for partnership and future benefits (including capacity building etc.). The Proponent also sponsored a school BBQ in 2024 with Wagmatcook First Nation.
We'koqma'q First Nation	Chief Annie Bernard Daisley Kyle Usher Gioia Usher Cassandra Googoo Chrissy Tanner	The Proponent has engaged with We'koqma'q First Nation since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. In 2023, the Proponent met with We'koqma'q First Nation and Wagmatcook First Nation to discuss the Project and submission to the GCP. We'koqma'q and Wagmatcook expressed interest in the Project, with both

First Nation / Organization	Representative(s)	Contact Details
		communities seeking more information on wind energy and financial aspects. Eskasoni had made the introductions to We'koqma'q and Wagmatcook. In May 2024, the Proponent met with We'koqma'q First Nation Chief and Council in person to discuss the Project, including opportunities for partnership and future benefits (including capacity building etc.).
Organizations		
Assembly of First Nations Nova Scotia	General Contact (Glooscap First Nation) Chief Leroy D.C. Denny (Eskasoni First Nation) Chief Gerald Toney (Annapolis Valley First Nation) Chief Deborah Robinson (Acadia First Nation) Chief Andrea Paul (Pictou Landing First Nation) Chief Annie Bernard Daisley [We'ko'kma'q (Waycobah) First Nation] Chief Norman Bernard (Wagmatcook First Nation) Chief Terrance J. Paul (Membertou First Nation) Cheryl MacLeod, Michelle Glasgow, Chief Mill Brook Band Carol Brfn, Cory Jullian, Chief Wilbert Marshall [Potlotek (Chapel Island) First Nation]	ABO Energy Canada Ltd. reached out to all Nova Scotia Mi'kmaq Chiefs in September 2023 to provide a Project update and invitation to open houses, with an offer to meet or provide any further information.
Wskijinu'k Mtmo'taqnuow Agency Ltd. (WMA)	Crystal Nicholas Steve Parsons	The Proponent engaged with the WMA in 2023 to discuss possible partnership opportunities and the next steps for the Project. The Proponent followed up with the WMA Director after a presentation on the Project in April 2024.

First Nation / Organization	Representative(s)	Contact Details
Atlantic Policy Congress of First Nations Chiefs Secretariat (APCFNS)	John Paul	The Proponent engaged with the APCFNS in 2022 regarding the Project, which included a Project description and Project update pamphlet. An offer to meet with the APCFNS was also extended.
Confederation of Mainland Mi'kmaq (CMM)	Winter Sack Angie Gillis	The Proponent engaged with Mi'kmaq Conservation Group (part of CMM) in 2022 through the distribution of a series of Project update pamphlets. An offer to meet with the Mi'kmaq Conservation Group was also extended to discuss the Project and any potential concerns.
Kwilm'kw Maw-Klusuaqn Negotiation Office (KMKNO)	Tracy Menge Patrick Butler Twila Gaudet	The Proponent has had ongoing engagement with KMKNO since 2021 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for open houses, further engagement, collaboration, and feedback were also provided. Discussions were held on First Nations engagement protocols and recommendations. Updates on engagement with communities and organizations were also provided. The Proponent also requested contacts for Indigenous companies with the capacity for tree clearing work. The Proponent hosted a series of virtual meetings in 2022 and 2023 with KMKNO to discuss the Project and the status of environmental studies. General concerns raised include Section 35 rights (hunting moose and salmon fishing), local and traditional plants and medicines, and the need for a MEKS. In April and May 2024, the Proponent had a booth and participated in two in-person events hosted by KMKNO for First Nations procurement and employment information. Informational materials on the Project were also provided.
Native Council of Nova Scotia	Chief Lorraine Augustine	The Proponent engaged with the Native Council of Nova Scotia in 2022 through the distribution of Project mailouts/pamphlets outlining Project information and website information; also included was any recent updates on the Project (e.g., status, layout changes,

First Nation / Organization	Representative(s)	Contact Details
		etc.). Invitations for further engagement, collaboration, and feedback were also provided.
Nova Scotia Native Women's Association	Karen Pictou	The Proponent engaged with the Nova Scotia Native Women's Association in 2022 through the distribution of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided.
Nova Scotia Office of L'nu Affairs (Office of Aboriginal Affairs)	Janel Hayward Salima Medouar	The Proponent has had ongoing engagement with Nova Scotia Office of L'nu Affairs through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for open houses, further engagement, collaboration, and feedback were also provided. The Proponent held several meetings with the Nova Scotia Office of L'nu Affairs in 2022 to introduce the Project, describe the communication to date with Mi'kmaq communities, and Mi’kmaq engagement requirements. The Nova Scotia Office of L'nu Affairs provided information regarding expectations, the consultation process, and MEKS.
Unama’ki Institute of Natural Resources	Lisa Young Elizabeth Jessome	The Proponent has had ongoing engagement with the Unama’ki Institute of Natural Resources since 2022 through the distribution of a series of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for open houses, further engagement, collaboration, and feedback were also provided. A virtual presentation was held in June 2022 to provide an introduction and to present the Project and its submission to the provincial rate base program Request for Proposals (RFP). The Proponent also provided an overview on size and location of the Project, the public and Indigenous engagement, as well as local and community benefits. The Proponent followed up in 2023 with the Unama’ki Institute of Natural Resources regarding the expansion of the Mi’kmaq Forestry Initiative (MFI) and expressed

First Nation / Organization	Representative(s)	Contact Details
		interest in seeing if there are opportunities for the Project to assist with MFI goals, setback requirements, and the MEKS report. Invitations to the 2023 open house were also provided along with updates on the environmental studies.
Union of Nova Scotia Mi'kmaq	Douglas Brown	The Proponent engaged with the Union of Nova Scotia Mi'kmaq in 2022 through the distribution of Project mailouts/pamphlets outlining Project information and website information; any recent updates on the Project were also included (e.g., status, layout changes, etc.). Invitations for further engagement, collaboration, and feedback were also provided. Invitations to the 2023 open house were also provided.

5.1.1 Review of Concerns

Feedback on the Project from the Mi'kmaq Nova Scotia has been overall positive to-date. Key areas of interest identified through engagement were related to the following as described in Table 5.1.

Lifestyle Impacts

No specific impacts were brought forward; however, the Proponent has shared that Project planning will be prioritized to minimize restrictions on land use. Typically, most activities carried out before construction of a windfarm can continue afterwards.

Participation in MEKS

The MEKS provides the opportunity for First Nations participation and review.

Section 35 Rights (hunting moose and salmon fishing)

It has been communicated that Project planning will be prioritized to minimize restrictions on land use. Typically, most activities carried out before construction of a windfarm can continue afterwards.

Local and Traditional Plants and Medicines

MEKS and environmental studies completed on-site to identify presence of species.

Assurance to Receive Social and Economic Benefits

Benefits Agreement and a Capacity Building and Business Procurement Plan developed to provide equity dollars, jobs, and capacity building opportunities for the members of involved and adjacent First Nations.

Several of the topics of interest listed above were considered and assessed as part of the MEKS report completed by Membertou Geomatics Solutions.

5.1.2 Ongoing Engagement

The Proponent is committed to on-going, meaningful engagement with the Mi'kmaq of Nova Scotia and will continue to provide regular updates and seek feedback throughout all phases of the Project. Tours of the Project have been offered to the Mi'kmaq of Nova Scotia and will continue to be offered during construction and operation. The Proponent is also committed to minimizing footprint disturbance and impacts to the Mi'kmaq of Nova Scotia while generating positive economic and environmental benefits through capacity building and business procurement planning. The Proponent will develop a Mi'kmaq Communication Plan that outlines an ongoing two-way communication process throughout the life of the Project.

5.2 MEKS

A MEKS presents a thorough and accurate understanding of the Mi'kmaq'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, the 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 was developed by Membertou Geomatics Solutions and was geographically scoped to include an evaluation of the Project Area along with a 5 km buffer surrounding the Project Area (referred to as the "Study Area" in the MEKS report). The MEKS for this Project is currently underway with site visits having been completed in 2023, and again in May 2024 to accommodate Project layout changes. Once available, a copy of the MEKS will be provided directly to the required reviewers under separate cover.

MEKS considers 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 is done in accordance with the Mi'kmaq Ecological Knowledge Protocol, 2nd Edition, 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.

The MEKS consists 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 Significance 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.

Interviews undertaken by the MEKS Team with Mi'kmaq knowledge holders are ongoing. Interviewees were shown topographical maps of the Project Area and its 5 km buffer and asked to identify where they undertake their activities as well as to identify where and what activities were undertaken by other Mi'kmaq, if known. These interviews allowed the MEKS Team to develop a collection of data that reflected the most recent Mi'kmaq traditional use in this area, as well as historic accounts. The data gathered was also considered regarding its significance to the Mi'kmaq people. Once the analysis is complete, the MEKS report and any recommendations will be reviewed by the Project Team to determine if any mitigation measures are required to support the continued traditional use of the Study Area by the Mi'kmaq of Nova Scotia.

6.0 ENGAGEMENT

The Proponent is committed to transparent, meaningful, and ongoing engagement with government, the public, stakeholders, and the Mi'kmaq of Nova Scotia. To date, the Project Team has participated in meetings, delivered presentations, established a Community Liaison Committee (CLC), and hosted five open house events in Port Hastings (1) and Creignish (4). The Proponent has aimed to involve communities at-large, elected officials and key stakeholder groups early on in their planning process to strengthen acceptance and foster local engagement.

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

6.1 Engagement with Government Departments, Agencies, & Regulators

The Project Team has been in contact with government entities and officials representing federal, 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
Federal Government		
Canadian Coast Guard (CCG)	Wind Farm Coordinator	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Email received confirming no interference expected.
DND	Military Air Defence and Air Traffic Control; Military Radio communication users	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Confirmation of receipt received. August 8, 2024 Strum provided the Natural Resources Canada (NRCan) project number to DND, as requested. September 11, 2024 Letter of non-objection received.
ECCC	Weather Radar Coordinator	July 25, 2024 EMI notification letter sent via email. July 31, 2024 Letter of non-objection received.
Innovation, Science, and Economic Development (ISED) Canada	Nova Scotia District Office	July 24, 2024 EMI notification letter sent via email. July 26, 2024 Email received that did not identify any objections.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
NAV CANADA	Land Use Specialist	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Confirmation of receipt received.
Member of Parliament (MP), Cape Breton—Canso	Mike Kelloway	June 27, 2023 The Proponent sent an email including a Project update and invitation to upcoming open houses. April 10, 2024 The Proponent sent an email including a Project update and invitation to upcoming open houses. June 6, 2024 The Proponent sent an email including Project update.
RCMP	Wind Farm Coordinator	July 25, 2024 EMI notification letter sent via email. August 1, 2024 Letter of non-interference received.
Provincial Government		
ECCC-CWS	Stephanie Zwicker Godfrey Lee	April 8, 2022 Sent the avian survey methods via email for review.
NSECC	Oliver Maass Kermit deGooyer Neil Morehouse Bridget Tutty Candace Quinn Lynda Weatherby	December 21, 2021 Virtual meeting with the EA Branch to coordinate a one-window scoping meeting (Oliver Maass). January 7, 2022

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
	Paula Francis Helen MacPhail	Email confirmation of meeting and agenda (Oliver Maass). January 11, 2022 Email received from the EA Branch requesting one presentation for all wind projects the Proponent had in development, and to postpone the meeting until Proponent can provide more details (Oliver Maass). January 13, 2022 Email received recommending a meeting with the Protected Areas and Ecosystems Branch (Oliver Maass). January 18, 2022 Virtual meeting with the Protected Areas and Ecosystems Branch focused on an overview of the Project and to review known areas in proximity to the Project (Oliver Maass, Kermit deGooyer, Neil Morehouse). January 20, 2022 Email received asking about overwintering deer areas and protected areas (Oliver Maass, Kermit deGooyer, Neil Morehouse). February and March 2022 Project Team worked with the EA Branch to produce a Project Description, schedule a virtual meeting, and coordinate GIS resources. April 12, 2022 Virtual meeting presenting the Project and proposing to submit to Nova Scotia's Rate

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		Based Procurement Request for Proposals (Candace Quinn). April 27, 2022 Virtual meeting with OLA and NSECC to obtain further clarification on engagement requirements [Candace Quinn, Janel Hayward (OLA)]. September 22, 2022 Sent scope for technical survey methods, including noise, shadow flicker and visual impact (Candace Quinn). October 6, 2022 Received feedback on technical study methods (Candace Quinn). January 23, 2024 to February 13, 2024 Multiple email exchanges between NSECC and the Proponent to coordinate and confirm an update meeting for the Proponent and the EA Branch (Lynda Weatherby). February 14, 2024 Virtual meeting with NSECC and NSNRR to provide an EA update and next steps regarding the Project, including repositioning of turbines from Crown to private lands (Lynda Weatherby, Bridget Tutty, Paula Francis, Mark McGarrigle [NSNRR], Tara Crewe [NSNRR]). February 20, 2024 Provision of meeting minutes, and presentation materials to meeting attendees.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		May 28 to 30, 2024 Email exchanges between the Proponent and the EA Branch requesting a follow up meeting with NSNRR and NSECC to discuss Project updates and EA submission timelines (Bridget Tutty, Mark McGarrigle [NSNRR]). May 30, 2024 Email response received with suggested meeting times (Bridget Tutty, Mark McGarrigle [NSNRR]). June 13, 2024 Presentation of EA submission timeline updates to NSECC and NSNRR for regulator feedback per May email correspondence (Helen McPhail, Gillian DesRoche [OLA], Mark McGarrigle, Lynda Weatherby [NSECC], Candace Quinn [NSECC]). August 8-9, 2024 Submitted questions via email with respect to the Project description and the EA review period (Helen MacPhail, Bridget Tutty).
NSNRR	Louise Boudreau; Mark McGarrigle; Lisa Doucette; Bob Petrie; Shavonne Meyer; Maureen Cameron-MacMillan; Leslie Hickman; Peter Geddes; Bradley Middlemiss; Joan MacLean;	April 8, 2022 Sent avian survey methods via email for review (Donna Hurlburt and Terrence Power). May 5, 2022 Virtual meeting with EA reviewers to review proposed surveys for flora and fauna. Recommendations were provided from reviewers (Louise Boudreau, Mark McGarrigle;

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
	Tara Crewe; Kimberly Doane; Sarah Spencer	Lisa Doucette, Bob Petrie, Shavonne Meyer, Maureen Cameron-MacMillan). May 26, 2022 In person meeting to introduce the Project Team and future Projects (Leslie Hickman, Peter Geddes, Bradley Middlemiss). May 27, 2022 Email sent by the Proponent thanking those attending May 26 meeting and making plans to meet in June to review the Crown land application (Leslie Hickman, Peter Geddes, Bradley Middlemiss). May 27, 2022 Email response received from NSNRR including the map from the May 26 meeting and highlighting the importance of community consultation (Leslie Hickman, Peter Geddes, Bradley Middlemiss). May 30, 2022 Email sent by the Proponent thanking NSNRR for a planning tool and informing them the Project Team would reach out the next time they were in Halifax (Leslie Hickman, Peter Geddes, Bradley Middlemiss). October 20 and 25, 2022 Corresponded via email to discuss the constraints with development in and around Lynx range (Mark McGarrigle).

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		May 4, 2023 Proponent attended a follow up meeting and introductions from Crown Lands Division (Joan MacLean). December 6, 2023 Meeting between the Proponent and NSNRR to discuss NSNRR's recent re-organization, conservation easement, and the ongoing EA (Kimberly Doane, Leslie Hickman). February 14, 2024 Virtual meeting with NSECC and NSNRR to provide an EA update and next steps regarding Project, including repositioning of turbines from Crown to private lands (Lynda Weatherby [NSECC], Bridget Tutty [NSECC], Paula Francis [NSECC], Mark McGarrigle, Tara Crewe). February 20, 2024 Email from Mark McGarrigle providing feedback on bat acoustic surveys, bird surveys, and Wood turtle survey coverage given changes to the layout. February 20, 2024 Provision of meeting minutes from February 14, and presentation materials to meeting attendees. May 28 to 30, 2024 Email exchanges between Proponent and the EA Branch requesting follow up meeting with NSNRR and NSECC to discuss Project updates

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		and EA submission timelines (Bridget Tutty, Mark McGarrigle [NSNRR]). May 30, 2024 Email response received with suggested meeting times (Bridget Tutty, Mark McGarrigle [NSNRR]). May 13 to June 10, 2024 Multiple email exchanges (approximately 10) between the Land Services Branch and the Proponent regarding the application process to obtain a Crown land easement for Project infrastructure that is located on Crown land. June 13, 2024 Presentation of EA submission timeline updates to NSECC and NSNRR for regulator feedback (Helen McPhail, Gillian DesRoche [OLA], Mark McGarrigle [NSECC], Lynda Weatherby, Candace Quinn [NSECC]) August 6, 2024 Request to NSNRR via email for additional information regarding Wood turtle habitat within the vicinity of the Project (Sarah Spencer).
NSPW	NSPW General Email	December 14, 2023 Proponent reached out via email to discuss turbine transport/routing.
Office of L’nu Affairs (OLA)	General Contact Janel Hayward Salima Medouar Gillian DesRoche	February 8, 2022 Proponent sent an introductory email including links to the Project websites (general contact).

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		February 15, 2022 Email received introducing Janel Hayward as the contact for Projects under the Rate Base Procurement Program (Janel Hayward, Salima Medouar). February 2022 Project Team worked with department staff to schedule a meeting. March 1, 2022 Virtual meeting with OLA to introduce the Project and summarize communications with Mi'kmaw communities to date. OLA provided information regarding expectations, the consultation process, and the MEKS. OLA also recommended reaching out to all 13 Mi'kmaq communities, as traditional territories could be impacted (Janel Hayward). March 1, 2022 Phone call with OLA regarding the engagement process with Sipekne'katik. The Crown consultation process was also discussed (Janel Hayward). March 14, 2022 Proponent corresponded with OLA regarding the information shat should be included in the EA Registration Document. March 24, 2022 March 2022 Project update pamphlet and directions to additional information on Project

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		website sent via email. Meeting also requested (Janel Hayward). April 27, 2022 Virtual meeting with OLA and NSECC to obtain further clarification on engagement requirements [Janel Hayward, Candace Quinn (NSECC)]. May 4, 2022 Email update to OLA regarding engagement with Mi’kmaq communities and organizations (May 2022 Project update pamphlet and directions to additional information on Project website sent via email; offer to meet was also extended to discuss the Project and identify any early concerns). Proponent also inquired about Mi’kmaq Grand Council procedures and indicated some Mi’kmaq communities have updated contact information (Janel Hayward). July 12, 2023 Email sent to OLA including Project information and updates (general contact). April 8, 2024 Email sent to OLA providing Project updates, overview of continued engagement with Mi’kmaq communities, and inviting OLA to April 17 open houses (general contact).

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
Member of the Legislative Assembly (MLA), Inverness	Honourable Allan MacMaster	June 27, 2023 Proponent emailed a Project update, requested to meet, and extended an invitation to upcoming open houses. April 10, 2024 Proponent sent an email including a Project update and an invitation to upcoming open houses.
Municipal Government		
Municipality of the County of Inverness	Keith MacDonald, CAO Brian Luciano, CFO Debbie Nicholson, Administrative Assistant to Council and CAO	April 25, 2023 Email sent by the Proponent requesting a presentation to Council. May 25, 2023 Email sent by the Proponent to the CAO providing a Project update and requesting a meeting to discuss the Project. June 6, 2023 Email sent by the Proponent to the CAO providing a Project update and invitation to upcoming open houses. June 27, 2023 Proponent sent an email including Project updates and an invitation to July 11 and12 open houses to the CAO and Municipal Councilors. July 17, 2023 In person meeting with the Cape Breton Partnership, CAO, and CFO to discuss the Project and other opportunities in the region (Keith MacDonald).

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		July 20, 2023 Proponent presented to Committee of the Whole meeting of Council. February 14, 2024 Proponent sent email with a Project update, including a reduced turbine layout, upcoming open houses, and continued community engagement efforts, inviting feedback and participation (CAO and Council). February 26, 2024 Proponent sent an email about the revised Project proposal, sharing updated information for public dissemination before April's open houses. Proponent also proposed a meeting on March 11 or 12 to provide further Project updates (Keith MacDonald, Brian Luciano). April 8, 2024 Email reminder for upcoming open houses on April 17 with updated details (CAO and Council). April 15, 2024 Proponent sent an email requesting to provide a Project update presentation to Council, highlighting layout changes and open house feedback (Debbie Nicholson). April 19, 2024 County confirmed presentation date for May 2, 2024 (Debbie Nicholson).

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
Municipality of the County of Inverness Councilors	Claude Poirer, Councilor, District 1 (Chéticamp) Blair Phillips, Councilor, District 2 (Inverness County, Margaree) Bonny MacIsaac, Councilor, District 3 (Inverness/Glenville/Dunvegan), Warden John MacLennan, Councilor, District 4 (Whycocomagh/Orangedale/Ainslie) Lynn Chisholm, Councilor, District 5 (Port Hood/Mabo) Catherine Gillis, Councilor, District 6 (Port Hastings/Judique/West Bay, Deputy Warden	June 21, 2023 Email sent by the Proponent to Councilor MacLellan and Councilor Gillis to request a meeting and provide a Project update. June 27, 2023 Email sent by the Proponent including Project update and invitation to upcoming open houses. July 20, 2023 Proponent presented a Project update to Inverness Council in a public presentation to Council. February 14, 2024 Proponent sent an email with a Project update, including a reduced turbine layout, upcoming open houses, and continued community engagement efforts, inviting feedback and participation. April 8, 2024 Email reminder for upcoming open houses on April 17 with updated details. May 2, 2024 The Proponent publicly presented a Project update to Inverness. The Warden and Councilors asked questions about the Project including information about the layout change, more information about the CLC, what the Proponent heard from communities at the open house, and more. Two Councilors indicated they are still hearing concerns from some community

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		members. One Councilor indicated clear support from himself for the Project.
Municipality of the County of Inverness Eastern District Planning Commission (EDPC)	John Bain, Director of Planning	January 20, 2023 Virtual meeting regarding permitting for a MET Mast, which indicated permitting was not required. Also discussed wind by-laws in the municipality. March 9, 2023 In person meeting to discuss the Municipal Wind Turbine By-law. May 12, 2023 Proponent sent an email requesting a meeting to discuss local by-laws [John Bain, Keith MacDonald [Municipality of the County of Inverness)]. June 16, 2023 In person meeting with EDPC to provide Project update and discuss sections of the land use by-law that pertain to wind. June 27, 2023 The Proponent sent an email including Project updates and an invitation to upcoming open houses. April 16, 2024 The Proponent emailed Project revision details, extending invitation to houses the following day, and offering an opportunity for further discussion if unable to attend.

Government Departments, Agencies, & Regulators	Representative	Dates, Activities, & Comments
		April to September, 2024 Proponent consulted with EDPC on sections of the land use bylaw that pertain to wind.
Town of Port Hawkesbury elected officials	Jason Aucoin, Councilor Blaine MacQuarrie, Councilor Mark MacIver, Councilor Hughie MacDougall, Deputy Mayor Brenda Chisholm Beaton, Mayor	June 27, 2023 The Proponent sent an email including Project updates and an invitation to upcoming open houses. April 8, 2024 Email reminder for upcoming open houses on April 17, with updated details.

6.1.1 Review of Government Concerns

Discussions with federal and provincial regulators primarily focused on:

- Project scope
- Turbine layout
- Project and EA timeline
- Scope of environmental surveys
- Habitat and protected areas in proximity to the Project
- Setback requirements
- Turbine transport and routing
- Public engagement
- Mi'kmaq engagement
- Crown land easement applications

Questions from municipal government and planners mainly pertained to:

- Community benefits
- Turbine layout
- By-laws and associated setback requirements
- Turbine noise
- Public engagement

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

6.2 Public & Stakeholder Engagement

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

Acknowledging the importance of giving back to communities where it works, the Proponent has contributed funding toward local causes including the Creignish Recreational Centre, the West Bay and Port Hastings Fire Departments, the Ceilidh Groomers and to neighbouring First Nation communities.

The Proponent is committed to continuing sponsorships and donations through a community giving strategy to ensure communities in proximity of the Project avail of funding during each year of the Project's planning and operation. A significant Community Benefit Fund and a Capacity Building and Business Procurement Plan has also been created by the Proponent for this Project to implement in Inverness County.

The Proponent is also a proud member of the Strait Area Chamber of Commerce. With a Local Economic Development policy in place, the Proponent is focused on assuring that residents and businesses in the local region receive preferential attention and access to business and employment opportunities. It is the Proponent's intent to maximize economic benefits for communities and First Nations in the local region through promoting long-term commercial growth through access to goods and service contracts, capacity training, and employment.

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
Atlantic Canada Opportunities Agency (ACOA)	May 18, 2023 In person meeting with ACOA, Cape Breton Partnership, Invest Nova Scotia, and Strait Area Chamber of Commerce. In this meeting, the Proponent presented the Project status and next steps and received feedback and suggestions from these organizations. June 27, 2023 The Proponent sent an email including Project updates and an invitation to upcoming open houses. April 8, 2024 The Proponent sent an email including Project updates and an invitation to upcoming open houses.
ATV Association of Nova Scotia	December 11, 2023 The Proponent sent an email request for shapefiles for ATV trails in Nova Scotia so they could be included in the GIS mapping and Project planning.
Bell Canada	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Confirmation of receipt received and kmz file requested. August 8, 2024 Strum provided kmz file. October 1, 2024 Strum provided kmz file again. October 4, 2024 Letter of non-objection received via email.
Black River Wind Ltd.	April 18, 2024 The Proponent met with the owner of the wind turbine in Creignish to discuss the Project and the existing turbine to consider lessons learned from the existing development in the area.

Community / Stakeholder Organization	Engagement
Canada Infrastructure Bank	January 17, 2024 The Proponent sent an email seeking information on additional support avenues for Indigenous partners in Nova Scotia and requesting materials related to Indigenous Community Infrastructure Initiative and Indigenous Equity Initiative.
Canadian Renewable Energy Association (CanREA)	September 6, 2023 The Proponent met with CanREA to discuss the Project status and GCP requirements.
Cape Breton Regional Police	July 25, 2024 EMI notification letter sent via email.
Cape Breton Partnership	May 18, 2023 In person meeting with Invest Nova Scotia, ACOA, Cape Breton Partnership, and Strait Area Chamber of Commerce. The Proponent presented the Project status and next steps and also received feedback and suggestions from these organizations. June 27, 2023 The Proponent emailed Project updates and an invitation to upcoming open houses. July 4, 2023 The Proponent sent a follow up email about potential local economic development contacts. July 17, 2023 In person meeting with Cape Breton Partnership and CAO/CFO to discuss the Project and other opportunities in the region (Keith MacDonald). April 8, 2024 The Proponent sent an email including Project updates and an invitation to upcoming open houses.

Community / Stakeholder Organization	Engagement
Cape Clear Snowmobile Association/Ceilidh Trails Groomers	June 28, 2023 The Proponent sent an email requesting a meeting. July 5, 2023 In person meeting with the President of the association to discuss ways to ensure continued access and shared land use in the future. The Proponent provided details on next steps and shared suggestions from the association with the GIS team to incorporate into future Project planning. Both parties exchanged maps. The Proponent also provided a donation to the Ceilidh Trails Groomers to support trail grooming the region. July 12, 2023 Phone call from the Proponent to follow up on snowmobiling trail map and grooming sponsorship. April 8, 2024 The Proponent invited snowmobile association members to upcoming open houses, emphasizing layout changes and community engagement opportunities. April 24, 2024 The Proponent updated the President of the snowmobiling club following the open houses as he was not able to attend. Lots of attendees were positive about the Project. Two individuals mentioned they are snowmobilers and were hopeful for continued access and consideration by the Proponent.
Celtic Shores Coastal Trails	June 26, 2023 The Proponent shared Project information and requested a meeting with the local trails association. A follow up call with a trails association contact did not identify any concerns about the Project.

Community / Stakeholder Organization	Engagement
Creignish Recreation Centre	May 29, 2024 Phone call to discuss community needs and sponsorship opportunities. May 30, 2024 The Proponent committed to donate $2,000 for the activities and needs of the Creignish Recreation Centre, as a community hub near the Project. Proponent requested a formal letter to outline their needs.
Destination Cape Breton	May 16, 2023 The Proponent emailed about tourism operators in Port Hawkesbury up to the Judique area (and vicinity). The Proponent provided a Project overview and offered to meet to discuss any concerns regarding the tourism industry in the region.
Eastlink	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Confirmation of receipt and note that they will follow up if they have any questions.
Ecology Action Centre	July 6, 2023 In person meeting to discuss Mainland moose. The Proponent also extended an invitation to upcoming open houses.
Invest Nova Scotia	May 18, 2023 In person meeting with Invest Nova Scotia, ACOA, Cape Breton Partnership, and Strait Area Chamber of Commerce. In this meeting, the Proponent presented the Project status and next steps and received feedback and suggestions from these organizations. June 27, 2023 The Proponent sent an email including Project updates and an invitation to upcoming open houses. July 25, 2023 The Proponent sent an email with Project updates and CLC information.

Community / Stakeholder Organization	Engagement
	April 8, 2024 The Proponent sent an email including Project updates and an invitation to upcoming open houses.
Judique Volunteer Fire Department	June 28, 2023 The Proponent called the Fire Chief to request meeting.
Nova Scotia Community College (NSCC)	June 26, 2023 The Proponent emailed Project information and requested a meeting.
Port Hastings Volunteer Fire Department	May 15, 2023 The Proponent introduced the Project and requested a meeting via email. May 17, 2023 Email response from Fire Chief. May 19, 2023 In-person meeting with Port Hastings Volunteer Fire Department and West Bay Road & District Volunteer Fire Department to discuss emergency response plan and opening lines of communication about the Project. May 29, 2023 The Proponent sent an email thanking them for the meeting. June 27 and July 12, 2023 The Proponent requested a follow up meeting. August 28, 2023 The Proponent emailed the Port Hastings Volunteer Fire Department and West Bay Road and District Volunteer Fire Department regarding donations and next steps for emergency response plan collaboration. September 5, 2023 The Proponent emailed the Port Hastings Volunteer Fire Department and West Bay Road and District Volunteer Fire Department confirming delivery method and address for donations.

Community / Stakeholder Organization	Engagement
	April 24, 2024 The Proponent emailed the Port Hastings Volunteer Fire Department and West Bay Road and District Volunteer Fire Department to thank them for attending open houses in Creignish. The Proponent noted that the Project Team is currently reviewing the feasibility of their recommendation for the access road. May 15, 2024 The Proponent made changes to the Project access route based on feedback from first responders in the area. Proponent shared the new map via email and the Fire Chief applauded the changes and thanked the Proponent for incorporating the changes for better access in the event of an emergency. May 27, 2024 The Proponent shared the draft Emergency Response Plan with fire responders and requested their feedback and local knowledge for input. This followed previous discussion and meetings to help inform the plan and local response.
Port Hawkesbury Volunteer Fire Department	July 25, 2024 EMI notification letter sent via email. July 25, 2024 Read receipt received via email.
Port Hawkesbury Paper (PHP)	March 9, 2023 In person meeting to discuss Project May 1, 2024 The Proponent sent an email to request a meeting and provide a Project update. May 3, 2024 In person meeting to discuss the Project

Community / Stakeholder Organization	Engagement
	May 6, 2024 In person meeting to discuss Project, including the shared use of roads. Proponent committed to send shapefiles showing roads to PHP.
Rogers Communications	July 25, 2024 EMI notification letter sent via letter mail.
Route 19 Community Association	June 23, 2023 The Proponent emailed this opposition group to provide an update on the Project status, invite them to meet, and invite them to upcoming open houses. June 27, 2023 Proponent sent email to request a meeting to discuss concerns. April 10, 2024 Proponent sent email to invite the group to upcoming open houses and provided a brief Project update.
Seaside Communications	July 25, 2024 EMI notification letter sent via email.
Snowmobile Association of Nova Scotia (SANS)	August 14, 2023 The Proponent provided maps and meeting request.
Strait Area Chamber of Commerce	May 18, 2023 The Proponent became a member of the Strait Area Chamber of Commerce and then met in person with the Strait Area Chamber of Commerce, ACOA, Cape Breton Partnership, and Invest Nova Scotia. In this meeting, the Proponent presented the Project status and next steps and received feedback and suggestions from these organizations. June 27, 2023 The Proponent sent an email including Project updates and an invitation to the upcoming open houses. December 5, 2023 The Proponent reached out via email to share information about the Project CLC advertisement to provide to their members. The Proponent

Community / Stakeholder Organization	Engagement
	also noted plans to schedule a meeting with the Chamber, ACOA, and the Cape Breton Partnership to provide a Project update. April 8, 2024 The Proponent sent an email including Project updates and invitation to upcoming open houses. June 24, 2024 The Strait Area Chamber of Commerce confirmed their Letter of Support was in the final review stage.
Walkers Electrical	December 18, 2023 Email from local construction company representative who lives/works in the region regarding Project update. December 18, 2023 The Proponent replied with full update.
West Bay Road and District Volunteer Fire Department	May 19, 2023 In person meeting with West Bay Road and District Volunteer Fire Department and Port Hastings Volunteer Fire Department to discuss emergency response plan and opening lines of communication about the Project. May 29, 2023 The Proponent sent an email thanking them for the meeting. August 28, 2023 The Proponent emailed the West Bay Road and District Volunteer Fire Department and Port Hastings Volunteer Fire Department regarding donations and next steps for emergency response plan collaboration. September 5, 2023 The Proponent emailed the West Bay Road and District Volunteer Fire Department and Port Hastings Volunteer Fire Department confirming delivery method and address for donations.

Community / Stakeholder Organization	Engagement
	December 19, 2023 Local representative from the West Bay Road and District Volunteer Fire Department reached out via email to express interest in the CLC for Project. December 19, 2023 The Proponent provided information on CLC scheduling and involvement. February 14, 2024 The Proponent provided a Project update and CLC information to the West Bay Road and District Volunteer Fire Department Fire Chief via email. April 24, 2024 The Proponent emailed the Port Hastings Volunteer Fire Department and West Bay Road and District Volunteer Fire Department to thank them for attending open houses in Creignish. The Proponent noted the Project Team is currently reviewing the feasibility of their recommendation for the access road. May 15, 2024 The Proponent made changes to the Project access route based on feedback from first responders in the area. the Proponent shared the new map via email and the Fire Chief applauded the changes and thanked the Proponent for incorporating the changes for better access in the event of an emergency. May 27, 2024 The Proponent shared the draft Emergency Response Plan with fire responders and requested their feedback and local knowledge for input. This followed previous discussion and meetings to help inform the plan and local response.

6.2.1 Digital Communications

The Proponent has maintained a Project website since December 2021 (https://www.rhodenawind.ca). This publicly accessible website continues to be updated regularly. It includes information about the Project and Proponent including:

- Introduction to the Project, First Nation Partnership, and GCP
- About the Proponent
- News (Project updates, information on open houses/information sessions)
- Project information (site location, size)
- Project schedule/timeline
- Community benefits
- Project engagement documents (open house posters, Project brochures, newsletters)
- Frequently asked questions (environment, wind turbines, permitting, public engagement, construction, land development, property, and Project benefits)
- Vendor/supplier registration form
- Project contact information

6.2.2 Newsletters

Newsletters were distributed via Canada Post Neighbourhood Mail to residents in proximity to the Project in September 2021, March 2022, May 2022, June 2023, February 2024, and April 2024.

These newsletters were distributed to 500 to 530 residences on each occasion and included the following information:

- Overview of the Project
- Project Timeline
- Introduction to the Proponent
- Information on upcoming open houses (if applicable)
- Map of the Project layout
- Community benefits and economic opportunities
- Overview of engagement efforts
- Frequently Asked Questions
- Information about the CLC (February 2024 onwards)
- Contact information for Proponent and Project's engagement lead

6.2.3 Project Update Advertisements

Project update advertisements ran in the Cape Breton Post and Port Hawkesbury Reporter on March 16 and May 4, 2022. The March 2022 Project update advertisement included an introduction to the Project/Project Area and encouraged community members to visit the Project website for more information. The May 2022 Project update advertisement included an overview of the Project/Project Area, a map of the revised Project layout based on community input and contact information for the Social Impact and Engagement Lead.

A Community Notice of Proposal ran in the Cape Breton Post and Port Hawkesbury Reporter on November 1, 2023. It was also featured in the Strait Area Chamber membership newsletter and on the Creignish Recreation Centre Facebook page. This notice included information on the Proponent's plans to bid the Project in response to the GCP RFP, an overview of community engagement efforts, and an invitation to provide feedback and questions on the Project website.

6.2.4 Public Open Houses

Five public open house events took place in Port Hastings (1) and Creignish (4) proir to EA registration.

Open House #1

The first open house was held on Tuesday, September 14, 2021 from 7:00 pm to 9:00 pm at the Port Hastings Fire Hall (15 Old Victoria Road, Port Hastings). This event was advertised on the Project website, in the Cape Breton Post (September 8, 2021 edition), in the Port Hawkesbury Reporter (Septembet 8, 2021 edition), and in the September 2021 mailout. The objective of this open house was to introduce the Project to the community, show a preliminary Project layout, early visual similations and sound modelling, and to gather community feedback to inform the Project design.

The Project Team presented 15 posters, answered questions, and took feedback about concerns and interest from the local community and various stakeholders. Sign-in sheets were available for participants to provide their contact information and enable follow up. A total of 32 attendees were recorded on the sign-in sheets. All materials presented at the session were also made available on the Project website. A follow up advertisement ran in the Cape Breton Post (October 6, 2021 edition) and Port Hawkesbury Reporter (October 6, 2021 edition) thanking the community for their participation and providing contact information.

Open House #2 and #3

Two open houses were held in July 2023 at the Creignish Community Centre Hall (2061 Ceilidh Trail, Creignish). The first was held on Tuesday July 11 from 6:00 pm – 8:30 pm and the second was held on Wednesday July 12 from 6:00 pm – 8:30 pm. These events were advertised on the Project website, in the Inverness Oran and Port Hawkesbury Reporter on June 28 and July 5, through the Strait Area Chamber of Commerce e-newsletter and in the June 2023 mailout. The invitation was also sent to an e-mail distribution list of key regional contacts and residents who had previously attended the open house and provided permission for contact. The objective of these open houses was to show a revised Project layout and updated visual similations/sound modelling, to introduce shadow flicker modelling, to provide an overview of environmental studies, to recruit CLC participants, and to gather community feedback to inform the Project design.

The Project Team presented 24 posters, answered questions, and took feedback about concerns and interest from the local community and various stakeholders. Sign-in sheets were available for participants to provide their contact information and enable follow up. Comment forms were also available for participants to provide written feedback.

A total of 96 individuals attended with 29 who opted to sign in at these events. A total of 24 feedback and comments forms were also collected. All materials presented at the session were also made available on the Project website.

Open House #4 and #5

Two open houses were held on April 17, 2024, at the Creignish Recreation Centre (2123 Route 19, Creignish). The first was held from 2:00 pm – 4:30 pm and the second was held from 6:00 pm – 8:30 pm. These events were advertised on the Project website, in the Inverness Oran in the Port Hawkesbury Reporter on April 3 and 10, 2024, in the February 2024 mailout via Canada Post Neighbourhood Mail, and an April 2024 reminder postcard via Canada Post Neighbourhood Mail. The invitation was also shared through the Strait Area Chamber of Commerce e-newsletter and posted on the Creignish Recreation Centre's Facebook page with over 1,700 followers. The invitation was also sent to an e-mail distribution list of key regional contacts and residents who had previously attended the open house and provided permission for contact. The objective of these open houses was to share the revised Project layout, to show updated visual similations and sound/shadow flicker modelling, to provide an update on environmental studies and mitigation strategies, to provide information about human health and safety, to identify new and existing access routes, and to gather further community feedback.

The Project Team presented 19 posters, responded to questions, and took feedback about concerns and interest from the local community and various stakeholders. Sign-in sheets were available for participants to provide their contact information and enable follow up. Comment forms were also available for participants to provide written feedback.

A total of 27 attendees were recorded on the sign-in sheets for the afternon session and 28 for the evening session. There were 23 feedback forms collected. All materials presented at the session were also made available on the Project website.

6.2.5 Community Liaison Committee

Efforts to recruit CLC members began in July 2023 at Open House #3 and #4. Following these open houses, CLC information was sent to municipal councillors and other stakeholders (see Table 6.1 and 6.2). These efforts include:

- December 6, 2023 - an invitation to submit applications to join the Project CLC was advertised in the Inverness Oran (December 6, 2023 edition) and Port Hawkesbury Reporter (December 13, 2023 edition).
- December 7, 2023 - an invitation to submit applications to join the Project CLC was sent to members in a Strait Area Chamber of Commerce e-blast.
- December 18, 2023 - a recruitment email was sent to local government (elected and staff) and individuals who had signed in and left their email (with permission to contact) at the July 2023 open houses.

- January 19, 2024 - a mass email was sent to those who had expressed interest in participating in the CLC.
- February 8, 2024 - an email was sent to all CLC members to announce inaugural meeting on February 13, 2024.

A summary of correspondence and interactions with CLC members can be found in Table 6.3.

Table 6.3: Summary of Correspondence and Interactions with Rhodena Wind CLC Members

Date	Topic
February 7, 2024	Email from the Proponent proposing virtual CLC introductory meeting on February 13.
February 13, 2024	Virtual CLC Meeting (details in Table 6.4).
February 14, 2024	Follow up email sent by the Proponent expressing gratitude to attendees for participation, discussing plans for future meetings, proposing inviting guest speakers, and emphasizing continued dialogue and local input.
March 6, 2024	In-person meeting (details in Table 6.4).
March 14, 2024	Follow up email from the Proponent proposing an in-person meeting in Creignish or Port Hawkesbury on April 4 ahead of the information sessions in April.
March 26, 2024	Email sent by the Proponent to suggest meeting on April 10 in Port Hawkesbury or Creignish Recreation Centre at 7 pm, or alternatively, a virtual or in-person meeting later in April after the open houses in Creignish on April 17.
April 3, 2024	Email sent by the Proponent to suggest postponing the April 10 CLC meeting due to low availability and to encourage attendance at the April 17 open houses.
April 8, 2024	Email sent by the Proponent inviting CLC members to the April 17 open houses and providing Project update.
April 10, 2024	Email sent by the Proponent inviting CLC members to the April 17 open houses featuring updates and community feedback opportunities, with attached invitation and Project details.
May 1, 2024	The Proponent reached out to the CLC to confirm the in-person meeting for May 8 in Port Hawkesbury.
May 6, 2024	The Proponent reached out to the CLC to schedule meeting #2 in person in Port Hawkesbury.
May 8, 2024	In person meeting at Maritime Inn in Port Hawkesbury (details in Table 6.4). The meeting was very positive, though not all were able to attend. There was a suggestion to have a sponsored event in the Creignish area.
May 21, 2024	Follow up email to a CLC member who had suggested a community engagement/sponsorship idea to support the Creignish Recreation Centre. Proponent has since committed to supporting the centre through a donation towards infrastructure improvements as suggested by the CLC.

A summary of meetings with CLC members can be found in Table 6.4.

Table 6.4: CLC Meeting Summary

CLC Meeting Date	Agenda
February 13, 2024, 7:00 pm (Virtual)	• Introductions • ABO Wind overview – Who are we? • Rhodena Project Overview and updates, Project timeline • Local benefits and opportunities

CLC Meeting Date	Agenda
	• Next steps for community engagement • Your feedback and questions / suggestions • Next meeting?
May 8, 2024, 6:00 pm (Maritime Inn, Port Hawkesbury)	• Project update and timeline • Rhodena Wind Open House follow up (observations, outcomes) • Presentation to Inverness Council follow up (observations, outcomes) • Other discussions on integrating local feedback, community benefits, timeline etc. • Ideas for Community Support or additional outreach in community for Green Choice Bid • Open discussion – your feedback

6.2.6 Individual Meetings with Members of the Public

Further to the open houses and other forms of public engagement, the Proponent also met with individual members of the public within the local community on an as requested basis to foster dialogue, listen to and acknowledge concerns, and respond to questions related to the Project.

6.2.7 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 6.5).

Table 6.5: Comments Received from the Public

Key Issues	Proponent Response	Section of EA
Human Health		
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 residences will fall below the 40 dBA threshold. The Proponent has used a minimum setback of 1000 m from all receptors to ensure that noise is mitigated.	Section 10.5
What is infrasound and is it harmful to me?	Infrasound can be defined as sound waves with frequencies below the lower limit of human hearing. Humans are exposed to infrasound on a regular basis from several natural and engineered sources, at levels that generally exceed those produced by wind turbines.	Section 10.5

Key Issues	Proponent Response	Section of EA
	Information from the turbine manufacturer supplied the 1/3 octave low frequency power levels that were entered into a Finland low frequency model in windPRO software to produce the maximum dBA at each receptor. No potential receptors exceed the most critical noise demand from windPRO's Finland low frequency model of 43 dBA. Therefore, low frequency sound is not expected to be a concern. The Proponent has provided information regarding Health Canada's study on health impacts relating to wind turbines on the Project website and at the open houses. The Proponent meets and exceeds required thresholds for setbacks, along with noise and shadow flicker and have completed and publicly shared study results specific to this Project on these matters.	
Questions about fire risks and emergency access	An Emergency Response Plan (ERP) has been developed and will be regularly updated for the duration of the Project. Discussions with first responders addressed water and emergency access needs and fire mitigation measures. Local Fire Chiefs suggested road layout modifications for more efficient site access, which the Proponent incorporated into the revised road design.	Section 13.2
Socio Economic		
Concerns about proximity to Highway 19	In response to hearing concerns about the proximity of turbines to Highway 19, the nearest turbines was relocated a minimum of 2 km from the highway. The closest residence is now 1,200 m away from a turbine.	NA
Questions about land leases.	The Proponent has contracts with landowners who will have infrastructure on their property. For confidentiality reasons, the details of these agreements are not available to the public. Contracts are typical and competitive within this region and within the renewable energy industry.	NA
How will the Project impact property values?	A literature review was completed to assess potential impacts of wind developments on nearby property values. Many rigorous and statistically defensible studies have concluded that wind energy developments have had no significant effect on surrounding property values.	Section 8.2

Key Issues	Proponent Response	Section of EA
Will the Project roads be open to ATV/off highway use?	The Project Team is committed to working with local ATV and snowmobile groups to ensure continued access to the area and associated trails, within the bounds of all safety considerations, particularly during construction.	Section 8.4
Will the Project result in restrictions to hiking, hunting, trapping, or gathering in the area? Is it safe to partake in these activities near wind turbines?	Project planning has minimized restrictions on land use. The Project Team is committed to working with local recreational groups to ensure continued access to the area, within the bounds of all safety considerations, particularly during construction. The presence of turbines is highly compatible with most land-based recreation activities and is not expected to limit the usability of the area.	Section 8.4
How will the Project impact tourism?	The impact to recreation and tourism is expected to be low, extend to the LAA for a medium duration, be intermittent and reversible. Impacts related to tourism and recreation are considered not significant. The Proponent believes that a well-planned wind farm can be cohesively integrated into a landscape, co-existing with nature and tourism and has met with local stakeholders including the snowmobile club (a potential source of tourism) to understand how to best assure shared land use.	Section 8.4
Visual Impacts		
What will be the visual impacts associated with the wind turbines?	Photo renderings of what the Project could look like from specific vantage points and viewsheds have been prepared for this EA. The Proponent has also reduced the number of turbines significantly from the original design, resulting in less visual impact.	Section 10.4
How will a wind turbine development alter the sightlines in the area?	The Proponent has taken comments and feedback from nearby landowners and interested stakeholders into consideration for turbine placement. Photo renderings of what the Project could look like from specific vantage points and viewsheds have been prepared for this EA.	Section 10.4
Environmental Impacts		
How will this Project impact wildlife and/or species at risk?	A full desktop review and extensive field surveys have been completed by independent environmental consultants to identify the presence of, and potential impact to wildlife and wildlife habitat, vegetative communities, species at risk, wetlands, waterbodies, and areas of scientific or natural interest.	Sections 7.3.2 7.4.1 7.4.2 7.4.3 7.4.4 7.4.5

Key Issues	Proponent Response	Section of EA
Will turbine components be recycled at the end of their lifespan?	Portions of wind turbines for which feasible recycling mechanisms exist will be recycled, especially steel, copper, and electrical components. Fiberglass, a component of turbine blades, is currently less recyclable, though recent innovations have improved this and indicate promising options to divert these materials from landfill (Power Technology, 2024).	3.3.3
General		
Will the electricity being produced be used locally or be connected to the grid?	This Project will connect to the NS Power grid to provide Nova Scotians with more renewable energy. The Project is expected to deliver 153 GWh of renewable energy to the grid annually.	Section 2.1

6.2.8 Ongoing Engagement

The Project has evolved significantly to address feedback received from the public. Some examples include:

- Relocating turbines closest to Highway 19 and reducing the total number of turbines
- Improving proposed access road connectivity for emergency response situations
- Incorporating suggestions into road maintenance planning to foster ongoing shared use through dialogue with snowmobile association

The Proponent will continue to document questions and concerns raised by the public through telephone and e-mail correspondence, and any additional in-person contact. When possible, the Proponent will directly engage with members of the public, landowners, stakeholders, and government entities who have expressed concerns relating to the Project.

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*, S.N.S. 1994-95, c.1
- Air Quality Regulations, N.S. Reg. 8/2020

7.1.1.3 Desktop 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 (ECCC, 2024a; ECCC, 2024b)
- NSECC Ambient Air Quality Data (NSECC, 2024)

7.1.1.4 Desktop 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 Project is located within the Cape Breton Hills Ecodistrict (310) of the Nova Scotia Uplands Ecoregion (Drawing 7.1). This ecodistrict's climate is characterized by strong and cold winds from the Gulf of St. Lawrence, which cause cooler temperatures and a reduction of the growing season (Neily et al., 2017).

Generally, climate normals based on 30 years of climate data are used to characterize long-term climate trends. However, the most recent climate normals, from 1991 to 2020, are not available for any of the meteorological stations nearest to the Project. The closest meteorological station with climatic normals over this time period is in Sydney, NS (over 90 km away from the Project). Instead, 10 years of local temperature and precipitation data were obtained from the Port Hawkesbury meteorological station (Climate ID 8204495), located approximately 12 km southeast of the Project at 45.6567 N, -61.3681 W (Table 7.1).

Table 7.1: Climate Data from the Port Hawkesbury Lake Meteorological Station (2013-2023)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature													
Daily Avg. (°C)	-4.1	-5.3	-2.8	3.0	8.0	13.6	18.4	18.7	14.8	9.6	4.1	-0.3	6.5
Daily Max (°C)	0.0	-0.9	1.5	7.4	13.4	18.7	23.5	23.9	20.1	14.3	8.1	3.1	11.1
Daily Min (°C)	-8.2	-9.7	-7.1	-1.5	2.5	8.3	13.2	13.4	9.5	4.8	0.0	-3.7	1.8
Extreme Max (°C)	12.9	13.6	17.2	20.0	31.0	32.5	33.3	33.6	30.0	24.4	23.2	15.6	33.6
Extreme Min (°C)	-20.2	-27.4	-21.7	-11.1	-5.4	-1.5	4.6	4.2	-1.1	-3.5	-13.1	-18.5	-27.4
Precipitation													
Total Precipitation (mm)	116.5	98.8	87.7	123.5	77.4	122.6	97.0	96.7	79.7	134.4	157.5	139.5	116.5

Source: ECCC, 2024a

From 2014 to 2023, the mean annual temperature was 6.5°C, with a mean daily maximum of 11.1°C and a mean minimum of 1.8°C. January and February were the coldest months (mean daily average of -8.2°C and -9.7°C, respectively), while the warmest months were July and August (mean daily average of 23.5°C and 23.9°C, respectively). From 2014 to 2023, the Port Hawkesbury meteorological station recorded mean total precipitation. The precipitation data were recorded in terms of monthly averages, with the most rain occurring in November and December [157.5 mm and 139.5 mm, respectively] (ECCC, 2024a).

Wind speed and direction data were recorded at the Port Hawkesbury meteorological station (Table 7.2).

Table 7.2: Wind Data from the Port Hawkesbury Meteorological Station (2014-2023)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Maximum Hourly Speed (km/h)	111	105	109	94	78	74	76	74	91	98	102	94
Most Frequent Direction	NW	NW	NW	NW	NW	W	W	W	NW	NW	W	NW

Source: ECCC, 2024a

The maximum hourly wind speeds recorded at the Port Hawkesbury meteorological station between 2014 and 2023 ranged from 74 km/h in August to 111 km/h in January. The wind direction most observed at the meteorological station is from the northwest; however, between June and August, and in November, wind occurred primarily from the west. Note that wind directions may occur in all directions; however, during calm wind flows, the direction is not recorded at the meteorological station (ECCC, 2024a). A windrose plot provided for the Port Hawkesbury meteorological station demonstrates the wind directions from 2014 to 2023 (Figure 7.1).

Figure 7.1 demonstrates that between January 1, 2014, and December 31, 2023, wind speeds above 12 m per second (m/s) [43.2 km/h] occurred the most frequently from the west and northwest.

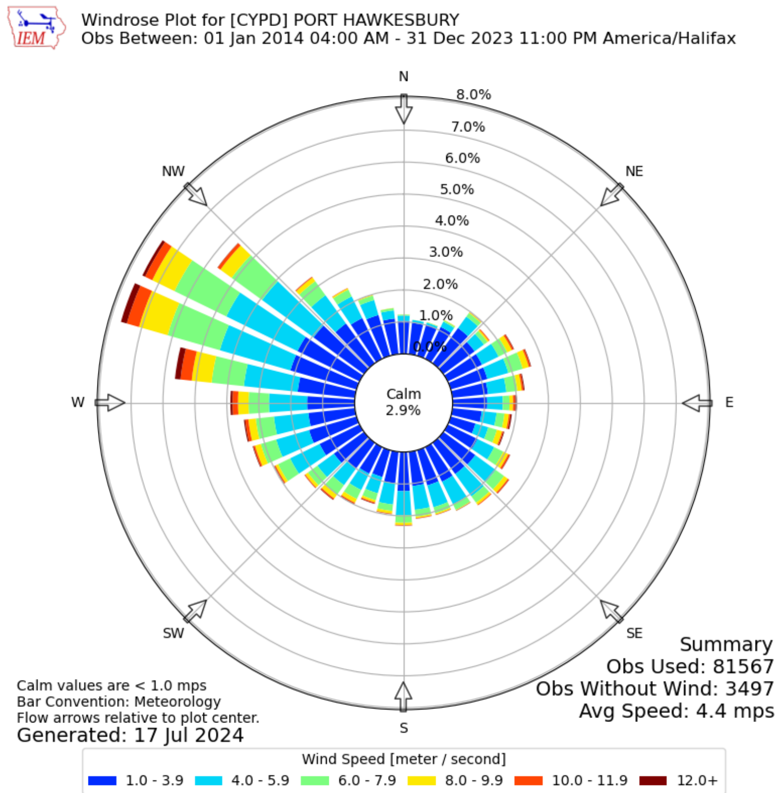

Figure 7.1: Windrose Plot for the Port Hawkesbury Meteorological Station (CYPD) – January 1, 2014, through December 31, 2023 (Iowa State University, 2024)

Air Quality

The Canadian Council of Ministers of the Environment (CCME) has established Canadian Ambient Air Quality Standards (CAAQS) for fine particulate matter [≤2.5 micrometres (µm) ($PM_{2.5}$) or ≤10 µm (PM_{10}) in size], ozone (O_3), sulphur dioxide (SO_2), and nitrogen dioxide (NO_2) over select averaging time periods (CCME, u.d.); while the Government of Nova Scotia has legislated Air Quality Regulations (NSAQR), NS Reg. 8/2020 under the *Environment Act,* S.N.S. 1994-95, c.1. The Nova Scotia ambient air quality standards (NS 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 (µg/m^3)
		Existing Provincial[1]
Carbon Monoxide (CO)	1-hour	34,600
	8-hour	12,700
Nitrogen Dioxide (NO_2)	1-hour	400
	24-hour	-
	Annual	100
Ozone (O_3)	1-hour	160
$PM_{2.5}$	24-hour	-
	Annual	-

Contaminant	Averaging Period	Regulatory Threshold (µg/m³) Existing Provincial[1]
PM_{10}	24-hour	-
	Annual	-
Sulphur Dioxide (SO_2)	1-hour	900
	24-hour	300
	Annual	60
Total Suspended Particulate (TSP)	24-hour	120
	Annual	70[2]

[1] Current Ambient Air Quality Standards (NS AAQS) [Air Quality Regulations, NS Reg. 8/2020].
[2] Geometric mean.

Nova Scotia monitors air quality at eight ambient air quality monitoring stations located throughout the province (NSECC, 2024). Measured parameters at these locations may include the following:

- Carbon monoxide (CO)
- Ground-level ozone (O_3)
- Nitrogen oxides (NO_x)
- Nitric oxide (NO)
- Nitrogen dioxide (NO_2)
- Particulate matter ($PM_{2.5}$)
- Sulphur dioxide (SO_2)
- Total reduced sulphur (TRS)

The NO_2, O_3, and $PM_{2.5}$ values from seven of the eight air quality monitoring stations are used to calculate a score on the Air Quality Health Index (AQHI) (ECCC, 2024b; NSECC, 2024). The AQHI is a scale from 1-10+, in which scores represent the following health risk categories: Low (1-3), Moderate (4-6), High (7-10), and Very High (10+) (ECCC, 2023b).

The air quality monitoring station closest to the Project is in Port Hawkesbury, NS, approximately 12 km southeast of the Project.

Table 7.4 summarizes the current (baseline) maximum ambient air quality conditions observed at the Halifax air quality monitoring station from 2019 to 2023. The monitored parameters are compared to the current NSAQR.

Table 7.4: Current (Baseline) Maximum Ambient Air Quality Conditions in Proximity to the Project

Parameter	Averaging Period	O_3 (ppb)	SO_2 (ppb)	NO_X (ppb)	NO (ppb)	NO_2 (ppb)	$PM_{2.5}$ (ug/m³)	TSP (ug/m³)	CO (ppb)	H_2S (ppb)
Port Hawkesbury Monitoring 2019-2023	1 hour	92.5	89.7	139.1	93.9	49.3	64.6	-	-	-
	24 hours	47.6	14.7	41.0	21.2	19.7	21.8	-	-	-
	Annual	29.5	0.7	4.1	1.4	2.7	5.4	-	-	-
	1 hour	82	340	-	-	210	-	-	30,000	30

Parameter	Averaging Period	O_3 (ppb)	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)
NS AAQS Schedule A	24 hours	-	110	-	-	-	-	120	-	6
	Annual	-	20	-	-	50	-	70*	-	-
Fraction of NS AAQS Schedule A	1 hour	113%	26%	-	-	23%	-	-	-	-
	24 hours	-	13%	-	-	-	-	-	-	-
	Annual	-	4%	-	-	5%	-	-	-	-

Source: NSECC, 2024
*geometric mean

Existing air quality conditions (i.e., baseline data, Table 7.4) indicate that most of the measured contaminants are well below their respective NS AAQS Schedule A limits. In reviewing the available data for the Port Hawkesbury air quality monitoring station, the reported AQHI is typically scored 'low' at all times of the year (ECCC, 2024b).

7.1.1.5 Effects Assessment

Project-Atmospheric Interactions

Project activities will primarily interact with the atmospheric environment through fugitive dust and exhaust emissions from construction equipment (Table 7.5). While this may occur during all phases of the Project, fugitive dust and exhaust emissions would be highest during the construction phase. No air emissions are associated with the operation of the wind turbines as the generation of wind power will offset power production that would have otherwise been generated from fossil fuels (Section 7.1.2).

Table 7.5: Potential Project-Atmospheric Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Atmospheric Environment		X	X	X	X	X	X	X		X		X	X	X	X

Assessment Boundaries

The LAA for the atmospheric environment is the Study Area (Drawing 2.2). The RAA for atmospheric is not applicable.

Assessment Criteria

The assessment criteria provided in Section 4.6 apply to the atmospheric environment. The VC-specific definition for magnitude is as follows:

- Negligible – no changes are expected to ambient air quality.
- Low – minimal changes are expected to ambient air quality.
- Medium – some changes are expected to ambient air quality.
- High – widespread changes are expected to ambient air quality.

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, increase in traffic). Fugitive dust emissions are composed mainly of soil minerals, but can also contain salt, pollen, spores, and tire particles. There are two forms of PM which pose the greatest concern for human health: PM with a diameter of 10 microns (µm) or less (PM_{10}) and PM with a diameter of 2.5 µm or less ($PM_{2.5}$). PM is measured by TSP and is defined as the mass of airborne particles having a diameter of less than 44 µm.

When fugitive dust enters the atmosphere, it may potentially affect lung and heart functions. 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 the environment through visibility impairment and 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 effects of particulate deposition may include the following (US EPA, 2024b):

- Increasing lake and stream acidity.
- Altering the nutrient balance in coastal waters and large river basins.
- Depleting the nutrients in the soil.
- Damaging sensitive forests and farm crops.
- Affecting the diversity of ecosystems.
- Contributing to acid rain effects.

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

- Soil disturbance during site preparation (i.e., clearing/grubbing, grading, blasting).
- 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).

The interaction with local receptors was assessed to determine environmental impacts on ambient air quality from fugitive dust emissions. The closest receptor is located 1.2 km from the Project (Drawing 7.2). Fugitive dust travel distance is based on several factors, including particle height, wind conditions, and particle size. Under most standard conditions, fugitive dust above 30 micrometres settles out within 100 m of the emission source. Other finer particles have a slower settling velocity and may travel further (US EPA, 1995). The Study Area is forested, which will likely help to entrap and settle particles of all sizes. Furthermore, these fugitive dust emissions are considered short-term (construction) and intermittent within the LAA.

Construction of the Project may result in an increase of 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. The closest receptor is located 1.2 km from the Project (Drawing 7.2). Exhaust emissions are primarily anticipated to be associated with local roadways and roads developed for the Project within the Project Area. Exhaust emissions are not anticipated to travel beyond the extent of the Project Area, and as such, impacts to local residential receptors are not anticipated. Overall, exhaust emissions are considered short-term, intermittent, and within the LAA.

Mitigation

An Air Quality and Dust Management Plan will be developed to define measures to minimize and mitigate the creation and emission of pollutants, including fugitive dust and exhaust emissions, particularly for the Project's construction phase.

In addition, general mitigation measures for fugitive (dust) emissions include:

- 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 ridge disturbed soil to prevent dust formation.
- Cease dust-generating construction activities during periods of excessive wind.
- Enclose or cover soil storage and/or stockpile areas.
- Wet (with water) aggregate and soil stockpiles to control dust.
- Design storage areas and material stockpiles with prevailing wind directions in mind.
- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- 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.
- Ensure Project personnel adhere to all safety protocols and wear appropriate personal protective equipment (PPE) during significant fugitive emissions events (i.e., windstorms, dust storms).

General mitigation measures for exhaust emissions include:

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

Monitoring

Given the low to negligible impacts, no monitoring is required.

Conclusion

Following mitigation, residual effects are characterized as low to negligible magnitude, within the LAA, of short-duration, intermittent, reversible, and not significant.

7.1.2 Climate Change

The Project is being developed to support various end-use electrical requirements. Climate change for this Project is addressed in terms of GHG emissions and per NSECC's Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (2021).

7.1.2.1 Overview

Climate change is a long-term alteration of weather patterns and conditions strongly impacted by changes in temperature and precipitation. Climate change typically involves changes in average conditions, as well as changes in variability. The main contributor to climate change is GHGs from anthropogenic sources. Since GHGs disrupt the 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 (GOC, 2019a).

The impacts of climate change on the Project are assessed separately under Section 12.1.

7.1.2.2 Regulatory Context

The climate change assessment considered the following Acts and Regulations:

- *Canadian Environmental Protection Act*, 1999 (CEPA)
  - Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations, S.O.R./2010-201

- Heavy-duty Vehicle and Engine Greenhouse Gas Emission Regulations, S.O.R./2013-24
- Ozone-depleting Substances and Halocarbon Alternatives Regulations, S.O.R./2016-137

- *Environment Act*, S.N.S. 1994-95, c. 1
  - Regulations Respecting Greenhouse Gas Emissions, N.S. Reg. 305/2013
- *Environmental Goals and Sustainable Prosperity Act*, S.N.S. 2007, c. 7

Regulatory guidance was used to determine the appropriate assessment methodologies, mitigation controls, best management practices, and emissions targets.

7.1.2.3 Desktop Assessment Methodology

The objectives of this assessment include the following:

- Establish the sources of GHG contributions from the Project.
- 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.

Baseline GHGs were quantified using emission factors published in the NSECC Standards for Quantification, Reporting, and Verification of Greenhouse Gas Emissions (2020) and current electricity generating practices from NS Power.

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). GHG emissions and removal enhancements are stated in tonnes of carbon dioxide equivalent (tCO_2e).

7.1.2.4 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 (Government of Canada, 2019b). The following subsections describe the GHGs and their contributors (sources) as anticipated during each phase of the Project.

Carbon Dioxide

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

Site preparation and construction will include several activities that are likely to produce CO_2. These include, but are not limited to, the following:

- Use of heavy equipment (excavators, dozers, cranes, etc.).
- Use of light-duty vehicles and equipment (pick-up trucks, light plants, generators, etc.).
- Land clearing, including the decay of cut foliage (which releases CO_2 slowly).
- Cement production results in the heating of limestone, which releases CO_2 (Government of Canada, 2019b).

During the operations phase, CO_2 emissions will be limited to maintenance activities (i.e., transportation and materials). Where these activities are intermittent and short-term, the GHG contributions from operations are negligible and are not considered further.

Methane

Methane (CH_4) is produced when fossil fuels are burned with insufficient oxygen to complete combustion (Government of Canada, 2019b). The Project's construction phase requires different heavy- and light-duty equipment, contributing to methane emissions.

During the operations phase, methane emissions will be limited to maintenance activities (i.e., transportation and materials). Where these activities are intermittent and short-term, the GHG contributions from operations are negligible and are not considered further.

Nitrous Oxide

The primary sources of 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 (Government of Canada, 2019b).

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

During the operations phase, N_2O emissions will be limited to maintenance activities (i.e., transportation and materials). Where these activities are intermittent and short-term, the GHG contributions from operations are negligible and are not considered further.

Halocarbons

Halocarbons are a group of synthetic chemicals containing a halogen group (e.g., fluorine, chlorine, and bromine) and carbon (Government of Canada, 2019b). They are typically used in refrigerants, fire-extinguishing agents, solvents, foam-blowing agents, and fumigants (Government of Canada, 2013). There are various industrial sources, but the main contributor is aluminum production (US EPA, 2021).

The primary source of halocarbon emissions from the Project will be associated with coolants in air conditioning units found in vehicles, portable construction buildings (i.e., trailers), and equipment. Air conditioning units will be used during the Project's construction phase. Fire-extinguishing agents (containing halocarbons) may also be used at the Project in the event of an emergency which requires a fire-fighting response.

During the operations phase, halocarbon emissions will be limited to maintenance activities (i.e., transportation and materials). Where these activities are intermittent and short-term, the GHG contributions from operations are negligible and are 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 about 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., variances 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 (Government of Canada, 2019b).

Project activities contributing to GHG emissions are not anticipated to impact water vapour concentrations in the atmosphere.

7.1.2.5 Quantification of the GHG Baseline Conditions

The GHG baseline is a reference of sources, sinks (removing), and reservoirs (storing) occurring in the absence of the Project and is used to compare pre- and post-Project conditions. That said, the baseline determines the quantity of CO_2e emitted from current electricity production methods for the same electrical capacity of 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 six turbines capable of generating up to 42 MW of renewable energy. Based on the wind turbine design capacity and a typical capacity rating of 43.59% (Hatch, 2008), the Project will be capable of producing approximately **160,376,328**[2] kilowatts per hour per year (kWh/year). The lifespan of the Project is estimated at a minimum of 25 to 30 years.

Quantifying GHGs in terms of tCO_2e requires using emission factors published in the NSECC Standards for Quantification, Reporting, and Verification of Greenhouse Gas Emissions (2020) and current electricity generating practices. For the year 2023 (latest available data), electricity generated in Nova Scotia by NS Power (the leading producer) was produced from the following fuel sources (NS Power, 2024):

- Coal (31%)
- Natural Gas (17%)
- Wind (14%)
- Renewable Imports (17%)
- Hydro (9%)
- Non-Renewable Imports (8%)
- Biomass (3%)
- Oil (1%)

For this assessment, the 8% non-renewable energy imports into Nova Scotia are distributed amongst coal (+3%), natural gas (+3%), and oil (+2%) as a conservative assumption to quantify the emission factors for non-renewable energy imports. Therefore, the fractions of electricity production used for this assessment were coal at 34%, natural gas at 20%, and oil at 3%. Renewable energy (locally sourced and imported) was lumped together, and for this assessment, renewables were considered as wind energy at 43%.

Table 7.6 summarizes the GHG emission factors for the different types of electricity generated in Nova Scotia.

Table 7.6: Electricity Fuel Source Emission Factors

Electricity Fuel Source	Emission Factor (tCO_2e/year)
Coal	0.001251
Natural Gas	0.000440
Oil	0.001107
Wind	0

Source: US EIA, 2022

[2] $7.0\,\frac{MW}{Turbine} \times 6\,Turbines \times 0.4359 \times 365\,\frac{days}{year} \times 24\,\frac{hours}{day} \times 1000\,\frac{kW}{MW} = 160{,}376{,}328\,\frac{kWh}{year}$

Given the current electricity generation methods and the fuel source emission factors (Table 7.6), Table 7.7 summarizes the baseline GHG emissions.

Table 7.7: Baseline Quantification Summary

Electricity Fuel Source	Electricity Generation (kWh/yr)	Emissions (tCO_2e)
Coal	54,527,952	56,920.72
Natural Gas	32,075,266	14,126.25
Oil	4,811,290	5,245.40
Wind	68,961,821	0
Total	**160,376,328**	**76,292.36**

The total annual GHG emissions generated in Nova Scotia for the same electrical capacity of the Project is **76,292.36 tCO_2e.**

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

7.1.2.6 Quantification of GHG Emissions - Construction

Access Roads

Primary site access roads are existing, however new access roads to turbines will be required. The construction of new roads and upgrading of existing roads will require the removal of vegetation and overburden, which will create fugitive dust and GHG emissions. Where fugitive dust and GHG contributions for these activities are temporary, short-term, and represent a small incremental addition compared to the overall Project emissions, they were not quantified.

Fugitive dust and air emissions as they relate to the Project, are discussed in Section 7.1.1 (Atmosphere and Air Quality).

Laydown Areas

A laydown area (estimated area 150 m x 80 m = 12,000 m^2) is intended to store equipment temporarily, the turbine pad foundation, and the crane pad. This area will be prepped by removing the vegetation and overburden and placing competent soils. Construction activities and equipment associated with the laydown area are anticipated to create fugitive dust and GHG emissions. However, where fugitive dust and GHG contributions for these activities are temporary, short-term, and represent a small incremental addition compared to the overall Project emissions, they were not quantified. Additionally, a vegetation management plan will be initiated to recover the lost flora and reduce dust resuspension while maintaining access and clearances to the turbine.

Concrete Foundation

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

In 2017, Casey Concrete Ltd. poured approximately 1,000 cubic metres (m^3) to build the base of a 3 MW wind turbine in Amherst, NS. Transportation of the concrete consisted of 140 truckloads (Kenter, 2017). Note that a concrete supplier has not been procured at this stage of the Project; as such, for the purpose of this assessment, the Casey Concrete Ltd. quantities will be assumed for GHG quantification. The quantification of the GHG emissions requires the following inputs:

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

Heavy duty diesel concrete trucks will be required to transport concrete to the Project Area. For this assessment, transportation distances are based on the nearest known concrete supplier, which is approximately 25 km from the Project Area. Given that turbine locations are scattered across the Project Area, transportation distances range from 28 km to 32 km (Table 7.8).

Table 7.8: Distance from the Nearest Known Concrete Supplier to Individual Wind Turbine Locations

Wind Turbine	Approximate Distance (km)
1	32.41
2	31.77
3	31.13
4	30.51
5	31.54
6	31.07

Based on Table 7.8, the total distance between the wind turbines and the nearest concrete supplier is 188.43 km. Assuming 140 truckloads per wind turbine, the total one-way distance travelled is **26,380.20 km**. GHG quantification considered travel to and from the nearest concrete supplier to the wind turbine locations.

It is assumed that each concrete truck will carry approximately 17.86 tonnes[3] of concrete per delivery for a total of 2,500 tonnes of concrete per wind turbine.

[3] $2{,}500\,\frac{Tonnes\ of\ Concrete}{Turbine} \div 140\,\frac{Trucks}{Turbine} = 17.86\,\frac{Tonnes\ of\ Concrete}{Truck}$

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

Table 7.9: Concrete Manufacturing and Transportation Emission Factors

Component	Emission Factor
Concrete Production	3×10^{-4} tCO_2e/kg
Concrete Truck (Diesel) with Freight	1.35×10^{-4} tCO_2e/tonne·km
Concrete Truck (Diesel) without Freight	1.106×10^{-3} tCO_2e/km

Source: GHGenius v5.0d (Squared Consultants Inc., 2022)

Given the travelling distances, the quantity of concrete required for the Project, and the emission factors (Table 7.9), the CO_2e emissions are expected to be approximately **4,592.77 tCO_2e**[3] for constructing all the tower foundation and pedestal.

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

Turbine

The Project will require wind turbines to be manufactured and delivered to the Project Area. As mentioned, various wind turbines are under consideration, but for this assessment, the Nordex N163/7.X will be used to quantify GHG contributions. This turbine has a rotor diameter of 163 m and can generate up to 7.0 MW of power.

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: Chennai, India
- Nearest Shipping Port: Chennai, India
- Nearest NS Shipping Port: Canso Superport, NS, CA

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

- Blade (three)
- Drive Train
- Gearbox
- Generator
- Hub

- Nacelle
- Rotor
- Speed Shafts (low and high)
- Tower

According to the National Renewable Energy Laboratory (NREL, 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 7.10.

Table 7.10: Wind Turbine Manufacturing Emission Factor

Component	Emission Factor (tCO_2e/kg)
Wind Turbine Material (Steel)*	$1.5x10^{-3}$

*Estimated from the UK's mixture of steel types, excluding stainless steel (University of Bath, 2011).

Given the steel required to produce the wind turbines for the Project and the emission factor (Table 7.10), the CO_2e emissions from the manufacturing of all the wind turbines are expected to be approximately **13,424.80 tCO_2e**.

Nordex SE occupies 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, NS. Table 7.11 summarizes the transportation distances from the manufacturer to the Project.

Table 7.11: Wind Turbine Transportation Distances

Originating Destination	Final Destination	Distance (km)
Chennai, India	Port of Chennai	49 (Land)
Port of Chennai, India	Strait of Canso Superport, NS	16,000 (Marine)
Strait of Canso Superport, NS	Rhodena Wind (Project)	24.6 (Land)

These measurements were based on a desktop geospatial analysis; the exact routes and distances may vary.

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 to the Port of Chennai (total of 588 km per turbine).
  - 12 components per turbine to travel from the Strait of Canso Superport, NS, 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.

Land transportation distances were calculated according to the assumptions in Table 7.12.

Table 7.12: Land Distance from the Manufacturer to Individual Wind Turbine Locations

Wind Turbine	Approximate Distance (km)
1	970.92
2	963.24
3	955.56
4	948.12
5	960.48
6	954.84
Total	**5,753.16**

Estimated distances from the Strait of Canso Superport to the individual turbines, one way. The number of trips and the number of transport vehicles should be considered for a cumulative travel distance.

Based on Table 7.12, the total land transportation distance between the wind turbine manufacturer and the wind turbine laydowns (not including marine transportation) is **5,753 km**. The total marine transportation distance associated with getting the wind turbines from Chennai, India to Canso, NS, is **96,000 km**. The distances travelled consider travel from the manufacturer to the Project Area 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 7.13.

Table 7.13: Wind Turbine Transportation Emission Factors

Component	Emission Factor (tCO_2e/tonne·km)
Heavy Duty Truck (Diesel) with freight	1.35×10^{-4}
Marine Cargo and Container Vessel (Diesel) with Freight	1.51×10^{-5}

Source: GHGenius v5.0d (Squared Consultants Inc., 2022)

Given the land transportation distances required to deliver the wind turbines to the Project and the emission factors (Table 7.13), the CO_2e emissions from land transportation of the wind turbines are expected to be approximately **54.37 tCO_2e**. In addition, the marine transportation distances required to deliver the wind turbines from the United States to Canada will contribute **1,217.66 tCO_2e**.

Detailed CO_2e calculations are provided in Table 3(Appendix B).

7.1.2.7 Quantification of GHG Emissions - Operations

Following the construction phase, the turbine will be operational, and the reduction (or sinking) of GHG emissions will begin. Based on the wind turbine design capacity and a capacity rating of 43.59% (Hatch, 2008), the Project will be capable of producing approximately 160,376,328 kWh/year. Therefore, the renewable energy produced will replace 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 contributor of GHGs during the operations phase. The maintenance typically includes replacing approximately 15% of the nacelle components and one blade during the 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. The total emission from the replacement material for all the Project's wind turbines is **271.07 $tCO2_e$** (Table 3, Appendix B).

Summary of Project GHG Emissions

A summary of the Project's GHG emissions is provided in Table 7.14.

Table 7.14: Project GHG Emission Summary

Component	Emissions (tCO_2e)
Baseline	
Electricity Generated from Coal	56,920.72
Electricity Generated from Natural Gas	14,126.25
Electricity Generated from Oil	5,245.40
Electricity Generated from Wind	0
Total	**76,292.36**
Construction Phase	
Concrete Production and Transportation	4,592.77
Wind Turbine Manufacturing	7,560.00
Wind Turbine Transportation	1,271.66
Total	**13,424.80**
Operations Phase	
Electricity Generated from Wind	0
Wind Turbine Maintenance	271.07*
Total	**271.07**

Rounding errors may cause the values in this table to differ from those in Appendix B; however, the rounding errors are negligible and do not change their representation.
*Project lifespan emissions (single event)

7.1.2.8 Effects Assessment

Project-GHG Interactions

Project activities will emit GHGs during all phases of the Project (Table 7.15).

Table 7.15: Potential Project-GHG Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
GHG		X	X	X	X	X	X	X		X		X	X	X	X

Assessment Boundaries

The LAA for GHGs is the Study Area (Drawing 2.2). The RAA for GHGs is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for Project-related GHG contributions. The VC-specific definition for magnitude is as follows:

- Positive – Project is expected to have a positive effect on GHG emissions.
- Negative – Project is expected to have a negative effect on GHG emissions.

Effects

As mentioned, the current GHG emissions for the quantity of electricity required by the Project using Nova Scotia Power's conventional generation methods are **76,292.36 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 for the tower foundation and pedestal. The total GHG emission contributions from the construction phase are **13,424.80 tCO_2e**.

The operations phase will generate GHGs from the wind turbines' maintenance (i.e., part replacements) as a one-time (Project lifespan) occurrence of **271.07 tCO_2e**.

Following the commissioning of the Project, the annual Project GHG emission reduction is expected to be **76,292.36 tCO_2e**. A one-time **271.07 tCO_2e** may be subtracted from any annual reduction; however, the annual reduction rate will be applied for the lifespan of the Project (25 to 30 years). The Project is anticipating a 0.18-year[4] payback period to offset the construction-

[4] $$\frac{Construction\ Emissions}{Offset\ Emissions} = \frac{13{,}424.80\ tCO2e}{76{,}292.36\ tCO2e/year} = 0.18\ years$$

related GHG emissions. Following this period, the Project will positively offset GHG emissions that would typically be emitted from conventional production methods employed by NS Power.

The assumptions considered in this assessment propose a conservative estimate of GHG emissions, which may be lower if turbine and concrete manufacturer locations are closer to the Project and manufacturing materials are less than assumed. Where assumptions may change the values provided in this assessment, the results remain constant; the Project will offset GHG emissions.

Mitigation

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

- Use 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/decommissioning waste, where possible.
- Recycle and compost workforce waste (i.e., food waste). Diverting this waste will reduce methane generated in landfills as it decomposes.
- Minimize deforestation during land clearing by only clearing the area that will be needed.
- Plan construction activities to reduce the double handling of materials, reducing GHG emissions associated with heavy equipment operations.
- Use recycled or repurposed materials, where possible, to reduce GHG emissions associated with embodied energy (i.e., the energy associated with manufacturing a product or service).
- Ensure Project equipment meets all applicable provincial and air quality regulations and emissions standards.
- Maintain engine and exhaust systems according to the manufacturer's specifications and applicable maintenance schedule.
- Remove from service malfunctioning equipment or equipment generating excess amounts of smoke, odour, or noise until an assessment and necessary repairs can be completed.
- Ensure construction equipment with an improperly functioning emission control system is not operated.
- Ensure regular equipment maintenance is undertaken to maintain good operations and fuel efficiency.
- Ensure equipment containing coolant (i.e., air conditioning units) undergoes preventative maintenance and inspections (i.e., leak testing).
- Train Project personnel (as appropriate) in the proper disposal of halocarbon-containing substances.
- Hire from a local labour force to reduce emissions associated with workforce transportation.

- Dispose of halocarbon-containing substances at an approved hazardous waste facility per applicable regulations and in compliance with local requirements.
- Ensure 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.
- Incorporate energy-efficient infrastructure (i.e., solar panels) where feasible to limit GHG emissions and the use of fossil fuels resulting from standard equipment (e.g., diesel-powered generators or light stands).

Monitoring

No monitoring programs are recommended.

Conclusion

Results are characterized as a positive effect within the LAA, medium duration, continuous, irreversible, and significant (positive).

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:

- Sulphide Bearing Material Disposal Regulations, NS Reg. 57/95
- *Environment Act*, SNS 1994-95, c. 1

In addition to the aforementioned legislation, if blasting is required for the construction of the Project, groundwater wells within 800 m must undergo assessment according to NSECC's Procedure for Conducting a Pre-Blast Survey (1993) which will involve individual consultation with well owners, a description of the condition of the structure and a thorough description of the water supply.

7.2.3 Desktop Assessment Methodology

The 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 (NSNRR, 2024a)
- Mineral Resource Land-Use Atlas (NSNRR, 2002)
- Nova Scotia Groundwater Atlas (NSNRR, 2024b)

- Karst Risk Map (NSNRR, 2019b)
- Well Logs Database (NSECC, 2020a)
- Nova Scotia Pumping Test Database (NSNRR, 2022c)
- Nova Scotia Groundwater Observation Well Network (NSECC, 2015b)
- Potential for Radon in Indoor Air (NSNRR, 2009)

7.2.4 Desktop Assessment Results

Topography
The Study Area lies within the Cape Breton Hills Ecodistrict (310) of the Nova Scotia Uplands Ecoregion (Drawing 7.1). The Cape Breton Hills Ecodistrict encompasses the hardwood-covered slopes that lead to the Cape Breton plateau. This sloped terrain reaches between 150 and 300 metres above sea level (masl) and is characterized as a mix of discontinuous geological units, representing an array of geological history (Drawing 7.3) (Neily et al., 2017).

Surficial Geology
The northern extent of the Study Area is dominated by glacially derived stony and silty till plains, with scoured exposed bedrock underlying the centre of the Study Area. Colluvial deposits underlie the eastern and southeastern portion of the Study Area, a glaciofluvial deposit is located along the western boundary, and organic deposits are spotted throughout (Drawing 7.4). The stony and silty till plain features are derived from glacial deposits of foreign material and are generally 2 to 20 m or 3 to 30 m thick, respectively. The colluvial deposits are loosely consolidated mixtures of glacial materials overtop steep slopes and are susceptible to mass wasting [i.e. avalanches, rock falls, etc.] (NSNRR, 2024a). Other surficial units that occur within the Study Area include:

- Glacial Fluvial Deposits
- Organic Deposits

Glacial fluvial deposits are a mixture of gravel, sand, silt, and diamicton layers. Together, these materials are poorly to well-bedded and form horizontal to angular beds. Faulting and collapse of these features are common, and they tend to form hummocky terrain (GHD, 2021).

Lastly, there is one record of organic deposits in the northwest extent, along the boundary of the Study Area. Organic deposits are areas of bogs, swamps, fens, etc., that contain waterlogged sediments (e.g., peat, clay, etc.) ranging in depth between 1 m and 5 m (NSNRR, 2024b).

Bedrock Geology
Bedrock within the Study Area belongs to the Horton Group, including the Creignish Formation, as well as a series of intruding plutons (Neoproterozoic granites, granodiorites, and Devonian to Carboniferous diorites). The Creignish Formation can be generally classified here as grey and greenish-grey sandstone to conglomerate. An abundance of gabbroic dykes and sills are

found within this unit. The Horton Group can be surmised as being non-marine fluvial and lacustrine sediments with units of orthoquartzite (Drawing 7.5) (GHD 2021; NSNRR 2024a).

General Hydrogeologic Conditions

The nearest protected water area is within the Port Hawkesbury Watershed, over 7 km southeast of the Study Area.

Groundwater Quality and Quantity

The Study Area is predominantly underlain by plutonic rocks, which carry groundwater through fractures and cracks within the bedrock. Groundwater sourced from plutonic rock is classified as plutonic water and is typically associated with lower quantities of groundwater and, consequently, lower well yields compared to other regions. Wells located in plutonic rock typically have lower dissolved solids, hardness, and well water yields as a result of groundwater only flowing through cracks and fractures in the rock (NSECC & NSNRR, 2009). The sedimentary formation of the Horton group underlies a portion of the Study Area; this bedrock type may contain primary porosity and flow through interconnected pore spaces in addition to fractures.

Groundwater Wells

According to the NSECC Well Logs Database (2020a), 101 individually drilled wells are located within 2 km of the Study Area (Drawing 7.6). Any well logs with a spatial reference that exceeded 1,000 m in accuracy were removed from this analysis. Water well use for these wells is classified as domestic (95), standby (1), or unspecified (5). A summary of well properties within 2 km of the Study Area is presented in Table 7.16, and a complete characterization log of wells within 2 km is provided in Appendix C.

Table 7.16: Summary of Well Records within 2 km of the Study Area

	Drilled Date (year)	Well Depth (m)	Casing Depth (m)	Depth to Bedrock (m)	Static (m)	Estimated Yield (Lpm)
Minimum	1966-10-13	9.44	4.87	0.91	-0.03	0
Maximum	2016-10-24	90.44	36.54	28.93	71.86	499.40
Average	N/A	30.55	14.68	10.18	11.47	70.27

Source: NSECC Well Logs Database (2020a).

Based on short term driller's estimates for the wells located within 2 km of the Study Area, the average yield is approximately 70.27 Lpm (litres per minute) with an average well depth of approximately 30.55 m. These measurements represent very short-term yields estimated by the driller at the completion of well construction (NSECC, 2020a).

Only a single water well was identified within the Study Area. However, this well has a spatial error of 707 m and no structures nearby. It is likely misplaced and not actually within the Study Area.

The NSNRR Pumping Test Database (2022b) provides longer-term yields for select wells throughout the province. The nearest test well is located approximately 3.5 km northwest of the Study Area in the community of Long Point (Well # 700626), which indicates a long-term safe yield (Q20) of 9.5 Lpm and an apparent transmissivity of 3.6 m^2/day. This well is in the sedimentary groundwater region of the Windsor Group (NSNRR, 2024b).

NSECC maintains the Nova Scotia Groundwater Observation Well Network (NSECC, 2015b). The nearest observation well to the Study Area is the same well as the pumping test well (Well # 700626). This well (082) was drilled to a depth of 18.5 m through sedimentary Windsor Group bedrock. This well has been monitored since 2009, where water levels have ranged between approximately 8.3 to 9.25 masl. Water quality in this observation well was tested in 2009, and water samples had no exceedances above Health Canada guidelines (NSECC, 2015b).

7.2.5 Effects Assessment

Project-Geophysical Interactions

Project activities will primarily interact with the geophysical environment during earth moving activities (Table 7.17).

Table 7.17: Potential Project-Geophysical Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Geophysical Environment		X		X	X	X				X				X	X

Assessment Boundaries

The LAA for the geophysical environment is the Assessment Area. The RAA is 800 m around the Assessment Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for the geophysical environment. The VC-specific definition for magnitude is as follows:

- Negligible – no expected changes to local topography or geology; no anticipated impacts to the quality/quantity of groundwater wells (no wells within 2 km of the Assessment Area).

- Low – changes to local topography/geology are possible but not anticipated as no geologic hazards are presence within the Study Area; impacts to the quality/quantity of groundwater wells are possible but not anticipated (wells exist between 800 m and 2 km from the Assessment Area).
- Moderate – changes to local topography/geology are possible as geologic hazards exist within proximity to the Assessment Area that cannot be mitigated with routine measures; impacts to the quality/quantity of groundwater wells are possible (wells exist within 800 m of the Assessment Area).
- High – changes to local topography or geology are anticipated due to the presence of geologic hazards within the Assessment Area that cannot be mitigated with routine measures; impacts to the quality/quantity of groundwater wells are anticipated (wells present within the Assessment Area).

Effects

The geophysical environment will be disturbed within the Assessment Area during the 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:

- Sulphide-bearing slates (i.e., acid generating rock)
- Karst topography
- Radon
- Arsenic and/or uranium containing bedrock

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 (NSNRR, 2021a). There have been no records of sulphide bearing slates within either the Study Area and Assessment Area, and the risk of ARD is assessed as low (NSNRR, 2002; GHD, 2021). The presence of sulphide-bearing minerals and likelihood of ARD will be confirmed following the results of the geotechnical evaluation.

According to the Karst Risk Map (Drawing 7.7), the Assessment Area is in a “Low to High Risk” zone for encountering karst terrain and/or naturally occurring sinkholes. The areas of “High Risk” are situated along portions of the transmission line. Meanwhile, areas of “Low” and “Medium Risk” are situated where roads and turbines are sited (NSNRR, 2019b). Karst topography is produced by the erosion and dissolution of soluble bedrock, such as limestone. Based on the variety of karst risk levels within the Study Area, impacts associated with karst topography should be mitigated.

Radon potential mapping (Drawing 7.8) shows the Assessment Area is primarily located in “Low to Medium Risk” area for radon in indoor air (NSNRR, 2009). Radon is present in some bedrock types similar to granite within the Assessment Area; however, there is no indoor air pathway for radon gas associated with the Project. Radon gas is not considered a risk for outdoor inhalation. Though some radioactive shows have been recorded in bedrock similar to the type within the Assessment Area, no shows or radioactive mineralogy above ambient levels are known within the boundaries of the Study Area.

Groundwater risk mapping shows that the Assessment Area is situated in a “Low Risk” region for arsenic and “Medium risk” for uranium-containing bedrock (Drawings 7.9 and 7.10) (GHD 2021; NSNRR, 2020b). Construction activities (primarily blasting, as required) can result in the disturbance of naturally occurring arsenic and uranium within underlying bedrock. Disturbed arsenic/uranium also the potential to be mobilized through groundwater and subsequently degrade nearby groundwater well quality. Arsenic and uranium-containing bedrock (and groundwater) is a common occurrence across Nova Scotia, and as a result, groundwater well owners are encouraged by the province to frequently test wells to ensure adherence to applicable standards (NSECC n.d.; NSNRR, 2009). The Maximum Acceptable Concentration of arsenic in well water is 0.01 mg/L while the Maximum Acceptable Concentration of uranium in well water is 0.02 mg/L (Health Canada, 2024a). Potential impacts to nearby groundwater well quality as a result of arsenic and uranium 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.
- Blasting activities are not anticipated to be required for construction of the Project. If required, blasting monitoring and mitigation plans will be developed and regulatory guidelines will be adhered to.
- Only a single well is located within 800 m of the Assessment Area.

In addition to water quality, groundwater quantity can potentially be impacted if blasting activities (as required) alter local hydrogeological flow regimes, resulting in groundwater draining from or flowing towards existing wells. If blasting is required, wells located within 800 m of blasting activities will undergo monitoring per NSECC’s Procedure for Conducting a Pre-Blast Survey (1993). The requirement for blasting and pre-blast surveys will be confirmed and assessed further during geotechnical investigations.

Uranium specifically also carries the risk of potential health impacts from exposure to radioactive material. Uranium is a naturally occurring radioactive element that can be found throughout the earth’s crust, that when disturbed/exposed, may release radiation (alpha, beta, and some gamma radiation). People are exposed to background levels/low levels of radiation continually from sources such as the sun, ground surface, medical procedures, etc. (US EPA, 2024c). Potential impacts to human health (e.g., cancer risk) arise when individuals are exposed to radiation levels at high concentrations and/or for prolonged durations (Health Canada, 2024b). For this Project, the receptor with the greatest potential for exposure to uranium is construction workers from direct contact/inhalation of uranium containing material (e.g., soil, dust, bedrock) during earthwork activities. The Project’s disruption of uranium containing material is anticipated to be low as construction activities will primarily occur within the surficial geologic layer (bedrock is not anticipated to be blasted). Potential impacts to human health from uranium containing bedrock are not anticipated based on:

- Disruption of uranium containing material is anticipated to be minimal as construction activities will primarily occur within the surficial geologic layer. Blasting activities, if required, will be localized and contained. Mitigation measures for blasting in areas of elevated risk for uranium will also be included as part of the Project's blasting plan.
- Construction (where exposures are most likely) will be temporary, short term, and outdoors.

Mitigation

Avoidance of geologic hazards and groundwater users during the Project's design and development was the priority. In addition, the use of existing road networks and use of existing right-of-way's minimized the Project's impact to the overall geologic environment.

The following general mitigation measures related to the geophysical environment are recommended:

- Conduct blasting, as required, in accordance with provincial legislation and subject to terms and conditions of applicable permits.
  - Ensure all blasts are conducted and monitored by certified professionals.
  - Notify landowners within 800 m of any blasting activities.
  - Conduct a pre-blast survey for wells within 800 m of the point of blast in accordance with NSECC's Procedure for Conducting a Pre-Blast Survey (1993) to monitor for changes in well quality or quantity.
  - Recover and revegetate exposed soils or bedrock as required to minimize any exposure following blasting.
- Identification of karst features through pre-construction geotechnical surveys.
- If identified through pre-construction geotechnical surveys, develop site-specific mitigation for sulphide bearing materials. This would include:
  - Plan site work to minimize disturbance of slate bedrock and exposure of disturbed slate bedrock to rainfall.
  - Avoid locating any disturbed or stockpiled slate within or near wetlands, watercourses, and/or waterbodies.
  - Ensure rock removal in known areas of elevated sulphide potential will conform to the Sulphide Bearing Material Disposal Regulations, NS Reg. 57/95 and any requirements from relevant regulatory departments.
- Store all soils removed during the excavation phase according to provincial standards and best practice guidelines.
- Store any soil needed for backfilling, after foundations have been poured, temporarily adjacent to the excavations until needed. Any remaining excavated material will be used on-site or removed and sent to an approved facility.
- Install erosion and sedimentation control measures prior to excavation activities and inspect controls on a regular basis.

- Remove temporary erosion and sedimentation controls once the area has been stabilized.

Monitoring

The presence of acid generating rock/potential for ARD will be confirmed during detailed geotechnical investigations, although ARD is not anticipated based on no records of sulphide bearing slates in the Assessment Area. If acid generating rock is discovered, a management and monitoring plan will be developed and implemented prior to construction.

If blasting is determined to be required during upcoming geotechnical investigations, groundwater wells within 800 m of the blast point will undergo assessment as per the NSECC Procedure for Conducting a Pre-Blast Survey (1993).

Conclusion

Following mitigation, residual effects to the geophysical environment are characterized as moderate magnitude, within the LAA, short-term duration, intermittent, reversible, and not significant.

7.3 Aquatic Environment

7.3.1 Waterbodies and Watercourses

7.3.1.1 Overview

The objective of the waterbody and watercourse assessment was to inform the Project's design and collect the information necessary to assess potential impacts to waterbodies, watercourses, and fish habitat (assessed separately in Section 7.3.2) resulting from the Project. This was accomplished using the following approach:

- Identify watercourses and waterbodies within the Study Area using desktop resources.
- Use the information collected to inform Project design (e.g., avoid/minimize impacts to waterbodies and watercourses).
- Traverse the entirety of the Assessment Area to ground truth waterbodies and watercourses and provide characterization of any identified features.
- Use the information collected to inform mitigation and management practices and further refine the Project Area.

7.3.1.2 Regulatory Context

Under the *Environment Act,* SNS 1994-95, c. 1, NSECC has the authority to promote the sustainable management of water resources in Nova Scotia. More specifically, as per section 5A of the Activities Designation Regulations, NS Reg 47/95, 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).

There are also federal regulations that impact the management of watercourses. DFO has a responsibility to oversee the protection of fish and fish habitat in accordance with the *Fisheries Act* and *SARA*. Furthermore, the *Canadian Navigable Waters Act* gives Transport Canada the authority to regulate interferences with the public right to navigable waters, including approving and setting the terms and conditions for works within navigable waterways.

7.3.1.3 Desktop Review

Waterbodies

A desktop review was conducted to identify mapped and potential waterbodies within the Study Area using the following sources:

- CanVec Database – Hydrographic Features (NRCan, 2022a)
- Significant Species and Habitats Database (NSNRR, 2023)

A review of the federal CanVec Database – Hydrographic Features (NRCan, 2022a) identified Brileys Lake and two unnamed waterbody features within the outer bounds of the Study Area (Drawing 7.11), along with 24 named and unnamed features within 5 km. Brileys Lake is the largest open body of water within the Study Area, approximately 5.8 ha in size, located within the central south extent of the Study Area. A complete list of named waterbodies located within 5 km of the Study Area is provided in Table 7.18.

Table 7.18: Named Waterbodies Within 5 km of Study Area

Name of Waterbody	Distance (km)
Waterbodies Within the Study Area	
Brileys Lake	--
Waterbodies Within 5 km of Study Area*	
Lake Murray	0.17
Horton Lake	3.26
MacGregors Lake	3.39
Red Lake	4.14

*Measurement from the nearest point of the Study Area.

According to the Significant Species and Habitats Database (NSNRR, 2023), Brileys Lake and an unnamed waterbody (herein described as Pond 1) are identified as significant habitat based on the confirmed presence of Wood turtle (*Glyptemys insculpta*). Refer to Section 7.4.3 for further details.

The results of the desktop review indicated that Project infrastructure will not interact with any waterbodies. This was later confirmed by the results of the field assessments. As such, waterbodies are not discussed further in this section.

Watercourses

A desktop review was conducted to identify mapped and potential watercourses within the Study Area using the following sources:

- NS Topographic Database – Water Features (GeoNOVA, 2022)
- CanVec Database – Hydrographic Features (NRCan, 2022a)
- Significant Species and Habitats Database (NSNRR, 2023)
- Wet Areas Mapping (WAM) (NSNRR, 2021e)
- NS 1:10,000 Primary Watersheds (NSECC, 2011)

The Study Area is located within the River Inhabitants primary watershed (1FA), which is subdivided into three secondary watersheds: River Inhabitants (1FA-1), Chisholm Brook (1FA-3) and a Shore Direct (1FA-SD9) (Drawing 7.11). The Study Area is located partially within each of these secondary watersheds; however, the Assessment Area is only located in the River Inhabitants and Shore Direct secondary watersheds.

The River Inhabitants secondary watershed has a total surface area of 34,284 ha, which extends southeast through Glenora and Cleveland to Hureauville. The upper watershed includes several second and third order streams, and contains more than a dozen lakes, wetlands, and tributaries. The main feature within the watershed receives water from various aquatic features and flows southeast before draining into the Big Basin of the Atlantic Ocean.

The Shore Direct secondary watershed has a total surface area of 3,230 ha which extends west through Craigmore and Low Point. Water is directed west down a moderately steep gradient towards Isaacs Harbour via several unnamed topographically mapped channels. The watershed does not contain any named watercourses or waterbodies.

The Chisholm Brook secondary watershed encompasses 2,041 ha. The upper portion of the watershed predominantly begins north of the Assessment Area as headwaters of Chisholm Brook flowing northwest where it has a single point of discharge to the Atlantic Ocean at Long Point.

Rough Brook and MacMaster Brook, along with their associated tributaries, direct flow through the north and east of the Study Area to the southeast where they feed into Lamey Brook.

The largest watercourse flowing through the Study Area is Lamey Brook, located within the southern and western portions of the Study Area. This watercourse and its associated tributaries direct flow from its headwaters in the Study Area to the southeast, eventually feeding into River Inhabitants and ultimately discharging into the Atlantic Ocean near Lower River Inhabitants.

A review of the CanVec Database – Hydrographic Features (NRCan, 2022a) identified 37 watercourse segments within the Study Area and 162 segments within 5 km of the Study Area. Four named watercourses were identified within the Study Area (Drawing 7.11):

- Chisholm Brook
- Rough Brook
- Lamey Brook
- MacMaster Brook

According to the Significant Species and Habitats Database (2018a), Lamey Brook, Rough Brook, and MacMaster Brook are identified as significant habitat based on the potential presence of Wood turtles.

Throughout the Study Area, WAM data indicates that groundwater ranges from 0 m to >10 m of the surface, with the majority being within >10 m of the surface on account of the area being rapidly to well drained (Drawing 7.12). WAM results generally aligned with the locations of watercourses identified using topographic mapping and highlighted the potential for additional watercourses throughout the Study Area (NSNRR, 2021e).

7.3.1.4 Field Assessment Methodology

The results of the desktop review were used to inform Project design (e.g., avoid/minimize impacts to waterbodies and watercourses). Given that no waterbodies are located within the Assessment Area, field assessment efforts were focused on potential Project-watercourse interactions. However, fish and fish habitat assessments were completed in Brileys Lake and Pond 1 (as discussed in Section 7.3.2).

Watercourse assessments were completed during summer 2022 with additional assessments completed in 2024 to accommodate changes to the Project layout. Relevant information from the desktop review, including mapped watercourses, WAM, and predicted flow data, were provided to field staff to guide the identification and assessment of watercourses within the Assessment Area. Field crews assessed the entire footprint of the Assessment Area, including a 25 m area on either side of existing/proposed roadways and proposed collector line routes, and a 200 m radius around the centre of proposed turbine locations. Any watercourses identified were delineated (until their extent reached the Assessment Area boundary or the watercourse terminated) and assessed for general watercourse characteristics in conjunction with wetland delineation and evaluation. Supplementary information on fish/fish habitat and incidental observations of fish were also recorded during the surveys (Section 7.3.2). Field evaluations were conducted using NSECC guidance on watercourse determinations (NSECC, 2015a). The following parameters were used to define watercourses:

- Presence of a mineral soil channel.
- Presence of sand, gravel and/or cobbles evident in a continuous pattern over a continuous length with little to no vegetation.
- Indication that water has flowed in a path or channel for a length of time and rate sufficient to erode a channel or pathway.
- Presence of pools, riffles, or rapids.
- Presence of aquatic animals, insects, or fish.
- Presence of aquatic plants.

According to guidance provided by NSECC, any surface feature that meets two of the criteria above meets the definition of a provincially regulated watercourse. Identified watercourse information collected included:

- Date and time
- Weather
- Watercourse type
- Flow characteristics (direction, velocity, etc.)
- Physical characteristics (width, length, etc.)
- Substrate composition
- Instream cover
- Riparian habitat
- Bank stability and siltation presence
- Fish presence/habitat potential (Section 7.3.2)
- Photos, global positioning system (GPS) location, etc.

Information was collected and georeferenced using Survey123, an ESRI application for creating, sharing, and analyzing data. As a result of identified environmental constraints (such as watercourses), the Project's turbine layout underwent several iterations to minimize potential interactions and limit the number of required watercourse crossings. Information collected on watercourses was also used to guide further freshwater species assessments (i.e., fish and herpetofauna).

7.3.1.5 Field Assessment Results

A total of 26 watercourses were identified within the Assessment Area (Drawing 7.13A-G), including eight intermittent and 18 perennial features, comprised of both small permanent and large permanent features, ranging in a bankfull width of 0.25 m to 8.75 m. A summary of the watercourses identified and their characteristics is provided in Appendix D.

Permanent watercourses see flow for the vast 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).

Intermittent watercourses exhibit overland flow in intervals throughout the year. They typically have well-defined stream morphology, and often have subterranean flow when overland flow is absent (US EPA, 2013). These features are heavily influenced by seasonality, often displaying characteristics similar to permanent features during periods of heavy rain, or after significant snowmelt. During drier times of the year, flow velocity within these features may reduce to pools of standing water, or eventually dry stream beds (US EPA, 2013).

Many of the watercourses observed within the Assessment Area showed evidence of alteration resulting from anthropogenic development activities throughout the last century. For example, many watercourses have culverts or bridges to facilitate forestry activities and/or recreational use of the area.

7.3.1.6 Effects Assessment

The Project layout was designed so that the placement of infrastructure would avoid waterbodies and watercourses, to the greatest extent possible. The Project layout considered multiple options/configurations of infrastructure components such as roads, collector lines, a substation, and a laydown area. Further, the Project layout utilizes as many pre-existing roads as possible. The Project's detailed design phase may see additional refinements to the Project footprint and placement of infrastructure, which could further reduce interactions with field-identified watercourses within the Assessment Area.

Project-Watercourse Interactions

Project activities, primarily those that involve earth moving, vegetation removal, and road construction have the potential to impact watercourses (Table 7.19). These potential impacts could include habitat loss, changes to hydrology, and displacement of sediment. As there are no waterbodies located within the Assessment Area, this section focuses on Project-watercourse interactions.

Table 7.19: Potential Project-Watercourse/ Waterbody Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Watercourses			X	X	X	X	X		X	X			X		X

Assessment Boundaries

The LAA for watercourses is the Assessment Area. The RAA is the Study Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 also apply to watercourses. The VC-specific definition for magnitude is as follows:

- Negligible – no loss of aquatic habitat. No expectation for altered hydrology.
- Low – no loss of aquatic habitat, with minimal potential for altered hydrology.

- Moderate – loss of aquatic habitat. Altered hydrology expected but can be managed with routine measures.
- High – loss of aquatic habitat. Altered hydrology expected that would be challenging to manage with routine measures.

Direct Effects

Direct effects to watercourses such as habitat loss and altered hydrology are likely to be most prominent during the construction phase. Effect-specific active management, mitigation, and monitoring are required to eliminate, mitigate, or otherwise manage the magnitude of these direct effects.

Habitat Loss

Watercourse alterations required for the Project have the potential to impact aquatic 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.

Altered Hydrology

Several of the watercourses within the Assessment Area contain pre-existing crossings that have declined in efficiency since being installed, including culverts that have become rusted or misshapen. Therefore, some areas will see improved hydrology and fish passage with the upgraded crossings.

A summary of the watercourses identified within the Assessment Area and how they are expected to interact with Project infrastructure is provided in Table 7.20. It is currently expected that 10 watercourses may require alterations as part of Project construction. None of the alterations are expected to result in the diversion, redistribution, or realignment of the respective watercourse.

Table 7.20: Watercourse Alteration Summary

Watercourse	Existing Alteration Present?	Forecasted Alteration
WC1	None observed	Crossing to be assessed and a culvert may be installed with road upgrade.
WC2	Yes, metal culvert installation for road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC3	None observed	None – watercourse expected to be avoided.
WC4	Yes, plastic culvert installation for road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC5	None observed	Crossing to be installed with road construction.

Watercourse	Existing Alteration Present?	Forecasted Alteration
WC6	Yes, metal culvert installation for road crossing.	Culvert to be assessed and potentially replaced during road upgrades.
WC7	None observed	Crossing to be installed with the access road to turbine pad construction.
WC8	None observed	None – watercourse expected to be avoided.
WC9	None observed	None – watercourse expected to be avoided.
WC10	None observed	Crossing to be installed with the access road to turbine pad construction.
WC11 (Lamey Brook)	None observed	Crossing to be installed with the access road to turbine construction.
WC12	None observed	Crossing to be installed with road construction.
WC13	None observed	None – watercourse expected to be spanned by collector line.
WC14	Unknown	Crossing to be assessed and a culvert may be installed with road upgrade.
WC15	Yes, metal culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC16	Yes, metal culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC17	Yes, metal culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC18	Yes, metal culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC19	Yes, metal culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC20	Yes, plastic culvert installation for road crossing.	None – watercourse expected to be spanned by collector line.
WC21	Yes, metal culvert installation and open-bottom bridge for road crossings.	Culvert to be assessed and potentially replaced during road upgrades; bridge to be replaced during road upgrades.
WC22	None observed	None – watercourse expected to be spanned by collector line.
WC23 (MacMaster Brook)	None observed	None – watercourse expected to be spanned by collector line.
WC24 (Lamey Brook)	None observed	None – watercourse expected to be spanned by collector line.
WC25	None observed	None – watercourse expected to be spanned by collector line.
WC26	None observed	None – watercourse expected to be spanned by collector line.

Road and Turbine Pad Construction

If determined to be required, six of the potential alterations will be upgrades to existing watercourse crossings during road construction. Four of these alterations would stem from upgrading existing infrastructure (culverts and a bridge) to accommodate road widening or to meet current engineering standards and NSECC flow/sizing requirements. The remaining two alterations are at existing road crossings that presently do not have culverts. Project engineers will make final culvert upgrade/installation determinations during the detailed design phase.

The construction of new roads and turbine pad access roads will require the installation of five new watercourse crossings. Each of these crossings will be designed to avoid any permanent diversion, restriction, or blockage of natural flow, such that the hydrologic function of the watercourse is maintained. Specific details of each crossing will be finalized during the detailed design phase and will be included in any necessary applications for alteration or notifications to NSECC.

Collector Line and Transmission Line

Of the identified watercourses within the Assessment Area, 12 are either partially or fully within the proposed collector line or transmission line route. None of these crossings are anticipated to impact the respective watercourses, as the lines will span the watercourse. Further, any activity related to the installation of poles or structures to string or pull the collector or transmission lines will be confined to the area above the ordinary high-water mark and will ensure a sufficient vegetative buffer is preserved along the riparian zone.

Indirect Effects

Indirect effects such as erosion and sedimentation or changes in water quantity and quality can be farther reaching, extending outside of the LAA and into the greater RAA. These effects are often foreseeable, and research based, standardized BMPs can be implemented to mitigate the resulting outcomes, and the magnitude at which they are felt.

Erosion and Sedimentation

The mobilization of sediment within aquatic environments can cause shifts in ecological integrity, including changes to the 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.

Changes in Surface Water Quantity

Changes to the amount of flow can alter channel morphology, increase flood potential, and disrupt habitat characteristics that support vulnerable species (MTO, 2009). These impacts could result from the alteration of bank or channel grades for road development, the compaction of soil from the heavy machinery required for turbine assembly, or the alteration of channel beds to facilitate the removal and replacement of preexisting infrastructure (e.g., rusted culverts).

Changes in Surface Water Quality

Changes in the quality of surface water 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 upon water quality can quickly spread throughout different reaches of the respective watershed.

Mitigation

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

As required, all work completed under the provincial watercourse alteration notification process will be done in accordance with the Nova Scotia Watercourse Alterations Standards (NSECC, 2015c) and the Guidelines for Fish Passage in Nova Scotia (DFO, 2015) and will be executed by a certified Watercourse Alteration Installer/Sizer. For work requiring an approval, specific and detailed mitigation will be developed and submitted to NSECC as part of the application process.

Additional mitigation measures have been supplied below with respect to:

Habitat Loss

- Educate Project personnel on the sensitivity of aquatic habitat.
- Mark watercourses clearly and avoid impacts to the watercourse and adjacent riparian habitat to the extent possible.
- Revegetate along the watercourse edge and above the ordinary high-water mark to stabilize the area.
- Redesign existing watercourse crossings to facilitate habitat upgrades, including unblocking culverts and making waterways more conducive to fish passage.
- Conduct work 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 revegetation period (NSECC, 2015a).

Altered Hydrology

- Plan any activities to align with low-flow periods.
- 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.

Erosion and Sedimentation

- Develop a site-specific erosion and sedimentation 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 revegetation.

- Limit the area of exposed soil and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover).
- Limit the slope and gradient of disturbed areas to minimize the velocity of surface water runoff.

Changes in Surface Water Quantity

- Integrate water management systems including diversion and collection ditches, roadside drainage channels, vegetated swales, and stormwater retention ponds.
- Fit any watercourse crossings with appropriately sized infrastructure, as prescribed by a certified Watercourse Alteration Installer/Sizer.

Changes in Surface Water Quality

- Leave riparian vegetation as intact as Project developments will allow.
- Integrate outlet protection features to dissipate flow velocities and decrease erosion at the outflow.
- Confirm 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, 2015a).
- Utilize 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, 2015a).
- Utilize rock material that is clean, coarse granular, non-ore-bearing, non-watercourse-derived, and non-toxic to aquatic life (NSECC, 2015a).

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 Alterations Standards (NSECC, 2015c). Monitoring requirements for crossings requiring an approval will be determined on a crossing-specific basis during the detail design phase and submitted to NSECC as part of the watercourse alteration application 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. An example is included in Table 7.21.

Table 7.21: General Watercourse Monitoring Parameters and Methods of Assessment

Monitoring Parameter	Tasks	Method of Assessment	
		General Monitoring	Detailed Monitoring
Erosion and Sedimentation	Examine stability of watercourse banks both upstream and downstream of the crossing. Examine grade of slope at the crossing, taking note of any erosive	Yes	Yes

Monitoring Parameter	Tasks	Method of Assessment	
		General Monitoring	Detailed Monitoring
	channeling in substrate that would indicate the slope may be too steep.		
	Inspect sediment control measures for effectiveness and look for evidence of sedimentation within the watercourse.	Yes	No
Water Quantity	Examine flow velocity, taking note of any undercutting or abrasive channeling, leftover construction debris, or obstruction to flow resulting from alteration activities.	No	Yes
	Preserve ability for fish passage by maintaining flow and adequate water levels.	No	Yes
	Examine water management systems (e.g., drainage channels) for effectiveness, taking note of any blockages, washouts, or unfavorable conditions.	Yes	No
Water Quality	Record basic water quality parameters and infer whether alteration activities have drastically disrupted natural conditions.	Yes	Yes
	Note the physical characteristics of watercourse, including colour, odour, cloudiness, or presence of algae.	Yes	Yes
Habitat Loss	Conduct stream assessments equivalent to those completed prior to alteration. Examine substrate, taking note of any obvious sediment mobilization, residual slash, or a build-up of fines/muck.	Yes	Yes
	Examine crossing for visual observance of fish, and/or any obvious signs of deteriorated fish habitat (e.g., desiccation of riparian vegetation, channel infill, etc.) or diversified fish habitat (e.g., pools, woody debris, etc.).	Yes	No

Conclusion
Following mitigations, residual effects to watercourses are expected to be of moderate magnitude such that there will be a loss of aquatic habitat. Altered hydrology is expected to be managed with routine measures. Timing and seasonality of effects is expected to be applicable, with a potential for the effects to be exacerbated by high precipitation events in the spring and fall. Effects will be restricted to the LAA, be a short-term single event, and reversible. Therefore, effects to watercourses will not be significant.

7.3.2 Fish and Fish Habitat

7.3.2.1 Overview
The objective of the fish and fish habitat assessment was to inform the Project's design and collect the information necessary for the assessment of fish species and associated habitat within the Study Area. This was accomplished using the following approach:

- Identify potential fish habitat (waterbodies, watercourses, and wetlands) within the Study Area using desktop resources.
- Use the information collected to inform the Project design (e.g., avoid/minimize impacts to watercourses and water bodies).
- Assess the quality of fish habitat within the Study Area via field surveys.
- Inventory and assess abundance and diversity of fish within the watersheds of the Study Area.
- Use the information collected to inform mitigation and management practices and further refine the Project Area.

7.3.2.2 Regulatory Context

Federally, DFO is responsible for the protection of fish and fish habitat in accordance with the *Fisheries Act.* The *Fisheries Act* defines fish as "(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;", and fish habitat as "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* 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) of the *Fisheries Act* restricts any work, undertaking or activity that results in the harmful alteration, disruption or destruction of fish or fish habitat. Under Section 35(2) of the *Act,* 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. The *Fisheries Act* provides additional protection to fish and fish habitat through means such as permitting, licensing, regulations, habitat restoration, marine refuge, and fish stocks.

Provincially, the potential for alterations/activities to impact fish and fish habitat is considered through the watercourse and/or wetland alteration application process, as appropriate.

7.3.2.3 Desktop Review

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

- Completed watercourse assessments (Section 7.3.1)
- Completed wetland assessments (Section 7.3.3)
- NS 10K Topographic Database – Hydrographic Network (Open Data NS, 2022)
- Wet Area Mapping (WAM) (NSNRR, 2021e)
- Aquatic Species at Risk Map (DFO, 2024)
- NS Significant Species and Habitats Database (NSNRR, 2023)
- ACCDC Data Report (ACCDC, 2024)

Surface water mapping and associated information conducted for waterbodies, watercourses, and wetlands is found in Sections 7.3.1 and 7.3.3, respectively.

The Aquatic Species at Risk Map (DFO, 2024) is a federal database showing the distribution of SAR and their associated critical habitat within Canadian waters. A review of this database determined that there are no water features within the Study Area that contain SAR.

The Nova Scotia Significant Species and Habitat Database (NSNRR, 2023) does not contain any unique species and/or habitat records pertaining to fish and fish habitat within a 100 km radius of the Study Area.

The ACCDC database identified 14 fish and aquatic invertebrate SOCI within a 100 km radius of the Study Area (Table 7.22).

Table 7.22: Fish and Aquatic Invertebrate SOCI within a 100 km Radius of the Study Area

Common Name	Scientific Name	COSEWIC Status[1]	*SARA* Status[1]	*ESA* Status[2]	NS S-Rank[3]
Fish					
Alewife / Gaspereau	*Alosa pseudoharengus*	---	---	---	S3B
American eel	*Anguilla rostrata*	Threatened	---	---	S3N
Atlantic salmon - Gaspe-Southern Gulf of St Lawrence pop.	*Salmo salar pop. 12*	Special Concern	---	---	S1
Atlantic salmon – Eastern Cape Breton pop.	*Salmo salar pop. 4*	Endangered	---	---	S1
Atlantic salmon- NS Southern Upland pop.	*Salmo salar pop. 6*	Endangered	---	---	S1
Atlantic sturgeon	*Acipenser oxyrinchus*	Threatened	---	---	S2S3N
Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Striped bass	*Morone saxatilis*	Endangered / Special Concern	---	---	S2S3B,S2S3N
Striped bass – Southern Gulf of St. Lawrence pop	*Morone saxatilis pop. 1*	Special Concern	---	---	S2S3N
Aquatic Invertebrates					
Brook floater	*Alasmidonta varicosa*	Special Concern	Special Concern	Threatened	S3
Eastern pearlshell	*Margaritifera margaritifera*	---	---	---	S2
Tidewater mucket	*Atlanticoncha ochraea*	---	---	---	S1
Triangle floater	*Alasmidonta undulata*	---	---	---	S2S3
Yellow lampmussel	*Lampsilis cariosa*	Special Concern	Special Concern	Threatened	S1

Source: (ACCDC, 2024) [1] (Government of Canada, 2022); [2] (Government of NS, 2022); [3] (ACCDC, 2024)

The ACCDC Data Report (ACCDC, 2024) also identified six observations of marine mammals within 100 km of the Study Area which are found in Appendix E. These species are not discussed further as the Study Area is contained inland and will not impact the marine environment.

Two ACCDC-documented observations of fish and aquatic invertebrates are within 5 km of the Study Area, including Brook trout (*Salvelinus fontinalis)* and Eastern pearlshell (*Margaritifera margaritifera*) (ACCDC, 2024).

7.3.2.4 Field Assessment Methodology

Fish presence and existing habitat were documented as part of the watercourse surveys (Section 7.3.1). For each watercourse, notes on the visual observance of fish were recorded along with any habitat characteristics that may influence fish presence such as pool/riffle sequences, barriers to fish passage, and substrate composition. This information, along with the results of the desktop review, was then used to select ideal watercourses for detailed fish habitat assessments and qualitative electrofishing. Locations selected also considered the position of the watercourse within the watershed and attempted to utilize notable, permanent features that offered a representation of the surficial hydrology across the entire Study Area.

Fish Habitat Assessment

The fish and fish habitat assessments were completed during the summer and autumn months of 2022. Assessments included: an analysis of in-situ water chemistry, a physical analysis of the watercourse including bank characteristics and substrate composition, and an assessment of fish habitat potential across various life stages (i.e., spawning, rearing, and overwintering). A description of assessment components is provided below.

Physical Makeup

- <u>Substrate Percent</u>
  Substrate composition was evaluated based on percent cover of bedrock, boulders, rubble, cobble, gravel, sand, silt, muck/detritus, and clay/mud. Habitat potential was assessed based on the presence/absence of suitable areas for various fish life stages, including spawning, rearing, and overwintering.

- <u>In-stream Habitat Types</u>
  In-stream habitat diversity was assessed by presence of pools, riffles, runs, flat sections, rapids, or cascades. A diverse selection of in-stream habitat can cater to a diverse assemblage of species.

- <u>In-stream Cover</u>
  Watercourses were assessed for physical characteristics that provide fish refuge, including boulders, overhanging and instream vegetation, woody debris, deep pools, and undercut banks. These parameters were ranked as being present in either trace, moderate, or abundant amounts.

- Bank Characteristics
  Bank conditions were evaluated for evidence of siltation, erosion, stability, and undercutting. Conditions were ranked as being present in either trace, moderate, or abundant amounts.

- Barriers to Fish Passage
  Watercourses were assessed for any potential barriers to fish passage. Barriers may include any physical structure or feature that hinders the ability of fish to navigate throughout the watercourse.

Water Chemistry

- Temperature
  As most fish are considered ectotherms, water temperature is a crucial factor in habitat suitability. While the ideal temperature range is mostly species-specific, extreme temperature changes can have adverse effects on critical processes including metabolism, energy levels, behaviour, and nutrient uptake (Volkoff & Rønnestad, 2020).

- Dissolved Oxygen
  DO fluctuates in response factors such as plant biomass, substrate, velocity, and temperature. Optimal DO concentrations should be >6.5-8 mg/L, with a subsequent saturation of around 80-120% (DataStream Initiative, 2021).

- Conductivity
  Conductivity is a measure of how easily water can conduct electricity, providing an indirect estimate of salinity. Conductivity is often categorized by the following hierarchy:
    - Low conductivity (0-0.2 mS/cm) is used as an indicator of pristine conditions.
    - Medium conductivity (0.2-1 mS/cm) is the typical range of most major rivers.
    - High conductivity (1-10 mS/cm) indicates saline conditions (Government of the Northwest Territories, 2013).

- *pH*
  pH is a measure of acidity based on a 0-14 scale. Waterbodies of low pH (high acidity) typically register below 6 or 6.5. Waterbodies of high pH (low acidity), typically register above 9. Aquatic species typically have an optimum pH range, and fluctuation from this range can result in reduced hatching rates, poor health, or mortality (US EPA, 2022).

Electrofishing Surveys

Electrofishing is a standard fish capture measure used to collect juvenile and adult fish in streams, rivers, and standing bodies of water (e.g., lakes). The process involves submerging an anode and cathode in the water and passing an electrical current through the water to attract and immobilize fish for capture.

Qualitative electrofishing surveys were conducted in summer 2022 and performed in aquatic features with the goal of evaluating fish species presence and relative abundance under DFO Scientific License #341208.

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 document provides a detailed list of standard equipment, safety, training, and emergency response procedure requirements for electrofishing. Each electrofishing crew consisted of two individuals, one of which (the crew lead) was a qualified person as defined under the DFO Interim Electrofishing 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 second crew member.

Fish were sampled using a Halltech Battery Backpack Electrofisher (HT-2000) with un-pulsed direct current (DC). A crew member walked alongside the electrofisher operator to net any stunned fish using a D-frame landing net (1/8" mesh). All captured fish were held in a live well containing ambient stream water, which was kept out of the sun and fish were checked regularly for any signs of stress. At the conclusion of each pass, fish in the live well were identified (species confirmation), weighed, and measured for length. After recuperating, all fish were released back into the watercourse.

Qualitative electrofishing surveys were performed using an "open" site methodology with no barrier nets. One pass with a backpack electrofisher was performed unless crew members noted a high number of fish that evaded capture. In that case, a second or third pass was performed to obtain greater species representation. In the Salmonid Field Protocols Handbook: Techniques for Assessing Status and Trends in Salmon and Trout Populations, Johnson et al. describe the use of single-pass electrofishing without barrier nets and provide a summary of academic reports supporting this method (2007). Though the technique does not support estimates of absolute abundance or population estimates, research has found that single-pass electrofishing works well to determine species richness (Simonson and Lyons 1995), and relative abundance (Kruse et al. 1998). Qualitative species abundance estimates were calculated using electrofishing Catch Per Unit Effort (CPUE) indices, standardized to 300 seconds of effort (Scruton and Gibson 1995).

Three watercourses were selected for qualitative electrofishing surveys in linear watercourses outside the Study Area. Two electrofishing reaches of 100 m were completed within each of the three watercourses:

- Rough Brook
- Chisholm Brook
- Lamey Brook

These three reaches were selected based on suitability of the habitat to conduct electrofishing surveys (i.e., deep enough to submerge the anode), fish habitat potential, and access considerations. All are third order streams that feed from first and second order watercourses within the Study Area. Fish caught within these watercourses are extrapolated upstream to the first order watercourses within the Study Area.

Table 7.23: Qualitative Electrofishing Locations and Details

Electrofishing Location	Stream Order	Survey Dates	Upstream Coordinates (UTM)		Downstream Coordinates (UTM)		Reach Length (m)	Effort (seconds)
			Easting	Northing	Easting	Northing		
Rough Brook Reach 1	3	August 3, 2022	629178	5067993	629250	5068061	100	1180.8
Rough Brook Reach 2	3		629055	5067983	629145	5067981	100	628.1
Chisholm Brook Reach 1	3	August 4, 2022	619473	5074536	619373	5074522	100	821.5
Chisholm Brook Reach 2	3		619586	5074569	619493	5074562	100	319.6
Lamey Brook Reach 1	3	August 5, 2022	627499	5064576	627583	5064524	100	637.5
Lamey Brook Reach 2	3		627439	5064584	627493	5064572	57*	284.6

*Reach 2 at Lamey Brook was cut short due to survival concerns of captured fish brought on by extreme heat on August 5th, 2022.

Trapping Surveys

Trapping was used to supplement fish collection efforts when electrofishing was not practical across the Study Area (e.g., in open water areas, unconsolidated substrate, temperatures exceeding 22℃, etc.). At each sampling location, biologists deployed either baited minnow traps or eel pots. Fyke nets were used at various locations. CPUE was determined for each trap type and fish species based on trapping effort, which was calculated as total catch or total catch per species per wetted hour.

Details of fish collection locations, survey dates, and traps deployed are provided in Table 7.24. Trap locations are shown in Drawing 7.14.

Table 7.24: Trapping Locations and Details

Trapping Location	Survey Dates	Coordinates (UTM)		Trap Type (#)[1]	Set Time (hours)
		Easting	Northing		
Briley's Lake	August 4, 2022	624142	5067711	MT (2)	24
		624208	5067814	MT (2)	24
		624200	5067883	MT (2)	24
		624213	5067919	MT (2)	24
		624246	5067999	MT (2)	24
		624220	5068022	MT (2)	24
		624166	5067772	EP (2)	24
		624234	5067957	EP (2)	24
		624147	5067692	FN (1)	24

Trapping Location	Survey Dates	Coordinates (UTM)		Trap Type (#)[1]	Set Time (hours)
		Easting	Northing		
Pond 1	August 5, 2022	625282	5067863	MT (2)	22
		625292	5067986	MT (2)	22
		625260	5068045	MT (2)	22
		625249	5068076	MT (2)	22
		625253	5068141	MT (2)	22
		625279	5069207	MT (2)	22
		625275	5068018	EP (2)	22
		625256	5068115	EP (2)	22
		625300	5067963	FN (1)	22

[1]Trap Types – Minnow Trap (MT), Eel Pot (EP) and Fyke Net (FN).

7.3.2.5 Field Assessment Results

Fish Habitat Assessment

Fish presence and existing habitat were documented as part of the watercourse surveys (Section 7.3.1). Notes on the visual observance of fish were recorded along with fish habitat characteristics such as pool/riffle sequences, substrate composition, and barriers to fish passage (e.g., elevated culverts). Detailed descriptions and characterization parameters for each watercourse are in Appendix D. Fish habitat assessments are summarized in Table 7.25

Table 7.25: Fish and Fish Habitat Assessment Results

Watercourse	Flow Type	Habitat Characteristics		
		Spawning (1)	Rearing (2)	Overwintering (3)
WC1	Perennial	Poor	Poor	Poor
WC2	Perennial	Poor	Poor	High
WC3	Perennial	Poor	Poor	Poor
WC4	Perennial	Poor	Poor	Poor
WC5	Intermittent	Moderate	Poor	Poor
WC6	Perennial	Moderate	Poor	Poor
WC7	Perennial	Poor	Poor	High
WC8	Intermittent	Poor	Poor	High
WC9	Intermittent	Poor	Poor	Poor
WC10	Perennial	Moderate	High	High
WC11 (Lamey Brook)	Perennial	Moderate	High	High
WC12	Perennial	Poor	Poor	Poor
WC13	Perennial	Poor	Poor	Poor

Watercourse	Flow Type	Habitat Characteristics		
		Spawning (1)	Rearing (2)	Overwintering (3)
WC14	Intermittent	Poor	Poor	Poor
WC15	Perennial	Poor	Poor	Poor
WC16	Intermittent	Poor	Poor	Poor
WC17	Perennial	Poor	Poor	Poor
WC18	Perennial	Poor	Poor	Poor
WC19	Intermittent	Poor	Poor	Poor
WC20	Intermittent	Poor	Poor	Poor
WC21	Intermittent to Perennial	Moderate	High	High
WC22	Intermittent	Poor	Poor	Poor
WC23 (MacMaster Brook)	Perennial	Moderate	High	High
WC24 (Lamey Brook)	Perennial	Poor	High	High
WC25	Perennial	Moderate	High	High
WC26	Perennial	Moderate	Poor	Poor
WC1	Perennial	Poor	Poor	Poor

(1) Spawning Habitat = gravel to cobble dominant substrates. Ranked poor, moderate, or high depending on the substrate composition and proportion of gravel/cobble.
(2) Rearing Habitat = riffle-pool sequences. Ranked high (if sequence present) or poor (sequence not present). No moderate rank.
(3) Overwintering Habitat = contains deep pools. Ranked high (if deep pools present) or poor (deep pools not present). No moderate rank.

Electrofishing Surveys

Qualitative electrofishing was conducted during summer 2022 along Rough Brook, Chisholm Brook, and Lamey Brook. (Drawing 7.14). Results are provided in Table 7.26.

Table 7.26: Electrofishing Survey Results

Watercourse	Count	Common Name	Scientific Name	COSEWIC[1]	*SARA*[1]	*ESA*[2]	S-Rank[3]
Rough Brook Reach 1	6	American eel	*Anguilla rostrata*	Threatened	---	---	S3N
	2	Atlantic salmon–Eastern Cape Breton population	*Salmo salar pop. 4*	Endangered	6	---	S1
	31	Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Rough Brook Reach 2	3	American eel	*Anguilla rostrata*	Threatened	---	---	S3N

Watercourse	Count	Common Name	Scientific Name	COSEWIC[1]	*SARA*[1]	*ESA*[2]	S-Rank[3]
	3	Atlantic salmon–Eastern Cape Breton population	*Salmo salar pop. 4*	Endangered	---	---	S1
	32	Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Chisholm Brook Reach 1	4	Atlantic salmon–Gaspe-Southern Gulf of St. Lawrence population	*Salmo salar pop. 12*	Special Concern	---	---	S1
	21	Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Chisholm Brook Reach 2	1	Atlantic salmon–Gaspe-Southern Gulf of St. Lawrence population	*Salmo salar pop. 12*	Special Concern	---	---	S1
	12	Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Lamey Brook Reach 1	2	American eel	*Anguilla rostrata*	Threatened	---	---	S3N
	10	Atlantic salmon–Eastern Cape Breton population	*Salmo salar pop. 4*	Endangered	---	---	S1
	16	Brook trout	*Salvelinus fontinalis*	---	---	---	S3
Lamey Brook Reach 2	5	Atlantic salmon – Eastern Cape Breton population	*Salmo salar pop. 4*	Endangered	---	---	S1
	8	Brook trout	*Salvelinus fontinalis*	---	---	---	S3

Source: [1] (Government of Canada, 2022); [2] (Government of NS, 2022); [3] (ACCDC, 2024)

Electrofishing surveys resulted in the capture of 156 individual fish representing three species: Atlantic salmon (*Salmo salar*), American eel (*Anguila rostrata*), and Brook trout. All three species were caught at each location except Chisholm Brook which had no American eel observed.

Trapping Surveys

Trapping was completed during summer 2022 within two waterbodies, Briley's Lake and Pond 1 (Drawing 7.14). Results are provided in Table 7.27.

Table 7.27: Trapping Survey Results

Watercourse	Count	Common Name	Scientific Name	COSEWIC[1]	*SARA*[1]	*ESA*[2]	S-Rank[3]
Briley's Lake	0	---	---	---	---	---	---
Pond 1	1	American eel	*Anguilla rostrata*	Threatened	---	---	S3N
	1	Brook trout	*Salvelinus fontinalis*	---	---	---	S3

Source: [1] (Government of Canada, 2022); [2] (Government of NS, 2022); [3] (ACCDC, 2024)

Two individual fish were captured as a result of trapping efforts, one American eel and one Brook trout, both were caught within the Pond 1. No fish were captured through trapping efforts in Briley's Lake.

Priority Species

Based on the results of the field and desktop assessments, the following fish species were identified as priority species.

American Eel (*Anguilla rostrata*)

Suitable habitat for eel is varied. As a catadromous species, eel spend the majority of their lives in freshwater, moving to the Sargasso Sea to spawn. Once hatched, American eel larvae drift back to the coast, undergoing several phases of metamorphosis. By the time they reach freshwater, young glass eel have developed pigment and are now referred to as elvers (Scott and Crossman, 1973). In freshwater, elvers develop into yellow eels – immature adults and at which point sexual differentiation occurs. As growth proceeds, the yellow eel metamorphoses into silver eel, or mature adults that are now physiologically prepared to return to the sea to spawn (COSEWIC, 2012a).

American eel are frequently found in watercourses that offer structural complexity and shade in the form of coarse woody debris, rocks, in-stream vegetation for daytime cover, and an available food source of forage fish, invertebrates, molluscs and vegetation. Migrating elvers are bottom dwellers and spend most of their time burrowed or hidden, including directly into soft bottom sediments (Tomie, 2011). In freshwater, yellow eel continue their migration upstream into rivers, streams, and muddy or silt bottomed lakes (Scott and Scott, 1998). Like elvers, yellow eel are primarily nocturnal, spending most of the day under cover or buried in soft substrates. These soft substrates are particularly important for overwintering, where the eel hibernate by burying themselves into the bottoms of lakes and rivers (Smith and Saunders, 1955; Scott and Scott, 1998). Trautman (1981) also reported that eel partially or completely bury themselves in mud, sand and gravel during the day, emerging at dusk to begin feeding.

American eel have been assessed as threatened by COSEWIC (2012a) and are considered provincially vulnerable by ACCDC (S3N). American eel are not currently protected under *SARA* or *ESA*. During the 2022 field program, 12 American eels were caught, nine in Rough Brook, two in Lamey Brook, and one in Pond 1. Only yellow (juvenile) eels were observed.

Atlantic Salmon (*Salmo salar*)

Within the freshwater environment, Atlantic salmon of both the Eastern Cape Breton population and Gaspe-Southern Gulf St. Lawrence population, are found in cool, clear, well-oxygenated waters that support a reliable food source of aquatic invertebrates. Gravel and cobble are the preferred substrates for spawning (Bowlby et al., 2013), with redd sites (depressions dug in the substrate by female salmon to deposit eggs) typically located in well aerated areas - a riffle above a pool, or at the tail of pools on the upstream edge of riffles with depths of 10-70 cm (Grant and Lee, 2004). Young of year will remain near the redd for a few months, after which they disperse downstream, occupying areas of faster velocities as they increase in size (Grant and Lee, 2004). Juveniles can be found occupying a variety of habitats. In summer and fall, they are typically found in moderate velocity runs with clean, rocky substrate free of sand, silt, and detritus (Rimmer et al., 1983). Older parr are usually found in riffles, whereas deeper pools are the preferred habitat during low water levels, high temperatures, and winter freeze (Grant and Lee, 2004).

The Eastern Cape Breton population of Atlantic salmon has been assessed as endangered by COSEWIC (2010) and is considered provincially critically imperiled by ACCDC (S1). This population is not currently protected under *SARA* or *ESA*. During the 2022 field program, this population of Atlantic salmon made up almost 17% of all fish caught, with 15 of the 21 Atlantic salmon caught within Lamey Brook, and six within Chisholm Brook. Parr was the only life stage of Eastern Cape Breton Atlantic salmon observed.

The Gaspe-Southern Gulf of St. Lawrence population of Atlantic salmon has been assessed as special concern by COSEWIC (2010) and is considered provincially critically imperiled by ACCDC (S1). This population is not currently protected under *SARA* or *ESA*. During the 2022 field program, five Gaspe-Southern Gulf of St. Lawrence Atlantic Salmon were caught within Chisholm Brook. Only parr were caught within the linear watercourses.

No Atlantic salmon of either population was observed or caught within Briley's Lake or Pond 1.

Brook Trout (*Salvelinus fontinalis*)

Brook trout are known to inhabit a wide range of cool, freshwater environments, from small headwater streams to large lakes. Water temperature is a critical factor influencing Brook trout distribution and production. Though typically not anadromous, Brook trout require free passage along streams to move between areas of use, including spawning grounds, overwintering areas, and summer rearing areas.
In Nova Scotia, mature Brook trout migrate to spawn in lakes or streams in the fall of the year. Brook trout spawning sites are usually near groundwater upwelling or spring seeps and within a lake or stream with gravel substrate (NSDAF, 2005). Optimal spawning conditions for Brook trout include clear substrate 3 to 8 mm in size in shallow water with limited fines (<5%), and velocities of 25-75 cm/s (Raleigh, 1982).

Young of the year Brook trout require cold water, stable, low velocities and an abundance of in-stream cover. Optimal temperature for juvenile growth is 10 to 16℃, while cover in the form rubble, vegetation, undercut banks, and woody debris should account for a minimum of 15% of total stream area (Raleigh, 1982). In winter, Brook trout aggregate in pools beneath silt-free rocky substrate and close to point sources of groundwater discharge (Raleigh, 1982; Cunjak and Power, 1986). Adults use both pools and riffles, with more than 25% in-stream cover being optimal (Raleigh, 1982). Brook trout respond negatively to flashy or hydrologically dynamic systems and require stable flow for all life stages (Raleigh, 1982).

Brook trout are considered provincially vulnerable by ACCDC (S3) but have not been assessed by COSEWIC, nor are they currently listed under *SARA* or *ESA*. During the 2022 field program, Brook trout made up over 75% of all fish caught. Between Rough Brook (n=63), Chisholm Brook (n=32), Lamey Brook (n=24), and the Pond 1 (n=1), 120 Brook trout were caught throughout all life stages, excluding young of year.

7.3.2.6 Effects Assessment

Project-Fish and Fish Habitat Interactions

Project activities, primarily those that involve watercourse crossing, earth moving, or vegetation removal, have the potential to impact fish and fish habitat (Table 7.28). These potential impacts could include habitat removal, disruptions to hydrology, and/or displacement of sediment.

Table 7.28: Potential Project-Fish and Fish Habitat Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Fish and Fish Habitat			X	X	X	X				X			X		X

Assessment Boundaries

The LAA for fish and fish habitat includes the Assessment Area. The RAA for fish and fish habitat includes the Study Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for fish and fish habitat. The VC-specific definition for magnitude is as follows:

- Negligible – no loss of fish habitat or impact to fish behaviour expected.
- Low – small loss of fish habitat or impact to fish behaviour.

- Moderate – moderate loss of fish habitat or impacts to fish behaviour, but these impacts will only be experienced by individuals rather than entire populations and can be managed with routine measures.
- High – high loss of fish habitat and impacts to fish behaviour that will be experienced by entire populations and cannot be managed with routine measures; the population's life history is permanently altered.

Direct Effects

Direct effects to fish and fish habitat, such as habitat loss, are likely to be most prominent during the construction phase. Effect-specific active management, mitigation, and monitoring are required to eliminate, mitigate, or otherwise manage the magnitude of these direct 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 required for the Project have the potential to impact fish and 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). Alterations to channel morphology and interference with sediment transport can also result in aquatic habitat degradation.

As detailed in Section 7.3.1, there is a potential for 10 watercourse alterations for the Project. These alterations are all associated with upgrades to existing roads and associated crossings. Should the structures require upgrading, each watercourse will be fitted with an adequately sized culvert or open bottomed structure and designed to meet the Nova Scotia Watercourse Alterations Standard and the Guidelines for Fish Passage in Nova Scotia.

Wetland alterations required to facilitate Project developments also have the potential to impact fish and fish habitat. Wetlands that are contiguous with a watercourse or offer areas of open water may provide areas of fish feeding, spawning, and/or rearing. The dense macrophytic vegetation that often comes with these wetland environments can offer refuge to fish including shelter from predators, a substrate to which eggs can be adhered, and a source of food.

Based on the wetland assessments, it is possible that 2 of the 36 wetlands within the Assessment Area (see Section 7.3.3.5) may offer some form of fish habitat. In these situations, habitat loss may be attributed to either partial or total infill, thus altering wetland functionality such as water cooling, sediment stabilization, or stream flow support. However, given the position of these wetlands it is anticipated that alterations can be avoided or limited to road crossing. Any potential effects to fish and fish habitat stemming from Project-wetland interactions are addressed below and will be further addressed through the watercourse notification or alteration permitting process.

Indirect Effects

The temporal and spatial extent of indirect effects such as erosion and sedimentation and changes in water quantity and quality can be farther reaching, but are often foreseeable, and research based, standardized BMPs can be implemented to mitigate the resulting outcomes.

Erosion and Sedimentation

The mobilization of sediment within aquatic environments can cause shifts in ecological integrity, including changes to the 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 crossing structures. The alteration or removal of riparian vegetation can also result in bank instability and erosion, further exasperating these effects (MTO, 2009).

Blasting

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 and Hopky, 1998). An overpressure in excess of 100 kPa can result in effects to 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 and 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 and Hopky, 1998).

Blasting is not anticipated to be required to support Project construction activities on roads or collector lines or laydown yards. If blasting for turbine foundations is required, explosive charge weights will be restricted based on setbacks to fish habitat to achieve the 100 kPa guideline criteria outlined in Wright and Hopky (1998).

Changes in Surface Water Quantity

Changes to the amount of flow can alter channel morphology, increase flood potential, and disrupt habitat characteristics that support vulnerable species (MTO, 2009). These impacts could result from the alteration of catchment area grades for road development, the compaction of soil from the heavy machinery required for turbine assembly, or the redirection of overland flow via roadway construction.

Changes in Surface Water Quality

Changes in the quality of surface water can arise from alterations to the surrounding environment and can include an increase in water temperature due to 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 upon water quality can quickly spread throughout different reaches of the respective watershed.

Mitigation

As required, all work completed under the provincial watercourse alteration notification process will be done in accordance with the Nova Scotia Watercourse Alterations Standards (2015c) and executed by a certified Watercourse Alteration Installer/Sizer. For work requiring an approval, specific and detailed mitigation will be developed and submitted to NSECC as part of the application process.

In addition, the following mitigative 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.
- Revegetate along the watercourse edge and above the ordinary high-water mark to stabilize the area.
- Conduct any work within the bed of a watercourse or along the banks of a watercourse between June 1 and September 30, where possible, to avoid sensitive periods in the life cycles of fish, to better control water flow, and to allow for a faster revegetation period (NSECC, 2015c).
- Complete a fish rescue, as required, during crossing construction.

Altered Hydrology

- Plan any activities within the bed of a watercourse or along the banks of a watercourse to align with low-flow periods, where possible.
- 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.

Erosion and Sedimentation

- Develop a site-specific erosion and sedimentation plan during the detailed design phase.
    - The plan will target the disturbance to banks and adjacent land, and 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).
- Limit the slope and gradient of disturbed areas to minimize the velocity of surface water runoff.
- Require that surface run-off containing suspended materials or other harmful substances is minimized.

Blasting

- Blasting, if required, will follow the guidelines presented in Wright and Hopky (1998).

Changes in Surface Water Quantity

- Integrate water management systems into the design, where appropriate, including diversion and collection ditches, roadside drainage channels, and vegetated swales.
- 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 or Engineer.

Changes in Surface Water Quality

- Leave riparian vegetation as intact as Project developments will allow.
- Integrate outlet protection features to dissipate flow velocities and decrease erosion at the outflow.
- If concrete is to be utilized, ensure it is pre-cast and cured for at least one week prior to use at a crossing site (NSECC, 2015c).
- Utilize 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, 2015c).
- Utilize rock material that is clean, coarse granular, non-ore-bearing, non-watercourse-derived, and non-toxic to aquatic life (NSECC, 2015c).
- Storage of any on-site machinery and potential pollutants in areas sited above the flood water limits.
- Areas for fuel storage, refueling, or lubrication of equipment should be located at least 30 m from any water body, watercourse or wetland.
- Washing and servicing of machinery and equipment should not be completed within 30 m of a waterbody or in an area where wash water will run into a water body, watercourse or wetland.
- Containment of all construction debris in areas where flood water will not come in contact with debris.

Monitoring

If bridge and/or culvert replacement is required and the replacement structure is 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 (2015c). Monitoring requirements for crossings requiring an approval will be determined on a crossing-specific basis during the detail design phase.

A watercourse monitoring plan, if required as part of the permitting phase, will consist of detailed monitoring and general spot checks. Detailed monitoring will include hydrological, sediment, and stability assessments upstream, downstream, and at the crossing of the watercourse. Spot checks will involve a general overview of vegetative, hydrological, and substrate conditions, focusing on evidence of significant hydrologic alterations, sedimentation, and degradation of fish habitat. An example is included in Table 7.29.

Table 7.29: General Watercourse Monitoring Parameters and Methods of Assessment

Monitoring Parameter	Tasks	Method of Assessment	
		General Monitoring	Detailed Monitoring
Erosion and Sedimentation	Examine stability of watercourse banks both upstream and downstream of the crossing. Examine grade of slope at the crossing, taking note of any erosive channeling in substrate that would indicate the slope may be too steep.	Yes	Yes
	Inspect sediment control measures for effectiveness and look for evidence of sedimentation within the watercourse.	Yes	No
Water Quantity	Examine flow velocity, taking note of any undercutting or abrasive channeling, leftover construction debris, or obstruction to flow resulting from alteration activities.	No	Yes
	Preserve ability for fish passage by maintaining flow and adequate water levels.	No	Yes
	Examine water management systems (e.g., drainage channels) for effectiveness, taking note of any blockages, washouts, or unfavorable conditions.	Yes	No
Water Quality	Record basic water quality parameters and infer whether alteration activities have drastically disrupted natural conditions.	Yes	Yes
	Note the physical characteristics of watercourse, including colour, odour, cloudiness, or presence of algae.	Yes	Yes
Habitat Loss	Conduct stream assessments equivalent to those completed prior to alteration. Examine substrate, taking note of any obvious sediment mobilization, residual slash, or a build-up of fines/muck.	Yes	Yes
	Examine crossing for visual observance of fish, and/or any obvious signs of deteriorated fish habitat (e.g., desiccation of riparian vegetation, channel infill, etc.) or diversified fish habitat (e.g., pools, woody debris, etc.).	Yes	No

Conclusion

The effects to fish and fish habitat are expected to be low, such that there may be a small loss of fish habitat or impact to fish behaviour that can be minimized through the implementation of effect-specific active management and mitigation measures. Timing and seasonality of effects is expected to be applicable, with a potential for the indirect effects to be exasperated by high precipitation events in the spring and fall. Indirect effects will be restricted to the LAA, occurring as a short-term, single event during the construction phase, and are reversible. Therefore, effects to fish and fish habitat are not significant.

7.3.3 Wetlands

7.3.3.1 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 using the following approach:

- Identify wetland habitat in the Study Area using desktop resources.
- Use the findings of the desktop study to design the Project (e.g., avoid/minimize impacts to wetlands) and inform planning and logistics for field studies.
- Ground-truth and delineate wetland habitat within the Assessment Area.
- Complete functional assessments for delineated wetlands identified within the Assessment Area.
- Identify the potential for, and confirm the presence of, Wetlands of Special Significance (WSS) within the Assessment Area.

7.3.3.2 Regulatory Context

The Nova Scotia Wetland Conservation Policy outlines a policy goal of no loss of WSS and no net loss in area and function for other wetlands (NSECC, 2019). 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 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 the *ESA*.
- Wetlands in designated protected water areas as described within Section 106 of the Nova Scotia *Environment Act,* SNS 1994-95, c. 1.

As per Section 5 of the Nova Scotia *Environment Act*, SNS 1994-95, c. 1 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 (NSECC, 2019).

7.3.3.3 Desktop Review

A desktop review for the location and extent of potential wetlands across the Study Area was completed using the following information sources:

- Wetlands Inventory (NSNRR, 2021f)
- Wetlands of Special Significance (WSS) Database (NSNRR, 2020c)
- NS Topographic Database – Water Features (GeoNOVA, 2022)
- Nova Scotia Wet Areas Mapping Database (NSNRR, 2021e)
- Nova Scotia Digital Elevation Model (DEM) (GeoNOVA, 2020)
- Provincial Landscape Viewer (NSNRR, 2017)
- Satellite and aerial imagery

The NSNRR Wetland Inventory (NSNRR, 2021) identified 26 wetlands within the Study Area, which are classified as either swamp (16), bog or fen (9), or fen (1). The wetlands range in size from 0.93 to 18.66 ha (Drawing 7.15).

According to the WSS database (NSNRR, 2020c), there are no WSS located within the Assessment Area or Study Area. The nearest NSNRR-mapped WSS is a freshwater marsh, located approximately 1.6 km south of the Assessment Area. The Project has been designed in a way that will see no Project interactions with this feature.

The NS Topographic Database – Water Features (GeoNOVA, 2022) was used in conjunction with the Nova Scotia WAM database and Nova Scotia DEM layer 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 (NSNRR, 2017). 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 rapidly to well drained.

The Provincial Landscape Viewer (NSNRR, 2017) was reviewed to confirm the presence of wetlands and WSS, as well as to identify areas of interest including significant habitat, special management practice zones, and protected areas. The results show that the Study Area contains watercourses and waterbodies identified as significant habitat for species at risk (discussed in Section 7.3.1).

Satellite and aerial imagery were used as a quality assurance/quality control tool when reviewing desktop resources.

The results of the desktop review assisted in scoping field studies and were ultimately used to conduct a constraints analysis thus refining turbine/road siting locations to avoid or minimize interactions with known wetlands and significant areas.

7.3.3.4 Field Assessment Methodology

General

Wetland field assessments were completed across the Assessment Area in 2022 for an older version of the layout and 2024. This included high-level assessments for hydrology, complimented by in-depth wetland delineations and functional assessments. Wetland surveys were done in conjunction with watercourse assessment surveys. Field assessments aimed to minimize wetland alteration by establishing areas to be avoided during Project scoping for turbine siting and road placement. This approach resulted in several layout modifications as the Project Area was optimized to minimize interactions with wetlands. Although extensive wetland field assessments were completed throughout the entire Study Area, only wetlands within the current Assessment Area are discussed in this report.

To accompany wetland field surveys, a list of SAR and SOCI known to occur within the general area of the Project was compiled to help with incidental identification. Throughout the wetland surveys all incidental observations of SAR and SOCI were noted; details of these observations are captured within the EA under their respective reporting sections, as applicable to the species observed.

Field Delineations

Field crews surveyed the Assessment Area, delineating and characterizing each wetland identified. 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). If the identified wetland extended outside of the Assessment Area, the extent of its boundary was estimated using aerial imagery and other desktop resources.

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) (Reed, 1988) (Table 7.30). These indicators are used as this region most closely resembles the flora and climate regime of Nova Scotia. Further relevant information was reviewed in Flora of Nova Scotia (Zinck, 1998).

Table 7.30: Classification of Wetland-Associated Plant Species

Plant Species Classification	Abbreviation[2]	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

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

If the majority (greater than 50%) of the dominant vegetation at a data point is classified as obligate (OBL), facultative wetland (FACW), or facultative (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, 2010). 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 maximum 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.

Identification 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 (Table 7.31). Wetland habitat is assessed for signs of hydrology via visual observations across the area and through the assessment of soil pits.

Table 7.31: 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

Examples of Primary Indicators	Examples of Secondary Indicators
Water-stained Leaves	Drainage Patterns
Sparsely Vegetated Concave Surfaces	Surface Soil Cracks
Hydrogen Sulfide Odor	Moss Trim Lines

Source: (Environmental Laboratory, 1987)

Functional Assessments

Wetland functional assessments were completed for all wetlands identified within the Assessment Area. Functional assessments were completed using the Wetland Ecosystem Services Protocol – Atlantic Canada (WESP-AC) evaluation technique. 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), if any. The process serves as a rapid method for assessing individual wetland functions and values. WESP-AC addresses 17 specific functions that wetlands may provide (Table 7.32).

The specific wetland functions are individually allocated into grouped wetland functions and measured for “functional” and “benefit” scores. Wetland function relates the wetland’s natural ability (i.e., water storage), whereas wetland benefits are benefits of these functions, whether it is ecological, social, or economic. The highest functioning wetlands are those that have both high ‘function’ and ‘benefit’ scores for a given function. WESP-AC enables a comparison to be made between individual wetlands within a province to gain a sense of the importance each has in providing ecosystem services.

Table 7.32: WESP-AC Function Parameters

Grouped Wetland Function	Specific Wetland Functions
Hydrologic Function	Surface Water Storage
Aquatic Support	Aquatic Invertebrate Habitat
	Stream Flow Support
	Organic Nutrient Export
	Water Cooling
Water Quality	Sediment Retention & Stabilization
	Phosphorus Retention
	Nitrate Removal & Retention
	Carbon Sequestration
Aquatic Habitat	Anadromous Fish Habitat
	Resident Fish Habitat
	Waterbird Feeding Habitat
	Waterbird Nesting Habitat
	Amphibian and Turtle Habitat
Terrestrial Habitat	Songbird, Raptor, & Mammal Habitat
	Pollinator Habitat
	Native Plant Habitat

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:

- Wetland Condition
- Wetland Risk (i.e., sensitivity to potential impacts)

The following individual functions are assessed to determine the benefit scores associated with each wetland:

- Public Use & Recognition
- Wetland Sensitivity
- Wetland Ecological Condition
- Wetland Stressors

For each wetland evaluated, the WESP-AC process calculates the overall score for the seven grouped wetland functions and the 17 specific wetland functions listed in Table 7.33. 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.

The WESP-AC functional evaluation technique recognizes that, in many cases, delineation of entire wetlands where they extend beyond a Study Area is not always feasible (e.g., property ownership) or required to complete an appropriate assessment using this tool (NBDELG, 2018). Instead, WESP-AC permits the delimitation of an assessed area, defined as the wetland or portion of wetland physically assessed in the field, while the Office Form considers the broader landscape characteristics and functions that extend beyond the assessed area and/or Study Area.

7.3.3.5 Field Assessment Results

General

Field surveys completed during summer 2022 and 2024 identified 36 wetlands either partially or fully within the Assessment Area (Drawings 7.13A-G). For coherence, wetlands were given a numerical ID based on the order of their occurrence from north to south. Detailed results are found in Appendix F.

Of the 36 identified wetlands, the most prominent wetland type was swamp (26). The Canadian Wetland Classification System (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, 10 were classified as treed swamps. Treed swamps are characterized by the presence of trees as the dominant vegetation [>7.5 cm Diameter at Breast Height (DBH)] and an environment that is not as waterlogged as other wetland types, such as shrub swamps or marshes, and typically experience their highest hydroperiod during spring and fall precipitation events (Province of NS, 2018). As a result, treed swamps provide deciduous trees [e.g., red maple (*Acer rubrum*) and yellow birch (*Betula alleghaniensis*)] 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 (Province of NS, 2018). Of the treed swamps observed by field staff, typical species composition consisted of cinnamon fern (*Osmundastrum cinnamomeum*), New York fern (*Amauropelta noveboracensis),* mountain holly (*Amauropelta noveboracensis*), black spruce, and red maple. Surface water was not always observed, though saturation was ubiquitously present as identified through the excavation of small soil pits.

Six wetlands identified within the Assessment Area were shrub swamps. Shrub swamps are dominated by shrubs and smaller woody plants (<7.5cm DBH, >1m 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. The typical species composition of shrub swamps identified within the Assessment Area included soft rush (*Juncus effusus*), common woolly bulrush (*Scirpus cyperinus*), alder (*Alnus spp.*), black spruce, and red maple. Surface water was more prevalent than within treed swamps, though the temporal extent of the surficial hydroperiod seemed to be seasonal.

In many cases, shrub swamps eventually transition into treed swamps via succession (Province of NS, 2018). This process may result in wetland complexes comprised of areas of treed swamp and shrub swamp within one contiguous wetland. Within the Assessment Area, 10 such wetland complexes were identified.

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 grass-like sedges (Province of NS, 2018). Species composition observed included tawny cottongrass (*Eriophorum virginicum*), northern pitcher plant (*Sarracenia purpurea*), bog aster (*Oclemena nemoralis*), sheep laurel (*Kalmi angustifolia),* and black spruce. Trees were stunted and there were many snags. Additionally, two wetland complexes containing a bog component were identified, including one shrub swam/bog complex and one treed swamp/bog complex.

Three fens were identified within the Assessment Area. Fens typically exhibit more open water areas than bogs, often with a connection to a small watercourse or abutting a lakeshore. They may also receive hydrology from neighbouring uplands. Ultimately, this inundation of water from outside sources facilitates a transfer of nutrients that allow fens to support a wider variety of flora and fauna than bogs (Province of NS, 2018). Of the fens observed by field staff, typical species assemblages included Canada manna grass (*Glyceria canadensis*), sweet gale (*Myrica gale*), leather leaf (*Chamaedaphne calyculata*), and red maple. One wetland complex containing a fen and treed swamp component was also identified.

Functional Assessments

Functional assessments were completed in 2022 and 2024 by Strum wetland specialists for each of the 37 wetlands located within the Assessment Area. Detailed WESP-AC results are found in Appendix F, and a summary is provided in Table 7.33.

None of the field-delineated wetlands met the criteria for WSS, as dictated by the Functional WSS Interpretation Results within the WESP-AC spreadsheet calculator. The results of the wetland field assessments were also cross-referenced with breeding bird, vegetation, and lichen survey results, specifically for SAR with habitat requirements tied to wetlands. Despite the outcomes from the Functional WSS Interpretation tool, three wetlands were later determined to be potential WSS based on the confirmed presence of flora and bird SAR (discussed further below).

Table 7.33: Summary of WESP-AC Assessments Using Version 2.0 for Wetlands within the Assessment Area

Wetland ID	Wetland Type(s)	WSS[1] (Yes/No)	Benefit Ratings for Grouped Functions				
			Hydrologic	Water Quality Support	Aquatic Support	Aquatic Habitat	Transition Habitat
WL1	Shrub swamp; Treed swamp	No	Higher	Lower	Lower	Lower	Lower
WL2	Shrub swamp; Treed swamp	No	Higher	Lower	Lower	Lower	Lower
WL3	Treed swamp	No	Higher	Lower	Lower	Lower	Moderate
WL4	Bog	No	Higher	Moderate	Moderate	Moderate	Lower
WL5	Fen	No	Higher	Moderate	Higher	Moderate	Lower
WL6	Shrub swamp; Treed swamp	No	Higher	Lower	Lower	Lower	Lower
WL7	Shrub swamp; Treed swamp	No	Higher	Moderate	Moderate	Moderate	Lower
WL8	Treed swamp	No	Moderate	Lower	Lower	Higher	Moderate
WL9	Bog	No	Moderate	Lower	Lower	Moderate	Moderate
WL10	Treed swamp	No	Higher	Lower	Lower	Lower	Lower
WL11	Shrub Swamp	No	Moderate	Lower	Higher	Higher	Lower
WL12	Treed Swamp; Shrub Swamp	No	Moderate	Lower	Lower	Lower	Lower
WL13	Treed swamp; Bog	No	Higher	Moderate	Lower	Lower	Lower
WL14	Treed Swamp; Shrub Swamp	No	Moderate	Lower	Lower	Lower	Lower

Wetland ID	Wetland Type(s)	WSS[1] (Yes/No)	Benefit Ratings for Grouped Functions				
			Hydrologic	Water Quality Support	Aquatic Support	Aquatic Habitat	Transition Habitat
WL15	Treed Swamp; Shrub Swamp	No	Moderate	Lower	Lower	Moderate	Lower
WL16	Treed swamp; Shrub swamp	No	Moderate	Moderate	Moderate	Moderate	Lower
WL17	Shrub swamp; Bog	No	Moderate	Moderate	Moderate	Moderate	Lower
WL18	Treed swamp	No	Higher	Higher	Moderate	Moderate	Lower
WL19	Treed swamp	No	Higher	Lower	Lower	Lower	Lower
WL20	Shrub Swamp	No	Higher	Moderate	Lower	Lower	Lower
WL21	Shrub Swamp	No	Higher	Lower	Lower	Moderate	Moderate
WL22	Treed Swamp; Fen	No	Higher	Higher	Higher	Higher	Moderate
WL23	Fen	No	Higher	Moderate	Moderate	Higher	Lower
WL24	Shrub swamp	No	Moderate	Lower	Higher	Higher	Lower
WL25	Treed swamp	No	Lower	Higher	Higher	Moderate	Lower
WL26	Shrub swamp	No	Moderate	Lower	Moderate	Moderate	Lower
WL27	Bog	No	Moderate	Lower	Moderate	Moderate	Lower
WL28	Bog	No	Moderate	Lower	Lower	Lower	Lower
WL29	Treed swamp	No	Moderate	Higher	Moderate	Moderate	Lower
WL30	Fen	No	Moderate	Lower	Higher	Moderate	Lower
WL31	Treed swamp	No	Higher	Moderate	Lower	Lower	Moderate
WL32	Treed Swamp	No	Moderate	Lower	Lower	Moderate	Higher
WL33	Treed swamp	No	Lower	Moderate	Moderate	Moderate	Lower
WL34	Shrub swamp	No	Moderate	Lower	Lower	Lower	Lower
WL35	Treed swamp; Shrub swamp	No	Moderate	Lower	Moderate	Higher	Moderate
WL36	Treed swamp; Shrub swamp	No	Lower	Lower	Lower	Lower	Lower

[1] Wetlands of Special Significance determination as dictated by the Functional WSS Interpretation Results within the WESP-AC spreadsheet calculator

Hydrological 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 functions within this group tend to include those that do not have surface water outlets, and instead, are isolated from flowing surface water.

The majority of the wetlands (92%) had a moderate or higher benefit score, regardless of their function score. This indicates that the functionality of all wetlands assessed is generally similar to others on the landscape and none appear ecologically unique.

Water Quality Group

The water quality group is compiled from four different functions: sediment retention and stabilization; phosphorus retention; nitrate removal; carbon sequestration. 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 functions 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.

More than half (61%) of the wetlands have a benefit score in the lower ranking, likely due to the isolation from surrounding developed areas, and the small size of the wetlands compared to their catchment sizes, which limits the potential benefits of the water purification function within this group.

Aquatic Support Group

The aquatic support group comprises four individual functions: stream flow support; aquatic invertebrate habitat; organic nutrient export; and water cooling. 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. Just over half (52%) of the wetlands scored lower in benefit score, due to isolation and small wetland size.

Aquatic Habitat Group

The aquatic habitat group is compiled from five different functions: anadromous fish habitat, resident fish habitat, amphibian and turtle 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 majority of wetlands (61%) were ranked moderate or higher in benefit scores. Two wetlands ranked higher in both function and benefit score. These wetlands were both associated with watercourse systems and open water features. The wetlands that ranked lower may not contain key features to support habitat for fish, herpetofauna, or waterbirds.

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.

Due to the relatively remote Study Area location, most of the wetlands provide relatively remote, undisturbed and unfragmented habitat, resulting in a higher average function rank for the transitional habitat group. In general, wetlands within the Study Area provide habitat that supports a variety of flora and fauna, including downed wood, prevalent ground cover, varied microtopography, tree and shrub cover in and around the wetlands, and naturally vegetated buffer zones. The wetlands have a variety of woody heights and diverse forms, allowing for nesting habitat, perches, and feeding grounds. All but one of the wetlands scored lower to moderate for the benefit score, again likely due to the remoteness of the Study Area, indicating that these wetlands perform at equal or lower rates to others in the area.

Wetland Condition

Wetland condition refers to the integrity or health of a wetland as defined by its vegetative composition and richness of native species. Scores are derived from the similarity between the wetland being evaluated and reference wetlands of the same type and landscape setting (Adamus, 2021). Refer to Table 7.34 for a summary of wetland condition benefit scores.

Table 7.34: Summary of Wetland Condition Benefit Scores

Benefit		
Lower	**Moderate**	**Higher**
n = 9 (25%)	n = 9 (25%)	n = 18 (50%)

Note: The numbers presented in this table indicate the total number of wetlands, not the wetland IDs
Only wetland benefits, not functions are scored in this group.

Wetland condition within the Assessment Area included lower, moderate, and higher scores; the highest percentage of wetlands (50%) scored higher in wetland condition. Wetlands scoring moderate to higher carry a relatively good range of vegetative community health and natural functions. Higher scoring wetlands may have greater ecological integrity, microhabitats, species diversity, etc., while lower scoring wetlands may have lost their function and integrity due to historical natural or anthropogenic impacts.

Wetland Risk

Wetland risk takes sensitivity and stressors into account by averaging the two. Sensitivity is the lack of intrinsic resistance and resilience of the wetland to human or naturally caused stress (Niemi et al., 1990). Stress relates to the degree to which the wetland is or has recently been anthropogenically altered in a way that degrades natural condition and/or function.

The functional assessment tool uses five metrics to measure sensitivity: abiotic resistance, biotic resistance, site fertility, availability of colonizers, and growth rate. The model applies four stress groups: hydrologic stress, water quality stress, fragmentation stress, and general disturbance stress. Wetlands that are highly resilient may have lower risk scores despite their exposure to multiple stressors. Additionally, wetlands exposed to fewer threats, but with low resilience may have higher risk scores. Wetland resilience is tied to multiple factors, such as size, proximity to natural land cover, and presence of invasive species.

Most of the wetlands in the Assessment Area scored moderate (13.9% of wetlands) or higher (83.3% of wetlands) for wetland risk (Table 7.35), meaning they have a reasonable resilience and are not highly susceptible to change. Only one wetland scored Lower, indicating a greater risk and susceptibility to anthropological impacts.

Table 7.35: Summary of Wetland Risk Benefit Scores

Benefit		
Lower	**Moderate**	**Higher**
n = 1 (2.8%)	n = 5 (13.9%)	n = 30 (83.3%)

Note: The numbers presented in this table indicate the total number of wetlands, not the wetland IDs
Only wetland benefits, not functions are scored in this group.

Wetlands of Special Significance

Three of the field delineated wetlands were determined to be potential WSS based on the confirmed presence of flora SAR (lichens) and/or bird SAR. Wetlands IDs have been provided to NSECC, as SAR observation locations are omitted from this EA to protect the sensitivity of these species and their habitats. Final WSS designations will be made by NSECC upon review of this data.

Data was collected via targeted lichen and breeding bird surveys, supplemented by additional observations recorded during other surveys. Flora and bird SAR are discussed further in Section 7.4.2 and 7.4.5 (respectively). Canada warbler (*Cardellina canadensis)* was observed in all three potential WSS during breeding season, each of which contained preferred Canada warbler breeding/nesting habitat. Frosted glass-whiskers lichen (*Sclerophora peronella*) was also observed in one of the wetlands. One WSS is located in a proposed turbine pad, one is located along a pre-existing road, and one is located along the proposed collector line corridor. Impacts to these wetlands are not anticipated as they can be avoided during detailed design.

7.3.3.6 Effects Assessment

Project-Wetlands Interactions

Project activities, primarily those that involve earth moving or vegetation removal, have the potential to impact wetlands through habitat removal, disruptions to hydrology, and/or displacement of sediment (Table 7.36).

Table 7.36: Potential Project-Wetland Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Wetlands				X	X	X			X	X			X		X

Assessment Boundaries

The LAA for wetlands is the Assessment Area. The RAA for wetlands is the Study Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for wetlands. The VC-specific definition for magnitude is 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 wetland's watershed and/or the impacted wetland areas are not part of a WSS.
- High – direct loss of wetland habitat and impact to wetland functions; and wetland area loss will affect the hydrology of the wetland's watershed and/or the impacted wetland areas are part of a WSS.

Direct Effects

Direct effects on wetland habitat and functionality such as habitat loss and changes to hydrology can occur throughout the life of the Project but are likely to be most prominent during construction. Effect-specific active management, mitigation, and monitoring are required to eliminate, mitigate, or otherwise manage the magnitude of these direct effects.

Habitat Loss

Habitat loss can 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. Further, the removal or infilling of wetland habitat can impact the hydroperiod of neighbouring wet areas, resulting in farther reaching impacts on habitat quality (Mitsch & Gosselink, 2001).

Hydrological Effects

The hydrology of a wetland is one of the most important aspects of its overall structure and function. Project infrastructure within or near a wetland can result in changes in the timing and quantity of flow, potentially impacting species composition, water treatment capabilities, and nutrient export (Mitsch & Gosselink, 2001). Further, disruption to the hydrology of one area may hinder the hydrological connectivity to other areas, thus resulting in impacts being felt in neighbouring wet areas.

A GIS suitability analysis was conducted to design a Project Area that would optimize the placement of Project infrastructure to avoid and minimize loss of wetland area and function, to the greatest extent possible. The analysis was based on a conservative road disturbance width of 25 m and a conservative turbine pad area of 120 m x 120 m. A summary of the wetlands identified within the Assessment Area and how they may be affected by the Project is provided in Table 7.37.

Table 7.37: Habitat Alteration for Wetlands within the Assessment Area

ID	Wetland Type	Delineated Area Within Assessment Area (m^2)	Area Of Potential Alteration (m^2)[1]	Activity
WL1	Shrub swamp; Treed swamp	3,828.02	0	No impact
WL2	Shrub swamp; Treed swamp	975.31	11.51	Road construction
WL3	Treed swamp	20,820.28	0	No impact
WL4	Bog	1,027.77	0	No impact
WL5	Fen	724.48	390.96	Road construction
WL6	Shrub swamp; Treed swamp	582.02	436.57	Road construction
WL7	Shrub swamp; Treed swamp	8,146.75	460.56	Road construction
WL8	Treed swamp	389.03	220.81	Road upgrade
WL9	Bog	6.71	0	No impact
WL10	Treed swamp	280.76	0	No impact
WL11	Shrub Swamp	3,122.68	893.38	Road upgrade
WL12	Treed Swamp; Shrub Swamp	2,526.67	1,236.86	Road construction
WL13	Treed swamp; Bog	30,611.97	0	No impact
WL14	Treed Swamp; Shrub Swamp	907.16	459.03	Road construction

ID	Wetland Type	Delineated Area Within Assessment Area (m^2)	Area Of Potential Alteration (m^2)[1]	Activity
WL15	Treed Swamp; Shrub Swamp	1,426.89	717.60	Road construction
WL16a	Treed swamp; Shrub swamp	52,142.00	1,892.00	Road and turbine pad construction
WL16b	Treed swamp; Shrub swamp	3,843.00	2,372.00	Road and turbine pad construction
WL17	Shrub swamp; Bog	2,916.06	0	No impact
WL18	Treed swamp	482.36	315.46	Road construction
WL20	Shrub Swamp	1,919.38	1,292.39	Road construction
WL21	Shrub Swamp	127.98	27.51	Road construction
WL22	Treed Swamp; Fen	2,742.19	1,522.63	Road construction
WL23	Fen	6,643.81	0	No impact
WL24	Shrub swamp	284.27	0	No impact
WL25	Treed swamp	1,484.52	0	No impact
WL26	Shrub swamp	61.51	0	No impact
WL27	Bog	160.56	0	No impact
WL28	Bog	989.00	0	No impact
WL29	Treed swamp	947.96	0	No impact
WL30	Fen	5,573.38	0	No impact
WL31	Treed swamp	167.61	0	No impact
WL32	Treed Swamp	1,578.13	0	No impact
WL33	Treed swamp	2,124.76	0	No impact
WL34	Shrub swamp	289.97	0	No impact
WL35	Treed swamp; Shrub swamp	1,758.38	0	No impact
WL36	Treed swamp; Shrub swamp	1,101.50	0	No impact

[1] The area of potential alteration was calculated via GIS by assuming a conservative road disturbance width of 25 m and turbine pad area of 120 m x 120 m. As the detailed design is completed, the actual area of alteration required to upgrade or construct a new road will be used to determine the precise area of alteration, which will be smaller than the estimates presented here.

Despite there being 36 wetlands identified within the Assessment Area, the Project layout was modified such that only 14 wetlands, or fewer, are expected to require alteration for the Project. Significant effort was made to maximize use of existing disturbed areas, with only approximately 4.75 km of new road being constructed, and approximately 5 km of previously existing road being utilized. The potential wetland alterations would arise from road upgrades, if determined to be required during the detailed design phase, as well as road and turbine pad construction. The total conservative area of potential impact to wetland habitat is approximately 1.22 ha.

In areas where wetland alteration is unavoidable, the detailed design phase will refine the layout to have wetland crossings along wetland edges or narrow portions of the wetland to further minimize the impacts to wetland habitat and function. 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 crossing will be finalized during the detailed design phase and will be included in the application for alteration.

Provincial wetland data supplied by NSNRR was used to estimate the total amount of wetland habitat within the 4,005 ha RAA. An estimated 124 ha of wetland habitat was identified, which equates to approximately 3% of the RAA. As such, field delineated wetland habitat that may be directly impacted by the Project comprises approximately 0.020% of the total area within the RAA, approximately 0.64% of the potential wetland habitat within the RAA, and approximately 0.24% of the total area within the 327 ha LAA.

Indirect Effects

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.

Erosion and Sedimentation

Erosion and sedimentation can occur throughout the lifecycle of the Project, including during construction efforts, routine road maintenance, and daily traffic. 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).

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, 2003). Smaller particulate can result in clogged pores, hindering vital biochemical processes including photosynthesis, respiration, and transpiration; and larger particulate can result in lacerations in plant tissues, thus jeopardizing the health of the plant (Farmer, 2003).

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, 2005). 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, 2005).

Mitigation Measures

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

Habitat Loss

- Flag wetlands to avoid interference with wetland habitat to the extent possible.
- Avoid impacts to wetlands to the extent possible.
    - Where unavoidable, complete wetland alterations in accordance with the NS Wetland Conservation Policy and the wetland alteration process during the permitting stage, which includes a requirement to compensate for lost wetland habitat and functions.
    - Design wetland crossings to occur at the narrow part of the wetland or the wetland's edges, to the extent possible.

Hydrology

- 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 sedimentation plan during the detail 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 extent feasible.
- Avoid travel through wetlands. If travel through wetlands is required:
    - Use anti-rutting mitigation (e.g., mud mats), as appropriate.
    - Cross the wetland at the narrowest portion, where possible.
    - Time work to occur during frozen ground conditions, where possible.
- Avoid surface run-off containing suspended materials or other harmful substances.
- 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.
- Enforce 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, where possible.
- Prior to arrival on site equipment will be cleaned and inspected to prevent the introduction of invasive/non-native species.

Compaction

- Delineate and flag wetlands to avoid unnecessary compaction within wetlands.
- Train staff on the requirements for work in and around wetlands.
- Avoid travel through wetlands. If travel through wetlands is required:
    - Use anti-rutting mitigation (e.g., mud mats), as appropriate.
    - Cross the wetland at the narrowest portion, where possible.
    - Time work to occur during frozen ground conditions, where possible.

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 consist of detailed monitoring and general spot checks. Detailed monitoring will include vegetative, hydrological, and soil assessments within the wetland habitat adjacent to the infill site. Spot checks will involve a general overview of vegetative, hydrological, and soil conditions, focusing on evidence of significant hydrologic alterations and sedimentation (Table 7.38).

Table 7.38: General Wetland Monitoring Parameters and Methods of Assessment

Monitoring Parameter	Tasks	Method of Assessment	
		General Monitoring	Detailed Monitoring
Hydrology	A shallow monitoring well will be installed within the remaining wetland habitat of the partially infilled wetland.	No	Yes
	Standing water depth measurements will be noted within the existing wetland (if applicable).	No	Yes
	Evidence of positive indicators of hydrology (e.g., drainage patterns, water-stained leaves, saturated surfaces, raised tree roots, development of a hydrogen sulphide odour in soils, water marks etc.) will be noted.	Yes	Yes
	An assessment of the general hydrologic condition and hydrologic connectivity will be made, including evidence of drier/wetter conditions, impeded water drainage, and upland flooding.	Yes	Yes

Monitoring Parameter	Tasks	Method of Assessment	
		General Monitoring	Detailed Monitoring
Vegetation	Vegetation assessments will be completed within plots along a vegetative transect throughout the remaining wetland habitat of the partially infilled wetlands. An assessment of the potential changes in composition, species, health, and presence/absence of invasive plants will be evaluated. Photographs will be taken of individual vegetation plots for comparison with future monitoring events.	No	Yes
	General assessment of the above variables throughout existing wetland habitat will be completed.	Yes	Yes
	Photographs will be taken of the existing wetland habitat from a fixed location for comparison with future monitoring events.	Yes	Yes
Soils	Assessment of surface soils within the remaining wetland habitat will be completed via hand digging of test pits. An assessment of potential shifts in soil characteristics will be evaluated.	Yes	Yes
	Assessment of potential changes in soil conditions throughout the remaining wetland habitat will be evaluated, including evidence of sedimentation and siltation.	Yes	Yes

Conclusion

Following mitigation, residual effects to wetland habitat and functionality are expected to be of low magnitude. Timing and seasonality of effects is expected to be applicable, with a potential for the effects to be exacerbated by high precipitation events in the spring and fall. Effects will be restricted to the LAA, occurring as a short-term, single event during the construction phase, and are reversible. Therefore, effects to wetlands are considered not significant.

7.4 Terrestrial Environment

7.4.1 Terrestrial Habitat

7.4.1.1 Overview

The terrestrial habitat assessment focused on the identification of sensitive and important habitats through a combination of desktop review and field surveys, with the goal of designing the Project to avoid sensitive and important habitats. Wetland habitats are addressed in Section 7.3.3, and habitat assessment related to specific fish, fauna, bats, and bird species are addressed in Sections 7.3.2, and 7.4.3 to 7.4.5.

Historic and existing land use within the Study Area includes extensive forestry operations. The Study Area is predominantly provincial Crown land that is managed for forestry and therefore few other land uses are present. Forestry activities have established a relatively expansive and well-established road network that allows for access to most of the Study Area, and the Assessment Area within.

To assess the terrestrial habitat within the Study Area, a desktop review was conducted prior to field surveys to identify different habitats and key areas of interest. The findings informed the design of field surveys with the goal of assessing all habitat types, including habitats in both their natural state and habitat that have been subject to anthropogenic disturbance. Results of the desktop and field studies informed the siting of wind turbines, laydown areas, spur roads, and other infrastructure components. This was an iterative process, with the layout being refined through ground truthing of Project component footprint impacts against sensitive and important habitats confirmed to be present through field studies. The results were also used to develop targeted mitigation and BMPs.

7.4.1.2 Regulatory Context

Applicable laws and regulations relevant to terrestrial habitat are within the *Environment Act*, SNS 1994-95, c 1 as well as the Old-Growth Forest Policy for Nova Scotia (NSNRR, 2022a) and the Nova Scotia Silvicultural Guide for the Ecological Matrix (SGEM) (McGrath et al., 2021).

The *Environment Act*, SNS 1994-95, c 1 supports and promotes the protection, enhancement, and use of the provincial environment while maintaining ecosystem integrity and sustainable development. The Old-Growth Forest Policy and SGEM regulate forestry practices on Crown land in Nova Scotia and inform best practices for management of forested areas on private lands. These policies provide requirements and/or guidance on how best to maintain ecological integrity and allow for the determination of whether old-growth forests exist. These requirements include no net loss of old-growth forests on Crown land, and guidance for avoiding development within 100 m of a confirmed old-growth stand.

For species designated as rare or at risk, individual species and/or their dwellings are provided protection federally, under *SARA*, and provincially, under the *ESA* and *Biodiversity Act*, SNS 2021, c 3.

7.4.1.3 Desktop Review

To assess the terrestrial habitat, a desktop review was undertaken prior to any field activities using the following resources:

- Ecological Land Classification for Nova Scotia (Neily et al., 2017)
- Provincial Landscape Viewer (NSNRR, 2017)
- Nova Scotia Forest Inventory (Province of NS, 2021)
- Significant Species and Habitat Database (NSNRR, 2023)
- Old-Growth Forest Policy Layer (Province of NS, 2024b)
- Nova Scotia Parks and Protected Areas Map (NSECC, 2022a)

The Study Area falls within the Nova Scotia Uplands Ecoregion (300), which covers 19.8% of the province and includes formations of plateaus reaching 300 m, separated by lowlands and usually joined by steep slopes (Drawing 7.1) (Neily et al., 2017). The Assessment Area lies within the Cape Breton Hills (310) Ecodistrict, which is distributed throughout Cape Breton Island and features hardwood covered hills between 150 and 350 masl. The climate of this ecodistrict is dominated by strong winds from the Gulf of St. Lawrence, causing a late and short growing season. Geology varies by slope, with higher, steeply sloped hills comprised of erosion resistant rock, and lower, gradually sloping hills comprised of coarse sandstone, shale, and conglomerate. The lower slopes hold medium to rich soils with fresh moisture conditions that support shade-tolerant, mid- to late-successional, hardwood, Acadian forest stands. Higher elevations support black spruce and balsam fir, especially where drainage is imperfect (Neily et al., 2017).

The Nova Scotia Forest Inventory was reviewed to identify the forest/non-forest (FORNON) groupings within the Study Area (Table 7.39; Drawing 7.16). The Nova Scotia Forest Inventory indicates that the majority of the Study Area is composed of untreated (i.e., not treated silviculturally) natural forest stands (53% cover), while a large proportion of the area is classified as plantation (37% cover), where the tree population was established by artificial planting (Province of NS, 2021). The remainder of the Study Area has either been treated recently and is not mature forest, is naturally non-forested or has low canopy cover, or is part of wetlands.

Table 7.39: Habitat Groupings (according to FORNON code) within the Study Area and their Respective Percent Cover as Determined from the NSNRR Forest Inventory

Forest/Non-Forest Grouping	Area (ha)	Percent Cover (%)
Natural stand	2116.2	53%
Plantation	1475.6	37%
Clear cut	93.8	2%
Dead, 51-75% crown closure of live residual	87.4	2%
Treated	79.0	2%
Open bog[1]	52.7	1%
Treed bog[1]	38.4	1%
Beaver flowage[1]	22.3	1%
Wetlands general[1]	20.8	0.5%
Old field	8.2	0.2%
Alders <75% cover, commercial species <25% crown	5.3	0.1%
Partial depletion	2.9	0.1%
Gravel pit	1.5	0.0%
Powerline corridor	0.9	0.0%
Wetland in lake[1]	0.6	0.0%
Total Study Area	**4005.6**	

[1]Includes wetlands from provincial forestry layer (NSNRR, 2021) and does not include field delineated wetlands

According to 'cover-type' within the Nova Scotia Forest Inventory, forested areas are predominantly softwood, comprising approximately 55% of the total Study Area (Drawing 7.17). Mixedwood forests comprise approximately 22% of the Study Area, while hardwood forests make up the smallest component of forested area at approximately 17%. The forest inventory is based on aerial imagery from 2008, and more recent imagery from 2020 and 2022 shows that many of these previously natural forest stands have since been harvested, especially immediately south of the Assessment Area. Therefore, the percentage of land cover made up of natural, untreated forest stands is likely lower than expected from provincial forestry records.

A habitat model was developed to understand the vegetation communities that may be present within the Study Area. The model was built using the Nova Scotia Forest Inventory (Province of NS, 2021), the provincial Canopy Height Model, and the Depth to Water layer (NSNRR, 2021e). The process involved re-classifying the forestry layer based on the "FORNON" code category, re-classifying polygons based on average tree height, and coarsely dividing the area into wet and upland areas based on the predicted depth to ground water. The layers were then combined and categorized into polygons of the following habitat types:

- Agriculture
- Cutover
- Cutover Wetlands
- Hardwood Forests
- Hardwood Wet Forests
- Mixed-wood Forests
- Mixed-wood Wet Forests
- Open Wetlands
- Softwood Forests
- Softwood Wet Forests
- Urban/Developed
- Waterbodies

The results of the habitat model indicate that the Assessment Area is primarily comprised of hardwood, softwood and mixedwood forests (Drawing 7.22; Table 7.40).

Table 7.40: Habitat Modelling Results for the Assessment Area

Forest/Non-Forest Grouping	Area (ha)	Percent Cover (%)
Cutover	0.66	0.40
Hardwood forest	51.63	30.91
Hardwood wet forest	1.55	0.93
Mixedwood forest	27.68	16.57
Mixedwood wet forest	2.84	1.70
Open areas	20.47	12.25
Open wetland	5.38	3.22
Softwood forest	50.44	30.20

Forest/Non-Forest Grouping	Area (ha)	Percent Cover (%)
Softwood wet forest	6.27	3.76
Urban/developed	0.12	0.07
Total Assessment Area	**167.05**	

The Old-Growth Policy layer and an Old-Growth Potential Index layer provided by NSNRR through a data sharing agreement were also reviewed (Province of NS, 2024b). There is one confirmed old-growth forest stand within the Study Area; however, the stand is more than 200 m from the Assessment Area (Drawing 7.18). The Old-Growth Potential Index identified several stands ranking nine or higher within the Study Area and within 100 m of the Assessment Area. Twelve stands ranked 9 or higher were identified for field assessment where old-growth scoring was conducted (see Section 7.4.1.5).

The Nova Scotia Significant Species and Habitat Database (NSNRR, 2023) contains 27 unique habitat records pertaining to significant areas within a 100 km radius of the Study Area. These records include:

- 9 records classified as 'Other Habitat' which relate to caves (4), a cove (1), islands (3), and a ledge (1).
- 1 record classified as 'Species at Risk' which relates to dunes.
- 17 records classified as 'Species of Concern' which relate to caves (16) and one Ecological Monitoring and Assessment Network site.

None of these features are located within the Study Area. The closest feature is Diogenes Cave found 10.2 km from the Study Area, for which four records pertain.

The Nova Scotia Parks and Protected Areas Map (NSECC, 2022a) was screened to identify any protected areas in/near the Study Area (Drawing 7.19), which include:

- River Inhabitants Nature Reserve (Designated)
- River Inhabitants Nature Reserve Addition (Pending Designation)

The River Inhabitants Nature Reserve is approximately 1 km from the Study Area, across Highway 105, will not interact with the Project, and therefore is not further assessed.

7.4.1.4 Field Assessment Methodology

Terrestrial habitats investigated through field studies included those associated with watercourses, wetlands, mature/old-growth forests, caves/mine shafts, and habitat types known to support rare plants, lichens, and important lifecycle functions/stages for moose, birds, and bats. Terrestrial communities found within the Study Area were classified according to the Forest Ecosystem Classification (FEC) for Nova Scotia (Neily et al., 2023) during 2024 field studies.

Targeted old-growth surveys were conducted at 12 forest stands with a Potential Old-Growth Rank of ≥9 within the Assessment Area. Field biologists with demonstrated experience in conducting old-growth forest assessments travelled to the pre-determined sample plot locations. At each plot, a rapid assessment for old-growth conditions was conducted. Where the rapid assessment was inconclusive or indicated potential for old-growth, Part 1 of the old-growth scoring procedure, as defined by NSNRR (2022d), was employed. At each plot, a tree core was retrieved and analyzed with a microscope to determine the average stand age.

7.4.1.5 Field Assessment Results

Anthropogenic disturbances to the Study Area include roads, past harvests, and silvicultural tending, which are spread throughout the Study Area. The forests of this area are comprised of a mosaic of softwood, mixed wood, and hardwood stands, in line with findings of the desktop review. Treed wetlands were generally softwood dominated. Natural, undisturbed forests are found adjacent to watercourses, wetlands, lakes, and in steep ravines where forestry equipment cannot operate.

An inventory of forest types within the Study Area was conducted in 2024 (Table 7.41) (Drawing 7.20A-E). Five upland forest groups were identified, comprised of 18 different vegetation types. Additionally, three wet forest groups were identified, comprised of five different vegetation types.

Table 7.41: Vegetation Types Identified within the Study Area

	Forest Group	Vegetation Type(s)
Upland Forest Groups	Intolerant Hardwood	IH6
	Mixedwood	MW3, MW4, MW5, MW7, MW9
	Spruce Hemlock	SH2
	Spruce Pine	SP6, SP7
	Tolerant Hardwood	TH1, TH1a, TH2, TH2a, TH3, TH5, TH8, TH8a, TH9
Wetland Forest Groups	Wet Coniferous	WC1, WC2
	Wet Deciduous	WD1
	Wet Mixed	WM1, WM5

Source: Forest Ecosystem Classification (Neily et al., 2023)

The extent of treated and cleared areas was found to be greater than aerial imagery and the Nova Scotia Forest Inventory database designations suggested. Historic and ongoing forestry operations in the Study Area have resulted in extensive modification to natural habitat conditions. Current habitat conditions include forests that have been subject to clearcutting, weeding and commercial thinning in softwood stands, plantation management including single-species re-seeding, and stands of naturally regenerating forests. Given the extent and intensity of forestry activities in the Study Area, there are few areas except for the above that have gone unmanaged through forestry interventions. Although seemingly untouched forests are present, the majority of the Study Area demonstrates evidence of recent or historical harvesting or other anthropogenic disturbances.

To comply with the Old Growth Forest Policy on Crown land, potential locations for old-growth forest were noted during field surveys. In stands with a high Potential Old Growth Rank, trees were cored to determine whether the stands qualified as old growth. The province defines old-growth forest as “an area 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” (NSNRR, 2022a). One stand (Mapstand ID S038-05613) was found to contain no vegetation types that were eligible to be considered old-growth and was therefore confirmed as not old-growth.

Six forest stands that overlap with the Assessment Area were identified as old-growth, on both private and Crown land (Table 7.42; Drawing 7.20A-E). Within these stands, canopies were predominantly tolerant hardwood, with a high abundance of yellow birch and red maple. One stand (Mapstand ID S038-05154) overlaps with the Assessment Area around turbines 1, 2, 5, and 6, and the connecting corridors between them. As all turbines will be located on private land, no clearing will occur within this forest stand on Crown land. Four stands (Mapstand IDs S038-05593, S038-05827, S038-06125, and S038-06161) overlap with the proposed transmission corridor. Of these, one stand (Mapstand ID S038-05593) overlaps with the Assessment Area on private property only, while the remaining three stands overlap with small sections of Crown land. The final stand (Mapstand ID S038-05423) occurs on Crown land where it overlaps the southern terminus of the proposed road layout; as there is a pre-existing road where this stand overlaps with the Assessment Area, no new disturbance is expected within this forest stand.

Table 7.42: Old-Growth Scoring Results

Stand ID	Stand Size (ha)	Potential Old Growth Rank	Plot #	Species Cored[1]	DBH[2] (cm)	Height (m)	Age (years)	Old Growth Reference Age (years)	Avg. Stand Age (years)	Old Growth Status
S038-05154	85.9	9	1	RM	22.8	12.8	73	140	159.9	Old Growth
			2	SM	29.6	12.0	154			
			3	SM	37.3	15.5	194			
			4	YB	31.3	16.0	113			
			5	YB	36.4	12.5	260			
			6	YB	35.4	14.3	173			
			7	YB	46.8	18.3	170			
			8	YB	31.2	12.5	198			
			9	YB	42.2	15.8	181			
			10	YB	35.7	15.5	83			
S038-05383	7.2	10	1	RM	45.4	14.0	122	115	83.6	Not Old Growth
			2	BS	28.5	16.0	48			
			3	RM	31.4	12.3	70			
			4	RM	27.9	14.3	94			
			5	RM	29.7	12..25	84			

Stand ID	Stand Size (ha)	Potential Old Growth Rank	Plot #	Species Cored[1]	DBH[2] (cm)	Height (m)	Age (years)	Old Growth Reference Age (years)	Avg. Stand Age (years)	Old Growth Status
S038-05402	28.7	9	1	YB	36.3	15.8	100	140	125.3	Not Old Growth
			2	YB	43.6	17.5	145			
			3	YB	43.8	16.5	126			
			4	YB	41.8	17.0	137			
			5	SM	33.9	13.3	134			
			6	BE	36.4	13.3	139			
			7	YB	36.5	14.0	124			
			8	BE	30.9	13.5	148			
			9	YB	36.9	15.3	125			
			10	YB	30.6	13.3	75			
S038-05423	31.2	9	1	RM	31.5	12.0	124	125	137.9	Old Growth
			2	YB	30.7	15.5	131			
			3	RM	31.8	13.0	136			
			4	YB	45.9	15.5	142			
			5	SM	36.8	16.8	142			
			6	RM	37.0	16.8	156			
			7	RM	36.6	19.5	138			
			8	YB	30.9	13.0	112			
			9	YB	38.2	18.8	136			
			10	EH	48.3	19.3	162			
S038-05430	23.2	9	1	RM	20.8	12.0	150	140	127.5	Not Old Growth
			2	SM	27.3	16.0	116			
			3	WA	30.9	15.8	101			
			4	YB	27.4	18.5	108			
			5	SM	27.8	14.3	125			
			6	BE	42.4	14.8	180			
			7	RM	34.5	21.0	137			
			8	YB	36.3	20.0	115			
			9	BE	28.9	11.3	137			
			10	BE	25.3	14.8	106			
S038-05593	43.4	9	1	YB	41.6	15.5	144	115	142.4	Old Growth
			2	EH	50.5	19.5	122			
			3	SM	45.9	18.8	125			
			4	SM	48.2	17.5	212			
			5	RM	24.3	14.3	104			

Stand ID	Stand Size (ha)	Potential Old Growth Rank	Plot #	Species Cored[1]	DBH[2] (cm)	Height (m)	Age (years)	Old Growth Reference Age (years)	Avg. Stand Age (years)	Old Growth Status
			6	BE	47.4	17.8	179			
			7	RM	41.2	17.0	138			
			8	YB	39.3	16.3	122			
			9	SM	36.7	11.3	147			
			10	SM	19.8	13.8	131			
S038-05607	4.2	9	1	RM	23.3	13.0	100	115	80.0	Not Old Growth
			2	BS	20.8	14.5	48			
			3	RM	23.3	13.8	92			
S038-05616	34.0	9	1	SM	27.7	14.5	94	140	96.4	Not Old Growth
			2	YB	26.1	12.5	116			
			3	WP	22.0	12.3	34			
			4	RM	26.5	11.8	90			
			5	RM	26.8	13.8	102			
			6	YB	41.3	18.3	128			
			7	EH	52.8	19.0	175			
			8	RM	33.4	14.0	96			
			9	RM	18.2	12.0	39			
			10	RM	24.7	14.0	90			
S038-05827	18.9	9	1	YB	39.5	18.5	141	140	140.0	Old Growth
			2	RM	42.2	19.3	159			
			3	SM	42.8	14.8	145			
			4	WS	26.3	13.8	143			
			5	SM	36.8	16.5	200			
			6	RM	30.0	13.5	157			
			7	WS	26.8	14.3	78			
			8	WA	39.6	18.8	97			
			9	RM	31.3	16.3	101			
S038-06125	6.3	10	1	BS	32.4	14.5	76	115	140.7	Old Growth
			2	WP	51.8	19.5	152			
			3	YB	31.5	10.0	194			
S038-06161	7.9	9	1	RM	31.8	18.0	127	125	133.3	Old Growth
			2	RM	40.4	16.5	105			
			3	SM	39.7	13.8	168			

[1] RM = red maple; SM = sugar maple; YB = yellow birch; BS = black spruce; BE = American beech; EH = eastern hemlock; WA = white ash; WP = white pine; WS = white spruce
[2] DBH = Diameter at Breast Height

7.4.1.6 Effects Assessment

Project-Terrestrial Habitat Interactions

Project activities, primarily those that involve earth moving or vegetation removal, have the potential to impact terrestrial habitat (Table 7.43). These activities could result in habitat removal or alteration.

Table 7.43: Potential Project-Terrestrial Habitat Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Terrestrial Habitat			X	X	X	X				X			X		X

Assessment Boundaries

The LAA for terrestrial habitat includes the Assessment Area, while the RAA includes the Study Area and all connected neighbouring habitat (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for terrestrial habitat. The VC-specific definition for magnitude is as follows:

- Low – small loss of terrestrial habitat, but overall habitat functions remain intact.
- Moderate – small to moderate loss of sensitive terrestrial habitat or loss of key habitat functions.
- High – high loss of sensitive terrestrial habitat or key habitat functions.

Effects

Habitat Loss and Fragmentation

The loss or conversion of undisturbed habitat to construct roads, transmission line corridors, and turbine pads can impact the terrestrial habitat. Terrestrial habitat that has been considered for potential to be impacted includes habitat that supports flora and fauna SAR/SOCI; old-growth forest; priority habitat features; areas of special concern for conservation or protection; and unfragmented, undisturbed areas.

No pending or designated conservation areas, wilderness areas, or otherwise protected areas are found within the Study Area. The NSNRR Significant Species and Habitat Database (2023) did not identify any known habitat for terrestrial SAR/SOCI. Old-growth stands on both private and Crown land were identified to overlap with portions of the Assessment Area. The Project design has been iteratively modified based on the findings of the old-growth assessments to minimize effects on terrestrial habitat. Where the Assessment Area overlaps with confirmed old-growth stands on Crown Land, further layout adjustments will be required as design progresses and will occur in consultation with NSNRR to minimize and mitigate impacts to old-growth forests.

Habitat loss and fragmentation will occur within unfragmented or undisturbed terrestrial habitat within the Assessment Area. Due to the widespread extent of forestry activities in the Study Area, the amount of entirely undisturbed habitat that will be affected within the Assessment Area is limited. To minimize habitat loss and fragmentation, pre-existing roads have been incorporated into the Project design to the greatest extent possible. The Assessment Area will consist of 4.75 km of new roads and utilize 5 km of pre-existing roads. Therefore, although there will be small losses to terrestrial habitat associated with the Project, habitat functionality will remain intact relative to pre-construction conditions. Additionally, the Project footprint represents a small proportion of the total Study Area, most of which will remain undisturbed by Project activities.

Habitat Creation

The terrestrial habitat within the Assessment Area will be modified. Although some existing roads will be used, 4.75 km of new roadway will need to be constructed, and existing roads may need to be widened and additional infrastructure added in the rights-of-way (ditches, transmission line). New gravel roads may become preferred nesting habitat for herpetofauna, and the new and widened roads may become basking habitat for snakes and wildlife corridors for terrestrial mammals, and the introduction of road salt may attract ungulates. New and widened road rights-of-way may become new habitat for nesting birds who prefer rocky or grassy surfaces to nest in. Roadside ditches and cleared rights-of-way will be revegetated through mitigation measures and naturally over time. This process may lead to the creation of different habitat types than were previously present, including wetlands and early successional forests. Although succession will be induced by anthropogenic factors, the natural process will, in time, persist, and this new habitat may be used by a variety of species. Mitigation measures will be designed to ensure the process can proceed as naturally as possible, and that any new habitat created has a low magnitude of effects on the terrestrial environment.

Mitigation Measures

To address effects to terrestrial habitat, the following mitigation measures will be implemented:

Habitat Loss

- Minimize the overall area to be cleared, fragmentation of habitats, and isolation of existing habitats by utilizing pre-existing roads.

- Minimize the Project footprint, especially within old-growth and other late-successional stands, by clearing only the area necessary for turbine erection and operation.
- Avoid tree clearing in old-growth forests on Crown land within the Assessment Area.
  - Consult with NSNRR when finalizing the Project design to avoid, where possible, impacts to old-growth forests, or minimize and mitigate impacts to old-growth forests.
- Restore cleared areas where possible to reduce permanent habitat loss, primarily through revegetation of road rights of way and other areas cleared temporarily for construction.

Habitat Creation

- Revegetate disturbed areas, exposed soils, and cleared areas using native seed mixes.
- Minimize use of road salt to minimize attraction of ungulates to roadsides during the winter.

Monitoring

No monitoring programs specific to terrestrial habitat are recommended.

Conclusion

Through the implementation of proposed mitigation strategies, residual effects to terrestrial habitat including habitat loss and creation, are expected to occur within the LAA and be low in magnitude. Although a small loss of terrestrial habitat will occur, overall habitat functions will remain intact relative to pre-construction functionality. Residual effects may occur as a single event and persist long-term until natural successional processes can occur. Furthermore, residual effects are expected to be reversible upon decommissioning of the Project and are not significant.

7.4.2 Terrestrial Flora

7.4.2.1 Overview

The terrestrial flora assessment included both desktop and field study components. The objectives of the terrestrial flora assessment included the following:

- Classify habitat that supports terrestrial flora SAR/SOCI in the Study Area using available desktop resources (see Section 7.3.2.2 for definition of SAR/SOCI species).
- Identify important and sensitive habitat features that support terrestrial flora SAR/SOCI on/near the Project.
- Design field program efforts to document the diversity of terrestrial flora within the Assessment Area, and to identify locations of terrestrial flora SAR/SOCI within the Assessment Area.
- Ground truth and collect information on terrestrial flora SAR/SOCI identified during desktop studies.

- Use the information collected through field studies to update the Project design to avoid or minimize interactions between Project infrastructure components and confirmed locations of terrestrial flora SAR/SOCI or the habitats that are known to support terrestrial flora SAR/SOCI.
- Apply mitigation, construction, and operational management practices to minimize effects to terrestrial flora (i.e., apply setbacks to lichen SAR/SOCI).

7.4.2.2 Regulatory Context

The following section describes terrestrial flora resources with the potential to occur in the Study Area, with a focus on vascular plant and lichen SAR/SOCI, that may be potentially impacted by Project activities. Plant and lichen SAR are listed under *SARA* and/or *ESA* and species listed as 'Endangered' or 'Threatened' receive protection which prohibits their disturbance and destruction. On Crown land, special management practices are required around occurrences of certain rare lichen, as prescribed in the At-Risk Lichens–Special Management Practices (NSNRR, 2018). Additional regulations discussed in Section 7.4.1 aim to protect important habitat features, such as old-growth forests or wetlands, that support many plant and lichen SAR/SOCI in Nova Scotia.

7.4.2.3 Desktop Review

The desktop review included a review of the following databases for terrestrial flora:

- ACCDC Data Report (2024)
- Boreal Felt Lichen Habitat Layer (NSNRR, 2012b)

Additional resources reviewed included the Significant Species and Habitat Database (NSNRR, 2023); Atlantic Coastal Plain Flora buffers (NSNRR, 2019a); vole ears (*Erioderma mollissimum*) and boreal felt lichen (*Erioderma pedicellatum*) databases (MTRI, 2019; NSNRR, 2012b); and *SARA* Critical Habitat layers. No data within these resources was applicable to the Study Area and therefore they are not discussed further (Drawing 7.21).

ACCDC records (2024a) identified 391 flora species within 100 km of the Study Area (Appendix E). Of the 391 species, 253 are vascular plants and 138 are non-vascular plants. The ACCDC records indicate 16 vascular and five non-vascular (lichen) SAR/SOCI have been found within 5 km of the Study Area (Table 7.44) (Drawing 7.21).

Only one plant species, spurred gentian (*Halenia deflexa*) has been found within the Study Area. This includes eight observations, all of which occurred along Lamey Brook, which crosses beneath the transmission line corridor. The crossing point has avoided all recorded locations of this species.

Table 7.44: ACCDC Plant and Lichen SAR/SOCI Identified within 5 km of the Study Area

Common Name	Scientific Name	COSEWIC[1]	*SARA*[1]	*ESA*[2]	NS S-Rank[3]
Plants (Vascular)					
American beech	*Fagus grandifolia*	---	---	---	S3S4
Blunt broom sedge	*Carex tribuloides*	---	---	---	S3
False mermaidweed	*Floerkea proserpinacoides*	---	---	---	S2S3
Fragrant green orchid	*Platanthera huronensis*	---	---	---	S1S2
Green spleenwort	*Asplenium viride*	---	---	---	S3
Hidden-scaled sedge	*Carex cryptolepis*	---	---	---	S3
Large purple fringed orchid	*Platanthera grandiflora*	---	---	---	S3
Pennsylvania smartweed	*Persicaria pensylvanica*	---	---	---	S3S4
Richardson's pondweed	*Potamogeton richardsonii*	---	---	---	S3
Southern twayblade	*Neottia bifolia*	---	---	---	S3
Spurred gentian	*Halenia deflexa*	---	---	---	S3
Sweet wood reed grass	*Cinna arundinacea*	---	---	---	S2
White elm	*Ulmus americana*	---	---	---	S3S4
Woodland strawberry	*Fragaria vesca ssp. americana*	---	---	---	S3S4
Yellow lady's-slipper	*Cypripedium parviflorum*	---	---	---	S3
Yellow ladies'-tresses	*Spiranthes ochroleuca*	---	---	---	S3S4
Lichens (Non-vascular)					
Blue felt lichen	*Pectenia plumbea*	Special Concern	Special Concern	Vulnerable	S3
Corrugated shingles lichen	*Fuscopannaria ahlneri*	---	---	---	S3
Fringe lichen	*Heterodermia neglecta*	---	---	---	S3S4
Shaggy fringed lichen	*Anaptychia palmulata*	---	---	---	S3S4
Tree pelt lichen	*Peltigera collina*	---	---	---	S3

Source: [1](Government of Canada, 2022); [2](Government of NS, 2023); [3](ACCDC 2024)

7.4.2.4 Field Assessment Methodology

Plant and lichen surveys were completed in conjunction across the Assessment Area by qualified biologists on June 27 and 28, and July 26, 2024. The habitat review and desktop model results were used to design a field assessment strategy that targeted habitats with a greater likelihood of supporting SAR and SOCI flora. Meandering transects were completed on foot within all major habitat types, including wetlands, upland forests, open areas, and forestry trails, to create a list of the vascular plant species and vegetation communities present within the Assessment Area. More time was spent surveying within habitat types more likely to support SAR/SOCI, including mature forests, wetlands, and flooded areas (Drawing 7.22). All vascular and non-vascular plant species were identified as they were encountered. Any vascular or non-vascular SAR/SOCI observed 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.

Incidental observations of flora SAR/SOCI were also recorded during other biophysical surveys within the Study Area.

7.4.2.5 Vascular Plant Field Assessment Results

A total of 92 vascular plant species were identified within the Assessment Area during field assessments (Appendix G). Of these species, two are SOCI: American beech (*Fagus grandifolia*) and spurred gentian (Table 7.45) (Drawing 7.13A-G). No vascular plant SAR were identified. One non-native plant was also encountered during field surveys (Table 7.46).

Table 7.45: Vascular Flora SOCI Encountered within the Assessment Area

Common Name	Scientific Name	COSEWIC Status[1]	*SARA* Status[1]	*ESA* Status[2]	NS S-Rank[3]	Habitat
American beech	*Fagus grandifolia*	---	---	---	S3S4	Understory of hardwood and mixedwood stands throughout the Assessment Area.
Spurred gentian	*Halenia deflexa*	---	---	---	S3	Well-shaded, moist forests; one instance found outside of the transmission corridor buffer.

Source: [1](Government of Canada, 2022); [2](Government of NS, 2022); [3](ACCDC, 2024)

Table 7.46: Non-Native Flora Encountered during Flora Surveys

Common Name	Scientific Name	Exotic Status[1]	NS S-Rank[2]
Common hawkweed	*Hieracium lachenalii*	Widespread	NA

Source: [1](NSECC, 2012); [2](ACCDC, 2024)

American beech was assigned an S-Rank of 'S3S4' in March 2022, indicating that it is uncommon in the province and/or widespread, common, and apparently secure in the province (ACCDC, 2024). Although historically a common tree species in Nova Scotia, the quality and mast production of American beech trees have been devastated by beech bark disease. While still present across the province, the ecological role that this tree has played in tolerant hardwood forest has changed in recent years, shifting from an overstory tree to an intermediate or understory species (NSNRR, 2021c).

Spurred gentian is found throughout all of Canada and the northern United States. This species has an S-Rank of S3 in Nova Scotia (ACCDC, 2024). Spurred gentian is found in moist environments, including swamps, and in coarse, calcareous soils (eFloras.org, n.d.). Within mainland Nova Scotia, the plant is noted as rare as it is only found in Kings and Guysborough Counties, while it is considered common in northern Cape Breton (Munroe et al., 2014).

7.4.2.6 Lichen Field Assessment Results

Field assessments identified six lichen SAR/SOCI within the Assessment Area (Table 7.47) (Drawing 7.13A-G), two of which are SAR: blue felt lichen (*Pectenia plumbea*) and frosted glass-whiskers lichen.

Table 7.47: Lichen SAR/SOCI Identified within the Assessment Area

Common Name	Scientific Name	COSEWIC Status[1]	*SARA* Status[1]	*ESA* Status[2]	NS S-Rank[3]	Habitat
Blue felt lichen	*Pectenia plumbea*	Special Concern	Special Concern	Vulnerable	S3	Mature hardwood and mixedwood forests, often in proximity to a watercourse.
Frosted glass-whiskers lichen (Atlantic pop.)	*Sclerophora peronella*	Special Concern	Special Concern	---	S3S4	Red maple, yellow birch, and sugar maple heartwood in tolerant hardwood forests.
Naked kidney lichen	*Nephroma bellum*	---	---	---	S3	One occurrence found on a red maple tree within a tolerant hardwood forest.
Roughened shingle lichen	*Fuscopannaria ahlneri*	---	---	---	S3	Found on red maple and yellow birch trees in tolerant hardwood forests.
Shaggy fringed lichen	*Anaptychia palmulata*	---	---	---	S3S4	Found on yellow birch, American beech, and red maple trees in mature red spruce, tolerant hardwood, and wet coniferous forests.
Tree pelt lichen	*Peltigera collina*	---	---	---	S3	Found on red maple and sugar maple trees in addition to an American beech snag, in tolerant hardwood forests.

Source: [1](Government of Canada, 2022); [2](Government of NS, 2023); [3](ACCDC, 2024)

Eight occurrences of blue felt lichen were observed within the Study Area. Blue felt lichen was designated as Nova Scotia's provincial lichen in 2022 (CBC News, 2022). Just under half of the North American population of this 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 At-Risk Lichens – Special Management Practices (NSNRR, 2018) outlines a 100 m buffer for blue felt lichen on Crown land. Two of these observations are within the Assessment Area on private land and will be avoided during detailed design. Three observations are on Crown land within 100 m of the Assessment Area; two adjacent to a pre-existing access road, and one adjacent to the transmission line. Three observations are on Crown lands more than 100 m from the Assessment Area.

Four observations of frosted glass-whiskers lichen were noted in a mature hardwood stand within the Assessment Area. The Atlantic population of frosted glass-whiskers is a COSEWIC and *SARA* listed species of “Special Concern” (COSEWIC, 2013). Specimens were identified on the heartwoods of not only red maple, but also sugar maple and yellow birch trees, and were verified under microscope. The At-Risk Lichens – Special Management Practices for frosted glass-whiskers lichen (NSNRR, 2018) outlines a 200 m buffer for the species on Crown land. All recorded observations of frosted glass-whiskers lichen occur on private land and the buffer does not apply. The project has been designed to avoid these observations and provide as large of a buffer as possible during detailed design.

There are no associated buffers for naked kidney lichen (*Nephroma bellum*), roughened shingle lichen (*Fuscopannaria ahlneri*), shaggy fringed lichen (*Anaptychia palmulata*) or tree pelt lichen (*Peltigera collina*). The Project has been designed to avoid these species.

7.4.2.7 Effects Assessment

Project-Terrestrial Flora Interactions

Project activities, primarily those that involve earth moving or vegetation removal, have the potential to impact terrestrial flora (Table 7.48). These activities could result in changes to, or loss of habitat used by SOCI, loss of plant or lichen SOCI, or introduction of non-native species that may become invasive in the environment.

Table 7.48: Potential Project-Flora Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Terrestrial Flora				X	X	X				X			X		X

Assessment Boundaries

The LAA for terrestrial flora includes the Assessment Area, while the RAA includes the Study Area and all connected neighbouring habitat (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for terrestrial habitat. The VC-specific definition for magnitude is as follows:

- Negligible – no loss of terrestrial flora SAR/SOCI individuals or alteration to habitat supporting terrestrial flora SAR/SOCI expected.
- Low – small loss of habitat supporting terrestrial flora SAR/SOCI, but no terrestrial flora SAR/SOCI individuals lost.
- Moderate – small loss of terrestrial flora SAR/SOCI individuals (and associated habitat), but their populations remain largely intact.
- High – high loss of the habitat that supports terrestrial flora SAR/SOCI and/or loss of an entire population of terrestrial flora SAR/SOCI.

Effects

Loss of SAR/SOCI

Six species of lichen SAR/SOCI were identified within the Assessment Area. The Project has undergone various layout changes, including several changes to the access roads and the transmission line to avoid lichen SAR/SOCI identified to the extent feasible. Occurrences of SAR/SOCI lichen within the Assessment Area will be considered during the detailed Project design phase, and no direct impacts to these species are expected.

Three observations of blue felt lichen occur within 100 m of the Assessment Area on Crown land. The associated protective buffer for two observations overlaps the Assessment Area at the location of a pre-existing access road. Any upgrades that may be required will occur on the far side of the road to maintain the existing buffer. One observation occurs within 100 m of the proposed transmission line route. If the 100 m buffer cannot be maintained during detailed design, the Proponent will consider post-construction monitoring to ensure that Project activities do not negatively impact the specimen. No other SAR lichen were found on Crown land with buffers overlapping the Assessment area.

Two species of vascular plant SOCI were identified within the Assessment Area. Spurred gentian was found within Lamey Brook within the Assessment Area along the proposed transmission line route. Impacts from all phases of the Project to the brook will be negligible, therefore the risk to this SOCI is negligible. American beech was found throughout the Assessment Area in relatively low abundances. However, this species often comprises large components of forest understories and may therefore be difficult to avoid completely. According to NS forestry records, stands intersecting the Assessment Area are comprised of no more than 10% American beech (NSNRR, 2021). Within 10 km of the Study Area, 153 of approximately 3500 stands have populations of American beech, including stands in which the species comprises up to 40% of the total tree population. Due to the relatively low population of American beech within the affected stands and the low proportion of stand loss due to the Project, the loss of SOCI will be low.

Habitat Loss

Rare plants often become rare because they require specialized habitats (BCECC, 2018; CPC, 2020). Road works to include new road (4.75 km) and widening existing roads (5 km) are required, causing habitat loss within those corridors. A targeted approach was used when conducting field assessments for terrestrial flora to survey habitat that may host rare flora. For example, blue felt lichen requires moist wooded areas with mature hardwood trees and the occurrences of blue felt lichen identified during flora surveys indicated the accuracy of this method. The Project design has attempted to avoid habitat that is known to support plant and lichen SAR/SOCI within the Study Area to the greatest extent feasible through iterative layout planning.

Given the widespread nature of similar stands within the ecodistrict (Section 7.4.1), the Project is not expected to significantly reduce overall habitat availability within the RAA. The compact nature of the Project and minimal requirements for new road in the context of the widespread nature of this ecosystem type mitigate the total loss of potential habitat for plant and lichen SAR and SOCI. The populations of these species should remain intact.

Air Quality

Air quality, including both air temperature and humidity, is critical in determining the habitability of a site for lichen. Road construction and logging associated with the Project's development may affect air quality by increasing the prevalence of edge effects (ECCC, 2022a). Edge effects include both higher susceptibility of trees to blowdown following the loss of neighbouring trees, and changes to microclimate due to greater sunlight, especially on the edges of clearings and roads that receive direct, angled sunlight (northeast to northwest particularly). Because habitat fragmentation is expected to be low, edge effects are unlikely to significantly alter air quality within the Study Area. Air pollution poses a risk to air quality, and therefore to susceptible lichen species. Levels of air pollution associated with wind project operations are unlikely to pose a long-term, chronic risk to lichens (ECCC, 2022a).

Invasive Species

Terrestrial flora, particularly rare native flora, may be at risk due to threats from invasive species (BCECC, 2018). Non-native species, often introduced into 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 native species (National Geographic, 2022). 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.

Only one non-native plant (i.e., common hawkweed) has been found within the Study Area. Although the significance of effects due to introducing and/or spreading invasive species across the Study Area is expected to be negligible to low, mitigation strategies to minimize the risk are provided.

Mitigation Measures

To address effects to terrestrial flora, the following mitigation measures will be implemented:

Loss of SAR/SOCI

- Minimize overall area to be cleared by utilizing pre-existing roads and previously altered areas (i.e., clearcuts).
- Design upgrades to existing roads that already overlap with an existing SAR buffer to be on the opposite side of the road to the SAR observation.
- Maintain avoidance of flora SAR from areas with known occurrences during the design phase, and for SOCI to the greatest extent possible.
    - Desktop and field assessments identified important habitat features with terrestrial flora SAR/SOCI locations to be avoided during the design phase to the greatest extent possible.
- Avoid habitats that are likely to support flora SAR/SOCI known to occur within the Study Area during the detail design phase to the greatest extent possible.
- Educate Project personnel about the potential for plant or lichen SAR/SOCI during construction.
    - Guidance will be provided to Project personnel to raise awareness of terrestrial flora SAR/SOCI that are known to exist within the Study Area to increase the number of trained eyes looking for these species.
- Consult with NSNRR if an unexpected flora SAR/SOCI is encountered during construction activities. Potential mitigation measures based upon recognized practices to transplant or collect seeds can be used as a contingency if flora SAR/SOCI are unexpectedly encountered during construction activities. A transplantation plan will be developed along with a monitoring protocol through consultation with NSNRR should this be required during construction.
- Flag or otherwise clearly mark SAR/SOCI flora located near to construction areas to ensure protection of select individuals during the construction phase of the Project.

Habitat Loss

- Minimize overall area to be cleared by utilizing pre-existing roads and previously disturbed areas (i.e., clearcuts).
- Minimize (through avoidance) the loss of important habitat which supports terrestrial flora SAR/SOCI during the detailed design phase.
- Restore as much habitat as possible through revegetation (with native seed mix) to promote continued growth of terrestrial flora across the Study Area.

Air Quality

- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- Use low-sulphur diesel to reduce sulfur oxides (SO_x) air emissions.
- Require equipment to meet all applicable provincial and air quality regulations and emissions standards.
- Maintain engines and exhaust systems according to the manufacturer's specifications and applicable maintenance schedule.
- Stabilize exposed soil surfaces by sloping or using vegetation, stone, soil, or geotextiles to prevent dust and airborne particles.

- Wet aggregate and soil stockpiles (where practical) to control/minimize dust generation.
- Enclose or cover soil storage and/or stockpile areas (where practical).
- Maximize buffers to SAR/SOCI lichen to minimize edge effects.

Invasive Species

- Use native seed mixes when revegetating cleared areas.
- Require equipment to be as clean as possible to prevent the introduction of non-native species into previously untouched areas.
    - Because non-native species are already present within the Study Area, care will be taken when travelling from developed areas to intact areas so that plant material is not transferred between locations.

Monitoring

Detailed design will incorporate all known locations of flora SAR and SOCI and their respective buffers. Monitoring of terrestrial flora may be considered during the detailed design process when the potential impacts to individual specimens are better understood.

Conclusion

Effects to terrestrial flora associated with the Project have been assessed, including loss of SAR and SOCI, habitat loss, and introduction of invasive species. Based on this assessment and through the implementation of proposed mitigation and monitoring strategies, effects to terrestrial flora are expected to occur within the LAA and be of low to moderate magnitude. Although a small loss of habitat that supports terrestrial flora SAR and SOCI may occur, the loss of known flora SAR and SOCI will be avoided to the extent possible. Residual effects may occur as a single-event and persist long-term with no seasonal aspects applicable; however, effects are expected to be reversible upon decommissioning of the Project and are not significant.

7.4.3 Terrestrial Fauna

7.4.3.1 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/SOCI within/near the Study Area using desktop resources.
- Determine the likelihood of SAR/SOCI species occurring in the Study Area.
- Undertake targeted surveys for different groups of terrestrial fauna to document the presence of species within the Study Area, particularly SAR/SOCI.
- Use the information collected through field studies to update the Project design to avoid or minimize interactions between Project infrastructure components and confirmed locations of terrestrial fauna SAR/SOCI or the habitats that are known to support terrestrial fauna SAR/SOCI.

- Apply mitigation, construction, and operational management practices to minimize effects to terrestrial fauna.

7.4.3.2 Regulatory Context

Applicable laws and regulations relating to the protection of fauna (i.e., mammals, herpetofauna, lepidopterans (butterflies and moths), and odonates (dragonflies and damselflies) include the following:

- *SARA*
- *ESA*
- *Canada Wildlife Act*
- *Wildlife Act,* R.S.N.S. 1989, c. 504
- *Biodiversity Act*
- *CEPA*
- *Environment Act,* S.N.S. 1994-95, c. 1

The *ESA* and *SARA* prohibit harm to listed SAR along with their habitually occupied spaces and core/critical habitat (respectively). The *Canada Wildlife Act* provides a framework for the creation of protected wildlife areas, and the Nova Scotia *Wildlife Act,* R.S.N.S. 1989, c. 504 provides policies and programs for wildlife to maintain diversity of species at levels of abundance to meet specific management objectives. The *Wildlife Act* includes a clause for the protection of den/habitation of a furbearer [48(3)]. The Nova Scotia *Biodiversity Act* provides a framework for the creation of Biodiversity Management Zones used for conservation and sustainable biodiversity values. Lastly, *CEPA* and the *Environment Act,* S.N.S. 1994-95, c. 1 both provide measures for the protection of the environment and pollution prevention.

7.4.3.3 Desktop Review

The desktop component included a review of the NSNRR Significant Species and Habitat Database (2018a), ACCDC data (2024), and the NS Special Management Practice Zones (SMPZ). The NS SMPZ review examined established SMPZs for Canada lynx (*Lynx canadensis*), Wood turtle, and American marten (*Martes americana*); three SAR with habitat in this part of Cape Breton.

Mammals

The NSNRR Significant Species and Habitat Database (2023) contains 805 unique species and/or habitat records pertaining to terrestrial mammals within a 100 km radius of the Study Area. These records include:

- 556 records of “Species at Risk” relating to:
    - American marten – 197
    - Canada lynx – 286
    - Mainland moose (*Alces alces americana*) – 73
- 11 records of “Species of Concern” relating to:
    - Fisher (*Martes pennanti*) – 3

    - Gaspe shrew (*Sorex gaspenis*) – 1
    - Rock vole (*Microtus chrotorrhinus*) – 5
    - Southern bog lemming (*Synaptomys cooperi*) – 2
- 260 records of “Deer Wintering” related to white-tailed deer (*Odocoileus virginianus*)
- 8 records of “Other Habitat” for non-SOCI species:
    - American black bear (*Ursus americanus*) – 2
    - Gray seal (*Halichoerus grypus*) – 3
    - Pygmy shrew (*Sorex hoyi*) – 1
    - River otter (*Lutra canadensis*) – 2

One record of “deer wintering” (White-tailed deer) intersects the Study Area (Drawing 7.23).

The ACCDC Data Report (2024) indicates that nine terrestrial mammal SAR/SOCI (excluding birds and bats, see Sections 7.4.4 and 7.4.5) have been recorded within a 100 km radius of the centre of the Study Area (Table 7.49). None of the identified SAR/SOCI have records within the Study Area.

Table 7.49: Mammals Recorded within a 100 km Radius of the Study Area Centre

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
American marten	*Martes americana*			Endangered	S2S3
American water shrew	*Sorex palustris*				S3S4
Canada lynx	*Lynx canadensis*	Not At Risk		Endangered	S2S3
Fisher	*Pekania pennanti*				S3
Long-tailed shrew	*Sorex dispar*	Not At Risk			S2
Mainland moose	*Alces alces americana*			Endangered	S1
Rock vole	*Microtus chrotorrhinus*				S2
Southern bog lemming	*Synaptomys cooperi*				S3

Source: (ACCDC, 2024)

Mainland moose refers to the mainland Nova Scotia sub-population. The moose sub-population on Cape Breton Island (*Alces alces andersoni*) has a S-Rank of S5 as assigned by the ACCDC and is deemed healthy according to the Status Report on moose in Mainland Nova Scotia (Parker, 2003). The Project, located on Cape Breton Island, will not impact the Mainland moose population directly and no targeted surveys were completed.

The ACCDC also records marine mammals within 100 km radius of the centre of the Study Area, but there are no foreseeable impacts from the Project. Therefore, they are not discussed further.

The NS SMPZ review identified Canada lynx SMPZ buffer areas northeast of the Study Area. No buffers are within the Study Area itself and all are found more than 3 km from the Assessment Area. The Canada lynx range layer overlaps the northern portion of the Study Area; however, no Project activities are expected within a 3 km buffer of the range.

The nearest American marten SMPZ is over 36 km from the Study Area. Due to the low chance of interaction with Project activities based on distance, no targeted surveys were completed, although opportunistic sampling of SAR/SOCI was completed throughout field assessments.

Herpetofauna

The NSNRR Nova Scotia Significant Species and Habitat Database (2018a) contains 322 unique species and/or habitat records pertaining to reptiles and amphibians within a 100 km radius of the Study Area. These records include:

- 320 records of “Species at Risk” relating to:
  - Snapping turtle (*Chelydra serpentina*) – 51
  - Wood turtle - 269
- 2 records of “Species of Concern”, one each relating to Green frog (*Rana clamitans*) and Mink frog (*Rana septentrionalis*).

Watercourses throughout the Study Area are noted as hosting Wood turtle habitat (Drawing 7.23). Due to the location sensitivity of Wood turtles, these watercourse names have not been included in this document.

Data from the ACCDC (2024) report indicates that four herpetofauna SOCI have been recorded within a 100 km radius of the Study Area (Table 7.50). Marine herpetofauna were also recorded, but there are no foreseeable impacts to marine species from the Project. Therefore, they are not discussed further.

Table 7.50: Herpetofauna Species Recorded by ACCDC within a 100 km Radius of the Centre of the Study Area

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
Eastern painted turtle	*Chrysemys picta picta*	Special Concern	Special Concern	---	S4
Four-toed salamander	*Hemidactylium scutatum*	---	---	---	S3
Snapping turtle	*Chelydra serpentina*	Special Concern	Special Concern	Vulnerable	S3
Wood turtle	*Glyptemys insculpta*	Threatened	Threatened	Threatened	S2

Source: (ACCDC, 2024)

The NS SMPZ review identified a Wood turtle SMPZ buffered stream that overlaps with the Study Area. Additionally, Wood turtle critical habitat overlaps with the Study Area and there is a confirmed Wood turtle occurrence within the Study Area (S. Spencer, Pers. Comm.).

Lepidopterans and Odonates

The NSNRR Significant Species and Habitats (2023) database identifies 34 significant habitat features relating to lepidopterans and odonates within a 100 km radius of the Study Area. These records include:

- 1 record of "Species at Risk" relating to monarch butterfly (*Danaus Plexippus*)
- 28 records of "Species of Concern" relating to:
  - Aphrodite fritillary (*Speyeria aphrodite*) – 2
  - Arctic fritillary (*Boloria chariclea*) – 2
  - Black meadowhawk (*Sympetrum danae*) – 1
  - Elfin skimmer (*Nannothemis bella*) – 1
  - Juttra arctic (*Oeneis jutta*) – 7
  - Kennedy's emerald (*Somatochlora kennedyi*) – 1
  - Muskeg emerald (*Somatochlora septentrionalis*) – 6
  - Quebec emerald (*Somatochlora brevicincta*) – 3
  - Ringed emerald (*Somathchlora albicincta*) – 2
  - Seaside dragonlet (*Erythrodiplax Berenice*) – 3
- 5 records of "Other Habitat" relating to:
  - Arctic fritillary – 1
  - Elfin skimmer – 1
  - Subartic bluet (*Coenagrion interrogatum*) – 1
  - Williamson's emerald (*Somatochlora williamsoni*) – 2

None of the above habitat records are contained within 10 km of the Study Area.

The ACCDC report (2024) contains records of 41 unique lepidopteran and odonate SOCI within a 100 km radius of the Study Area (Table 7.51). None of the identified SOCI have records within the Study Area.

Table 7.51: Unique Lepidopteran and Odonate Species Recorded within a 100 km Radius of the Study Area

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
Aphrodite fritillary	*Argynnis aphrodite*	---	---	---	S3S4
Arctic fritillary	*Boloria chariclea*	---	---	---	S1S2
Banded hairstreak	*Satyrium calanus*	---	---	---	S3
Black meadowhawk	*Sympetrum danae*	---	---	---	S3S4
Broad-tailed shadowdragon	*Neurocordulia michaeli*	---	---	---	S2
Brook snaketail	*Ophiogomphus aspersus*	---	---	---	S3
Compton tortoiseshell	*Nymphalis l-album*	---	---	---	S2S3
Delicate emerald	*Somatochlora franklini*	---	---	---	S3S4
Dorcas copper	*Tharsalea dorcas*	---	---	---	S2
Eastern red damsel	*Amphiagrion saucium*	---	---	---	S3S4

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
Elfin skimmer	*Nannothemis bella*	---	---	---	S3S4
Forcipate emerald	*Somatochlora forcipata*	---	---	---	S3
Gray hairstreak	*Strymon melinus*	---	---	---	S3
Green comma	*Polygonia faunus*	---	---	---	S3S4
Greenish blue	*Icaricia saepiolus*	---	---	---	SH
Harlequin darner	*Gomphaeschna furcillata*	---	---	---	S3S4
Harpoon clubtail	*Phanogomphus descriptus*	---	---	---	S3
Hoary comma	*Polygonia gracilis*	---	---	---	SH
Jutta arctic	*Oeneis jutta*	---	---	---	S3S4
Lance-tipped darner	*Aeshna constricta*	---	---	---	S3S4
Maine snaketail	*Ophiogomphus mainensis*	---	---	---	S3
Maritime copper	*Tharsalea dospassosi*	---	---	---	S2
Milbert's tortoiseshell	*Aglais milberti*	---	---	---	S2S3
Monarch	*Danaus plexippus*	Endangered	Special Concern	Endangered	S2?B,S3 M
Mottled darner	*Aeshna clepsydra*	---	---	---	S3S4
Muskeg emerald	*Somatochlora septentrionalis*	---	---	---	S2
Northern cloudywing	*Cecropterus pylades*	---	---	---	S3S4
Ocellated darner	*Boyeria grafiana*	---	---	---	S3S4
Pepper and salt skipper	*Amblyscirtes hegon*	---	---	---	S3S4
Question mark	*Polygonia interrogationis*	---	---	---	S3B
Ringed emerald	*Somatochlora albicincta*	---	---	---	S1S2
Rusty snaketail	*Ophiogomphus rupinsulensis*	---	---	---	S3
Satyr comma	*Polygonia satyrus*	---	---	---	S1?
Short-tailed swallowtail	*Papilio brevicauda bretonensis*	---	---	---	S1
Southern pygmy clubtail	*Lanthus vernalis*	---	---	---	S2S3
Spot-winged glider	*Pantala hymenaea*	---	---	---	S2?B
Subarctic bluet	*Coenagrion interrogatum*	---	---	---	S1
Taiga bluet	*Coenagrion resolutum*	---	---	---	S2
two-spotted skipper	*Euphyes bimacula*	---	---	---	S1S2
Vernal bluet	*Enallagma vernale*	---	---	---	S3
Williamson's emerald	*Somatochlora williamsoni*	---	---	---	S2S3
Aphrodite fritillary	*Argynnis aphrodite*	---	---	---	S3S4

Source: (ACCDC, 2024)

7.4.3.4 Field Assessment Methodology

Data collection on signs and observations of terrestrial fauna including mammals, herpetofauna, lepidopterans, and odonates was conducted through both incidental observations and targeted surveys. The objective of this data collection was to understand which species are present within the Study Area and how they could potentially interact with the Project. Particular attention was paid to SAR and SOCI. Although the survey methods were designed based on a previous layout of the Project that was much larger in size, the methods and scope provide adequate coverage and suitable data for the current Project, as determined through consultation with NSNRR and NSECC (see Section 6.1).

Direct observations of terrestrial fauna or signs thereof within the Study Area were recorded and photographed, when feasible, during all biophysical field surveys. Incidental observations were chosen in addition to dedicated wildlife surveys as they provide the broadest coverage of the Study Area, both spatially and temporally. Signs included features such as dens, nests, scat, tracks, and evidence of foraging. Specific field methods are provided in the following sections.

Mammals

Canada lynx targeted winter tracking surveys were conducted to assess the presence and distribution of mammals across the Study Area. The goal of the surveys was to cover all relevant habitat types present, including roadways, wetlands, various forested habitats, riparian areas along watercourses and waterbodies, and previously disturbed areas (i.e., clearcuts).

Survey methods complied with the requirements of the Nova Scotia Environment's Guide to Addressing Wildlife Species and Habitat in an EA Registration Document (NSECC, 2009) and were developed in consultation with NSNRR (see Section 6.1). Twelve transects, each approximately 1 km long, were completed within and to the east of the Study Area (Table 7.52, Drawing 7.24) from December 2022 to February 2023. Survey dates were all within three to seven days of the most recent snowfall of 10 cm or more, and when possible, within two to three days of the most recent snowfall. This timeline allowed sufficient time for animals to leave their tracks, and limited opportunities for tracks to deteriorate or disappear due to excessive snowfall, melting, or rain. Surveys were not completed during rain or snow events. Recent, intact tracks in fresh snow allow for the most accurate track identification.

Transect locations were strategically selected to target preferred Canada lynx habitat, as their range extends to the northern portion of the Study Area. Dense, immature, conifer-dominated forests that support snowshoe hare (*Lepus americanus*) are an important source of prey for the Canada lynx (Orr & Dodds, 1982). Additionally, the American red squirrel (*Tamiasciurus hudsonicus*) is a secondary food source for the Canada lynx. The trees at the edge of wetlands, especially bogs, provide a primary food source for the red squirrel. Therefore, habitats supporting snowshoe hare and red squirrel were targeted. During surveys, all observed Canada lynx (and other mammal) sightings, tracks, and scat were recorded.

Table 7.52: Canada Lynx Winter Tracking Survey Information

Transect ID	Length (m)	Within Study Area (Y/N)	Within Canada lynx Range (Y/N)	Within Canada lynx SMPZ buffer (Y/N)	Transect Description
1	946	Y	N	N	Hardwood and softwood forest stands present throughout. Hardwood stands with mature maple tree layer and balsam fir dominated shrub layer. Softwood stands are young and dense. Wetland habitat present for approximately 25 to 30% of transect, dominated by shrubby or treed bogs.
2	967	Y	N	N	Primarily coniferous forest of varying age classes dominated by red spruce and balsam fir. Small portion of wetland habitat observed, primarily bog.
3	788	Y	N	N	Transect partially runs along a wide access road. Transect dominated by open, mixedwood forest of varying age classes. Some coniferous stands of varying age classes also present. Little wetland habitat observed, some treed bog and swamp.
4	1000	Y	N	N	Primarily mixedwood stands of varying age classes. Treed bog, and softwood forest habitats also observed. Forest stands ranged in age classes and species. Treed bog primarily at the beginning of the transect. The transect terminated along an old forestry road.
5	1025	Y	N	N	Primarily hardwood forest of varying age classes. Some mixedwood stands where coniferous species dominated shrub layer. Wetland habitat primarily consists of open bogs.
6	945	Y	N	N	Habitat is dominated by mixedwood, mixed age forest and some formerly clear-cut regenerating areas. Wetland habitat consists of treed swamps.

Transect ID	Length (m)	Within Study Area (Y/N)	Within Canada lynx Range (Y/N)	Within Canada lynx SMPZ buffer (Y/N)	Transect Description
7	928	Y	N	N	Dominated by medium aged to mature hardwood forest with beech. Smaller proportion of medium age and regenerating coniferous forest. Transect includes an area of steep slopes with a watercourse at the bottom.
8	1019	N	Y	Partial	Dominated by balsam fir, with some red spruce. Small bogs were also along the transect.
9	1035	Partial	Y	Partial	Predominantly areas cut with approximately two to five years of regeneration.
10	1033	Y	Y	N	Habitat consists of primarily treed bogs dominated by coniferous species, black spruce, and balsam fir. Small bands of medium age softwood and hardwood stands crossed between long stretches of treed bog.
11	1045	Y	Y	N	Forested area with primarily young regenerating coniferous trees. Smaller proportion of young hardwood stands dominated by birch. Approximately half of the transect includes wetland habitat primarily consisting of treed bogs and swamps.
12	1017	Y	N	N	Medium age coniferous forest with spruce and balsam fir, with a smaller proportion of open, regenerating, coniferous forest. Wetland habitat comparatively small, includes treed swamp and bog.

Locations were selected to cover all relevant habitat types present across the Study Area, including roadways, wetlands, various forested habitats, riparian areas along watercourses and waterbodies, and previously disturbed areas (i.e., clearcuts). These surveys provided a broader perspective of terrestrial mammal activity within and around the Study Area, with the objective of informing a discussion of the potential impacts to terrestrial mammals in the Study Area.

Herpetofauna

Targeted Wood turtle surveys were completed at select reaches of watercourses with the SMP buffer within the Study Area and at all watercourses with potential habitat intersecting the Assessment Area. According to their Recovery Strategy, Wood turtles require water with sufficient flow and sufficient depth to provide them with ice-free, well-oxygenated water throughout the winter (ECCC, 2020c). In Ontario, Wood turtles hibernate in water with an average depth of 91 ± 34.8 cm, approximately 123.3 cm from the shore (ECCC, 2020c). Wood turtles tend to hibernate wherever instream structures such as boulders or root-wads provide some cover, and rarely hibernate outside of the main channel of a watercourse, as they require well oxygenated water throughout the winter (pers. comm., M. Pulsifer, January 2021).

Wood turtles nest in well-drained gravelly soil on the banks of inhabited watercourses. While some may be attracted to gravelly roadsides for nesting, this habitat is considered unsuitable due to the danger presented to emerging hatchlings. To support egg incubation, soils need to be well-drained, with a southern aspect, and free of vegetation. This habitat is typically present as sand or gravel bars in depositional areas of dynamic, natural watercourses (ECCC, 2020c).

Targeted Wood turtle surveys occurred in late spring 2022 and again in 2024 to provide additional coverage due to layout modifications. The ambient air temperature was at least 9 °C but not higher than 25 °C, and ideally between 15-20 °C. Surveys were conducted May 10, 11, 18, 19, 24, and 25, 2022, and May 23, 28, 29, and 31, 2024, along pre-determined transects on selected watercourses. Transects were selected based on proposed infrastructure and potential crossing locations and based on contiguity with known Wood turtle populations (according to the SMPZ and consultation with NSNRR). Each transect was repeated three times and at least 48 hours apart, weather permitting.

Table 7.53: Wood Turtle Transect Survey Details

Transect ID	Dates	Secondary Watershed
1	2022/05/11 2022/05/19 2022/05/25	River Inhabitants
2	2022/05/11 2022/05/19 2022/05/25	River Inhabitants
3	2022/05/10 2022/05/18 2022/05/24	River Inhabitants
4	2022/05/11 2022/05/18 2022/05/24	River Inhabitants
5	2022/05/10 2022/05/18 2022/05/24	River Inhabitants

Transect ID	Dates	Secondary Watershed
6	2022/05/10 2022/05/18 2022/05/24	River Inhabitants
7	2022/05/10 2022/05/18 2022/05/24	River Inhabitants
8	2022/05/11 2022/05/18 2022/05/25	Chisholm Brook
9	2022/05/10 2022/05/18 2022/05/25	Chisholm Brook
10	2024/05/28 2024/05/29	River Inhabitants
11	2024/05/23 2024/05/28 2024/05/31	River Inhabitants
12	2024/05/23 2024/05/29	River Inhabitants
13	2024/05/23 2024/05/28 2024/05/31	River Inhabitants
14	2024/05/28 2024/05/31	Coastal
15	2024/05/23 2024/05/29 2024/05/31	River Inhabitants

Nine 1 km transect lines were walked along both banks of each watercourse in 2022 surveys (Drawing 7.24). The transect line served as a centre point, and surveyors scanned the ground, banks, and water up to 10 m on either side of the line, for a total search width of 20 m. Search efforts focused on bank areas with high sun exposure or other adequate basking areas such as instream rocks or logs.

An additional six targeted surveys were completed in 2024 at anticipated watercourse crossings in the Assessment Area. Watercourses were surveyed up to 200 m upstream and downstream of the proposed crossing locations, when conditions permitted, scanning the ground, banks, and water up to 10 m on either side of the watercourse for a total search width of 20 m. Turtles may also be found under or near deadfall, grasses, leaf litter, or woody shrubs, particularly alder trees, and so these areas were searched with greater intensity as they may be more inconspicuous. All survey tracks were recorded using a handheld GPS.

Any observation of one of the four native turtles to Nova Scotia, snakes, or salamanders were recorded and georeferenced in the field using an ArcGIS Survey123 form. Upon completion of each transect, a general description of the transect, including the presence of any notable habitat features, was recorded. Any additional observations of herpetofauna made during other survey types such as wetland or watercourse surveys, as well as observations of suitable turtle habitat, were also recorded.

Lepidopterans and Odonates

Targeted surveys for lepidopteran and odonate species were not conducted; however, any incidental observations of lepidopteran and odonate SOCI during other field surveys were documented.

7.4.3.5 Field Assessment Results

Mammals

Seven species were identified during field assessments (including incidental observations) completed within the Study Area (Table 7.54).

Table 7.54: Summary Results of the Mammal Field Assessments

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
White-tailed deer	*Odocoileus virginianus*	---	---	---	S5
Moose	*Alces alces andersonii*	---	---	---	S5
North American beaver	*Castor canadensis*	---	---	---	S5
American red squirrel	*Tamiasciursus hudsonicus*	---	---	---	S5
Coyote	*Canis latrans*	---	---	---	S5
Snowshoe hare	*Lepus americanus*	---	---	---	S5
American back bear	*Ursus americanus*	---	---	---	S5

Source: Species Ranks (ACCDC, 2024)

No tracks or scat of Canada lynx were observed during targeted surveys. Suitable habitat for Canada lynx’s preferred prey, snowshoe hare and red squirrels, is found within the Study Area, and signs of these species were observed in abundance, indicating prey availability.

Herpetofauna

Three herpetofauna species were identified in the Study Area during targeted surveys and through incidental observations (Table 7.55). No observations of any turtle species were recorded.

Table 7.55: Summary Results of the Herpetofauna Field Assessments

Common Name	Scientific Name	COSEWIC Status	*SARA* Status	*ESA* Status	NS S-Rank
Maritime garter snake	*Thamnophis sirtalis*	---	---	---	S5
American toad	*Anaxyrus americanus*	---	---	---	S5
American bullfrog	*Lithobates catesbeianus*	---	---	---	S5

Source: Species Ranks (ACCDC, 2024)

Descriptions of habitat observed along the 15 surveyed wood turtle transects are presented, along with commentary on their potential for turtle habitat (Table 7.56). Habitat potential is based on review of known preferred overwintering, nesting, and general for each species. Note that the identification of potential suitable habitat does not describe critical or core habitat as defined in any recovery strategies (if applicable). Good potential nesting habitat was identified along Transects 1 and 4, which both exist along the SMP watercourse, and sparse along Transect 15. Overwintering habitat is sparse along transects 6, 11 and 12, and habitat for general usage is present throughout surveyed watercourses (general habitat includes foraging, transportation, thermoregulation, etc.).

Table 7.56: Habitat Descriptions for Wood Turtle Transects

Transect Number	Velocity	Substrate	Potential Wood Turtle Habitat		
			Nesting	Overwintering	General
T01	Moderate-high	Gravel, cobble	Y - potential	Y	Y
T02	High	Gravel, boulder, bedrock	N	N	Y
T03	Moderate-high	Muck, gravel	N	N	Y
T04	Moderate-high	Gravel, cobble, boulder	Y - potential	N	Y
T05	Moderate	Silt, cobble	N	N	Y
T06	Moderate	Gravel, cobble	N	Y - potentially in isolated pools	Y
T07	High	Boulder, bedrock	N	N	Y
T08	Moderate	Gravel, boulder	N	N	Y
T09	Moderate	Cobble, boulder	N	N	Y
T10	Low-moderate	Muck, gravel	N	N	Y
T11	Low	Muck	N	Y - low potential based on depth	Y
T12	Low	Muck	N	Y - low potential based on depth	Y
T13	Low	Muck, sand	N	N	Y
T14	Low	Muck, boulder	N	N	Y
T15	Moderate	Gravel	Y - low potential	N	Y

Based on desktop results, two species of herpetofauna species have been identified as priority species: Snapping turtle and Wood turtle.

Snapping Turtle

Preferred habitat for Snapping turtles includes ponds, lakes, slow-moving streams with soft mud bottoms and abundant aquatic vegetation (ECCC, 2020b). Hibernation occurs in freshwater systems deep enough to prevent freezing during the winter, with a mucky or muddy substrate. Snapping turtles travel through upland habitat and use gravelly areas to nest but they require wetland habitat as part of their life cycle activities (ECCC, 2020b; COSEWIC, 2009). These turtles nest in areas of soft sand, soil, or gravel where there is high sun exposure. This may include meadows, shorelines, rocky outcrops and roadsides (ECCC, 2020b). Preferred habitat exists throughout the Assessment Area.

Wood Turtle

Preferred Wood turtle overwintering habitat includes sites with a mean water depth of 91 cm in a variety of microhabitats including submerged logs, overhanging banks or resting on the bottom of a pool. Most individuals overwinter within deeper areas of their main inhabited stream or side channel of a watercourse with well oxygenated water flowing at a rate to prevent freezing to the substrate (ECCC, 2020c).

Wood turtle nesting habitat is in sand/gravel banks along a river where there is sun exposure. This turtle species is the most terrestrial of all freshwater turtles in Canada (ECCC, 2020c). Wood turtle general habitat includes areas that provide thermoregulation, foraging, mating, and movement opportunities. Wood turtles use wetlands and moderate to slow-moving clear-water streams, in-stream deep pools, and sand/gravel bars for thermoregulation, foraging, mating, movement, and nesting (ECCC, 2020c).

A portion of the southern section of the Study Area, surrounding the transmission line, overlaps with Wood turtle critical habitat (S. Spencer, Pers. Comm.) and an SMPZ buffered watercourse, Lamey's Brook, crosses the transmission line. Watercourses flow from within the Study Area into known Wood turtle streams outside and surrounding the Study Area.

Lepidopterans and Odonates

There were no observances of lepidopteran or odonate SOCI during field assessments within the Study Area. Based on the results of the field and desktop assessments no priority species were identified within the Study Area.

7.4.3.6 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 7.57). These activities could result in habitat removal, alterations to wildlife corridors, and reductions in food availability. Other Project-related activities, including during construction and operation, may impact terrestrial fauna behaviours, such as increased traffic and noise.

Table 7.57: Potential Project-Terrestrial Fauna Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Terrestrial Fauna	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Assessment Boundaries

For the purposes of this assessment, the LAA for terrestrial fauna includes the Assessment Area. The RAA for terrestrial fauna is the Study Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for terrestrial fauna. The VC-specific definition for magnitude is as follows:

- Negligible – no loss of fauna habitat or impact to fauna behaviours expected.
- Low – small loss of habitat supporting fauna, but no impacts to fauna behaviours expected.
- Moderate – moderate loss of fauna habitat or moderate impacts to fauna behaviours, but these impacts will only be experienced by individuals rather than entire populations.
- High – high loss of fauna habitat or high impact to fauna behaviours on a population scale.

Effects

Mammals

- Disruption of Canada lynx life history
  The most likely effect to the Canada lynx within the LAA is to its prey, thus affecting the likelihood that individuals will hunt in this area. Potential loss of immature, dense forest due to road construction, road widening, or creating spaces for the laydown area or turbine pads will potentially affect habitat for the snowshoe hare, the key prey for the

Canada lynx. Given the diverse nature of the Study Area, comprised of a mix of softwood, mixed wood, and hardwood stands, the Project should not substantially affect overall habitat availability for snowshoe hare. When snowshoe hare are in a population decline, Canada lynx may predate on red squirrels who use forested areas around bogs as a common food source. Overall avoidance of these wet areas and their forested surroundings during Project detailed design mitigates the likelihood of an appreciable change in squirrel habitat that might affect Canada lynx prey availability. Where complete avoidance is not possible, as much of a 100 m forested buffer around wetlands should be retained as possible, in line with Nova Scotia Endangered Canada Lynx Special Management Practices (NSNRR, 2012a). Whereas the impacts of the Project on Canada lynx's preferred prey, the Snowshoe hare, will be minimal, and impacts to most of the Red squirrel's habitat can be avoided, the expected impact to Canada lynx's food availability is expected to be low to negligible.

- Road Traffic
  The Project will result in increased road traffic within the LAA, especially during construction and decommissioning. An increase in road traffic will increase the chances of collision and mortality for animals using the roadways. Most roads within the Study Area are currently old forestry roads used by hunters, ATV, and snowmobile users. Outside of the construction phase, the Project will only require a small number of technicians to access the site to perform regular maintenance/equipment checks. Considering the pre-existing traffic load and the minimal traffic to be associated with the Project, road traffic is expected to have a negligible to low effect on terrestrial mammals in the LAA.

- Habitat Loss and Fragmentation
  A variety of mammal species, including White-tailed deer and Moose, were observed within the Study Area and make use of various habitat types across this area. The footprint of the Project, particularly the area that will impact intact habitat, is relatively small compared to other developments in the natural resource sector.

  Habitat alteration may result in the removal of refugia which may increase predation risks and disrupt the ecological balance within a community. Patterns of movement/migration across the landscape may also be disrupted by habitat alteration and fragmentation. Roughly 4.75 km of new road will be constructed within the Study Area, and upgrades to pre-existing roads will be limited to removing small areas of habitat in areas that have already been disturbed. These linear features allow for easier access across the Study Area, and terrestrial fauna will continue to use these roads post-construction. Direct habitat loss and fragmentation within the LAA will be small and can be mitigated through various strategies to reduce the effects of habitat loss.

- Sensory Disturbance
  Reproduction and survival strategies of terrestrial mammals may be directly or indirectly impacted by sensory disturbances caused by Project construction and

operation. Many species have sensitive windows for breeding and birthing, and any small disruption to these activities may reduce reproductive success in the population. Sensory disruptions may result from sound/vibration or excess light. 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 minimization of interactions with important wildlife habitat such as wetlands and mature forest, which will minimize sensory disturbances in these areas.

Project-related noise may impact habitat use, patterns of activity, stress levels, immune response, reproductive success, risk of predation, communication with conspecifics and antipredator behaviours, and hearing damage (Rabin et al., 2006; Lovich & Ennen, 2013). The extent that noise associated with wind farms may impact terrestrial mammals is not well studied, and results have been inconclusive thus far (Lovich & Ennen, 2013). The Study Area is, however, already subject to noise from forestry activities and the nearby Rhodena Quarry and despite the pre-existing noise, different mammal species were still observed across the Study Area so impacts from sensory disruptions caused by the Project within the LAA are anticipated to be low.

Herpetofauna

- Wood Turtles
  A Wood turtle SMPZ zone exists along a watercourse within the Assessment Area, and Wood turtle critical habitat also exists within the Study Area. Wood turtle surveys identified suitable nesting habitat along one watercourse, which overlaps with the Assessment Area along the proposed transmission line route. Suitable nesting habitat was not found elsewhere within the Assessment Area. Although many watercourses provided general habitat suitability, the lack of potential nesting and overwintering habitat through these watercourses suggests that they do not provide functional habitat (ECCC, 2020c).

  Although the Project may result in up to 11 watercourse alterations through creating or upgrading crossings, none of these are located on watercourses with functional Wood turtle habitat. The watercourse identified as having nesting habitat within the Assessment Area as well as the 200 m SMPZ will interact with the Project through the proposed transmission line corridor and will require no alterations to the watercourse itself. The Proponent will consider the SMPZ in its detailed design and engage with NSNRR in regard to pole placements to minimize any potential impacts to turtle habitat, per the Wood Turtle Special Management Practices (NSNRR 2012c). It is expected that impacts to Wood turtles will not be significant.

- Road Traffic
  Increased road traffic may affect herpetofauna within the LAA due to the potential for an increase in risk of traffic collisions with herpetofauna species. Turtles, salamanders, and snakes, if present, may cross roads daily in search of food, or seasonally during

migration to find nesting habitat or to escape uninhabitable climatic conditions (Wills, 2021). Road infrastructure and traffic have negative impacts on those species which are attracted to roads but lack the reaction time to avoid traffic. As stated previously, the pre-existing traffic load and the minimal traffic to be associated with the Project both indicate that road traffic is not expected to have a significant effect on terrestrial herpetofauna in the LAA.

- <u>Habitat Loss</u>
  Terrestrial habitat utilized by herpetofauna includes riparian areas along wetlands and watercourses, forested areas near watercourses, and rocky or gravelly areas such as roadsides. These different habitat types support different biological needs of species and relate directly to life history strategies. The Project layout aims to reduce impacts to intact habitat and has been specifically designed to minimize interactions with riparian areas and intact forest. With approximately 4.75 km of new road being constructed, a small area of new habitat may be created in the form of gravel roadsides and this new habitat may serve as a potential benefit to herpetofauna species. The Proponent will consider the Wood turtle SMPZ and any Wood turtle habitat located within the Study Area during detailed design and will engage with NSNRR to ensure that Wood turtle habitat is protected. It is expected that Project activities will result in low impacts to habitat loss within the LAA.

- <u>Habitat Fragmentation</u>
  Terrestrial herpetofauna use the terrestrial environment to move across the landscape, particularly between wetlands and watercourses. The alteration of these habitats and conversion of intact forest to roads may result in a fragmented landscape, preventing natural patterns of movement across the landscape. Habitat fragmentation has been minimized through the Project design, which prioritized the use of pre-existing roads or otherwise disturbed habitats. No herpetofauna SAR/SOCI were observed within the Study Area during field surveys; however, mitigation measures will be taken to maintain connectivity in watercourses and wetlands (see Sections 7.3.2 and 7.3.3). Therefore, minimal effects to herpetofauna related to habitat fragmentation are expected within the LAA or RAA.

- <u>Disruption of Life History</u>
  Sensitive windows for herpetofauna may relate to overwintering or nesting periods, and interference with these animals' activities during these windows may disrupt their natural life history. Interference may be both temporal and spatial. Project related activities occurring during sensitive windows may impact migratory or breeding behaviours, and habitat removal or fragmentation may create a physical barrier to herpetofauna species from reaching important habitat. Limited impacts to fragmentation and life history are expected due to the small Project footprint and minimized interactions with important habitat features such as wetlands and watercourses. No alterations to watercourses are proposed within the Wood turtle SMPZ.

- Sensory Disturbance
  Given the pre-existing traffic load and the minimal traffic to be associated with the Project, sound and light impacts are expected to be low.

Lepidopterans and Odonates

Turbine Collision-Induced Mortality

Swarming and migrating insects, including lepidopterans and odonates, are susceptible to mortality from collisions with wind turbines. There are several hypotheses as to whether, or why, these insects are attracted to wind turbines (Long et al., 2011; Rydell et al., 2010; Jansson et al., 2020). Questions remain in the literature concerning how this potential attraction affects mortality rates; whether insect fatalities at wind turbines are contributing to population declines; and how these fatalities are impacting ecological functions (Voigt, 2021). No significant effects to lepidopteran and odonate SAR/SOCI are expected from this Project based on current insect population and ecology research and a lack of confirmed lepidopteran and odonate SAR/SOCI within the Study Area.

Mitigation Measures

To address the above-mentioned effects to terrestrial fauna, the following mitigation measures will be implemented:

Habitat Loss

- Minimize overall area to be cleared by utilizing pre-existing roads and previously altered areas (i.e., clearcuts).
- Continue to review field survey results and guidance from NSNRR through the detailed design phase.
- Revegetate roadsides and cleared areas to minimize lost habitat as much as possible.
  - Reclaim small roads leading to turbines to minimize long-lasting effects of habitat loss.

Habitat Fragmentation

- Minimize fragmentation and habitat isolation by utilizing pre-existing roads and previously altered areas during the detailed design phase.
- Support connectivity by maintaining vegetated buffers around wetlands and watercourses, where possible.
- Revegetate as much cleared area as possible to limit the effects of fragmentation.

Road Traffic

- Design the Project footprint to minimize road density and utilize pre-existing roads to the greatest extent 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 on the site.

- Minimize Project-related traffic to reduce chances of wildlife collisions and traffic-related stress to wildlife.
- Impose restrictions to site access if deemed necessary due to a substantial increase in wildlife collisions and mortality.
- Respect sensitive timing windows for SAR species.

Disease

- Use seed mixes that do not contain clover to avoid attracting deer (which carry ticks) to the area when revegetating road right of ways and other cleared areas requiring revegetation.

Disruption of Life History

- Minimize loss of habitat or food sources for critical prey species of the Canada lynx, especially:
  - Snowshoe hare – immature, dense conifer stands.
  - Red squirrel – open bogs that serve as a key food source for the squirrel.
- Minimize loss of important habitat required by priority species for reproduction events, including:
  - Wood turtle – clear, meandering streams with gravel shores, gravel roadsides.
- Minimize overall area to be cleared to maintain refugia and cover for protection from predators.
- Maintain all equipment and machinery on site to reduce noise and vibration emissions associated with malfunctions. Where practical, install vehicles and machinery with noise muffling equipment to limit disturbance.
- Restrict on-site lighting, especially at night, to limit disturbance.
- Prohibit harassment and feeding of wildlife by Project personnel.
- Adhere to guidance provided in the Wood Turtle Special Management Practices.

Monitoring

A site-specific post-construction Wildlife Management Plan may be developed to inform monitoring activities that will take place to ensure continued protection of known SAR/SOCI in the LAA and RAA.

Conclusion

While effects to mammals, herpetofauna, and insects differ, the effects considered to be of greatest concern include habitat loss, habitat fragmentation, and associated disruption of the life history of populations within these groups. Based on this assessment and through the implementation of proposed mitigation and monitoring activities, effects on terrestrial fauna are expected to be of low magnitude and within the RAA. Residual effects are expected to be long-term for habitat loss but negligible for individual SOCI, continuous but differ seasonally as the needs of species change, reversible, and not significant.

7.4.4 Bats

7.4.4.1 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 impacts to SAR/SOCI and their habitats).
- Use the information collected to inform mitigation and management practices.

7.4.4.2 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*).

Three resident species (the Little brown myotis, Northern myotis, and Tri-colored bat) are protected federally and provincially under *SARA* and the *ESA*. These three species were added to the *ESA* as "Endangered" on July 11, 2013, and were declared "Endangered" under Schedule 1 of *SARA* on November 26, 2014. In Nova Scotia, a 90% population decline of resident bat species has been attributed to a disease called white-nose syndrome, caused by the fungus *Geomyces destructans*, which was first detected in Canada in 2010. White-nose syndrome is lethal and affects bat species that congregate in caves and abandoned mines during winter hibernation (COSEWIC, 2023). All three migratory bat species were listed by COSEWIC in May 2023 as "Endangered" (COSEWIC, 2023). The Big brown bat is not listed under either *SARA* or COSEWIC.

7.4.4.3 Desktop Review

Databases and online resources referenced as part of this desktop review include:

- Terrestrial Habitat Mapping (Section 7.4.1)
- Locations of Known Bat Hibernacula in NS (Moseley, 2007)
- NS Geoscience Atlas – Abandoned Mine Openings (NSNRR, 2021f)
- NS Significant Species and Habitats Database (NSNRR, 2023)
- ACCDC Data Report (ACCDC, 2024)

Terrestrial Habitat Mapping

Terrestrial habitat mapping from Section 7.4.1 was used to identify locations of ideal bat foraging and over-day habitat (i.e., day roosts) within the Study Area. Ideal habitats for bat foraging and over-day habitat include lakes, wetlands, watercourses, forest edges, cliffs, rock outcrops, talus slopes, and mature hardwood forests.

There are three habitat features considered to be significant for bats: hibernacula for overwintering, maternity roosts for birthing and raising young, and migratory stopovers for rest periods during spring/fall migration. Hibernacula are overwintering sites that are typically located in abandoned mines or caves and can support hundreds of bats.

Maternity colonies are poorly documented in Nova Scotia, with limited desktop information regarding these sites' location and use (ECCC, 2015; NSNRR, 2020a). As a result, information on potential maternity roosts near the Project was supplemented through notes of field observations and incidental identification.

Migration is one of the most poorly understood components of bat biology, at both a regional (<200 km) and long distance (>1000 km) scale. Migratory stopovers utilized for short term rest or sanctuary are thought to be located on islands or shorelines of large bodies of water and along linear geographic features such as riparian zones or mountain ranges (McGuire et al., 2011). During terrestrial habitat mapping, riparian and shoreline habitats were identified and used to guide monitoring.

Locations of Known Bat Hibernacula

Moseley (2007) provides an overview of the 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 7.58).

Table 7.58: Known Bat Hibernacula within 100 km of the Study Area

Hibernaculum	Approximate Distance to Study Area*	Direction
Hirschfield Galena Prospect	75 km	SW
McLellan's Brook Cave	97 km	W

*Distance measured to the nearest point of the Study Area.
Source: (Moseley, 2007)

No hibernacula are located within 25 km of the Study Area as per the recommended buffer provided in the NSECC Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021). 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

No abandoned mine openings were identified within the Study Area; however, 131 were identified within 25 km of the Study Area (NSNRR, 2021f). Of these, eight are open/dry mine shafts, slopes, or adits with a level of depth/complexity (>30 m, as per recommendations from GOBC, 2019) that could potentially support overwintering habitat for resident bat species:

- Two coal adits (IDs: PHC-1-037 and PHC-1-038) and three coal slopes (IDs: PHC-1-005, PHC-1-026, and PHC-1-031) associated with Six Foot Vein in Port Hood Mines, Inverness County, Cape Breton, NS.
- One coal shaft (ID: IHC-2-008) associated with Three Foot Vein in Little River Reservoir, Richmond County, Cape Breton, NS.
- Two coal slopes (IDs: IHC-3-003 and IHC-3-017) associated with an unidentified vein in Whiteside, Richmond County, Cape Breton, NS.

The remainder were not considered potential bat overwintering habitat as they were characterized as: pits, trenches, shallow in depth (<30 m, as per recommendations from GOBC, 2019), infilled, capped, plugged, or flooded.

Significant Species and Habitat Records

The NSNRR Significant Species and Habitats Database (2018a) contains 106 unique species/habitat records pertaining to bats and associated habitat within 100 km radius of the Study Area:

- Eight “Species of Concern” records relating to caves.
- Two “Other Habitat” records relating to potential small, urban over-day bat roosts.
- 96 “Species at Risk” records which relate to Tri-colored bat (2), Silver-haired bat (2), Eastern red bat (3), Northern myotis (3), Hoary bat (6), Little brown myotis (6), Myotis species (20), and unclassified bat species (54).

None of the aforementioned records are located within the Study Area.

ACCDC Records

The ACCDC Data Report (2024) completed for this Project indicated three bat species and one genus of concern recorded within 100 km of the Study Area (Table 7.59).

Table 7.59: 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
Tricolored bat	*Perimyotis subflavusc*	Endangered	Endangered	Endangered	S1
Bat species	*Vespertilionidae* spp.	---	---	---	S1S2

Source: (ACCDC, 2024).

According the ACCDC Report (2024), a “bat hibernaculum or bat species occurrence” is known to exist within the Study Area. NSNRR confirmed that these are species occurrences and there are no known hibernacula within 60 km of the Project (Ausenco, 2024).

7.4.4.4 Assessment Methodology

Field surveys and monitoring within the Study Area consisted of passive bat assessments and subsequent data analysis, completed by Ausenco in 2022 and 2023 (Ausenco, 2022; Ausenco, 2024). The bat survey locations in 2022 and 2023 were selected in consideration of an older layout that has since been modified. However, in reviewing these locations in consultation with NSECC and NSNRR (see Section 6.1), the locations are still within the Study Area and continue to provide representative spatial and habitat coverage for the Project. Monitoring locations were adjusted slightly in 2023 to reflect layout changes and provide additional coverage across the Study Area. Collectively, the two-year program provides a comprehensive and complete data set for the Project. For a detailed description of passive acoustic monitoring methods and results, see Appendix H; a summary is provided below.

Passive acoustic monitoring was conducted within the Study Area at different elevations across various representative, low clutter habitats with different topographic features such as clear cuts, wetlands, and mature forests (Drawing 7.25).

The passive acoustic bat monitoring program was conducted using Song Meter 3 (SM3) and Song Meter 4 (SM4) monitors from Wildlife Acoustics. In 2023, omni-directional Song Meter Microphone Ultrasonic 2 microphones were also used to record up to 30 m in all directions. The detectors were programmed to monitor between 30 minutes before sunset to 30 minutes after sunrise to correspond with peak times of bat activity. GPS points and supplementary information (i.e., habitat descriptions) were recorded at each monitor location. Batteries were changed approximately once every one to two weeks in 2022 and approximately once every four weeks in 2023 (Ausenco, 2022; Ausenco, 2024).

Passive acoustic bat monitoring in 2022 was conducted within the Study Area for 172 consecutive days between May 13 and October 31, 2022, encompassing the late spring, summer, and fall active bat seasons. Six detectors were deployed in habitats representative of the Study Area and in areas expected to provide suitable foraging habitat for bats (i.e., forest edges, waterbodies, watercourses, and wetlands) (Table 7.60). Detector BAT02 had to be moved on June 15, 2022, due to rising water levels and was relocated to BAT02B. The data from this detector was analyzed as one location as it was only moved approximately 450 m. Two detectors were also deployed at different heights in the same location (BAT01G and BAT01E) to capture bats flying at different elevations. A malfunction of BAT03 caused a period of data loss, and additional data was lost from BAT01 and BAT05 when batteries died due to an inability to access the detectors after Hurricane Fiona (Ausenco, 2022).

Table 7.60: Monitoring Periods for each Detector (2022)

ID	Microphone Height (m)	Habitat Description	Monitoring Duration (2022)	Number Of Nights
BAT01G	4.6	Wet softwood forest	May 13 to October 31	160

ID	Microphone Height (m)	Habitat Description	Monitoring Duration (2022)	Number Of Nights
BAT01E	10.0	Wet softwood forest	May 13 to October 31	160
BAT02	4.6	Wet softwood forest	May 13 to October 31	172
BAT03	4.6	Cutover, hardwood forest	May 13 to October 31	153
BAT04	4.6	Open wetland	May 13 to October 31	172
BAT05	7.0	Vegetation < 1m	May 13 to October 31	168

Source: (Ausenco, 2022)

Passive acoustic bat monitoring in 2023 was conducted within the Study Area for 160 consecutive days between May 24 and October 31, 2023, encompassing the late spring, summer, and fall active bat seasons. Five detectors were deployed nearby to the locations of the 2022 monitors, with the location of BAT01 moving to be between BAT04 and BAT05, and BAT02A being removed (Table 7.61). Malfunctions of the internal processors caused a period of data loss at BAT 1 and BAT 4 (Ausenco, 2024).

Table 7.61: Monitoring Periods for each Detector (2023)

ID	Microphone Height (m)	Habitat Description	Monitoring Duration (2023)	Number Of Nights
BAT 1	7.0	Cutover	May 24 to October 31	135
BAT 2	4.6	Wetland, softwood forest	May 24 to October 31	160
BAT 3	4.6	Softwood forest	May 24 to October 31	160
BAT 4	10.0	Softwood forest	May 24 to October 31	131
BAT 5	4.6	Cutover, mixedwood forest	May 24 to October 31	160

Source: (Ausenco, 2024)

Acoustic monitoring data (i.e., sonograms) was processed using Kaleidoscope software from Wildlife Acoustics and Analook software from Titley Scientific (Ausenco, 2022; Ausenco, 2024). Data was processed for potential bat generated ultrasonic vocalizations and speciated automatically by the software, then verified manually by an experienced biologist. Bat calls were categorized to the most specific grouping possible. Due to the similarity of the calls of some species and poor quality of calls on some recordings due to distance, clutter, or noise, some calls were not able to be attributed to a single species. Calls not able to be attributed to one species were separated into one of the following groupings of similar call types:

- Big brown bat / Silver-haired bat
- Big brown bat / Eastern red bat
- Tri-colored bat / Eastern red bat
- Eastern red bat / Little brown myotis
- Low frequency bat
- High frequency bat
- Myotis species

7.4.4.5 Field Assessment Results

In 2022, 139 bats were recorded by the acoustic detectors (Table 7.62). Of these, 97 (70%) were from migratory bat species and 42 (30%) were from resident bat species. Collectively, the detectors recorded 0.14 bat passes per night (Table 7.63) (Ausenco, 2022).

Table 7.62: Results of the Passive Acoustic Bat Survey by Species (2022)

Type	Species Group	Total Number Of Bat Passes
Migratory species	Hoary bat	87
	Big brown bat / Silver-haired bat	4
	Eastern red bat	3
	Low frequency bat	1
	Big brown bat / Eastern red bat	1
	Tri-colored bat / Eastern red bat	1
Resident species	*Myotis* species	37
	Little brown myotis	4
	Tri-colored bat	1
Total		**139**

Source: (Ausenco, 2022)

Table 7.63: Results of the Passive Acoustic Bat Survey by Detector (2022)

ID	Total Number of Passes	Total Bat Passes per Detector Night
BAT01G	30	0.19
BAT01E	25	0.16
BAT02	14	0.08
BAT03	14	0.09
BAT04	13	0.08
BAT05	43	0.26
Total	**139**	**0.14**

Source: (Ausenco, 2022)

Activity levels varied throughout the 2022 monitoring period (Figure 7.2), peaking during the summer months.

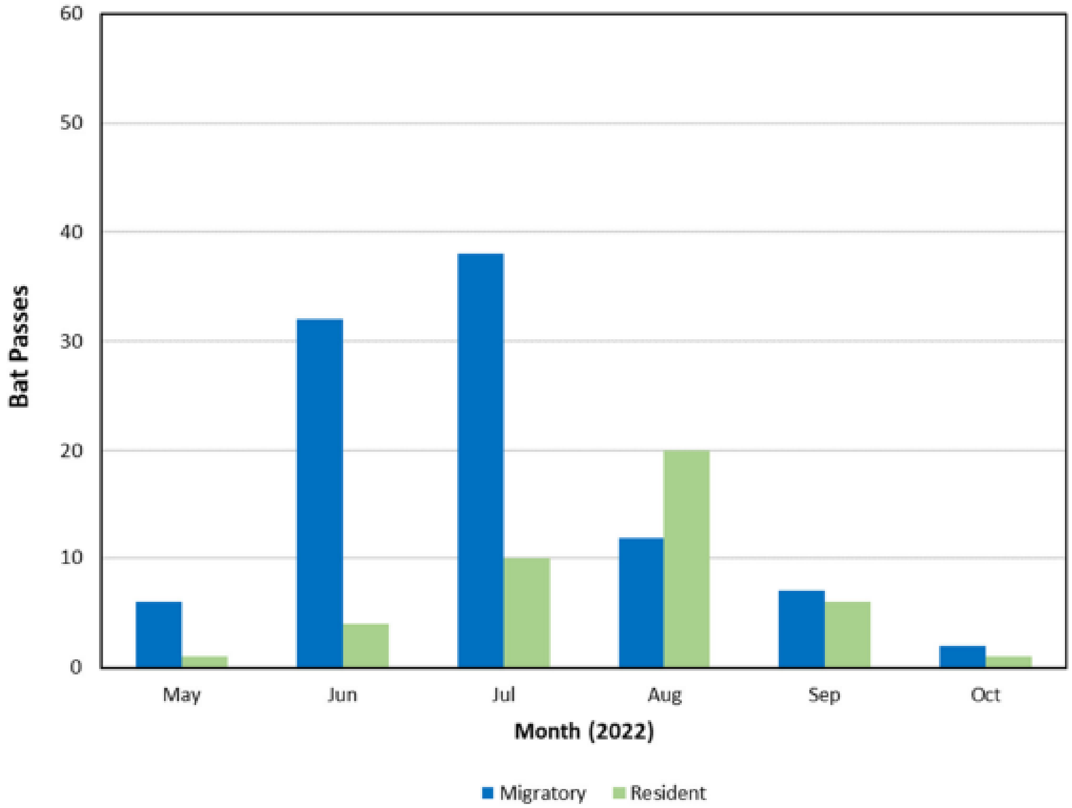

Figure 7.2: Bat Activity Per Month Observed During the Passive Acoustic Survey (2022) (Ausenco, 2022)

In 2023, 138 bats were recorded by the acoustic detectors (Table 7.64). Of these, 106 (77%) were from migratory bat species and 32 (23%) were from resident bat species. Collectively, the detectors recorded 0.18 bat passes per night (Table 7.65) (Ausenco, 2024).

Table 7.64: Results of the Passive Acoustic Bat Survey by Species (2023)

Type	Species Group	Total Number of Bat Passes
Migratory species	Hoary bat	55
	Silver-haired bat	4
	Big brown bat / Silver-haired bat	17
	Eastern red bat	10
	Eastern red bat / Little brown myotis	3
	Low-frequency bat	17
Resident species	Big brown bat	2
	Little brown myotis	1
	Myotis species	28
	High-frequency bat	1
Total		**138**

Source: (Ausenco, 2024)

Table 7.65: Results of the Passive Acoustic Bat Survey by Detector (2023)

ID	Total Number Of Passes	Total Bat Passes per Detector Night
BAT 1	12	0.09
BAT 2	28	0.18
BAT 3	13	0.08
BAT 4	44	0.34
BAT 5	41	0.26
Total	**138**	**0.18**

Source: (Ausenco, 2024)

Activity levels varied throughout the monitoring period (Figure 7.3), peaking during the fall.

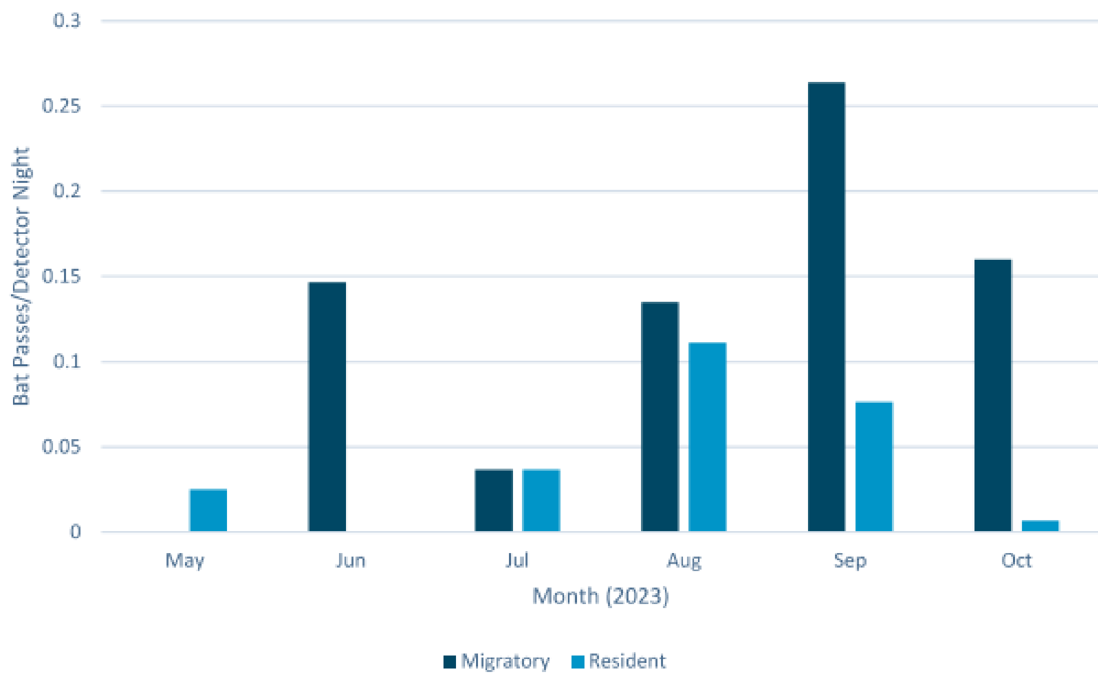

Figure 7.3: Bat Activity Per Month Observed During the Passive Acoustic Survey (2023) (Ausenco, 2024)

Overall, the 2022 and 2023 monitoring periods showed very similar results. Both years showed a similar number of total calls, as well as a similar proportion of migratory to resident bats, with 70% to 77% of calls being attributed to migratory species. The number of passings per monitor nights was also similar, with 0.14 bat passes per night (all species) in 2022 and 0.18 bat passes per night (all species) in 2023 (Ausenco, 2022; Ausenco, 2024).

All bat SAR and SOCI, and their respective habitat associations identified within the RAA through desktop review and field assessments were considered. Bat 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/SOCI and/or their associated habitat. These priority species include:

Resident Species

- Little brown myotis – listed as "Endangered" under *SARA*, *ESA*, and by COSEWIC and "S1" by ACCDC.
- Northern myotis – listed as "Endangered" under *SARA*, *ESA*, and by COSEWIC and "S1" by ACCDC.
- Tri-coloured bat – listed as "Endangered" under *SARA*, *ESA*, and by COSEWIC and "S1" by ACCDC.

Migratory Species

- Eastern red bat – listed as "Endangered" by COSEWIC and "SUB,S1M" by ACCDC.
- Hoary bat – listed as "Endangered" by COSEWIC and "SUB,S1M" by ACCDC.
- Silver-haired bat – listed as "Endangered" by COSEWIC and "SUB,S1M" by ACCDC.

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 in buildings, trees, under rocks, in wood piles, and in caves, congregating in tight spaces to roost at night (Fenton & Barclay, 1980). As a resident species, Little brown myotis hibernates from September to early or mid-May in abandoned mines or caves (Fenton & Barclay, 1980; Moseley, 2007).

The Northern myotis, once considered uncommon in Nova Scotia (Moseley, 2007), is likely ubiquitous in the 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 show 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 deciduous trees over coniferous trees, whereas males roost alone in coniferous or mixed-stands in mid-decay stages (Broders & Forbes, 2004). Northern myotis are also non-migratory and are typically associated with the Little brown myotis during hibernation, being found in caves or abandoned mines (Moseley, 2007). Hibernation of the Northern myotis is thought to begin as early as September and can last until May (Caceres & Barclay, 2000).

The Tri-colored bat (also known as the Eastern pipistrelle) only has approximately 10% of its range in Canada and is considered rare in Nova Scotia (COSEWIC, 2023). Documented observations of the Tri-colored bat predominantly occur in the southwest region of the province, especially during the summer months (Broders et al., 2003). The Tri-colored bat can be found in a variety of habitats, foraging in covered riparian areas and around open bodies of water. Hibernation for this species begins in September and extends to early or mid-May in abandoned mines or caves with high humidity and above freezing temperatures (COSEWIC, 2023). Less is known regarding maternity roosts for Tri-colored bats; in Nova Scotia specifically, maternity roosts have been identified within large clumps of arboreal lichens growing on deciduous and coniferous trees (COSEWIC, 2023).

Eastern red bats are typically found east of the Rocky Mountains within Canada/US and within northeastern Mexico (and are a distinct population from the Western red bats found west of the Rocky Mountains) (COSEWIC, 2023). This species undertakes long distance migrations during the spring and fall months, travelling hundreds to thousands of kilometres. Eastern red bats can be found during the winter in southeastern US and in Canada during the summer months. During the day, Eastern red bats can be found roosting within the foliage of trees (and sometimes shrubs) in both coniferous and deciduous forests of any age class; but prefer stands containing overhead/canopy cover and open flight space below. This species is often found roosting alone but can also be found with pups. Maternity roosts for this species are typically found in tall and large diameter trees that reach/exceed the surrounding canopy. Foraging habitat for Eastern red bat includes both open and forested (early and late stage) habitats along with forest edges; heavily disturbed habitats such as transportation corridors, urban developments, or mines are typically avoided by this species. Little is known about migration for this species. Migration is thought to occur across coastal areas and/or large open areas (COSEWIC, 2023).

Hoary bats have the widest range among all native terrestrial mammals within the Western Hemisphere and is found within all provinces and territories in Canada and all states in the US (COSEWIC, 2023). As a result, Hoary bats travel long distances (i.e., across the continent) during migratory periods and their locations vary seasonally. This species can be found during the winter months in coastal regions of Mexico and US, and in the spring, migrate north into Canadian regions. Roosting and maternity habitat characteristics for the Hoary bat mirror the Eastern red bat (described above). Foraging habitat for Hoary bats is associated with open areas that contain patches of trees, such as fields, grasslands, or wetlands; heavily disturbed habitats such as transportation corridors, urban developments, or mines are typically avoided by this species. Little is known about migration habitats for this species. Migration is thought to occur across coastal areas and/or large open areas (COSEWIC, 2023).

The Silver-haired bat is also widely distributed across Canada and US, extending from southern Northwest Territories and from British Columbia to Nova Scotia (COSEWIC, 2023). Similar to the Eastern red bat and Hoary bat, the Silver-hair bat undertakes long distance migrations and their distribution varies seasonally. This species can be found during the winter months in coastal regions of British Columbia and throughout US and Mexico. During the day, Silver-haired bats can be found roosting in the cavities or under the bark of large decaying trees. Maternity roosts are usually small and are typically found in deciduous tree species (especially *Populus spp.*) which often contain decay characteristics suitable for maternity roosts (e.g., centre rot, peeling bark, limb breakages/cavities). Silver-haired bats are also known to use buildings for roosting. Foraging habitat is not well characterized but is typically associated with forested habitats (early and late stage) along with forest edges and openings. Little is known about migration requirements for this species (COSEWIC, 2023).

7.4.4.6 Effects Assessment

Project-Bat Interactions

Project activities, primarily those involving vegetation clearing and turbine operation, have the potential to impact bat and bat habitat (Table 7.66). These activities could result in habitat loss and accidental injury or mortality. Other Project activities during construction and operation may impact bat behaviours such as increased noise and lighting.

Table 7.66: Potential Project-Bat Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Bats				X	X	X						X			

Assessment Boundaries

The LAA for bats includes the Assessment Area, while the RAA includes the Study Area (Drawing 2.2).

Assessment Criteria

Assessment criteria provided in Section 4.6 applies to bats. The VC-specific definition for magnitude is as follows:

- Negligible – no measurable loss of bat habitat or impact to bat behaviours expected.
- Low – small loss of habitat supporting bats, but loss of individuals is not expected.
- Moderate – loss of habitat supporting bats and minimal loss of individuals or impacts to bat behaviours, and these impacts will only be experienced by individuals rather than entire populations.
- High – high loss of habitat that supports bats and/or loss of individuals or impacts to bat behaviours on a population scale.

Effects

Potential impacts to bat species from the Project's construction and operation include:

- Habitat fragmentation and/or removal.
- Direct and indirect mortality.
- Sensory disturbance (i.e., lighting, noise, human activity, etc.).

Habitat Fragmentation and/or Removal

There is limited research and knowledge on how wind farm developments impact habitat suitability and populations of bat species (Segers & Broders, 2014). Vegetation clearing required for construction can result in the removal of bat habitat or the disruption of corridors between important habitat features (foraging grounds, birthing areas, etc.) (Segers & Broders, 2014). In addition, the construction of roads can potentially impede movement, foraging, flight activity, and habitat use (GOC, 2015). One study by Segers & Broders (2014) found that different species of bats respond differently to landscape alteration for wind farm development. Suitable habitat for the Little brown myotis increased after wind turbine installation, which is likely associated with the increase in open areas and forested edges as these are preferred foraging habitats for this species (Segers & Broders, 2014). Alternatively, suitable habitat for Northern myotis bats decreased, likely due to this species' preference to forage in forested areas and around canopy covered streams (Segers & Broders, 2014). Pregnant and lactating female bats have also been shown to be 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).

Potential roosting habitat was observed in select sites within the Study Area, mainly in wetlands containing large snags and mature hardwood forests. However, other significant habitat features, including caves, karst formations, and abandoned mines that could serve as hibernacula or over-wintering sites, were not observed during field assessments and a desktop review found that there is no significant habitat for bats within the Study Area.

Impacts to bats as a result of habitat fragmentation and removal are anticipated to be minimal based on the existing disturbance/fragmentation in the Study Area along with the Project's maximized use of existing roadways and clearings. Habitat fragmentation and removal will be associated with newly constructed roads (totaling 4.75 km in length) and clearing for turbine pads and the transmission line within the Project Area.

Injury/Mortality

Wind project related bat injuries/mortalities are increasingly becoming a concern as some researchers have highlighted that turbines could have a greater impact on bats than birds. Bats have a slower life cycle than birds resulting in adverse impacts to population dynamics when mortalities occur, especially where populations are already small (Wellig et al., 2018). Bat injuries/mortalities can result from either a direct collision with a turbine blade or from barotrauma which is physical damage caused by the sudden decrease in air pressure following rotating blades (GOC, 2015). Reasons for bats colliding with blades include the inability for bats to detect or avoid blades due to high speeds, which can be up to 300 km/hr at the tip of the blade (Wellig et al., 2018). In addition, research suggests that bats are attracted to wind turbines because they attract insects due to their light colour and are often built in high places that coincide with insect hilltopping behaviours (Guest et al., 2022). Swarms of insects that occur alongside wind turbines provide an excellent foraging opportunity for bats, especially migratory species that rely on stopover sites to feed during their migrations (Guest et al., 2022). Wind turbines may also be perceived as potential mating sites or roost trees (Guest et al., 2022; Wellig et al., 2018). A study by Horn et al. (2008) found that bats actively forage near turbines during operation. Through the investigation, researchers observed bats approaching non-rotating and rotating blades, repeatedly investigating turbine elements, following or trapped by blade-tip vortices, and bats colliding with turbine blades (Horn et al., 2008).

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 (Parisé & Walker, 2017; GOC, 2015). Alternatively, *Myotis* species have lower fatality rates due to lower flight elevation and short migrating distances (GOC, 2015). 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 summer, fall, and spring (GOC, 2015). In the COSEWIC Assessment and Status Report on the Hoary bat, Eastern red bat, and Silver-haired bat (COSEWIC, 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.

Bat activity and use of habitat within the Study Area was assessed through passive acoustic monitoring. Bat species identified during monitoring studies include *Myotis* species (i.e., Little brown myotis and/or Northern myotis), Tri-colored bat, Big brown bat, Hoary bat, Silver-haired bat, and Eastern red bat. Fewer resident bats were recorded within the Study Area than migratory bats, which are at a higher risk for turbine related injuries and mortalities due to flight patterns generally occurring at higher elevations and intersecting with the path of turbine blades. However, bat activity is low within the Study Area compared to baseline data collected at the locations of other wind energy projects (Ausenco, 2024).

Nova Scotia does not have specific thresholds or guidance for bat activity/risk levels for proposed wind developments, and therefore, the Alberta model (Alberta Government, 2013) was utilized to evaluate potential effects. This model uses a precautionary principle which establishes project-risk levels based on the number of bat passes per night for migratory species:

- Potentially Acceptable Risk = <1 migratory bat passes per detector night.
- Potentially Moderate Risk = 1-2 migratory bat passes per detector night.
- Potentially High Risk = >2 migratory bat passes per detector night.

The Alberta thresholds listed above are specific to migratory bat species; however, for this assessment, overall bat passes per night (migratory and resident) were compared to the guidelines since there were calls not identified to a single species (e.g., Big brown bat / Silver-haired bat). Based on precautionary guidance from the Alberta Government (2013), the average of 0.14 and 0.18 bat passes per detector night (all species) observed across the Study Area would be considered a “Potentially Acceptable Risk” and is the lowest risk threshold for bats identified. The Alberta Government also states that “Pre-construction surveys indicating less than one migratory-bat passes/detector-night (equating to less than four mortalities per turbine) suggests that bat fatality issues are unlikely; however, post-construction monitoring is required” (Government of Alberta, 2013).

Sensory Disturbance

Noise and light will be generated during all phases of the Project. During construction, decommissioning and reclamation, noise and lighting will be generated by heavy equipment. During operations, noise and light will be generated by wind turbines. During construction and reclamation, noise will occur during daylight hours (typically), and therefore, sensory disturbance should be limited to roosting bats. Project related effects will be associated with noise conditions that exceed those levels whether they be cumulative or independent.

Construction noise (e.g., heavy equipment, blasting, and pile-driving) could potentially affect bats, particularly those species that roost nearby, potentially causing roost abandonment. However, bats are well adapted morphologically, physiologically, and behaviourally to avoid acoustic trauma (CDOT, 2016). Since they are often exposed to the exceptionally loud sounds of their own (and other bat) echolocation signals (e.g., 110 dB), they have evolved protective mechanisms to prevent sensory overload and damage to the auditory system (CDOT, 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 the needed protection from constant noise exposure (i.e., in the case of wind turbines), it is speculated that these mechanisms also can prevent over exposure from sudden, unexpected anthropogenic noise shocks (e.g., blasting).

For bats, echolocation calls are in the ultrasonic range beyond the upper frequency limits of construction noise (CDOT, 2016). For these species, there is effectively no echolocation masking effect from construction noise. Additionally, the usual lack of construction activity during bats’ active 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 both construction, operation, and decommissioning phases of the Project may also impact bat behaviour. During construction/decommissioning, lighting will be a temporary source of sensory disturbance. During operation, turbine lighting will be restricted to the minimums required by Transport Canada for safety. Whereas the Study Area is not associated with particularly high bat activity, the impacts of this necessary lighting to bat behaviour and movements are anticipated to be low.

Mitigation

To address the abovementioned effects to bat and bat habitat, the following mitigation measures will be implemented:

- Minimize overall area to be cleared by utilizing pre-existing roads and previously altered areas (i.e., clearcuts) when possible.

- Target clearing activities outside the active bat window (April 1 to September 30).
- Install motion activated lights on site infrastructure to reduce insect attraction and subsequent attraction by bats. Motion activated lighting is only applicable to the ground-based infrastructure (i.e., at doorways and the substation) as turbine lighting at the top of individual turbines is regulated by Transport Canada.
- Maintain avoidance of potential bat habitat (i.e., large snags, mature forests, and wetlands) to the greatest extent possible.
- Revegetate roadsides and cleared areas to minimize habitat loss to the greatest extent possible.

Monitoring

A detailed Post Construction Bat Monitoring Plan will be developed and submitted to NSECC and NSNRR for review. Monitoring activities may include:

- Passive acoustic monitoring.
- Post-construction bat mortality monitoring.
- Adaptive management/contingency plan if post-construction monitoring identifies significant bat mortality, developed in consultation with NSNRR.

Conclusion

Following mitigations, residual effects to bats following mitigation are characterized as moderate magnitude within the LAA, medium duration, continuous, reversible, and not significant.

7.4.5 Avifauna

7.4.5.1 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 diversity and habitat utilization of avian species within the Study Area during all seasons.
- Use the information collected to inform and refine the Project design (i.e., avoid impacts to SAR and their habitats).
- Assess migratory bird activity and assess the risk that the Project poses to migratory birds.
- Use the information collected to inform mitigation and management practices.

7.4.5.2 Regulatory Context

Applicable laws and regulations relating to the protection of avian species include the following:

- *MBCA*
- *ESA*
- *SARA*

The *MBCA* protects all migratory birds while they are present in Canadian Jurisdiction, including on land, in the air, and on the water. The *ESA* and *SARA* prohibit harm to listed SAR along with their habitually occupied spaces and core/critical habitat.

7.4.5.3 Desktop Review

Desktop information was utilized to gain insight into protected avifauna habitats, species utilization of the area, and to identify SAR/SOCI potentially occurring at or within the Study Area using the following sources:

- Terrestrial Habitat Mapping
- Important Bird Areas (IBAs) (Birds Canada, 2024)
- Maritimes Breeding Bird Atlas (MBBA) (Bird Studies Canada, 2016)
- Nova Scotia Significant Species and Habitats Database (NSNRR, 2023)
- ACCDC Data Report (ACCDC, 2024)

According to habitat mapping (see Section 7.4.1.3), the Assessment Area features 10 habitat types:

- Softwood wet forest (6.27 ha; 3.76%)
- Softwood forests (50.44 ha; 30.20%)
- Mixedwood wet forest (2.84 ha; 1.70%)
- Mixedwood forest (27.68 ha; 16.57%)
- Hardwood wet forest (1.55 ha; 0.93%)
- Hardwood forest (51.63 ha; 30.91%)
- Open wetlands (5.38 ha; 3.22%)
- Open areas (20.46 ha; 12.25%)
- Cutover (0.66 ha; 0.40%)
- Urban/developed (0.12 ha; 0.07%)

On a landscape scale, the Study Area features a higher dominance of softwood stands and softwood wet forest. Much of the forested area is managed for silviculture and has been subject to clear-cutting or thinning activities within the past decade. The diversity of habitat types, in particular the prevalence of edge/transitional habitat, provides for the foraging, breeding, and roosting requirements of a variety of resident and migratory bird species.

The closest IBA in Nova Scotia is Pomquet Beach Region near Antigonish, on mainland Nova Scotia (Birds Canada, 2024), approximately 30 km southwest of the Study Area (Drawing 7.26). This area is known for hosting one of the most stable breeding populations of Piping Plover (*Charadrius melodus*) since the species' decline began. Piping Plover is a COSEWIC-listed endangered species (Birds Canada, 2024). Based on the distance and lack of habitat continuity between the Study Area and this IBA, no interactions with the Project and this IBA are expected.

Three MBBA squares (20PR17, 20PR26, and 20PR27) encompass the entirety of the Study Area (results are provided in Appendix I). Observations for each square are listed below:

- MBBA square 20PR17: First atlas has one possible, zero probable, and zero confirmed breeders. Second atlas had 35 possible, eight probable, and six confirmed breeders. Of these species, there was one SAR: Evening Grosbeak (*Coccothraustes vespertinus*).
- MBBA square 20PR26: First atlas has 48 possible, eight probable, and 10 confirmed breeders. Second atlas has 33 possible, 30 probable, and nine confirmed breeders. Of these species, there are eight SAR: Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Bobolink (*Dolichonyx oryzivorus*), Canada Warbler, Eastern Wood-Pewee (*Contopus virens*), Evening Grosbeak, Olive-sided Flycatcher (*Contopus cooperi*), and Rusty Blackbird (*Euphagus carolinus*).
- MBBA square 20PR27: First atlas has no breeding evidence recorded. Second atlas has 20 possible, 11 probable, and six confirmed breeders. Of these species, there were two SAR: Olive-sided Flycatcher and Rusty Blackbird.

All MBBA summary squares (20PR17, 20PR26, and 20PR27) had Common Nighthawk (*Chordeiles minor*) observations but no observations of breeding evidence were recorded.

The NS Significant Species and Habitats database (NSNRR, 2023) contains 75 unique records pertaining to birds and/or bird habitat within a 10 km radius of the Study Area, none of which overlap with the Study Area (Drawing 7.26). These records include:

- 3 records classified in the database as “Other Habitat”, all of which relate to Bald Eagle (*Haliaeetus leucocephalus*).
- 19 records classified as “Species of Concern” which relate to Common Loon (*Gavia immer*) (2), Tern (unclassified) (11), Boreal Chickadee (*Poecile hudsonicus*) (1), and Common Tern (*Sterna hirundo*) (5).
- 6 records classified as “Migratory Bird” which relate to Tern (unclassified), a saline pond, and Willet (*Tringa semipalmata*) (4).
- 47 records classified as “Species at Risk” which relate to Northern Goshawk (*Accipeter gentilis*) (1), Killdeer (*Charadrius vociferus*) (1), Olive-sided Flycatcher (3), Common Loon (20), Canada Jay (*Perisoreus canadensis*) (1), Eastern Wood-Pewee (2), Boreal Chickadee (1), Ruby-crowned Kinglet (*Regulus calendula*) (13), Golden-crowned Kinglet (*Regulus satrapa*) (5).

The NS Significant Species and Habitats database (NSNRR, 2023) contains 4,822 unique records pertaining to birds and/or bird habitat within a 100 km radius of the Study Area. These records include, but are not limited to:

- 2,352 records classified in the database as “Other Habitat”, most of which relate to Bald Eagle (2,143) and Osprey (*Pandion haliaetus*) (177).

- 437 records classified as “Migratory Bird”, many of which relate to Double-crested Cormorant (*Phalacrocorax auritus*) (100), Great Blue Heron (*Ardea herodias*) (51), and Common Eider (*Somateria mollissima*) (83).
- 806 records classified as “Species of Concern,” many of which relate to Tern (unclassified) (209), Northern Goshawk (93), and Boreal Chickadee (83).
- 1,227 records classified as “Species at Risk”, many of which relate to Yellow-bellied Flycatcher (*Empidonax flaviventris*) (74), Swainson’s Thrush (*Catharus ustulatus*) (46), Ruby-crowned Kinglet (129), Piping Plover (48), Double-crested cormorant (46), Common Tern (46), Common Eider (47), Boreal Chickadee (54), and Canada Warbler (70).

The ACCDC database contains records of 110 bird species within a 100 km radius of the Study Area (Table 7.67).

Table 7.67: Bird Species Recorded within a 100 km Radius of the Study Area

Common Name	Scientific Name	*SARA* Status	*ESA* Status	COSEWIC Status	NS S-Rank
American Bittern	*Botaurus lentiginosus*	---	---	---	S3S4B,S4S5M
American Coot	*Fulica americana*	---	---	Not At Risk	S1B
American Golden-Plover	*Pluvialis dominica*	---	---	---	S2S3M
American Goshawk	*Accipiter atricapillus*	---	---	Not at Risk	S3S4
American Kestrel	*Falco sparverius*	---	---	---	S3B,S4S5M
American Three-toed Woodpecker	*Picoides dorsalis*	---	---	---	S1?
Arctic Tern	*Sterna paradisaea*	---	---	---	S3B
Atlantic Puffin	*Fratercula arctica*	---	---	---	S2B
Baltimore Oriole	*Icterus galbula*	---	---	---	S2S3B,SUM
Bank Swallow*	*Riparia riparia*	Threatened	Endangered	Threatened	S2B
Barn Swallow*	*Hirundo rustica*	Threatened	Endangered	Special Concern	S3B
Bay-breasted Warbler	*Setophaga castanea*	---	---	---	S3S4B,S4S5M
Bicknell's Thrush	*Catharus bicknelli*	Threatened	Endangered	Threatened	S1B
Black Tern		---	---	Not at Risk	S1B
Black-backed Woodpecker*	*Picoides arcticus*	---	---	---	S3S4
Black-bellied Plover	*Pluvialis squatarola*	---	---	---	S3M
Black-billed Cuckoo	*Coccyzus erythropthalmus*	---	---	---	S3B
Black-crowned Night-heron		---	---	---	S1B
Black-headed Gull	*Chroicocephalus ridibundus*	---	---	---	S3N

Common Name	Scientific Name	*SARA* Status	*ESA* Status	COSEWIC Status	NS S-Rank
Black-legged Kittiwake	*Rissa tridactyla*	---	---	---	S2S3B
Blackpoll Warbler	*Setophaga striata*	---	---	---	S3B,S5M
Blue-winged Teal	*Spatula discors*	---	---	---	S3B
Bobolink*	*Dolichonyx oryzivorus*	Threatened	Vulnerable	Special Concern	S3B
Boreal Chickadee*	*Poecile hudsonicus*	---	---	---	S3
Boreal Owl	*Aegolius funereus*	---	---	Not At Risk	S2?B,SUM
Brant	*Branta bernicla*	---	---	---	S3M
Brown Thrasher	*Toxostoma rufum*	---	---	---	S1B
Brown-headed Cowbird	*Molothrus ater*	---	---	---	S2B
Canada Jay*	*Perisoreus canadensis*	---	---	---	S3
Canada Warbler*	*Cardellina canadensis*	Threatened	Endangered	Special Concern	S3B
Cape May Warbler	*Setophaga tigrina*	---	---	---	S3B,SUM
Chimney Swift	*Chaetura pelagica*	Threatened	Endangered	Threatened	S2S3B,S1M
Cliff Swallow	*Petrochelidon pyrrhonota*	---	---	---	S2S3B
Common Eider	*Somateria mollissima*	---	---	---	S2B,S2N,S4M
Common Goldeneye	*Bucephala clangula*	---	---	---	S4B,S4N,S5M
Common Murre	*Uria aalge*	---	---	---	S1?B
Common Nighthawk*	*Chordeiles minor*	Threatened	Threatened	Special Concern	S3B
Common Tern*	*Sterna hirundo*	---	---	Not At Risk	S3B
Cooper's Hawk	*Accipiter cooperii*	---	---	Not At Risk	S1?B,SUN,SUM
Eastern Bluebird	*Sialia sialis*	---	---	Not At Risk	S3B
Eastern Kingbird	*Tyrannus tyrannus*	---	---	---	S3B
Eastern Meadowlark	*Sturnella magna*	Threatened	---	Threatened	SHB
Eastern Whip-Poor-Will	*Antrostomus vociferus*	Threatened	Threatened	Special Concern	S1?B
Eastern Wood-Pewee*	*Contopus virens*	Special Concern	Vulnerable	Special Concern	S3S4B
Evening Grosbeak*	*Coccothraustes vespertinus*	Special Concern	Vulnerable	Special Concern	S3B,S3N,S3M
Fox Sparrow*	*Passerella iliaca*	---	---	---	S3S4B,S5M
Gadwall	*Mareca strepera*	---	---	---	S2B,SUM
Great Cormorant	*Phalacrocorax carbo*	---	---	---	S2S3B,S2S3N
Great Crested Flycatcher	*Myiarchus crinitus*	---	---	---	S1B

Common Name	Scientific Name	*SARA* Status	*ESA* Status	COSEWIC Status	NS S-Rank
Greater Yellowlegs	*Tringa melanoleuca*	---	---	---	S3B,S4M
Harlequin Duck – Eastern population	*Histrionicus histrionicus pop. 1*	Special Concern	Endangered	Special Concern	S2S3N,SUM
Horned Grebe	*Podiceps auritus*	Special Concern	---	Special Concern	S3N,SUM
Horned Lark	*Eremophila alpestris*	---	---	---	SHB,S4S5N,S5M
Hudsonian Godwit	*Limosa haemastica*	---	---	Threatened	S2S3M
Indigo Bunting	*Passerina cyanea*	---	---	---	S1?B,SUM
Ipswich Sparrow	*Passerculus sandwichensis princeps*	Special Concern	---	Special Concern	S1B
Killdeer*	*Charadrius vociferus*	---	---	---	S3B
Lapland Longspur	*Calcarius lapponicus*	---	---	---	S3?N,SUM
Laughing Gull	*Leucophaeus atricilla*	---	---	---	SHB
Leach's Storm-Petrel	*Hydrobates leucorhous*	---	---	Threatened	S3B
Least Sandpiper	*Calidris minutilla*	---	---	---	S1B,S4M
Lesser Yellowlegs	*Tringa flavipes*	---	---	Threatened	S3M
Long-eared Owl	*Asio otus*	---	---	---	S2S3
Nelson's Sparrow*	*Ammospiza nelsoni*	---	---	Not At Risk	S3S4B
Northern Gannet*	*Morus bassanus*	---	---	---	SHB
Northern Mockingbird	*Mimus polyglottos*	---	---	---	S1B
Northern Pintail	*Anas acuta*	---	---	---	S1B,SUM
Northern Shoveler	*Spatula clypeata*	---	---	---	S2B,SUM
Northern Shrike	*Lanius borealis*	---	---	---	S3S4N
Olive-sided Flycatcher*	*Contopus cooperi*	Threatened	Threatened	Special Concern	S3B
Pectoral Sandpiper	*Calidris melanotos*	---	---	---	S3M
Peregrine Falcon - anatum/tundrius	*Falco peregrinus pop. 1*	Special Concern	Vulnerable	Not At Risk	S1B,SUM
Philadelphia Vireo	*Vireo philadelphicus*	---	---	---	S2?B,SUM
Pine Grosbeak	*Pinicola enucleator*	---	---	---	S3B,S5N,S5M
Pine Siskin	*Spinus pinus*	---	---	---	S3
Pine Warbler	*Setophaga pinus*	---	---	---	S2S3B,S4S5M
Piping Plover melodus subspecies	*Charadrius melodus melodus*	Endangered	Endangered	Endangered	S1B
Purple Martin	*Progne subis*	---	---	---	SHB
Purple Sandpiper	*Calidris maritima*	---	---	---	S3S4N
Razorbill	*Alca torda*	---	---	---	S2B

Common Name	Scientific Name	*SARA* Status	*ESA* Status	COSEWIC Status	NS S-Rank
Red Crossbill	*Loxia curvirostra*	---	---	---	S3S4
Red Knot rufa subspecies	*Calidris canutus rufa*	Endangered	Endangered	Endangered, Special Concern	S2M
Red Phalarope	*Phalaropus fulicarius*	---	---	---	S2S3M
Red-breasted Merganser	*Mergus serrator*	---	---	---	S3S4B,S5M ,S5N
Redhead	*Aythya americana*	---	---	---	SHB
Red-necked Phalarope	*Phalaropus lobatus*	Special Concern	---	Special Concern	S2S3M
Roseate Tern	*Sterna dougallii*	Endangered	Endangered	Endangered	S1B
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	---	---	---	S3B
Rough-legged Hawk	*Buteo lagopus*	---	---	Not At Risk	S3N
Ruddy Duck	*Oxyura jamaicensis*	---	---	---	S1B
Ruddy Turnstone	*Arenaria interpres*	---	---	---	S3M
Rusty Blackbird*	*Euphagus carolinus*	Special Concern	Endangered	Special Concern	S2B
Sanderling	*Calidris alba*	---	---	---	S2N,S3M
Scarlet Tanager	*Piranga olivacea*	---	---	---	S2B,SUM
Semipalmated Plover	*Charadrius semipalmatus*	---	---	---	S1B,S4M
Semipalmated Sandpiper	*Calidris pusilla*	---	---	---	S3M
Short-billed Dowitcher	*Limnodromus griseus*	---	---	---	S3M
Short-eared Owl	*Asio flammeus*	Special Concern	---	Threatened	S1B
Spotted Sandpiper*	*Actitis macularius*	---	---	---	S3S4B,S5M
Tennessee Warbler	*Leiothlypis peregrina*	---	---	---	S3S4B,S5M
Turkey Vulture	*Cathartes aura*	---	---	---	S2S3B,S4S 5M
Vesper Sparrow	*Pooecetes gramineus*	---	---	---	S1S2B,SUM
Virginia Rail	*Rallus limicola*	---	---	---	S2S3B
Warbling Vireo	*Vireo gilvus*	---	---	---	S1B,SUM
Whimbrel	*Numenius phaeopus hudsonicus*	---	---	---	S2S3M
Willet*	*Tringa semipalmata*	---	---	---	S3B
Willow Flycatcher	*Empidonax traillii*	---	---	---	S2B
Wilson's Snipe*	*Gallinago delicata*	---	---	---	S3B,S5M
Wilson's Warbler	*Cardellina pusilla*	---	---	---	S3B,S5M
Wood Thrush	*Hylocichla mustelina*	Threatened	---	Threatened	SUB

Source: (ACCDC, 2024)
*Found within a 5km buffer around the Study Area

7.4.5.4 Field Survey Methodology

Several types of survey methods were employed to assess the avian species using the Study Area during various seasons in 2022. Fall migration surveys were used in tandem with spring migration surveys to determine the migratory species that are moving through or over the Study Area, though at a different time of year. In Nova Scotia, the fall migration period lasts from late August through late October for most species, while spring migration generally occurs between April and early June. These surveys included point counts and diurnal watches. Breeding bird surveys, including point count surveys and area surveys, were conducted during breeding season to determine breeding species present within the Study Area.

Additionally, any birds that were observed during winter Canada lynx surveys completed on March 1 and March 5, 2023 were recorded as incidental observations. All other bird observations made during additional biophysical field surveys were also recorded as incidental observations.

Survey methods were based on the protocols recommended in the document Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds (CWS, 2007), unless otherwise stated. Survey locations were spread throughout the Study Area to provide a comprehensive assessment of bird activity within the region and to accommodate previous Project layouts.

Spring and Fall Migration Point Count Surveys

Surveys began at, or within half an hour of, sunrise and effort was made to complete surveys within four to five hours of sunrise. Each point count (PC) was surveyed for a duration of 10 minutes. At each PC, a handheld Garmin GPS unit was used to geo-reference the location. During each survey, weather conditions (i.e., temperature, wind speed, precipitation, and visibility) were monitored and bird observations were recorded at three distance regimes: within a 50 m radius, 50 to 100 m radius, and outside the 100 m radius. All birds identified (auditory and/or visual) were recorded by species, including age and sex if known. Breeding behaviour and fly-overs were also documented (e.g., altitude and flight direction). Surveys were not conducted in wind speeds over 3 on the Beaufort scale (12-19 km/hr), when noise levels make it difficult to hear or distinguish bird calls, or in rain that was more than a light drizzle. Any birds observed outside PC locations or outside allocated survey time were recorded if novel (e.g., not observed during any other survey),SAR/SOCI, or species displaying breeding or other noteworthy behaviour(s).

Diurnal Watch Surveys

Diurnal watch counts (DWC) occurred after the morning point count surveys during spring and fall migration surveys. Each survey was three hours in length (with data recorded in 30-minute time blocks, completed in sets of six). Data collection protocols matched those of the migration PC surveys, with a focus on fly-over activity (e.g., altitude and flight direction). During each survey, weather conditions (i.e., temperature, wind speed, precipitation, and visibility) were monitored and bird observations were recorded at three distance regimes: within a 50 m radius, 50 to 100 m radius, and outside the 100 m radius. Fly-overs were documented, with a focus on height, direction, and any migration behaviour observed. Surveys were not conducted in wind speeds over 3 on the Beaufort scale (12-19 km/hr), when noise levels make it difficult to hear or distinguish bird calls, or in rain that was more than a light drizzle.

Breeding Bird Surveys

The methods for breeding bird surveys mirror those described for spring and fall migration PC surveys with the addition of area searches and surveying for breeding evidence within the Study Area. Area searches are recommended by CWS during the breeding season to visit more habitat types and/or search habitats more thoroughly for species use during the breeding season. Qualified biologists conducted area searches either before the morning survey, between PC locations during the morning breeding bird survey, or after the morning survey in different areas. Meandering, non-standardized transects were completed and focused on new habitat or habitat with notable high activity. Area searches do not require standardized effort; however, GPS tracks were recorded. Area searches were approximately between 10 to 165 minutes in length, with an average of 30 to 60 minutes; the level of effort required was dependent on the quality of habitat present. All bird observations were recorded in the same manner as the PC location method but with a focus on novel species, SAR/SOCI, and breeding evidence.

The breeding status of all bird species observed was also recorded. The surveyor documented all bird behaviours, such as distraction display, carrying food, and carrying nesting material. These various breeding evidence codes then determined the breeding status for each species (Bird Studies Canada, 2016).

Nightjar Surveys

Nightjar surveys consisted of a six-minute passive surveying period at each nightjar PC location (hereafter CONI PC). This survey did not employ call playback or use of flashlights, as per survey protocol by Birds Canada (2022). CONI PCs were on roads and ATV trails spread throughout the Study Area. As per survey protocol, effort was made to choose PC locations with little noise and surveys were completed between June 15 and July 15 (Birds Canada, 2022). Surveys were not conducted in wind speeds greater than Beaufort scale 3, when rain was heavier than a light drizzle, or if noise levels were high enough to affect the surveyor's hearing. Site conditions recorded included weather conditions, cloud cover, time effort, number of cars passing by, and if the moon was visible. All individual nightjar observations were recorded, including behaviours such as vocalizations or wing booms, as well as the sex, distance to surveyor, bearing, and time the observation occurred (e.g., what type of observation or behaviour was observed when) (Birds Canada, 2022). Any other birds observed during the nightjar surveys were also recorded as incidentals.

Habitat Modelling Methodology

Habitat modelling for SAR observed during the 2022 breeding bird and nocturnal surveys, or incidentally during breeding season in 2024 was completed. Breeding habitat preferences for these species were incorporated into a GIS model, which was used to estimate the quality and quantity of breeding habitat for each species. The model criterion for each species is summarized below.

Canada Warbler

Breeding habitat preferences for Canada Warbler include poorly draining forests with a dense, deciduous shrub layer, available perch trees, and an undulating forest floor dominated by cinnamon fern and sphagnum moss (ECCC, 2016a). Forest data was queried to include the FORNON code of 39 which is an area where alders compose 75% or more of the crown closure, in part. The leading species (SP1) attribute of red maple (RM), balsam fir (BF), and black spruce (BS) were used. The WAM database was filtered to include values of up to 0.5 m, narrowing the results to moist to wet forests with a dense shrub layer. Furthermore, to account for wetland features and their respective edge habitat, the Canadian Wetland Inventory (CNWI) data was included.

Common Nighthawk

Common Nighthawk breeding habitat includes open ground/clearings for nesting, including sandy areas, open forests, grasslands, wetlands, and barrens or other rocky areas (ECCC, 2016b). To identify open ground and cleared areas within the Study Area, a 10 m buffer was applied to unpaved trails within the Study Area. Furthermore, the land cover types 'urban, landfill, quarry, transport corridor', 'utility corridor', and 'blueberries or barren' were filtered. The CNWI was filtered to include only open wetland types (e.g., bog, bog or fen, fen, marsh). Identification of additional open ground areas was conducted using manual classification based on aerial imagery.

Eastern Wood-Pewee

Eastern Wood-Pewee nest in a wide variety of deciduous tree species, with preference for mature, open forest habitat with a tall canopy (COSEWIC, 2012b). All hardwood dominated stands were included from the land cover dataset. In addition, SP1 was filtered from the Forest Inventory based on all hardwood species with the criteria of crown closure being greater than 70%.

Evening Grosbeak

Breeding habitat preferences of Evening Grosbeak include second-growth, mature, and old growth softwood and softwood-dominant mixedwood forests. Large, mature mixedwood stands with high percentages of fir (*Abies* spp.), spruce (*Picea* spp.), larch (*Larix* spp.), pine (*Pinus* spp.) and aspen (*Populus* spp.) are preferred nesting habitat (ECCC, 2022b). To identify nesting habitat, the Forest Inventory was queried to identify stands where aspen was the leading species (SP1); no stands were identified within the Study Area. A second query was conducted to include all stands where pine, fir, spruce, and larch species composed greater than 50% but less than 70% of a given stand. Harvests were included from the land cover dataset to account for areas of second-growth.

Olive-sided Flycatcher

Olive-sided Flycatcher breeding habitat is commonly observed in mature, open or patchy softwood or softwood-dominant mixedwood forests located near water or wetlands (ECCC, 2016c). Forest stands that have been influenced by natural disturbance (e.g., recent burns) or harvesting may be preferred due to the high availability of open or edge habitat (ECCC, 2016c). Using the forest inventory, forest data was queried to include the leading species (SP1) attribute of black spruce (BS), red spruce (RS), white spruce (WS), Scots pine (SP), red pine (RP), jack pine (JP), and eastern hemlock (EH), if present. Harvest land cover class and plantation records were included, as well as the CNWI data and natural regeneration areas. Burn data was also included but no burn areas have been recorded in the Study Area; the nearest burn area is approximately 1.3 km from the edge of the Study Area.

7.4.5.5 Remote Sensing Methodology

Avian Radar and Avian Acoustic Assessments were completed between 2022 and 2023 by Ausenco Sustainability ULC (Ausenco 2023a; Ausenco 2023b). Refer to Appendix I for detailed methods and results associated with these monitoring programs; see summarized methodologies below.

Avian Radar Assessment

Avian Radar Assessments were conducted over two years within the Study Area (Drawing 7.27A-G). During the spring season, radar data were collected from April 13 to June 7, 2022, and April 27 to June 15, 2023. During the fall season, radar data were collected from July 7 to November 17, 2022, and July 13 to November 15, 2023. The radar system used was a Furuno (Camas, Washington, USA) 1962 BB marine radar that operated in the microwave X-band [9410 ± 30 Megahertz (MHz), 25 kilowatt (kW)] with a 6-foot XN13A open-array antenna with a beam width of approximately 22 degrees in the horizontal plane and approximately 1.35 degrees in the vertical plane. The radar was mounted on a custom support framework in a vertical orientation to monitor the altitude of targets and was run in short pulse mode (2100 pulses per second) at 24 revolutions per minute (rpm). The radar system was stationed in the northern portion of the Study Area. The radar was calibrated while in a horizontal orientation using targets at a known distance. The radar signal was digitized at 4.5 m range resolution with an azimuth resolution of 1.35 degrees using a DSPNOR ScanStreamer.

During the 2022 monitoring year, data was saved on external hard drives and later analyzed using Cognitive Marine Tracker (CMT) radar analysis software, from the Cognitive Radar Corporation. Targets were defined as radar detections that were extracted over background noise if they were at least 6 pixels in size, and the sensitivity to detect targets over the threshold in the CMT software (Pfa setting) was set at 0.02. This data analysis assumes that most targets were migratory birds once the data was filtered for non-birds, though targets may have included insects, bats, clutter, or precipitation.

To filter out insects and birds on the periphery of the beam at close range, the peak power of the radar return for each target (“peak_val setting”) was used and corrected for range. The numbers of targets in five-minute intervals across the entire season were then correlated with acoustic data, to determine a threshold above which there was confidence in classifying the target as a bird. The correlation between acoustic and radar detections plateaued at a scaled intensity of 18, so targets below that threshold were removed from the analysis.

Radar data was visually inspected to determine periods of rain, which were excluded from analysis. Targets below 70 m above ground-level (agl) were also eliminated because they are contaminated by ground clutter. Targets were then extracted from individual "columns" of air starting at a distance along the ground between 300 m and 320 m from the radar.

During the 2023 monitoring year, radar processing methods were altered, and occurred using a two-stage process: 1) raw data were processed locally throughout the sampling period and then uploaded to a remote server each hour, and 2) once uploaded, the data underwent a secondary data cleaning. Both processing stages used the open-source software package radR (Taylor et al., 2010). The data were processed autonomously during the first stage, producing a series of blipmovies and associated SQLite databases containing target detections as an output. These initial targets were determined according to relatively liberal parameters, and therefore included radar clutter as well as smaller non-bird and non-bat targets. Once uploaded to the remote server, the database could be downloaded by analysts for further processing.

During the second stage, the blipmovies were processed further using more conservative parameters to remove radar clutter and non-bird targets, to the extent possible. The data were filtered to remove detections that fell beyond a specific distance from the radar, thus narrowing the sampling area to only capture activity within a vertical column a set distance from the radar. The data were also filtered to remove periods of heavy rain using an automated process, and to remove all targets that were below 70 m agl.

In both 2022 and 2023 monitoring years, the remaining targets formed the datasets used to describe temporal and spatial trends in migratory birds, including observations above and below 200 m in altitude, as well as the influence of weather. The 200 m threshold was selected based on the proposed turbine height for the Project. Two response variables were derived from the compiled radar data. The first was the number of targets detected in each hourly period across all nights (i.e., flight volume). The second was the ratio of the number of targets detected below and above 200 m in altitude [i.e., proportion of targets within the Rotor Swept Zone (RSZ)]. Weather data (wind speed and direction, pressure, temperature, and humidity) were acquired from the National Centres for Environmental Prediction (NCEP) and downloaded using the software R (V 4.0.4) via the RNCEP package (R Core Team, 2023).

Simple models were fit to show the dominant relationships between the two response variables described above and the weather variables. Furthermore, since relationships between wind speed, wind direction and the number of birds aloft can also be complex, a 'tailwind assistance' variable was used to provide a measure of how much the wind would assist a given bird flying in a specific direction. Tailwind assistance was calculated assuming migrants are flying in a direction of 45 degrees during spring and 225 degrees in the fall. To assess how targets differed at migratory initiation (sunset), cessation (sunrise) and during the night, terms were fit for time of night. The R package 'tidyverse' (Wickham et al., 2019) was used for data manipulation and visualization and the function 'glmer' in package 'lme4' (Bates et al., 2015) was used for statistical modelling.

Avian Acoustic Assessment

Avian acoustic assessments were conducted over two years within the Study Area. During the spring season, acoustic data were recorded from April 13 to June 7, 2022, and April 21 to June 15, 2023. During the fall season, radar data were collected from July 7 to November 17, 2022, and July 13 to November 20, 2023. In 2022, a network of eight acoustic sensors (Audiomoths™) were placed within the Study Area, with one sensor placed at the radar unit, and seven sensors distributed throughout the remainder of the Study Area. In 2023, an additional three sensors were deployed. Sensors were placed a minimum of approximately 500 m apart in open areas with a clear view of the sky to reduce the potential for duplicate sampling of airspace and to capture nocturnal migrants throughout the Study Area.

The acoustic sensors were programmed to begin recording approximately one hour before the end of evening civil twilight (or 30 minutes before sunset), and finish recording one hour after the beginning of morning civil twilight (or 30 minutes after sunrise). The sensors were checked approximately every 30 days to replace batteries and download data onto an external hard drive.

All acoustic files were processed using a custom-built artificial intelligence nocturnal flight call (NFC) detection model to identify bird species and species groups (Table 7.68).

Table 7.68: Nocturnal Flight Calls for Potential Species and Species Groups Detected in 2022 and 2023

Species / Species Group	Potential Species*
Cup Sparrows	• Chipping Sparrow (*Spizella passerine*) • Field Sparrow (*Spizella pusilla*) • American Tree Sparrow (*Spizelloides arborea*)
Fox / Song Sparrow Complex	• Fox Sparrow (*Passerella iliaca*) • Song Sparrow (*Melospiza melodia*)
Zeep	• Bay-breasted Warbler (*Setophaga castanea*) • Blackburnian Warbler (*Setophaga fusca*) • Blackpoll Warbler (*Setophaga striata*) • Cape May Warbler (*Setophaga tigrina*) • Magnolia Warbler (*Setophaga magnolia*) • Northern Waterthrush (*Parkesia noveboracensis*) • Yellow Warbler (*Setophaga petechia*)
Single-banded down sweep	• Pine Warbler (*Setophaga pinus*) • Northern Parula (*Setophaga americana*) • Yellow-throated Warbler (*Setophaga dominica*) • Prairie Warbler (*Setophaga discolor*)
Double-up	• Black-throated Green Warbler (*Setophaga virens*) • Tennessee Warbler (*Leiothlypis peregrina*) • Nashville Warbler (*Leiothlypis ruficapilla*) • Orange-crowned Warbler (*Leiothlypis celata*)

Species / Species Group	Potential Species*
Thrushes	• Hermit Thrush (*Catharus guttatus*) • American Robin (*Turdus migratorius*) • Swainson's Thrush (*Catharus ustulatus*) • Veery (*Catharus fuscescens*) • Grey-cheeked Thrush (*Catharus minimus*) • Bicknell's Thrush (*Catharus bicknelli*) • Eastern Bluebird (*Sialia sialis*) • Wood Thrush (*Hylocichla mustelina*) • Rose-breasted Grosbeak (*Pheucticus ludovicianus*) • Scarlet Tanager (*Piranga olivacea*)
Full Species	Sparrows: • White-throated sparrow (*Zonotrichia albicollis*) • Savannah Sparrow (*Passerculus sandwichensis*) Warblers: • American Redstart (*Setophaga ruticilla*) • Black-and-white Warbler (*Mniotilta varia*) • Black-throated Blue Warbler[1] (*Setophaga caerulescens*) • **Canada Warbler (*Cardellina canadensis*)** • Chestnut-sided Warbler (*Setophaga pensylvanica*) • Common Yellowthroat (*Geothlypis trichas*) • Mourning Warbler (*Geothlypis philadelphia*) • Ovenbird (*Seiurus aurocapilla*) • Palm Warbler (*Setophaga palmarum*) • Wilson's Warbler[2] (*Cardellina pusilla*) • Yellow-rumped Warbler (*Setophaga coronata*) Other: • **Common Nighthawk (*Chordeiles minor*)** • American Woodcock (*Scolopax minor*) Poorly detected/classified (not included): • Wilson's Warbler[1] (*Cardellina pusilla)* • Red-breasted Nuthatch (*Sitta canadensis*) • Pine Siskin (*Spinus pinus*) • Golden-crowned Kinglet (*Regulus satrapa*)

Note: * = Species in bold are federally listed under the ***SARA*** (S.C. 2002, c. 29; Government of Canada 2021).
[1]Identified in 2022 only
[2]Identified in 2023 only

7.4.5.6 Field Survey Results

Results for field surveys in 2022, as well as incidental observation made between 2022 and 2024 are summarized below. Avifauna winter surveys were conducted opportunistically during the winter Canada lynx surveys on March 1 and March 5, 2023. The weather on both survey days was described as a mix of sun and cloud with light to moderate wind and a temperature of approximately -5°C.

2022 Spring Migration Surveys

Spring surveys were completed within the Study Area between April 12 and May 27, 2022 (Table 1, Appendix I). The surveys included 41 10-minute point counts, and four 180-minute diurnal watches, which were repeated over five survey rounds (Drawing 7.27A-G).

A total of 81 species, comprising 2,501 individual birds were observed in the Study Area during spring migration point count surveys (Table 7.69; Tables 2 and 3, Appendix I). American Robin (*Turdus migratorius*) (n=228) and White-winged Crossbill (*Loxia leucoptera*) (n=205) were the most abundantly observed species. Migrant and resident passerines accounted for 90.8% of individual birds, and 72.8% of species observed.

Table 7.69: Total Observations by Bird Group – 2022 Spring Migration Point Count Surveys

Bird Group	Group #	# Individuals	# Species
Waterfowl	1	33	4
Shorebirds	2	19	2
Other Waterbirds	3	0	0
Diurnal Raptors	4	20	6
Nocturnal Raptors	5	3	1
Passerines	6	2271	59
Other Landbirds	7	155	9
Total		**2501**	**81***

*Does not include unknowns

Three avian SAR (Canada Warbler, Evening Grosbeak, and Peregrine Falcon) and six SOCI [American Robin, Boreal Chickadee, Canada Jay, Cape May Warbler (*Setophaga tigrine)*, Pine Siskin (*Spinus pinus)*, and Rose-breasted Grosbeak (*Pheucticus ludovicianus*)] were observed during the spring migration surveys. The Bay-breasted Warbler (*Setophaga castanea*) (S4S5M), Blackpoll Warbler (*Setophaga striata*) (S5M), Pine Grosbeak (*Pinicola enucleator*) (S5M), Spotted Sandpiper (*Actitis macularius*) (S5M), and Wilson's Snipe (*Gallinago delicata*) (S5M) are not considered SOCI due to their ACCDC S-Ranks during the migration season. During the spring migration PC and DWC surveys, there were multiple observations of breeding behaviour that would designate these species as either having a probable or confirmed breeding status (Bird Studies Canada, 2016).

A total of 54 species comprising 711 individual birds were observed in the Study Area during spring migration diurnal watch surveys (Table 7.70; Table 4 and 5, Appendix I). American Goldfinch (*Spinus tristis)* (n=155) was the most abundantly observed species. Several soaring species were observed, including seven diurnal raptor species. Migrant and resident passerines accounted for 92.5% of individual birds, and 72.2% of species observed.

Table 7.70: Total Observations by Bird Group – 2022 Spring Migration Diurnal Watch Surveys

Bird Group	Group #	# Individuals	# Species
Waterfowl	1	0	0
Shorebirds	2	1	1
Other Waterbirds	3	0	0
Diurnal Raptors	4	21	7
Nocturnal Raptors	5	1	1
Passerines	6	658	39
Other Landbirds	7	30	6
Total		**711**	**54***

*Does not include unknowns

One SAR (Peregrine Falcon) and five SOCI (American Robin, Boreal Chickadee, Canada Jay, Cape May Warbler, and Pine Siskin) were observed during these surveys. The American Kestrel (*Falco sparverius*) (S4S5M) and Wilson's Warbler (S5M) are not considered SOCI due to their ACCDC S-Ranks during migration season.

During the 2022 spring migration surveys, there were no general migratory patterns noted within the Study Area (e.g., specific migratory areas/corridors or flocks of birds numbering in the hundreds).

2022 Fall Migration Surveys

Fall migration surveys were completed between August 15 and October 30, 2022 (Table 6, Appendix I). The surveys included 36 10-minute point counts and four 180-minute diurnal watches, which were repeated over five survey rounds (Drawing 7.27A-G).

A total of 63 species, comprising 1,093 individual birds, were observed during the fall migration point count surveys (Table 7.71; Tables 7 and 8, Appendix I). Black-capped Chickadee (*Poecile atricapilla*) (n=161) and American Robin (n=93) were the most abundant species. Migrant and resident passerines accounted for 85.9% of the individual birds, and 71.4% of the species observed.

Table 7.71: Total Observations by Bird Group – 2022 Fall Migration Point Count Surveys

Bird Group	Group #	# Individuals	# Species
Waterfowl	1	7	1
Shorebirds	2	33	4
Other Waterbirds	3	0	0
Diurnal Raptors	4	15	5
Nocturnal Raptors	5	2	1
Passerines	6	939	45
Other Landbirds	7	97	7
Total		**1093**	**63**

*Does not include unknowns

One avian SAR (Canada Warbler) and five SOCI (American Robin, Boreal Chickadee, Canada Jay, Northern Goshawk, and Pine Siskin) were observed. The American Kestrel (S4S5M), Bay-breasted Warbler (S4S5M), Blackpoll Warbler (S5M), Fox Sparrow (*Passerella iliaca*) (S5M), Spotted Sandpiper (S5M), and Wilson's Snipe (S5M) were not considered SOCI due to their ACCDC S-Ranks during the migration season. Two male and female pairs of Common Yellowthroats (*Geothlypis trichas*) were observed, which designates this species as having a confirmed breeding status (Bird Studies Canada, 2016).

A total of 43 species, comprising 557 individual birds were observed during fall migration diurnal watch surveys (Table 7.72; Tables 4 and 8, Appendix I). American Robin (n=82), Black-capped Chickadee (n=74), and Dark-eyed Junco (*Junco hyemalis*) (n=73) were the most abundantly observed species. Migrant and resident passerines accounted for 93.9% of the individual birds, and 74.4% of the species observed.

Table 7.72: Total Observations by Bird Group – 2022 Fall Migration Diurnal Watch Surveys

Bird Group	Group #	# Individuals	# Species
Waterfowl	1	0	0
Shorebirds	2	1	1
Other Waterbirds	3	0	0
Diurnal Raptors	4	12	6
Nocturnal Raptors	5	0	0
Passerines	6	523	32
Other Landbirds	7	21	4
Total		**557**	**43***

*Does not include unknowns

One avian SAR (Olive-sided Flycatcher) and five SOCI (American Robin, Boreal Chickadee, Canada Jay, Northern Goshawk, and Pine Siskin) were observed during these surveys. The American Kestrel (S4S5M) and Pine Grosbeak (S5M) are not considered SOCI due to their ACCDC S-Ranks during the migration season.

During the 2022 fall migration surveys, there were no general migratory patterns noted within the Study Area (e.g., specific migratory areas/corridors or flocks of birds numbering in the hundreds).

2022 Breeding Bird Surveys

Breeding bird surveys were conducted within the Study Area between June 7 and July 1, 2022 (Table 9, Appendix I). In total, 41 10-minute point counts were completed across the Study Area repeated over two survey rounds, as well as approximately 39 hours of area searches over these two rounds (Drawing 7.27A-G). A total of 1,361 individual birds, representing 70 species, were observed (Table 7.73; Tables 10 and 11, Appendix I). The most abundant and frequently observed species were Ovenbird (*Seiurus aurocapilla)* (n=104) and Hermit Thrush (*Catharus guttatus*) (n=96). Passerines accounted for 94.1% of individuals birds observed, and

80% of species observed. All species recorded were observed in suitable nesting habitat during the breeding season.

Table 7.73: Total Observations by Bird Group – 2022 Breeding Bird Point Count Surveys

Bird Group	Group #	# Individuals	# Species
Waterfowl	1	3	1
Shorebirds	2	11	1
Other Waterbirds	3	1	1
Diurnal Raptors	4	8	2
Nocturnal Raptors	5	1	1
Passerines	6	1281	56
Other Landbirds	7	56	8
Total		**1361**	**70***

*Does not include unknowns

Three avian SAR (Canada Warbler, Common Nighthawk, and Olive-sided Flycatcher) and 12 SOCI [Bay-Breasted Warbler, Blackpoll Warbler, Boreal Chickadee, Canada Jay, Cape May Warbler, Northern Goshawk, Northern Mockingbird (*Mimus polyglottos*), Pine Siskin, Red Crossbill (*Loxia curvirostra*), Rose-breasted Grosbeak, Spotted Sandpiper, and Tennessee Warbler (*Leiothlypis peregrina*)] were observed during the breeding bird surveys. American Robin (S5B) is not considered SOCI due to its ACCDC S-Rank for the breeding population. Breeding status was confirmed for 14 species, including three SOCI (Spotted Sandpiper, Northern Goshawk, and Canada Jay). Breeding status was probable for 14 species, and possible for 42 species (Table 10, Appendix I). Two SAR (Canada Warbler and Olive-Sided Flycatcher) were also observed during the breeding bird area searches (Table 10, Appendix I):

2022 Nightjar Surveys

Two rounds of nightjar surveys were completed on June 15 and 16, 2022 (Round 1) and July 11 and 12, 2022 (Round 2) (Table 12, Appendix I). Twelve six-minute point counts were completed throughout the Study Area, repeated over the two survey rounds (Drawing 7.27A-G). Common Nighthawk was the only observed species, with 10 individuals recorded. Two Common Nighthawks were observed vocalizing and displaying breeding and territorial behaviour (wing-boom behaviour). Because the nightjar surveys were completed during the breeding season, this behaviour would designate the Common Nighthawk as a probable breeder (Bird Studies Canada, 2016).

Incidental Observations

Incidental observations include those made during dedicated bird surveys (i.e., observation outside of point count time or survey location) and those made during non-bird related surveys (e.g., wetland delineation, botany, etc.). All incidental bird observations were recorded during nightjar and winter Canada lynx surveys. Only incidental SAR and SOCI, as well as any novel species or species displaying breeding behaviour, were recorded during dedicated bird surveys and all other non-bird related surveys. Fifteen species, comprising 81 individual birds were recorded as incidental observations (Table 13, Appendix I).

Three avian SAR (Canada Warbler, Eastern Wood-Pewee, and Olive-sided Flycatcher) and six SOCI [American Kestrel, Black-billed Cuckoo (*Coccyzus erythropthalmus*), Boreal Chickadee, Canada Jay, Northern Goshawk, and Pine Siskin] were observed incidentally. Out of all incidentals, only the Black-billed Cuckoo and Eastern Wood-Pewee were novel species (e.g., not observed during any other surveys).

Four incidentals observed during the breeding season (Black-billed Cuckoo, Canada Warbler, Eastern Wood-Pewee, and Olive-sided Flycatcher) were observed singing in suitable nesting habitat, which would designate these species as possible breeders. A pair of Northern Harrier (*Circus hudsonius*) were observed in suitable breeding habitat, circling the air and calling aggressively, and one bird was carrying food; these various breeding behaviours designate this species as confirmed breeders. Blue Jay (*Cyanocitta cristata*) fledglings were observed during breeding season within the Study Area, which also designates this species as a confirmed breeder (Bird Studies Canada, 2016).

7.4.5.7 Habitat Modelling Results

Following a review of desktop resources and the completion of field assessments, a habitat model for SAR encountered during breeding season field surveys, or SAR that were observed during other field surveys and whose appropriate breeding habitat is available within the Study Area, was constructed based on their respective breeding habitat requirements, as described above.

- Canada Warbler
- Common Nighthawk
- Eastern Wood-Pewee
- Evening Grosbeak
- Olive-sided Flycatcher

The results of the modelling are shown in Drawings 7.28-7.32.

7.4.5.8 Remote Sensing Results

Avian Radar Assessment

All avian radar results provided herein are adapted from Rhodena Wind Project 2022 Radar and Acoustic Monitoring (Ausenco, 2023a) and ROA 2023 Radar and Acoustic Monitoring (Ausenco, 2023b) reports (see Appendix H for full report).

2022 Spring Migration

The data indicates that spring migration activity mostly occurred in May (Figure 7.4), specifically over five nights (May 9, 14, 18, 26, and 30). During these nights, most targets were detected at altitudes above 200 m.

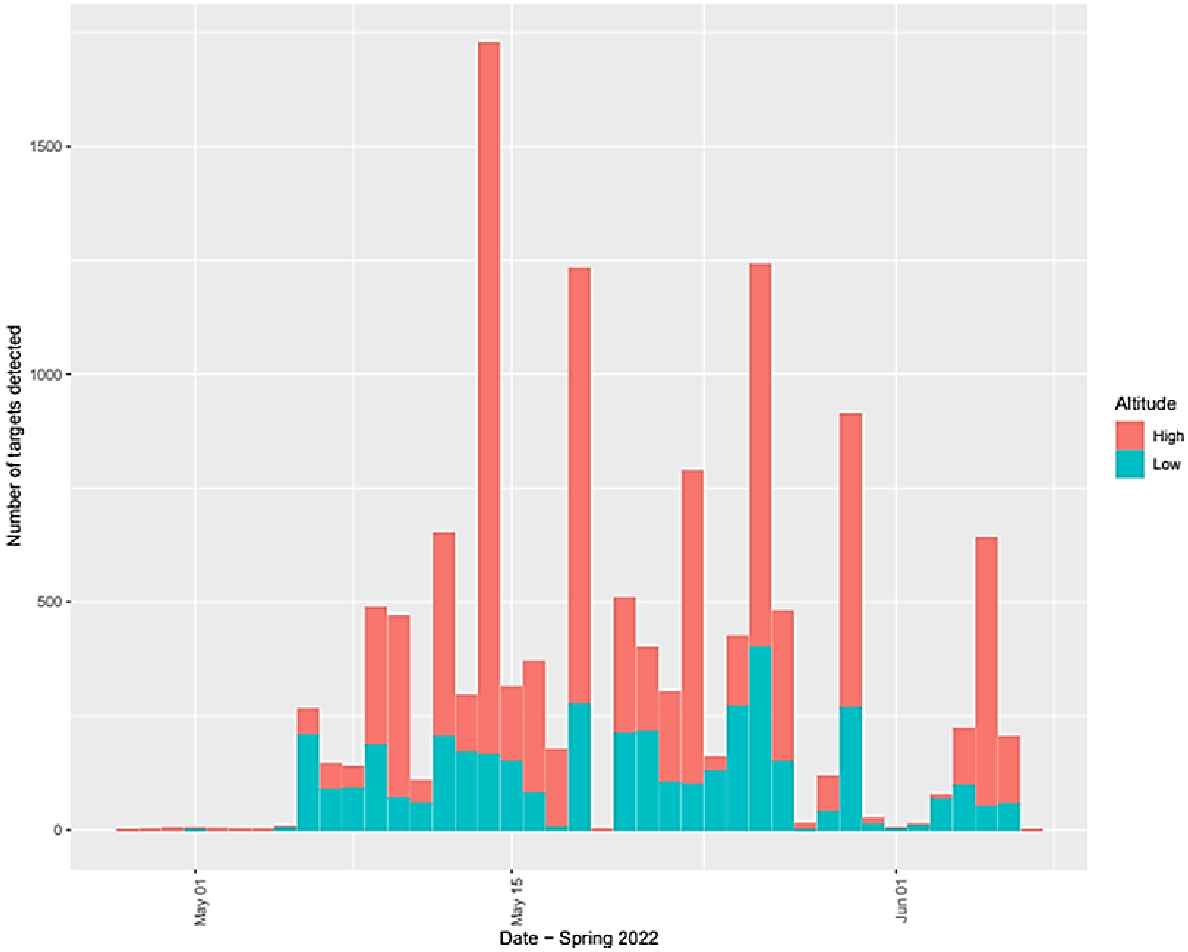

Figure 7.4: Seasonal change in radar detections by altitude during Spring 2022 (Ausenco, 2023a). High altitude refers to targets detected above 200 m, and low altitude refers to targets detected below 200 m.

Across the spring migration period, altitudinal bands below 200 m had the highest numbers of detected targets (Figure 7.5). Detected targets were generally found to decrease as altitude increased. This pattern is likely due to a real decrease in the number of targets, as well as a decrease in target detection. As altitude of the target increases, so does the potential of targets (particularly smaller targets) to go undetected by the radar system. On most of the peak migration nights, however, the majority of targets were observed at altitudes greater than 250 m (e.g., above the RSZ) (Figure 7.6).

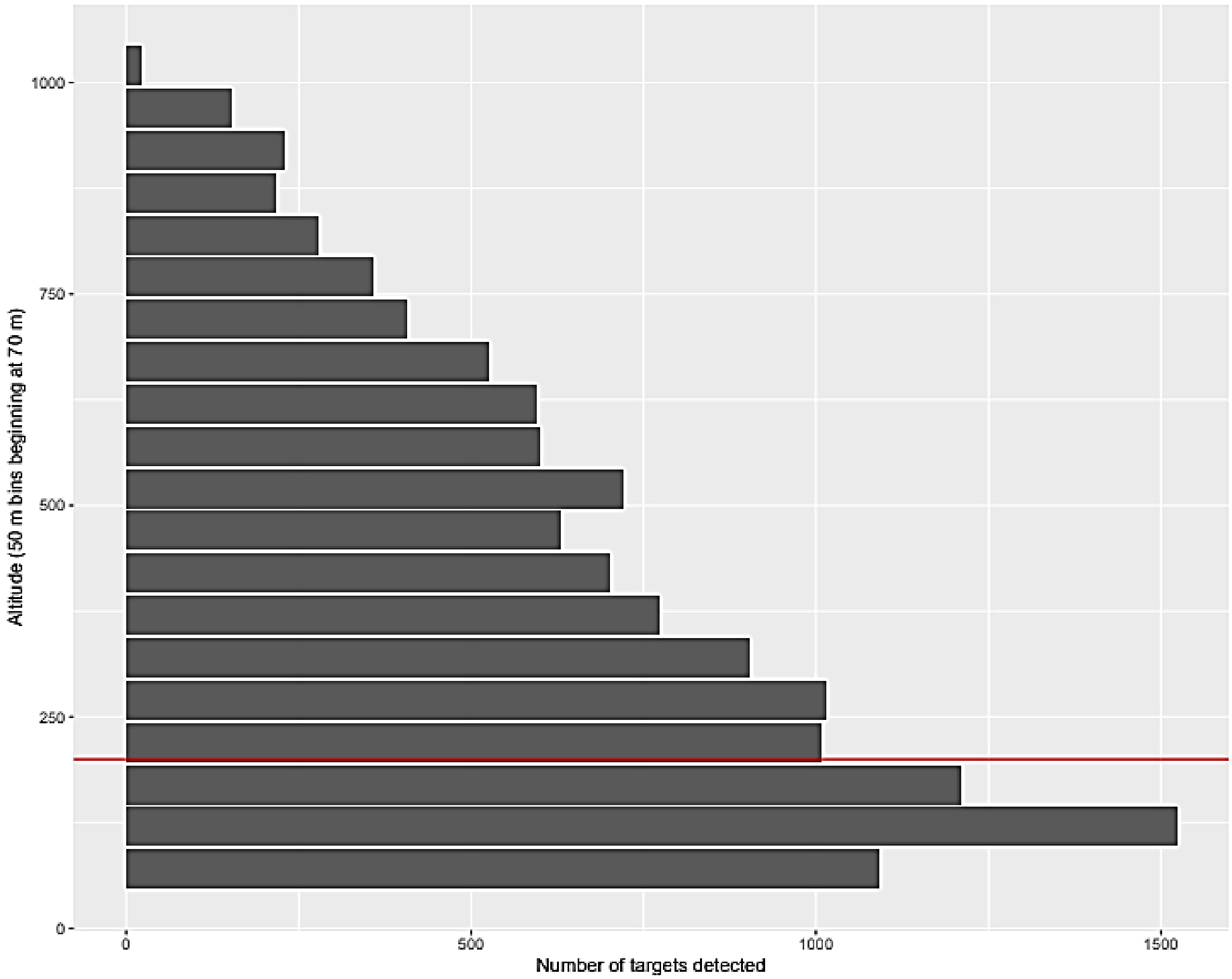

Figure 7.5: Radar targets by altitude during Spring 2022 (Ausenco, 2023a). The red line indicates the maximum height of the turbines.

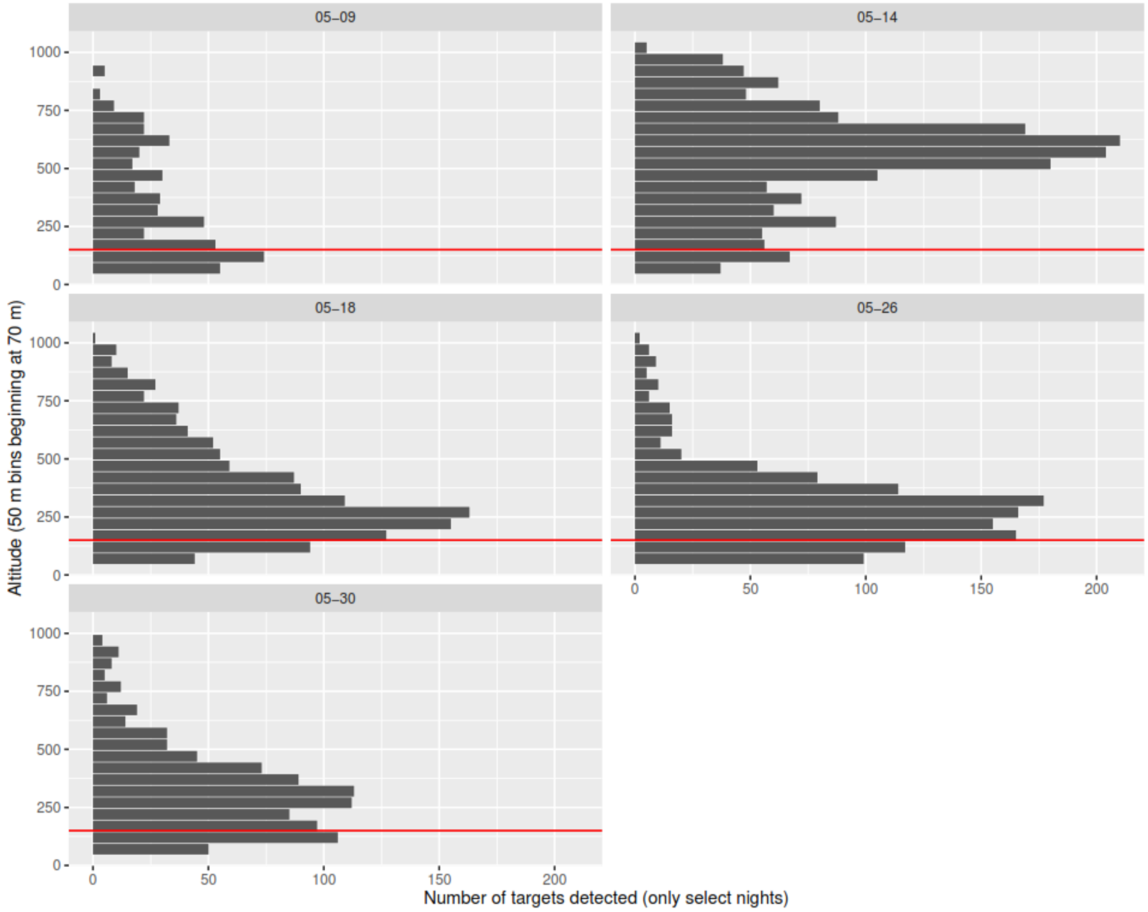

Figure 7.6: Radar targets by altitude during select peak migration nights during Spring 2022 (Ausenco, 2023a). The red line indicates the maximum height of the turbines.

Analyses of the relationships between targets and weather variables found statistically significant relationships between the number of targets per hour and tailwind assistance, time of night, and relative humidity. The number of targets detected was found to increase with increases in tailwind assistance (strong tailwinds opposed to strong headwinds); however, detections at lower altitudinal bands decreased with these increasing tailwinds, indicating targets prefer to fly at higher altitudes in strong tailwinds. The time of night analysis revealed target detection was greater during the hours of sunset and the middle of the night, opposed to times closer to sunrise. The number of detected targets was found to decrease as relative humidity increased (i.e., increased precipitation). This relationship was found to strengthen as target detection increased.

To determine the relative number of birds at lower altitudes (i.e., below 200 m), an index of the proportion of targets flying at low altitudes in the context of overall number of migrants, along with all timing and weather variables, was analyzed. The primary finding from this analysis was that on nights when large numbers of targets were detected, and during the middle part of the night, there tended to be fewer of those targets at lower altitudes.

2022 Fall Migration

The data indicates that fall migration activity steadily increased until the end of September (Figure 7.7); however, most detections occurred over nine nights (August 13, 16, 21, 28; September 3, 6; and October 4, 13, and 24).

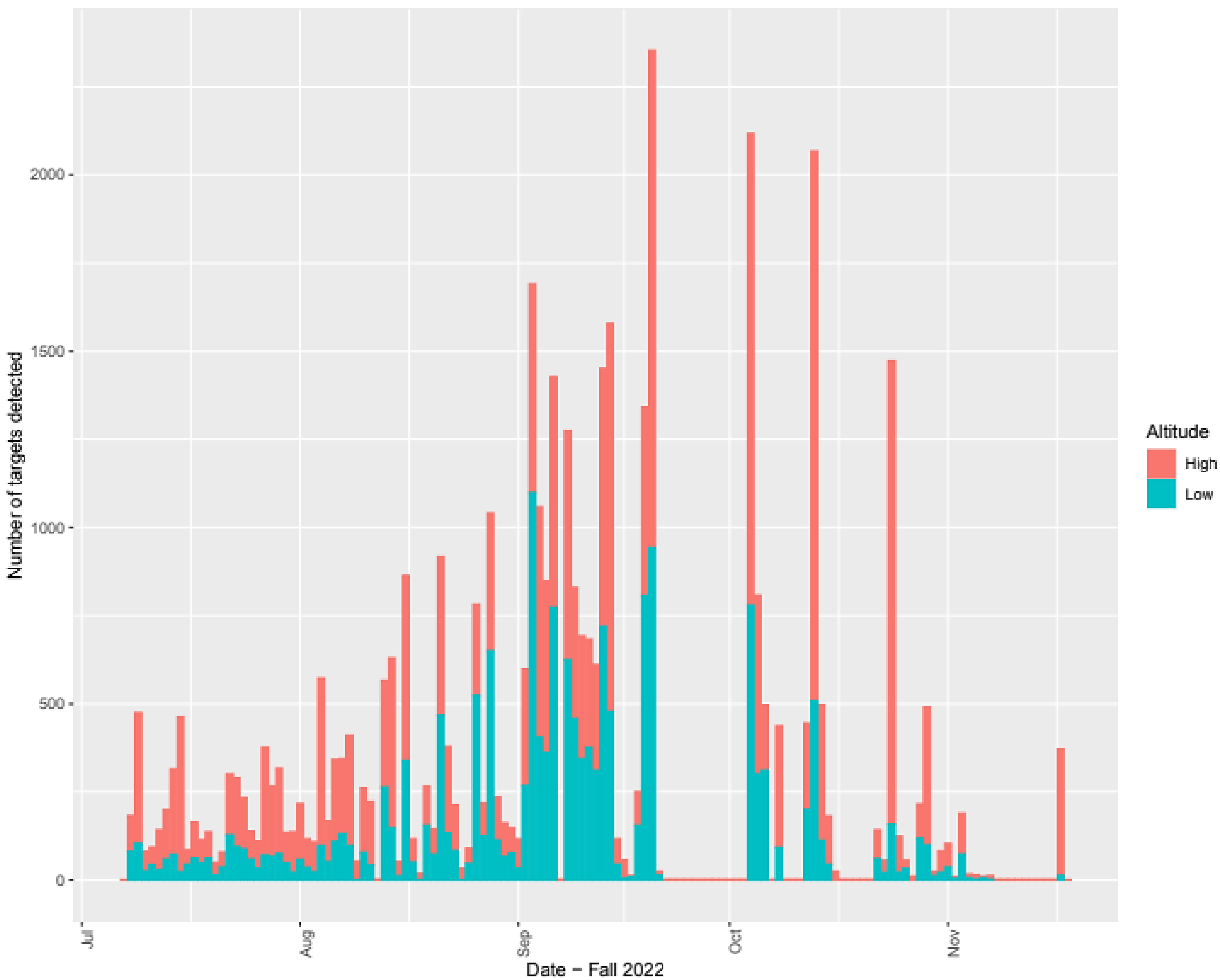

Figure 7.7: Seasonal change in radar detections by altitude during Fall 2022 (Ausenco, 2023a). High altitude refers to targets detected above 200 m, and low altitude refers to targets detected below 200 m.

Across the fall migration period, the 120 to 170 m altitudinal band had the highest number of detections of all altitudes (Figure 7.8). Detected targets were generally found to decrease as altitude increased. This is likely due to a real decrease in the number of targets, as well as a decrease in target detection. As altitude of the target increased, so did the potential of targets (particularly smaller targets) to go undetected by the radar system.

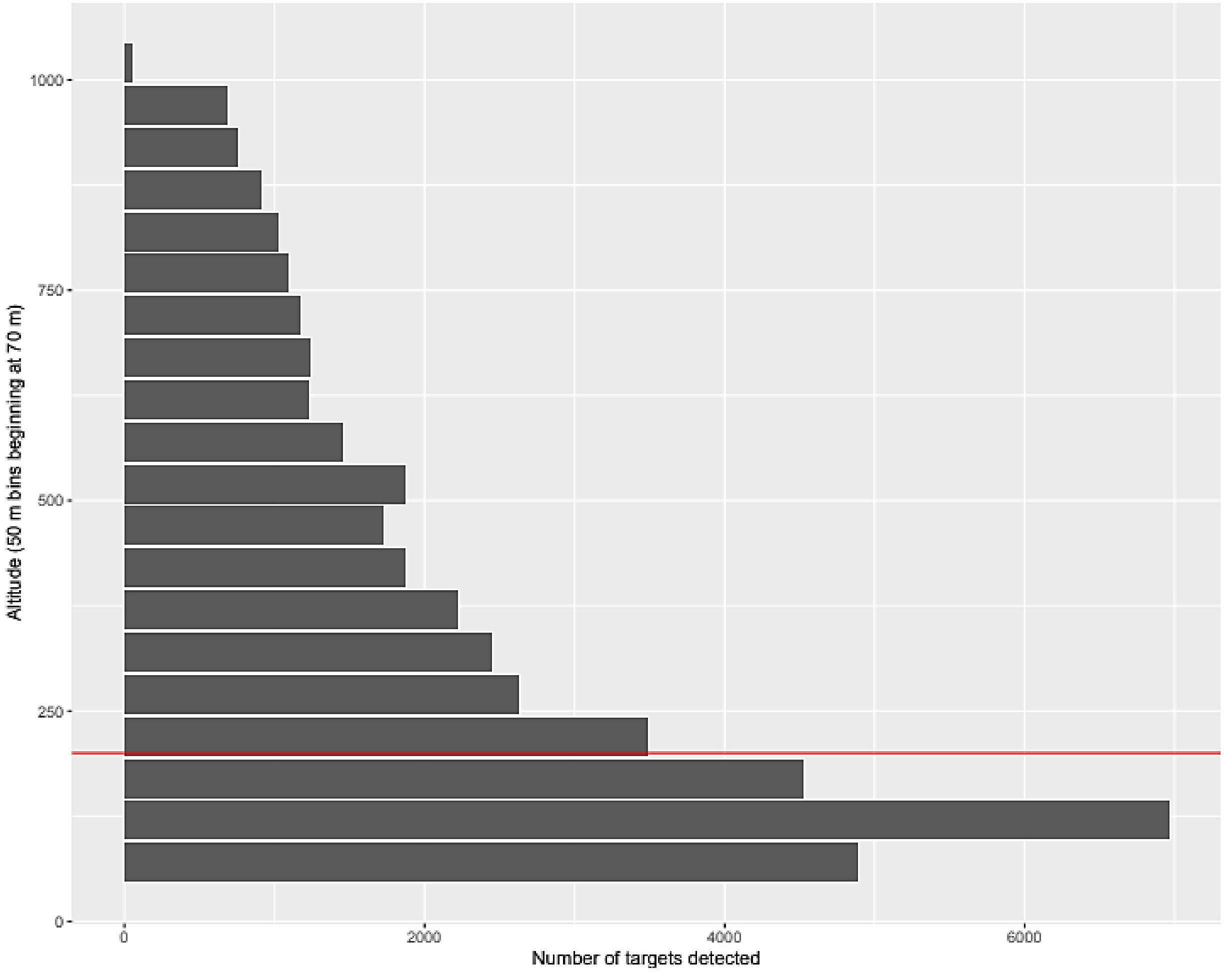

Figure 7.8: Radar targets by altitude during Fall 2022 (Ausenco, 2023a). The red line indicates the maximum height of the turbines.

Nine nights were selected for further focus based on these nights having many radar targets, many acoustic detections, or exhibiting relatively different patterns of bird behaviour compared to other nights (Figure 7.9). From these nine nights, those nights with a northerly wind direction had high densities of targets detected at low altitudes (i.e., less than 200 m) (August 28, September 3, and September 6). Migration density at low altitudes was especially high in low tailwinds (October 4). Those nights with a westerly wind direction had a higher density of targets detected at high altitudes (i.e., greater than 200 m) than low altitudes (October 13 and October 24). Overall, the pattern of radar targets by altitude for these nights show most nights with peak activity at approximately the top of the RSZ (Figure 7.9).

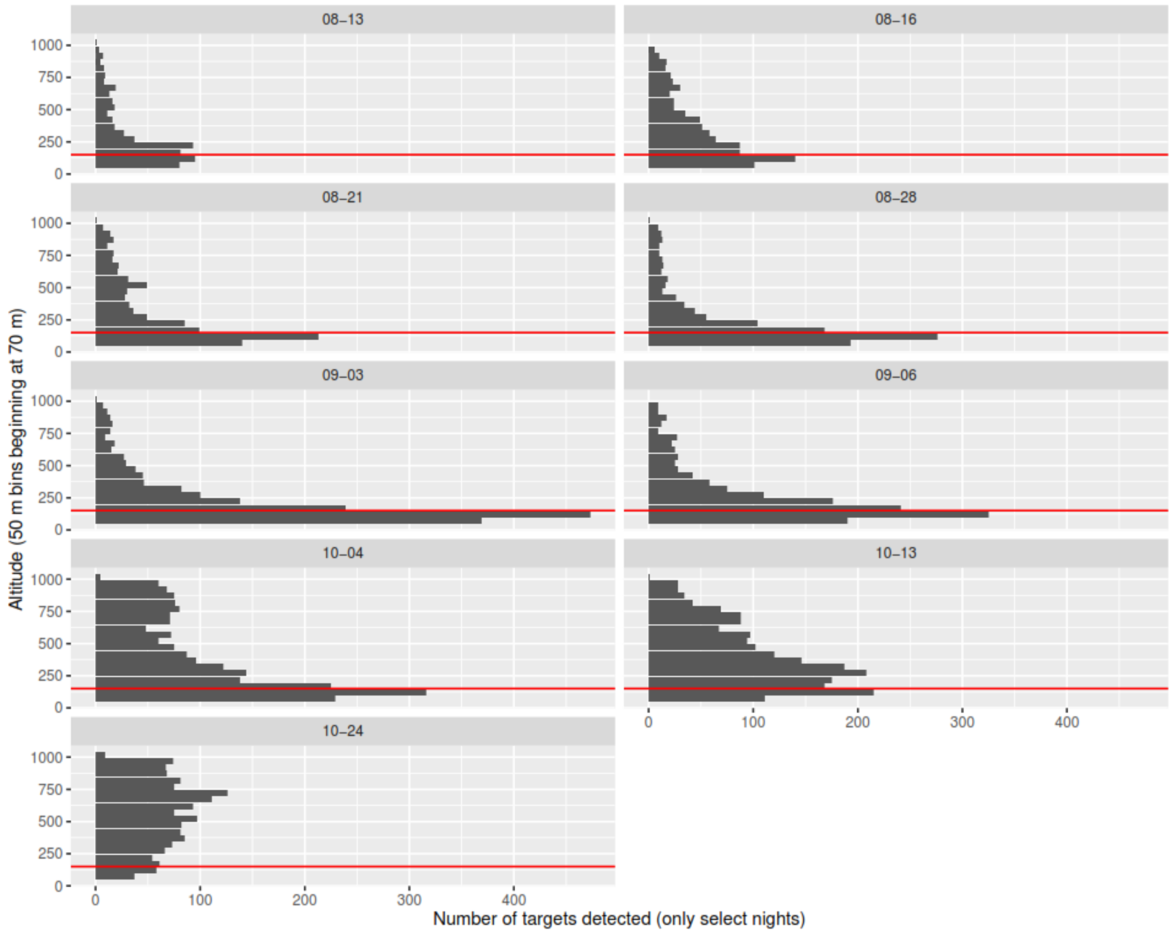

Figure 7.9: Radar targets by altitude during select peak migration nights during Spring 2022 (Ausenco, 2023a). The red line indicates the maximum height of the turbines.

Analyses of the relationships between targets and weather variables found statistical relationships between the number of targets per hour and both tailwind assistance and relative humidity.

The number of targets detected was found to increase with increases in tailwind assistance (strong tailwinds opposed to strong headwinds); however, the relationship between tailwind assistance and targets detected at lower altitude bands observed during 2022 spring migration was not repeated. The factor resulting in this difference in trend is not known. The number of detected targets was found to decrease as relative humidity increased, and this relationship was found to strengthen as target detection increased.

To determine the relative number of birds at lower altitudes (i.e., below 200 m), an index of the proportion of targets flying at low altitudes in the context of overall number of migrants, along with all timing and weather variables, was analyzed. During the middle part of the night (i.e., the bulk of active migration) there was a constant relationship between the total number of targets and the proportion of those targets below 200 m. This indicates that the proportion of targets below 200 m was consistent across the migration period, irrespective of the total number of targets detected each night. This pattern contrasts with what was observed during spring 2022.

2023 Spring Migration

The data indicates that spring migration activity mostly occurred between late April and early June (Figure 7.10), with peaks in activity occurring over six nights (April 30 and May 8, 12, 19, 21, and 28). The highest proportion of targets detected within the RSZ occurred in late April and late May.

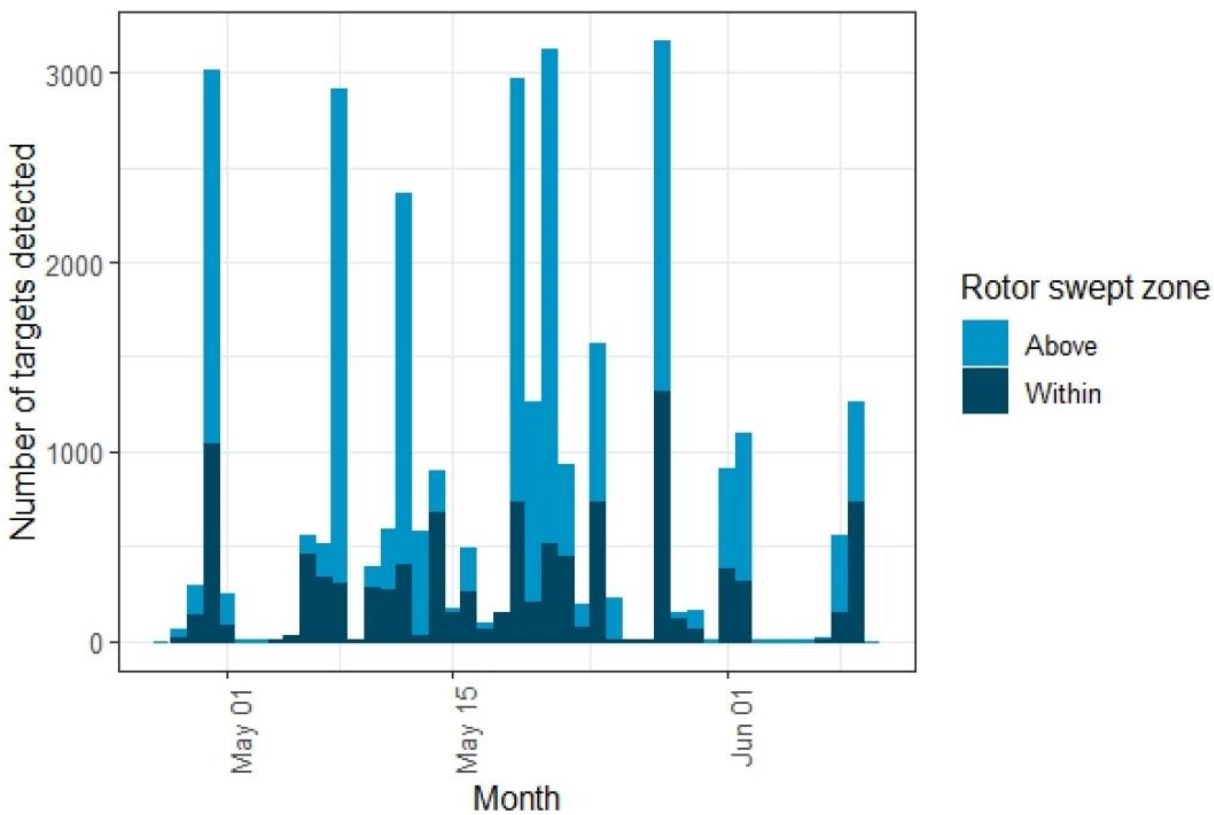

Figure 7.10: Seasonal change in radar detections by altitude during Spring 2023 (Ausenco, 2023b). Rotor swept zone refers to altitudes of 200 m or less.

Across the spring migration period, altitudinal bands between 100 and 200 m had the highest numbers of detected targets (Figure 7.11). Cumulatively, however, flight volumes were much greater above the RSZ. On most of the peak migration nights, flight volume was greater above the RSZ than within (Figure 7.12). During two of these peak nights, a direct relationship was seen between altitude and tailwind strength. Flight volumes were greatest at high altitudes on May 21 when strong tailwinds were present, while flight volumes were greatest at low altitudes when strong headwinds were present. For most of the peak migration nights, the pattern of radar targets by altitude show peak activity above the top of the RSZ (Figure 7.12).

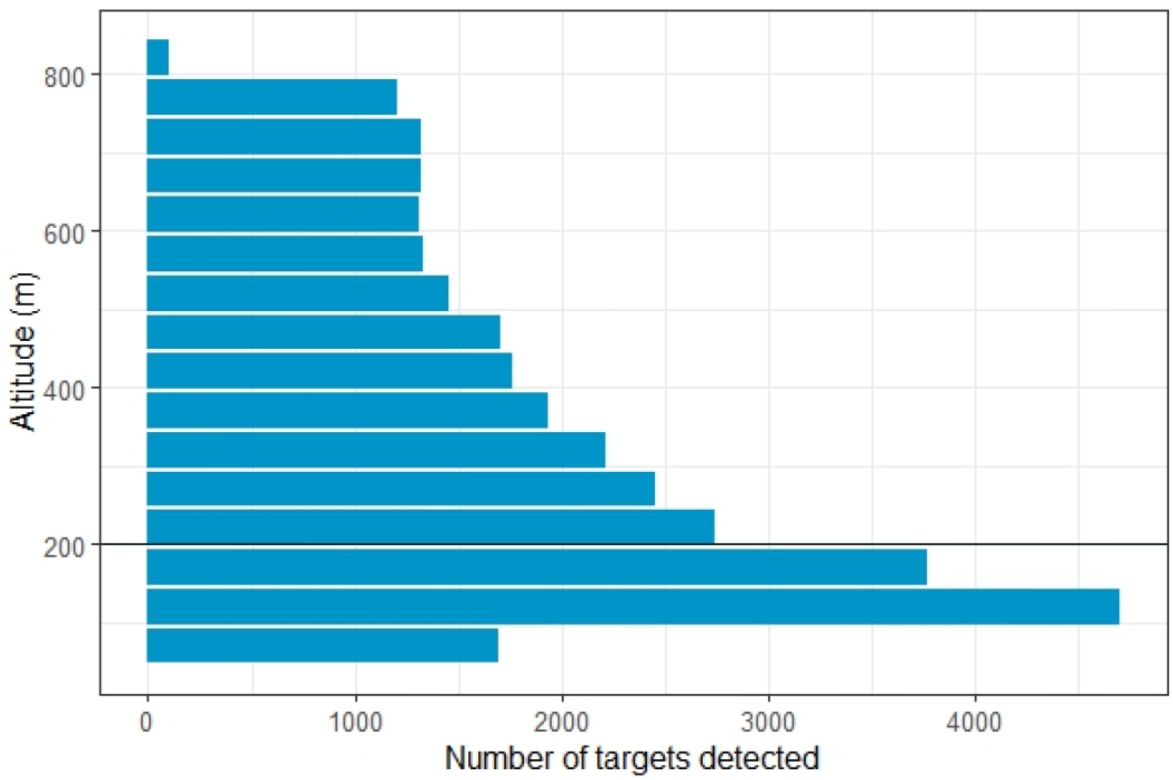

Figure 7.11. Radar targets by altitude during Spring 2023 (Ausenco, 2023b). The black line indicates the maximum height of the turbines.

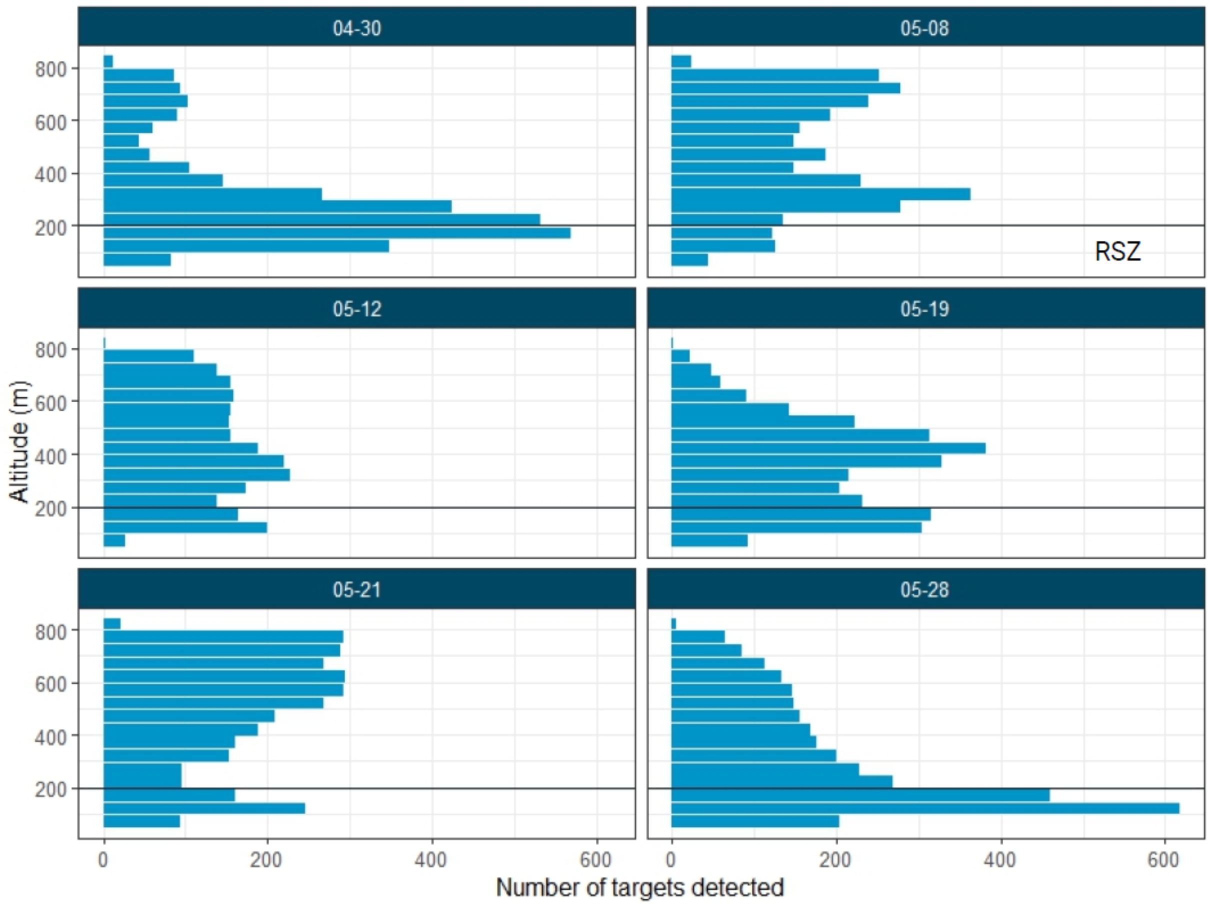

Figure 7.12: Radar targets by altitude during select peak migration nights during Spring 2023 (Ausenco, 2023b). The black line indicates the maximum height of the turbines.

Analyses of the relationships between targets and weather variables found statistical relationships between the number of targets per hour and tailwind assistance and time of night. The number of targets detected was found to increase with increases in tailwind assistance (strong tailwinds opposed to strong headwinds) during the middle of the night and sunrise in April, and from sunset to sunrise in May; no increase was observed during any periods of night in June. As described above, detections at lower altitudinal bands decreased with these increased tailwinds, indicating targets prefer to fly at higher altitudes in strong tailwinds, particularly during sunset. For peak migration nights, the time of night analysis revealed target detection was greater at the start of the night, as opposed to the middle of the night or closer to sunrise.

2023 Fall Migration

The data indicates that fall migration activity mostly occurred between mid-August and early November, with both the largest volume of targets detected and the highest proportion of targets within the RSZ occurring in late September (Figure 7.13). Across the fall migration period, the volume of detected targets was highest between 70 and 150 m (Figure 7.14).

Unlike the results from Spring 2023 migration, cumulative flight volumes were much greater within the RSZ.

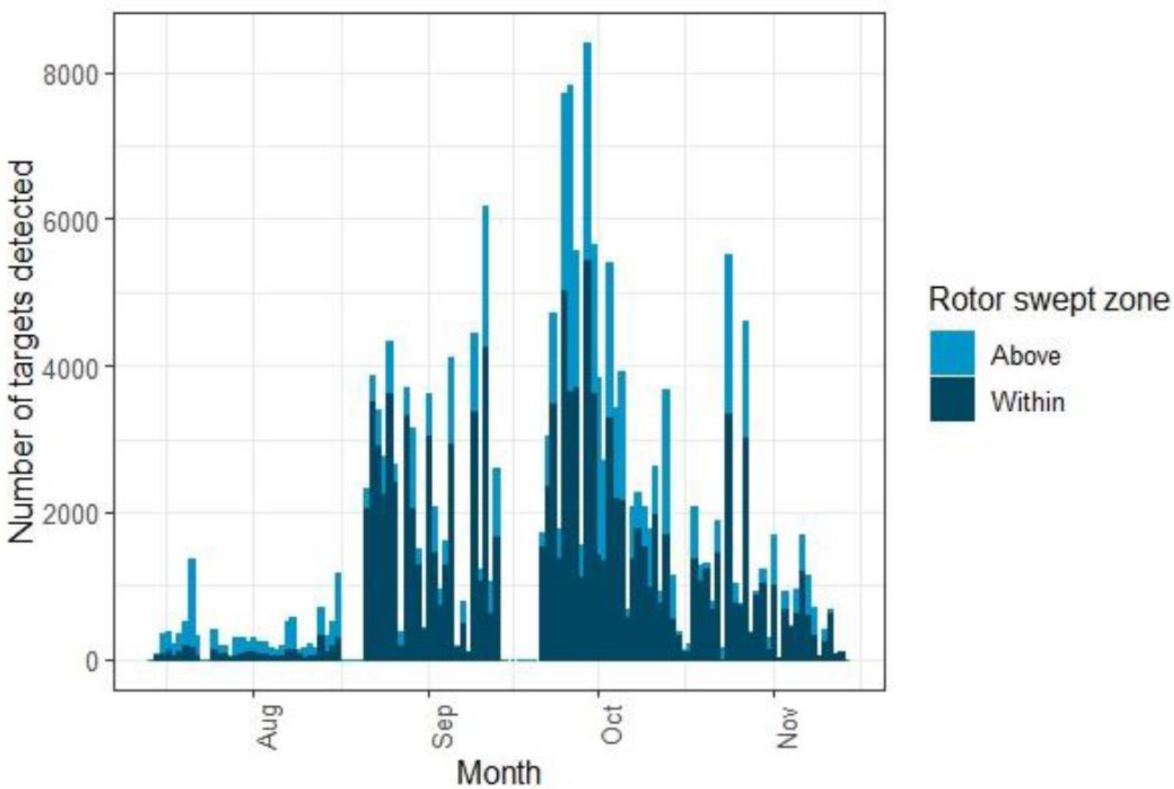

Figure 7.13: Seasonal change in radar detections by altitude during Fall 2023 (Ausenco, 2023b). Rotor swept zone refers to altitudes of 200 m or less.

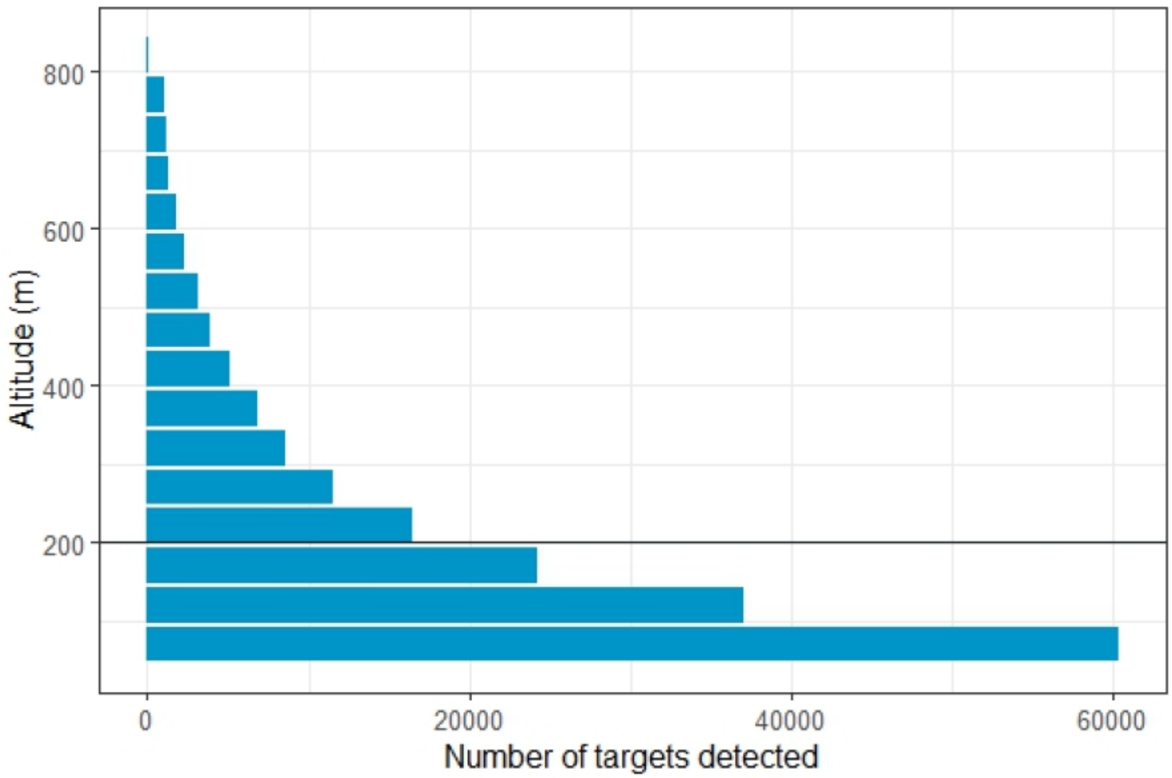

Figure 7.14: Radar targets by altitude during Fall 2023 (Ausenco, 2023b). The black line indicates the maximum height of the turbines.

Eight nights were selected for further focus based on these nights having many radar targets, many acoustic detections, or exhibiting relatively different patterns of bird behaviour compared to other nights (July 2; August 29; September 5, 11, and 26; October 13, and 24; and November 7). On most of the peak migration nights, flight volume was consistently high at low altitudes, with the number of targets detected highest within the RSZ for all but one night (Figure 7.15). During three of these nights (September 5 and 26, and October 24), an inverse relationship was seen between altitude and tailwind strength. Flight volumes remained high at low altitudes despite the presence of strong tailwinds.

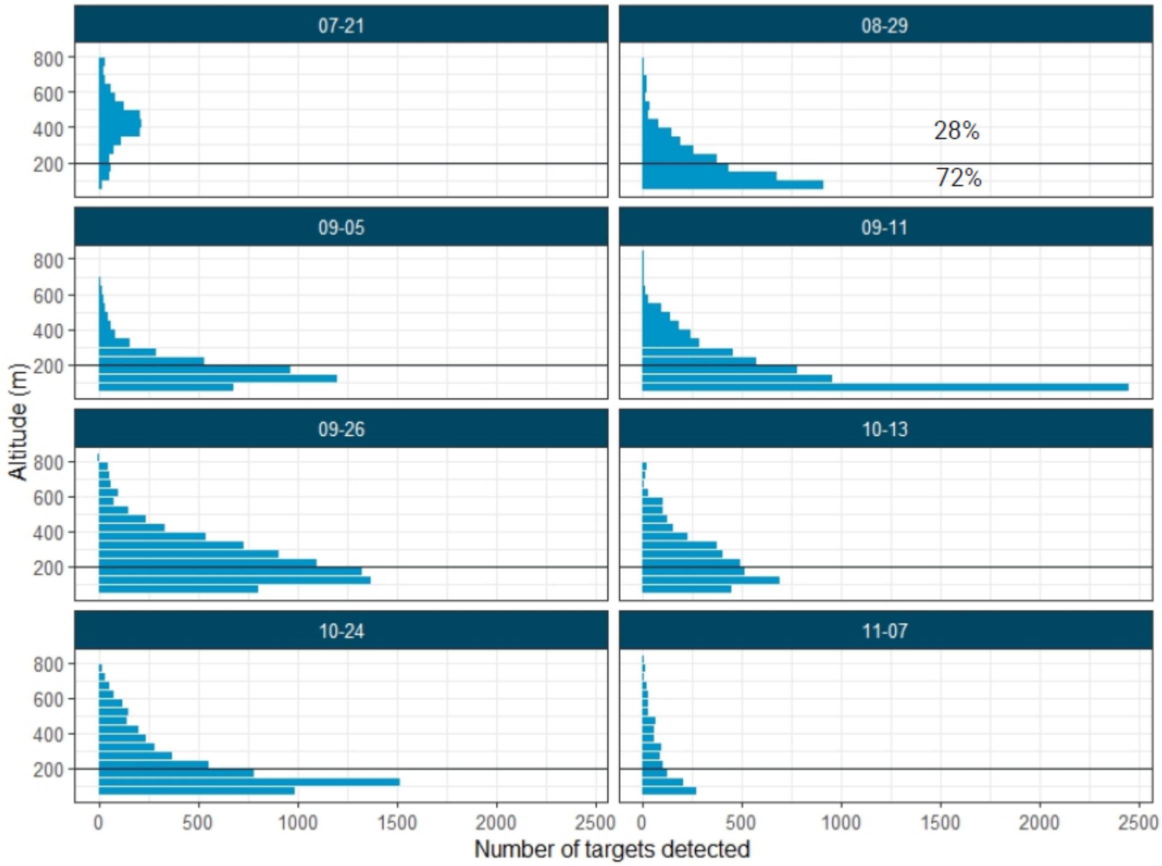

Figure 7.15: Radar targets by altitude during select peak migration nights during Fall 2023 (Ausenco, 2023b). The black line indicates the maximum height of the turbines.

Analyses of the relationships between targets and weather variables found statistical relationships between the number of targets per hour and tailwind assistance and time of night. The number of targets detected was found to increase with increases in tailwind assistance (strong tailwinds opposed to strong headwinds) during all periods of the night across the fall migration period, with the exception of sunrise in July. Similarly to spring 2023, for the majority of the migration period, detections at lower altitudinal bands decreased with increasing tailwinds. However, the proportion of targets within the RSZ during periods of strong tailwinds was much higher than in spring 2023. Additionally, the density of targets detected at low altitudes remained high during three nights of fall migration despite the presence of strong tailwinds. For peak migration nights, the time of night analysis revealed target detection was consistently high at low altitudes during most nights.

Acoustic Monitoring Results

All avian acoustic results provided herein are adapted from Rhodena Wind Project 2022 Radar and Acoustic Monitoring (Ausenco, 2023a) and ROA 2023 Radar and Acoustic Monitoring (Ausenco, 2023b) reports (see Appendix H for full reports).

2022 Spring Migration

NFC detection results for spring migration showed 731 calls detected over the monitoring period. Sparrow and warbler species accounted for the greatest proportions of calls, with 55% and 43% respectively. Savannah Sparrow (*Passerculus sandwichensis*) and White-throated Sparrow (*Zonotrichia albicollis*) were the most common callers, with 217 and 170 calls respectively. Two SAR were detected during the spring period, including Canada Warbler with eight calls and Common Nighthawk with 11 calls.

Analysis of detection timings showed that few detections were recorded during April (Figure 7.16). Sparrows were mostly detected in early May and most warblers were detected during mid to late May. Thrushes and nightjars were mostly detected in late May and early June. Sparrows and warblers were generally heard throughout the night across the monitoring period, while thrushes and nightjars were more frequently heard closer to the end of the night during May and June (Figure 7.16).

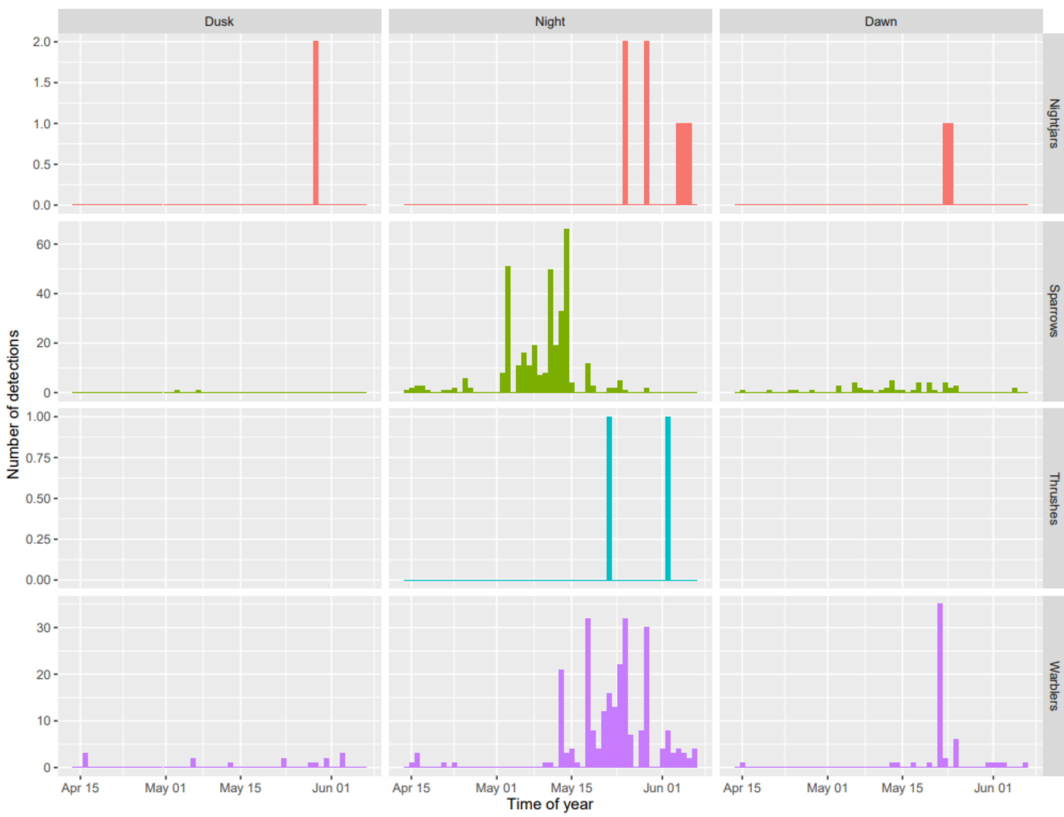

Figure 7.16: Nocturnal flight call detections species group and time of year during Spring 2022 (Ausenco, 2023a). Note the scale is different for different species.

2022 Fall Migration

Detection results for fall migration showed a large increase in detections compared to the spring period at 8,320 calls. Warbler species accounted for the greatest proportion of calls (88%), while the most common species group detected were 'Zeeps' (4,569 calls). The most common species detected was Ovenbird with 1,261 calls. Two SAR were detected, including Canada Warbler with eight calls and Common Nighthawk with 15 calls.

Analysis of detection timings showed that few detections were recorded during the beginning (August) and end (November) of the monitoring period, indicating a high likelihood that the entire migration period was captured (Figure 7.17). Sparrows were mostly detected in late September to early October, and most warblers were detected from mid-August to early October. Thrushes were primarily detected around early September, while nightjar detection was concentrated in August.

Sparrows, warblers, and nightjars were generally heard throughout the night (Figure 7.17). More specifically, warbler detections were concentrated in the middle of the night, which suggests that these NFCs represent birds that were passing over the area and not stopping over. Most sparrows were recorded during the middle of the night, while a small portion were detected at dawn, likely after a stop-over. Nearly all thrush calls were detected around dawn as these individuals descended from their migratory flight.

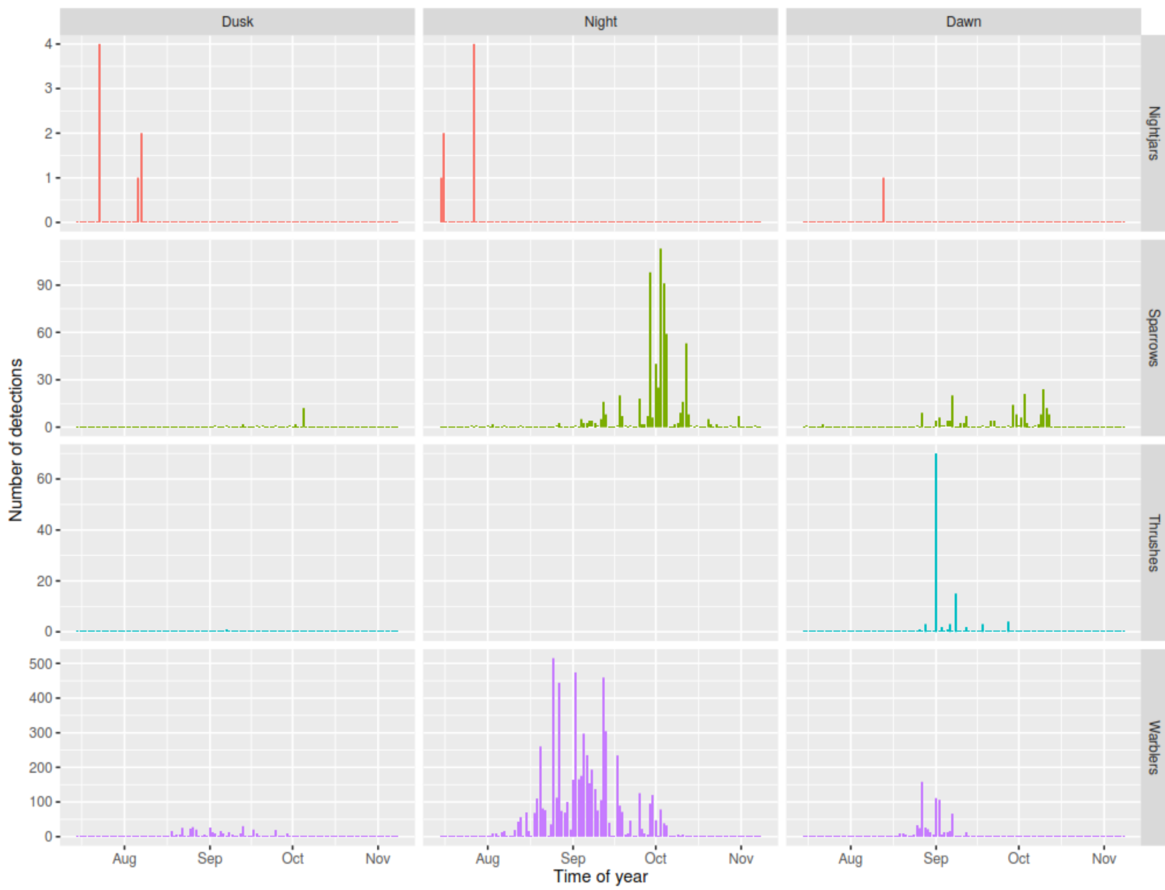

Figure 7.17: Nocturnal flight call detections species group and time of year during Fall 2022 (Ausenco, 2023a). Note the scale is different for different species.

2023 Spring Migration

NFC detection results for spring migration showed 222 calls detected over the monitoring period. Swainson's Thrush and Common Nighthawk were the most common callers, with 105 and 63 calls respectively. Common Nighthawk was the only SAR detected during spring 2023 migration.

Analysis of detection timings showed that detections differ throughout the season and time of night for each species group (Figure 7.18). Swainson's Thrush, the most commonly detected species, was first detected in early May and detection levels peaked at the end of May. Thrushes were almost all detected in the middle of the night, with a small number of recordings at dawn in the second half of the monitoring period. Warblers were also detected mainly at midnight, with few detections at dusk and dawn in early to mid-May. Common Nighthawk was first detected in early May with detection levels peaking in late May, and recordings occurred throughout the night (Figure 7.18).

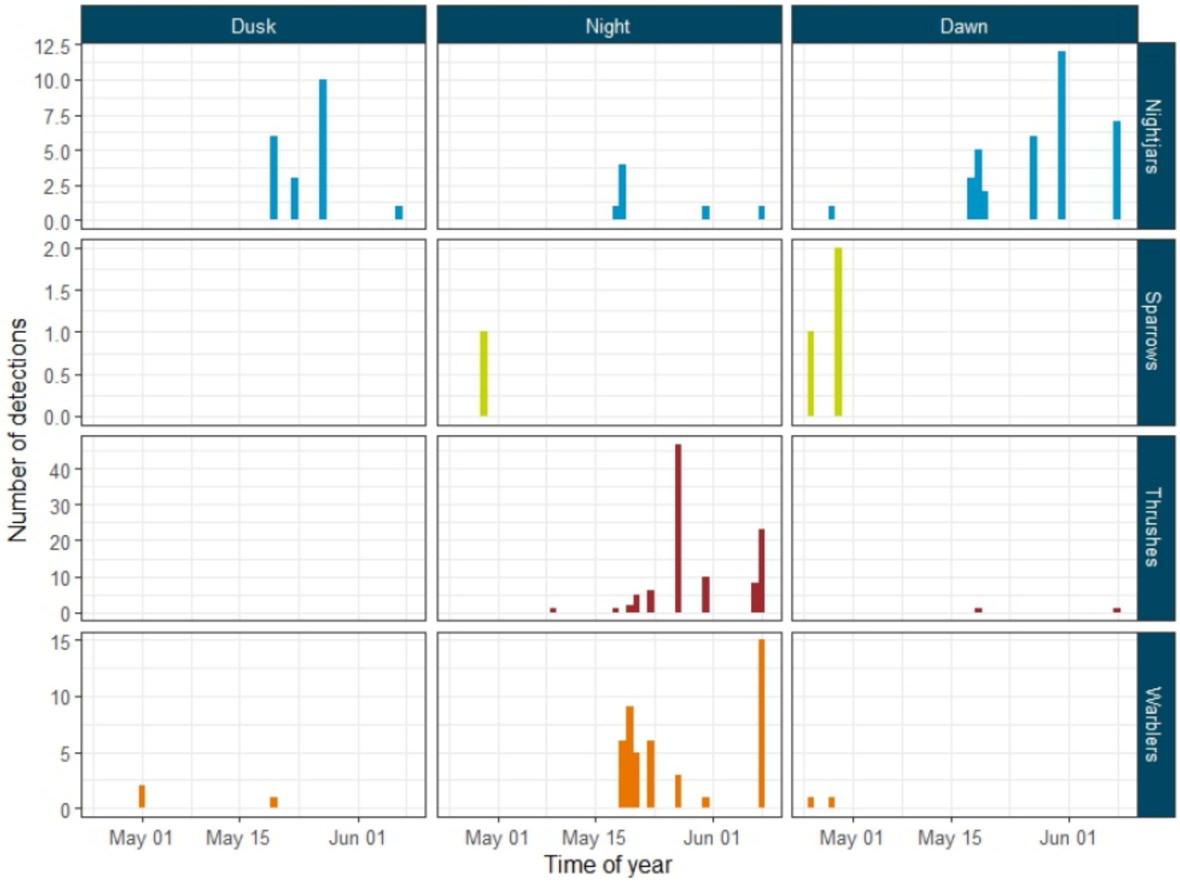

Figure 7.18: Nocturnal flight call detections species group and time of year during Spring 2023 (Ausenco, 2023b). Note the scale is different for different species.

2023 Fall Migration

Similar to results from 2022, NFC detection results for fall migration showed a large increase in detections compared to the spring period at 4,049 calls. The species group 'Zeep' accounted for the second largest proportion of calls (14%) with 566 calls. The most common species detected was Swainson's Thrush with 759 calls, followed by Black-and-white Warbler (*Mniotilta varia*) with 496 calls. Cumulatively, the warblers species group had the large number of detections during fall 2023. Two SAR were detected, including Canada Warbler with 115 calls and Common Nighthawk with 57 calls.

Analysis of detection timings showed that bird activity peaked for all species groups in the middle of the night and was generally concentrated around September (Figure 7.19). Sparrow detections peaked in late September, as did detection of Common Nighthawk. The high proportion of detections occurring at midnight suggests that these NFCs represent birds that were passing over the area and not stopping over. Most sparrows, warblers, and Swainson's Thrush were recorded during the middle of the night. The remainder of most thrush calls were detected around dawn, as these individuals typically call as they descend from their migratory flight.

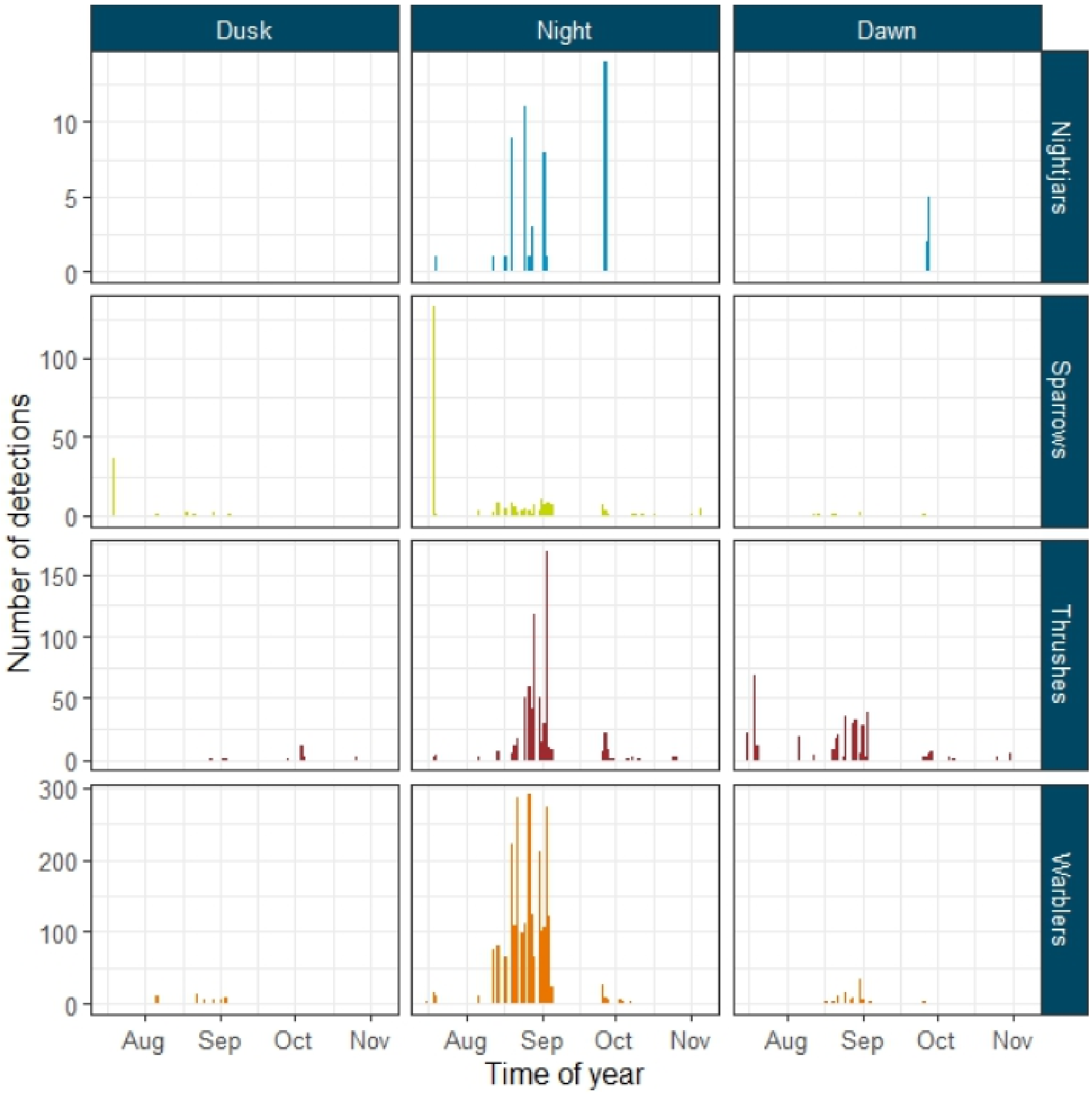

Figure 7.19: Nocturnal flight call detections species group and time of year during Fall 2023 (Ausenco, 2023b). Note the scale is different for different species.

7.4.5.9 Effects Assessment

Project-Avifauna Interactions

Project activities, primarily those that involve earth moving or vegetation removal or interactions with avifauna in the airspace, have the potential to impact avifauna (Table 7.74). These activities could result in habitat removal, reductions in food availability, and direct bird-turbine interactions. Other Project related activities may impact avifauna behaviours, including during construction and operation, such as increased traffic and noise.

Table 7.74: Potential Project-Avifauna Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Avifauna		X		X	X	X			X	X		X	X		X

Assessment Boundaries
For the purposes of this assessment, the LAA for avifauna includes the Assessment Area as well as the airspace that is directly surrounding the turbines. The RAA for avifauna includes the surrounding landscape, and the airspace above these areas, up to approximately 3000 m agl (Drawing 7.27A-G).

Assessment Criteria
Assessment criteria provided in Section 4.6 also apply for avifauna. The VC-specific definition for magnitude is as follows:

- Negligible – no loss of important avifauna habitat (e.g., breeding bird habitat) and no impacts to migratory avifauna are expected.
- Low – small loss of important habitat supporting avifauna and/or impacts to migratory avifauna are expected to be low.
- Moderate – moderate loss of important avifauna habitat and/or moderate impacts to migratory avifauna.
- High – high loss of important avifauna habitat and/or high impact to migratory avifauna that would be sufficient to impact species on a population scale.

Effects
Wind turbine effects on birds and bird migrations have been studied in great detail over the past decades (Kern & Kerlinger, 2003; Drewitt & Langston, 2006; Smallwood, 2013). The impact that wind turbines may have on birds, and bird movements, depends largely on local topography, Project design, and the particular bird communities inhabiting the Study Area. While birds may be affected during the construction phase through displacement and habitat loss, they are most likely to interact with the Project during its operation in the form of direct mortality. This section describes the potential Project interactions and environmental effects associated with the various Project activities.

Direct Mortality

Bird fatalities due to wind turbine collisions have been consistently identified as an ecological shortcoming to wind energy (Drewitt & Langston, 2006). Turbine blades spin at high speeds through the airspace frequented by a variety of species. 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. The risk to avian species for collision with wind turbines is highest during migration periods, when the most fatalities tend to be reported (AEP, 2018). Fatalities can also occur from collisions with meteorological evaluation towers and guywires, through nest mortality/disturbance from clearing of vegetation, or through vehicle collisions (Band et al., 2007).

During spring and fall migrations surveys, no large flocks of migrating birds were recorded, indicating no migration pathways will be disrupted by the Project. Peak migratory activity appeared to occur over a period of five to seven days spread throughout the season. This is consistent with the findings of a large-scale avian radar study conducted in the continental United States, which determined that most migratory bird movements occur on just 10% of a migration season’s nights (Horton et al., 2021).

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; Ferrer et al., 2012). Avian radar monitoring in the Study Area during 2022 and 2023 spring and fall migration periods portrayed varying patterns between flight volume, altitude, wind direction, and tailwind strength, thus exhibiting high variability in the potential for migratory birds to interact with wind turbines. Turbine height and elevation may also influence collision rates; however, there is no evidence of an association between collision likelihood and turbine type or the position of a turbine in a row (De Lucas et al., 2008). Mitigating for wind turbine collisions is not always straightforward due to the complexity of factors influencing collisions (Marques et al., 2014). Furthermore, a more accurate understanding of the risk of collision impacts associated with a Project can only be achieved through post-construction mortality monitoring.

Band et al. (2007) stated that birds with flight heights coinciding with the RSZ of turbines have a higher likelihood of collision (i.e., a high collision exposure index). Spring radar data from 2022 and 2023 indicate that during peak migration nights a greater proportion of targets were detected at high elevations, above the RSZ (200 m altitude). Alternatively, results from fall 2022 and 2023 showed a higher cumulative flight volume within the RSZ. Although birds flying within the RSZ may interact with wind turbines in some capacity, a variety of variables influence collision rates, and a collision exposure index cannot therefore be used to accurately predict collision rates for bird species.

In Canada, 69% of bird fatalities recorded from wind power projects were passerines (Bird Studies Canada, 2016). It is likely that passerines make up an even larger percentage of fatalities than estimated, due to the relative difficulty in detection of individuals during surveys compared to larger birds (Erickson et al., 2014), as well as rapid scavenger removal (70 to

80% within two days) (Lekuona & Ursua, 2007). Passerines accounted for the majority of individual birds and species observed during all active and passive bird surveys conducted within the Study Area. The high abundance of passerines present may result in this bird group comprising the majority of fatalities that may occur as a result of the Project. Relative numbers of fatalities per bird group and species should be considered in relation to numbers of individuals and species in each bird group recorded on site during monitoring and when informing adaptive management strategies.

Raptors and waterfowl may have increased risk of wind turbine collision due to flocking behaviours, rapid flight, and their large size with flow maneuverability resulting in high wing loading and low wing aspect ratio (Rioux et al., 2013). Raptors also appear to be more vulnerable to collision with wind turbines than most other avian groups due to behaviours or habitat preferences during hunting or breeding (Erickson et al., 2002; Young et al., 2003; Higgins et al., 2007; Bevanger et al., 2009; Eichhorn et al., 2012). The majority of modelled breeding habitat for Common Nighthawk, a SAR observed within the Study Area, was located to the north and west of all wind turbines, with limited overlap between the Assessment Area and modelled habitat.

Diurnal migrants (i.e., diurnal raptors and some waterfowl) are more constrained by topographical features than nocturnal migrants – they tend to be concentrated along linear features such as rivers, ridges, and valleys (Richardson, 2000). This Project has therefore been designed to avoid such features, thus minimizing impacts to diurnal migrants.

Ferrer et al. (2012) provide further evidence that the likelihood of bird collisions with wind turbines is highly dependent on species behaviour and topographic factors, and not only on local abundance. Birds do not move over the area at random, but rather follow main wind currents which are affected by topography. Therefore, certain locations could be disproportionately more harmful for birds even where there is a relatively low density of birds, whereas other locations would be relatively risk free even with higher densities of birds (Ferrer et al., 2012). For example, diurnal migrants utilizing thermal updrafts to increase altitude and conserve energy may be increasingly vulnerable to wind turbine collisions (Barrios & Rodriguez, 2004). Wind direction may also contribute to relative vulnerability of migration birds; a general pattern was observed in 2022 and 2023 avian radar data where a relatively high volume of targets were detected at high altitudes during strong tailwinds, while targets were more likely to fly at lower altitudes when strong headwinds were present.

A study completed in 2013 found that after conducting carcass searches at 43 wind farms across Canada, the average number of birds killed/turbine/year was 8.2 ± 1.4 (Zimmerling et al., 2013). Another study completed in 2013 reviewed 22 wind projects in the eastern United States and, after accounting for varying proportions of the year being sampled, found the annual per turbine mortality to be 6.86 birds killed (Loss et al., 2013). 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, found an estimated average mortality rate of 1.17 birds/turbine/year (WEBBMD, 2016). Several post-construction avian mortality monitoring programs conducted by Strum at operating wind power projects in Nova Scotia within the past decade have revealed low mortality rates, with approximately one detectable bird mortality per wind turbine per year on average. As stated previously, carcass search results are subject to error due to scavenger removal and searcher efficiency, so the actual bird mortality levels are likely higher than the detectable levels. Scientific and regulatory literature notes that mortality risk from wind turbine collisions does exist but is likely low. Furthermore, large-scale mortality events are extremely unlikely, as exhibited in a study of approximately 25,000 wind turbines resulting in only four multi-bird fatality events recorded (Kerlinger et al., 2010).

Habitat Loss and Fragmentation

Across Canada, forest harvesting and silviculture are leading causes of habitat loss for forest-dependent avian species, with mining and energy exploration also contributing to habitat loss as well as to the disruption of individuals and their migratory and breeding behaviours (ECCC, 2016a).

The footprint of the Project, particularly the area that will impact intact habitat, is relatively small compared to other developments in the natural resource sector. Only 4.75 km of new road will be constructed within the Study Area, and upgrades to pre-existing roads will be removing small areas of habitat in an area that has already been disturbed. The final Project design will prioritize the avoidance of old growth forests and minimize loss of wetland habitat. Habitat loss and fragmentation effects to avifauna are therefore expected to be low.

The Project will result in a slight increase in forest edge area, which may act as a barrier for some bird species, while presenting potential benefits to others. Some bird species benefit from forest edges and have shown to return in subsequent years after an area is cleared. Bird species that currently use the habitat within the Assessment Area and surrounding area may be displaced during the initial stages of construction. However, there are areas of suitable nesting habitat in adjacent lands and the regional area in general, as exhibited by habitat modelling for bird SAR (Drawings 7.28-7.32). It is expected that any birds utilizing habitat that will be disturbed by Project activities will move to similar habitats within and adjacent to the Study Area.

An evaluation of habitat loss and availability was completed for SAR that were observed displaying breeding behaviour within the Study Area during field surveys.

Canada Warblers were observed at several locations throughout the Study Area in 2022 and 2024. Canada Warbler breeding requirements include wetland types where a closed canopy and complex shrub layer are present (ECCC, 2016a; COSEWIC 2020). The Project design has prioritized the use of existing roads and minimized alterations to wetlands. Furthermore, Canada Warbler habitat modelling results indicates that the Study Area contains ample suitable breeding habitat for this species (Drawing 7.28). Of the 886.8 ha of breeding habitat determined to be suitable for Canada Warbler within the RAA, 16.6 ha lie within the

Assessment Area (1.9%). Detailed design will reduce this proportion further, indicating that impacts to breeding habitat are expected to be low.

Common Nighthawks were observed during nocturnal and breeding bird field surveys and were detected during acoustic monitoring. No confirmed breeding evidence was observed; however one instance of probable breeding behaviour was observed. Modelled habitat suggests there is breeding habitat available for these birds within the Study Area, mainly outside the Assessment Area (Drawing 7.29). Of the 1,146.5 ha of breeding habitat determined to be suitable for Common Nighthawk within the RAA, 20.1 ha lie within the Assessment Area (1.8%). In addition, the construction of turbine pads and new spur road may create additional suitable breeding habitat for Common Nighthawks.

Eastern Wood-Pewees prefer intermediate to mature deciduous or mixed wood forests, a habitat type which is moderately abundant within the Study Area (Section 7.4.1) (NSNRR, 2022b). Potential breeding habitat is present within the Assessment Area; however the majority of modelled habitat is available outside (but nearby to) the Assessment Area where no habitat loss will occur (Drawing 7.30). Specifically, of the 3,938.2 ha of breeding habitat determined to be suitable for Eastern Wood-Pewee within the RAA, 62.7 ha lie within the Assessment Area (1.6%). It is expected that, should any Eastern Wood-Pewees experience loss of breeding habitat, they will move to nearby suitable habitat, and impacts to breeding habitats are expected to be low.

Evening Grosbeak utilize softwood or softwood-dominant mixed wood forests, ranging from second-growth to mature (ECCC, 2022b). Potential breeding habitat appears to be fairly spread out across the Study Area, with mainly small, isolated patches occurring within the Assessment Area (Drawing 7.31). Of the 2,250.1 ha of breeding habitat determined to be suitable for Evening Grosbeak within the RAA, 13.7 ha lie within the Assessment Area (0.6%). Therefore, although some habitat loss may occur, impacts to breeding habitat associated with the Project are expected to be low.

Olive-sided Flycatchers prefer breeding habitats in open coniferous and mixed wood forests, while feeding on insects in open areas, often near swamps (ECCC, 2016c). Breeding habitat appears to be moderately abundant within the Study Area (Drawing 7.32), and this species is known to inhabit a variety of habitats where preferred habitat is less available. Of the 2,342.9 ha of breeding habitat determined to be suitable for Olive-sided Flycatcher within the RAA, 25.6 ha lie within the Assessment Area 1.1%. The majority of modelled habitat occurs outside the Assessment Area, and in some cases spans from inside to outside the Assessment Area. The Project has prioritized the use of existing roads and previously disturbed areas in developing the Study Area, which minimizes impacts to preferred habitats for both breeding and foraging, including wetlands.

Sensory Disturbance

The Project could impact bird migration directly (e.g., turbine strike, as discussed above), or indirectly (e.g., sensory disturbance or requiring excess calorie expenditure that would compromise a bird's ability to migrate). Sensory disturbance refers to changes in ambient noise or light levels caused by Project activities. It has the potential to impact avifauna, either negatively through disruption to migration and behavioural patterns, or positively by attracting some species with the increased activity levels. Noise and vibrations are provincially regulated under the Workplace Health and Safety Regulations to protect the health and safety of site workers and the general public, which will help mitigate any negative impacts to bird species.

Sensory disturbance may occur during all Project phases. Temporary sensory disturbance is expected during construction (limited to daylight hours during construction), and limited disturbance is expected through operations (i.e., consistent noise and lighting generated by wind turbines). Birds may exhibit high susceptibility to noise impacts as many species rely on vocal communication (Blickley & Patricelli, 2010). A literature review conducted by Shannon et al. (2016) found that birds have the potential to exhibit changes in song characteristics, reproduction, abundance, stress levels, and species richness at sound levels greater than 45 dBA. 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 habitat modelling results, where breeding habitat may be impacted by the Project, adjacent breeding habitat will remain available for all SAR (Drawings 7.28-7.32).

Impacts resulting from noise-related sensory disturbance may differ based on noise source (i.e., acute or chronic) or species. Chronic noise exposure may degrade auditory cues, feedback, and vocal development over time, all of which are important for predator/prey detection, communication, and orientation (Bickley & Patricelli, 2010; Marler et. al, 1973; Shannon 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 likely to occur until 125-140 dBA (Bickley & Patricelli, 2010). The median sound level produced by construction equipment at 15 m from point source is expected to be 96 dBA. Therefore, impacts to auditory sensitivity may occur from acute noise during the construction phase. The decibel limits of 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.

Some bird species may not experience impacts from elevated noise levels. A study of the impacts of logging truck traffic on birds reported no observed effects on nesting behaviours at noise levels of 53 dBA (Grubb et al., 1998). Noise tolerant species have been found to display increased nest success at elevated noise levels resulting from decreased nest predation (Francis et al., 2009). Additionally, a study that addressed the impacts of operating wind turbines on migratory bird movements determined that wind turbines do not significantly alter migratory bird movements (d'Entremont et al., 2017).

Distance from point source may also alter the extent of sensory disturbance. All noise attenuates with distance from the source (CDOT, 2016). Noise from point sources (i.e., construction equipment) traveling through a soft site (e.g., a forest or meadow), is reduced by attenuation rates of 7.5 dBA for each doubling of distance (based on 15m) (CDOT, 2016). Noise attenuation estimates based on a 'worst-case' scenario (i.e., not considering local landscape/topography or buildings) were calculated for the Project (see Section 10.5) at a rate of 6 dBA per doubling distance. Sound attenuation for all construction related equipment is expected to be below 100 dBA within 100 m from the source of the sound, with a range of 61.5 to 98.5 dBA depending upon the equipment being used.

Light is a source of sensory disturbance that can impact birds by potentially causing disorientation, avoidance, or attraction (Longcore & Rich, 2004). Operating turbines can cause birds to divert course, and possibly spend excess caloric energy, thus compromising migration success. Additional behavioural changes resulting from light disturbance can impede the success of foraging, reproduction, and communication of birds (Longcore & Rich, 2004) and can disrupt habitat connectivity (Bliss-Ketchum et al., 2019). Exterior structures such as substations, buildings, and other floodlit structures can attract birds during the night and lead to mortality events; migratory birds during fall and spring are especially attracted to lighting on tall structures.

Lighting associated with the Project will be minimal, and the turbines will be un-lit at night (apart from a red navigation hazard light mounted on the turbine's nacelle). As such, lighting is not expected to impact bird migration. Because modifications and timing of use for lighting can be managed to limit impacts on birds, no effects to avifauna are expected related to light pollution.

Mitigation Measures

Adaptive management of potential effects will be addressed through the development and implementation of a Wildlife Management Plan which will include mitigation and monitoring for avian species. The primary mitigation for avifauna is avoidance in the siting of infrastructure, including:

- Avoidance of topographic funnels, such as within lake or river valleys, for turbine placement to reduce the likelihood of interactions with concentrated bird movements.
- Avoidance, to the extent possible, of important bird habitats, such as wetlands, waterbodies, old growth forest, etc. to reduce the impact of habitat changes. This includes siting Project infrastructure within areas with existing disturbances, such as existing roads and cutover areas of forest.

Mitigations to reduce effects on avifauna include:

- Adhere to ECCC guidelines on clearing windows for nesting migratory birds. Vegetation clearing activities will be conducted outside of the nesting period that is generally from April 1 to September 30 each year. Timing of clearing activities are generally dependent on seasonal conditions.
    - Should any ground or burrow-nesting species initiate breeding activities within

stockpiles or exposed areas during construction or operations, the Proponent will avoid disturbance to these areas until chicks have fledged and the nesting areas are no longer being utilized.

- Establish speed limits within the Study Area for construction vehicles to mitigate the effect of vehicle-avifauna collisions.
- Incorporate a lighting plan for construction-related activities.
- Maintain good housekeeping practices during construction to avoid indirectly feeding birds, and potentially attracting nuisance wildlife.
- Develop a spill response plan, and an emergency response plan within the Contingency Plan to mitigate the impacts of spills, hazardous substances, and other emergencies.
- Develop a fire response plan in accordance with provincial standards.
- Revegetate disturbed areas, as appropriate.
- Install avian deflectors on powerlines, including any powerline spans, or areas of line identified as requiring mitigation based on monitoring results.
- Minimize lighting, to the extent possible.
- Completing construction activities during day time hours as much as practical during sensitive migration or breeding periods.
- Develop a site reclamation plan in accordance with engineering standards and in consultation with NSECC and NSNRR.

Monitoring

A site-specific post-construction Wildlife Management Plan will be developed in consultation with NSECC, NSNRR, and all other relevant parties. The management plan will inform monitoring activities that will take place to ensure continued protection of known SAR in the LAA and RAA. Some preliminary monitoring activities related to avifauna may include:

- Conduct post-construction avian mortality monitoring to assess mortality levels caused by turbine operations.
- Monitor changes to habitat within the Study Area and greater RAA that may occur as an indirect result of the Project.
- Conduct breeding bird surveys post-construction to establish potential impacts to the breeding bird community, while also addressing changes in population dynamics, with special attention to SAR.

Conclusion

While effects to avifauna species differ, the residual effects considered to be of greatest concern include direct mortality, habitat loss and fragmentation, and sensory disturbance. Based on this assessment and through the implementation of proposed mitigation and monitoring activities, effects to avifauna are expected to be of low magnitude, within the LAA, of medium duration, intermittent, reversible, and not significant.

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)
- Taxation legislation
- Public mapping resources
- Economic data from the Proponent

8.1.2 Existing Environment

The Project is in Inverness County, near the communities of Creignish (6 km southwest), Queensville (5 km southeast), Craigmore (4 km west), and MacIntyres Mountain (4 km northeast), Inverness County is divided into census subdivisions (CSDs), including Subdivision A (Subd. A), Subdivision B (Subd. B), and Subdivision C (Subd. C). The Project is in Subd. C.

Population statistics for the province and the CSDs were summarized using the 2016 and 2021 Census of Population (Table 8.1).

Table 8.1: Population Characteristics from 2016-2021 for Nova Scotia and the Subd. C of Inverness County

Population Statistics	Nova Scotia	Subd. C
Population in 2021	969,383	3,167
Population in 2016	923,598	3,166
Population change from 2016-2021	+5.0%	0.0%
Total private dwellings in 2021	476,007	1,969
Land area	52,824.71 km^2	1,025.65km^2
Population density	18.4/km^2	3.1/km^2

Source: (Statistics Canada, 2023)

The age distribution in Subd. C reveals a median age of 54.8 years, which is higher than the provincial median age (45.6) (Statistics Canada, 2023). Further statistics on age distribution in 2021 were compared for the province and Subd. C (Table 8.2).

Table 8.2: Age Distribution in 2021 in Nova Scotia, and Inverness County, Subd. C

Age Statistics	Nova Scotia	Subd. C
0 - 14 years	136,710 (14.1%)	340 (10.7%)
15 - 64 years	617,345 (63.7%)	1,860 (58.7%)
65+ years	215,325 (22.2%)	965 (30.4%)
Total Population	**969,380 (100%)**	**3,165 (100%)**

Source: (Statistics Canada, 2023)

Average housing costs and average individual incomes in 2020 for Inverness County, Subd. C were compared to the provincial and federal averages (Table 8.3).

Table 8.3: Housing Costs and Average Individual Income in 2020 for Canada, Nova Scotia, and Subd. C of Inverness County

Housing and Income Statistics	Canada	Nova Scotia	Subd. C
Average Total Income	$54,450	$47,480	$45,640
Average Dwelling Value	$618,500	$295,600	$219,200
Average Monthly Shelter Costs for Owned Dwellings	$1,498	$1,070	$810
% of Owner Households Spending 30% or More of Its Income on Shelter Costs	14.8%	9.7%	6.9%
Average Monthly Shelter Costs for Rented Dwellings	$1,209	$1,083	$750
% of Tenant Households Spending 30% or More of Its Income on Shelter Costs	33.2%	34.7%	36.0%

Source: (Statistics Canada, 2023)

Most residents in Subd. C (98.8%) use English as their first official language spoken (Statistics Canada, 2023). All public outreach and communication for the Project has been and will continue to be in English.

Several fire stations and departments exist in the area including the West Bay Road & District Volunteer Fire Department, located approximately 14 km southeast of the Study Area on Cenetaph Road, in West Bay Road. The Port Hastings Fire Hall is also nearby, located approximately 13 km south of the Study Area on old Victoria Road, Port Hastings. Approximately 13 km northwest of the Study Area is the Judique & District Volunteer Fire Department on River Denys Road, Judique.

Health and emergency services also exist in the area and are accessible to Project workers if the need should arise. The closest location is the Strait Richmond Hospital, approximately 22 km southeast of the Study Area on Hospital Road, Cleveland, NS.

Statistics for Inverness County, Subd. C indicate that the unemployment rate in 2021 was 17.4%, which is higher than the provincial rate of 12.7% (Statistics Canada, 2023). The employment rate for Inverness County, Subd. C was 44.5%, which is lower than the provincial rate of 51.9% (Statistics Canada, 2023).

The top five industries in the province in 2017 were compared with the top industries in Subd. C (Table 8.4). The highest proportion of workers fall into the "health care and social assistance" (13.7%), "construction" (12.4%) and "manufacturing" (8.7%) industries in Subd. C. Other significant industries include "retail trade" and "transportation and warehousing" (Statistics Canada, 2023).

Subd. C and the province share the same top industry, however, the second to fifth top industries were different. The second highest population of the labour force in Subd. C falls within the "construction" industry (12.4%) which takes fifth place (7.3%) in the province. The fourth top industry in Subd. C was "retail trade" (8.1%) which is the second top industry (12.1%) in the province (Statistics Canada, 2023).

Table 8.4: Top Industries for the Employed Labour Force in 2017 in Nova Scotia Compared to Inverness County, Subd. C

Industry	Nova Scotia	Subd. C
Total employed labour force 15 years +	487,260	1,495
Health care and social assistance	70,595 (14.5%)	205 (13.7%)
Retail trade	58,985 (12.1%)	125 (8.4%)
Public administration	42,070 (8.6%)	85 (5.7%)
Educational services	38,425 (7.9%)	105 (7.0%)
Construction	35,720 (7.3%)	185 (12.4%)

Source: (Statistics Canada, 2023)

The Town of Port Hawkesbury is the closest economic centre, located approximately 18 km southeast from the centre of the Study Area, and offering a range of business services. A review of some of the businesses located near the Project is provided in Table 8.5.

Table 8.5: Local Businesses and Proximity to the Centre of the Study Area

Business	Distance (km) and Direction to the Project*
Ceilidh Tent & Event Rentals	12 km northwest, on Graham Road, Judique
Twisted Roots Farm	16 km north, on Gussieville Road, Judique Intervale
Inn on the Intervale	17 km north, on Stoney Brook Road, Judique Intervale
Archer's Edge Luxury Camping	17 km northwest, on Shore Road, Judique
Scott Vac Septic Services	7 km northwest, on Highway 19, Judique
Redbeard Welding & Fabrication	10 km northwest, on Walkers Cove Road, Judique South
Archer Metal Roofing Inc.	18 km east, on Big Brook Road, River Denys
Golden Lake Estates Ltd.	11 km southeast, on Cenotaph Road, West Bay Road
Lamey Brooke Farms	8 km southeast, on Crandall Road, Queensville
C D Blue Forestry Limited	8 km southeast, on Highway 105, Queensville
Furrs N Purrs Critter Spa	13 km southeast, on Crandall Road, Port Hawkesbury
Chisholms of Troy Coastal Cottages	8 km southwest, on Highway 19, Troy
Celtic Shores Coastal Inn & Suites	10 km southwest, on Highway 19, Troy
Troy Lodge Cottages	10 km southwest, on Highway 19, Troy
Allsteel Coatings Limited	14 km south, on Highway 19, Port Hastings
Norvon Enterprises Limited	15 km south, on Highway 104, Port Hastings
Shindigs Pub	18 km south, on Granville Street, Port Hawkesbury
Papa's Pub & Eatery	18 km southeast, on Reeves Street, Port Hawkesbury
Seaboard Tire Service	19 km southeast, on MacIntosh Avenue, Port Hawkesbury

*All distances were measured from the centre of the Study Area, using the most direct route.

Aside from the immediate area and associated businesses, the nearby communities are highly dependant on Port Hawkesbury for many of their regular shops and services, including indoor recreation, big-box stores, and significant health care facilities including emergency services and inpatient care. Many residents of the communities surrounding the Project would commute daily within the area or to Port Hawkesbury 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 8.6).

Table 8.6: Potential Project-Economy Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Economy	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Assessment Boundaries

The LAA for economy is Inverness County, Subd. C. The RAA for economy includes the entire province.

Assessment Criteria

Assessment criteria provided in Section 4.6 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

It is estimated that the Project will result in approximately $150 million in investments into the province prior to operations at the end of 2028. The Proponent is committed to sharing economic opportunities with the local community throughout the development and lifespan of the Project via the use of local skills and labour where possible, municipal tax revenue, and on-going energy literacy/education (such as presentations about renewable energy at local schools, community meetings, or for municipal councils, windfarm tours, and visits, etc.). 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 suburban and rural communities. The Project Team is committed to using as many local skills as possible.

Potential work includes environmental studies, geotechnical investigation, engineering, land and snow clearing, surveying, worksite security, road construction and maintenance, turbine component transportation, laydown area and crane pad construction, turbine foundation construction, turbine installation, collector system construction, and substation construction. Specifically, elements of job creation 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, archaeological, land and community relations, and many others. Approximately 85 professionals within Nova Scotia will render their services as part of the development of the Project; many of whom will be Indigenous professionals.

- Construction – Though the construction phase of the Project is relatively short (approximately 12 to 18 months), it will require a large workforce that will fluctuate throughout the construction period. Much of the construction employment will come through contracting and subcontracting of Canadian, and where possible, Nova Scotian construction firms and specialized service providers related to the balance of plant and installation and commissioning of the wind turbines. It is estimated that the Project will provide approximately 85 full- and part-time jobs for varying scope and duration throughout the construction period. Many of these positions will be filled by Indigenous professionals. The largest construction scopes of work are anticipated to be:
    - Civil installation, that is, land clearing, grubbing, road construction, laydown area and crane pad construction and foundation installation, which includes:
        - Excavation
        - Aggregate supply and placement
        - Rebar supply and installation
        - Anchor bolt supply and installation
        - Concrete formwork
        - Concrete supply and placement
        - Grouting
    - Electrical installation, that is, transmission line, collector line and substation infrastructure installation, which includes:
        - Underground and overhead installation
        - Cable terminations
        - Electrical testing
        - Instrument installation and testing
    - Turbine installation, that is, the offloading of turbine components, stacking of the wind turbine generators, and commissioning, which includes:
        - Crane supply
        - Turbine offload and erection
        - Mechanical works inside turbines
        - Electrical work inside turbines

- The Proponent believes that communities in proximity to its projects should receive preferential attention and access to business and employment opportunities. The Proponent is committed to sourcing projects from local content by supporting capacity building, joint venture agreements, and community and Indigenous-owned entities for the projects they develop. The Proponent will look to maximize local content where appropriate, including hosting supplier sessions and/or career fairs in the local region.

- Operations and Maintenance - Operational wind projects require long-term operations and maintenance technicians to be located either on-site or within short driving distance of the Project. It is generally anticipated that an on-site operations manager will be required to run the day-to-day operations. This individual will work closely with local service providers who will carry out high-voltage maintenance work, collection maintenance work, snow removal, road maintenance, and vegetation removal. In addition, a team of four turbine maintenance technicians will be required to maintain the wind turbines. In all, it is anticipated that there will be up to nine full- and part-time jobs associated with the Project, including the maintenance technicians described above. The employment associated with operations and maintenance is long-term, local, stable, and well-paying jobs requiring skillsets such as experience managing facilities, working on wind farms, or working with high-voltage systems. These jobs include:
  - High-Voltage Technicians/Electricians
  - Wind Technicians
  - Road Maintenance Workers
  - Vegetation Management Service Providers

- In addition to operations and maintenance of the wind turbines, there will be a variety of wind farm activities that will require on-going resources such as snow removal and road surface maintenance, administrative support, inventory/materials management, shipping, scheduling, 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 would bring to Nova Scotia’s economy, the Project will result in indirect and induced economic benefits that will be realized by governments, local businesses, 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).

As outlined in the *Wind Turbine Facilities Municipal Taxation Act*, S.N.S. 2006, c. 22, the Municipality of the County of Inverness will receive tax revenues per MW on an annual basis, and as such, the royalty will annually increase as the Consumer Price Index rises. The Project is expected to enhance the community’s economic development by providing tax revenues of approximately $350,000 annually to the Municipality, increasing each year of operation.

A renewable energy project in a community provides residents with the opportunity to gain a better understanding of wind technology and how wind power can help reduce reliance on fossil fuels. Energy literacy is an increasingly important skill in today's economy, and the Project Team is committed to promoting energy literacy initiatives in the surrounding communities and is available to answer questions and provide a better understanding of local and provincial energy issues.

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 impact to the economy is expected to be positive, extend to the RAA for a medium duration, be continuous, and irreversible.

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

8.2.2 Existing Environment
The Study Area consists of a combination of Crown and private land. Land use around the Study Area is currently zoned as General Resource (GR-1) according to the Wind Turbine Development Zoning Map by the Municipality of Inverness County (Municipality of the County of Inverness, 2012) and primarily used for forestry and recreational use. However, there is a mix of residential and agricultural land uses in the surrounding area (recreational land use is discussed in Section 8.4). Adjacent to the southern boundary of the Study Area lies the Rhodena Quarry, owned and operated by Zutphen Resources Inc. The Rhodena Quarry is an aggregate quarry located west of Rhodena Road at the intersection of Creignish Mountain Road. Haul trucks from this quarry travel south on Rhodena Road to Highway 105 (i.e., away from the Project). Although the Project is accessible via Rhodena Road, General Line Road will be used as the access route to the Project.

General Line Road is located within and southwest of the Study Area and connects to Highway 105. General Line Road houses several residential properties. Land use west of the Study Area includes undeveloped areas, a public paved road, Highway 19, and residential properties.

Land use east of the Study Area includes undeveloped area, and an unpaved road, MacIntyre Mountain Road, which houses several residential properties and connects to Highway 105. One residential receptor was identified within the southwestern extent of the Study Area via desktop review, west of General Line Road.

Evidence of recreational activities, including ATV use and hunting, was observed within the Study Area during field surveys. The Snowmobilers Association of Nova Scotia (SANS) Trail Map shows existing snowmobiling trails within the Study Area along General Line Road, Rhodena Road, and MacIntyre Mountain Road (SANS, 2023). The Proponent has engaged with the local snowmobiling club, a member of SANS.

There are no First Nations reserve lands within 10 km of the Study Area, nor any mineral leases known to be held for the Study Area, Further consideration of Mi'kmaq resources and the results of the MEKS are included in Section 5.0, and further consideration of the Project's geophysical environment are included in Section 7.2.

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 8.7).

Table 8.7: Potential Project-Land Use and Value Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Land Use and Value	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Assessment Boundaries
The LAA for land use and value includes Inverness County, Subd. C. The RAA is not applicable.

Assessment Criteria
Assessment criteria provided in Section 4.6 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 as is.
- Low – small change in land value expected and/or minor limitations to surrounding land use.
- Moderate – moderate change in land value and/or moderate limitations to surrounding land use.
- High – high change in land value and/or widespread limitation to surrounding land use.

Effects

Due to the nature of wind turbines being tall structures with small footprints, they are highly compatible with other land uses like agriculture, forestry, and ground-based recreation. Potential forestry activities or access to the adjacent Rhodena quarry in the area will not be disrupted by the Project. Upgraded roads and infrastructure will improve access, limit weather-related access disruptions, and improve the access road conditions, which will reduce wear on vehicles and other industrial equipment. None of the existing and permitted users of the Crown land are expected to be impacted by the Project.

A 2017 study mentions that given the traditional energy industry's impacts on conservation in both direct and indirect ways, wind energy can be seen as a complementary land use to conservation and protected areas in a broad way, as wind energy is not a carbon emitter (Wind Europe, 2017). Given the context of Nova Scotia where the traditional energy source has primarily been coal, land use for wind energy can be seen as a positive step.

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 had been 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., 2011).

Carter (2011) analyzed home transactions in a rural landscape surrounding small (one to four turbines) wind energy developments while employing a hedonic model to statistically control for variables affecting all real estate transactions such as square footage, age of home, and school zone. This study concluded that proximity to the wind farms did not impact the average selling price of homes; in fact, in one case, homes closer to a wind farm sold for significantly higher than those elsewhere (Carter, 2011).

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 (2010) 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.

Until recently, the primary limitation of previous research on the effects of wind energy facilities on surrounding home values has been that research has been based on relatively small sample sizes (data sets) of relevant home-sale data. The inability to account for the complexity of the various factors which affect property values has also been cited as a limitation to previous studies. In particular, data had been limited for homes located within approximately 800 m of turbines, where impacts would be expected to be the largest: Hinman (2010) (sample size of 11); 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 (principal authors) was conducted to address these gaps in data and included the largest home-sale dataset to date. Researchers collected data from 51,276 home sales spanning 27 counties in nine states, related to 67 different wind facilities (Hoen et al., 2013). 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 have 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 Hoen et al.'s (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 allow 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 were 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, either the average impacts are relatively small (within the margin of error in the models) and/or sporadic (impacting only a small subset of homes) (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 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 (ACP, 2023).

Research has consistently demonstrated that, in a variety of spatial settings and across a wide temporal scale, sale prices for homes surrounding wind energy facilities are not significantly different from those attained for homes sited away from wind energy facilities.

Mitigation Measures
The Project has been designed to minimize potential effects to land use and value through siting considerations and engagement with neighbouring landowners. This has included the movement of specific turbines based upon stakeholder engagement and the results of desktop, field, and modelling studies to minimize visual disturbance to existing homes. Furthermore, the Project has a large spatial and topographic separation from most dwellings which will avoid other nuisance interactions such as shadow flicker and wind turbine-related noise. No specific mitigation related to land use and value is recommended.

Monitoring
A specific land use and value monitoring program is not recommended.

Conclusion
The impact to land use and value is expected to be negligible and is therefore considered not significant.

8.3 Traffic and Transportation

8.3.1 Overview and Assessment Methodology

The assessment of traffic and transportation was completed using information provided by the Proponent and gathered during stakeholder engagement to understand how the Project may interact with existing traffic volume and patterns.

8.3.2 Existing Environment

The most recent NSPW traffic counts for the area indicate that Highway 105, from the Port Hastings Rotary to MacMaster Road (north of Rhodena Road), had an annual average daily traffic count of 3,480 vehicles (NSPW, 2023). Annual average daily traffic counts show a decrease from 2017 (3,590) to 2020 (2,790), followed by an increase to 3,480 (NSPW, 2023). The lower counts may have been due to fewer road travelers resulting from the onset of the COVID-19 pandemic.

The current local road network was deemed by the Proponent to be sufficient to accommodate Project traffic during construction and operation.

The Allan J. MacEachen Port Hawkesbury Airport is located approximately 13 km south of the Assessment Area, on Airport Road, Port Hastings. The Strait of Canso Superport is located approximately 18 km south of the Project Area and serves various energy and marine construction projects in Atlantic Canada (Cape Breton Partnership, n.d.).

The primary access road to the Project Area is General Line Road. Both roads begin at Highway 105 and run northeast to the Project and are accessible by truck/SUV as well as other vehicles. Due to the relatively remote location and lack of year-round inhabitants, there is very little through traffic. Smaller roads that cover the Study Area, many of which are dead ends, are primarily used for ATVs year-round, though most see very little traffic. Access is limited in the winter to users with specific equipment depending on the depth of snow, or who are travelling on foot.

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. Primary access routes during the operational lifespan of the Project are expected to be Highway 19, Highway 104, Highway 105, and General Line Road. Appropriate permits and engagement with NSPW will occur prior to transportation.

Air Navigation, communications, and navigation aids are addressed in Section 10.2.

8.3.3 Regulatory Context

The following permits and considerations are anticipated to be required for the transportation of turbine components:

- Work Within Highway Right of Way Permit (NSPW).
    - Required if removing access signs and guard rails.
- Overweight Special Moves Permit (Service NS 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.

8.3.4 Effects Assessment

Project-Transportation Interactions

As on-site traffic is minimal, Project activities primarily have the potential to interact with transportation during the delivery and removal of turbine components (Table 8.8).

Table 8.8: Potential Project-Transportation Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Transportation							X							X	

Assessment Boundaries

The LAA for transportation is Subd. C. The RAA extends from the LAA to the Strait of Canso Superport. A route study is currently underway to determine the exact transportation route that turbine components will follow to reach the Project.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for transportation as well. The VC-specific definition for magnitude is as follows:

- Low – small change in traffic levels and/or minimal disruptions to traffic flow and routing.
- Moderate – moderate change in traffic levels and/or moderate disruptions to traffic flow and routing.
- High – high change in traffic levels and/or high disruptions to traffic flow and routing.

Effects

The transportation route may require road modifications, including the removal of signage and guardrails. Upgrades will also be made to roads and overhead wires, branches, and signs if conflicts arise.

During the Project's construction phase, trucks and other vehicles will be frequently visiting the area resulting in increased vehicular sound and air emissions. During construction, most days will have 25 to 35 trucks per day, with a few days potentially requiring up to 50 trucks. Outside of the construction phase, the Project will only require a small number of technicians to access the site to perform regular maintenance/equipment checks.

The Proponent has committed to not restricting public access to roads and trails in the area with the exception of active construction sites such as excavations or lift sites where restrictions are necessary 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.

Mitigation Measures

- Install notices 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.
- Replace removed signage and guardrails immediately with appropriate temporary signage to ensure the safety of travelling public.
- Complete upgrades to roads and overhead wires, branches, and signs if conflicts arise.
- Complete modifications and associated reinstatement to relevant specifications.
- Avoid, to the extent possible, transportation through urban areas during high traffic times (e.g., 7 am to 9 am and 3 pm to 6 pm; Monday through Friday).
- Conduct all travel using safe work practices for transporting oversized loads.
- Utilize the minimum number of vehicles possible to minimize impacts to road-way flow and air quality due to exhaust emissions.
- Ensure vehicles only visit and work on-site during normal daytime hours of operation, where possible, and avoid high-traffic times of day to reduce local traffic congestion.

Monitoring

A specific traffic monitoring program is not recommended. However, the Project will develop a complaint response protocol, which will consider complaints related to traffic.

Conclusion

The impact to traffic and transportation is expected to be moderate, extend to the RAA for a short duration, be intermittent and reversible. Impacts related to transportation are considered not significant.

8.4 Recreation and Tourism

8.4.1 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 (2019)
- Literature review of wind farm impacts on tourism and recreation
- Review of Inverness County Municipality websites

8.4.2 Existing Environment

Culture and tourism are key economic drivers in Inverness County, which includes music, art, and language. Named Canada's Musical Coast, Inverness County hosts many festivals throughout the year and has many cultural centres and museums. For instance, Inverness County is home to the Inverness Miners Museum, located approximately 52 km north of the Study Area. This museum, which is dedicated to preserving and showcasing the region's 19th and 20th century coal-mining history, was situated in the former Canadian National Railway Station built in 1901. However, a new location at 15932 Central Avenue has been secured and the museum has not yet reopened (Inverness Miners Museum, n.d.).

Residents of Inverness County have access to many playgrounds and beaches, as well as several ice hockey rinks and baseball fields. The Creignish Recreational Centre, a full-service community hall, is located approximately 5 km southeast of the Study Area. Additional recreational activities include hiking, whale watching, and recreational salmon fishing in the Margaree River. Inverness County is also home to popular golf courses including the Cabot Links, Cabot Cliffs, and Le Portage Golf Course.

The Margaree Highlands Snowmobile Club operates on trails throughout the winter months. The Snowmobilers Association of Nova Scotia Trail Map shows existing snowmobile trails within and near the Study Area along General Line Road, Rhodena Road, and MacIntyre Mountain Road (SANS, n.d.). Since many areas of the country are rural, residents may also participate in hunting and ATV use, evidence of which was identified within the Study Area.

There are over 50 trails in Inverness County including the Celtic Shores Coastal Trail, a walking, hiking, and cycling trail stretching 92 km from Port Hastings to Inverness, as well as many trails throughout Cape Breton Highlands National Park. Hiking trails within 15 km of the Study Area include the Ceilidh Coastal Trail (6 km southeast), the Judique Flyer Trail (14 km northeast), River Denys Mountain Road (11 km northwest), and Myles Doyle Falls (15 km northeast). Further, Port Hood Station Provincial Park, a popular coastal picnic park opposite the Port Hood trailhead for the Celtic Shores Coastal Trail, is located 26 km northeast of the Study Area. The Inverness Beach and boardwalk is also located approximately 46 km north of the Study Area. The boardwalk meanders between the beach and the fairways of the Cabot Links and provides a two-mile-long stretch walk for beach lovers (Inverness Cape Breton, n.d.).

Inverness County is also home to the world-famous Cabot Trail, a 298 km highway that weaves through the Cape Breton Highlands National Park, offering spectacular valley and coastal views along the way (Province of NS, 2024a). Further, Inverness County is home to the Cape Breton Highlands National Park, a popular tourist destination known for its ocean views, deep river canyons, and forested plateau (Parks Canada, 2023b). The park offers a variety of activities including hiking, camping, swimming, cycling, golfing, and fishing, and the park as well as the Cabot Trail was visited by at least one in 10 visitor parties according to the 2019 Nova Scotia Visitor Exit Survey (Tourism Nova Scotia, 2019).

Most recreation within the Study Area is concentrated on the existing roads and trails. ATV use in the warmer months and snowmobile use in the winter account for most of the recreational use; however, other uses may exist.

8.4.3 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 8.9). Note that further details regarding visual impacts are addressed in Section 10.4.

Table 8.9: Potential Project-Recreation and Tourism Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Recreation and Tourism	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Assessment Boundaries

The LAA for recreation and tourism is Inverness County. The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.6 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 change to tourism expected and/or minor limitations to recreation use.

- Moderate – moderate change to tourism and/or moderate limitations to recreation use.
- High – high change to tourism and/or widespread limitation to recreation use.

Effects

The 2019 Nova Scotia Visitor Exit Survey, administered by Tourism Nova Scotia from January 1 to December 31, 2019, shows little information about attractions that could be related to the region surrounding the Project. No spatial data is available regarding the places visited within province, limiting the understanding of the impact that tourism has on the communities that surround the Project. However, although the Cabot Trail and the Cape Breton Highlands National Park are relatively far from the Study Area (approximately 80 to 115 km northeast), they were visited by at least one in 10 visitor parties according to the survey (Tourism Nova Scotia, 2019). Overall, the communities directly surrounding the Project do not appear to be significant tourist destinations, indicating that the Project is not likely to have a significant impact on inter-provincial tourism in the area.

The Project is not largely visible from surrounding vantage points. Selected viewscape points located along Highway 19 and Highway 105 selected as part of the visual impact assessment show no turbines visible. For further information on the view planes and landscape impacts related to the proposed turbines, see Section 10.4.

The area is also known for its recreational offerings such as hiking, running, and mountain biking. Enjoyment of the area and these activities are not expected to be impacted by the Project and will remain an interest for intra-provincial visitors.

It is difficult to determine with certainty how tourists will react to a wind power development. Wind farms are objects of fascination for many and thus could generate tourism for the local community, while others consider them to be an “eyesore”. Some wind farms attract thousands of visitors per year and the benefits of even drawing a fraction of that number of visitors to a community can be felt by many businesses including shops, restaurants, and hotels (CanWEA, 2006a). Pincher Creek, Alberta developed a 19 MW wind farm in 1993. Since that time, tourism revenue from visitors from as far away as Russia has generated $5,000 in annual sales of clothing and souvenirs branded with the “Naturally Powerful Pincher Creek” logo (CanWEA, 2006a). The North Cape Wind Farm, a 10.56 MW wind facility located near Tignish, Prince Edward Island, has become a regional attraction, bringing in over 60,000 visitors per year. PEI’s provincial government constructed a restaurant and gift shop at the site, resulting in a capital expenditure of $1.4 million. At the time of publication, the restaurant and gift shop were generating approximately $260,000 in annual revenue and employing 20 seasonal workers from mid-May to the end of October (CanWEA, 2006b). In Nova Scotia, the Pubnico Point wind farm has a positive public perception, despite being very visible from most of the surrounding communities (Municipality of Argyle, 2014).

The Project Team is committed to working with local recreational groups to ensure continued access to the area and associated trails, within the bounds of all safety considerations, particularly during construction. As discussed above, the presence of turbines is highly compatible with most land-based recreation activities and is not expected to limit the usability of the area.

Mitigation Measures

- Work with local recreation groups to ensure continued access within the Study Area for recreation and hunting/trapping.
- Continue to work with nearby landowners to ensure there is a positive relationship within the community.

Monitoring

A specific tourism and recreation monitoring program is not recommended.

Conclusion

The impact to recreation and tourism is expected to be low, extend to the LAA for a medium duration, be intermittent and reversible. Impacts related to tourism and recreation are considered not significant.

8.5 Other Wind Farm Undertakings in the Area

The nearest wind development to the Study Area is the Creignishrear Wind Farm, comprised of a single turbine 3.3 km south of the nearest Project turbine. The Point Tupper Wind Farm, located in Richmond County, is located 15 km south of the Study Area with 12 turbines and an installed capacity of 24 MW.

The Goose Harbour Lake Wind Farm Project is a proposed development by Port Hawkesbury Paper Wind Limited Partnership, which received EA approval from NSECC in 2023 (NSECC, 2023). This wind development was approved for the construction and operation of 29 wind turbines, for a total capacity of 130.5 MW. This Project, if undertaken, would be located approximately 13 km southwest of the Study Area.

9.0 ARCHAEOLOGICAL RESOURCES

9.1 Overview

The purpose of the Archaeological Resource Impact Assessment (ARIA) is to identify areas of high archaeological potential within the Assessment Area. Davis MacIntyre & Associates Limited (Davis MacIntyre) was contracted to conduct the ARIA, which took place in three phases as the Project layout changed, including assessments in 2022, 2023, and 2024. This section discusses the results of the most recent assessment which is based on the current layout.

9.2 Regulatory Context

The *Special Places Protection Act,* R.S.N.S. 1989, c. 438 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 A2024NS150, issued by the NSCCTH – Special Places Program. Previous assessment, which is referenced within the ARIA, was conducted under Heritage Research Permit A2022NS129.

As archaeological work can often result in findings or information that is confidential or sensitive, a summary of the results of the ARIA are provided in the EA, with the ARIA report itself provided directly to NSCCTH for review. It is understood that the findings and recommendations of the ARIA are considered “draft” until the report is accepted by NSCCTH.

9.3 Assessment Methodology

The objectives of the ARIA were to:

- Evaluate the potential for archaeological resources within the Assessment Area.
- Identify, delineate, and investigate (where recommended) areas considered to exhibit 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, Davis MacIntyre designed an assessment strategy consisting of a desktop component (background screening) and a field component (archaeological reconnaissance).

Desktop assessment included examining the palaeoecological and environmental context of the Study Area, querying the Maritime Archaeological Resource Inventory, analyzing previous archaeological assessments, studying the recorded history of the area, and conducting predictive modelling to inform subsequent field investigations. Many of these steps were informed by analysis of historic map, manuscripts, and published literature from the Nova Scotia Archives and other sources, in addition to LiDAR and air photos to assess the effects of topography and natural landforms and the current landscape.

Field reconnaissance included a thorough study of the Assessment Area, with particular attention paid to areas of anticipated impact and especially areas where desktop assessment identified as having a high potential for archaeological significance. Transect tracks were created in advance of field assessments for crews to follow using handheld GPS units to maximize coverage of the area assessed. Records collected included detailed notes and photographs, with locations for any noted archaeological or other features.

In Nova Scotia, the Maritime Archaeological Resource Inventory (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.

Upon completion of field activities, analysis and interpretation, the results of the assessment were summarized in the report (submitted under separate cover), including recommendations for appropriate resource management strategies. Photos, detailed plans, and GIS-based mapping of the testing area and specific find locations (if applicable) were also incorporated.

9.4 Assessment Results

The field component of the ARIA was carried out between August and October 2024 and resulted in the identification of five areas considered to exhibit high potential (HP-02 to HP-06) and four areas with a moderate potential (MP-01 to MP-04) for encountering archaeological resources. Four archaeological features (Cellars 4 and 7 and Possible Cellars 1 and 2) were noted. Six additional features were noted during field assessments that were evaluated to be of either modern origin or of otherwise low archaeological significance, and no further considerations were deemed warranted for these.

9.5 Effects Assessment

Project-Archaeological Resources Interactions

Project activities could interact with archaeological resources during earth moving activities in the construction phase (Table 9.1).

Table 9.1: Potential Project-Archaeological Resources Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Archaeological Resources		X		X	X	X									

Assessment Boundaries

The LAA for archaeological resources is the Assessment Area. The RAA is not applicable.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for archaeological resources. The VC-specific definition for magnitude is as follows:

- Negligible – activities have no potential for encountering archaeological resources during ground disturbance.
- Low – activities have a low potential for encountering archaeological resources during ground disturbance.
- Moderate – activities have a moderate potential for encountering archaeological resources during ground disturbance.
- High – activities have a high potential for encountering archaeological resources during ground disturbance.

Effects

There is a negligible to low potential for effects to archaeology resources across most of the Assessment Area. Following the recommendations of Davis MacIntyre, most areas of potential (HP-02 to HP-06 and MP-01 to MP-04) and observed (Cellars 4 and 7 and Possible Cellars 1 and 2) archaeological resources can be avoided during detailed design. No sites of interest are located within new roadways where clearing would necessitate disturbance. Sites adjacent to existing roadways where upgrades are required can be avoided by favouring widening towards the side not implicated. Sites within transmission corridors can be avoided through careful placement of power poles, while vegetation clearing between poles should not disturb any sites, either possible of observed.

Mitigation

The following mitigation measures are recommended:

- Maintain avoidance of sites of high and moderate potential for archaeological sites where possible in detail design.
- Conduct shovel testing when sites of potential archaeological resources cannot be avoided to the specifications per the recommendations of Davis MacIntyre and NSCCTH.
- Conduct vegetation removal within areas of potential archaeological resources (especially within the transmission corridors) by hand-clearing and make use of swamp mats where heavy machinery must transit these areas to avid ground disturbance.
- Develop a chance find procedure in the contingency plan related to the potential unexpected discovery of archaeological items or sites 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 assessment if, during the detail design phase, it is determined that ground disturbance is required in areas not previously assessed. The EA Branch will be provided with the acceptance letter from NSCCTH prior to completion of any disturbance in newly proposed areas.

Monitoring

No monitoring programs are recommended.

Conclusion

With the implementation of the above mitigation measures, the potential for disturbing archaeological resources is negligible to low. Effects would occur once, be short-term, restricted to the LAA, and be irreversible (to be confirmed based on any identified resources, as applicable). Effects are considered not significant.

10.0 OTHER CONSIDERATIONS

10.1 Human Health

The Project will be constructed and operated in the safest manner possible according to applicable health and safety related standards and requirements. The wind turbine model that will ultimately be selected for this Project will comply with international wind class standards and incorporation of safety features to reduce the risk of lightning strikes, ice build-up, and general malfunctions. In addition, wind turbine siting considerations were incorporated into the Project's design to reduce potential impacts on nearby receptors.

Potential human health impacts associated with air quality, shadow flicker, sound, effects from climate change, and other natural environmental hazards on the Project, and accidents and malfunctions are addressed in the following sections:

- Section 7.1.1 Atmosphere and Air Quality
- Section 10.3 Shadow Flicker
- Section 10.5 Sound
- Section 12.0 Effects of the Environment on the Undertaking
- Section 13.0 Accidents and Malfunctions

Other potential effects to human health include electromagnetic fields (EMFs), ice throw, and electrical fires, which are discussed in the sections that follow.

10.1.1 Electromagnetic Fields

EMFs are a form of naturally occurring energy that are produced by equipment or electrical appliances, not unique to wind turbines or farms. EMFs are concentrated near the source and dissipate quickly with distance (Health Canada, 2020). Sources of low frequency EMFs may be associated with the following Project components:

- Wind turbines
- Transmission lines
- Underground cables
- Generator transformers

Limited research has been conducted on EMF emissions from wind turbines and associated transmission infrastructure (ODH, 2022). While EMFs are a form of radiation, the low- to mid-frequency EMFs associated with wind turbines and power transmission infrastructure are within the non-ionizing portion of the electromagnetic spectrum. Non-ionizing radiation does not damage living cells or DNA and therefore is not identified as a carcinogenic form of radiation (NCI, 2022).

Multiple assessments of the EMF generated by wind turbines have found that the amount of non-ionizing radiation produced even amidst large quantities of turbines is low, similar or lower than levels found in urban areas (Alexias et al. 2020). The authors of a study in Bulgaria found that levels of non-ionizing radiation were more than four orders of magnitude lower than the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline for the general public for acute exposure (Israel et al. 2011; ICNIRP, 2010).

Several studies and reports have demonstrated that EMFs generated by wind turbines and associated infrastructure are not considered to be a concern to human health (CMOH, 2010; Knopper et al., 2014; & McCallum et al., 2014). Therefore, impacts to human health from Project emitted EMFs are negligible.

10.1.2 Ice Throw

Ice throw and ice shedding occurs when ice builds up and releases from the turbine's rotor blades, tower, or nacelle. This phenomenon is possible under a variety of freezing conditions when air temperatures range from 0°C to -12°C because of accumulation of ice caused by fog, rain, or snow. Ice fragments can either be thrown from the rotor due to centrifugal and aerodynamic forces or fall to the ground during idle or shutdown periods (CREA, 2020).

Typically, ice buildup is associated with high winds or extreme weather events when the turbines are already shut down. In addition, wind turbines have built-in ice sensors and heating elements on parts of the leading edge of each rotor blade, automatically removing any ice that has formed on the leading edge. Ice throw typically only occurs due to a malfunction of the control system or during start-up when speeds are low. 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 (CREA, 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 the primary turbine model specifications (163 m rotor diameter and 118 m hub height), the maximum throwing distance associated with the Project's turbines is 421.5 m. Turbines for the Project have been located 1.2 km from the nearest residential receptor, which exceeds current municipal requirements outlined in the Municipality of the County of Inverness Land Use Bylaws. The closest public road to a turbine is Rhodena Quarry, approximately 2.9 km southeast of the nearest turbine. Therefore, there is no risk associated with ice throw to the public using these roads. However, there is a collection of logging roads and trails throughout the Study Area, which are frequented by recreationalists for snowmobiling, hunting, and ATV use. Additionally, 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.

Mitigation measures to protect recreation users and site workers from ice throw or shedding will include:

- Continue engagement and education with local recreational users (Section 8) regarding the safe continued use of lands within the Study Area.
- 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 Project Area for maintenance or other purposes with necessary PPE and associated safety protocols and procedures to mitigate risk of injury and/or fatality, especially during potential icing conditions.

With the implementation of these mitigation measures, the impacts to human health from ice throw are negligible.

10.1.3 Electrical Fires

Wind turbines contain the key elements required for fire: fuel, oxygen, and a source of ignition. These elements are housed in the turbine nacelle, which is a compact and enclosed space at a height of 118 m. Fires in wind farms are most often caused by lightning strikes, mechanical and hydraulic faults, and electrical installation failure (You et al., 2023). 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 the early detection and effective control of fires difficult. However, these factors also reduce the direct impacts of electrical fires to human health.

Various standards and guidelines have been implemented to minimize the chances of fires occurring in turbines and associated infrastructure. The addition of fire-suppression systems has the potential not only to save project infrastructure in the event of a fire, but also protect the surrounding environment (Krcmar, 2021). The turbines planned for use in this Project are compliant with the International Electrotechnical Commission's IEC 61400 international standard to avoid damage from hazards during their operational lifespan. This includes lightning and surge protection measures. Additionally, the Project has large setbacks from potential receptors (1.2 km from the nearest residence) and public roads (2.9 km from Rhodena Quarry).

A fire prevention and evacuation plan will be developed, in addition to general safety protocol and training. Impacts to human health from electrical fires are therefore expected to be negligible.

In addition, the following measures have been taken to protect against the risk posed to human health by potential fires:

- Considered the installation of dry hydrants where suitable near large waterbodies to allow fire and emergency response workers access to water.
- Consultation with local fire departments to ensure access routes are suitable for emergency vehicle access during all project phases.
- Development of an emergency response plan, including circulation to local fire departments for input and awareness.

Accidental fires, including wildfires, are discussed further in Section 13.2.

10.1.4 Conclusion

The impact to human health is expected to be negligible and is therefore considered not significant.

10.2 Electromagnetic Interference

10.2.1 Overview

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.

10.2.2 Assessment Guidelines

The Radio Advisory Board of Canada (RABC) and the Canadian Wind Energy Association (CanWEA) 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.

10.2.3 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 10.1.

Table 10.1: RABC Guidelines – Recommended Consultation Zones

Systems	Consultation Zone
Point-to-Point Systems above 890 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	DND Air Defence Radar: **100 km** DND or NAV CANADA Air Traffic Control Primary Surveillance Radar: **80 km** DND or Nav Can Air Traffic Control Secondary Surveillance Radar: **10 km** DND Precision Approach Radar: **40 km** CCG Vessel Traffic Radar System: **60 km** Military or Civilian airfield: **10 km** Environment Canada Weather Radar: **50 km**
Very High Frequency (VHF) OmniRange	**15 km**

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

- Turbine 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)
- Substation/converter location coordinates and new transmission line(s) to connect to a grid.

Response time and feedback from the various organizations vary and can take up to 12 weeks. If turbine type, layout or design changes, many organizations will need to be re-consulted prior to proceeding.

10.2.4 Assessment Results

Consultation with relevant agencies was completed and results are provided in Table 10.2. Responses are provided in Appendix J.

Table 10.2: EMI Consultation Results

Operator	Signal Source(s)	Consultation Results
Innovation, Science and Economic Development Canada (ISED)	Regulator • General Radiofrequency database • Spectrum Direct • Broadcasting database • Integrated Spectrum Observation Centre	Notification letter sent July 2024. ISED assessment received July 2024.
DND	Military Air Defence and Air Traffic Control Radars Military Radiocommunication Users	Notification letter sent July 2024. Request for NAV CANADA Land Use number received February 2024. The Project Team responded with this information. No objection confirmation received September 2024.
RCMP	Radiocommunication Systems	Notification letter sent July 2024. No objection confirmation received August 2024.

Operator	Signal Source(s)	Consultation Results
CCG	Maritime Vessel Traffic System Radars	Notification letter sent July 2024. No objection confirmation received July 2024.
ECCC	Weather Radars	Notification letter sent July 2024. No objection confirmation received July 2024.
NAV CANADA	Civilian Radar Air Traffic Control Radar Air Navigation Equipment VHF omnidirectional range	Notification letter sent July 2024. No objection letter received October 2024.
Cape Breton Regional Police	Public Safety Agency	Notification letter mailed in July 2024.
RCMP – Port Hawkesbury	Radiocommunication Systems	Notification letter mailed in July 2024.
Port Hawkesbury Volunteer Fire Department	Emergency Services	Notification letter sent July 2024. Receipt notification July 2024.
Bell Alliant	Telecommunications	Notification letter sent July 2024. KMZ files requested by Bell, files emailed in July and October 2024. No objection confirmation received October 2024.
Eastlink	Telecommunications	Notification letter sent July 2024.
Rogers Communications	Telecommunications	Notification letter mailed in July 2024.
Seaside Communications	Telecommunications	Notification letter sent July 2024.

10.2.5 Effects Assessment

Project-EMI Interactions

Project activities only interact with electromagnetic signals during operations (Table 10.3).

Table 10.3: Potential Project-EMI Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
EMI												X			

Assessment Boundaries
Assessment boundaries align with the consultation boundaries established by the RABC Guidelines.

Assessment Criteria
Assessment criteria provided in Section 4.6 apply for EMI. The VC-specific definition for magnitude is applied to each operator individually as follows:

- Low – letter of no objection received.
- Moderate – organization requests additional consultation.
- High – letter of objection received.

Effects
As shown in Table 10.2, 14 notifications were submitted in total.

Correspondence received from ISED, DND, RCMP, CCG, ECCC, NAV CANADA, Bell, and Port Hawkesbury Volunteer Fire Department confirmed receipt and (if relevant) indicated no objections.

No response was received from Cape Breton Regional Police, Port Hawkesbury RCMP, Eastlink, Seaside Communications, or Rogers Communications.

Mitigation
The following general mitigation measures regarding EMI will be implemented:

- Ensure operators are consulted on any future layout updates.
- Continue consultation with operators who have not yet responded to the notification letters and/or who expressed concerns with the initial layouts presented.

Should additional layout modifications be required, the above agencies will be provided with updated information, as appropriate.

Monitoring
No monitoring programs are recommended.

Conclusion
Results are characterized as low magnitude, within the consultation zones defined by RABC Guidelines, medium duration, continuous, reversible, and not significant.

10.3 Shadow Flicker

10.3.1 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 wind turbine must be operating.
- The wind turbine must be situated between the sun and the shadow receptor.
- The wind turbine must be facing directly towards, or away from, the sun such that the rotational plane of the blades (i.e., rotor plane) is 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 wind turbine and the shadow receptor must be clear. Light-impermeable obstacles, such as vegetation, tall structures, etc., will prevent shadow flicker from occurring at the receptor.
- The shadow receptor must be close enough to the wind turbine to be in the shadow.

10.3.2 Regulatory Context

There is no municipal, provincial, or federal legislation related to shadow flicker, but many jurisdictions, including Nova Scotia (through NSECC), have adopted the industry guideline of no more than 30 hours of shadow flicker per year, or no more than 30 minutes of shadow flicker on the worst day of the year at residential receptors (NSECC, 2021).

10.3.3 Assessment Methodology

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

- To identify nearby receptors that may potentially experience shadow flicker from the Project’s operation.

- To quantify and assess the duration and frequency of shadow flicker for nearby residents under a worst-case scenario.
- To determine if applicable guidelines are met/exceeded.
- To mitigate and minimize shadow flicker experienced by nearby residents, as necessary.

Potential receptors located within 2 km of the turbine locations were identified using GIS data from the Nova Scotia Geomatics Centre and aerial imagery. As a conservative measure, no distinction was made between habitable dwellings and barns, sheds, or outbuildings. An existing wind turbine was identified approximately 3.3 km south of the nearest proposed turbine and was also included in the modelling.

An analysis was conducted using the windPRO version 4.0.547 under a worst-case scenario, which assumes that all the criteria listed in Section 10.3.1 are always met. The worst-case modelling also assumes receptor structures are a ‘greenhouse’, having windows on all surfaces. Model results are presented graphically as contour lines of the number of hours of shadow flicker received by the area surrounding the Project within a calendar year.

10.3.4 Assessment Results

Only one receptor was identified within 2 km of the Project turbines, located approximately 1.2 km east of the nearest proposed turbine (Appendix K). This receptor’s worst case scenario shadow flicker results are within the guidelines at 24:01 hours per year and a maximum of 26 minutes per day. Detailed results are provided in Appendix K.

10.3.5 Effects Assessment

Project-Shadow Flicker Interactions

Project activities only interact with shadow flicker during wind turbine operations (Table 10.4).

Table 10.4: Potential Project-Shadow Flicker Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Shadow Flicker												X			

Assessment Boundaries
The LAA for shadow flicker includes a 2 km area around the Assessment Area (Drawing 7.2). The RAA is not applicable for shadow flicker.

Assessment Criteria
The assessment criteria provided in Section 4.6 are applicable to shadow flicker. The VC-specific definition for magnitude is as follows:

- Negligible – no measurable shadow flicker predicted at receptor location(s).
- Low – measurable shadow flicker predicted at receptor locations, but results are below guidance.
- High – shadow flicker predicted to exceed guidance at receptor locations.

Effects
Per the shadow flicker modelling results in Appendix K, the identified receptor within 2 km of the Project complies with the threshold of 30 minutes per day and 30 hours per year of shadow flicker.

Mitigation
No mitigation is recommended.

The Project will develop a complaint response protocol, which will consider complaints related to shadow flicker and outline a process to investigate these complaints. Mitigation to resolve complaints, if determined to be necessary, will be completed on a case-by-case basis in consultation with the affected landowner.

Monitoring
No monitoring programs are recommended.

Conclusion
Results are characterized as low magnitude, within the LAA, medium duration, intermittent, reversible, and not significant.

10.4 Visual Impacts

10.4.1 Overview

The development of wind turbines has the potential to change the visual landscape and/or aesthetics of a local area. The level of change varies depending on the significance of the landscape, local topography, and the degree to which the turbines alter or modify the landscape. Locations of concern may include:

- Public viewpoints
- Protected areas
- Areas of local significance
- Recreational areas (hiking trails, biking routes, etc.)

Lighting associated with wind turbines may also result in visual impacts, especially during the nighttime.

10.4.2 Regulatory Context

There are no provincial or federal guidelines related to viewscapes in Nova Scotia. At the municipal level, visual impacts are considered during the review and approval of development permits as prescribed within the Municipality of the County of Inverness Municipal Planning Strategy (2023).

Operational turbine lighting is regulated by NAV CANADA and Transport Canada.

10.4.3 Assessment Methodology

Visual simulations were undertaken to assess the wind turbines' impact on the visual landscape and local aesthetics. Locations for the visual assessment were selected based on known significant viewpoints (i.e., lookouts, hiking trails, etc.) within the area surrounding the Project and through engagement with and consideration of local stakeholders/users. The following locations were selected for visual simulations (Drawing 10.1A):

- Havre Boucher Beach looking northeast (coordinates provided in Drawing 10.1B)
- Aulds Cove Motel looking northeast (coordinates provided in Drawing 10.2C)
- Craigmore Enduro Park looking east (coordinates provided in Drawing 10.2D)
- General Line - Turbine Road looking northwest (coordinates provided in Drawing 10.2E)
- Route 19 near Judique looking southeast (coordinates provided in Drawing 10.2E)
- Princeville looking west (coordinates provided in Drawing 10.2H)
- Walker's Cove looking southeast (coordinates provided in Drawing 10.2I)

Photos were taken using a Canon EOS REBEL T7 camera with a 50 mm lens. Precise location, time, direction of view, and weather conditions at the time of the photo were also recorded and are noted on each of the visual simulation drawings.

The visual simulations were completed using WindPro software that incorporates elevation, turbine location, and camera/photo location information to simulate what the landscape will look like after the wind turbines have been constructed. Weather conditions (clear sky, overcast, etc.) and visibility (clear, fog, etc.) can be selected during the process to demonstrate the visual aesthetics of the Project during various environmental conditions.

The result is a series of photos showing the landscape from selected locations with the turbines in place.

10.4.4 Assessment Results

Visual simulations are provided in Drawings 10.2A – 10.2I.

Turbines will be equipped with pilot warning and obstruction avoidance lighting to ensure compliance with NAV CANADA and Transport Canada safety requirements.

10.4.5 Effects Assessment

Project-Visual Aesthetics Interactions

Project activities only interact with visual aesthetics during operations (Table 10.5).

Table 10.5: Potential Project-Visual Aesthetics Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Visual Aesthetics												X			

Assessment Boundaries

The LAA for visual effects includes the observer locations. The RAA is not applicable for visual effects.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for visual effects. The VC-specific definition for magnitude is applied to each observer location individually as follows:

- Negligible – Project components cannot be seen from the observer location.
- Low – Project components may be seen from the observer location, but do not stand out or are not discernible in the view (i.e., low exposure on the horizon).
- Moderate – Project components can be seen from the observer location but are not a prominent feature in the view.
- High – Project components are a prominent feature in the view from the observer location.

It is noted that the magnitude criteria for visual effects is considered a neutral criteria as the perception of a change to the visual landscape can be adverse or positive depending on the individual observer.

Effects

Based on the simulations, portions of the turbines are visible from the following observer locations:

- Craigmore Enduro Park
- Turbine Road
- Havre Boucher Beach
- Route 19 near Judique
- Princeville
- Walkers Cove

Turbines were not observable from the Aulds Cove Motel.

Operational lighting could be visible from the turbines during the night. However, potential impacts to residents are expected to be limited due to the distance between the Project turbines and nearest potential receptor. Lighting intensity and flashes will be minimized, as allowable by Transport Canada, and the exterior turbine maintenance lights will be turned off prior to maintenance staff leaving the site. In addition, the Proponent expects to install a light mitigation system. The technologies under consideration are a light dimming system whereby the turbine lights would be dimmed by up to 90% during high visibility conditions (i.e., clear skies). The Proponent will make a final decision once the Project design has been further advanced and a final turbine technology has been selected.

Mitigation

No mitigation is recommended related to viewscapes.

The following mitigation is recommended regarding turbine lighting:

- Limit lighting on turbine hubs and blades to minimum levels while still meeting requirements of NAV CANADA and Transport Canada.
- Limit general lighting within the Project Area. Lighting will only be used when technicians are working on-site.

Construction activities will be limited to daytime hours when possible. It is noted that the turbine may be erected during the evening as the activity must be completed when the wind is less than 8 m/s as a safety measure. On-site lighting will be pointed downward to minimize light throw.

Monitoring

No monitoring programs are recommended.

Conclusion

Results are characterized as low to moderate magnitude, within the LAA, medium duration, continuous, reversible, and not significant.

10.5 Sound

10.5.1 Overview

The assessment of sound considered both construction and operational generated noise 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 transmission interconnection and grid connection, along with the subsequent assembly of wind turbines. To quantify potential impacts, noise levels of equipment anticipated for use in the Project's construction were used to calculate noise levels throughout the Study Area at set distances from the Assessment Area in consideration of nearby receptors.

During the operational phase of the Project, wind turbines will emit sound to the surrounding environment from mechanical equipment operation and the turbines interaction with the surrounding air (aerodynamic sound). Design and engineering of wind turbine components (e.g., anti-vibration products) have reduced, but not eliminated, mechanical and aerodynamic sound and its associated impacts. To quantify potential impacts of turbine generated noise on nearby receptors, detailed sound modeling was completed.

10.5.2 Regulatory Context

Changes to the acoustic environment during construction and operational activities could result in displacement, annoyance, and interference of communication, sleep, and/or working efficiency. As such, sound levels are regulated at the various government levels (Table 10.6).

Table 10.6: Summary of Sound Level Regulations and Guidelines

Regulated By	Regulation/Guidance	Sound Level (dBA)	Hours / Duration
For Residential Receptors			
Nova Scotia Department of Environment and Labour (now NSECC)	Guidelines for Environmental Noise Measurement and Assessment (NSECC, 2022b)	≤ 65	0700 to 1900
		≤ 60	1900 to 2300
		≤ 55	2300 to 0700
NSECC	Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021)	≤ 40	During the operation of wind turbines
Municipality of the County of Inverness	By-Law 41 – Noise Control Noise Control By-Law	*Not applicable*	*NA*
For Occupational Safety			
Workplace Health and Safety Regulations & Canadian Centre for Occupational Health and Safety (CCOHS)	Noise – Occupational Exposure Limits in Canada (Workplace Health and Safety Regulations & CCOHS)	85	8-hour maximum

There are no municipal, provincial, or federal regulations related to operational sound, but many jurisdictions, including Nova Scotia (through NSECC) have adopted the industry standard that wind turbine generated sound must not exceed 40 dBA at the exterior of any residential receptors (NSECC, 2021).

10.5.3 Assessment Methodology

Ambient Sound

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

Construction Sound

The assessment of construction sound is based on desktop studies and addresses Project-related effects on human receptors. The objectives aim to achieve the following:

- Establish the construction sound levels produced by the Project.
- Identify nearby receptors that may be exposed to construction sound produced by the Project.
- Determine if the applicable guidelines are met/exceeded.
- Mitigate and minimize any impacts experienced by nearby receptors.

Receptors (including sensitive receptors such as schools, daycares, and senior residences) located within 2 km of the Assessment Area were identified using GIS data from the Nova Scotia Geomatics Centre and aerial imagery.

Note, sound levels and impacts from blasting activities have not been included in this assessment as these activities are not anticipated. If blasting is determined to be required during construction, the Proponent will notify NSECC and apply for any required permits and approvals.

Operational Sound

The operational sound assessment was completed by ABO Energy Canada Ltd. through a combination of desktop studies and modelling with the following objectives in mind:

- Identify receptors/dwellings within the vicinity of the Project.
- Identify existing operational turbines within 5 km of the Project (one identified).
- Identify and assess any potential impacts on these receptors, including cumulative effects from neighbouring turbines.
- Avoid and/or mitigate impacts of Project generated sound on nearby receptors.

The sound assessment identified receptors within a 2 km radius of the Assessment Area. The assessment was completed using the WindPRO version 4.0.547 software package. For the purposes of this model, receptors included all structures identified in GIS data from the Nova Scotia Geomatics Centre, as well as any additional identifiable structures based on aerial imagery. No attempt to distinguish sheds and outbuildings from dwellings or cottages was made.

The model followed *ISO 9613-2 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method and calculations*, and was based on the following input information:

- UTM coordinates for the wind turbines.
- 1/1 Octave band sound power level data, either provided by the manufacturer or calculated by WindPro, for the wind turbines.
- UTM coordinates for receptors (all non-Project participant structures within a 5 km radius of the Assessment Area were evaluated).
- A wind speed of 7 m/s, the speed at which the highest sound power level output is achieved (based on test data from the manufacturer).
- Topographic data for the surrounding area.

The ISO 9613-2 calculation method assumes meteorological conditions that are ideal for noise propagation, including a ground temperature of 10°C and 70% relative atmospheric humidity. A ground factor of 0.5 was applied to the model, representing hard surfaces and considered a worst-case scenario. An ambient sound level of 35.1 dB was also applied.

Modelling results were mapped and presented as a heat-map, demonstrating the sound levels each receptor will experience.

10.5.4 Sound Assessment Results

Ambient Sound

When evaluating sound levels produced by the Project, it is important to understand ambient sound existing in and around the Study Area pre-development. Several developments also contribute to ambient sound levels within/near the Study Area, primarily:

- Active forestry (throughout and surrounding the Study Area)
- Aggregates quarry

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.

Construction Sound

During construction activities, sound will predominantly be generated by the operation of construction 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 have been provided in Table 10.7.

Table 10.7: Decibel Limits of Construction Equipment Required for the Project

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

Note that measurements shown are relevant to the decibel level ranges within close proximity (i.e., less than 15 m of distance) between a receptor and the relevant piece of equipment.

Sources: [1] (WorkSafe BC, n.d.)
[2] (Transport Scotland, n.d.)
[3] (WorkSafe BC, 2016)
[4] (Government of Oregon, n.d.)
[5] (The Driller, 2005)
[6] (SCE, 2016)
[7] (Government of Ontario, 2021)

The range of decibels anticipated for the Project's construction activities will be between 78 to 115 dBA (from a single piece of equipment within 15 m from the source). Construction activities are anticipated to occur from Q2 2026 to Q4 2028.

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 provided in Table 10.8. The attenuation rate of sound presented below does not consider local landscape/topography or buildings, and therefore, is considered a "worst-case" scenario for sound levels produced by a single piece of equipment.

Table 10.8: Attenuation of Construction Related Sounds

Case	Example Equipment Type	Sound Level @ 15 m (dBA)*	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

*Approximate point source sound levels, based on data collected in Table 10.7 above. Combined sound levels produced by multiple pieces of equipment operating simultaneously have not been included in the assessment.

Operational Sound

One receptor was identified within 2 km of the Study Area, located approximately 1.2 km east of the nearest proposed turbine (Appendix L). One existing wind turbine is located approximately 3.3 km south of the nearest proposed turbine, which was included in noise modelling. The predicted sound level at the identified receptor is 39.4 dBA.

Information from the turbine manufacturer supplied the 1/3 octave low frequency power levels at 118 m hub height. The power levels were entered into a Finland low frequency model in WindPRO software to produce the maximum dBA at each receptor. No potential receptors exceed the most critical noise demand from WindPRO's Finland low frequency model of 43 dBA; therefore, low frequency sound is not expected to be a concern. The Finland low frequency model along with a literature review of low frequency/infrasound is provided in Appendix L.

10.5.5 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 specifically addressed because sound levels are expected to be comparable to construction levels (Table 10.9).

Table 10.9: Potential Project-Sound Interactions

Valued Component	Site Preparation and Construction											Operations and Maintenance		Decommissioning	
	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	Grid Connection	Removal of Temporary Works and Site Restoration	Commissioning	General Operation and Maintenance	Vegetation Management	Infrastructure Removal	Site Reclamation
Sound		X		X	X	X	X	X	X			X	X	X	X

Assessment Boundaries

The LAA for sound includes a 2 km buffer around the Assessment Area (Drawing 2.2). The RAA is not applicable for sound.

Assessment Criteria

Assessment criteria provided in Section 4.6 apply for sound. The VC-specific definition for magnitude is provided for construction and operational sound as follows:

Construction Sound

- Negligible – sound levels from Project activities are expected to be ≤55 dBA at residential and sensitive receptor locations.
- Low – sound levels from Project activities may measure between 55 and 65 dBA at residential and sensitive receptor locations.
- Moderate – sound levels from Project activities may exceed 65 dBA at residential and sensitive receptor locations, but only during high-impact activities (intermittently).
- High – sound levels from Project activities are expected to exceed 65 dBA at residential and sensitive receptor locations during multiple activities (continuously).

Operational Sound

- Low – measurable sound levels predicted at receptor location(s), but results are below NSECC guidance.
- High – sound levels predicted to exceed NSECC guidance at receptor location(s).

Effects

During construction of the Project, decibel limits above 55 dBA at residential receptors can result in disruptions of sleep during nighttime hours while sounds above 65 dBA may cause during daytime hours. Sounds produced during construction have the potential to exceed these thresholds at the only receptor within the LAA. However, construction will be kept within daylight hours, based on local noise by-laws, and is considered a temporary source of noise generated by the Project. Based on the desktop review, a total of:

- No potential receptors are located within 0.5 km of construction activities, which may result in median/continuous sound levels above 65 dBA during daytime hours.
- No potential receptors are located within 1.0 km of construction activities, which may result in median/continuous sounds above 55 to 65 dBA during daytime hours.
- One potential receptor is located within 2.0 km of construction activities, which may result in median/continuous sound levels above 55 dBA during daytime hours.

The closest receptor is located approximately 1.2 km away from the turbines and given that the construction footprint is widespread, Project-related construction noise potentially exceeding NSECC guidance at this individual receptor would occur over a very short time frame. Furthermore, the median sound level from construction is similar to sound produced from a pick-up truck, which is already a source of sound within the Study Area. As a result, 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 a very short duration.

Operational sound levels are within guidelines.

Mitigation

To minimize construction sound and the potential to disturb receptors during construction, the following general mitigation/protective measures will be implemented:

- Use noise suppressants (e.g., mufflers) on vehicles/equipment.
- Require that equipment is maintained in good working order.
- Limit vehicle idling.
- Conduct construction activities within the recommended daytime hours of 7:00 am to 10:00 pm.
- If geotechnical investigations determine blasting is required, additional mitigation and monitoring will be developed.

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

- Regular maintenance of turbines to ensure they are in good working order and continue to comply with sound level standards.

The Project will develop a complaint response protocol, which 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 landowner. It is recommended that pre-construction sound levels at key receptor locations be measured as part of this process to establish baseline conditions for future reference (if needed).

Monitoring

No monitoring programs are recommended.

Conclusion

Construction phase results are characterized as low magnitude, within the LAA, short duration, continuous, reversible, and not significant.

Operational phase results are characterized as low magnitude, within the LAA, medium duration, continuous, reversible, and not significant.

11.0 EFFECTS OF THE UNDERTAKING ON THE ENVIRONMENT

11.1 Summary of Effects of the Undertaking on the Environment

Table 11.1 summarizes the results of the effects assessment for each VC.

Table 11.1: Effects of the Undertaking on the Environment Summary

VC	Magnitude of Effects	Geographic Extent of Effects	Timing and Duration of Effects	Frequency of Effects	Reversibility of Effects	Significance Level	Mitigation and/or Monitoring Required?
Atmosphere and Air Quality	Low to negligible – Minimal to no changes are expected to ambient air quality	Within the Study Area	Seasonal aspects not applicable; short-term duration	Intermittent	Reversible	Not significant	Mitigation required; no monitoring required
Climate Change	Positive – A positive effect on GHG emissions is expected	Within the Study Area	Seasonal aspects not applicable; medium-term duration	Continuous	Irreversible	Significant (positive)	Mitigation required; no monitoring required
Geophysical Environment	Moderate – Changes to local topography/geology are possible as geologic hazards exist within proximity of the Assessment Area; impacts to the quality/quantity of groundwater wells are possible (wells exist within 800 m of the Assessment Area)	Within the Assessment Area	Seasonal aspects not applicable; short-term duration	Intermittent	Reversible	Not significant	Mitigation required; monitoring may be required
Waterbodies and Watercourses	Moderate – Small loss of aquatic habitat, with potential for altered hydrology	Within the Assessment Area	Seasonal aspects applicable; short-term duration	Single event	Reversible	Not significant	Mitigation and monitoring required
Fish and Fish Habitat	Low – Small loss of fish habitat or impact to fish behaviours	Within the Assessment Area	Seasonal aspects applicable; short-term duration	Single event	Reversible	Not significant	Mitigation and monitoring required
Wetlands	Low – Direct loss of wetland habitat, but overall wetland functions remain intact.	Within the Assessment Area	Seasonal aspects applicable; short-term duration	Single event	Reversible	Not significant	Mitigation and monitoring required

VC	Magnitude of Effects	Geographic Extent of Effects	Timing and Duration of Effects	Frequency of Effects	Reversibility of Effects	Significance Level	Mitigation and/or Monitoring Required?
Terrestrial Habitat	Low – Some loss of terrestrial habitat, but overall habitat functions remain intact	Within the Assessment Area	Seasonal aspects not applicable; long-term duration	Single event	Reversible	Not significant	Mitigation required; no monitoring required
Terrestrial Flora	Low – Small loss of habitat supporting terrestrial flora SAR/SOCI, but no terrestrial flora SAR/SOCI individuals lost	Within the Assessment Area	Seasonal aspects not applicable; long-term duration (for habitat, N/A for individual SAR/SOCI)	Single event (for habitat, N/A for individual SAR/SOCI)	Reversible	Not significant	Mitigation required; no monitoring required
Terrestrial Fauna	Low – Small loss of habitat supporting fauna, but no impacts to fauna behaviours expected	Regions surrounding the Assessment Area that may fall within the habitat range of each species, bounded by pre-existing infrastructure and roads or other large crossing areas	Seasonal aspects applicable; long-term duration (for habitat, N/A for SAR/SOCI)	Continuous	Reversible	Not significant	Mitigation and monitoring required
Bats	Moderate – Minimal loss of individuals or impacts to bat behaviours, but these impacts will only be experienced by individuals rather than entire populations.	Within the Assessment Area	Seasonal aspects not applicable; medium-term duration	Continuous	Reversible	Not significant	Mitigation and monitoring required

VC	Magnitude of Effects	Geographic Extent of Effects	Timing and Duration of Effects	Frequency of Effects	Reversibility of Effects	Significance Level	Mitigation and/or Monitoring Required?
Avifauna	Low – Small loss of important habitat supporting avifauna and/or impacts to migratory avifauna are expected to be low	Within the Assessment Area and the airspace directly surround the turbines	Seasonal aspects not applicable; medium-term duration	Intermittent	Reversible	Not significant	Mitigation and monitoring required
Economy	Positive – A positive effect on the economy is expected	Within Nova Scotia	Seasonal aspects not applicable; medium-term duration	Continuous	Irreversible	Significant (positive)	No mitigation or monitoring required
Land Use and Value	Negligible – No change in land value expected and surrounding land use can largely continue					Not significant	No mitigation or monitoring required
Traffic and Transportation	Moderate – Moderate change in traffic levels and/or moderate disruptions to traffic flow and routing	Within the area of Subdivision C extending to the Strait of Canso Superport	Seasonal aspects not applicable; short-term duration	Traffic and Transportation	Moderate – Moderate change in traffic levels and/or moderate disruptions to traffic flow and routing	Within the area of Subdivision C extending to the Strait of Canso Superport	Seasonal aspects not applicable; short-term duration
Recreation and Tourism	Low – small change to tourism expected and/or minor limitations to recreation use	Within Inverness County	Seasonal aspects not applicable; medium-term duration	Recreation and Tourism	Low – small change to tourism expected and/or minor limitations to recreation use	Not Significant	Seasonal aspects not applicable; medium-term duration

VC	Magnitude of Effects	Geographic Extent of Effects	Timing and Duration of Effects	Frequency of Effects	Reversibility of Effects	Significance Level	Mitigation and/or Monitoring Required?
Archaeological Resources	Negligible to low – Activities have a negligible to low potential for encountering archaeological resources during ground disturbance.	Within the Assessment Area	Seasonal aspects not applicable; short-term duration	Single event	Irreversible (to be confirmed based on any identified resources, as applicable)	Not significant	Mitigation required; no monitoring required
Human Health	Negligible – No expected impacts to human health					Not significant	Mitigation required; no monitoring required
Electromagnetic Interference	Low – Letter of no objection received	Within consultation zones as defined by RABC Guidelines	Seasonal aspects not applicable; medium-term duration	Continuous	Reversible	Not significant	Mitigation required; no monitoring required
Shadow Flicker	Low – Measurable shadow flicker predicted at receptor location(s), but results are below guidance	Within 2 km buffer around Assessment Area	Seasonal aspects applicable; medium-term duration	Intermittent	Reversible	Not significant	No mitigation or monitoring required
Visual Impacts	Low to Moderate – Project components may be seen depending on the observer location	Within observer locations	Seasonal aspects not applicable; medium-term duration	Continuous	Reversible	Not significant	Mitigation required; no monitoring required
Sound: Construction Phase	Low – sound levels from Project activities may measure between 55-65 dBA at residential and sensitive receptor locations.	Within 2 km buffer around Assessment Area	Seasonal aspects not applicable; short-term duration	Continuous	Reversible	Not significant	Mitigation required; no monitoring required

VC	Magnitude of Effects	Geographic Extent of Effects	Timing and Duration of Effects	Frequency of Effects	Reversibility of Effects	Significance Level	Mitigation and/or Monitoring Required?
Sound: Operation Phase	Low – Measurable sound levels predicted at receptor location(s), but results are below NSECC guidance	Within 2 km buffer around Assessment Area	Seasonal aspects not applicable; medium-term duration	Continuous	Reversible	Not significant	No mitigation or monitoring required

11.2 Summary of Mitigation Measures

A compiled list of mitigation measures identified throughout the EA is provided below.

Atmospheric Environment

General mitigation measures for fugitive emissions, exhaust emissions, and GHG emissions include:

- 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 ridge disturbed soil to prevent dust formation.
- Cease dust-generating construction activities during periods of excessive wind.
- Enclose or cover soil storage and/or stockpile areas.
- Wet (with water) aggregate and soil stockpiles to control dust.
- Design storage areas and material stockpiles with prevailing wind directions in mind.
- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- 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.
- Ensure Project personnel adhere to all safety protocols and wear appropriate personal protective equipment (PPE) during significant fugitive emissions events (i.e., windstorms, dust storms).
- Ensure equipment meets all applicable provincial and air quality regulations and emissions standards.
- Ensure equipment is fueled using low-sulphur diesel (to reduce SO_x air emissions).
- Maintain engines and exhaust systems according to the manufacturer's specifications and the recommended maintenance schedule.
- Remove from service malfunctioning equipment and/or equipment generating excess amounts of smoke, odour, or noise until an assessment and necessary repairs can be completed.
- Remove from service construction equipment with improperly functioning emissions control systems.
- Restrict the idling of equipment where feasible.
- Use 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/decommissioning waste, where possible.
- Recycle and compost workforce waste (i.e., food waste). Diverting this waste will reduce methane generated in landfills as it decomposes.

- Minimize deforestation during land clearing by only clearing the area that will be needed. This will reduce CH_4 and NO_x emissions associated with soil disturbance and limit the use of equipment (lowering emissions produced during equipment operations).
- Plan construction activities to reduce the double handling of materials, reducing GHG emissions associated with heavy equipment operations.
- Use recycled or repurposed materials, where possible, to reduce GHG emissions associated with embodied energy (i.e., the energy associated with manufacturing a product or service).
- Ensure Project equipment meets all applicable provincial and air quality regulations and emissions standards.
- Maintain engine and exhaust systems according to the manufacturer's specifications and applicable maintenance schedule.
- Remove from service malfunctioning equipment or equipment generating excess amounts of smoke, odour, or noise until an assessment and necessary repairs can be completed.
- Ensure construction equipment with an improperly functioning emission control system is not operated.
- Ensure regular equipment maintenance is undertaken to maintain good operations and fuel efficiency.
- Ensure equipment containing coolant (i.e., air conditioning units) undergoes preventative maintenance and inspections (i.e., leak testing).
- Train Project personnel (as appropriate) in the proper disposal of halocarbon-containing substances.
- Hire from a local labour force to reduce emissions associated with workforce transportation.
- Dispose of halocarbon-containing substances at an approved hazardous waste facility per applicable regulations and in compliance with local requirements.
- Ensure 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.
- Incorporate energy-efficient infrastructure (i.e., solar panels) where feasible to limit GHG emissions and the use of fossil fuels resulting from standard equipment (e.g., diesel-powered generators or light stands).

Geophysical Environment

General mitigation measures for avoidance of geologic hazards and groundwater resources include:

- Conduct blasting, as required, in accordance with provincial legislation and subject to terms and conditions of applicable permits.
  - Ensure all blasts are conducted and monitored by certified professionals.
- Blasting, if required, will follow the guidelines presented in Wright and Hopky (1998).
  - Notify landowners within 800 m of any blasting activities.

    - Conduct a pre-blast survey for wells within 800 m of the point of blast in accordance with NSECC's Procedure for Conducting a Pre-Blast Survey (1993) to monitor for changes in well quality or quantity.
    - Recover and revegetate exposed soils or bedrock as required to minimize any exposure following blasting.
- If sulphide bearing materials are identified through pre-construction, develop specific mitigations to be communicated to the construction crew.
- Plan site work to minimize disturbance of slate bedrock and exposure of disturbed slate bedrock to rainfall.
- Avoid locating any disturbed or stockpiled slate within or near wetlands, watercourses, and/or waterbodies.
- Ensure rock removal in known areas of elevated sulphide potential will conform to the Sulphide Bearing Material Disposal Regulations, NS Reg. 57/95 and any requirements from relevant regulatory departments.
- Store all soils removed during the excavation phase according to provincial standards and best practice guidelines.
- Store any soil needed for backfilling, after foundations have been poured, temporarily adjacent to the excavations until needed. Any remaining excavated material will be used on-site or removed and sent to an approved facility.
- Install erosion and sedimentation control measures prior to excavation activities and inspect controls on a regular basis.
- Remove temporary erosion and sedimentation controls once the area has been stabilized.

Aquatic Environment

General mitigation measures for impacts to watercourses, waterbodies, fish and fish habitat, and wetlands include:

- Educate Project personnel on the sensitivity of aquatic habitat.
- Mark watercourses clearly and avoid impacts to the watercourse and adjacent riparian habitat to the extent possible.
- Revegetate along the watercourse edge and above the ordinary high-water mark to stabilize the area.
- Redesign existing watercourse crossings to facilitate habitat upgrades, including unblocking culverts and making waterways more conducive to fish passage.
- Conduct work 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 revegetation period (NSECC, 2015a).
- Plan any activities to align with low-flow periods.
- 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.
- Develop a site-specific erosion and sedimentation 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 revegetation.

- Limit the area of exposed soil and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover).
- Limit the slope and gradient of disturbed areas to minimize the velocity of surface water runoff.
- Integrate water management systems including diversion and collection ditches, roadside drainage channels, vegetated swales, and stormwater retention ponds.
- 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.
- Leave riparian vegetation as intact as Project developments will allow.
- Integrate outlet protection features to dissipate flow velocities and decrease erosion at the outflow.
- Ensure 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, 2015a).
- Utilize 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, 2015a).
- Utilize rock material that is clean, coarse granular, non-ore-bearing, non-watercourse-derived, and non-toxic to aquatic life (NSECC, 2015a).
- A fish rescue will be completed during crossing construction.
- Blasting, if required, will follow the guidelines presented in Wright and Hopky (1998).
- Flag wetlands to avoid interference with wetland habitat to the extent possible.
- Avoid impacts to wetlands to the extent possible.
    - Where unavoidable, complete wetland alterations in accordance with the NS Wetland Conservation Policy and the wetland alteration process during the permitting stage, which includes a requirement to compensate for lost wetland habitat and functions.
    - Design wetland crossings to occur at the narrow part of the wetland or the wetland’s edges, to the extent possible.
- Design wetland crossings to avoid permanent diversion, restriction or blockage of natural flow, such that hydrologic function of wetlands will be maintained.
- Use the existing roads and access routes to the extent feasible.
- Avoid travel through wetlands. If travel through wetlands is required:
    - Use anti-rutting mitigation (e.g., mud mats), as appropriate.
    - Cross the wetland at the narrowest portion, where possible.
    - Time work to occur during frozen ground conditions, where possible.
- Avoid surface run-off containing suspended materials or other harmful substances.
- Direct run-off from construction activities away from wetlands.
- Use water or an approved dust suppressant to control dust on roads, as required.
- Enforce site speed limits to minimize dust generation.

- Use quarried, crushed materials for road construction to reduce the introduction of invasive vascular plant species, where possible.
- Prior to arrival on site equipment will be cleaned and inspected to prevent the introduction of invasive/non-native species.
- Train staff on the requirements for work in and around wetlands.

Terrestrial Environment

General mitigation measures for impacts to terrestrial habitat, flora, fauna, bats, and avifauna include the following:

- Minimize the overall area to be cleared, fragmentation of habitats, and isolation of existing habitats by utilizing pre-existing roads and previously altered areas (i.e., clear cuts).
- Minimize the Project footprint, especially within old-growth and other late-successional stands, by clearing only the area necessary for turbine erection and operation.
- Avoid tree clearing in old-growth forests on Crown land within the Assessment Area.
    - Consult with NSNRR when finalizing the Project design to avoid impacts to old-growth forests.
- Restore cleared areas where possible to reduce permanent habitat loss, primarily through revegetation of road rights of way and other areas cleared temporarily for construction.
- Revegetate disturbed areas, exposed soils, and cleared areas using native seed mixes.
    - Use seed mixes that do not contain clover to avoid attracting deer (which carry ticks) to the area when revegetating road ROWs and other cleared areas requiring revegetation.
- Minimize use of road salt to minimize attraction of ungulates to roadsides during the winter.
- Maintain avoidance of flora SAR/SOCI from areas with known occurrences during the design phase to the greatest extent possible.
    - Desktop and field assessments identified important habitat features with terrestrial flora SAR/SOCI locations to be avoided during the design phase to the greatest extent possible.
- Avoid habitats that are likely to support flora SAR/SOCI known to occur within the Study Area during the detail design phase to the greatest extent possible.
- Educate Project personnel about the potential for plant or lichen SAR/SOCI during construction.
    - Guidance will be provided to Project personnel to raise awareness of terrestrial flora SAR/SOCI that are known to exist within the Study Area to increase the number of trained eyes looking for these species.
- Consult with NSNRR if an unexpected flora SAR/SOCI is encountered during construction activities. Potential mitigation measures based upon recognized practices to transplant or collect seeds can be used as a contingency if flora SAR/SOCI are unexpectedly encountered during construction activities. A transplantation plan will be

developed along with a monitoring protocol through consultation with NSNRR should this be required during construction.

- Flag or otherwise clearly mark SAR/SOCI flora located near to construction areas to ensure protection of select individuals during the construction phase of the Project.
- Restore as much habitat as possible through revegetation (with native seed mix) to promote continued growth of terrestrial flora across the Study Area.
- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- Use low-sulphur diesel to reduce SO_x air emissions.
- Require equipment to meet all applicable provincial and air quality regulations and emissions standards.
- Maintain engines and exhaust systems according to the manufacturer's specifications and applicable maintenance schedule.
- Stabilize exposed soil surfaces by sloping or using vegetation, stone, soil, or geotextiles to prevent dust and airborne particles.
- Wet aggregate and soil stockpiles (where practical) to control/minimize dust generation.
- Enclose or cover soil storage and/or stockpile areas (where practical).
- Maximize buffers to SAR/SOCI lichen to minimize edge effects.
- Use native seed mixes when revegetating cleared areas.
- Require equipment to be as clean as possible to prevent the introduction of non-native species into previously untouched areas.
    - Because non-native species are already present within the Study Area, care will be taken when travelling from developed areas to intact areas so that plant material is not transferred between locations.
- Continue to review field survey results, and guidance from NSNRR through the detail design phase.
- Reclaim small roads leading to turbines to minimize long-lasting effects of habitat loss.
- Support connectivity by maintaining vegetated buffers around wetlands and watercourses, 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 on the site.
- Minimize Project-related traffic to reduce chances of wildlife collisions and traffic-related stress to wildlife.
- Impose restrictions to site access if deemed necessary due to a substantial increase in wildlife collisions and mortality.
- Respect sensitive timing windows for SAR species.
- Minimize loss of habitat or food sources for critical prey species of the Canada lynx, especially:
    - Snowshoe hare – immature, dense conifer stands.
    - Red squirrel – open bogs that serve as a key food source for the squirrel.

- Minimize loss of important habitat required by priority species for reproduction events, including:
    - Wood turtle – clear, meandering streams with gravel shores, gravel roadsides.
- Minimize overall area to be cleared to maintain refugia and cover for protection from predators.
- Maintain all equipment and machinery on site to reduce noise and vibration emissions associated with malfunctions. Where practical, install vehicles and machinery with noise muffling equipment to limit disturbance.
- Restrict on-site lighting, especially at night, to limit disturbance.
- Prohibit harassment and feeding of wildlife by Project personnel.
- Target clearing activities outside the active bat window (April 1 to September 30).
- Install motion activated lights on site infrastructure to reduce insect attraction and subsequent attraction by bats. Motion activated lighting is only applicable to the ground-based infrastructure (i.e., at doorways and the substation) as turbine lighting at the top of individual turbines is regulated by Transport Canada.
- Maintain avoidance of potential bat habitat (i.e., large snags, mature forests, and wetlands) to the greatest extent possible.
- Avoidance of topographic funnels, such as within lake or river valleys, for turbine placement to reduce the likelihood of interactions with concentrated bird movements.
- Avoidance, to the extent possible, of important bird habitats, such as wetlands, waterbodies, old growth forest, etc. to reduce the impact of habitat changes. This includes siting Project infrastructure within areas with existing disturbances, such as existing roads and cutover areas of forest.
- Adhere to ECCC guidelines on clearing windows for nesting migratory birds. Vegetation clearing activities will be conducted outside of the nesting period that is generally from April 1 to September 30 each year. Timing of clearing activities are generally dependent on seasonal conditions.
    - Should any ground or burrow-nesting species initiate breeding activities within stockpiles or exposed areas during construction or operations, the Proponent will avoid disturbance to these areas until chicks have fledged and the nesting areas are no longer being utilized.
- Maintain good housekeeping practices during construction to avoid indirectly feeding birds, and potentially attracting nuisance wildlife.
- Develop a spill response plan, and an emergency response plan within the Contingency Plan to mitigate the impacts of spills, hazardous substances, and other emergencies.
- Develop a fire response plan in accordance with provincial standards.
- Install avian deflectors on powerlines, including any powerline spans, or areas of line identified as requiring mitigation based on monitoring results.
- Completing construction activities during day time hours as much as practical during sensitive migration or breeding periods.
- Develop a site reclamation plan in accordance with engineering standards and in consultation with NSECC and NSNRR.

Socio-Economic Environment

General mitigation measures for traffic, transportation, recreation, and tourism include:

- Install notices 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.
- Replace removed signage and guardrails immediately with appropriate temporary signage to ensure the safety of travelling public.
- Complete upgrades to roads and overhead wires, branches, and signs if conflicts arise.
- Complete modifications and associated reinstatement to relevant specifications.
- Avoid, to the extent possible, transportation through urban areas during high traffic times (e.g., 7 am to 9 am and 3 pm to 6 pm; Monday through Friday).
- Conduct all travel using safe work practices for transporting oversized loads.
- Utilize the minimum number of vehicles possible to minimize impacts to road-way flow and air quality due to exhaust emissions.
- Ensure vehicles only visit and work on-site during normal daytime hours of operation, where possible, and avoid high-traffic times of day to reduce local traffic congestion.
- Work with local recreation groups to ensure continued access within the Study Area for recreation and hunting/trapping.
- Continue to work with nearby landowners to ensure there is a positive relationship within the community.

Archaeological Resources

- Maintain avoidance of sites of high and moderate potential for archaeological sites where possible in detail design.
- Conduct shovel testing when sites of potential archaeological resources cannot be avoided to the specifications per the recommendations of Davis MacIntyre and NSCCTH.
- Conduct vegetation removal within areas of potential archaeological resources (especially within the transmission corridors) by hand-clearing and make use of swamp mats where heavy machinery must transit these areas to avid ground disturbance.
- Develop a chance find procedure in the contingency plan related to the potential unexpected discovery of archaeological items or sites 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 assessment if, during the detail design phase, it is determined that ground disturbance is required in areas not previously assessed. The EA Branch will be provided with the acceptance letter from NSCCTH prior to completion of any disturbance in newly proposed areas.

Other Considerations

General mitigation measures for impacts to human health, shadow flicker, EMI, visual impacts, and sound include the following:

- Ensure operators are consulted on any future layout updates.
- Continue consultation with operators who have not yet responded to the EMI notification letters and/or who expressed concerns with the initial layouts presented.
- Limit lighting on turbine hubs and blades to minimum levels while still meeting requirements of NAV CANADA and Transport Canada.
- Limit general lighting within the Project Area. Lighting will only be used when technicians are working on-site.
- Use noise suppressants (e.g., mufflers) on vehicles/equipment.
- Limit vehicle idling.
- Conduct construction activities within the recommended daytime hours of 7:00 am to 10:00 pm.
- Blasting, if required, will follow the guidelines presented in Wright and Hopky (1998).

12.0 EFFECTS OF THE ENVIRONMENT ON THE UNDERTAKING

The following section discusses potential effects of the natural environment, including natural hazards and weather events, on the infrastructure and operation of the Project. Potential sources of effects from the environment are described below, including mitigation and design strategies for reducing the significance of residual effects.

The primary mitigative measure employed during the construction and operation of the Project will be to educate and train site personnel. Environmental and safety orientations will be conducted prior to the start of construction and all staff will be informed of the potential effects of the environment on the Project. Staff responsible for the operation and maintenance of the Project will be trained in the design and operation of the turbines, including applicable operating procedures, safety protocols, and evacuation plans. To further mitigate damages that cannot be controlled by education and training alone, the Project will be equipped with safety mechanisms to limit damage resulting from extreme weather events.

12.1 Climate Change

Climate change is the persistent change in the state of the climate which lasts for decades or longer (IPCC, 2018). Climate change may impact the Project through increased occurrences of extreme weather, precipitation, and subsequent flooding. In addition, increased weather extremes due to climate change may impact turbines, powerlines, and/or roadways, causing washouts and/or damage to infrastructure.

12.1.1 Temperature

One major change associated with climate change is global warming, which is defined as an increase in global mean surface temperature averaged over a 30-year period, relative to preindustrial temperatures (IPCC, 2018). Projected rising temperatures associated with global warming may impact many phases of the Project and on-site personnel. Under the high emissions scenario of the Coupled Model Intercomparison Project Phase 6 (CMIP6), annual average temperatures in the Study Area are expected to increase from the 1989-2010 baseline of 6.1°C to 7.9°C in the 2021-2050 period (ClimateData.ca, 2024). Furthermore, the number of days annually with maximum temperature exceeding 27°C is expected to increase from 11 to 21 under the same future climate scenario. These impacts, including acute temperature spikes and longer and more intense heat waves may increase risks of heat-related illnesses, food and water-borne contamination, and forest fires during both construction and operations (Government of Canada, 2019c). Requirements for stopping work or taking regular breaks to cool down and rehydrate will be mandated throughout the Project's lifetime to protect Project personnel. If it is unsafe to work due to severe conditions, a stop-work-authority may be issued.

Warmer temperatures can also spread forest and agricultural pests and disease vectors (i.e., ticks) to the Project location. Invasive plant species are discussed in greater detail in Section 7.4.2.

12.1.2 Sea Level Rise

The Assessment Area is over 2 km from St. George's Bay, close to the Strait of Canso, the nearest aquatic body. The entire Project Area has an elevation of over 200 masl. Based on distance from and elevation above sea level, Project infrastructure is unlikely to be impacted by rising water levels within the lifespan of the Project.

12.1.3 Flooding

Flooding in the Assessment Area may increase due to more frequent severe precipitation associated with climate change. Due to the effects of ocean warming, climate change is predicted to change precipitation amounts and patterns. Future climate scenarios do not predict drastic changes in total annual precipitation within the Project's lifespan, from a 1981-2010 baseline of 1,308 mm to 1,387 mm during 2021-2050 under a high-emissions scenario (ClimateData.ca, 2024). However, under the high-emissions future climate scenario, the number of wet days (≥ 20 mm) is expected to increase from a baseline of 13 to 16 days (ClimateData.ca, 2024), which may result in increased flood risk (US EPA, 2024a). Flooding may impact both terrestrial and aquatic habitat, damage Project infrastructure, and limit site access. The Project will mitigate the risks of flooding by concentrating the road and turbine layout in high elevation areas, situating turbines a minimum of 30 m from watercourses, maintaining regular upkeep and grading of roads to reduce formation of ruts, designing roadside ditches and water offtake infrastructure next to all roads to encourage drainage of rainwater off the roads, and revegetating roadsides to absorb excess water. A stormwater management plan will be developed during detailed engineering to mitigate potential flooding risks through drainage or other Project design features.

12.2 Natural Hazards

12.2.1 Severe Weather Events

Nova Scotia is subject to severe weather events including flooding, blizzards, hurricanes, and wildfires, all of which may lead to negative outcomes including power outages, health related emergencies, infrastructure damage, and road damage, and therefore may pose direct risks to wind farm infrastructure (GOC, 2018). Heavy rainfall is a common, highly probable natural hazard in Nova Scotia. Short duration heavy rainfall is defined as 25 mm or more of rain within one hour, while long duration heavy rainfall can range from 25 mm of rain or more within 24 hours during winter, or 50 mm of rain or more within 24 hours during summer (ECCC, 2020a). Heavy rain has the potential to flood the Assessment Area, making the roads impassable. Project design features noted in Section 12.1.3, where the risk of increased occurrence of heavy rain events is noted under future climate change scenarios, will also mitigate the effects of heavy rainfall. Project design features noted in Section 12.1.3 will also mitigate the effects of heavy rainfall and snow melt to maintain road access during severe precipitation events.

Wind and lightning, which may be associated with heavy rainfall or hurricane conditions, may increase the risk of mechanical issues or electrical fires. Restricted access to the site during severe weather events may limit the ability to shut down the system to prevent damage. To mitigate this risk, the turbines will be equipped with an automatic shut down when thresholds for wind speeds are reached and will also be designed with a built-in grounding system for lightning strikes. In addition, the Proponent will ensure access is maintained, either by clearing the roads or providing vehicles that can traverse all conditions.

12.2.2 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. The chance of turbine icing increases when the blades reach 150 m above ground, where the lower clouds may contain supercooled rain (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. Due to the numerous factors contributing to where these ice fragments may land when thrown/fallen, the likelihood of a human being struck is insignificant and thus the risk of injury is low (LeBlanc, 2007). Ice throw and its risk to human health is discussed in more detail in Section 10.1.

The impacts from turbine icing on human health are discussed in Section 10.1.2, including the low-downtime predicted for wind turbines in this region according to the WIceAtlas (VTT, n.d.). To further reduce the risk of injury from ice throw or falling ice, restricted site use may be enforced when the ideal weather conditions for turbine icing are present. Education of operators, adequate signage warning of falling ice, and the requirement to wear hardhats around operational turbines will also be implemented. Additionally, the turbines will be equipped to automatically shut down when thresholds for ice formation are detected.

12.2.3 Wildfire

Wildfire is potentially a risk during the site preparation and construction, operating and maintenance, and decommissioning phases of the Project. During construction and decommissioning, the use of power tools and machinery presents a risk of producing fire starts. The Forest Fire Protection Regulations, NS Reg. 135/2019 outline restrictions for burning and operating power saws during the fire season (March 15 to October 15). Burning restrictions are determined daily, depending on the Fire Weather Index (FWI). The Nova Scotia government employs an FWI during the fire season to determine fire danger across the forested areas in Nova Scotia (NSNRR, 2021b). A higher FWI score indicates that if a fire were to start it would be of high intensity and pose greater danger than a lower FWI score. Operation of power saws and/or clearing saws in forested areas within the Assessment Area will only occur when and as permitted under the Forest Fire Protection Regulations. Any activities requiring burning during the Project lifetime will be timed according to local burning restrictions.

As a best practice, the FWI can be used to determine fire danger associated with activities that may result in burning. The FWI during the summer months of 2023 across the Study Area ranged from low (0-5) to high (10-20) (NRCan, 2022b). Federal and provincial FWI data is updated daily, with the closest provincial weather stations to the Study Area being 'MacLeod Settlement' (NSNRR, 2021b; NRCan, 2022b). Although most days in the 2023 wildfire season had a low FWI score; to mitigate potential risk of wildfire, safety protocols will be put into place such as implementing a fire prevention and site evacuation plan. Furthermore, the FWI will be checked regularly at nearby weather stations during summer months to determine the potential for highly dangerous wildfires. Precautions should be taken when undergoing construction or maintenance activities that could result in fires on days when FWI scores are >5, such as mechanical brushing/land clearing, using spark-producing tools, or piling of woody debris (Government of BC, 2023). Should the risk of fires increase throughout the lifetime of the Project, mitigation strategies to protect Project infrastructure and relevant VCs will be adapted accordingly.

During the Project's operation and maintenance phases, turbines have the potential to initiate wildfires through several means including attracting lightning strikes, equipment overheating, power surges causing sparks, and by fires that start in equipment and spread to the surrounding environment. The potential for, possible effects of, and mitigative actions to prevent wildfire started by these means are discussed in Section 10.1.

12.3 Potential Residual Effects

Environmental effects associated with climate change and natural hazards have the potential to result in a significant effect on the Project. Project location siting and design measures will minimize many of the risks associated with these environmental hazards, and the mitigation measures described above will allow for both proactive and adaptive management of any remaining risks, thus limiting the likelihood of impacts on all phases of the Project. Therefore, the residual effects associated with climate change are considered not significant.

13.0 ACCIDENTS AND 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 Spills
- Structural Damage
- Transportation-related Incidents
- Ice throw (addressed in Section 10.1)

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 Nova Scotia *Occupational Health and Safety Act*, SNS. 1996, c. 7. A site-specific contingency plan will be developed to address accidents, spills and malfunctions.

Additionally, the Proponent has developed a preliminary Emergency Response Plan for the Project, which outlines emergency response jurisdictions, contact information, directions to the nearest emergency services, training, and other resources and actions important for implementation in a variety of emergency situations, especially those resulting from an accident or malfunction. This draft Emergency Response Plan has already been circulated to nearby fire stations or departments for input and feedback. Maintaining access for emergency services during all Project phases is a priority for the Proponent, who has made substantial efforts to consult with first responders on accessibility and their service needs.

13.1 Erosion and 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.
- Implement all mitigation related to erosion and sediment control provided in Sections 7.2, 7.3.1, 7.3.2, and 7.3.3.
- Develop and implement an erosion and sedimentation control plan for all phases of the Project, which includes maintenance and monitoring.
- Install erosion and sediment controls per the manufacturer's specifications or site-specific requirements.

- Stabilize erosion and sediment controls in advance of and following extreme weather events.
- Conduct regular monitoring of all the erosion and sediment controls and repair or replace them as necessary.
- Maintain function of erosion and sediment controls.

13.2 Fire

An accidental fire could potentially adversely affect the atmospheric environment (emissions), vegetation, and wildlife during all Project phases. Accidental fires could start from fueling, use of power tools and machinery, onsite burning, and other human activities.

Mitigation measures to limit the probability of an occurrence and reduce the magnitude and extent of potential effects include:

- Prohibit the use of campfires or burning within the Project Area by staff and contractors.
- Dispose of all flammable waste regularly at an approved facility (e.g., flammable chemicals, fuels, vegetation).
- Implement mitigation related to chemical and fuel storage (Section 13.3).
- Allow smoking in designated areas only.
- Equip heavy machinery and turbines with fire suppressant equipment.
- Develop contingency plan including fire safety plan.
- Continue to engage with first responders on site access.
- Maintain corridors containing electrical infrastructure during operations.

13.3 General Hazardous Material Spills

Hazardous spills resulting from fuel (i.e., storage, refueling, operation of internal-combustion vehicles, transportation accidents) 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:

- Develop spill prevention and response procedures as part of the Project's Contingency Plan, which will set out spill prevention and response procedures.
- Store all fuels, lubricants, and hazardous material 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 surface water (i.e., watercourse) and groundwater feature (i.e., 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/wetland.
- 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/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.
- Establish and enforce speed limits on access roads.
- Install signage where existing trails cross access roads to avoid potential interactions with trail users when heavy equipment is in use.
- Locate stationary spill kits or spill drums at work areas utilizing 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.

13.4 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, which is covered in greater detail in section 12.2 (Katsaprakakis, 2021). While damage by these mechanisms and others is unavoidable in many cases, preventing failure or harm to human or environmental health is key. 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, detects anomalies in performance, and the presence of abnormal vibrations that might indicate an imbalance that should be investigated (Algolfat et al., 2023).

Regular monitoring and inspections are critical to ensuring the continued structural integrity of all components of turbines (Enlita, 2024), and the Proponent will engage in mitigative actions, to limit the probability of an occurrence and reduce the magnitude and extent of potential effects, that include:

- Ensure sufficient lubrication in bearings, and that it is free of debris that would cause excess friction.
- 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 brake function.
- Check and change lubrication regularly in the turbine gearboxes to prevent excess heat and minimize wear.
- Test full suite of sensors regularly to ensure that anomalous conditions and behaviours are detected early and managed before they result in damage to turbines, other infrastructure, or harm human health.

The separation of turbines from people [1.2 km from turbine to nearest receptor (Drawing 7.2)] and infrastructure (300 m to the nearest public road) also mitigate the risk to human health and public infrastructure in the highly unlikely event of a failure.

13.5 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 site. On site especially, where workers may be near light to heavy-duty traffic, there is a higher risk of incidents affecting human health (Health and Safety Executive, 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 Project Area.

Additionally, mitigation measures to limit the probability of an incident and reduce the magnitude and extent of potential effects include:

- 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) or impaired driving on and off site.
- 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.
- Establish the following, within the Project Area, to the extent possible (Health and Safety Executive, n.d.):
    - Keep vehicles and pedestrians apart.
    - Minimize vehicle movements.
    - Minimize reversing by providing adequate room to turn vehicles.

- Ensure adequate visibility by operating in appropriate weather and providing ample lighting and visibility aids (e.g. mirrors around tight turns).
- Ensure visitors are familiar with the Project layout or are accompanied whether in vehicles or on foot.

14.0 CUMULATIVE EFFECTS

14.1 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 BC, n.d.). 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 (Hegman 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.

14.2 Other Undertakings in the Area

There is one wind turbine located within 3 km of the Study Area, as per the recommended buffer in the Guide to Preparing an EA Registration Document for Wind Power Projects in Nova Scotia (NSECC, 2021). The Creignish Rear Project, located in Creignish Rear, consists of one Enercon E82/2000 wind turbine with a total capacity of 2 MW (NS Power, 2024; The Wind Power, 2022). It is owned and operated by Black River Wind Limited (Black River, n.d.)

The nearest wind development outside that buffer, known as the Point Tupper Wind farm, is an onshore wind farm consisting of twelve 2 MW turbines generating up to 24 MW of wind energy located approximately 15 km south of the Study Area in Richmond County, NS. The windfarm was commissioned in 2006 and operated by Renewable Energy Services Limited and Nova Scotia Power (CBCL Limited, 2008).

Table 14.1 summarizes other industrial activities/developments near the Assessment Area (within approximately 5 km).

Table 14.1: Nearby Industrial Activities/Developments

Development	Development Activity	Status of Activity	Activity Location	Proximity to Assessment Area
Forestry	Harvests, thinning, plantations, & other treatments.	Active	Throughout Study Area	Within Assessment Area
Rhodena Quarry	Aggregate quarry	Active	West of Rhodena Road at the intersection of Creignish Mountain Road	Adjacent to Assessment Area

14.3 Cumulative Effects Assessment

Cumulative effects were assessed for the Project by taking into consideration the potential residual effects of significance (as identified in VC sections) in relation to the activities that have taken place in the past, those that currently exist, and those that can be reasonably expected to be developed within the area surrounding the Project (i.e., undergoing regulatory approval/under construction). Table 14.2 summarizes the potential for VCs to have cumulative impacts with other undertakings in the area.

Table 14.2: Potential for Cumulative Effects on Identified VCs

VC	Cumulative Effects Assessed	Reasoning
Atmosphere	No	Residual positive impacts in regards to provincial GHG emissions from the use of renewable energy resources.
Geology	No	The Project will not impact the geologic environment outside the Project Area or interact with nearby industrial activities.
Waterbodies & Watercourses	No	The Project is maximizing use of existing roadways, minimizing the disturbance of surface freshwater resources. Residual impacts will be mitigated, monitored, and be contained within the Project Area.
Fish & Fish Habitat	No	Utilization of existing roadways and watercourse crossing locations, minimizing the requirement for new crossings/disturbance of potential fish habitat. Structures that are suitable for fish passage (e.g., embedded box or round bottom culverts, span bridges) will be utilized for any watercourse crossings that are new or require replacements. Watercourse crossings will have applied mitigation and monitoring.
Wetlands	No	Compensation of impacted wetland habitat.
Terrestrial Habitat	No	Project Area is located within an active forest management area on both private and Crown land, such that a large portion of tree removal would have been subject to future harvesting in the absence of the Project. Cleared areas will be re-vegetated where possible. The Project will minimize impacts to old-growth forests by only clearing what is necessary and avoiding tree clearing old-growth forests on Crown Land.

VC	Cumulative Effects Assessed	Reasoning
Terrestrial Flora	No	Cleared areas will be re-vegetated where possible. In addition, the Project will minimize the loss of habitat that supports SAR and SOCI.
Terrestrial Fauna	No	Existing cleared areas will be used as much as possible to reduce fragmentation. Cleared areas will be re-vegetated where possible. In addition, the Project will minimize the loss of habitat that supports the prey habitat and the habitat of SAR and SOCI.
Bats	Yes	Non-Project wind turbine is within 3 km of the Study Area.
Avifauna	Yes	Non-Project wind turbine is within 3 km of the Study Area.
Economy, Land Use, Transportation, & Recreation/Tourism	No	Residual impacts considered not significant or positive.
Archeology, Culture, & Heritage	No	Avoidance of archaeological, historical, or culturally significant areas.
Human Health	No	Residual impacts to human health are not anticipated.
EMI	No	Cumulative effects are considered as part of the consultation zones used in the EMI assessment.
Shadow Flicker	Yes	Unrelated wind turbine is within 3 km of the Study Area.
Visual Aesthetics	Yes	Unrelated wind turbine is within 3 km of the Study Area.
Sound	Yes	Unrelated wind turbine is within 3 km of the Study Area.

The following VCs are assessed for cumulative effects:

- Bats
- Avifauna
- Shadow flicker
- Visual aesthetics
- Sound

Bats & Avifauna

Bats and avifauna are discussed in terms of cumulative effects based on the Project's proximity to other wind developments along with the cumulative potential for injury/mortality of

SAR. The Creignish Rear Wind Project is considered a small sized wind farm consisting of a single wind turbine. This single turbine was the only one constructed (in 2012) out of a proposed six that received approval following EA submission in 2005. As part of the EA for the Creignish Rear Wind project, pre-construction avian surveys were completed, and the EA determined that impacts to avifauna would not be significant.

Based on the small scale of the existing wind power development nearby and their EA conclusions, the anticipated cumulative effects on bats and avifauna from the operation of the combined wind developments are anticipated to be not significant.

Historic forestry activities have already resulted in wide-spread habitat removal and an existing road network throughout the Study Area which the Project is utilizing to minimize requirements for clearing. It is also likely that a large portion of the remaining required tree removal for the Project would have been subject to future harvesting in the absence of the Project. Therefore, the effects of forestry activities are not considered to be cumulative with the Project.

Shadow Flicker, Visual Aesthetics, and Sound

Potential effects on human health and enjoyment of the area near the Project are discussed due to the Project's proximity to both other wind developments and a quarry. Wind projects have the potential to create cumulative effects when the shadow flicker and sound from more than one wind facility both affect a single receptor. Additionally, the visual impact of wind projects can be cumulative when co-located near one another, which can be interpreted differently by various parties.

Both shadow and noise modelling incorporated the existing single turbine in modelling, so the effects assessment associated with each (See Section 10.3 and Section 10.5) are applicable as the results of cumulative effects for both existing and proposed turbines. Visual effects assessment used imagery captured after construction of the single existing turbine, and therefore the cumulative effects are included within the effects assessment for visual effects (see Section 10.4).

15.0 CONCLUSION

In accordance with A Proponent's Guide to Environmental Assessment (NSECC, 2017), 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 not anticipated to be significant.

16.0 CLOSURE

This EA Report was completed by Strum Consulting, an independent, multi-disciplinary team of consultants with extensive experience with submission of EA Registration documents for undertakings within Atlantic Canada. Curriculum vitae for EA Report contributors and Project Team members are provided in Appendix M. A list of the Project Team and their associated roles is provided below.

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DRAWINGS

APPENDIX A
ENGAGEMENT

Rhodena Wind

Open House

Tuesday, Sept. 14, 7 to 9 pm
Port Hastings Fire Hall
15 Old Victoria Road

Please join us

Learn about the proposed Rhodena Wind project to be located mostly on Crown Land on the hills between Highway 19 and TransCanada Highway 105.

Meet the partners, learn about the development process, how the turbines will look and sound, and about environmental studies underway. Hear about jobs and contract opportunities and community benefits.

We look forward to meeting you. Please contact us anytime through the website.

www.rhodenawind.ca

Provincial back-to-school plan: More familiar routine awaits students, staff

by **Alec Bruce**
Local Journalism Initiative Reporter
Guysborough Journal

GUYSBOROUGH: "It's time to start living more with COVID," Dr. Robert Strang, Nova Scotia's chief medical officer of health, said at a news conference announcing the back-to-school plan on Monday, August 23.

Two weeks before students and staff return to classrooms on Sept. 7, they learned that school will be a return to more familiar routine. While in the first week of school masks will be required inside a school building or bus, when the province enters Phase 5 of its reopening plan, scheduled for Sept. 15, masks will become optional.

Entry into Phase 5 is dependent on the rate of vaccination within the province; 75 per cent of the population must be fully vaccinated (have two doses of vaccine) before Phase 5 protocols can be implemented.

"Our schools are as safe as our communities and thanks to safe and effective vaccines, and Nova Scotians rolling up their sleeves, our schools have an additional layer of protection this year that will allow students to have a much more normal year," said Strang adding, "We continue to have core public health measures in place to protect everyone in our schools, including wearing masks, frequent hand washing, staying home if you're sick and sanitizing high-touch surfaces."

Although Nova Scotia has navigated the pandemic well, concerns and reluctance to reduce public health restrictions may remain for some, especially for parents of children who are not eligible for vaccination; those under 12 years of age.

The Journal asked Strang, during the news conference, what options were available for parents and guardians who don't want to send their children to school when masks are no longer mandatory in Phase 5. Strang replied that in such cases, the parents would have to consult with the principal and school administration, "and as appropriate, virtual learning or take-home learning arrangements can be made with that student."

Since movement into Phase 5 has been framed as contingent upon a 75 per cent rate of full vaccination within the province, The Journal asked Strang if case numbers, which have been creeping up this past week, would affect the decision to move into Phase 5, which includes the removal of the mandatory masking requirement in schools.

Strang answered, "No, I've always said the decisions are based on the epidemiology not on a case number. It is always the trend that we are seeing, and the average number of cases that we are seeing over time, the context of the cases. Right now, we're still very comfortable with what we're seeing. There's no sign of community spread; it's travel or close contact, and the number of contacts per case. So, there are a number of things that we look at some of them number driven, some of them contextual … it's more than just a single number that would drive any sort of decision around epidemiology."

In a news release issued shortly after the back-to-school announcement, the Nova Scotia Teacher's Union (NSTU) stated it was "pleased that a back-to-school plan has been released, which families, teachers and students have been anxiously anticipating for weeks."

NSTU President Paul Wozney said, "Premier Designate Houston said during his first press conference following the election that releasing the back-to-school plan was his top priority and he's certainly fulfilled that commitment … I've already had one discussion with Mr. Houston since the election and I'm very optimistic about his proactive approach to engaging with Nova Scotia's teachers and education specialists."

The Strait Regional Centre for Education's Regional Executive Director of Education, Paul Landry, sent an email to the school community after the announcement stating, "I am excited to welcome you all back into our buildings for the start of another year. This school year, our educational routine will look more familiar, with a full return to music, band, field trips, and clubs. All school sports will resume. Gyms will be open to community groups in the evenings and on weekends. Students and staff will once again be able to use cafeterias and participate in food programs as they have in previous years. Parents and guardians who follow public health measures will be allowed to visit schools, including on the first day of school for our youngest learners."

As of Sept. 7 students, families and staff can expect the following when they return to school:

· full in-class learning with the associated academic, social and emotional supports

· continued use of outdoor learning, small-group instruction, and enhanced use of technology

· full resumption of music classes, band, sports, use of cafeterias, lockers and cubbies, extra-curricular activities and community use of gyms, following core public health measures

· ongoing inspections and maintenance of school ventilation systems

· school counsellors, SchoolsPlus staff, and others will continue to provide timely and appropriate mental health supports to students

· schools will create supportive environments for those who choose to wear a mask once the province enters Phase 5

· non-essential visitors will be permitted (following all safety protocols), although virtual meetings and visits are still encouraged

· parents and guardians of pre-primary and Primary students will be able to visit schools on their child's first day

Strait area MLAs appointed to cabinet

Continued from page 1

"We can no longer accept the status-quo," Houston said.

Then on Sept. 1, Houston and Thompson announced a new health system leadership team.

"I've said all along that transformational change was needed to improve health care and it starts today," said Houston.

The current CEO of the NSHA, Brendan Carr, will leave his post. As well, Thompson dismissed the board of directors under the minister's authority in the Health Authorities Act. The administrator replaces the board.

The four-person leadership team will be led by Karen Oldfield, who has been appointed interim CEO of the Nova Scotia Health Authority (NSHA). Working with her will be: Jeannine Lagasse, deputy minister of the Department of Health and Wellness; Dr. Kevin Orrell, CEO of the newly created Office of Health Care Professionals Recruitment; and Janet Davidson was appointed as the administrator of the Nova Scotia Health Authority.

From Sept. 20-23, the premier, minister and the leadership team will tour the province to hear from frontline health-care professionals.

Replacing Lagasse as associate deputy minister at Health and Wellness will be Craig Beaton, a former senior executive director at the department.

Houston was sworn in as Nova Scotia's 30th premier on Aug. 31 and appointed a 19-member cabinet with refocused government departments.

The premier will also serve as President of the Executive Council, the Minister of Trade and the Minister responsible for Intergovernmental Affairs and the Office of Regulatory Affairs and Service Effectiveness.

Karla MacFarlane is the new Minister of Community Services and Minister responsible for the Status of Women and the Office of L'nu Affairs.

Jill Balser will be the Minister of Labour Skills and Immigration and have responsibility for Apprenticeship. Brian Wong will lead a separate Department of Advanced Education.

Becky Druhan will be the Minister of Education and Early Childhood Development.

Pat Dunn will return to cabinet as the Minister of Communities, Culture, Tourism and Heritage, which assumes responsibility of Tourism Nova Scotia. He'll also have responsibility for African Nova Scotian Affairs, the Office of Equity and Anti-Racism Initiatives and the Voluntary Sector.

Antigonish MLA Michelle Thompson is the new Minister of Health and Wellness, and will also oversee a newly created Office of Health Care Professionals Recruitment.

Susan Corkum-Greek will be the new Minister of Economic Development.

Steve Craig will be the new Minister of Fisheries and Aquaculture.

Brad Johns is the new Minister of Justice and Attorney General. He's also responsible for Elections Nova Scotia, the Human Rights Commission and the Accessibility Act.

John Lohr is the Minister for the Department of Municipal Affairs and Housing. He'll also have responsibility for the Emergency Management Office and Military Relations.

Kim Masland will lead the Department of Public Works, formerly Transportation and Active Transit.

Tory Rushton becomes Minister of the Department of Natural Resources and Renewables, combining the former Departments of Lands and Forestry and Energy and Mines.

Environment and Climate Change will be led by Tim Halman who has also been appointed Chair of Treasury Board.

Colton LeBlanc takes on the Public Service Commission, Service Nova Scotia and Internal Services, and Acadian Affairs and Francophonie.

The premier said his vision includes: doubling opportunities for high school students to take skills trade studies and updating the education curriculum to help youth find jobs that match the needs of their communities; eliminating provincial taxes on the first $50,000 of earnings for workers aged 30 years and under in designated trades; doubling the population by 2060 through a multi-pronged population growth strategy; ensuring every household has high-speed internet; working with employers to offer the better pay cheque guarantee; and hiring 2,500 more health care professionals, with the creation of a team focused on recruitment.

COMMENTARY

Backing away from a battle

GUEST COLUMN

TERESA WRIGHT
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@ReporterTeresa

There's a lot of rhetoric and hot air being tossed around by federal leaders in this election, so you can be excused if you failed to notice a small item in the Liberal platform released this week that warrants closer inspection.

If re-elected prime minister, Liberal Leader Justin Trudeau pledged to revoke charity status for anti-abortion organizations that "provide dishonest counselling to women" about their rights to abortion and the reproductive health services available to them during their pregnancy. The Liberal platform specifically mentions "crisis pregnancy centres" as culprits that could be targeted by this new measure.

While it's not new for Trudeau to champion abortion rights and it's totally predictable for him to use it as a wedge issue against the Conservatives during the campaign, this new measure represents a more aggressive approach by the Trudeau Liberals on the issue of abortion rights.

It also shows that a Liberal government would be willing to penalize organizations that do things it doesn't like through Canada's tax system.

This is interesting because there are many people – tens of thousands, in fact – currently pushing the federal government to use this tool, but not against anti-abortion organizations. At least two petitions, with over 35,000 signatures between them, are asking Ottawa to suspend or revoke the charitable tax status of the Catholic church in Canada for not taking adequate responsibility for its role in Indian Residential Schools.

Approximately 150,000 Indigenous children were forced to attend these government-funded, church-operated institutions, where many were subjected to the worst forms of abuse, including emotional, physical and sexual assault. More than 4,000 children died at the schools – a number that could be 6,000 or higher, according to the Truth and Reconciliation Commission's 2015 report.

Many of the survivors have suffered generations of fallout from the abuse they endured and/or witnessed. This intergenerational trauma has been identified by experts as a key reason so many Indigenous men, women and children are horrifyingly over-represented in the child-welfare system, in prisons and jails and why so many become victims of systemic racism, violence and murder.

Just days before Trudeau triggered this election, the biggest story in the country was the discovery of what are believed to be hundreds of unmarked children's graves adjacent to several former residential schools. It sparked outcry from across Canada and prompted the creation of memorials all over the country with hundreds of tiny shoes, a sombre illustration of the massive loss of life among Indigenous children.

Federal Liberal Leader Justin Trudeau has pledged to revoke charity status for anti-abortion organizations that "provide dishonest counselling to women" about their rights to abortion and reproductive health services available to them during their pregnancy. He is shown during a recent campaign stop in St. John's.

The discoveries also led to a renewed focus and dialogue about residential schools and about holding those involved responsible for their actions.

The Canadian government and other religious organizations that helped run the institutions have apologized and contributed millions in compensation to survivors and families through the Indian Residential Schools Settlement Agreement.

But the Catholic church has never officially apologized, despite the fact a majority of the 139 schools in Canada were run by Catholic entities, and it skirted most of its financial compensation duties.

As part of the settlement agreement, Catholic entities were supposed to pay more several amounts of compensation, but they ended up only raising a tiny fraction of the millions they were ordered to pay and spent millions more on expenses, as reported by The Globe and Mail.

The church was also supposed to hand over documents related to the schools but has withheld many key records.

"Many Canadians are outraged that not only is a supposedly charitable organization's lack of accountability willingly and knowingly continuing to cause so much sorrow and suffering, they are also deeply disturbed that Canadian taxpayers continue to subsidize this willful lack of accountability," says David Thomson in his online petition, which now has over 25,000 signatures.

He is calling on the government to suspend the Catholic church's charitable status to send a message to the institution that it needs to take full responsibility and make reparations for its role in the abuses and deaths suffered by children at these schools.

In late June, I asked a senior official in the Trudeau government if this was something being considered. I was told "on background" that it was not.

The question I had then has become even more pressing now – why not?

If the Liberals are willing to penalize anti-abortion organizations using the tax system, why wouldn't they be willing to do the same to compel the Catholic church to say sorry and pay up?

In 2017, Trudeau declared that "no relationship is more important to Canada than the relationship with Indigenous Peoples".

If that's true, why not use every tool available to ensure churches involved in the abuse and deaths of thousands of children do the very minimum to atone for their sins against Indigenous Peoples – reparations survivors and their families say are integral to the healing and reconciliation process?

The answer is cold and cynical: politics.

Trudeau gets a political boost every time he creates an opportunity to remind voters he is pro-choice and that he's willing to take bold steps to support this position.

Getting into a fight with one of the oldest, largest and richest institutions in the world is not a battle the Liberals want to fight, and it's not one that will help them win re-election.

But one thing I have learned from Canada's shameful history of mistreatment of Indigenous Peoples is that these issues don't go away – even if they are buried in an unmarked grave. The Liberals would be wise to remember this, even if they think it won't buy them votes.

Teresa Wright is a freelance journalist based in P.E.I. who covers federal and regional politics, most recently for The Canadian Press in Ottawa. She is also a journalism instructor at Holland College in Charlottetown.

Person of interest arrested, released in Truro homicide

RICHARD MACKENZIE
SALTWIRE NETWORK
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@capebretonpost

TRURO — It is too early to speculate as to whether the weekend homicide of Prabhjot Singh was racially motivated, Truro Police Service Chief Dave MacNeil said, while providing an update on the case.

"Contrary to social media, we have no confirmation as to motive that we're releasing at this time," MacNeil said, while meeting with reporters Tuesday morning in front of the Truro Police Service building. "Should it become clear to our investigation that it's a motive or factor in this case, then appropriate charges will be laid at the time. Right now, there is nothing to substantiate that."

Singh, 23, was killed sometime early Sunday morning. MacNeil said during the news conference that officers found Singh with life-threatening injuries after responding to a call that morning at 2 a.m. to 404 Robie Street. He was taken to the Colchester East Hants Health Centre in Truro where he later died.

Truro Police Service Chief Dave MacNeil met with media Tuesday morning outside the department's building to speak to the homicide case which took place early Sunday morning, claiming the life of Truro resident Prabhjot Singh. SALTWIRE NETWORK

However, the chief did not disclose the cause of death or whether the homicide occurred inside or outside the Robie Street apartment building. Social media posts suggest the victim was stabbed in the throat area.

"We're not releasing anything at this time that would hamper the investigation," he said.

"He was taken to … hospital by EHS and later passed away by those injuries," he said.

MacNeil said several search warrants were executed during the Labour Day weekend and that a person of interest had been arrested and released.

"They have since been released from our custody with no charges related to this homicide at this time," he said, adding the individual remains a person of interest. "So, the investigation is ongoing and that is where we are at today."

Despite having no one in custody, MacNeil stated there is no reason to believe there is a risk to the general public.

"There is no evidence to suggest any ongoing risk to the public, nothing at all," he said, adding police are comfortable with where the investigation stands.

"These are very complex investigations, lengthy investigations, there may be a resolution today, two months, two years, but we're working actively towards that goal," he said.

"We want to assure the public we are diligently working on this file and all the resources we have are being brought to bear with our policing partners. The HRP (Halifax Regional Police) K-9 Unit was here on the weekend assisting, so it's a joint effort and we're not going to rest until we bring those responsible to justice."

MacNeil said he met with the victim's family and friends the evening before.

"This is a very heartbreaking case," MacNeil said. "They are very patient and understanding of where we are in the investigation, and we have offered all the supports and services our community can provide.

"The community is outraged by this. This is a senseless, tragic loss of life of a hardworking young man with a bright future. This should not have happened to him."

Community Benefits

- Power generated by Rhodena Wind would feed into local power lines, providing **clean renewable energy**.
- The project would pay a substantial amount of money in property **taxes** each year to the Municipality.
- Local people would benefit from **jobs** in site clearing, road building and concrete work.
- There would be **permanent jobs** for operation and maintenance.
- The project will need the help of **local businesses** for clearing land, supplying gravel, for improving existing roads and building new ones. There will be a need for local goods and services during the life cycle of the wind farm.
- There will be **ongoing contracts** for snow clearing, road maintenance and land reclamation.
- In addition, ABO Wind and Community Wind are looking at ways to partner with post-secondary schools to offer **education and training opportunities** in the field of renewable energy.

Let Us Know

We would also like to hear your suggestions on the best way to use a **community benefit fund**. Please come to the meeting with your ideas or send us an email.

Please join us at the Open House

- Learn more about the proposed Rhodena Wind project
- Meet the partners – Nova Scotia company Community Wind and international renewable energy experts ABO Wind Canada
- Learn more about the construction schedule and process, how the turbines will look and sound, and about environmental studies underway
- Hear about opportunities
- Provide your input on how to use a community benefit fund from the project

We look forward to meeting you.

If you have questions or concerns, please contact us anytime through the website:

www.rhodenawind.ca

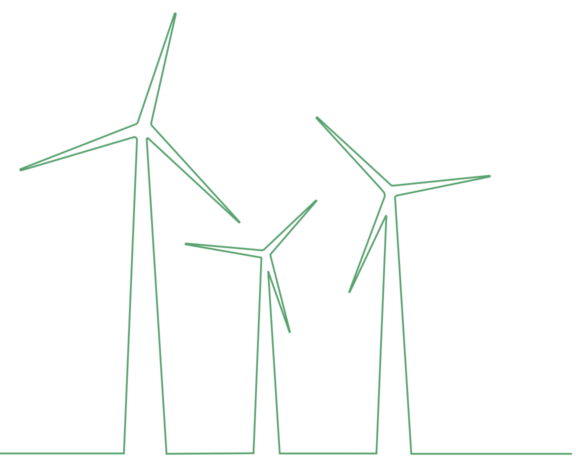
CommunityWind powered through partnership

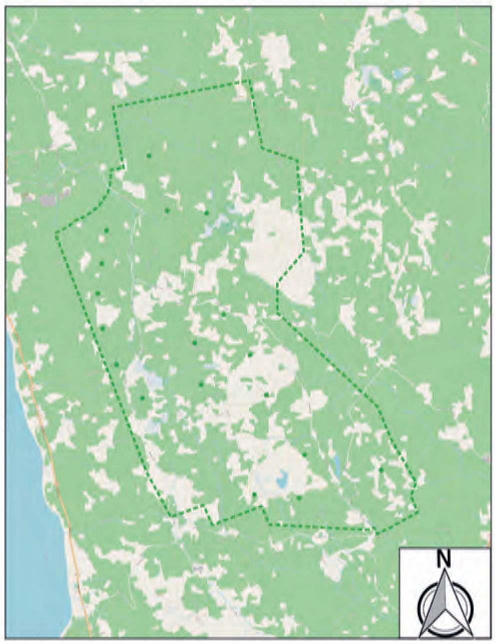
ABO WIND

Rhodena Wind
Open House

Tuesday
September 14
7 pm to 9 pm

Port Hastings Fire Hall
15 Old Victoria Road





At Rhodena Wind farm, up to 16 turbines will provide carbon-free power for more than 23,000 homes in Nova Scotia, and municipal tax revenue, local jobs and contracts for local businesses.

About the Project

This wind farm will generate approximately 80 megawatts of clean green renewable energy. Power from the site will help meet the Nova Scotia goal to close all coal-fired power plants by 2030.

Community Wind is working with ABO Wind to develop and manage the project. Much of the construction will be done by local businesses.

Location

Wind turbines will be on mostly Crown Land on the hills between Highway 19 and TransCanada Highway 105. The map shows preliminary placement of turbines.

At What Stage is the Project?

So far, the project team has conducted desktop studies and a preliminary environmental review and they have measured the wind strength.

They have been visiting landowners and talking to individuals and groups that may be involved in the project, or be in the area.

Tentative Schedule

- ABO Wind and Community Wind are planning to submit a proposal to the Province of Nova Scotia later this fall.
- If the project gets selected, the next steps will be to get environmental approval. We would carry out field studies of birds and other wildlife, consult the Mi'kmaq and local communities, and hold ongoing public information sessions and conversations.
- Construction will begin likely in Spring 2023, with clearing and road building. We expect the wind farm to be operational by late 2024.

What Will the Turbines Look Like?

We will have large poster boards at the meeting showing how the wind turbines will likely look from different locations. We will post these visualizations to the website at www.rhodenawind.ca

What Will We Hear?

The closest residential properties are more than a kilometre from the wind turbines. It is unlikely there will be any noise from the site.
We are careful to respect setbacks to homes and businesses.

Studies show average noise levels from wind turbines at 1,000 metres are around 35 average decibels – a bit louder than a whisper. Most first-time visitors are surprised by how quiet wind farms are. You can have a conversation below a turbine without raising your voice.

Rhodena Wind

Welcome to the Open House and thank you for attending.
Please sign in.

Name	Address	Phone Number	Email
[redacted]			
[redacted]	[illegible]	[illegible]	
[redacted]			

15-

CommunityWind
powered through partnership

ABO WIND

Rhodena Wind

Welcome to the Open House and thank you for attending.
Please sign in.

Name	Address	Phone Number	Email
[redacted]			

17

NAME	ADDRESS	#	EMAIL

[redacted]

Open House #1 (with Community Wind)
Tuesday, September 14, 2021 - 7:00 pm to 9:00 pm
Port Hastings Fire Hall
15 Old Victoria Road, Port Hastings

Rhodena Wind

up to 16 turbines approximately 80 megawatts of renewable energy

low carbon power for more than 23,000 homes

lowers emissions by more than 150,000 tonnes

local benefits include property tax revenue, local jobs, contracts and payments to land owners

Welcome

We acknowledge that we are in Mi’kma’ki, the ancestral and unceded territory of the Mi’kmaq People. This territory is covered by the 1725 Treaties of Peace and Friendship.

The Rhodena Wind project has a capacity of approximately 80 megawatts of green renewable energy. Power from the site will help meet the Nova Scotia goal to close all coal-fired power plants by 2030.

Community Wind, a local renewable energy company, is working with ABO Wind Canada, part of ABO Wind AG, a global company with extensive experience in renewable energy development. Together, we are developing green energy from Nova Scotia’s excellent wind.

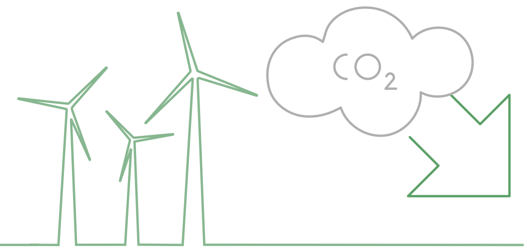
We are glad that you are here. We hope to answer your questions.

Rhodena Wind

Why Wind Energy Works

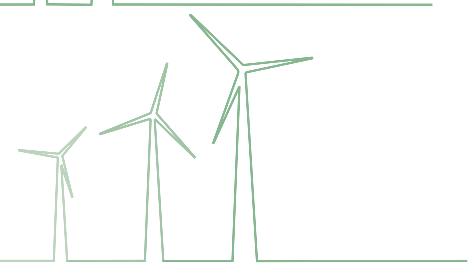
Offsets Emmissions

A wind farm with a capacity of 80 megawatts a year can offset 150,000 tonnes of carbon dioxide annually



Evolving Technology

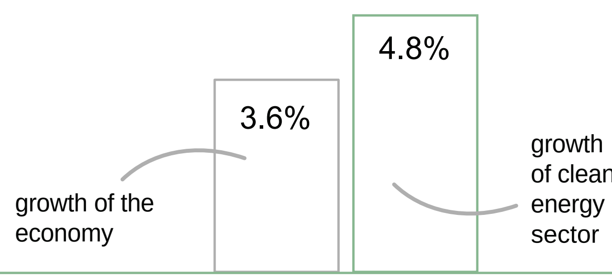
A turbine in 2021 can produce 3 times the power of a typical turbine from 2000



Growing Sector

Canada’s clean energy is a rapidly growing and diversifying industry

6,000 people in Nova Scotia work in the environment and clean tech sectors



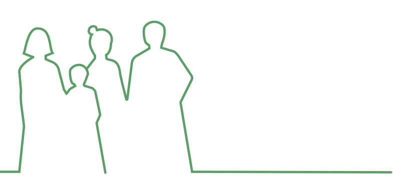
Lower Impact on Environment

Renewable energy, such as wind development, can have a reduced impact on our environment as turbines can be removed and recycled

Human Health

Project will be designed to meet or exceed provincial regulations and guidelines to protect our health

Health Canada, Statistics Canada and experts concluded in a 2014 study that turbine noise was not linked to self-reported illnesses and health conditions

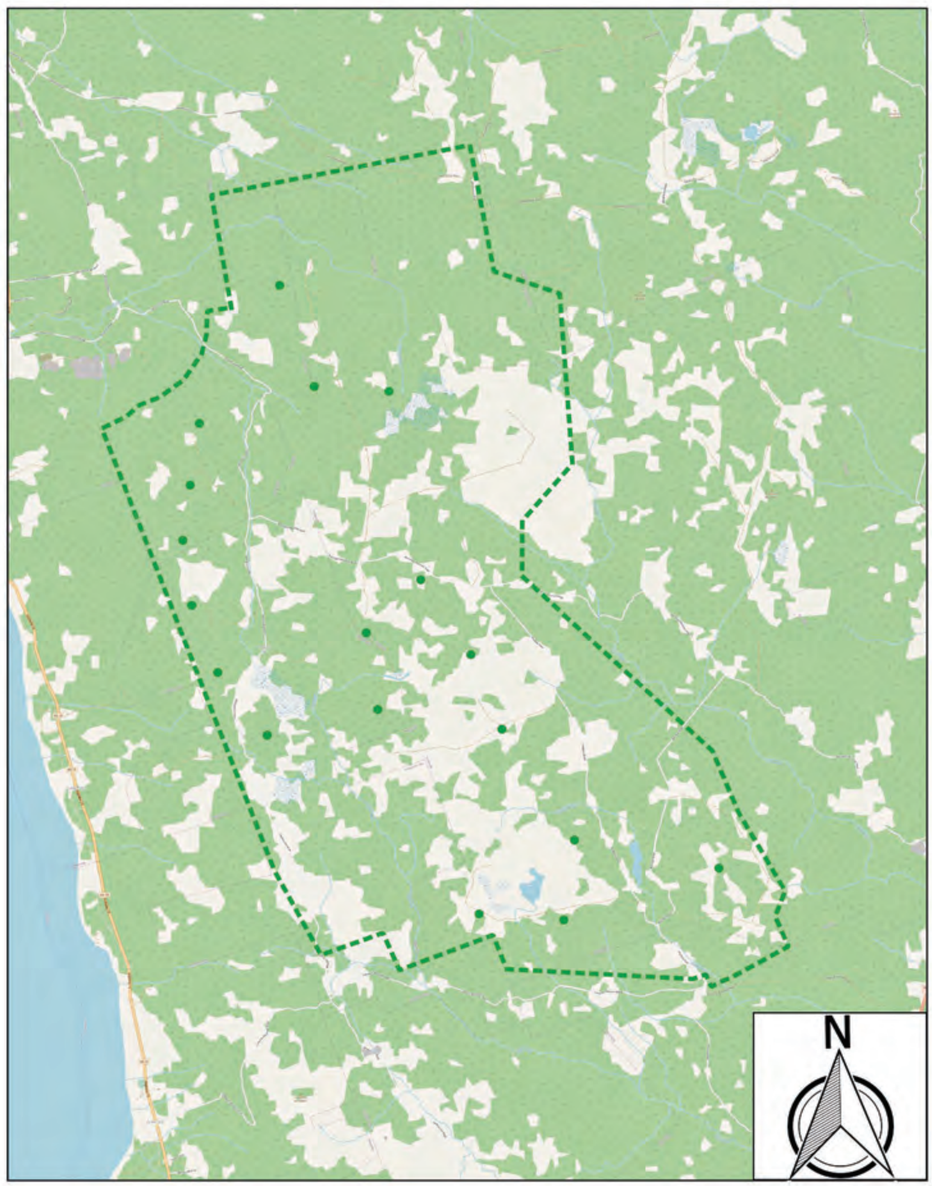


Rhodena Wind

What will the turbines look like?

Location

The wind turbines would be located on the hills between Highway 19 and the TransCanada Highway 105, mostly on Crown land. The map shows the preliminary location of the wind turbines.

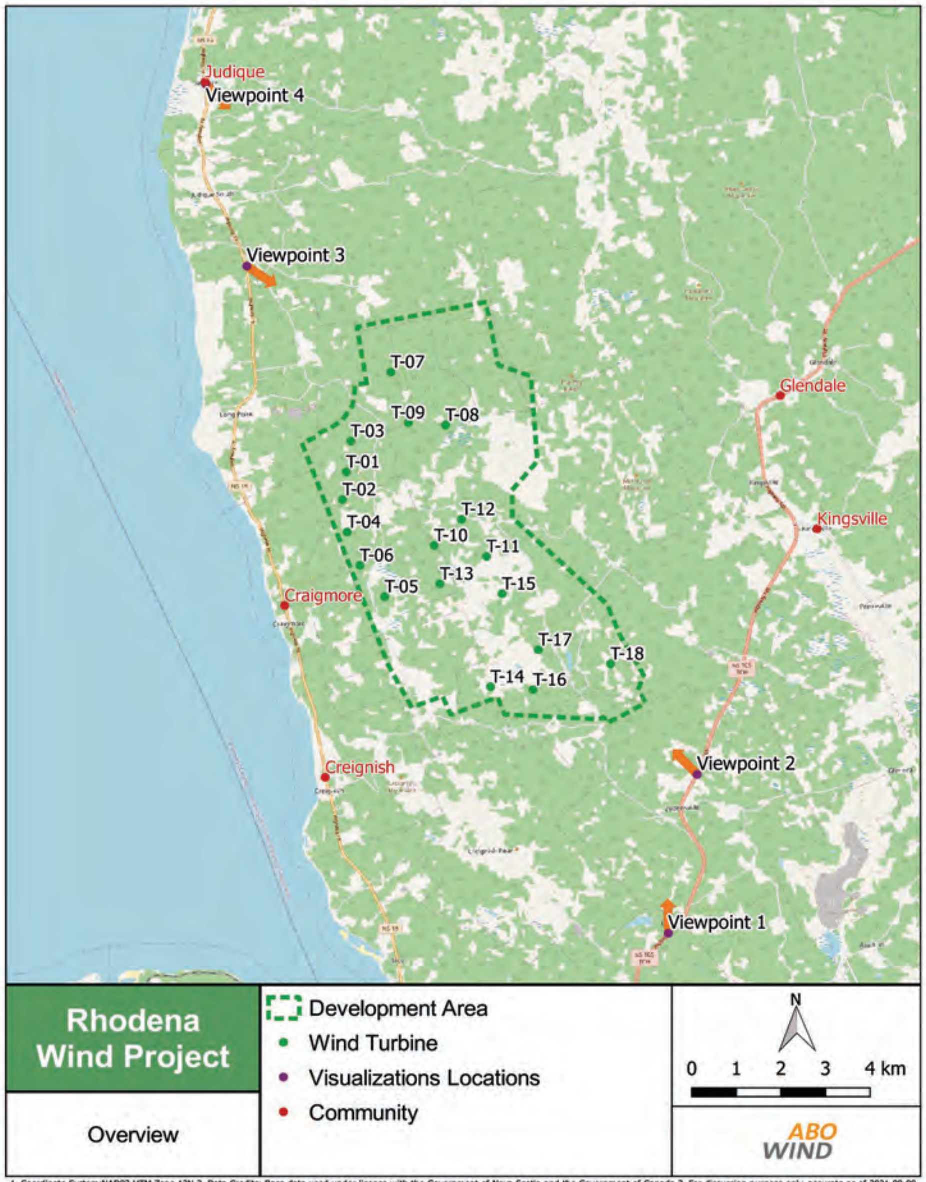


Rhodena Wind

What will the turbines look like?

Visualizations

The photos on the following posters were taken from the viewpoints on the map, so that you can see what the wind turbines might look like.

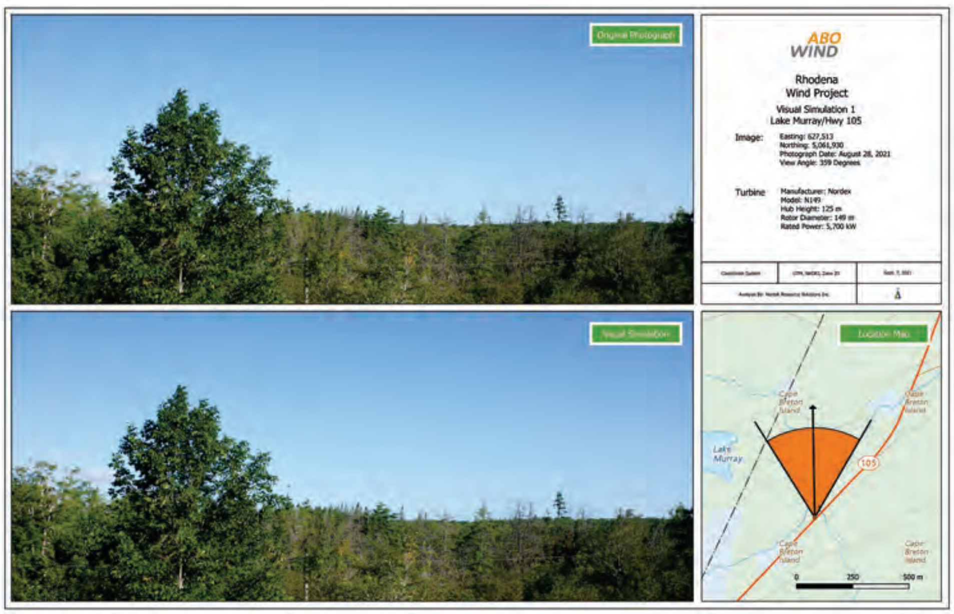


Rhodena Wind

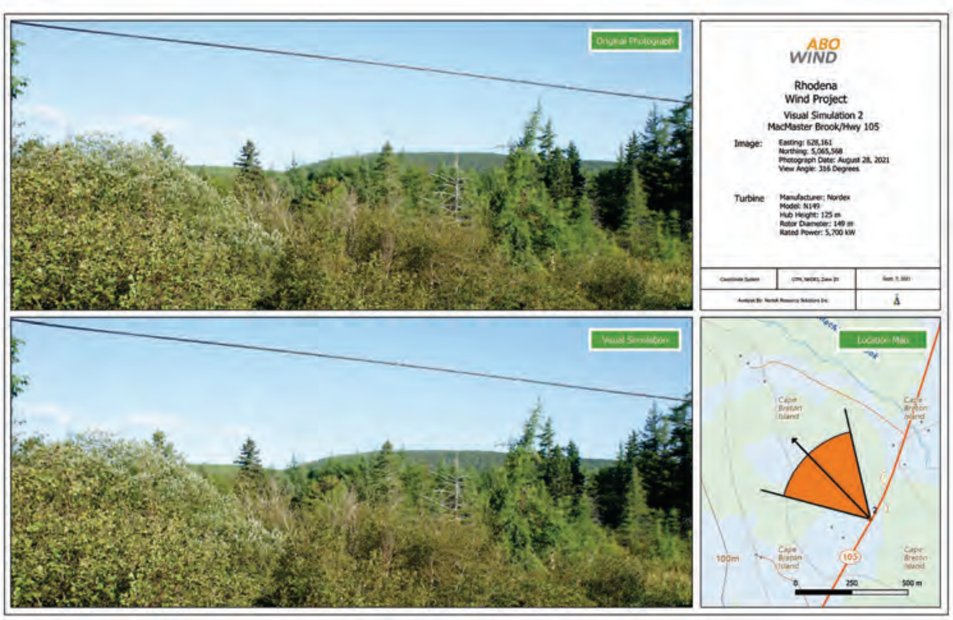
What will the turbines look like?

Visualizations

These photos were taken from various locations facing the position of the turbines. We inserted wind turbines into the photos, so you can see how it will look.



Visualization
Lake Murray/Hwy 105

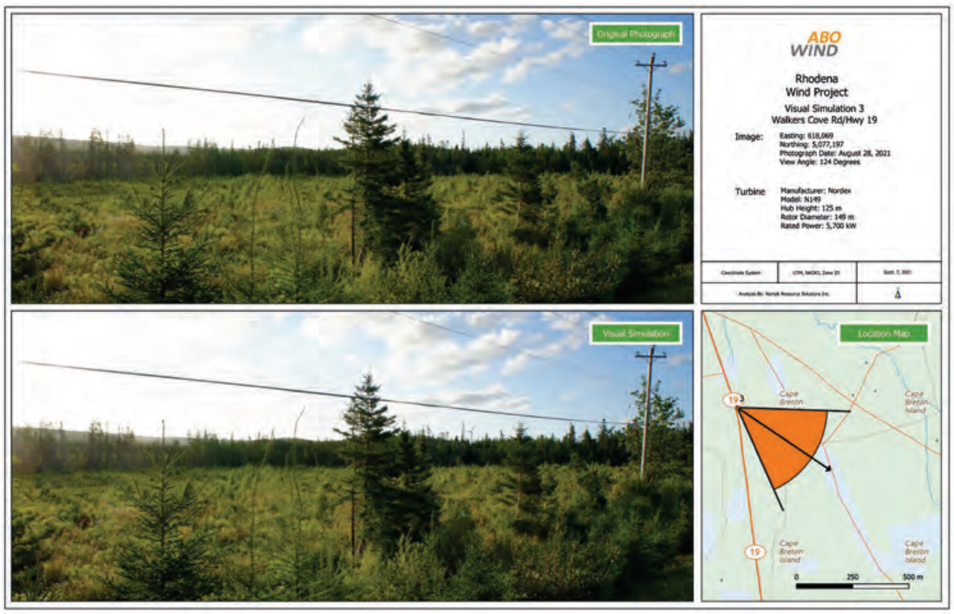


Visualization
McMaster Brook

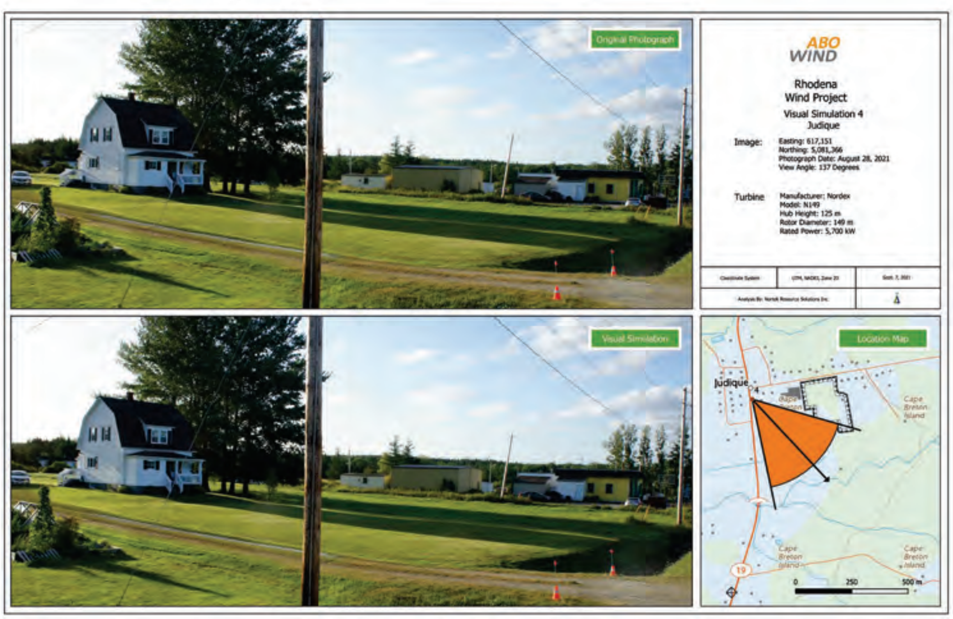
Rhodena
Wind

What will the turbines look like?

Visualizations



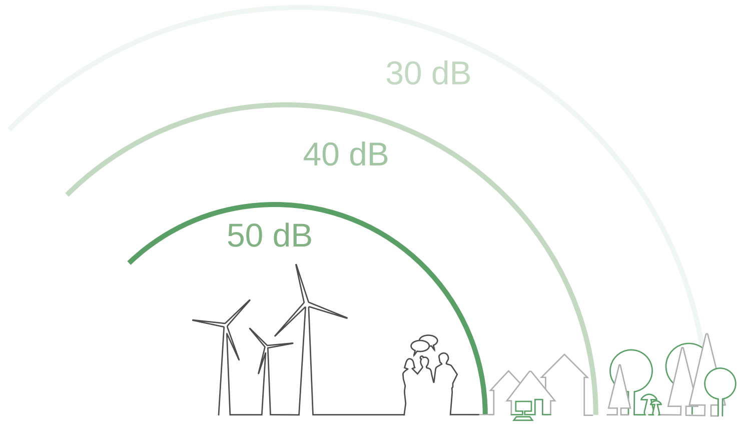
Visualization
Walkers Cove



Visualization
Judique

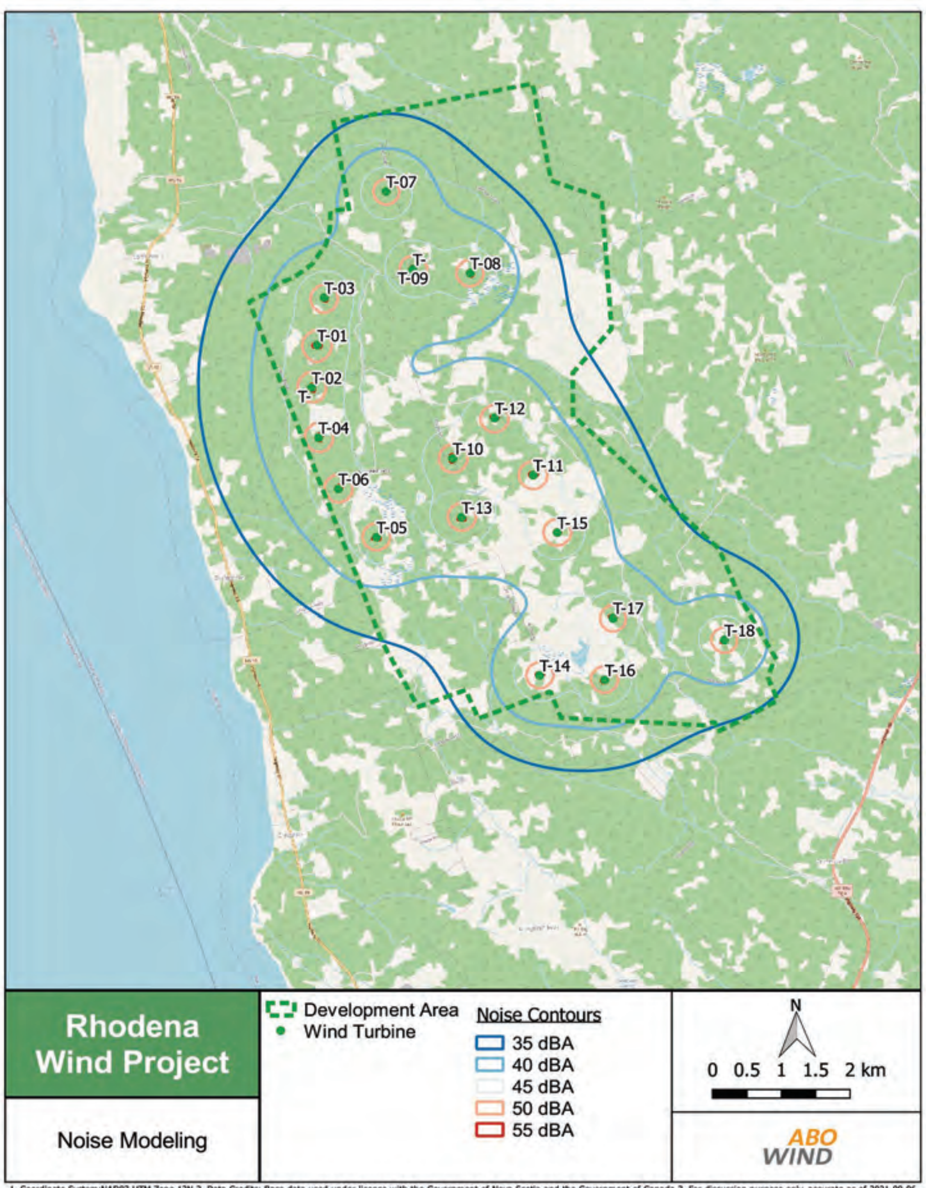
Rhodena Wind

Sound



What Will You Hear?

The closest residential properties are more than a kilometre from the wind turbines. It is unlikely there will be any noise from the site.



Sometimes local residents may hear turbine sound. This map (left) shows the 40 dBA (average decibels) sound contour. That's the sound level of a quiet library – the regulated level allowed in homes in Nova Scotia. DBA stands for A-weighted decibel, a measurement of the relative loudness of sounds in air adjusted to the human ear.

Rhodena Wind

Will the Project affect the environment?

Environmental Studies

The Process

The Project will carry out a variety of environmental and other studies as part of an Environmental Registration application to Nova Scotia's Department of Environment and Climate Change. A provincial guide outlines the requirements that wind project proponents must follow.

The environmental assessment (EA) involves consulting with experts and interested parties and gathering feedback from the public through information sessions and online channels. This information will help us determine what to study.

Valued Environmental Components

VECs may be of interest to First Nations, individuals and other stakeholders who may be affected by the Project. Examples are species or elements in the environment that have social, cultural or economic values, or that may be protected under federal and provincial legislation.

Rhodena Wind

Will the Project affect the environment?

Work to Date

We have performed desktop research using public information and professional opinion to determine areas that require formal, detailed surveys. Those surveys will be conducted by an environmental consultant during sampling windows in 2022. Studies will focus on birds, bats, species at risk, wetlands, and other components.

This data will help us determine what features require avoidance or additional mitigation.

Mi’kmaq Ecological Knowledge Study

The Project will carry out a Mi’kmaq Ecological Knowledge Study and a heritage resource assessment.

Updates on Surveys

We will provide information on field surveys and other work for the environmental assessment process through future open houses and the Project website.

Rhodena Wind

How long will it take to complete the wind farm?

2021

- Wind measurement, desktop studies, early environmental review
- Conversations with property owners, the Mi'kmaq and community partners
- Open House
- Proposal to the Province

2022

- More Open Houses and community conversations
- Wind measurement continues
- Environmental studies continue

2023

- Engineering
- Building roads
- Construction

2024

- Turbine Installation
- Operatlons

Measuring the wind

Building the tower

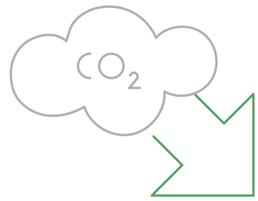
Moving the hub

Single blades mounting

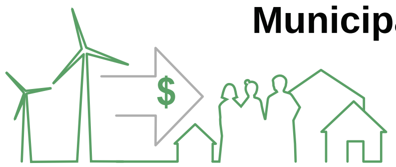
Completed turbine

Community Benefits

Carbon-Free Energy



- Power generated by Rhodena Wind would feed into local power lines, providing clean renewable energy for local electricity users



Municipal Taxes

- Rhodena Wind would pay more than $500,000 annually in property taxes to the municipality

Local Contracts and Jobs

During development and construction

- Jobs in site clearing, road building and concrete work
- More demand for local services, such as restaurants and motels
- Contracts for local businesses for clearing land, supplying gravel and road work

During operation

- Permanent operation and maintenance jobs
- Ongoing contracts for snow clearing, road maintenance and land reclamation
- Ongoing demand for local goods and services during life cycle of the wind farm

Community Benefits Fund

Rhodena Wind will establish this fund to contribute to...

- Well-being of surrounding communities
- Post-secondary schools for education and training in renewable energy
- Other ideas?

Rhodena Wind

Community Benefits

Have Your Say

The Community Benefits Fund will recognize the community's support and commitment to renewable energy in the area. What are your ideas about how to use the money? Use a sticky note to vote, or to write your own idea. Just post it on the board. You can also send us an email through the contact form at **www.rhodenawind.ca**

Support for Students Studying Engineering and the Environment

Community Halls/ Recreation Centres

Local Environmental Programs

Your Ideas

Rhodena Wind

Who is planning the wind farm?

The Partners

Community Wind

Community Wind Farms Inc. works with local, national and international partners to help communities develop renewable energy.

Based in Halifax, Nova Scotia, the company works to develop the excellent wind resources of Atlantic Canada for the benefit of local landowners and communities, and to bring stability to electricity consumers across the region.

Community Wind has more than a decade of experience building wind farms with municipalities, local community groups and First Nations across Atlantic Canada.

ABO Wind Canada

ABO Wind is a renewable energy company developing projects in 16 countries. It was founded in Germany in 1996 and has grown to be one of Europe's leading developers with over 3,600 MW of developed capacity.

The company's business focuses on planning, financing, and managing wind farms, solar farms and hybrid energy systems. We are currently working on the development of new projects with a total capacity of about 15 gigawatts, exceeding the capacity of four average nuclear power plants. ABO Wind employs over 800 people, including seven staff based in Calgary.

Rhodena Wind

Thank You For Coming

We would like to hear from you. Send us a note through the contact form on the website. Check back regularly for more information and updates.

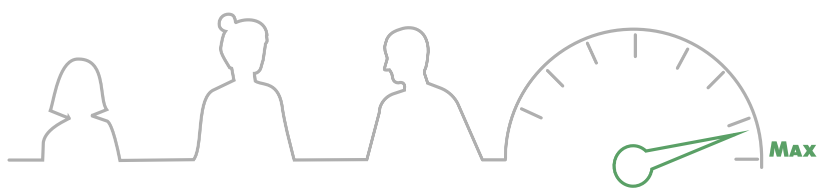
www.rhodenawind.ca

Rhodena
Wind

Masks Required

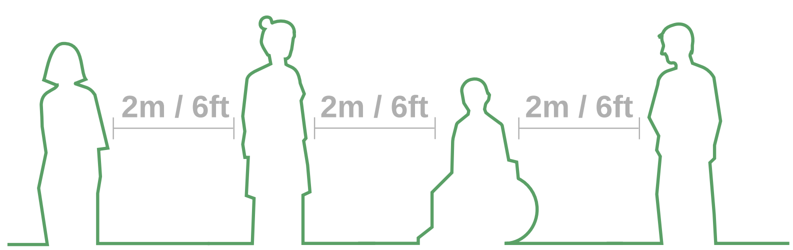
Maximum Occupancy

In an effort to protect the public and employees from the spread of COVID-19, we are limiting the number of people in this space.



Physical Distancing

Please keep 2 metres/6 feet away from others.



Rhodena Wind Open House

Thank You for Attending

Community Wind and ABO Wind held an information session about a proposed wind project that would be located on the hills between Highway 19 and TCH 105.

We wish to thank the many people who attended the event at the Port Hastings Fire Hall on Sept. 14. They met the developers, learned about the development process and environmental studies underway and viewed illustrations of how the turbines might look and sound. They heard about jobs and contract opportunities and community benefits.

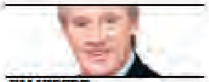
People asked many questions. We will post our responses on the website in the near future.

We would like to hear from you. Contact us anytime through **www.rhodenawind.ca**

OPINION

21st premier dies at age 95

We won't see another Roger Bacon, and that's a pity



JIM VIBERT
SALTWIRE NETWORK
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@JimVibert

Roger Bacon served just 167 days as Nova Scotia's premier, but the fact that he was there at all is testament to the esteem, trust and affection his colleagues held for him.

Former premier Roger Bacon died this week at the age of 95.

He was elevated to the premier's office in September 1990 after long-serving premier John Buchanan (1978-90) resigned amid controversy and more than a hint of scandal. Buchanan accepted then-prime minister Brian Mulroney's offer of a taskless thanks, otherwise known as a Senate seat.

Bacon served as premier until the Tories elected Donnie Cameron their new leader, and premier, in a hotly-contested race that included other Tory heavyweights Rollie Thornhill and Tom McInnis.

Bacon, the province's 21st premier, was untouched by the allegations of cronyism and political patronage that plagued Buchanan and, by extension, his government during the latter years of Buchanan's tenure.

That unassailable record of integrity, along with his long service in the legislature — he was first elected in Cumberland East in 1970 and served until 1993 — made Bacon an attractive, but not obvious, choice to lead the government and party through what could have been a tumultuous time.

He wasn't the obvious choice because the Tory caucus at the time was packed with more high-profile ministers, like Jack MacIsaac, Terry Donahoe and Ron Russell. None would seek the party leadership, so all were available to fill the premier's chair until a new leader and premier was selected.

But the Tories went with Bacon and he turned out to be just what the doctor ordered.

With MacIsaac as his strong right hand, Bacon shepherded the government and party through the troubled waters Buchanan had left behind with a quiet, even demeanour and unfailing good humour. He brought a sense of calm to a government that had been buffeted by stormy political weather for most of Buchanan's fourth and final term (1988-90).

Roger Bacon was one of the most colourful politicians in Nova Scotia at a time when the province was awash in colourful politicians, like Harry How, Billie Joe MacLean, MacIsaac, Thornhill and more.

Bacon also possessed an uncanny ability to leave reporters scratching their heads because, while he seemed to answer their questions, few were able to discern precisely what those answers were.

Bacon was famed for his unique, occasionally hilarious, facility to mold and mangle the language in a way that always conveyed his meaning, but in unexpected ways.

I recall — like it was yesterday — when Bacon stood in the house and berated opposition MLAs for the "insinuendos" they were hurling about the place with little or no basis in fact.

His unexpected combination of insinuation and innuendo had its desired effect. It entertained his Tory colleagues immensely, left opposition members speechless and perplexed, and sent reporters scurrying for dictionaries to see if "insinuendo" was an English word.

A more famous Baconism — I didn't hear it, but have on good authority that he said it — was again in response to what he felt were the unfair and unjustified attacks on the government by members of the opposition — Liberals and very few New Democrats in those days.

"Mr. Speaker, I have heard the allegations and I know who the alligators are," Bacon is alleged to have said and, because I've heard many Baconisms, I have no reason to doubt it.

Whether the Baconisms — as they were then known — were a slip of the tongue or intended, as many of his colleagues maintained, we'll never know for sure. But they were invariably uttered with that telling twinkle in Roger's eye, which is a pretty strong hint that he knew exactly what he was saying.

The penchant for perplexing prose only seemed to bolster his stature as a simple, country farmer, and that's all he ever claimed to be.

Roger Bacon served in a variety of cabinet posts, including tourism, housing and the environment, but he cherished and distinguished himself as minister of agriculture, a post he held for most of Buchanan's 11-plus years in the premier's office.

Bacon was a farmer and the farmers' friend.

He infuriated opposition MLAs who questioned any aspect of the government's agriculture policy by accusing them of being "against the farmers."

I don't believe Nova Scotian farmers ever had a more dedicated champion in government than Roger Bacon, and I doubt that Nova Scotia will ever see a politician like him again. And that's a pity.

Journalist and writer Jim Vibert has worked as a communications advisor to five Nova Scotia governments.

During a 2018 interview about climate change, former premier and farmer Roger Bacon said he wanted to see the dikes in the Amherst area built higher. Roger Bacon has died at the age of 95. SALTWIRE NETWORK • FILE

Treaty Day scholarship recipients announced

HALIFAX: The provincial government said it celebrated the many contributions of the Mi'kmaq and recognized the significance of Nova Scotia's relationship with Mi'kmaq people during its 35th annual Treaty Day on Oct. 1.

"I want to stress the importance of us gathering together to honour the Treaties and to strengthen the relationships between Mi'kmaq and the Crown," said Norman Sylliboy, Grand Chief of the Mi'kmaq Grand Council. "I want to acknowledge the wisdom of our ancestors who laid the foundation for us and our traditional way of life. Our Treaties are sacred to the Mi'kmaq; they are historical and living documents that will continue to guide us for the next seven generations."

Treaty Day award celebrations are hosted by Lt.-Gov. Arthur J. LeBlanc and Sylliboy. Treaty Day also begins Mi'kmaq History Month.

"The flag-raising ceremony at Government House is far more than an event held every October," said LeBlanc. "This ceremony symbolizes the Crown-Mi'kmaq relationship and demonstrates to all Nova Scotians the importance of honouring the Mi'kmaw people and how their history, heritage and culture are integral parts of today's Nova Scotia."

The achievements of Mi'kmaw Elders and youth are recognized each year on Treaty Day. This year, 13 Elders and young people were honoured with awards and scholarships.

Among the Strait area 2021 Treaty Day Scholarship and Award Recipients was Jenova Dennis of Potlotek First Nation who was awarded a Sister Dorothy Moore Education Scholarship.

One of the winners of the Grand Chief Donald Marshall Sr. Memorial Scholarship was Linda Peters of Paq'tnkek First Nation.

"We come together today to celebrate the unique and important relationship between the province and Mi'kmaq in Nova Scotia and our commitment to connect on topics of mutual interest," said Premier Tim Houston. "I encourage all Nova Scotians to learn more about the history of the Mi'kmaq in our Province."

The theme for Mi'kmaq History Month focuses on treaties and the treaty relationship. Nova Scotians can learn more about the contribution of the Mi'kmaq to the province's history, culture and economy through treaty education programs.

"Through treaty education, we will continue to bring more opportunities to every classroom for all students to understand who the Mi'kmaq are, historically and present day; what the treaties are and why they are important; what happened to the treaty relationship; and help everyone recognize their role in reconciliation," said Karla MacFarlane, Minister responsible for the Office of L'nu Affairs. "We remain committed to sharing treaty education with public service employees and the public through our memorandum of understanding with Mi'kmaq Kina'matnewey and Millbrook First Nations."

Treaty Day began in 1986 with the signing of a proclamation by then Grand Chief Donald Marshall Sr.

For more on treaty relationships and education, go to: https://novascotia.ca/treaty-education/, for more on Mi'kmaq History Month, check out: https://mikmaqhistorymonth.ca/, and information on Peace and Friendship Treaties, can be found at: https://archives.novascotia.ca/mikmaq/results/?Search=AR5&SearchList1=all&TABLE2=on.

Richmond implementing warning system for changes to sewer and water bills

Continued from page 4

that have been done for previous councils."

In addition to past strategic plans, she said the municipality will assemble an information package that also includes other documents like the trails study and the Age Friendly Communities plan.

"One of the things that I'm very hopeful for is that it will also result in a restructuring of our committees of council," she said. "How those committees are formed, making sure that there are strong and consistent terms of reference, that type of thing. I think also, I'd really be interested in having our strategic plan more closely tied to our capital plan because I don't really feel like there's been a strong linkage there in the past."

***

Council accepted a recommendation from its committee of the whole to create a fire department levy payment schedule policy.

The new policy was referred to the municipal Bylaw and Policy Committee, which will then make a recommendation to council.

***

Council approved grant recommendations from its committee of the whole, specifically $500 from the District 2 fund for the Lennox Passage Yacht Club.

The River Bourgeois Mariner Society was approved under the Type 4 Regional Health General Grant Fund for funding of $1,000, with $500 from the District 4 fund and $500 from the general grant fund.

Council approved a funding request of $7,500 to the Arichat Community Development Association from the Type 4 Regional Health General Grant Fund, with $1,250 from the each fund in Districts 1 and 2, and the remaining $500 from the general grant fund.

A request for funding of $15,000 from the Type 4 Regional Health General Grant Fund for the Pan Cape Breton Food Hub Co-op was denied because $2,000 was previously allocated in the budget.

"That was probably us not keeping as close a track as we should have," Mombourquette said. "When I received the Food Hub's request, and they put the whole application together, I thought I looked at the list, I must have missed it. We already provided them with funding as part of our budget deliberations. We chose to stick with that."

Council denied a request from Raising the Villages Co-operative Ltd. for $2,500 under the Type 4 Regional Health General Grant Fund.

The warden explained that council "has every intention" of supporting the group.

"There was some additional discussion about this at committee of the whole and we need to make an adjustment here," Mombourquette told council. "I made misstep in procedure at the committee of the whole. What ended up happening was the motion was passed but with one councillor voting against because the way it was passed was to take it from each of the district funds when we should have just taken from the regional health general fund. That's what we want to correct at our Oct. 12 committee of the whole meeting."

Because he mistakenly made a motion, District 5 Councillor Brent Sampson requested council revisit this request at the next committee of the whole session.

***

Council approved two new members to sit on its new Accessibility Advisory Committee.

The St. Peter's Village Commission reached out to the municipality to see if they would be interested in a joint committee after the village commission advertised for committee members but didn't get many responses.

On July 14, the committee voted unanimously in favour of joining forces, Mombourquette said, putting the final decision before council.

Because Meghan Hayter and Allison Martell are both village commission employees, Chief Administrative Officer Don Marchand said they can automatically become members, but council had to approve member-at-large Jessica Gibson, which it did.

PANS honours pandemic heroes

DARTMOUTH: The Pharmacy Association of Nova Scotia (PANS) presented its annual awards virtually over the weekend highlighting the enormous contributions that members of the profession have made to their communities over the past 18 months.

The Pharmacy Technician of the Year Award went to Jeannette Shaw from Havre Boucher, who played an integral part in the COVID-19 vaccine roll-out at the Medicine Shoppe in Port Hawkesbury, PANS noted. They said her efforts ensured her community had easy access to the vaccine.

Long service awards were also presented to those who have been practicing pharmacy for 25, 40 and 50 years.

PANS said it is the voice of pharmacists and pharmacy technicians in Nova Scotia and its mission is to support the professional and economic interests of its members, to advance the practice of pharmacy and improve the health of Nova Scotians. PANS added that it is proud to represent those in pharmacy who are committed to providing excellence in health care.

Little Spirits Society of Cape Breton taking part in Global Wave of Light

Continued from page 5

The Little Spirits Society of Cape Breton, a newly formed non-profit society located in Inverness County, said it is focused on creating a memorial park or garden where bereaved parents can memorialize the children they lost.

The society is waiting for its designation as a registered charity from the Canada Revenue Agency, and once that is official, Dowling said they will be seeking monetary donations or donations of land for the garden. They are a registered non-profit society with the Province of Nova Scotia, she noted.

After looking for board members last year, Dowling said they now have seven members, three from Inverness County, three from Victoria County and one from Cape Breton County.

The society received its incorporation documents in August, and they were able to approach Inverness Municipal Council first to get their approval for the event, Dowling said. She said they are trying to get a website up and running, and planning to offer a borrowing library for parents with resources to help them cope with loss.

"But our hope is next year, we'll get Port Hawkesbury up and running, and Baddeck, and Richmond County. We'd like to see several events happening for Oct. 15 next year," she noted.

For more on the Little Spirits Society, email: littlespiritssociety@gmail.com or go to their Facebook page: LittleSpirtsSociety.

"We want people in the community to feel there are others, that they're not alone. That the community sees them and recognizes their grief," Dowling added. "To honour to these little lives in some way."

Rhodena Wind
Project Update
March 2022

ABO Wind Canada and Community Wind are proposing the 100-megawatt Rhodena Wind project in response to Nova Scotia's Rate Base Procurement program for low-carbon, low-cost energy to fight climage change.

The wind farm would be high on the hills between Highway 19 and TransCanada Highway 105. This renewable energy project would produce enough electricity for 32,000 homes and displace approximately 2.6 million tonnes of CO_2 equivalent over its liftime.

We appreciate your questions and comments.
The Project continues to be informed by ongoing input from the community, regulators, and environmental and technical experts.

We are mailing an update to households in communities close to the project, with a new map of the proposed development area. For more information or to send us a note, see

www.rhodenawind.ca

CommunityWind
powered through partnership

ABO WIND

BUSINESS

Grocery store purging plastic

Downtown Sydney business adds package-free section

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CAPE BRETON POST
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@capebretonpost

Kat Gouthro holds a jar customers can use to buy package-free items at Port City Grocery, the independent store she operates with her husband in downtown Sydney. Many of the items in the new section were previously sold in 910-gram plastic bags. CHRIS CONNORS • CAPE BRETON POST

SYDNEY — Good things come in no packages.

That's Kat Gouthro's philosophy behind a new plastic-free, bulk-food section at Port City Grocery, the small, independent store she operates with her husband Devon Burke on Charlotte Street in downtown Sydney.

"It's always top of mind to minimize our waste and we've always been thinking about that," she explained.

BRING YOUR OWN CONTAINER

While customers can buy glass jars for $2.50 and fill them with hemp seeds, dark chocolate chips, basmati and brown rice, pumpkin seeds, and raisins, Gouthro hopes people will bring in their own containers.

"We sell small jars but we're really encouraging people to bring their own and be creative with it. As long as the container is clean, we are good with anything you can bring in. You can bring in baggies, you can bring in old containers — margarine containers are great and Mason jars work really well."

Typically, many of those products were sold in 910-gram plastic bags. Gouthro said they now purchase them in large five- and 10-pound bags to reduce the amount of plastic that comes through the store, which opened its doors this past summer.

ADDING ITEMS

Gouthro said she will continue to add more items to the section, with the goal of soon adding an entire aisle of package-free goods.

"We are bringing in some flax seeds and oats this week. We'll be adding a little bit each week. By the end of the month, we're hoping to add some home goods like laundry detergents, shampoos, cleaners — things like that."

Gouthro said Port City has always been committed to offering organically grown products created by people who share their values when it comes to sustainability and the environment.

"We would rather sell out of an item instead of having a bunch and then throwing it out at the end of the month. That's always been our motto, so we order a little bit less produce to try to minimize waste and this just goes hand in hand with that. We're trying not to throw out massive amounts of food like other grocery stores."

Businesses to benefit from AED donation

BADDECK — Businesses in Victoria County are set to benefit from the gift of automated external defibrillators from Markham Fire and Emergency Services in Markham, Ont.

In a release, EHS officials said the gift came as a result of a connection between EHS operations paramedic Lyle Donovan, who also serves as fire services coordinator for Victoria County and Chris Nearing, deputy fire chief in Markham, Ont. and a native of Glace Bay.

Nearing had been looking for a place to send 13 AEDs that Markham Fire was looking to replace.

Upon speaking with Donovan, Nearing offered to send the life-saving devices to Victoria County to be given to local businesses.

"We are extremely pleased that 13 Victoria County businesses will be equipped with a truly life-saving piece of equipment," said Nearing.

"Through this partnership, and the work of many, we have formed a bond that is meaningful and impactful."

The businesses selected to receive the AED are open year-round, giving the public improved access to these devices when needed.

The AEDs will be added to the provincial EHS AED Registry, said Mike Jarczyk, EHS AED registry program coordinator.

"Increasing AED coverage ensures that we are building more heart-safe communities throughout Nova Scotia," he said.

"Bystanders and communities performing the first three links of the chain of survival are vital to ensuring someone has the best chance of survival after a sudden cardiac arrest. We encourage anyone who is thinking about it to acquire an AED, if possible, and to register it with the EHS AED Registry."

More information about the EHS AED Registry is available online at [illegible]

IN brief

Probation and driving ban ordered

SYDNEY — A Westmount woman is to complete a 24-month probation period as part of her sentence on a host of offences.

Courtney Reid-Boone, 24, was sentenced on nine counts of breaching court orders, two counts of evading police and single counts of possession of stolen property (a licence plate), assault with a weapon (a vehicle), possession of cocaine, dangerous driving and possession of ecstasy.

The offences occurred between November 2020 and May 2021 in Sydney.

She was credited with serving six months on remand and her sentence included a one-day in jail served by her presence in court.

During her probation, Reid-Boone is to refrain from alcohol and drugs not prescribed to her and is to take all counselling as recommended by her probation officer.

She is also prohibited from driving for two years.

SPORTS

Islanders look to end playoff series this weekend

by Jake Boudrot Editor
jake@porthawkesburyreporter.com

PORT HOOD: The Cape Breton West U18 Islanders are off to a good start in the Nova Scotia U18 Hockey League playoffs, winning a pair of one-goal games on the road.

"It was a great weekend. Everything went according to plan," Islanders head coach Kyle Gillies told *The Reporter*. "We were short-staffed by a body but we were able to roll three lines and all three of them contributed. It was all around effort by the entire squad."

On March 12 at Kings Mutual Century Centre, the Islanders survived shorthanded and power-play goals, and scored three times in the second period for a 5-2 win over the Kholtech Valley Wildcats.

Jack MacDonald, Cadyn Power, and Logan McGrath scored for the visitors, while Rory Wood, Leyton Stewart, and Leo MacLean assisted.

"They haven't scored an even strength goal on us all weekend. That was an interesting statistic," Gillies said. "Our five-on-five game was really sound. This week in practice, that's one of the things we'll key on. The devil is always in the details with the special teams."

The next day, unassisted snipes from Power and Riley Sampson in the third period lifted the Islanders to a 2-1 win over the Wildcats.

Gillies was encouraged to see the offence spread around, as the teams' top performers were held-off the score sheets from the weekend.

Of note to the head coach was the play on the weekend of veteran forward Cadyn Power, who provided leadership and big goals in both games, getting the tying goal on Saturday then the winning goal the next day.

"I really owe Cadyn Power some credit here. Cadyn, through the year, he had the most points of anybody against the Valley. I knew he had their number," he noted. "Rolling 10 forwards, Cadyn was the guy I had filling in the lines, whether it was down the middle at centre, on the wall at right wing, and he saw his time with every single line. From a strategy standpoint, they weren't able to match-up with anybody."

While Cape Breton West fired 31 shots on goals, Jack Milner turned aside 26 shots to get the win.

"Everyone was clicking and contributing and playing the game right. When you play the game right, you get rewarded," said Gillies. "At the end of it all, we had Jack Milner backing us up. He made some big saves when he needed to give us a chance to win both games."

The Islanders will host the Wildcats on March 18 at the Al MacInnis Sports at 7 p.m. then the next afternoon at 2:30 p.m. If necessary, the two teams will return to the Annapolis Valley on Sunday.

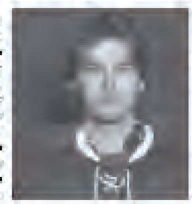
"We're going to try our best to finish them off on Friday night," Gillis added. "Should be a fun game in Port Hood on a Friday night."

Photo by Mary Hankey
Richmond Skating Club President, Tara MacInnis presented Coach Deanna King with flowers at the end the club's Theatre on Ice gala on March 11 at the Richmond Arena in Louisdale.

Bulldogs draw first blood against Pirates

PORT HAWKESBURY: The Strait Pirates are back at home Friday night after falling behind in their best-of-seven playoff series against Strait area rivals the Antigonish AA Munro Junior B Bulldogs.

On March 11 at the Antigonish Arena, the Bulldogs scored two straight power-play goals for a 3-1 win over the Pirates.



Michael MacMullen

Michael MacMullen made 19 saves in a losing effort, as Lewis Taylor scored on an assist by Gregor Yeell for the visiting side.

For Antigonish, Ryan MacLellan had a goal and an assist, and Jordan Etheridge had two assists, while Cody MacEachern made 26 saves in net.

Game 2 on March 13 was a different story as the Bulldogs skated to a 10-2 win. Fearghus MacDonald had four goals and an assist, and Darren Watermen added three assists, as the home side fired 48 shots on MacMullen.

Luke Baldwin, Will Fitzsimmons, Sam Mattie, Chris Keyes, Jordan Etheridge, and Ethan Price all had two points each for Antigonish.

The Pirates and Bulldogs are scheduled to play Tuesday (March 15) but the results of that playoff game are not available at press time Tuesday morning.

Friday's game at the Port Hawkesbury Civic Centre has a 7:30 p.m. start time.

If necessary, the two sides will return to Antigonish on March 20 at 7 p.m., then they are scheduled for Game 6 on March 22 at 7:30 p.m. in Port Hawkesbury with the deciding game slated for March 23 in Antigonish at 7:30 p.m.

Strait area groups approved for Age-Friendly Communities grants

HALIFAX: The provincial government announced more than $800,000 in funding for projects to help older Nova Scotians stay healthy, active, and socially connected in their communities.

In a press release, Seniors and Long-Term Care Minister Barbara Adams announced on March 14, that 38 projects led by organizations throughout Nova Scotia are receiving grants through the Age-Friendly Communities Grant Program.

Among the 2021-2022 grant program recipients was the Antigonish and Area Homemaker Services which was approved for $13,089 for its Meals Plus program which leverages locally produced food and municipal transit to bring food directly to the most vulnerable.

The Antigonish County Adult Learning Association will receive $11,776 for "Crossing Paths," which is a project mentoring and sharing of skills across generations.

Seniors Community Luncheon Program by the Glendale and Area Community Co-operative was greenlit for funding of $5,250.

Two Strait area municipalities also received provincial funding. Inverness County will see $10,300 for its Safe Haven Program while Richmond County will get $22,771 for ACTing Collectively.

The province said some of the projects receiving grants this year are aimed at helping seniors overcome social isolation and loneliness during the pandemic, while others provide opportunities for seniors to learn new hobbies and skills; participate in physical, educational and social activities; and connect with people of all ages and services in their communities.

"These connections and activities have been especially critical during the past two years of the pandemic," Adams said.

According to the province, the Age-Friendly Communities Grant Program provides grants of up to $25,000 for community-wide efforts to create age-friendly environments and promote healthy aging, grant are annual, and those eligible to apply include not-for-profit organizations and co-operatives, municipalities, First Nations communities, and universities.

The list of this year's grant recipients and more information on the Age-Friendly Communities Grant Program are available at: https://novascotia.ca/age-friendly-grant/.

Why we need wind power

The Government of Nova Scotia has introduced legislation that requires 80 per cent of electricity to be supplied by renewable energy by 2030. This commitment to a greener source of energy requires the province to phase out the use of coal over the next 8 years.

To meet these targets, the province has asked renewable energy companies to propose projects to supply low-carbon, low-cost energy. This spring, companies will bid into a competitive request for proposals (RFP) process through the Rate Based Procurement Program. The winning bids will be awarded Power Purchase Agreements with Nova Scotia Power Inc. to supply renewable electricity generation for their customers.

In addition to supporting Nova Scotia's goals to fight climate change, this procurement will encourage investment and create jobs. See https://novascotiarbp.com

Expected Timeline

Spring 2022	ABO Wind and Community Wind submit RFP proposal Begin environmental and other studies required by Environmental Assessment (EA) Regulations
Summer 2022	If the Project receives a Power Purchase Agreement, install wind measurement tower and continue environmental studies
Fall 2022	Environmental studies continue
Winter 2022-2023	EA submission goes to the Province
Summer 2023	EA receives approval from the Province
Fall 2023	Construction begins with clearing and road building
Summer 2025	Commissioning – turn on the wind farm

Project Consultation

Consultation will continue through the life of the Project with stakeholders and First Nations. Currently, we are in the planning stage. There will be ample opportunity to ask questions, make comments and provide input during the Project design and environmental assessment stage.

We will continue to provide Project updates and correspond on a timely basis, through our website, open houses, mail-outs, personal meetings and expanded communication channels. Our objective is to facilitate open, honest and respectful discussion with all those interested in the Project.

Our Partnership

Community Wind Farms Inc. (Community Wind) is a local renewable energy company with development projects across Atlantic Canada.

ABO Wind Canada Ltd. (ABO Wind), a wholly owned subsidiary of ABO Wind AG, is a global company with extensive experience in renewable energy development.

Together, we are developing renewable energy projects throughout Nova Scotia.

Our Values

We commit to being part of the solution by working on projects that help reduce carbon emissions. The transition to a climate friendly, sustainable energy supply, based on renewable energies, is critical.

We value input from communities and First Nations and commit to promoting and participating in open, honest and respectful communication. We understand and acknowledge that projects can have an impact, and we work to minimize those impacts and to maximize social benefits.

Contact us

Send us an email through the website.
You can also contact us directly.

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Phone: (902) 527-3158

Dave Berrade, Social Impact and Engagement Lead
ABO Wind Canada Ltd.
Email: dave.berrade@abo-wind.com
Phone: (902) 802-4540

www.rhodenawind.ca

CommunityWind
powered through partnership

ABO WIND

Rhodena Wind Project Update

March 2022

Community Wind and ABO Wind Canada are proposing the 100-megawatt Rhodena Wind Project in response to Nova Scotia's recent Rate Based Procurement Program. An estimated 18 wind turbines would be placed on on the hills between Highway 19 and TransCanada Highway 105, mostly on Crown land and private land where we have the permission of the landowner. This renewable energy project would generate enough electricity for more than 32,000 homes and displace approximately 2.6 million tonnes of CO2 equivalent during its lifetime.

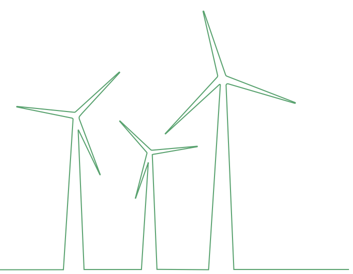
Thank you for your feedback

We held our first open house for the proposed Project in September 2021. We appreciate community members taking the time to come out to the event to learn more and discuss the Project.

Thank you for your calls and emails. We continue to respond to your questions and comments. We have captured many of the questions at **www.rhodenawind.ca**.

Our Project continues to be informed by ongoing input from the community, regulators, and environmental and technical experts.

See inside for a revised map of the proposed Project area



12 Questions

Here are the most common questions that we have heard from community members. For more topics, please see **www.rhodenawind.ca**

1 **Are wind turbines really that "green"?**

Third-party studies have confirmed that wind turbines typically offset greenhouse gases emitted as part of their production and installation within the first year of operation. When the whole cycle of production and operations is considered, wind energy is recognized as one of the "greenest" or least carbon intensive forms of energy production.

2 **How do you select the areas for the turbines?**

There are many factors to consider in siting wind turbines – our ability to keep setbacks to at least 1,000 metres from homes, the wind resource, environmental features, access to transmission lines, and the ability to access and build turbines at the location.

3 **What will we see?**

The visibility of each turbine depends on the viewpoint. On the Project website there are preliminary visual simulations prepared by a third party. During development, we will ask community representatives to offer more viewpoints for more detailed visual impact assessments.

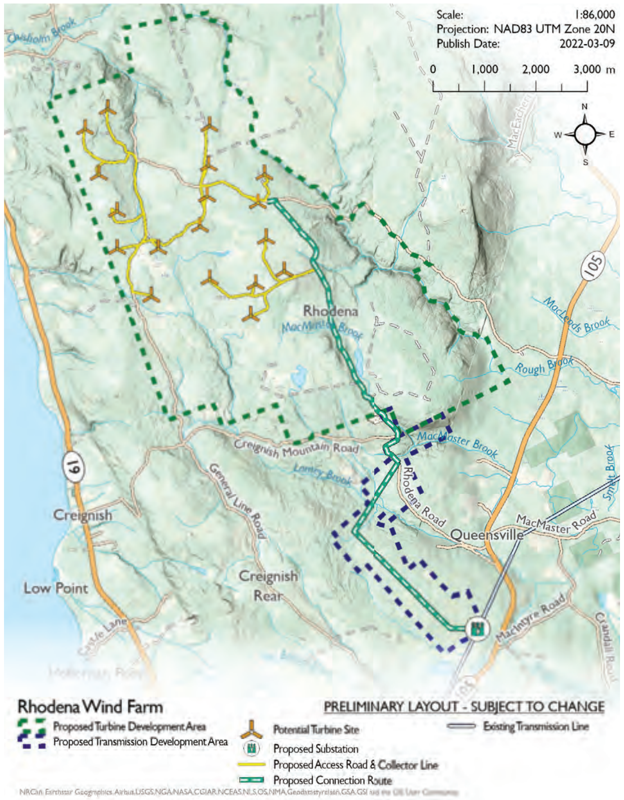
4 **Will the turbines be noisy?**

During development, we will prepare a detailed noise impact assessment with a map showing sound emissions in relation to nearby residential properties. As the Project team gains more information about the area and the wind, the engineers adjust their recommendations about turbine models. Once we have selected a model, more information will be made available.

5 **How does the community benefit from this Project?**

We anticipate many benefits to the community such as

- tax revenue for the municipality to provide services to residents
- short-term and long-term jobs and contracts in site clearing, road building, electrical, construction and concrete work, and ongoing maintenance
- revenue to local businesses during construction, for accommodations, restaurants and catering, and other services
- benefit funds to provide financial support to the community hosting the Project, for community-level initiatives
- revenue to local landowners from leases signed with the developer



This updated map shows proposed turbine locations that are subject to change, based on local resident, community, environmental, regulatory, and technical feedback.

6 **How do you protect wildlife?**

As part of the regulatory approval process, an environmental assessment will be undertaken to understand the relationship between wind turbines and the local environment. This is a requirement of the Province of Nova Scotia. Through this analysis, our team will make the necessary adjustments to avoid or reduce potential impact on wildlife.

7 **Will people be able to use the land as they have been (hunting, fishing, cutting wood)?**

Project planning will be done to minimize restrictions on land use. Typically, most activities underway before construction of a wind site can continue afterwards.

8 **Who maintains the turbines, access road, equipment, etc.?**

During the life of the Project, there will be a local site manager who will ensure the turbines, roads and equipment are well maintained and operating safely.

9 **Will plowing the roads lead to fewer snowmobiling trails?**

Project planning will be done to minimize restrictions on land use. If the Project is awarded a Power Purchase Agreement (PPA), Community Wind and ABO Wind will work with the local community to ensure minimal impact to snowmobiling trails.

10 **How big will the turbines be?**

A few factors contribute to the choice of wind turbines, such as the wind profile and the height of nearby vertical obstacles. The Project is still at a preliminary stage. Once we have more wind data to tell us where the wind blows strongest, we can choose a turbine. We anticipate the hub height would range from about 100 to 120 metres with an approximate blade length between 60 and 85 metres.

11 **Will safety lights have to be on all night?**

Aviation warning lights on wind turbines are required by Transport Canada regulations. However, the Project is exploring the feasibility of light mitigation options to reduce the visibility to those on the ground.

12 **Will the wind farm affect property values**?

Studies have been conducted on property sale data in and around wind farms in Canada, the United States, and internationally. Data gathered cannot support or disprove the impact on property values.

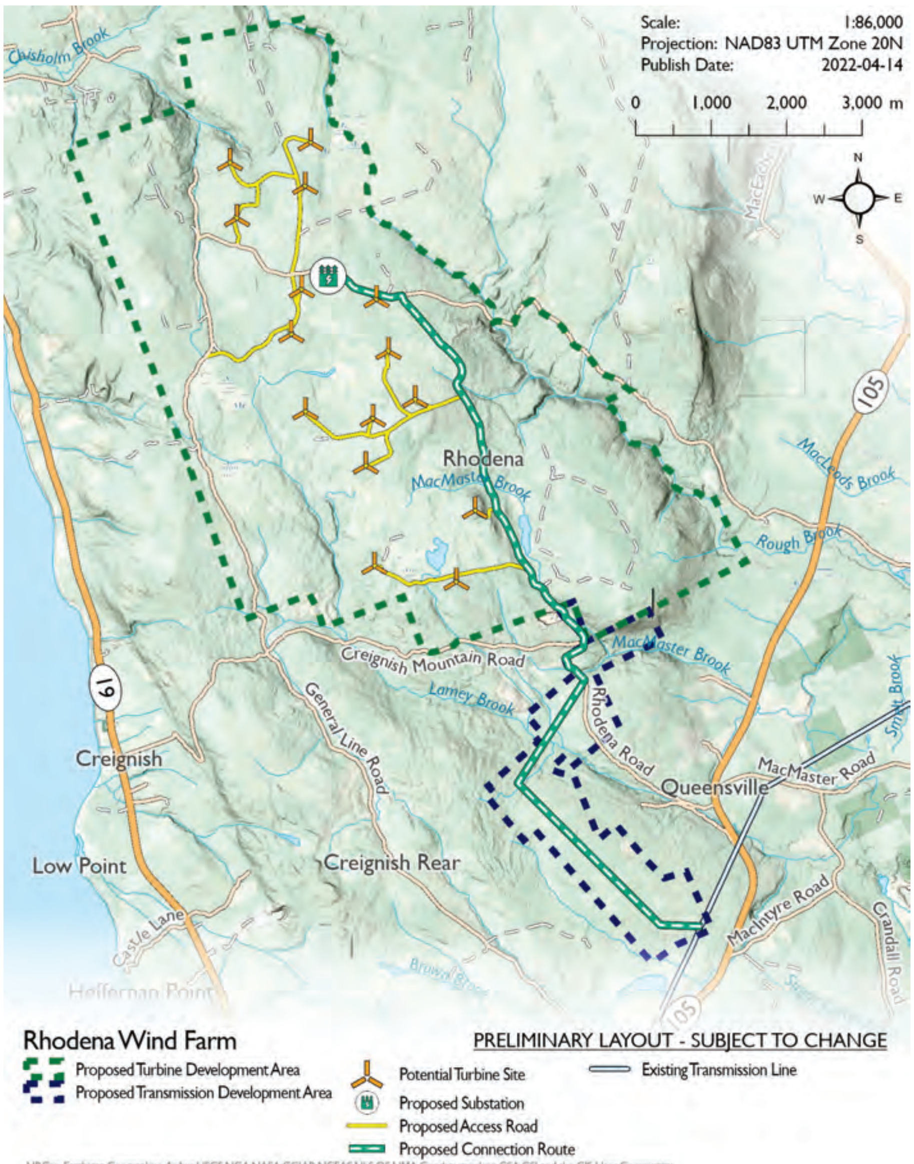
In Ontario, the Municipal Property Assessment Corporation examined assessments of properties located at 1, 2, and 5 kilometres from wind turbines. The studies found that for 2012 and 2016, there were no conclusive findings on the prices of residential properties resulting from the proximity to a turbine. See https://www.mpac.ca/en/PropertyTypes/SpecialStructuresProperties/Windturbinesnearorproperties.

Our options for producing renewable power are shaped by Nova Scotia's geography and weather. The most affordable and reliable option is harnessing the strong winds, often strongest on the coast. The requirements for good wind projects limit where they can be located. We are proposing this Project for a specific area with strong wind, where we can meet setback requirements from homes and we can access power transmission lines.

Rhodena Wind
Project Update
May 2022

Community Wind and ABO Wind Canada are proposing the 100-megawatt Rhodena Wind project in response to Nova Scotia's Rate Base Procurement Program. The project would provide local green energy into the power grid for local residences and businesses to use. The wind farm would be high on the hills between Highway 19 and TransCanada Highway 105.

Revised project layout based on community input



We have heard comments about the location of turbines west of General Line Road and their proximity to Highway 19. In response, we have relocated the 7 nearest turbines a minimum of 3 kilometres from the highway. The closest residence would now be 1,750 metres away from a turbine.

We have also reduced the number of turbines to 15, from 18. Please see map right.

Consultation will continue throughout the life of the project, with those living in the area, First Nations, and local businesses. Please check the mail for a new flyer and the website for updates at www.rhodenawind.ca. If you would like to speak to a project team member, please call Dave Berrade, Social Impact and Engagement Lead, at 902-802-4540.

CommunityWind powered through partnership

ABO WIND

Rhodena Wind
Project Update
May 2022

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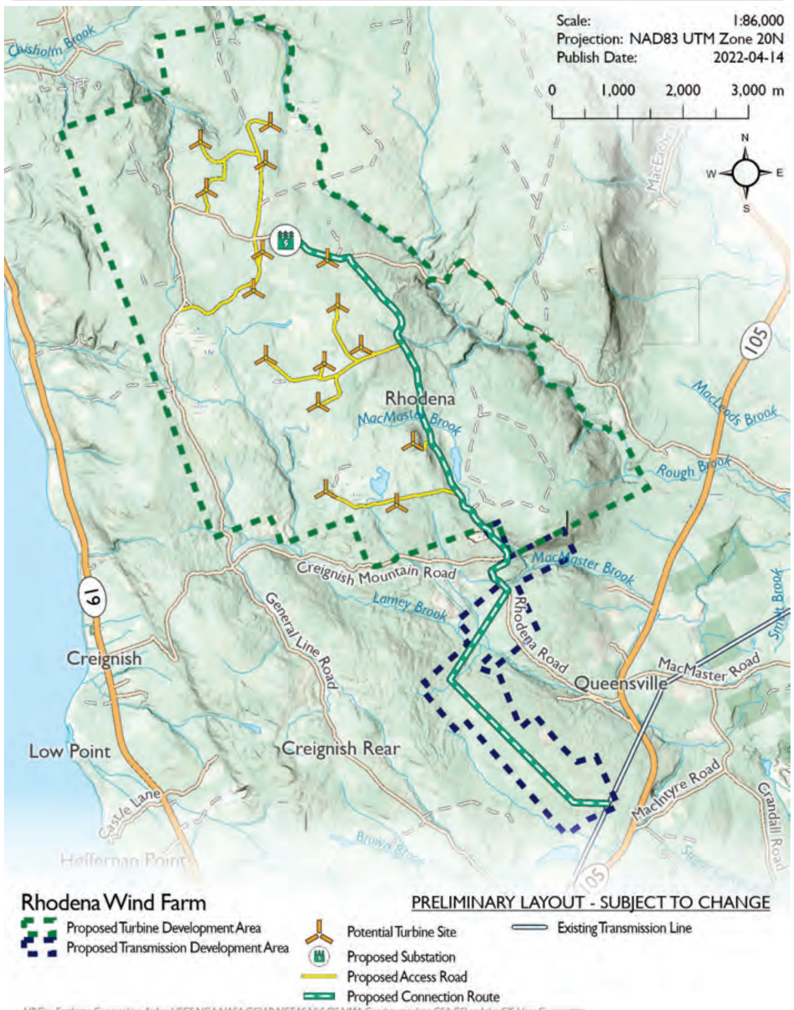

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Community Wind powered through partnership

ABO WIND

Richmond solidly behind Mi'kmaw Summer Games

by **Jake Boudrot** Editor
jake@porthawkesburyreporter.com

ARICHAT: The municipality is planning to budget more money to contribute to the upcoming Nova Scotia Mi'kmaw Summer Games from July 7 to 14 in Potlotek First Nation.

During the regular monthly meeting on April 25 in Arichat, Richmond Municipal Council accepted a recommendation from its committee of the whole that a $10,000 sponsorship for the Nova Scotia Mi'kmaw Summer Games be included in the draft budget.

"What an honour for Potlotek to be hosting the Mi'kmaw Summer Games, and for us to be part of the region that is going to be hosting those games," Warden Amanda Mombourquette said. "I'm happy that we've come forward with $10,000, and we will go into budget with that as our minimum. We will still look for ways to increase that level of support."

The warden anticipates the games will be "fantastic," but she recognizes how much work and support it will take to make it happen.

"Aside from the social impact, which is huge, the economic impact is also going to be really really wonderful for Richmond County," she added. "We've got folks coming from all over North America to attend these games. We want to be part of that process and putting our best foot forward as a region to make that everybody feels welcome, and we're showing them the best that Richmond County has to offer and doing everything we can to support our neighbours in Potlotek to be hugely successful in pulling off these games. It's a big, big undertaking."

International Student Program looking for local host families

by **Jake Boudrot** Editor
jake@porthawkesburyreporter.com

STRAIT AREA: Those involved with the Nova Scotia International Student Program (NSISP) are happy the program is returning.

Tommy Dilosa, Home Stay Coordinator with the NSISP, said the program was stalled from September 2020 to January 2022 due to the global COVID-19 pandemic.

"I try to recruit families that are interested in hosting students from all around the world, for one month, three months, five months, and for a year, at local high schools," he said.

Elizabeth Teasdale, Strait Regional Centre for Education SSP and Discipline Coordinator, as well as the Central and Northern Inverness Family of Schools Coordinator, wrote *The Reporter* via email that they are excited to rebuild the program locally.

"The program re-opened modestly in February with 12," she wrote. "The NSISP program has the potential to enrich the experience of all students and teachers in schools where the program is hosted. Not only are lifelong friendships established, we all learn more about cultures, humanity and the world. The program also results in positive economic impact in our communities."

Teasdale wrote that the NSISP is looking for families to host international students.

"Inviting a student into your home is a rewarding experience," she noted. "Host families become a home away from home for students, and in turn, the students become a member of the family. Relationships form that last long after the student has returned home."

The NSISP welcomes students from around the world into homes across Nova Scotia to study and learn about life in Canada, Teasdale wrote. She said students are "carefully matched" with host families with the help of homestay coordinators, and students range in age from eight to 18 years old and stay anywhere from one month to one year.

In normal times, Dilosa said there would be approximately 120 international students in the Strait area.

"It was what we were asked to do, and we were more than happy to comply with that," he noted of the program's slow restart.

Dilosa said they have reached out to host families, and he reported there will be 10 students attending SAERC in September.

"We're just looking to increase that a little bit more so that we can have a little bit more diversity in the town. It brings a lot to the community I think," he said. "We're also looking all through Inverness County, not just Port Hawkesbury."

Some of the misconceptions the program coordinators face are that prospective hosts assume they are required to have children attending school, they have to be married, or be part of what is considered a traditional family unit, Dilosa noted.

"You can be single, you can be widowed," he said. "It's not necessarily your mom and dad and two kids families (it can include) your empty nester, what have you, even those in the community who are single and looking for a new adventure."

Despite COVID-19 worries around international travel, vaccination status, masking, and other aspects of the pandemic, Dilosa added that the province is in demand.

"The amount of students that are requesting to come to Nova Scotia has increased and we just need to find few more homes because the existing homes that we have are pretty much all filled," he added. "Now we have to figure out how to get a few more host families on board to try the experience and bring the world to their home."

Mulgrave hears youth priorities, discusses policing costs

Continued from page 6

And then subsequent phases would be to build the wharf and the floating docks. Some work to the slipway and stuff like that," said Luddington, noting that proponents of the marina development project have been researching funding streams.

Council also discussed policing cost for the town as provided by the RCMP. The town is allotted one full-time member at a cost of $171,000 over the most recent fiscal year.

In the first quarter of 2022, 41 calls have been received by the RCMP from Mulgrave which lines up with the previous year.

"It doesn't warrant $171,000, I don't think," said Luddington.

Council will make inquiries regarding possible policing alternatives. One part-time RCMP officer or a town police force were ideas floated at the council table.

Luddington was quick to point out the high cost of policing as provided by the RCMP was not a problem experienced by the Town of Mulgrave alone. "It's everyone across the board."

RCMP costs are expected to rise this coming year and in following years under the recently ratified contract between the federal government and the union representing RCMP members.

FLOWER POWER

As the last shackles of winter fade, it is time for local residents to turn their attention to the power of the flower. Gardeners are ready to plant and workers like Mabou Gardens employee Rose MacDougall are ready to help them select from a wide assortment of plants and flowers to make their properties more attractive. CAPE BRETON POST

COURT

Judge reserves decision in case of former chief

CAPE BRETON POST STAFF
news@cbpost.com
@capebretonpost

WAGMATCOOK — A provincial court judge has reserved decision until June in the case of a former Mi'kmaq band and regional chief charged with sexual assault.

Judge Shane Russell is now set to deliver his decision June 3 in the case of Joseph Wayne Morley Googoo, 55, who is charged with sexual assault.

The offence is alleged to have been committed between March 1-31, 2013, in We'koqma'q.

Russell reserved decision after hearing testimony from both the complainant and the accused during a provincial court hearing in Wagmatcook. The Crown was represented by Tracey Stanley while Googoo was represented by Chris Conohan.

The female complainant, whose name is banned from publication, testified that Googoo was a long-time family friend with whom she had worked with on previous community projects during his tenure as band chief of We'koqma'q.

In March 2013, the woman testified she reached out to Googoo concerning a project she wanted to undertake.

She said Googoo sent her a text to come to his home in We'koqma'q to discuss the project.

She said it was between 9:30 p.m. and 10 p.m. when she arrived at his home and that he was alone.

He offered her a drink of 7Up which she accepted.

"It tasted like 7Up but a little weird," testified the complainant, adding she didn't remember much after drinking it.

She said she recalled staggering to the bedroom with Googoo helping her and that they sat on the bed.

The woman said Googoo took off her clothes and then raped her both vaginally and anally.

"It hurt so much," she testified, adding when she woke up several hours later, Googoo was in the bed beside her.

She said she dressed, went home and took a shower and was having difficulty recalling what had occurred the previous night.

She knew something had happened as she was continuing to experience pain in her genital and anal areas.

She testified that wasn't until 2020 that she began remembering what had happened.

In taking the witness stand in his own defence, Googoo denied the allegations.

He testified that he did receive a text message from the complainant in 2020 saying that she forgave him.

"I didn't know how to reply," said Googoo, adding he did not respond to the message.

His lawyer entered several exhibits indicating Googoo's schedule during the time of the alleged offence that suggested he was not in We'koqma'q during the relevant time.

"There were no days when she was in my home in March 2013," said Googoo.

In addition to being a band chief for nine terms, Googoo also served as a regional chief from 2011 until 2019 with the Assembly of First Nations.

He was removed from office after an internal investigation concluded that Googoo had discriminated and harassed women while serving as a regional chief.

Rhodena Wind
Project Update

May 2022

Community Wind and ABO Wind Canada are proposing the 100-megawatt Rhodena Wind project in response to Nova Scotia's Rate Base Procurement Program. We will submit our proposal this month. The project would provide local green energy into the power grid for local residences and businesses to use. It would help Nova Scotia achieve its goal to phase out the burning of coal as an energy source – and displace approximately 2.6 million tonnes of CO_2 equivalent during its lifetime.

Revised project layout based on community input

After hearing recent feedback from the community, we are making changes to the proposed project site. We have heard comments about the location of turbines west of General Line Road and their proximity to Highway 19. In response, we have relocated the 7 nearest turbines a minimum of 3 kilometres from the highway. The closest residence would now be 1,750 metres away from a turbine. We have also reduced the number of turbines to 15, from 18.

If the project is successful in the request for proposals, there will be ample opportunity to provide input during the design and environmental assessment (EA) stage. An independent third-party will conduct the EA, which we anticipate will go to the Province for review in December 2022. The public will be able to make comments.

Consultation will continue throughout the life of the project, with those living in the area, First Nations, and local businesses.

Benefits to Community

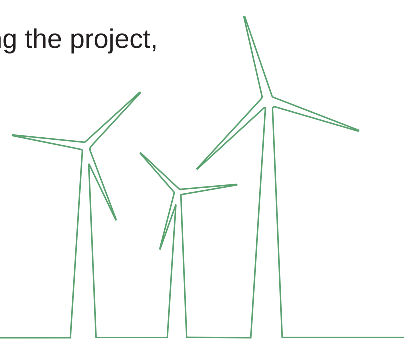
Up to $22 million in property tax to the municipality over the life of the project that can be used for local services and infrastructure

Short-term and long-term jobs and contracts in site clearing, road building, electrical, construction, concrete work, and ongoing maintenance – including 75 to 125 local jobs during construction, and high-paying permanent jobs for operations and maintenance

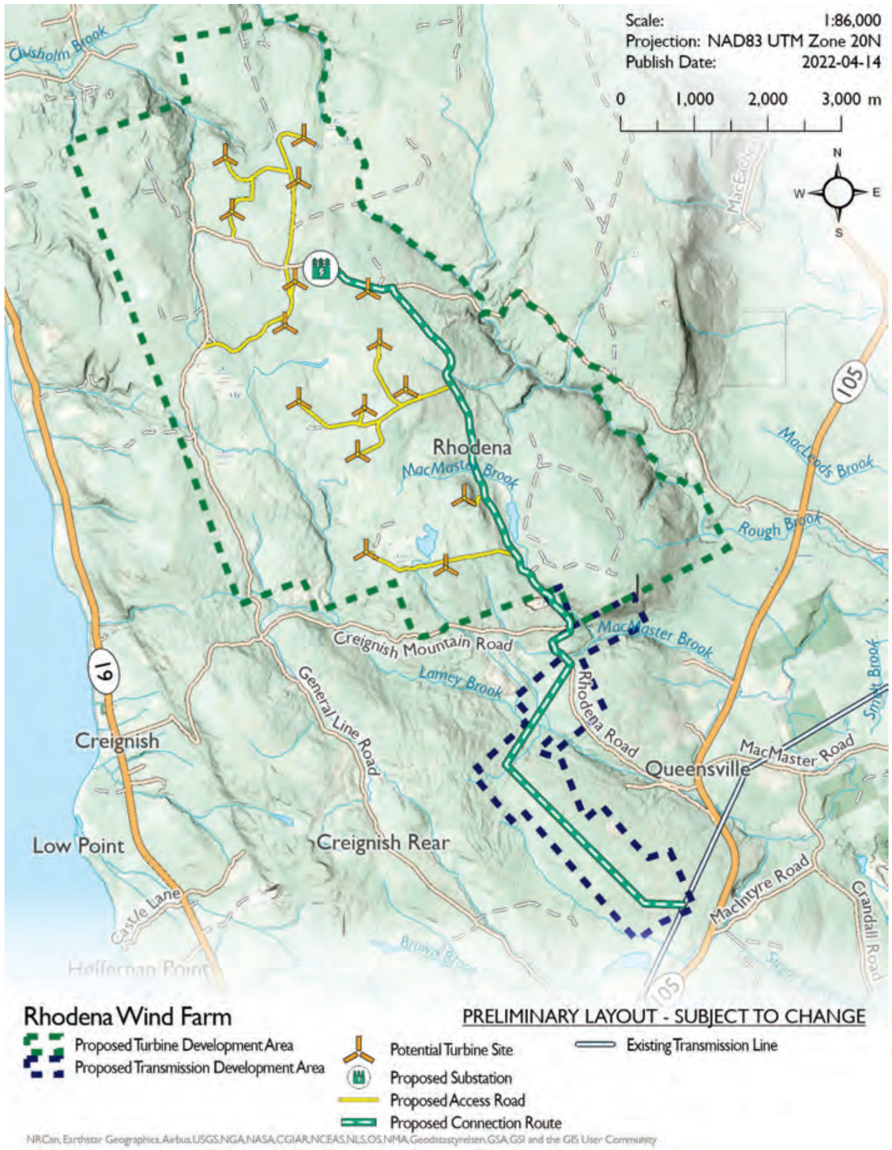
Revenue to local businesses – during the construction period, tens of millions of dollars in materials and services could come from local businesses, including for accommodations, restaurants and catering, and other amenities

Benefit funds will go to the community hosting the project, for community-level initiatives

Revenue to local landowners from leases signed with the developer



Please flip over to see an updated map



In this updated map, there are 15 turbines instead of 18, and 7 have been moved back from Highway 19. The wind farm would generate enough green power for 32,000 homes. Note: The proposed turbine locations are subject to change, based on local resident, community, environmental, regulatory, and technical feedback.

We acknowledge that the proposed project is in Unama'ki, the ancestral, unceded territory of the Mi'kmaq people. We are grateful for the Treaties of Peace and Friendship with the Mi'kmaq people, which set out long-standing promises, mutual obligations, and benefits for all parties involved.

www.rhodenawind.ca

We will continue to provide updates through our website, open houses, mail-outs, and through meetings and correspondence. Our objective is to facilitate open, honest, and respectful discussion with all those interested in the project. If you have any questions or concerns, please contact us below or through the website form. We can also meet virtually or in person.

Keith Towse, CEO
Community Wind Farms Inc.
Email: keith@communitywind.ca
Phone: (902) 527-3158

Dave Berrade, Social Impact and Engagement Lead
ABO Wind Canada Ltd.
Email: dave.berrade@abo-wind.com
Phone: (902) 802-4540

ABO Wind's Open House

Rhodena Wind Project

ABO Wind Canada invites you to attend an upcoming drop-in information session to learn more about the Project:

Tuesday, July 11
6:00 p.m. - 8:30 p.m.

Wednesday, July 12
6:00 p.m. - 8:30 p.m.

Creignish Community Centre Hall
2061 Ceilidh Trail
Creignish

ABO WIND

www.rhodenawind.ca

Rhodena Wind Project

June 2023

We would like to give you an update on our Rhodena Wind Project, a collaboration of ABO Wind Canada Ltd. (ABO Wind) and Eskasoni First Nation.

Upcoming Open Houses

ABO Wind invites you to attend an upcoming **drop-in information session** to learn more about the Project:

Tuesday, July 11 - 6pm - 8:30pm
Creignish Community Centre Hall
2061 Ceilidh Trail, Creignish

Wednesday, July 12 - 6pm - 8:30pm
Creignish Community Centre Hall
2061 Ceilidh Trail, Creignish

ABO WIND

The Project

Renewable Energy in Nova Scotia

Nova Scotia has one of the most ambitious climate change plans in Canada with a target to close all the coal power plants and reach 80% renewable energy by 2030. These ambitious targets require more renewable energy in our province.

The Green Choice Program (**www.novascotiagcp.com**) was developed collaboratively between the Province of Nova Scotia, renewable energy developers, Nova Scotia Power, and large energy buyers. It will allow participating customers to purchase up to 100% of their electricity from local renewable energy sources.

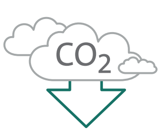
About the Project

The Rhodena Wind Project ("the Project") is being proposed by ABO Wind Canada Ltd. ("ABO Wind") in response to the Green Choice Program. ABO Wind is partnering with Eskasoni First Nation to develop the Project. As a 51% partner, Eskasoni First Nation is actively collaborating with ABO Wind to create capacity building, employment and economic opportunities, and acting as an environmental steward for the land.

The Project would place 15 wind turbines on Crown and private land between Route 19 and Trans-Canada Highway 105. The Project area of interest was initially selected due to world-class wind speeds, an existing network of forestry roads, land topography, grid capacity and the ability to adhere to and exceed company, municipal and provincial setback guidelines.

The Project will:

- Have an expected capacity of 105 megawatts, providing clean energy to the grid, powering local residences and businesses, generating enough energy for 34,000 homes annually.



- Help Nova Scotia achieve its goal to phase out burning coal as an energy source and displacing approximately 5.9 million tonnes of CO2 equivalent during its lifetime.

- Include other associated infrastructure, including a substation, a control building for site maintenance, access roads, underground collector lines, a transmission line, and meteorological towers.

Revised layout

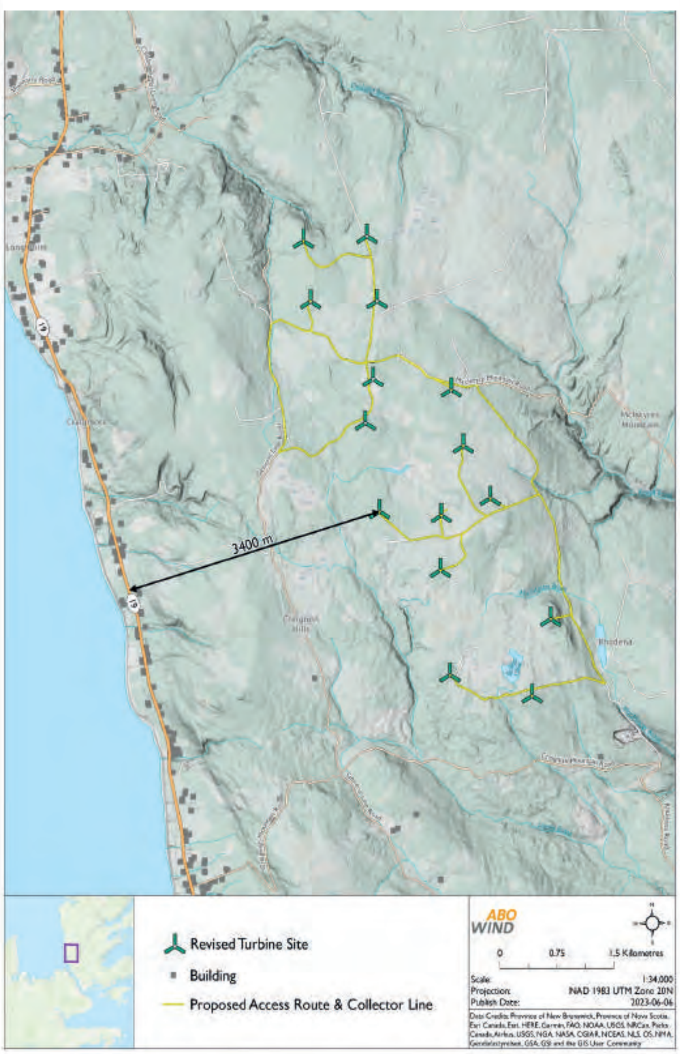
ABO Wind made changes to the Project layout after hearing feedback from the community. The community expressed concerns about the location and number of turbines along the ridge west of General Line Road and their proximity to Route 19. In response, ABO Wind:

- Reduced the number of turbines from 18 to 15.
- Relocated seven turbines on the ridge of Creignish Hills to a minimum of 3 kilometers from Route 19 and the residences along Route 19. The topography provides a natural barrier to reduce the potential visual impact of the Project from Route 19.

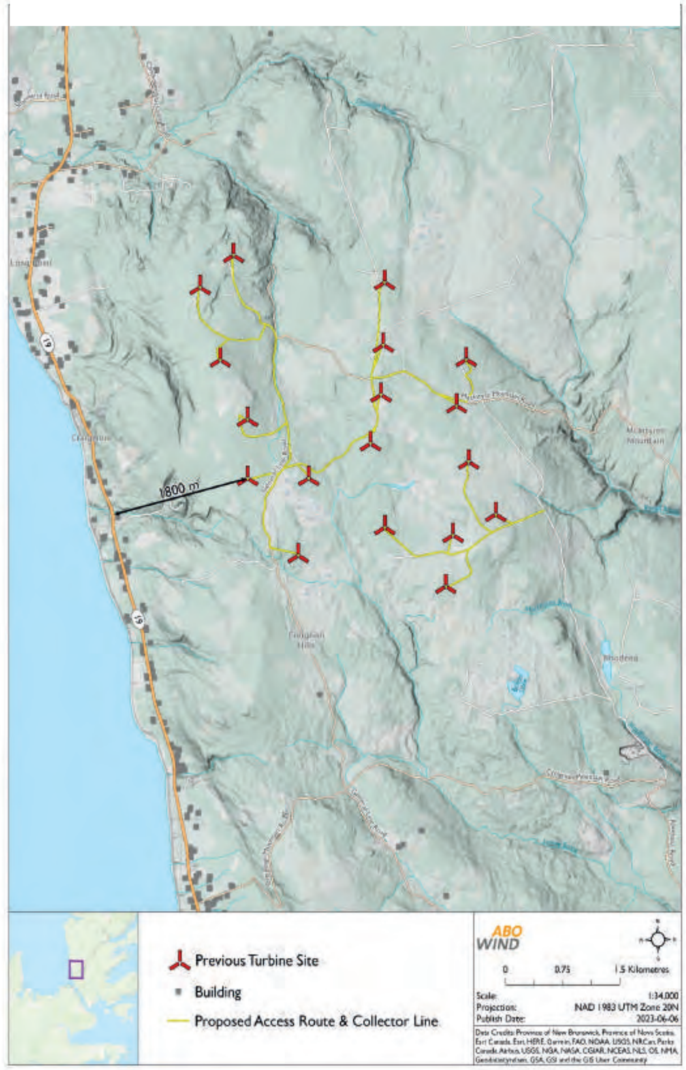
Field studies have also resulted in adjustments to turbine locations. For example, over 98% of the Project Area avoids the Canada lynx range (habitat). The Project continues to be informed by ongoing input from the community, regulators, and environmental and technical experts.

As indicated on the **Revised Turbine Layout** ("May 2023", left) map below, the nearest wind turbine is now 3400 metres from Route 19. In the previous layout ("March 2022", right) this distance was 1800 metres:

Rhodena Wind Farm
Revised Turbine Layout (May 2023)



Rhodena Wind Farm
Previous Turbine Layout (March 2022)



Environmental Studies

Updated information on environmental studies, potential impacts, and mitigation measures will be shared in more detail in the next mailout and open house.

A Mi'kmaq Ecological Knowledge Study (MEKS) was completed by Membertou GIS to understand any historic and current Mi'kmaq land.

ABO Wind is working with local third-party experts to complete the required technical and environmental studies to support the siting of wind turbines. Studies include analysis of shadow flicker, visualizations/ renderings of turbine locations, expected sound levels, and more. This information will be incorporated into an environmental assessment ("EA") submission to the Provincial government later this year. Some of the study results include:

- Over 86% of access roads utilized by the Project are existing roads to minimize the footprint of new disturbance.
- Turbine generated noise levels during operations will not exceed 40 dBA at residences closest to the Project, according to noise modeling (shown in the outlined blue area on the map).

This sound level is similar to a quiet library or a suburban area at night and falls within Nova Scotia's EA requirements for Wind Power Projects. A typical quiet rural area has a sound level of about 35 dBA.

Noise Contours

Benefits to Community

- An estimated \$20-25M in property tax to the municipality over the life of the Project that can be used for local services and infrastructure.

- Short-term and long-term jobs and contracts in site clearing, road building, electrical, construction, concrete work, and ongoing maintenance – including 75 to 125 local jobs during construction, and several permanent jobs for operations and maintenance.

- Revenue to local businesses – during the construction period, tens of millions of dollars in materials and services could come from local businesses, including construction sub-contracts, accommodations, restaurants and catering, and other amenities.

- Benefit funds will go to the community hosting the Project, for community-level initiatives and regional investment.

- Revenue to local landowners from leases signed.

- Wind energy provides community health benefits by offsetting emissions that would otherwise be emitted through the burning of fossil fuels. The Project will generate electricity without emitting greenhouse gases or air pollutants or any use of freshwater.

Ongoing opportunities for feedback

Timeline

Ongoing:
ABO Wind's team is actively engaging with local community groups and businesses, First Nations, government, and other relevant organizations in the region. Consultation will continue throughout the life of the Project.

Summer 2023:
Open Houses on July 11 and 12 (see details on front of pamphlet). ABO Wind will work with community members to identify those willing to participate on a Community Liaison Committee (CLC) for the project.

September 2023:
The Project's EA will be submitted to the Provincial government for review and approval. The EA process provides additional opportunities for citizens to share feedback on the Project.

December 2023:
The Rhodena Wind Project will be submitted for the Green Choice Program.

March 2024:
Anticipated Green Choice RFP award.

2024:
Construction begins with tree and road clearing.

2026:
Commissioning – The Project is producing clean energy.

Ample opportunities remain to ask questions, make comments, and provide input throughout 2023 as ABO Wind continues to consult the community and proceed with our project planning. ABO Wind will continue to provide updates through the Project website, open houses, mail-outs, meetings, and correspondence. ABO Wind's objective is to facilitate open, honest, and respectful discussion with all those interested in the Project.

Questions and additional information

If you have any questions or concerns ABO Wind invites you to reach out to

Heidi Kirby, Communications Coordinator at the Halifax office:

heidi.kirby@abo-wind.com or (902) 329-9907.

ABO Wind is open to meet virtually or in person. Many of the questions already asked by the public have responses available at **www.rhodenawind.ca.**

We acknowledge that the proposed project is in Unama'ki, the ancestral, unceded territory of the Mi'kmaq people. We are grateful for the Treaties of Peace and Friendship with the Mi'kmaq people, which set out long-standing promises, mutual obligations, and benefits for all parties involved.

ABO WIND