North Atlantic

North Atlantic Wind to Hydrogen Project

Environmental Assessment Registration

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***Note :** Some appendices are presented in the form of a Table of Contents (TOC) only, as the detailed information they contain is commercially sensitive, proprietary, or provided by third-party vendors through non-disclosure agreements. The TOCs have been included to inform the reader on the associated work involved and provide reassurance that the work is being conducted by qualified professionals.

List of Acronyms and Abbreviations

Acoustical Society of America	ASA
air quality monitoring	AQM
All-Terrain Vehicle	ATV
Aluminum Conductor Steel Reinforced	ACSR
American National Standards Institute	ANSI
American Society of mechanical engineers	ASME

aquatic invasive species	AIS
Arnold's Cove Area Chamber of Commerce	ACACC
Atlantic Canada Conservation Data Centre	AC CDC
Atlantic Canada Conservation Data Centre	NL CDC
A-weighted decibals [in report: "A-weighted sound power level"]	dBa
Before Present	BP
beginning-of-life	BOL
best management practices	BMP
Bull Arm Fabrication	BAF
Canada Council of Ministers of the Environment	CCME
Canadian Ambient Air Quality Standards	CAAQS
Canadian Centre for Occupational Health and Safety	CCOHS
canadian dollar	CAD
Canadian Electric Code	CEC
Canadian Environmental Protection Act	CEPA
Canadian Environmental Quality Guidelines	CEQG
Canadian Manufacturers & Exporters	CME
Canadian Parks and Wilderness Society	CPAWS
Canadian Renewable Energy Association	CanREA
Canadian Standards Association	CSA
carbon dioxide	CO_2
carbon dioxide equivalents	CO_2e
carbon monoxide	CO
Centimetre	cm
Certificate of Environmental approval	CEA
Coarse particulate matter	PM10
Commission Internationale de l'Éclairage	CIE
Committee on the Status of Endangered Wildlife in Canada	COSEWIC
Community Business Development Bank	CBDC
cubic meter	m^3
C-weighted decibels	dBC
Day Night Sound Levels	Ldn
Daytime sound pressure level	Ld
Deadweight Tons	DWT
Decommissioning and Rehabilitation Plan	DRP
Degrees celsius	°C
Ecological Land Classification	ELC
Ecologically and Biologically Significant Area	EBSA
Emergency response plan	ERP

Emergency Response Team	ERT
Environment and Climate Change Canada	ECCC
Environment and Non-Government Organization	NGO
Environmental Assessment	EA
Environmental Assessment Division	EAD
Environmental Assessment Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects	EAR-GWH
Environmental Protection Plan	EPP
Ephemeroptera, Plecoptera and Trichoptera	EPT
Export Credit Agencies	ECA
Fine particulate matter	$PM_{2.5}$
Fish Food and Allied Workers	FFAW
Fisheries and Oceans Canada	DFO
forest management districts	FMD
Front End Engineering Design	FEED
gigawatts	GW
glass fiber-reinforced polymer	GFRP
global warming potentials	GWP
Greenhouse gas	GHG
Health, Safety, & Environmental	HSE
Health, Safety, & Environmental Management System	HSEMS
hectares	ha
Hertz	Hz
High Potential Areas	HPA
Historic Resources Impact Assessment	HRIA
Historic Resources Overview Assessment	HROA
hydrofluorocarbons	HFC
hydrogen	H_2
Hydrogen Generation Plant	HGP
Hydrogenation Plant	HP
Identification	ID
industrial monitoring network	IMN
Infrared	IR
Institution of Lighting Engineers	ILE
International Dark Sky Association	IDA
International Electrotechnical Commission	IEC
International Union for Conservation of Nature	IUCN
International-Matex Tank Terminals	IMTT
Key Indicators	KI

kilo tonnes per annum	ktpa
kilogram	kg
kilogram per hour	kg/h
kilometer	km
kilometers per hour	km/h
kilovolt	kV
kilowatts	kW
Land and resource use	LRU
Laurentian North	LN
Liquid Organic Hydrogen Carrier	LOHC
Litres	L
Litres per second	L/s
Local Assessment Area	LAA
low frequency noise	LFN
lumen	lum
Marine Area	MA
Marine Institute	MI
Marine Protected Areas	MPA
Material Safety Data Sheet	MSDS
Medium Pressure	MP
megapascal	MPa
Megavolt-Ampere	MVA
megawatt	MW
Member of House of Assembly	MHA
Memorandum of Understanding	MOU
Memorial University of Newfoundland	MUN
meteorological evaluation tower	MET
meteorological evaluation towers	MET
meter	m
methane	CH_4
Methylcyclohexane	MCH
metric tonnes per hour	MT/h
Miawpukek First Nation	MFN
Micro siemens per centimetre	µS/cm
microcandelas per square meter	µcd/m^2
micrograms per cubic metre	µg/m^3
micrograms per liter	µg/L
micron	µm
Migratory Birds Convention Act	MBCA

millicandelas per square meter	mcd/m^2
milligrams per liter	mg/L
millimeters	mm
Municipal and Provincial Affairs	MAPA
Medium Range	MR
Newfoundland Aquaculture Industry Association	NAIA
National Air Pollution Surveillance	NAPS
National Fire Protection Association	NFPA
National Occupational Classification	NOC
Nephelometric Turbidity units	NTU
Newfoundland and Labrador	NL
Newfoundland and Labrador Construction Association	NLCA
Newfoundland and Labrador department of environment and climate change	NL DECC
Newfoundland and Labrador Department of Environment and Climate Change	DECC
Newfoundland and Labrador Endangered Species Act	NL ESA
Newfoundland and Labrador Hydro	NLH
Newfoundland and Labrador Wildlife Division	NL WD
Newfoundland Aquaculture Industry Association	NAIA
Newfoundland Power	NP
Nighttime sound pressure level	Ln
Nitric Oxide	NO
Nitrogen dioxide	NO_2
nitrogen oxides	NO_x
nitrogen trifluoride	NF_3
nitrous oxide	N_2O
NL Air Quality Standards	NL AQS
NL department of industry, energy and technology	NL IET
NL Environmental Assessment Division	NL EAD
NL Environmental Protection Act	NL EPA
North Atlantic Refining Limited	NARL
Occupational Health and Safety	OHS
operation and maintenance	O&M
Outfall to Sea	OFS
Outfall to Sea	OFS
oxygen	O_2
ozone	O_3
particulate matter	PM
Particulate matter < 10 microns	PM_{10}
Particulate matter < 2.5 microns	$PM_{2.5}$

parts per trillion	ppt
perfluorocarbons	PFC
personal protective equipment	PPE
Placentia Bay-Grand Blanks Large Ocean Management Area	PBGB LOMA
plan/do/check/act	PDCA
polycyclic aromatic hydrocarbons	PAHs
Professional Engineers and Geoscientists Newfoundland and Labrador	PEGNL
Project Area	PA
protected public water supply area	PPWSA
Proton Exchange Membrane	PEM
Provincial Archaeology Office	PAO
Public service announcement	PSA
Public services and procurement Canada?	PSPC
Qalipu Mi'kmaq First Nation	QFN
Reasonably foreseeable development	RFD
Recreational Vehicle	RV
Regional assessment area	RAA
Right of Way	ROW
Safe Work Practices	SWP
Salmon fishing area	SF6, SF10
salmon fishing areas	SFA
Selling, General, and Administrative	SG&A
Shadow Flicker	SF
solid waste disposal	SWD
Species at Risk	SAR
Species at Risk Act	SARA
Species of Conservation Concern	SCC
Species Status Advisory Committee	SSAC
Standard Operating Procedure	SOP
Statutory Orders and Regulations	SOR
sulfur dioxide	SO_2
sulfur hexafluoride	SF_6
Supervisory Control and Data Acquisition	SCADA
Term	Acr.
The Department of Fisheries, Forestry and Agriculture	FFA
Thermal Process System	TPS
tonnes per annum	tpa
Total dissolved solids	TDS
total suspended particulate	TSP

Total suspended solids	TSS
Trans Canada Highway	TCH
Transportation Association of Canada	TAC
Ultraviolet	UV
Unit Flow	L/s/km²
United States dollar	USD
United Steel Workers	USW
Unmanned Aerial Vehicle	UAV
Valued Components	VC
volatile organic compounds	VOC
water	H_2O
Water Resources Management Division	WRMD
Water Survey of Canada	WSC
White-nose Syndrome	WNS
young-of-the-year	YoY
Zone of Influence	ZOI

Executive Summary

Newfoundland and Labrador (NL) has significant wind energy potential. To harness that potential, North Atlantic Refining Corp. (North Atlantic) is proposing to develop a renewable energy project in the Come By Chance/Sunnyside area on the island portion of Newfoundland and Labrador, Canada. The North Atlantic Wind to Hydrogen Project (the Project) represents a transformative opportunity to redefine Newfoundland's role in the global clean energy economy. With strong wind resources, strategic geography, and supportive policy frameworks, this Project will deliver clean hydrogen, economic opportunity, and climate leadership for the region, Canada, and global partners.

The purpose of the North Atlantic Wind to Hydrogen Project is to establish and operate an onshore Wind Farm to power the production of green hydrogen for export to global markets. North Atlantic proposes to develop a 324 megawatt (MW) Wind Farm on 4,600 hectares (ha) in the Sunnyside area, a Hydrogen Generation Plant (HGP) capable of producing 30,000 tonnes per annum (tpa) of hydrogen, and a Hydrogenation Plant (HP) capable of processing 60,000 tpa of hydrogen at the existing Come by Chance Industrial Site, including the North Atlantic Refining Limited Logistics Terminal (NARL Logistics Terminal) and Braya Renewable Fuels' (Braya) refinery (Braya Refinery). While the HP will be capable of processing 60,000 tpa of hydrogen, North Atlantic acknowledges that any expansion of wind power and hydrogen production capacity beyond 30,000 tpa will require a separate submission under the Province's **NL Environmental Protection Act** (NL EPA).

As an important step in the Project's planning and approval process, this document has been prepared in accordance with the NL EPA (Part X) and the Environmental Assessment Regulations. This Registration Document (Registration) has been prepared by North Atlantic with assistance from Sikumiut Environmental Management Limited (SEM). The format of this submission is consistent with the "Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects" as well as the "Environmental Assessment Act: A Guide to the Process". The Project does not include any activities requiring federal assessment as listed in the Physical Activities Regulations under the **Impact Assessment Act**, 2019.

This Executive Summary has been organized to reflect the general content and organization of the Registration. The Executive Summary provides a description of the Proponent in Section 1 and proposed undertaking in Section 2. Section 3 describes the existing environment and Section 4 details the potential effects of the Project on the environment and the potential types of accidents and malfunctions that could occur, as well as the effects of the environment on the Project. Sections 5 and 6 describe the residual and cumulative effects, respectively. The assessment summary is described in Section 7. Public, Indigenous and regulatory consultation and issues scoping are described in Section 8. The environmental protection plan is outlined in Section 9.

ES1.0 The Proponent

The Proponent for this undertaking is North Atlantic, an NL based company with more than 30 years of experience in the fuel supply industry. Headquartered in St. John's, NL, with established relationships as a global fuel importer, North Atlantic is an experienced and capable company with a strong commitment to advancing a low-carbon economy for the province and globally. North Atlantic is fully owned by Silverpeak, an alternative investment management firm with approximately $25 billion United States dollar (USD) of gross asset value (Silverpeak, 2023). Silverpeak is committed to achieving the long-term goals of its companies, with investments across all major asset classes and core values that reflect collaboration and integrity.

ES2.0 Project Description

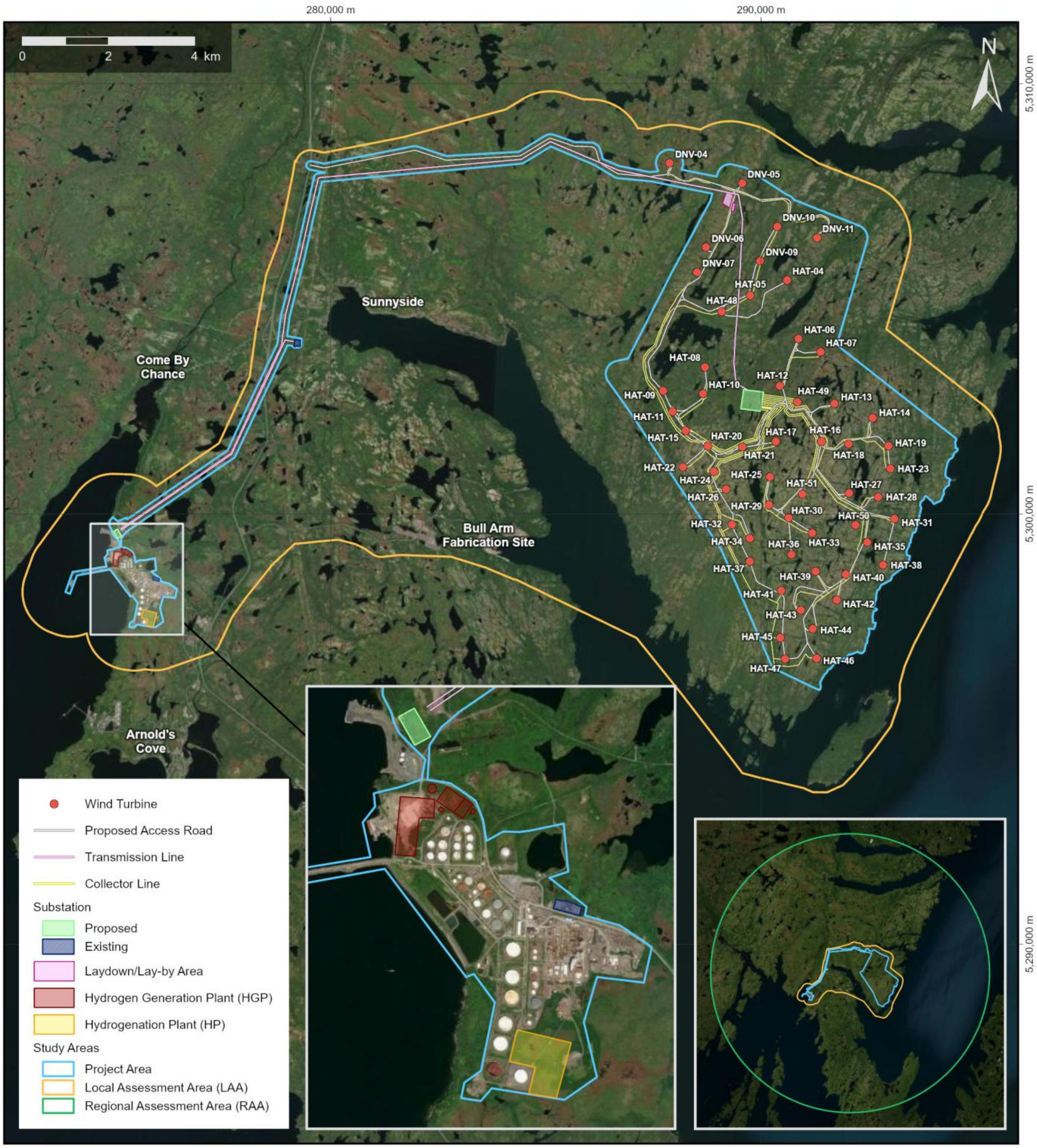
North Atlantic is proposing the Project development on the Isthmus of Avalon region. The Project will generate electricity from wind turbines and use the produced renewable energy for large-scale hydrogen production, supporting global decarbonization efforts.

The proposed Project will be constructed in the vicinity of the NARL Logistics Terminal and will consist of the following key components:

- A 324 MW Wind Farm;
- A HGP with the capacity to produce 30,000 tonnes of green hydrogen per year;
- A HP with capacity to convert the hydrogen to a Liquid Organic Hydrogen Carrier (LOHC) for export;
- A 138 kV transmission line and associated electrical infrastructure to connect the Wind Farm to the HGP; and
- The use of the existing NARL Logistics Terminal jetty and four storage tanks.

The Wind Farm will consist of 45 wind turbines, each with an approximate rated power generation capacity of 7.2 MW for a total of 324 MW. The electrical collection system will comprise 34.5 kilovolt (kV) collector lines to a central switchyard. From there, two 24-kilometre (km) long 138 kV transmission lines will deliver electricity to a new substation adjacent to the NARL Logistics Terminal. A separate, 7 km long 138 kV transmission line will connect the Project Area (PA) to the Newfoundland and Labrador Hydro (NLH) grid at the existing Sunnyside substation. This connection will ensure access to a power supply for site auxiliaries and serve to provide supplemental power to the HGP during periods when wind power is unavailable. In total, approximately 90 km of collector lines and 57 km of transmission lines will be constructed to support the Project. The Wind Farm will also require the development of a road network, entailing the creation of 66 km of new roads. A map of the PA is shown in Figure 0-ES.

The HGP will employ Proton Exchange Membrane (PEM) electrolyzers to produce hydrogen and oxygen from a supply of fresh water from Inkster's Pond. Oxygen will be vented to the atmosphere as a byproduct while hydrogen will be piped to the HP, which will combine hydrogen with toluene to produce methylcyclohexane (MCH) - a type of LOHC. The conversion to LOHC enables safe and efficient storage, transport, and release of hydrogen, with the toluene available for re-use (Li et al., 2021). The LOHC will be stored in tanks to await shipment, North Atlantic plans to use its existing liquid fuel infrastructure at the NARL Logistics Terminal for this purpose. The LOHC will be exported directly from the NARL Logistics Terminal. Once it reaches buyers in international markets, it will be dehydrogenated (i.e., MCH will be transformed back into toluene) to release hydrogen. The Project will produce an average of 85.6 tonnes of green hydrogen per day (30,000 tonnes per year), requiring up to 947,000 m^3 of water per year.



North Atlantic	FIGURE TITLE: **Project Layout and Study Areas**	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke / DATE: 10/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 10/06/2025
			APPROVED BY: C. Collins 10/06/2025
			CRS: WGS 1984 UTM Zone 22N
			sem

Figure 0-ES Project Layout and Study Areas.

ES2.1 Construction

The Construction Phase of the Project will involve site preparation and construction activities, including but not limited to:

- Civil works, including temporary accommodation facilities, site preparation, quarry, site clearing, grading, access roads;
- Wind Farm construction including wind turbine transportation and installation;
- Electrical infrastructure construction, including substations, collector system, and transmission lines installation;
- HGP and HP construction;
- Terminal upgrades, including retrofitting of existing crude tanks for LOHC storage and upgrades to the jetty;
- Laydown areas; and
- Office and parking lot.

Some of the existing NARL Logistics Terminal will also be modified to support the Project, including upgrades to jetty facilities and tank farm. Site preparation and foundational work will commence early, followed by mechanical and electrical installation in overlapping phases.

Oversized loads will require careful scheduling, use of heavy-lift cranes, and marine deliveries via port infrastructure at the NARL Logistics Terminal and Bull Arm Fabrication Site. Laydown areas at these ports and Wind Farm area will be organised to accommodate sequential unloading and assembly.

Construction camps at the Bull Arm Fabrication Site could potentially be made available for housing of skilled trades and construction personnel to provide lodging, catering, and transportation support. Daily workforce transportation to the PA will be managed by shuttle services, minimising local housing impact.

The Project is expected to generate an estimated 1,200 full-time positions during the Construction Phase, requiring a variety of skills.

The Project is expected to require capital investment of $1,745 million (CAD). The Project will provide opportunities for workers and businesses to establish long-term careers and relationships within a sector that has the potential to decarbonize challenging global industries and spearhead the creation of a new long-term industry in NL. North Atlantic intends to finance the Project through project financing, with the debt sourced from Commercial Banks, Export Credit Agencies (ECA) and/or Institutional Lenders.

ES2.2 Operation, Maintenance & Decommissioning

The Operation and Maintenance (O&M) activities for the Project are multifaceted, covering renewable energy generation, water electrolysis, hydrogen handling, and chemical processing. Each phase of the value chain (i.e., Wind Farm, HGP, and HP) requires tailored strategies to ensure safe, efficient, and continuous operation. Throughout the O&M Phase, the Project will create approximately 62 full-time positions.

Although the HGP, HP and Wind Farm are expected to operate for 30 years, Project components could be repaired or replaced to extend the design life. Decommissioning and rehabilitation of the Project will require an estimated 12 months and will entail the removal of Project infrastructure and restoration of the land to its prior state. A Project Decommissioning and Rehabilitation Plan (DRP) associated with all aspects of work within the PA will be developed and finalised once all Project infrastructure has been finalised to allow for a properly scoped plan prior to commencement of commercial operations.

ES2.3 Alternative Methods of Carrying out the Project

North Atlantic considered several alternatives in the process of developing the optimal project – a project that is financially viable, employs proven but innovative technology, has minimal negative environmental effects, and addresses sustainability objectives in an environmentally responsible manner.

Several alternatives within the Project remain under evaluation, with final decisions pending as the design and technology is refined. Wind Farm alternatives include the selection of the wind turbine model and siting considerations for the wind turbines and associated linear features. Hydrogen production and transport alternatives include the selection of electrolysis technology, energy storage solutions, hydrogen carrier options, water supply selection, wastewater treatment system, and product storage, transfer, and shipment. During all deliberations regarding Project alternatives, environmental considerations were considered paramount.

ES3.0 Existing Environment

The PA has three main components, the HP and HGP located at the existing Come By Chance Industrial Site, the wind turbine area (the 'Wind Farm'), and the "Linear Corridor" comprising roads and transmission lines that link the two areas. Each component has a relatively different landscape context, both in terms of the level of anthropogenic influence as well as the ecotypes (i.e., habitat cover types) present. Generally, the level of historical human activity decreases from west to east within the PA, from the highly industrialized Port, along the Linear Corridor that parallels existing infrastructure, and finally to the relatively untouched rocky hilltops of the Wind Farm.

The proposed footprint for the new infrastructure at the Come By Chance Industrial Site is within the existing brownfield boundaries. The Linear Corridor includes a transmission line to deliver electricity from the Wind Farm to the HGP at the NARL Logistics Terminal . The Linear Corridor will transit several habitat types ranging from rocky outcrop features of the Wind Farm, coniferous forests and wetlands along the corridor, and brownfield ecotypes in Come By Chance.

Valued Components (VCs) are elements identified as important by the public, Indigenous communities, scientists, and regulatory agencies. They are the focus of impact predictions and mitigation in the environmental assessment. Valued Component (VC) selection for the Project was based on guidance provided by various regulatory agencies, requirements of the Provincial Guidelines, results of engagement, and the role of the VC in the ecosystem. Within each VC, Key Indicators (KI) were assigned to encompass the full suite of potential and anticipated interactions with the Project. To help understand the existing conditions for each VC, numerous baseline studies were conducted over a two-year period (2024-2025).

ES4.0 Environmental Effects

For this Project, predictions were developed for:

- The future condition of the environment in the absence of the Project;
- The predicted environmental effects of the Project, including the effects of Accidents and Malfunctions (Unplanned Events);
- The effects of the environment on the Project; and
- The cumulative effects of the Project when combined with the effects of past, present, and planned projects/activities.

An effects assessment was conducted following standard methods for describing Project interactions with the biophysical and socio-economic environment and for determining the potential environmental effects associated with the Project during all phases. The environmental effects predictions regarding the VCs are based on conservative assumptions, with the objective of avoiding any underestimation of potential adverse effects. Table 1 (below) presents the VCs and associated KIs that were assessed. The assessment examined the potential effects of both routine Project activities and accidental events on each VC, as well as potential cumulative effects resulting from the combination of Project effects and other past, present, or likely future activities in the area.

Table 1 Index of Key Indicators Utilized in Effects Assessment.

Valued Component	Key Indicator
Atmospheric Environment	Greenhouse Gas (GHG) Emissions
	Air Quality
	Light
	Sound Quality (Noise)
	Vibration
Aquatic Environment	Surface Water Resources
	Ground Water Resources
	Freshwater Environment (Fish and Fish Habitat)
	Marine Environment (Fish and Fish Habitat)
	Fisheries and Aquaculture
	Species at Risk (SAR)
	Habitats of Conservation Concern
	Marine Biosecurity
Terrestrial Environment	Flora
	Ecological Land Classification
	Fauna
	Avifauna
	SAR and Species of Conservation Concern (SCC)
Land and Resource Use	Zoning
	Commercial and Industrial Resource Use
	Recreational and Subsistence Resource Use
	Protected, Special and Sensitive Areas
	Indigenous Land Use
Heritage and Cultural Resources	Historic and Archaeological Resources
	Architectural Resources
Socio-Economic Environment	Population Demographics
	Community Health and Wellbeing
	Infrastructure and Services
	Economy
	Employment
	Business
Human Health and Quality of Life	Air Quality[2]
	Light[2]
	Sound Quality (Noise)[2]
	Vibration[2]
	Shadow Flicker (SF)
	Ice Throw
	Recreational and Subsistence Resource Use[3]
	Indigenous Land Use[3]

Notes
[1]Assessed under Land and Resource Use – “Protected, Special and Sensitive Areas”
[2]Assessed under Atmospheric Environment.
[3]Assessed under Land and Resource Use.

ES4.1 Future Condition of the Environment Without the Project

If the Project was not to proceed, it is predicted that the Project footprint would remain undeveloped. In the absence of the Project, effects on the atmospheric, aquatic, terrestrial, land and resource use, and heritage and cultural resources VCs are predicted to remain like the existing environment. The socio-economic environment is predicted to see population decline due to aging population and out migration due to limited economic activity.

ES4.2 Accidents and Malfunctions

Accidents and malfunctions are unplanned events that may occur during all phases of the Project, with the risk of causing adverse environmental effects. An effective environmental management system reduces the probability of an accident or malfunction from occurring and limits the potential magnitude of any failure. North Atlantic has prepared an Emergency Response Plan (ERP) to document the steps to be undertaken in prevention, preparedness and response to accidents and malfunctions.

It is anticipated that the likelihood of a major accident or malfunction occurring is low, given proposed risk mitigation and management activities. Accidents and malfunctions considered to have the highest risk of occurring have been identified, they include:

- Accidental spills and releases of hydrogen, toluene, MCH and other hazardous materials;
- Flaring/venting of hydrogen and other gasses;
- Traffic incidents;
- Fires and explosions (other than from hydrogen);
- Dislodging of a wind tower or turbine blade;
- Ice throw;
- Occupational hazards and human injuries;
- Failure of industrial water supply; and
- Wildlife emergencies/incidents.

ES4.3 Effects of the Environment on the Project

The effects from natural processes and the environment on the Project were considered. The main environmental considerations include the impacts of weather and climate change, the potential for algal blooms in the water source, geological hazards, and forest fires. Harsh weather conditions and climate change can pose risks to the Project's infrastructure and equipment, including events like extreme snowfall, freezing rain, storms, and hurricanes. The water source for the Project may be susceptible to algal blooms, which may affect the water quality and require additional treatment for the operation of the HGP. In addition, algal blooms may clog intake systems or filtration equipment, potentially leading to operational interruptions.

Forest fires may result in delays in schedule, damage to Project infrastructure and loss in production during the O&M Phase and may create health and safety risks to Project personnel from reduced visibility due to smoke and poor air quality.

ES5.0 Residual Effects

Residual effects are those adverse environmental effects which cannot be avoided or mitigated, or that remain after the application of environmental control technologies and best management practices (BMPs). The significance of adverse residual environmental effects was determined using criteria developed for each VC. Effects of the environment (such as due to climate change) on the Project were also assessed. For each VC, mitigation measures were proposed to reduce or eliminate potential adverse effects that may result from the Project. Many of the potential adverse environmental effects can be managed by following accepted procedures and BMPs. In addition to VC-specific mitigation measures presented in the effects assessment sections (Sections 4.2.1-4.2.7), the Registration includes:

- Risk assessment for accidents and malfunctions (Section 4.3);
- Standard environmental mitigation measures and BMPs (Section 4.5);
- An environmental management framework which establishes the Project policies on reducing potential negative environmental effects, tracking environmental performance, and advancing long-term environmental sustainability (Section 4.6); and
- A suite of plans for monitoring, management, and emergency response including:
    - Environmental Protection Plan (annotated table of contents, Section 9.0);
    - Transportation Impact Study and Traffic Management Plan (Appendix E);
    - Emergency Response / Contingency Plan (Appendix M);
    - Waste Management Plan (Appendix N);
    - Hazardous Materials Response and Training Plan (Appendix O);
    - Public Participation Plan (Appendix P);
    - Workforce and Employment Plan (Appendix Q); and
    - Domestic Woodcutting Consultation Plan (Appendix T).

ES6.0 Cumulative Effects

Cumulative effects are the combined effects from multiple projects and activities that are on-going or planned in a geographic area or over a temporal period. The cumulative effects assessment considered past, present, ongoing, and future physical activities in the assessment area.

It is projected that the effects of the Project at all stages will result in minimal overlap with interactions from other undertakings and activities. Consequently, the cumulative environmental effects of the Project on VCs of the environment, in conjunction with effects from other planned or ongoing undertakings, are anticipated to be "not significant”.

ES7.0 Assessment Summary

North Atlantic predicts that the Project will not cause significant adverse environmental effects on any of the VCs. Potential negative effects will be managed by establishing avoidance and mitigation measures throughout all Project phases. North Atlantic commits to continuing consultation with regulators over the life of the Project.

The risk of a significant negative environmental effect resulting from an accidental or unplanned event is low, given the mitigation measures to reduce the probability and consequences of such an incident. In addition, emergency response plans and contingency measures will be in place to limit the extent and nature of potential environmental interactions in the event of an accident or malfunction.

North Atlantic, as stewards of the environment, will pursue this Project in a safe and responsible manner and with respect for communities, cultures, and the environment. The Project will be developed with the intention of being a part of the community for decades to come.

ES8.0 Regulatory, Stakeholder and Indigenous Consultation

North Atlantic’s consultation approach focused on early and active community engagement, ensuring community and stakeholder values are part of the Project planning process. North Atlantic’s consultation approach focused on four main objectives:

- Provide timely information to Project stakeholders; Prior to commencing consultation activities, key stakeholder and Indigenous peoples were identified through North Atlantic’s established relationships, desktop research, and consultation with local groups and organizations.
- Receive and respond to stakeholder feedback, questions, and concerns;

- Collect local knowledge for incorporation into Project planning; and
- Learn how communities may be potentially affected by the Project.

As part of the Registration planning process, North Atlantic has engaged with all identified provincial and federal government stakeholders to share information and request feedback.

Engagement activities started in 2022. A variety of consultation and communication methods have been used to engage with stakeholders and the public during the Registration planning process. The methods used were designed to proactively engage in respectful two-way information sharing with a focus on gathering local knowledge and perspectives on potential effects (both adverse and positive), respond to questions and concerns, and bridge the gap between technical and non-technical audiences. In addition to an extensive series of meetings and stakeholder correspondence, North Atlantic hosted 11 community information sessions and events in the local communities.

Stakeholder and Indigenous questions and concerns raised during consultation have been collected and inventoried throughout the Project planning process and summarized in Chapter 8.

North Atlantic is committed to ongoing engagement throughout all phases of Project planning and development. Beyond the Registration, North Atlantic will actively work with communities to provide timely Project updates, address concerns, and incorporate feedback. North Atlantic is committed to ensuring that the Project not only succeeds but does so in a way that is collaborative, inclusive, and respectful of communities. A Public Participation Plan for the Construction, O&M, and Decommissioning Phases has been developed and presented in Appendix P.

ES9.0 Environmental Protection Plan

The Environmental Protection Pan (EPP) represents a proactive approach to Project development in response to the pressing issues of climate change, biodiversity loss, and resource depletion. Grounded in scientific rigor and guided by a commitment to environmental and social responsibility, the EPP will be customized to fit the distinct periods of Project progression from the Construction Phase, throughout the O&M Phase, and eventually during the Decommissioning and Rehabilitation Phase.

1.0 Introduction

North Atlantic Refining Corp. (North Atlantic) is proposing the development of the North Atlantic Wind to Hydrogen Project (the Project) on the Isthmus of Avalon region adjacent to the Avalon Peninsula, Newfoundland and Labrador (NL). The Project will generate electricity from wind turbines and use the produced renewable energy for large-scale hydrogen production, supporting global decarbonization efforts. The major Project components include a Wind Farm, a Hydrogen Generation Plant (HGP), a Hydrogenation Plant (HP), and associated infrastructure, located on the Isthmus of Avalon region proximate to the North Atlantic Refining Limited Logistics Terminal (NARL Logistics Terminal) and in the vicinity of the communities of Sunnyside and Come By Chance (Figure 1.0-1).

The Project is required to be registered with the Province of NL in accordance with the **Environmental Protection Act** (NL EPA), SNL 2002 cE-14.2 (Part X) and Environmental Assessment Regulations, 2003. This submission has been formatted for consistency with the "*Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects*" (Department of Environment and Climate Change [NL DECC], 2023) as well as the "*Environmental Assessment Act: A Guide to the Process*" (NL DECC, 2025). The Project does not include any activities requiring federal assessment as listed in the Physical Activities Regulations (SOR/2019-285 [Statutory Orders and Regulations]) under the **Impact Assessment Act** (S.C. 2019, c. 28, s. 1).

This Registration introduces the proponent, North Atlantic, as well as an overview description of the proposed Project, including all Phases – Construction, Operation and Maintenance (O&M) and ultimately Decommissioning and Rehabilitation. Throughout the submission, designed-in mitigation measures are described reflecting the corporate commitment to environmental protection and stewardship. In keeping with guidance from NL Department of Environment and Climate Change (NL DECC), the document provides a comprehensive description of the existing environment, including both biophysical as well as socio-economic features. A prediction of potential negative environmental effects is made for all Valued Components (VC), including a consideration of cumulative effects from the Project in combination with other ongoing and anticipated undertakings, as well as a forecast of environmental conditions in the absence of the Project. Based on the predictions of potential negative effects, as well as to ensure compliance with regulatory requirements and industry standards, an extensive program of environmental protection (mitigation and monitoring) measures has been developed and presented.

	FIGURE TITLE:	NOTES:	PREPARED BY:	DATE:
North Atlantic	Project Location Overview		C. Burke	10/06/2025
			REVIEWED BY:	C. Bursey 10/06/2025
			APPROVED BY:	C. Collins 10/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		sem	

SEM MAP ID: 016-015-GIS-501-Rev0

Figure 1.0-1 Project overview.

1.1 Proponent

The Proponent for this undertaking is North Atlantic. North Atlantic is a NL-based company with more than 30 years of experience in the fuel supply industry. Headquartered in St. John's, NL, with established relationships as a global fuel importer, North Atlantic is an experienced and capable company with a strong commitment to advancing a low-carbon economy for the province, and indeed globally. North Atlantic is fully owned by Silverpeak, an alternative investment management firm with approximately $25 billion United States dollar (USD) of gross asset value (Silverpeak, 2023). Silverpeak is committed to achieving the long-term goals of its companies, with investments across all major asset classes and core values that reflect collaboration and integrity. Contact information for North Atlantic is provided in Table 1.1-1. Contact information for the environmental study team is provided in Table 1.1-2.

Table 1.1-1 North Atlantic contact information.

North Atlantic Contact Information	
Corporate Body	North Atlantic Refining Corp.
Proponent Address	29 Pippy Place, St. John's, NL, A1B 3X2
Chief Executive Officer	Ted Lomond
Principal Contact Person for the Environmental Assessment	Jeff Murphy jeffmurphy@northatlantic.ca

Table 1.1-2 Environmental consultant contact information.

Environmental Consultant Contact Information	
Consultant Name	Sikumiut Environmental Management Ltd.
Consultant Address	79 Mews Place, St. John's, NL, A1B 4N2
President/Chief Executive Officer	Grant Vivian
Principal Contact Person for the Environmental Assessment	Steve Gullage steve.gullage@semltd.ca

In April 2022, the Government of NL lifted a 15-year moratorium on wind developments, opening the door for companies to pursue wind and wind-to-hydrogen projects throughout the province. The combination of North Atlantic's vast experience in the NL energy sector and Silverpeak's background in renewable energy results in an exceptional and well-suited team for this Project. North Atlantic takes pride in being stewards of the environment and continues to support renewable energy development in the province. Hence, in late 2024 North Atlantic announced the development of a "Green Energy Hub" within the Placentia Bay and Trinity Bay Regions to inspire research and training opportunities relating to green hydrogen, and provide a centralized location for the manufacturing, construction, operation, and maintenance services necessary to support wind energy development in the region. The existing NARL Logistics Terminal is ideal for the development and export of green hydrogen, including a deep water, ice-free port and a substantial tank farm with excess capacity, which can be utilized for the storage of hydrogen in the form of Liquid Organic Hydrogen Carriers (LOHCs).

Silverpeak has extensive experience in the renewable energy sector and supports many sustainability initiatives with their investments in wind, solar, and other clean energy projects. Silverpeak, is a minority shareholder in Braya Renewable Fuels (Braya), which is majority owned by Cresta Fund Management and Energy Capital Partners. Braya is a renewable diesel producer based out of the former Come By Chance refinery, which has been repurposed to produce renewable diesel from feedstocks such as soybean, canola, or used cooking oil.

1.1.1 Funding

North Atlantic has a long history of supporting thriving industries in the province. As a leader in commercial fuel provision, it has gained an abundance of experience in hydrocarbon handling, terminal services, project management and project execution. North Atlantic is a portfolio company of Silverpeak, an alternative investment firm with expertise in energy and real estate. Silverpeak has extensive experience raising capital for infrastructure projects, including the financing of renewable and conventional energy assets.

To date, North Atlantic has spent more than $11.46M (CAD) in third party costs and $6M CAD in direct selling, general, and administrative (SG&A) expenses for key development activities for the Project, which include land reservation fees, technical analysis, Pre-FEED (Front End Engineering Design) studies, resource assessment and permitting requirements. North Atlantic intends to finance the Project through project financing, with the debt sourced from Commercial Banks, Export Credit Agencies (ECA) and/or Institutional Lenders. These loans are projected to cover a substantial portion of the Project's capital costs, which will be sized based on the projected operating cashflows, with suitable coverage ratios enabling periodic payment of the loan service and distribution of excess cash flows to equity. Remaining capital costs will be covered through Sponsor's equity.

1.2 Project Overview

The following is a summary description of the undertaking, including Project components, activities, and the proposed schedule. Detailed information is provided in Section 2: Proposed Undertaking. The Project involves the production of green hydrogen using wind-generated electricity, i.e., renewable energy, for export to global markets.

The Project comprises: a Wind Farm to be located on leased Crown land east of the community of Sunnyside (Figure 1.0-1); an HGP and an HP at the existing Come by Chance Industrial Site; and an associated road and electrical transmission interconnections. The Come by Chance Industrial Site includes the North Atlantic Refining Limited Logistics Terminal (NARL Logistics Terminal) and Braya Renewable Fuels' refinery (Braya Refinery). During construction, the Bull Arm Fabrication Site will serve as the equipment delivery, laydown and assembly location. Approximately 4,600 hectares (ha) of Crown lands will be used in the development of the Project. The storage and export of green hydrogen will utilize existing North Atlantic infrastructure at the NARL Logistics Terminal.

The HGP will be capable of producing 30,000 tonnes per annum (tpa) of hydrogen, and the HP will be capable of processing 60,000 tpa of hydrogen. While the HP will be capable of processing 60,000 tpa of hydrogen, North Atlantic acknowledges that any expansion of wind power and hydrogen production capacity beyond 30,000 tpa will require a separate submission under the Province's NL EPA.

The Wind Farm will consist of 45 wind turbines, each with an approximate rated power generation capacity of 7.2 megawatt (MW) for a total of 324 MW. The electrical collection system will be comprised of 34.5 kilovolt (kV) collector lines connected to a central switchyard. From there, two 25 kilometre (km) long 138 kV transmission lines will deliver electricity to a new substation adjacent to the NARL Logistics Terminal. A separate,7 km long 138 kV transmission line will connect the new substation to the NL Hydro (NLH) grid at the existing Sunnyside substation. This will provide a power supply for site auxiliaries and supplemental power to the HGP during periods when wind power is unavailable. In total, approximately 90 km of collector lines and 57 km of transmission lines will be constructed to support the Project. The Wind Farm will also require the development of a road network, entailing the creation of 66 km of new roads.

The HGP will employ Proton Exchange Membrane (PEM) electrolyzers to produce hydrogen and oxygen from a supply of fresh water from Inkster's Pond. Oxygen will be vented to the atmosphere as a byproduct while hydrogen will be piped to the HP which will combine hydrogen with toluene to produce methylcyclohexane (MCH) – a type of LOHC. The conversion to LOHC enables safe and efficient storage, transport, and release of hydrogen, with the toluene available for re-use (Li et al., 2021). The LOHC will be stored in tanks to await shipment, North Atlantic plans to use its existing liquid fuel infrastructure at the NARL Logistics Terminal for this purpose. The LOHC will be exported directly from the Terminal. Once the LOHC reaches buyers in international markets it will be dehydrogenated (i.e., MCH will be transformed back into toluene) to release the hydrogen. The Project will produce an average of 85.6 tonnes of green hydrogen per day (30,000 tonnes per year), requiring up to 947,000 m^3 of water per year.

The NARL Logistics Terminal property in Placentia Bay consists of approximately 380 ha of private lands within the Come By Chance Industrial Site. The NARL Logistics Terminal infrastructure, once used to support a crude oil refinery, and now used for the importation and storage of liquid fuel, will now be incorporated into the North Atlantic Green Energy Hub. This full-service hub will support the manufacturing, construction, operation, and maintenance services necessary to support the region's evolving wind and green hydrogen industries. The Project will use the three existing North Atlantic all-season, ice-free, deepwater berths for shipping activities. These berths have depths of up to 30 metres (m) and can accommodate tankers with capacity of up to 326,000 Deadweight Tons (DWT). The tank farm, with a total capacity of 4.3 million barrels of liquid storage, and associated pipeline infrastructure will ensure efficient handling of green hydrogen in LOHC form.

A critical element of Project planning has been the preparation of a comprehensive Registration (this document). The bulk of environmental baseline studies were completed throughout 2024, with a select few continuing in 2025. Assuming commencement in 2026, upon receipt of Authorization to Proceed (including release from the EA process) and the Final Investment Decision, Construction and Commissioning will be completed in 2029. The Construction Phase will consist of vegetation clearing and grubbing, access road construction, electrical infrastructure construction, plant construction and infrastructure retrofitting, foundation works, and wind turbine installation. Commissioning will involve inspecting, testing, and verifying all mechanical, electrical, and control systems to ensure safe and reliable operation before final grid connection. Commissioning will be completed in a phased approach throughout 2028 and 2029 as Project components are constructed. The Project is anticipated to remain operational for a minimum of 30 years. However, regular maintenance and repairs may extend the Project lifetime. Once the Project is deemed inoperable, the Decommissioning and Rehabilitation Phase will commence. This will entail the demolition and removal of Project infrastructure and subsequent restoration of the land. This Phase is expected to take 12 to 18 months.

1.3 Project Benefits

North Atlantic is a well-known and trusted company in the surrounding communities with more than 30 years of market leadership, most of which is in NL. As a major industry player in the energy sector, North Atlantic brings decades of experience, an array of existing infrastructure for the Project, and significant financial and human resources to support this undertaking.

As North Atlantic advances its business for the future, the company is focused on strategic growth to deliver innovative and green energy solutions aligned with global demand for renewable energy, while continuing to provide energy to the province. North Atlantic is committed to giving back to the communities where it conducts business. The North Atlantic pillars are leadership, commitment, and responsibility.

The proposed Project aims to capitalize on a globally recognized opportunity to harness the significant potential for wind energy development in the province and thereby contribute to the distribution of green energy products globally. Benefits and opportunities arising from Project development and operation will be distributed locally and throughout the province. These positive features of the Project span environmental, economic, and community receptors, as listed below.

Positive Environmental Contributions

- The Project will help pioneer wind energy development in NL, and at this time, is on track to be one of the first wind installations since the moratorium was lifted (no wind projects have been built in NL since 2009). The Project would be the first significant contributor to the Province's *The Way Forward on Climate Change* initiative and would align the province with Canada's climate change and sustainability goals.
- Hydrogen energy is emerging as one of the most promising potential solutions for the decarbonization of industrial processes. This right-sized Project presents a meaningful opportunity for NL to become a pioneer in this innovative technology and contribute meaningfully to the fight against climate change. The Project pursues the advent of the technology without compromising the province's other resources.
- By applying proven environmental management principles, such as "designed-in" mitigation measures, North Atlantic will avoid or minimize potential negative environmental effects throughout all Project Phases.
- The Project will utilize existing infrastructure within the NARL Logistics Terminal (i.e., tanks and Jetty), eliminating emissions associated with new builds and/or demolition.

Clean Economic Growth

- The Project will significantly contribute to the provincial economy, and locally to the neighboring communities. It will support new skills and job creation for the evolving green energy industry in NL. North Atlantic commits to prioritizing the provision of opportunities for local hires and suppliers. The Construction Phase is expected to generate an estimated 1,200 full-time positions. Throughout the O&M Phase, the Project will create approximately 62 full-time positions and generate billions of dollars in economic activity.

Community Benefits

- North Atlantic is committed to continuing frequent engagement with communities adjacent to the Project. Engagement efforts to date have included a series of public information sessions, newsletters, and drop-in office hours. North Atlantic has been a trusted entity and employer in the region, and intends, through ongoing and continuing community engagement, to ensure that trust continues during all phases of the Project.
- North Atlantic regularly supports social causes and community events in the region, through volunteering, employee engagement, awareness campaigns, social media marketing, and financial contributions.

2.0 Proposed Undertaking

This section provides an overview of the proposed undertaking and the context in which it will be carried out. A description of the study areas is provided, defining the geographic area within which the Project will be located and where potential environmental interactions may occur. The rationale for the undertaking is then discussed in terms of its need and purpose, addressing the specific opportunities the Project is intended to fulfill, highlighting its alignment with broader public sector policies, plans, and programs. The document includes a comprehensive description of Project Phases - Planning, Construction, O&M, and Decommissioning and Rehabilitation. The Project description focuses on the physical features of the undertaking and its anticipated interaction with VCs. This section also addresses alternative methods still under consideration, including the environmental effects of each. Lastly, this section includes an overview of the regulatory framework applicable to the geographic area and the full range of activities over the lifetime of the Project.

The Project will produce green hydrogen at the HGP, which will then be converted into an LOHC at the HP for export to offtakers in Europe. The Project will utilise behind-the-meter wind generated power to produce green hydrogen through electrolysis with freshwater as feedstock. The proposed onshore Wind Farm will consist of 45 wind turbines, each capable of generating approximately 7.2 MW of power, resulting in a total installed capacity of 324 MW. The wind turbine model will feature an approximate hub height of 119 m and a rotor diameter of 162 m. The HGP will be developed with an installed electrolyzer capacity of 240 MW, enabling the production of approximately 30,000 tonnes of hydrogen per annum. The HGP will utilise PEM electrolyzers, which are highly efficient and well-suited for integration with variable renewable energy sources due to their operational flexibility. To enhance stability and facilitate transport to European markets, the produced hydrogen will undergo catalytic hydrogenation, a process in which it is chemically bonded to toluene in the form of MCH. This conversion process will be carried out at the HP, which is expected to produce approximately 650,000 tonnes of MCH per year in order to transport 30,000 tonnes of green hydrogen per year. Where feasible, the Project will leverage existing infrastructure, including North Atlantic port facilities and tank farm, for the storage and transportation of toluene and MCH. By integrating wind power with hydrogen production and LOHC conversion technologies, the Project aims to support the global transition to sustainable energy by exporting green hydrogen to international markets.

North Atlantic is well-positioned and fully equipped to execute the Project, prioritising minimal environmental effects while optimizing socio-economic benefits. North Atlantic is a leading fuel provider and global energy importer headquartered in St. John’s, NL. North Atlantic is fully owned by Silverpeak, an alternative investment management firm specializing in real estate and energy. Silverpeak is committed to sustainability, with a strategic focus on identifying and investing in high-value sustainable energy projects.

2.1 Study Areas

The Project footprint comprises three components: a Wind Farm, HGP, and HP. The HGP and HP will be located within the existing Come By Chance Industrial Site. The proposed Wind Farm will be situated on 4,600 ha of Crown land reserve in the Sunnyside area, east of the town atop an upland rocky barren. Linear infrastructure, consisting of roads and transmission lines, will link the Wind Farm to the HGP and HP.

2.1.1 Site Description

Project components will interact with the natural and human environment over a range of spatial scales. To address this, three study areas were delineated: a Project Area (PA), a Local Assessment Area (LAA), and a Regional Assessment Area (RAA). Each study area is defined below and its boundary rationale provided, reflecting the scope of the biophysical study. Adaptations made to the study areas for socio-economic and heritage and cultural resource studies are detailed in Section 3.2 (Baseline Studies).

2.1.1.1 Project Area

The PA was defined as the area where Project infrastructure components will be located, where activities will be implemented, and where direct environmental interactions with the Project may occur.

The PA includes all proposed infrastructure and construction related to the Project, encompassing both the development and operation of hydrogen generation and wind energy components. The Wind Farm infrastructure, situated on provincial Crown lands designated as a Green Energy Reserve, includes wind turbines, access roads, collector and transmission lines, electrical substations, O&M building, and laydown area. Together, these components form an integrated system to generate and transmit electricity to the HGP and HP.

The NARL Logistics Terminal infrastructure consists of the port and terminal, tank farm and truck rack, and energy support services. The new infrastructure at the Termianl will include the HGP, the HP, an electrical substation, an office, and a warehouse.

Linear features in the PA consist of the proposed transmission line and associated access roads, and a buffer of 100 m on either side of the feature's centerline to encompass any interactions of the environment with the Project, including edge effects. In addition, the 200 m wide corridor will facilitate minor adjustments to the planned route and structure layout to optimize the line's performance and minimize negative environmental interactions. The Sunnyside substation will be the point of interconnection with the NLH electrical grid, with transmission lines linking the Wind Farm Substation to the HGP Substation and connecting the Sunnyside substation to the HGP Substation. Figure 2.1-1 depicts the PA.

2.1.1.2 Local Assessment Area

The LAA for the Project is defined as the area in which environmental interactions are detectable (and measurable) beyond the boundaries of the PA.

To account for the range of potential environmental interactions, a minimum buffer of 1 km was added to the PA around the Wind Farm, HGP, and HP. A minimum buffer of 250 m was applied to the access road and transmission lines. The LAA boundary (Figure 2.1-1) was extended in select places to allow for specific potential indirect effects. Extensions were applied to:

- The area around Bull Island, and the islands and coast south of the Wind Farm;
- The Bull Arm Fabrication Site/port and the roadway connecting the port to the NARL Logistics Terminal;
- The area between the Wind Farm and the NARL Logistics Terminal, encompassing the majority of the Bull Arm Fabrication Site and the community of Sunnyside; and
- The Trans-Canada Highway (TCH) from the NARL Logistics Terminal to the beginning of the proposed access road, with a 350 m buffer from the highway centerline and including the land between the proposed access road and the proposed transmission line.

The area encompassed by the LAA size was sufficient to include: (1) the coastal environment; (2) industrial activities associated with the existing Come By Chance Industrial Site; (3) municipal infrastructure and services; and (4) the proposed linear infrastructure (i.e., roads and transmission lines) between industrial sites and communities.

2.1.1.3 Regional Assessment Area

The RAA is defined as the spatial extent of potential indirect and cumulative environmental effects which may reach beyond the limits of the LAA. The RAA is represented by a 30 km radius around the center of the PA (Figure 2.1.1-1).

The RAA comprises the zone where most potential cumulative effects are anticipated, including additive interactions from other local industrial activities, infrastructure, and projects. The RAA has been established to incorporate the indirect interactions with the surrounding landscape at a larger scale than the LAA, interactions with communities in the region outside the LAA, and migratory wildlife species that use the landscape at a greater scale than the PA or LAA.

The RAA radius will be variable according to each VC, to address individual socio-economic and environmental interactions.

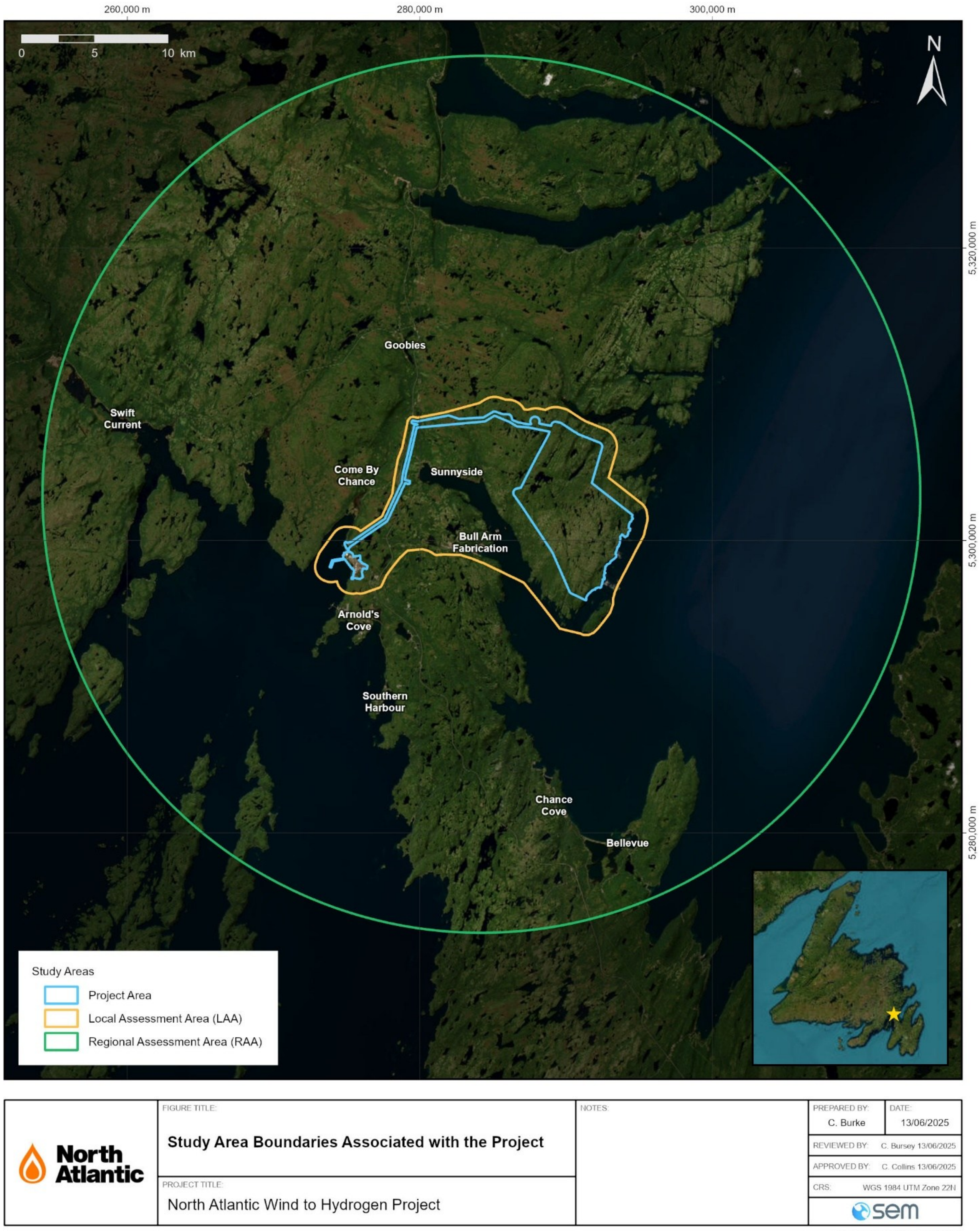


Figure 2.1.1-1 Study area boundaries associated with the Project.

2.1.2 Project Land and Property Ownership

The HGP and HP will be located at the existing Come By Chance Industrial Site, on land owned by North Atlantic or Braya. The Project will utilise existing North Atlantic infrastructure (port and terminal, jetty, industrial water supply and tank farm) for hydrogen storage and product transfer. The NARL Logistics and Braya property boundaries are illustrated in Figure 2.1.2-1. The refinery has changed ownership several times over the years, and since 2021 has been under the U.S. private equity group Cresta Fund Management. The refinery has been converted into a renewable diesel fuel plant and renamed the Braya Refinery. North Atlantic retains a storage and shipping terminal at Come By Chance with a year-round ice-free port. The facility consists of three berths with depths up to 30 m and can accommodate tankers with a capacity of up to 326,000 DWT. The tank farm has a capacity of 3.0 million barrels of storage for the LOHC (i.e., toluene, MCH).

North Atlantic will source water for Project construction from Lady Cove Pond (located on the western side of the Wind Farm area of the PA). Water for the Project operation is planned to be sourced from the Inkster's Pond Industrial Water Supply Area, which currently supplies industrial water solely to Braya under WUL-14-057. North Atlantic will obtain its own independent Water Use Licences for the Project.

Phase one of the Project will be developed on a portion of the 10,316 ha Crown land reserve exclusively allocated to North Atlantic by the Province under the authority of the **Lands Act.**

The Plant Substation, located on North Atlantic property, will function as the termination point for the transmission lines. The transmission lines associated with the Project will be mainly located on provincial Crown lands, this includes the transmission line connecting the Wind Farm to the HGP and the transmission line connecting the Sunnyside substation to the HGP; however, a portion of the Wind Farm to the HGP transmission line may traverse privately owned land in the Sunnyside area and will require consultation with landowners to secure the required permissions and agreements. The Sunnyside substation is an existing facility operated by NLH. As part of the Project, the construction and financing of the transmission lines will be undertaken by North Atlantic.

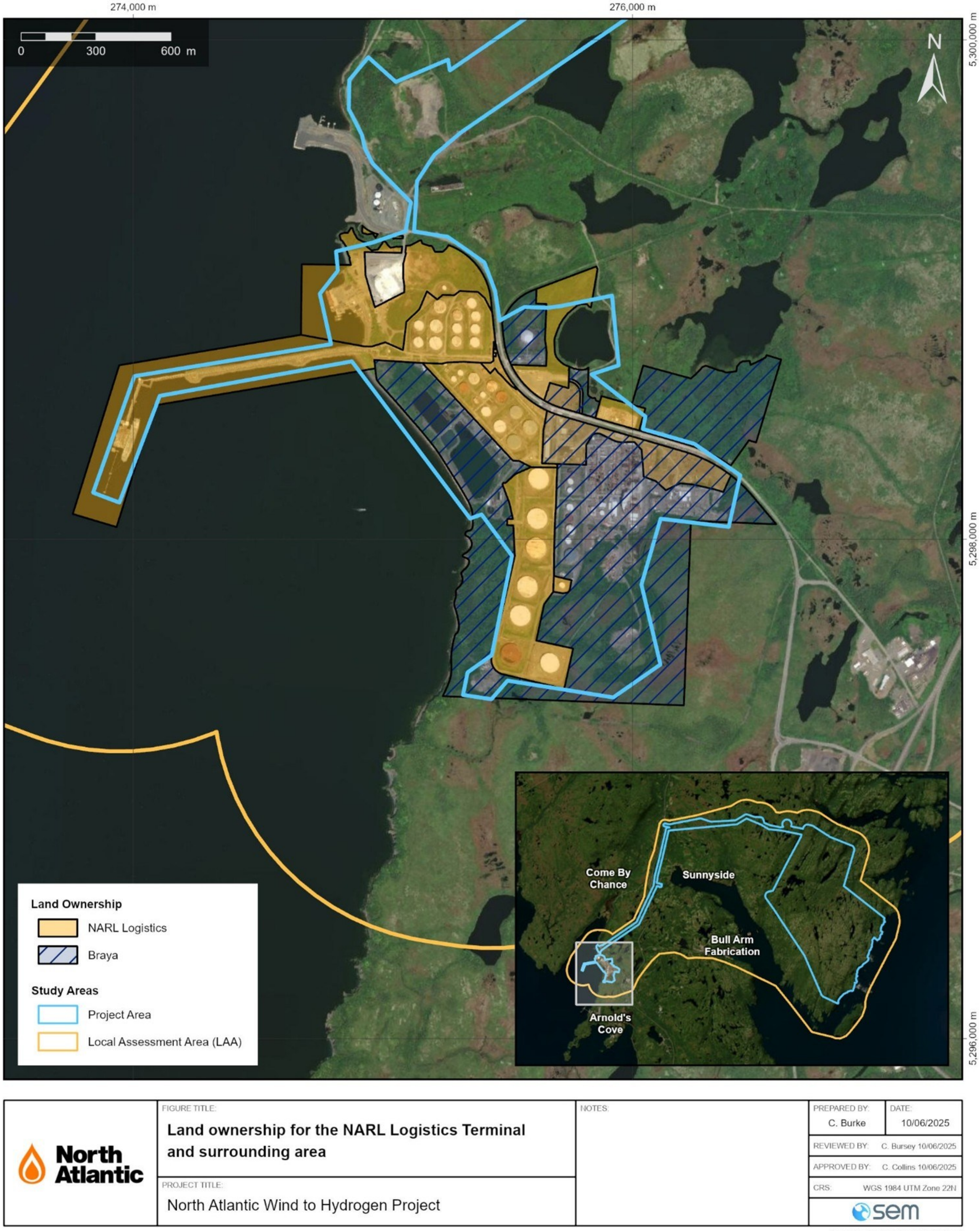


Figure 2.1.2-1 Land ownership for the NARL Logistics Terminal and surrounding area

2.2 Rationale for the Undertaking

The global transition to green energy marks a transformative paradigm shift toward a cleaner, more sustainable future. This transition will unlock new opportunities for the province in innovation, economic growth, and climate resilience. With solutions scaled to match this challenge, North Atlantic is advancing future business by driving strategic growth in the renewable energy sector.

The primary goal of the Project is to produce economically viable green hydrogen for export. This goal targets increasing market demands while contributing to the reduction of greenhouse gas (GHG) emissions and the global shift to decarbonisation.

Through the Project, North Atlantic will:

*Produce green hydrogen that will enable substantial reductions in carbon dioxide (CO2) emissions***.** Unlike conventional hydrogen production methods that require fossil fuels. This clean fuel can be used in various sectors, including transportation, industry, and power generation, to replace carbon-intensive fuels like natural gas, diesel or coal. As a result, the Project is expected to contribute to Canada's and the world's climate goals, helping reduce GHG emissions and combat climate change.

Support workforce development by fostering new skills and creating jobs in NL's evolving green energy sector. The Project will serve as a catalyst for developing a skilled green energy workforce in NL. By investing in training programs, North Atlantic aims to equip workers with the knowledge and skills required for careers in hydrogen production, renewable energy infrastructure, and wind turbine maintenance. The Project is expected to create both short-term construction jobs and long-term operational employment, resulting in a firmly anchored green energy workforce for years to come.

Drive economic growth by delivering significant benefits to local communities and the province. Beyond its environmental and employment effects, the Project is poised to bring broad economic benefits to the region, including: (1) direct investment in infrastructure, facilities, and equipment, (2) contracting and spinoff opportunities for local businesses during the construction and operational phases, (3) increased tax revenue for municipal, provincial and federal governments, (4) community engagement and partnerships, ensuring that residents and other stakeholders share in the Project's success, and (5) positioning NL as a hub for clean energy exports, unlocking new trade opportunities and attracting additional green technology investments.

While planned as a stand-alone and viable undertaking on its own, the Project will represent a critical early contribution in the establishment of a new industry for the province. North Atlantic brings decades of experience in refinery and terminal operations to this Project. As an established company in the province, it has strong stakeholder relationships and a clear understanding of the energy landscape. By leveraging its expertise and existing infrastructure and utilizing some of the best onshore wind resources in the country, North Atlantic is developing technically and economically viable green energy solutions that align with the growing international demand for renewable energy.

2.2.1 Global Market for Hydrogen

The global hydrogen market is expanding rapidly, and demand is expected to increase substantially over the next several decades. Driven by climate commitments, advancements in electrolyzer and hydrogen transportation technologies, and the falling cost of renewable electricity, hydrogen is gaining traction as a key pillar in the transition to net-zero economies. Major economies such as the EU, the U.S., China, and Japan have launched national hydrogen strategies, fostering investment and infrastructure development. Demand is rising across sectors including transportation, heavy industry, power generation, and chemical production. Hydrogen is a critical feedstock for petrochemicals and fertilizers, and a clean energy carrier for fuel cells in transportation and backup power. In heavy industries like steelmaking, it is being explored as a replacement for coal in production processes. Hydrogen also supports renewable energy systems by providing long-term energy storage and stabilizing the grid during output fluctuations.

Newfoundland’s geographic location offers a strategic advantage in this emerging market, as Newfoundland has the closest North American ports to Europe, a primary market for green hydrogen. Newfoundland’s electricity grid provides another unique advantage (Newfoundland Labrador Port of Rotterdam Memorandum of Understanding (“MOU”), n.d.). The European Commission has strict criteria for defining and certifying green hydrogen, and electricity for the electrolyzers must either come from newly developed renewable energy projects or be sourced through verifiable green electricity from the grid (European Commission, 2023). The primary source of energy for this Project will be wind energy with secondary power supplied from NL’s grid as needed. NL’s low-carbon grid provides an interconnection opportunity that is greener than almost all other jurisdictions, positioning the province to satisfy European standards and gain a strategic edge in accessing global hydrogen markets. The distinctive combination of proximity to international markets, deep ice-free ports, abundant water resources, and an already-green grid provides a unique window of opportunity to contribute to global decarbonization efforts while fostering significant local economic development.

2.2.2 Provincial and Federal Commitments to Address Climate Change

In 2022, NL repealed the onshore wind moratorium policy in effect since 2007; a significant barrier to industrial scale wind energy development. The Government of NL has also developed a Renewable Energy Plan (2021) and a Hydrogen Development Action Plan (2024) to further demonstrate the new focus on wind energy and green hydrogen development in the province. In addition, the province is developing a new Climate Change Mitigation Action Plan (2025 to 2030) to reduce GHG emissions, and a new Climate Change Adaptation Action Plan (2025 to 2030) to help prepare for and reduce the impacts of climate change.

NL's Renewable Energy Plan outlines commitments to address climate change and transition to a low-carbon economy (Department of Industry Energy and Technology, 2021).The province has committed to achieving net-zero GHG emissions by 2050, focusing on the development of renewable energy sources such as wind power, hydroelectricity, and green hydrogen to reduce reliance on fossil fuels. Green hydrogen production is a priority, with plans to position the province as a global leader in this emerging sector. The Plan emphasizes decarbonization across industries, transportation, and residential energy use through investments in electrification and energy efficiency. The province plans to strengthen its regulatory framework to ensure that renewable energy developments align with sustainability goals.

The recent Hydrogen Development Action Plan aims to position the province as a global leader in green hydrogen production and export (Department of Industry Energy and Technology, 2024); it outlines 31 specific initiatives to be undertaken over a three-year period, focusing on developing export and domestic markets, fostering partnerships and innovation, creating jobs and opportunities, and establishing a clear regulatory framework. As part of this strategy, the Government of NL granted rights to several parties to pursue hydrogen projects through the provincial Crown lands application and approval process (Department of Environment and Climate Change & DIET, 2023).

To further solidify its commitment to addressing climate change, the Government of NL signed a Memorandum of Understanding (MOU) in 2023 with the Port of Rotterdam, Europe's largest seaport and a key energy hub. The MOU focuses on the establishment of hydrogen supply chains from NL to the Netherlands and other parts of Europe. The Port Authority in Rotterdam is working towards a large-scale hydrogen network across the port complex, with the goal of making Rotterdam an international hub for hydrogen production, import, application and transport to other countries in northwest Europe.

Similarly, NL signed a Declaration of Intent in 2022 with the City of Hamburg, Germany, to cooperate on green hydrogen and hydrogen technologies. This agreement focuses on establishing hydrogen supply chains that will result in exports of green hydrogen from the Province to Germany. Hamburg aims to become a hydrogen hub for Germany and northern Europe, and this partnership supports joint efforts in technology development, regulatory frameworks, and commercial investment. The Hamburg and Rotterdam agreements reflect NL's commitment to developing its renewable energy resources to meet global clean energy demands.

In May 2025, NL and the Port of Amsterdam signed a strategic MOU to develop a transatlantic green hydrogen corridor. The agreement aims to connect NL's renewable energy resources with the Netherlands and northwestern Europe. The MOU outlines collaboration in exploring large-scale hydrogen trade routes and supply chains to facilitate the export of green hydrogen from NL to Europe. It also seeks to address regulatory and market barriers that could impede the development of hydrogen supply chains, and foster partnerships across public, private, and academic sectors to support the hydrogen economy.

Federally, Canada has made significant commitments to address climate change and advance its green hydrogen industry in recent years. It has established international partnerships and committed to achieving net-zero GHG emissions by 2050.

In December 2020, Canada released its Hydrogen Strategy, a comprehensive plan to position the country as a global leader in clean hydrogen production, use, and export. The goal of the strategy is to begin to decarbonize certain sectors, including transportation and heavy industry, while stimulating economic growth in a new industry. A Hydrogen Strategy Implementation Strategic Steering Committee was established, consisting of industry leaders, provincial and territorial partners, non-governmental organizations, and Indigenous representatives.

In August 2022, Canada and Germany signed a Joint Declaration of Intent to establish the Canada–Germany Hydrogen Alliance. This agreement focuses on facilitating investment in hydrogen projects through policy harmonization, developing secure hydrogen supply chains, and establishing a transatlantic supply corridor. Following up on that agreement, Canada and Germany signed an MOU to accelerate commercial-scale hydrogen trade in 2024. This MOU includes the creation of a bilateral program through Germany's H2Global Foundation to support transactions between Canadian hydrogen producers and German industrial sectors.

In addition to the partnerships and agreements above, the Government of Canada has also introduced several financial supports to bolster the hydrogen sector, including the Clean Hydrogen Investment Tax Credit, the Clean Technology Investment Tax Credit, and the Canada Growth Fund.

2.2.3 Wind Resource Opportunity

During preliminary engineering design, a first order wind assessment was carried out to gain an understanding of the energy resource available from the proposed Wind Farm area. The wind speed distribution graph that was produced (Figure 2.2.3-1) depicts a peak frequency of 9-10 m/s. Such consistent and relatively high wind speeds would provide a steady supply of energy for the production of hydrogen. The conclusion of the wind assessment was that the strength and frequency of high winds at the Wind Farm site are optimal for electricity production.

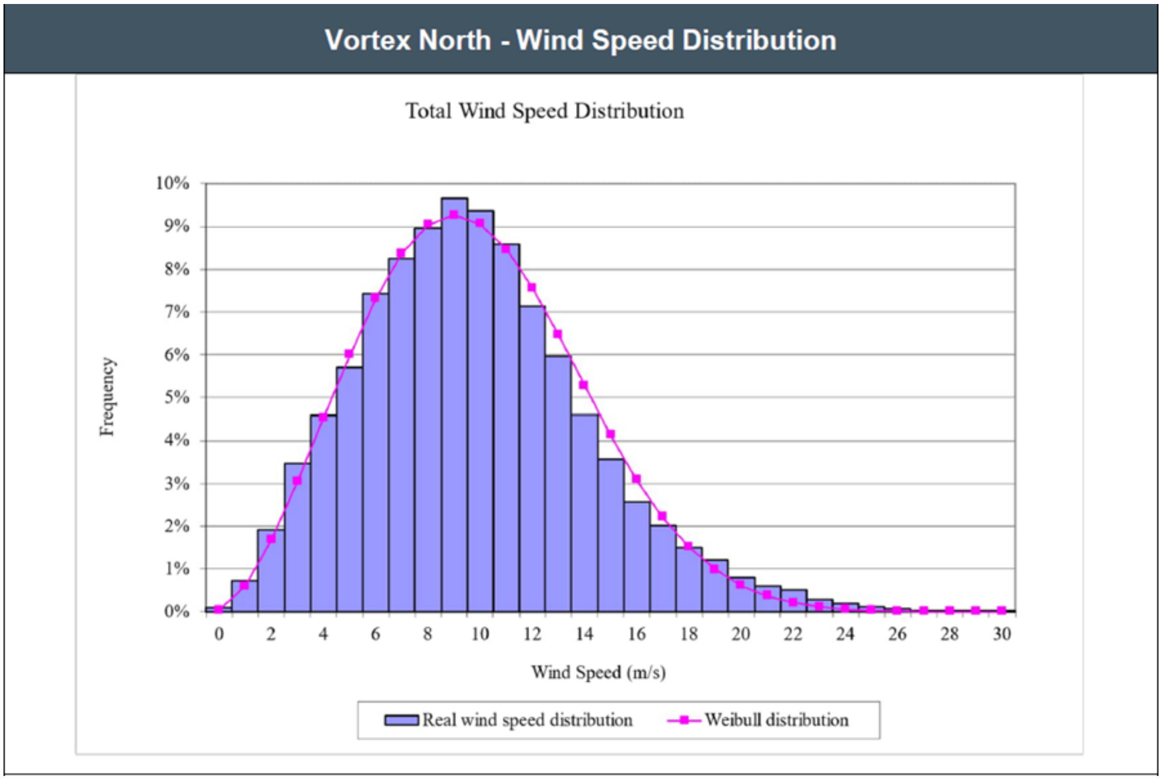


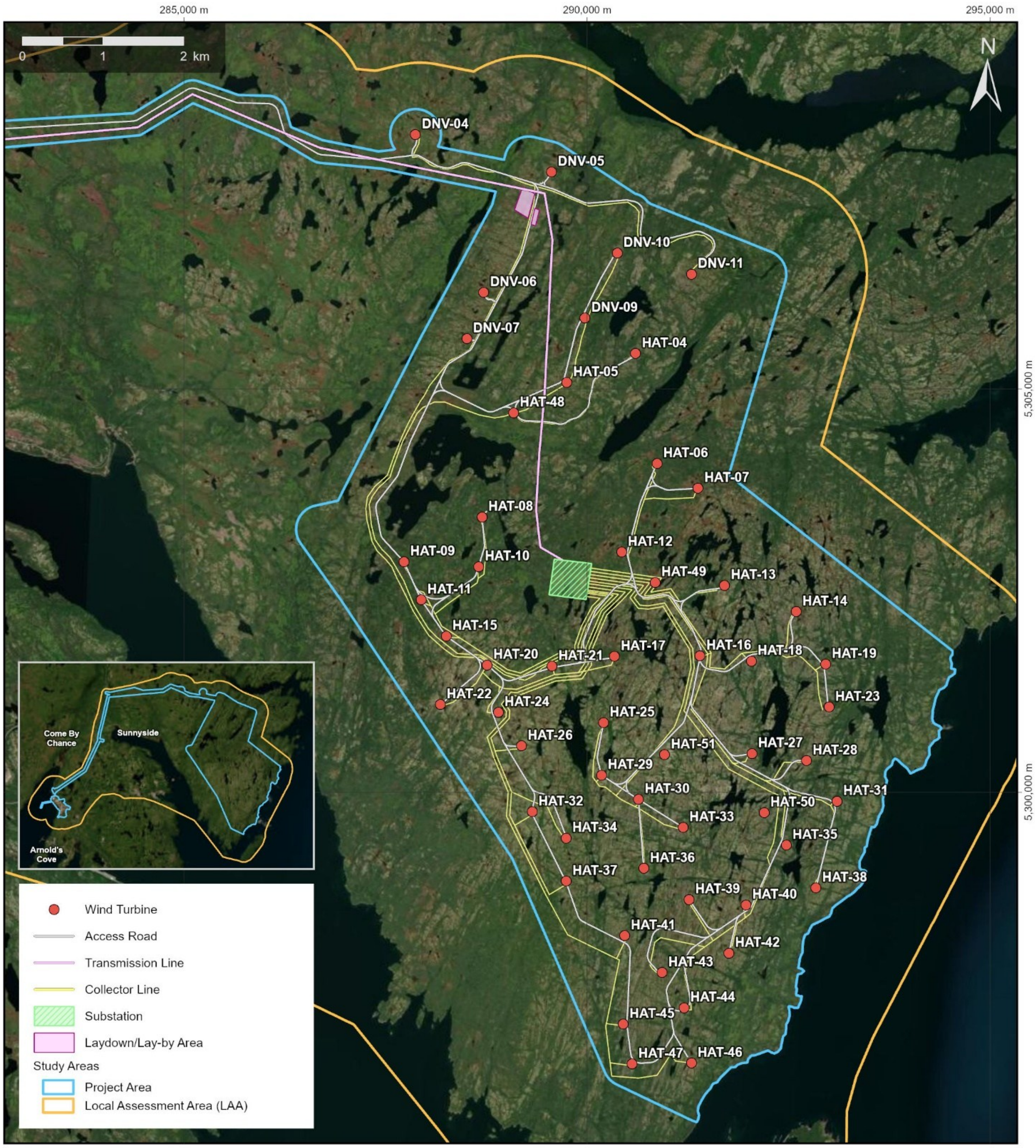
Figure 2.2.3-1 Wind speed frequency distribution graph.

2.3 Project Description

The Project will involve the development, construction, operation, and eventual decommissioning of a hydrogen production facility comprised of a Wind Farm, HGP, HP, and the linear infrastructure to connect those components (i.e., roads, transmission lines, and substations).

The 324 MW Wind Farm will consist of 45 wind turbines, each with a rated capacity of 7.2 MW. Upon approval of the Crown land process, the Wind Farm will be situated on provincial Crown lands currently designated as a "Wind Hydrogen Hub Land Reserve" on an undeveloped peninsula east of Sunnyside, as illustrated in the preliminary layout in Figure 2.3-1.

Within the Wind Farm, electricity produced by the wind turbines will be directed to a substation by a network of 34.5 kV wood pole collector lines. From there, a single 138 kV transmission line will deliver the energy to the HGP and HP. A second 138 kV transmission line will connect the Project to the NLH electrical grid. The HGP and HP will be located at Come By Chance Industrial Site, adjacent to the Braya Refinery, as shown in the preliminary layout in Figure 2.3-2. The Wind Farm will generate power to support the production of 30,000 tonnes of hydrogen per annum, with HGP and HP infrastructure designed for potential future expansion. Future expansions will be treated as separate projects with subsequent registrations..



North Atlantic	FIGURE TITLE: Preliminary Layout of the Wind Farm	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke	DATE: 13/06/2025
			REVIEWED BY: C. Bursey 13/06/2025	
			APPROVED BY: C. Collins 13/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-504-Rev0

Figure 2.3-1 Preliminary layout of the Wind Farm.

North Atlantic	FIGURE TITLE: Preliminary layout of the Hydrogen Generation Plant and Hydrogenation Plant	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke	DATE: 10/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 10/06/2025	
			APPROVED BY: C. Collins 10/06/2025	
			CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-505-Rev0

Figure 2.3-2 Preliminary layout of the Hydrogen Generation Plant and Hydrogenation Plant.

The HGP is designed to produce green hydrogen using low-temperature PEM electrolyzers with an electrical capacity of 240 MW. The production of 30,000 tonnes of hydrogen per year will correspond to an average production rate of 85.6 tonnes per day. The primary output of the HGP will be high-purity gaseous hydrogen, which will be transported via pipeline to the adjacent HP for further processing and eventual export. The HGP will feature infrastructure to support hydrogen production, storage, and distribution, including electrolyzers, raw water and fire water tanks, an office and warehouse facility, an electrical substation, and a hydrogen piping system.

The Project involves the construction of a HP adjacent to the Braya Refinery and NARL Logistics Terminal. The HP will utilise LOHC technology, specifically employing MCH as a hydrogen carrier. MCH will be produced through the catalytic hydrogenation of toluene with hydrogen, offering a safe and efficient means of storing and transporting hydrogen. MCH will be transported by marine vessels to supply European markets. Infrastructure components of the HP will include: retrofitted storage tanks for MCH and toluene; hydrogen, toluene, and MCH pumps and pipelines; electrical connections to grid power and renewable energy sources; and the Terminal loading arm and jetty facilities.

Front End Loading (FEL) 2 / Pre-FEED engineering studies describing the Wind Farm, HGP and HP have been completed to facilitate development of the Project. Copies of the Wind Farm, HGP, and HP Pre-FEED report table of contents are provided in Appendices W and X, respectively.

Water for Project operation will be sourced from the Inkster's Pond Industrial Water Supply Area. This watershed includes a network of ponds, wetlands, and streams that flow into Placentia Bay. Currently this watershed supplies industrial water to Braya under water use licence WUL-14-057 (permitted annual withdrawal of 4,500,00 m^3). The licence was issued to North Atlantic Refining Inc. as the General Partner of NARL Refining Limited Partnership, the former operator of the Braya Refinery, on November 13, 2014. The licence has been transferred to Braya and is valid until December 31, 2039. North Atlantic Refining Corp. will look to connect to this industrial water supply for the Project and apply for its own Water Use License as per direction of the NL Water Resource Management Division. As confirmed by the Surface Water Study (Appendix C), the industrial water supply has sufficient live storage capacity to meet the combined needs of Braya and the Project operation.

2.3.1 Hydrogen Generation Plant

Located adjacent to the Braya Refinery in Come By Chance, the proposed HGP will produce green hydrogen using PEM electrolysis as shown in Figure 2.3.1-1. The HGP is projected to produce 30,000 tonnes of hydrogen per year based on an overall Plant availability of 96%. To achieve this target, a 240 MW electrolyzer capacity will be installed.

Inputs to the HGP are electricity and freshwater. Raw water required for the electrolysis process will be sourced and treated onsite to meet operational specifications. Electricity will be provided by the Wind

Farm, supplemented as required from the NLH grid. Discussions with NLH regarding approval of the interconnection request are ongoing, and the Project's ability to draw supplemental power from the grid remains subject to regulatory approval. Hydrogen will then be transferred by pipeline to the HP to be converted into MCH for export. Oxygen, generated as a byproduct of electrolysis, will be safely vented to the atmosphere, while small quantities of hydrogen will be purged to maintain system integrity and optimize process efficiency. Additionally, any process water not converted into hydrogen will undergo treatment and be managed in full compliance with environmental regulations before being discharged. A block flow diagram and plot plan for the HGP are shown in Figures 2.3.1-2 and 2.3.1-3, respectively.

Figure 2.3.1-1 Electrolyzers and refinery render.

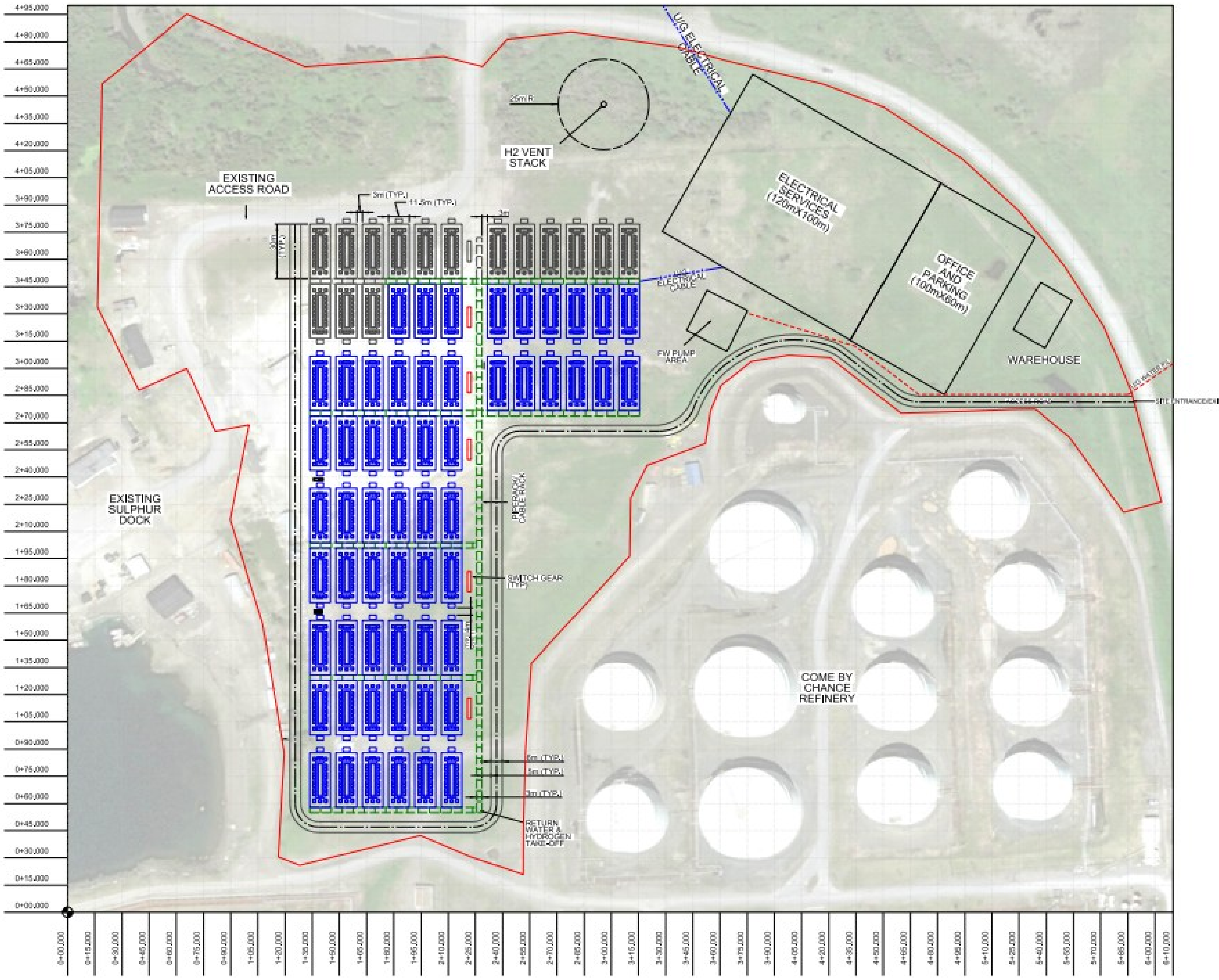


Figure 2.3.1-2 Hydrogen Generation Plant plot plan.

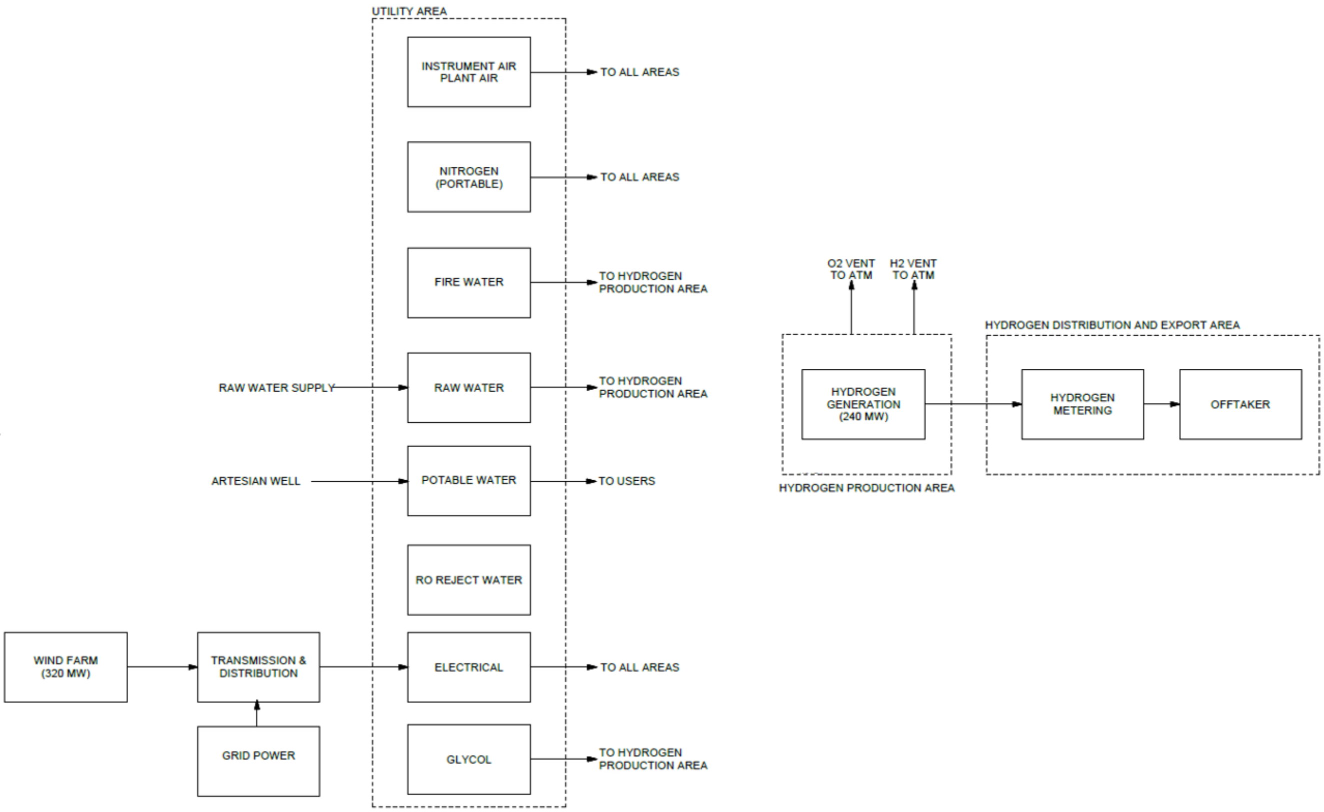


Figure 2.3.1-3 Hydrogen Generation Plant block flow diagram.

2.3.1.1 Hydrogen Production

PEM electrolyzers utilise a solid polymer membrane as the electrolyte to conduct hydrogen ions (protons; H^+) from the anode to the cathode, allowing hydrogen ions to pass through the membrane and react with electrons (e^-) from the power supply to form hydrogen gas (H_2). Oxygen gas (O_2) is also generated as part of the process. PEM technology allows for high operational efficiency, compact system design, high purity hydrogen production, and dynamic load capacity, making it well-suited for grid balancing and integration with variable renewable energy sources. The electrochemical reactions are detailed below:

$$\text{Anode: } H_2O \rightarrow 2H^+ + \frac{1}{2}O_2 + 2e^-$$

$$\text{Cathode: } 2H^+ + 2e^- \rightarrow H_2$$

$$\text{Overall: } 2H_2O \rightarrow H_2 + \frac{1}{2}O_2$$

The HGP will operate low-temperature PEM electrolyzers with 400 electrolyzer cells and up to 57 modular "stamps". Each electrolyzer cabinet operates at approximately 600 kilowatts (kW), generating 12 kilogram per hour (kg/h) of hydrogen. The stamps will each contain seven electrolyzer cabinets, along with glycol cooling, water treatment, telemetry, and distribution systems. A single stamp consumes 4.2 MW of power and produces hydrogen at a rate of 84 kg/h at beginning-of-life (BOL) conditions.

The HGP will be designed with a maximum hydrogen production rate of 4,800 kilograms per hour (or 42,000 tonnes per year). A minimum operation rate will be required to keep the HGP at warm idling, yielding a minimum hydrogen production rate of 480 kilograms per hour. The actual HGP production will vary between the maximum and the minimum production rates, depending on available wind energy resources and variations. External NLH grid power will be supplied during periods of low wind to maintain HGP production. Local wind resources were investigated for HGP system optimization, and the annual hydrogen production is expected to be 30,000 tonnes per year (Hatch, 2024).

2.3.1.2 Transfer of Hydrogen

Hydrogen produced at the HGP will be transported directly to the HP through a dedicated transfer pipeline. This approach ensures both a continuous, efficient transfer of hydrogen, while also eliminating the need for intermediate storage. North Atlantic has begun preliminary work on pipeline design which will be an estimated 1.4 km long and 203.2 mm diameter (CIMA, 2025 – see Appendix Y). This pipeline will be supported by a combination of existing infrastructure on site and new pipe supports.

Material: The pipeline will be composed of high-grade austenitic stainless steel, which resists hydrogen embrittlement and corrosion.

Diameter and Pressure Rating: The pipeline will be designed for a typical operating pressure of 30 bar, allowing for a steady, continuous flow of hydrogen without excessive compression energy requirements. The anticipated 203.5 mm (8 inch) diameter will be optimized for both flow rate and cost efficiency.

Welding and Joints: Welds will be undertaken to the highest industry standards (e.g., American Society of Mechanical Engineers (ASME) B31.12, CSA Z662 – Oil and Gas Pipeline Systems). ASME B31.12 is widely accepted in Canada as a best-practice standard for hydrogen piping and pipelines. CSA Z662 is Canada's principal pipeline standard and Clause 11 specifically addresses hydrogen pipelines.

Compression and Flow Control: Low pressure hydrogen from the HGP may then be routed to a booster compression station, where it is pressurized to pipeline operating conditions. From there, the hydrogen is metered, monitored, and injected into the pipeline. Key components specific to compression and flow control include: oil-free diaphragm compressors to ensure gas purity; ultrasonic mass flow meters with real-time data monitoring; and automated valves to manage pressure fluctuations and enable isolation in emergency situations. NOTE: Final selection of the LOHC technology licensor may eliminate the necessity for hydrogen gas compression.

Safety and Monitoring Systems: Given the high diffusivity and flammability of hydrogen, North Atlantic will ensure the pipeline is equipped with advanced safety and leak detection systems, including hydrogen sensors spaced at intervals for real-time leak detection, cathode protection to prevent corrosion, and emergency shutoff valves to isolate pipe segments in an emergency.

Environmental and Regulatory Compliance: The pipeline between the HGP and HP will be designed and operated in compliance with all relevant national and international standards, including ISO 16111 (hydrogen pipelines for industrial use), and ASME B31.12 (Hydrogen Piping and Pipelines Code). In addition, any local permitting required for the pipeline will be sought prior to construction, and any erosion control, wetland buffers, or restoration required will be conducted under best management practices.

2.3.1.3 Water Requirements and Supply

Electrolysis requires a reliable supply of demineralised water to support hydrogen production. Based on HGP's maximum hydrogen production rate of 4,800 kilograms per hour (or 42,000 tonnes per year), the estimated demineralized water consumption will be 883,000 m³ per year, or 27.9 liters per second (L/s) (Hatch, 2024).

The existing Inkster's Pond Industrial Water Supply Area will be the source of high-purity water for electrolysis. Raw water will be directed to a water cabinet, where it will undergo filtration, ion exchange, and reverse osmosis to produce demineralized water suitable for the electrolyzers. This treated water will then be distributed to the hydrogen cabinets for use in the electrolyzers. Each electrolyzer stamp will be equipped with two water cabinets, and each water cabinet will supply demineralized water to seven hydrogen cabinets. Water rejected during the treatment process will be collected and pumped to a new outfall location described in section 2.3.1.4.

A raw water storage tank will contain an eight-hour supply for the HGP. The water supply system will also supply a fire water storage tank for emergency use. Raw water pumps will distribute the supply through a raw water distribution header, which will serve 57 electrolyzer stamps. The raw water storage tank will have a capacity of 1,706 m^3, while the fire water storage tank will have a capacity of 2,544 m^3. The firefighting water supply will be designed to provide two hours of fire water storage, in accordance with National Fire Protection Association (NFPA) standards and engineering best practices.

2.3.1.4 Wastewater

The HGP will have three sources of wastewater. The first and largest will be water that is rejected from the manufacturing of demineralized water for electrolysis. The second will be surface water runoff that is collected from the HGP process area. Methods for handling of these wastewater streams are described in the following subsections.

The third source of wastewater is sanitary effluent. New buildings for the Project will require water service and will produce sanitary effluent. The sewerage rate and sanitary sewer design will be determined based on the estimated sewerage flows and design criteria in compliance with the Government of Newfoundland and Labrador Guidelines for the Design, Construction and Operation of Water and Sewerage Systems. The Environmental Control Water & Sewage Regulations, 2003 will also be consulted to determine the allowable discharge to sanitary sewers and receiving environments. Discharge of sanitary effluent into the municipal sewer system is not an option for the Project. The discharge of the sanitary effluent shall be to a new septic system.

2.3.1.5 Demineralization Wastewater

Electrolyzer cabinets will generate 1,207,200 L/d of wastewater during operation of the HGP. Modelled concentrations of electrolyzer cabinet outputs, developed based on electrolyzer technology and known composition of feedwater, are provided in Table 2.3.1.5-1 (Ohmium, 2025).

A new, dedicated outfall location will be constructed to the north side of the existing jetty for disposal of this demineralization wastewater (Figure 2.3.1.6-1). This infrastructure will include a pipe that runs 7.139 m below the water surface in a 3 in diameter tube. Effluent dispersion modelling was conducted to determine the effects of this wastewater on marine fish and fish habitat (Appendix B3).

Table 2.3.1.5-1 Modelled concentrations of electrolyzer cabinet wastewater.

Component	Unit	Concentration
Total dissolved solids	mg/L	78.21
Conductivity	µS/cm	165.09
pH	-	7.34
Calcium	mg/L	7.38
Magnesium	mg/L	1.94
Potassium (total)	mg/L	0.98
Iron (total)	mg/L	1.52
Silicon (total)	mg/L	2.88
Sodium	mg/L	16.31
Phosphorous (total)	mg/L	0.03
Sulfur (total)	mg/L	1.84
mg/L = milligrams per litre; µS/cm = microsiemens per centimetre		

2.3.1.6 Surface Water Runoff

Surface water runoff from the HGP process area will be collected to an open drains system. This system will contain a gravity-based oil-water separation system for the purpose of removing oil, grease, and other pollutants present in the HGP process area that are typically associated with industrial operations and maintenance activities. Separated oil from the separation system will be periodically pumped out and trucked to a licensed industrial wastewater treatment facility for treatment and disposal.

Separated wastewater from the HGP oil-water separation system will feed into the existing wastewater treatment plant for Braya (Certificate of Approval AA22-045668). This facility consists of a series of four holding basins, a water collection area and a marine outfall. The impounding basin, twenty-four-hour retention basin, primary holding basin, and the final holding basin provide extensive retention capacity for the system. The marine outfall is located approximately 100 m northwest of “Duck Pond” between the beach and the final holding basin. It consists of a concrete channel approximately 32 in wide by 22 in high and extends from the final holding basin to the beach. Through this channel, treated water is discharged into Placentia Bay (Figure 2.3.1-2). This discharge is strictly regulated under environmental approvals to ensure compliance with safety and environmental standards.

North Atlantic	FIGURE TITLE: Location of Wastewater Outfall	NOTES: The location of proposed project infrastructure is considered preliminary and is subject to change.	PREPARED BY: C. Burke	DATE: 07/07/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 07/07/2025	
			APPROVED BY: C. Collins 07/07/2025	
			CRS: WGS 1984 UTM Zone 22N	
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SEM MAP ID: 016-015-GIS-506-Rev0

Figure 2.3.1.6-1 Location of wastewater outfall.

2.3.2 Hydrogenation Plant

The Project will use LOHC technology to facilitate the safe and efficient transport of hydrogen to Europe. The HP is designed to convert hydrogen into MCH through the catalytic hydrogenation of toluene. The HP will be developed as a stand-alone facility adjacent to the existing Braya Refinery and the NARL Logistics Terminal. While the HP will operate independently, it will also share select infrastructure, most notably storage tanks for toluene and MCH.

The HP will be comprised of several interconnected systems and components essential for its continuous and efficient operation. The HP will feature a processing unit equipped with high-pressure reactors, heat exchangers, pumps, and automated control systems. The HP and processing equipment will include hydrogen compressors, toluene pumps, the piping systems, and toluene storage tanks, required to deliver hydrogen and toluene. Additionally, an MCH pump and piping system will be installed to transport MCH from the plant to the storage tanks. Supporting infrastructure will include storage tanks for both toluene and MCH, along with terminal loading arms, jetty facilities, a toluene and MCH pipeline, and other port infrastructure to facilitate loading and unloading operations.

The HP will require several key inputs to operate effectively, including a continuous supply of hydrogen and toluene delivered through pipelines to ensure an uninterrupted flow. In addition to hydrogen and toluene, the HP will require a reliable supply of water to support process operations and auxiliary systems. Electrical connections will be established to grid power and renewable energy sources, ensuring operational flexibility. The HP will also be connected to the port infrastructure, including terminal loading arms, jetty facilities, and the other port infrastructure supporting loading/unloading and transportation operations. The HP will be integrated with utility systems and balance-of-plant infrastructure. Outputs from the HP will consist of effluent streams (i.e., gasoline and diesel blending products, catalysts, residues, light hydrocarbons, condensates) managed through designated disposal pathways, and MCH, which will be measured and transferred at a custody transfer metering interface (equipment used to measure and record the quantity and quality of MCH prior to changing hands between producer to buyer).

The HP will have several incoming and outgoing connections. The incoming tie-in points will include the hydrogen supply from the HGP, the toluene supply from external storage tanks, the water supply, and electrical connections from the Wind Farm and the grid. The outgoing tie-in points will include the MCH transfer to the storage tanks, wastewater discharged to the Braya Refinery's wastewater treatment facility, hydrocarbon by-products and treated solid waste (i.e. spent reaction catalyst), which will be disposed of at a licensed industrial landfill in compliance with environmental and regulatory standards.

A plot plan and block flow diagram for the HP are shown in Figures 2.3.2-1 and 2.3.2-2, respectively.

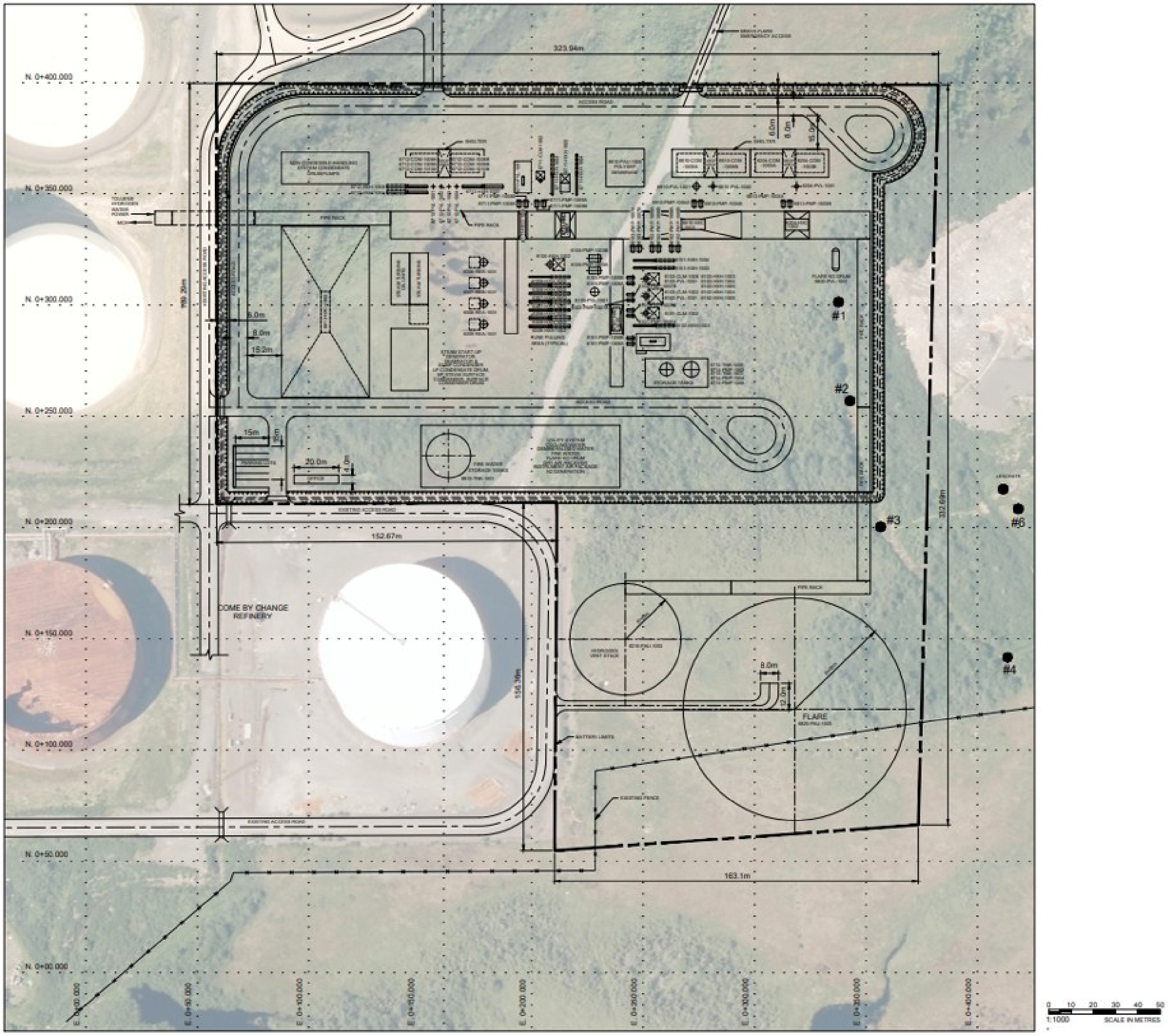


Figure 2.3.2-1 Hydrogenation Plant plot plan.

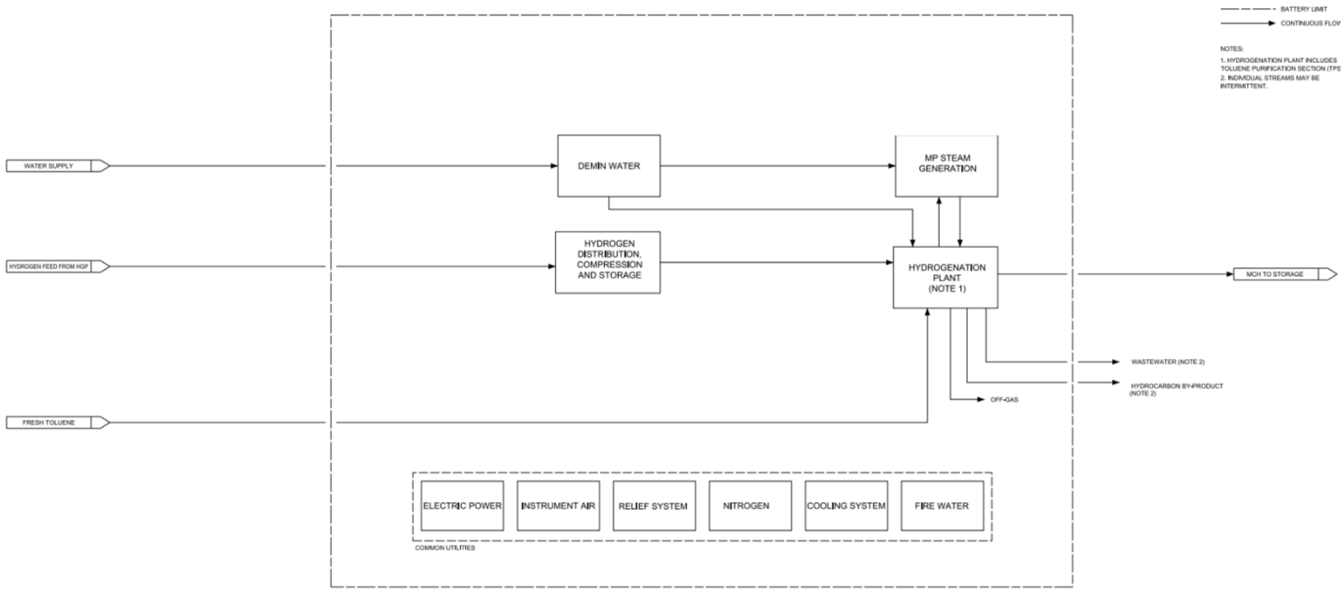


Figure 2.3.2-2 Hydrogenation Plant block flow diagram.

2.3.2.1 Hydrogen

The size and scale of the HGP operation will be optimized to ensure a steady hydrogen flow throughout its lifespan. To achieve the annual hydrogen production target of 30,000 tonnes, the HGP will operate with a minimum flow rate of 480 kg/h at 10% capacity and a maximum flow rate of 4,800 kg/h at full utilisation.

Hydrogen produced at the HGP will be transported directly to the HP through a dedicated pipeline (see section 2.3.1.2). This approach ensures both a continuous and efficient transfer of hydrogen.

LOHC technology has been selected for the HP partially due to its capability to handle variations in hydrogen flow rate to the facility. To demonstrate this, a HGP hydrogen production profile has been developed based on 22 months of measured wind data from the PA, thereby quantifying the maximum rate of change in hydrogen feed to the HP. LOHC technology licensors have developed HP dynamic process simulations based on the hydrogen production profile, which demonstrate LOHC technology can accept rates of change in hydrogen production of more than three times of that present in the hydrogen production profile. Further, LOHC technology licensors have provided process guarantees at the expected rates of change, for continuous turndown operation at 20% of maximum design hydrogen feed rate, and for warm-idle operation where no new hydrogen is fed to the HP. As such, the HGP and HP do not have a requirement for hydrogen storage.

LOHC technology licensors have outlined the required specifications for the hydrogen gas feed to ensure optimal performance for the HP. The hydrogen purity must be at least 99.9 mol%, with an oxygen content not exceeding 0.1 mol%. The gas is to be supplied at a pressure of 20.35 barg and a temperature of

48°C. As these specifications meet the necessary quality standards, no further purification is required before use in the HP.

2.3.2.2 Toluene and MCH

The toluene feed will be supplied by an external supplier and stored on the NARL Logistics site in repurposed storage tanks, at ambient temperature and pressure. North Atlantic plans to repurpose four existing crude oil storage tanks (Tanks 101, 103, 104, and 107). Two above ground cylindrical tanks will be dedicated to toluene storage and two will be dedicated to MCH storage. The projected toluene storage requirement is approximately 175,000 m^3, with an initial procurement volume of 144,175 m^3 for the 30,000 tpa hydrogen production case. The current pan-style internal floating roofs will be removed and replaced with modern Sandborn floating roofs to improve operational efficiency and minimize vapour emissions. Mechanical infrastructure upgrades will be made to enhance safety and environmental protection. New tank floors will be installed, incorporating a leak detection system, and a sacrificial anode cathodic protection system installed to prevent corrosion and protect against potential environmental effects from spills. A new bottom-course nozzle will be added to each tank to maximise hydraulic efficiency, complete with a manual valve and a low point suction pipe extending to the tank's center. The berm containment area will be cleared and graded. Drainage slopes will be re-established to ensure a dry tank floor (CIMA Canada Inc., 2025).

2.3.2.3 Liquid Organic Hydrogen Carrier

The Project will incorporate a LOHC system designed to enable the safe and efficient storage and transportation of hydrogen. LOHC technology involves catalytic conversion of hydrogen into a stable hydrogen carrier, MCH, through a hydrogenation process. This method allows hydrogen to be handled similarly to conventional fuels, minimizing the risks associated with high-pressure or cryogenic hydrogen storage. Hydrogen will be released from the carrier on the receiving end through a dehydrogenation process, and the toluene will be regenerated for reuse.

Hydrogenation components include hydrogenation units equipped with reactors and heat exchangers, storage tanks for toluene and MCH, and associated pumps and piping systems. MCH will be stored at ambient temperature and pressure conditions. Storage infrastructure will include two dedicated above ground cylindrical tanks for MCH, each with an approximate capacity of 68,100 tonnes. MCH will be produced onsite through the hydrogenation of toluene.

The targeted annual MCH production capacity is approximately 649,877.8 tonnes. The HP will receive hydrogen from the HGP and employ Toluene Hydrogenation technology to produce MCH. The Toluene Hydrogenation Process converts toluene into MCH using a staged reaction system. To ensure high quality feed, fresh toluene is first deoxygenated in a medium pressure (MP) steam-reboiled stripper column before being pumped to the feed surge drum.

The process is divided into three main sections:

1. Reactor Section (Including Heat Recovery): Toluene is heated through a series of exchangers to reach the required reactor temperature. The exothermic reaction generates heat, which is recovered to preheat the feed and produce MP steam, improving overall energy efficiency.

2. Separation Section: Reactor effluent is processed to separate hydrogen-rich gases from liquid products. Recycled hydrogen is sent back to the reactor via a recycle gas compressor, with a controlled purge to prevent the buildup of light ends. The liquid effluent is split—one portion is recycled to the reactor to regulate temperature, while the other is heated and sent for product stabilisation.

3. Product Stabilization: The MCH product is stabilized by removing dissolved hydrogen and light ends before being transferred to storage.

Additionally, a Toluene Purification Section will be integrated into the HP, leveraging available excess heat to manage side product accumulation from the hydrogenation and dehydrogenation processes. This ensures consistent toluene feed quality for optimal plant performance.

2.3.2.4 Water Supply

The HP will require fresh water for three purposes: generation of boiler feedwater for the facility's steam heat transfer system, for the cooling water system, and for firefighting. Both the steam and cooling water systems will be designed to operate on a closed loop basis therefore minimizing the intake of fresh water (Hatch, 2025). However, routine water losses are expected to happen from evaporation and an external water supply of up to a peak of 6.0 m^3/hr will be used to compensate for water losses (Hatch, 2025). This make-up supply will be sourced from Inkster's Pond Industrial Water Supply Area.

The steam and cooling water systems will require demineralized water. A new demineralized water system will be used to make up for losses in the steam and cooling water systems. Water from the demineralization system will also be used to supply the Fire Water Tank/Fire Suppression System.

2.3.2.5 Wastewater

Operation of the HP will generate wastewater from three sources: a process wastewater stream created during the purification of the toluene feed stream to the hydrogenation reactors; wastewater from the demineralization system that feeds the steam and cooling water system; and surface water run-off.

2.3.2.6 Process Wastewater

The reaction which generates MCH from toluene and hydrogen is not tolerant of the presence of water. As such, a distillation column will be installed upstream of the HP reactors to strip water from the toluene stream that feeds into the reactor. For the 30 ktpa production case, water is expected to be extracted from the distillation column at a rate for 57 kg/hr (Hatch, 2025). This water stream, which is expected to be relatively pure given it is drawn from a distillation column, will be condensed and sent to an oil-water separation unit.

Separated wastewater from this oil-water separation unit will feed into the existing wastewater treatment plant for Braya (Certificate of Approval AA22-045668). This facility consists of a series of four holding basins, a water collection area, and a marine outfall. The impounding basin, twenty-four-hour retention basin, primary holding basin, and the final holding basin provide extensive retention capacity for the system. The marine outfall is located approximately 100 m northwest of “Duck Pond” between the beach and the final holding basin. It consists of a concrete channel approximately 32 in wide by 22 in high and extends from the final holding basin to the beach. Through this channel, treated water is discharged into Placentia Bay (Figure 2.3.1-2). This discharge is strictly regulated under environmental approvals to ensure compliance with safety and environmental standards.

Separated oil from the separation system will be periodically pumped out and trucked to a licensed industrial wastewater treatment facility for treatment and disposal.

2.3.2.7 Demineralization System Reject Water

The HP’s cooling and steam systems will require demineralized water, and a new water treatment system will be installed to treat fresh water from the Inkster’s Pond Industrial Water Supply Area to supply the demineralized water. Generation of demineralized water will create a wastewater stream, however a closed loop design has been adopted for the cooling and steam systems which will minimize the amount of demineralized water make-up and the amount of associated wastewater generated. At peak, the amount of demineralized make-up water is anticipated to be 6.0 m^3/hr and using a conservative assumption of 2% of steam system design circulation rate, an average of ~1.5 m^3/hr of make-up water will be required. Assuming a reject ratio of 25% from the demineralization system, 0.5 m^3/hr of wastewater will be generated. This demineralization wastewater will have a similar composition to demineralization wastewater generated through production of boiler feedwater at the existing Braya facility, which is treated and discharged through the existing Braya wastewater treatment plant (Certificate of Approval AA22-045668) and will not impact the composition of wastewater treated at the facility. See Section 2.3.2.6 for a description of its operation. Further, due to the design of the Braya wastewater treatment facility, this new, relatively small HP demineralization stream will not change the flow rate of treated water discharge and will therefore not affect the dispersion of waste streams into the bay.

2.3.2.8 Surface Water Runoff

Surface water runoff from the HP area will be collected to an open drains system. This system will contain a gravity-based oil-water separation system for the purpose of removing oil, grease, and other pollutants present in the HP process area that are typically associated with industrial operations and maintenance activities. Oil from the separation system will be periodically pumped/trucked out and sent to a licensed industrial wastewater treatment facility for treatment and disposal.

Separated wastewater from the HGP oil-water separation system will feed into the existing wastewater treatment plant for Braya (Certificate of Approval AA22-045668). See section 2.3.2.5.1 for a description of its operation.

2.3.2.9 Liquid By-products

The toluene purification section system generates two liquid by-products that can be blended into gasoline and diesel. Their estimated compositions and annual production rates are detailed in Table 2.3.2-1. These by-products will be stored in separate atmospheric tanks (i.e., at atmospheric pressure); each designed with a one-week storage capacity. These by-products hold significant commercial value as heating fuel. They will be transported via truck and sold utilizing North Atlantic's existing commercial fuel supply infrastructure.

Table 2.3.2-1 Liquid by-product composition and annual production.

Component	Unit	Gasoline Blending Product	Diesel Blending Product
n-Heptane	wt%	1.34	-
Methylcyclohexane	wt%	53.77	-
Ethyl Cyclopentane	wt%	15.11	-
Toluene	wt%	29.78	27.89
o-Xylene	wt%	-	6.04
m-Xylene	wt%	-	2.51
p-Xylene	wt%	-	2.27
Heavies	wt%	-	61.79
Yealy Production – 30,000 tonnes per annum	MT/year	1552	96

2.3.2.10 Port Infrastructure

The NARL Logistics Terminal location offers strategic access to international markets, including North America and Europe.A portion of its existing port infrastructure will be repurposed for the storage and conveyance of LOHC. The existing deepwater marine terminal, including four storage tanks, the jetty, two loading arms, and its extensive road network will all be utilized by the Project. Repurposing these existing facilities reduces the Project footprint, lessens the capital expenditures of the Project, and accelerates the timeline to reach commissioning.

The dock can accommodate very large vessels, which allows the direct loading and off-loading of toluene and MCH, facilitating the export of hydrogen to global markets.

Four storage tanks that exist onsite (i.e., tanks 101, 103, 104, and 107) will be retrofitted to store toluene or MCH, for storage and shipment as required. These tanks have historically been utilized for storing petroleum products. LOHC components like MCH and toluene provide a safe and efficient medium for hydrogen storage and transportation, addressing challenges associated with hydrogen's low density and high flammability. LOHCs are stable liquids at ambient conditions (i.e., do notrequire cryogenic or high-pressure systems), are non-explosive, and behave similarly to gasoline in storage and transport. This compatibility confirms that the existing petroleum storage infrastructure can be repurposed for large volume LOHC storage with appropriate modifications and safety assessments. Engineering evaluations have been undertaken to ensure compliance with safety standards and optimise performance for LOHC storage (CIMA Canada Inc., 2025).

Retrofitting activities will be required for the storage tanks. Tanks will be cleaned to remove any residues of fossil fuels from previous use. A new 24 in pipeline will be installed to convey toluene and MCH from the jetty to the storage tanks (CIMA Canada Inc., 2025).

Two existing terminal loading arms, currently designed for crude oil service, will transfer the MCH and toluene from the toluene/MCH pipeline to and from vessels. The loading arms will be upgraded with replacement of the wetted seals (i.e., the part of the arm that directly contacts the MCH/toluene) to accommodate the new type of cargo (MCH/toluene instead of petroleum products) (CIMA Canada Inc., 2025). New wetted seals will also help prevent leaks, vapor emissions, or contamination, and would have better chemical resistance and performance.

2.3.2.11 Toluene and MCH Shipment

The jetty at the NARL Logistics Terminal is equipped with two deep water berths. Berth #1, where the two loading arms are located, will be used to berth the vessels that will carrier the toluene and MCH to and from its destination. This berth has over 30 m of water depth and is designed to accept vessels as large as Very Large Crude Carriers (VLCCs).

The Project will utilize Medium Range (MR) tankers capable of transporting IMO Type II cargos to transport toluene and MCH. MRs are commonly used to transport cargos of refined petroleum products over relatively short distances, such as from Europe to the East Coast of Canada and the United States. This type of tanker is commonly handled at the Terminal as part of North Atlantic’s existing fuel business. Shipment and jetty specifications for the Project are summarized in Table 2.3.2-2.

Table 2.3.2-2 Shipment and jetty specifications.

Property	30 ktpa Project Requirement
Vessel Type	MR (IMO Type-II) [1]
Vessel Capacity	52,000 m^3
Number of Tanks on the Vessel	16 – 18
Draft of Vessel	Approx. 14 m [2]
LOA of vessel	Approx. 183 m [2]
Port Call Frequency	15 times / year
Interval unit next vessel arrives	24.1 Days
Mooring Period	Approx. 4 days (including pilot, quality check, loading / discharging)

2.3.2.12 Utility Systems

The following are the utility systems and infrastructure requirements for the HP, for converting green hydrogen into MCH for transport (using toluene):

Medium Pressure (MP) Steam System (at 16 bar gauge): Hydrogenation reactions (e.g., converting toluene to MCH) are exothermic but require precise temperature control to operate safely and efficiently. An MP steam generation package is required to provide steam to start-up the reactor and hydrogenation unit, maintain warm standby of unit for rapid re-start, operate the Toluene Purification Section (TPS), and maintain reactor temperature during warm idle. For 60,000 tonnes per year there would be a requirement for 25.73 metric tonnes per hour (MT/h) of steam for turndown or warm idle (and half of that for 30,000 tonnes per year).

Cooling Medium System: A Cooling Medium System is required to provide cooling to exchangers, compressors, and reactors (so as not to degrade catalysts) in the system. A mixture of air cooling and water cooling will be used as the cooling medium, with water cooling taking place in a circulated closed loop to absorb and dissipate excess heat.

Demineralized Water System: The Demineralized Water System supplies ultra-pure water to the steam generation system, which is necessary to avoid damage to boilers and to provide efficient and safe production of the MP steam.

Instrument Air: Clean, dry compressed air is required for the actuating valves, the operating control instruments, and the pneumatic systems, and air-operated systems are safer in flammable environments (like those with hydrogen and/or toluene).

Nitrogen: Nitrogen is necessary for purging pipelines and vessels to eliminate oxygen and reduce the risk of explosions prior to the introduction of hydrogen or toluene. It is also used for inerting the system during shutdown or maintenance. It is a crucial component for safety of the HP. Nitrogen will be generated at the HP and stored in a pressurized tank prior to use.

Fire Water System: This system is for fire protection and consists of fire hydrants, sprinklers, and deluge systems. Hydrogen, toluene, and MCH are all flammable, therefore a dedicated fire water system is a regulatory requirement.

2.3.3 Wind Farm

The Wind Farm will be located on a rocky upland between Sunnyside to the west and Deer Harbour to the east, on the Isthmus of Avalon region of NL. The Wind Farm will consist of 45 wind turbines, a collector line system, substations, transmission lines, access roads, a batch plant, a laydown area, and an O&M building.

2.3.3.1 Wind Turbine Installations

The wind turbines comprising the Wind Farm will each have a rated capacity of 7.2 MW (for the total installed capacity of 324 MW). Site investigations have identified 55 suitable sites, ten more than required, to allow flexibility and accommodate environmental, geotechnical, regulatory, and stakeholder constraints. Each wind turbine will have an approximate hub height of 119 m and a rotor diameter of 162 m. Two types of tower configurations will be utilised: tubular steel towers and concrete hybrid towers.

Tubular steel towers are constructed from flanged steel sections, while hybrid towers combine a concrete base with a transition section leading to a tubular steel top. Each wind turbine is to be equipped with a rotor consisting of three blades and a hub. Blade operation will be managed by a pitch control system, which adjusts the pitch angle to maximize efficiency based on prevailing wind conditions. The blades will be composed of fibreglass reinforced epoxy, carbon fibres, and a solid metal tip. A 3D render of the wind turbines is presented in Figure 2.3.3-1.

Figure 2.3.3-1 3D Render of wind turbines in that PA.

Table 2.3.3-1 Preliminary Specifications for a 7.2MW wind turbine.

Wind Turbine Component	Specification
Rotor	
Rotor Diameter	162 m
Swept Area	20,612 m^2
Speed, Dynamic Operation Range	4.3 – 12.1 rpm
Rotational Direction	Clockwise (front view)
Orientation	Upwind
Tilt	6°
Hub Coning	6°
Number of Blades	3
Aerodynamic Brakes	Full feathering
Blade	
Blade Length	79.35 m
Maximum Chord	4.3 m
Chord at 90% blade radius	1.68 m
Type Description	Structural airfoil shell
Material	Fibreglass reinforced epoxy, carbon fibres and Solid Metal Tip
Blade Connection	Steel roots inserted
Airfoils	High-lift profile
Pitch System	
Type	Hydraulic
Number	1 cylinder per blade
Range	-20°C to 35°C
Hydraulic System	

Wind Turbine Component	Specification
Main Pump	Redundant internal-gear oil pumps
Pressure	Max. 260 bar
Filtration	3 µm (absolute) 40 µm in line
Hub	
Type	Ball shell hub
Material	Cast iron
Main Shaft	
Type Description	Hollow shaft
Material	Cast iron
Main Bearing Housing	
Material	Cast iron
Main Bearing	
Type	Rolling bearings
Lubrication	Oil circulation
Gearbox	
Type	2 Planetary stages
Gear House Material	Cast
Lubrication System	Pressure oil lubrication
Total Gear Oil Volume	900-1,100 L
Oil Cleanliness Codes	ISO 4406-/15/12
Generator Bearing	
Type	Rolling bearings
Lubrication	Oil circulation
Yaw System	
Type	Plain bearing system
Material	Forged yaw ring heat-treated. Plain bearings PETP
Yaw gear type	Multiple stages planetary gear
Yawing Speed (50 Hz)	Approx. 0.4°/sec.
Yawing Speed (60 Hz)	Approx. 0.5°/sec.
Towers	
Type	Tubular steel towers Concrete Hybrid Towers
Modularised Nacelle	
Main nacelle house and side compartment structure	Sheet metal structure. GRP components in roof dome and front cover.
Base frame	Cast iron

Wind turbine foundations will be designed and constructed to provide stability and durability under both static and dynamic loading conditions. Each wind turbine will require a cleared area of approximately 110 m by 110 m. The foundations have a footprint 17.0 m diameter and a thickness of 2.0 m with secure anchoring into bedrock by a symmetrical pattern of 24 rock anchors, positioned to distribute loads evenly and ensure structural integrity. Each rock anchor is approximately 15 m in length with a diameter of 65 mm. Anchors are designed to meet a required tensile strength of 1,034 megapascal (MPa).

Geotechnical investigations will be conducted during subsequent Project phases to confirm the suitability of the foundation design and optimize it for site-specific conditions.

2.3.3.2 Electrical Infrastructure

Within the Wind Farm, electricity produced by the wind turbines will be directed to a substation by a network of 34.5 kV wood pole collector lines. From there, a single 138 kV transmission line will deliver the energy to the HGP and HP. A second 138 kV transmission line will connect the Project to the NLH electrical grid.

Each wind turbine will be connected to a substation by an overhead collector network, primarily composed of Hendrix overhead conductors. The substation will be centrally located within the Wind Farm and will feature two 34.5 kV/138 kV step-up transformers. Two separate circuits of 138 kV transmission lines will connect the Wind Farm to HGP. Each circuit will span approximately 24 km and utilise Hawk 477.0 kcmill 26/7 stranding Aluminum Conductor Steel Reinforced (ACSR) conductors, with a power rating of 160 Megavolt-Ampere (MVA). The design ensures that each transmission line can handle up to 60% of the total capacity, enhancing system reliability. The estimated ROW width for the section containing two circuits from the Wind Farm to the HGP is 63 m. A typical H-frame standard structure, as used in the NLH system, will support the conductors.

The link between the Project and the grid will serve to provide operational stability to compensate for the intermittent and variable nature of wind generation. During periods of reduced wind generation, North Atlantic will look to work with NLH to utilize the grid to sustain the required minimum flow of electricity. Interconnection with the grid will occur at the Sunnyside substation, a 230/138 kV facility equipped with a 138 kV ring bus. The transmission line connecting the Project to the Sunnyside substation will be capable of delivering up to 85 MW over a single circuit of 138 kV transmission. North Atlantic will be responsible for procuring the 37 m wide, 7 km long ROW for the transmission lines.

The HGP substation will be the termination point for all three 138 kV transmission lines and operate at 138 kV/34.5 kV using two step-down power transformers. These transformers will be designed to accommodate the 240 MW capacity of the PEM electrolyzer, as well as the total electrical load of the facility.

2.3.3.3 Access Roads

The Project will require the development of a network of access roads to facilitate construction and transportation of Project components and equipment for the Wind Farm. The road network will also support efficient O&M and North Atlantic will provide security monitoring of the access roads during this phase. The access roads are specifically designed to accommodate the specialized vehicles needed to transport wind turbine components and other heavy equipment. Preliminary designs for the access roads were informed by Turbine Vendor Civil Work Specifications. These require a standard width of 6.0 m, allowing for two-way traffic on private access roads. Additionally, access to the site from the TCH was evaluated in accordance with the Transportation Association of Canada (TAC) manual. The final road layout and construction specifications with be refined through further engineering studies and site-specific environmental considerations. Figure 2.3-1 illustrates the layout of the proposed access roads, and Appendix E (Transportation Impact Study and Traffic Management Plan) provides additional detail regarding the access roads.

2.3.3.4 Meteorological Evaluation Towers

Meteorological measurements are necessary to assess the site's suitability for wind energy generation. The collected data includes wind speed, wind direction, air temperature, barometric pressure, and relative humidity. To support this data collection, two self-supporting, instrumented tubular meteorological evaluation towers (MET), each 60 m in height, along with two BEAM 6X wind power lidars, have been installed in the PA.

The first tower was installed on the northern side of PA at latitude 47.82709° N, longitude 53.79058° W, and has been operational since January 2024. The second tower, located on the southern side of PA at latitude 47.864472° N, longitude 53.8115558° W, has been in operation since April 2025. In May 2025, two BEAM 6X wind power LiDAR's were installed adjacent to each tower. These LiDAR's have an operational range of 40 to 500 meters and measure wind speed and direction at 1.3-meter intervals. Both towers are tubular in design and equipped with the following instrumentation:

- Four NRG S1 anemometers: located at 60 m, 50 m, and two redundant units at 40 m.
- Two NRG 200M wind vanes: installed at 48 m and 38 m.
- Two NRG Hybrid XT heated anemometers: positioned at 60 m and 50 m.
- One NRG Hybrid heated wind vane: installed at 58 m.
- One R. M. Young Alpine sensor: mounted at 55 m.
- Two NRG T60 temperature sensors: located at 58 m and 2 m.

2.3.3.5 Auxiliary Infrastructure

The following outlines the purpose, scale, and role of the auxiliary infrastructure required to support the Wind Farm during construction and operation.

Laydown Areas: Approximately 1 ha of clear, level space is required for temporary storage of Wind Farm components, materials, and equipment prior to site installation/use. The Bull Arm Fabrication Site laydown has capacity to store up to ten wind turbines (i.e., blades, towers, nacelles, and hubs). This existing space is of a size and location suited to the needs of the Project.

Wind Turbine Foundation Pad Laydown Areas: Once prepared, wind turbine pad sites can be used as temporary laydown areas. As wind turbine components arrive, they may be moved directly to their assigned pad locations, reducing the congestion at the Bull Arm Fabrication Site laydown. This strategy will reduce the need for the double-handling of components and situates the components in proximity to their final destinations.

Ancillary Storage: A dedicated area will be required for loose shipped items such as fasteners, electronics, cable reels, and subassemblies. During operations, this area will be utilized as a maintenance/storage depot.

Operation and Maintenance Building: The O&M Building will be a permanent support facility for technicians, engineers, managers, and contractors, and will house the monitoring and control systems, including the Supervisory Control and Data Acquisition (SCADA), a computer-based control system used to monitor and manage operations. The O&M Building will also provide warehouse space for spare parts and safety equipment, as well as offices, workshops, and a lunchroom.

Batch Plant: A dedicated concrete production facility will be required for the wind turbine foundations and related structures (e.g., cable trench encasements).

Quarry: A quarry will provide aggregate in the forms of gravel and crushed rock for concrete mixing at the batch plant, road construction, and foundation bases. Onsite quarrying will reduce cost, emissions, and traffic impacts from hauling.

2.3.4 Construction Activities

The Construction Phase of the Project will be a complex, multi-year undertaking involving infrastructure development across energy generation, hydrogen production, and export logistics, including:

- Wind Farm construction including wind turbine transportation and installation;
- Electrical infrastructure construction, including substations, collector system, and transmission lines installation;
- HGP and HP construction;

- Terminal Facility upgrades, including retrofitting of existing crude tanks for LOHC storage and upgrades to the jetty; and
- Office facilities and ancillary infrastructure.

Site preparation and foundational work will commence early, followed by mechanical and electrical installation in overlapping phases. Oversized loads will require careful scheduling, use of heavy-lift cranes, marine delivery via the Bull Arm Fabrication Site and NARL Logistics port facilities, and laydown areas organized to accommodate sequential unloading and assembly. Construction camps at the Bull Arm Fabrication Site could potentially be made available for housing of workers to provide lodging, catering, and transportation support. Daily workforce transportation to the site will be managed by shuttle services, minimizing local housing pressure.

All work will comply with provincial and federal permitting requirements, including electrical codes, process safety standards, and emissions regulations. There will be rigorous adherence to occupational health and safety regulations, including confined space work, high-voltage systems, working from heights, and chemical handling. Environmental controls will be implemented, including erosion control, dust suppression, and spill prevention measures during all phases of construction. Prior to excavation, areas will be cleared and grubbed. Trees and other vegetation, stumps, roots, and brush shall be cut off 200 mm above the original ground surface or as close as practical. Timber shall be harvested in accordance with Appendix T – Domestic Woodcutting Consultation Plan.

The key features of Project construction are summarised in Table 2.3.4-1.

Table 2.3.4-1 Key features of Project construction.

Key Metrics	Estimated Quantity
Total Road Length	66 km of new gravel roads
Number of Wind Turbine Sites	55 wind turbine sites for up to 45 wind turbines
Wind Turbine Major Component Deliveries	18 deliveries via marine vessel for nacelles, hubs, blades and towers
Wind Turbine Site Laydowns	0.36 ha (lay-by), 1.2 ha (Bull Arm laydown), 2.27 ha (Wind Farm laydown)
Concrete	12,845 m^3 (HGP Plant), 356 m^3 (substations), 276 m^3 (buildings), 28,930 m^3 (wind turbine area), 2,981 m^3 (HP Plant)
Common Excavation	220,392 m^3 (gravel roads), 28,552 m^3 (turbine/laydown areas), 4,757 m^3 (lay-by areas), 138,005 m^3 (foundations), 144,618 m^3 (transmission line), 23,839 m^3 (channel excavation), 28,440 m^3 (HP Plant)
Rock Excavation	14,696 m^3 (electrolysis yard), 329,875 m^3 (gravel roads), 313,656 m^3 (turbine areas)
Fill Quantities	143,237 m^3 (base course), 477,494 m^3 (sub base course), 1,766,050 m^3 (general rock fill), 21,265 m^3 (rip rap), 2,200 m^3 (armour stone), 100,946 m^3 (HP Plant)
Bulk Explosives	538,872 kg
Person Hours	1,268,373
Construction Duration	32 months for the Wind Farm, 24 months for the HGP, 26 months for the HP, 24 months for transmission line

Construction activities specific to the main component of the Project are summarized below.

2.3.4.1 Wind Farm

One of the first construction activities required is the establishment of the laydown areas and additional storage area to accommodate the placement of various construction materials and equipment. Foundation installation for wind turbines will entail excavation, concrete pouring, and installation of anchors. Soil conditions, wind loads, and seismic activity will be factored into the foundation design. Wind turbines will be assembled onsite and firmly anchored to the foundation. For the rotors to reach optimal wind speed, each wind turbine will be of a prescribed height and able to accommodate anticipated wind loads as prescribed in Canadian Building Codes. The wind turbine components (rotor, gearbox, generator, control systems) will be transported to each site and installed in accordance with the manufacturer's instructions.

In addition to the foundation installation for the turbines there will need to be tower crane foundations temporarily installed to assist with the assembly of the wind turbine components, such as the tower sections, nacelle, and rotor blades. These foundations will provide a stable and level platform that can support the weight and operational loads of the turbine components. They also ensure safety and structural integrity during lifting operations.

A summary of specific construction activities is as follows:

Site preparation and access development will involve clearing vegetation and grading/leveling the terrain to accommodate turbine foundations and access roads. After site preparation will be the development of durable roads to transport heavy equipment and turbine components to each site. Erosion control measures and wildlife buffers will help minimize ecological impact.

Foundations and civil works will require geotechnical surveys to conduct soil and rock assessments and design appropriate foundations for the turbines. Foundation construction will involve excavating and pouring reinforced concrete bases to anchor the turbines securely.

Turbine installation will begin with component transportation, starting with logistics planning for the delivery of 45 turbines, comprising of towers, nacelles, and blades. Assembly and erection will then require the use of cranes and specialized equipment to assemble and erect the turbines on-site. Electrical integration of the turbines will follow, with the installation of internal wiring and control systems within each turbine for operational readiness.

Electrical infrastructure development will start with *the installation of the collector systems*, laying underground and overhead cables to connect turbines to the central substation. Substation construction will follow to step-up voltage for efficient transmission. The main transmission line installation will involve constructing two 25-kilometer, 138 kV transmission lines to deliver electricity to the HGP at Come By Chance. Interconnection with the grid will occur at the Sunnyside substation, a 230/138 kV facility equipped with a 138 kV ring bus.

2.3.4.2 Linear Infrastructure

Electricity produced by the wind turbines will be directed to a substation by a network of 34.5 kV wood pole collector lines. A dedicated corridor for the main transmission line and road will be constructed for access to the site and to link the Wind Farm to the HGP and HP. These activities will be executed in sequential and sometimes overlapping phases to ensure efficiency and to minimize disruption. The routing will be optimized to parallel existing utility corridors and roads. Substations will be strategically placed near the Wind Farm and the HGP and HP to manage voltage levels and ensure grid stability.

In addition to new road construction, existing road infrastructure at the Bull Fabrication site and the Come By Chance Industrial Site will be upgraded as necessary to support heavy equipment, routine maintenance, and potential future expansion. The improved roads and new road will provide reliable, all-season access throughout the PA.

The specific activities associated with the construction of the linear infrastructure will include:

Land surveying and geotechnical investigations to finalise the alignment of the corridor, assess terrain conditions, and identify environmentally sensitive areas. Soil and geotechnical investigations will also inform the final foundation designs for structures. Other pre-construction activities include clearing and grubbing along the linear corridor route to allow access for construction equipment.

Transmission line construction including the access road development to each H-Frame transmission tower location and the associated grading and installation of culverts. In addition, each tower will require the installation of concrete foundations or helical piles. Conductor wires will be pulled between towers using tensioning equipment and insulators and other electrical hardware will be installed. Two substations will be constructed, one on the Wind Farm, and one at the Come By Chance Industrial Site. There will also be a tie-in to the existing Sunnyside substation. Construction of the substations will include site grading, concrete work, transformer installation, and electrical connections.

Road construction from the TCH to the Wind Farm will require grading and earthworks. Cuts and fills will ensure proper slope and drainage, a base layer of crushed stone or gravel will be laid, followed by paving of sections that require year-round heavy-duty access. In addition, ditches, bridges, and culverts will be installed.

During all construction activities associated with the linear corridor, best management practices (BMPs) will be followed, including silt fencing when interacting with streams, avoidance of critical wildlife breeding seasons, and habitat restoration, if necessary. Electrical systems will be tested for functionality, load capacity, and safety prior to operation.

2.3.4.3 Hydrogen Generation Plant and Hydrogenation Plant

The construction of the HGP and HP involves site preparation, civil works, mechanical and electrical installations, and complex logistics. The specific activities associated with the construction of the HGP and HP will include:

Site preparation and civil works, including site clearing and grading to establish a stable base for foundations and equipment, earthworks and drainage system installation, and access road upgrades (if necessary).

HGP construction will include pouring concrete foundations for electrolyzer stamps, transformers, electrical rooms, and ancillary systems. Modular electrolyzer cabinet units will be delivered and lifted into place using cranes. Cabling, piping, and water supply systems will be installed concurrently. A main distribution panel will split the incoming power supply to serve individual stamp, with each stamp equipped with isolating circuits and local protection system. To manage heat generated during the electrolysis process, air- or water-based heat exchangers will be installed, along with associated pumps, chillers, and control systems, which will be located in adjacent utility buildings. A dedicated water cabinet will house systems for filtration, ion exchange, and reverse osmosis. This water treatment system will produce deionised water for feed into the PEM stacks. Piping, chemical storage, and dosing equipment will be installed with appropriate containment systems. A hydrogen vent stack will be installed adjacent to the HGP.

HP construction, to be located 1.5 km southeast of the HGP, will include: foundations and structures for fixed-bed catalytic reactors and associated high-temperature piping systems; interconnecting pipelines from the HGP to the HP, including all the metering, pressure control, and associated safety systems; toluene storage tanks, pumps, piping systems, and vapor recovery and safety and fire protection systems; loading systems for imported toluene and outgoing MCH; control and automation systems like Programmable Logic Controllers and Distributed Control Systems for continuous monitoring and temperature/pressure/flow control; utility tie-ins (electricity, water and sewer); and piping systems to connect the HP to the upgraded jetty for the loading of MCH.

2.3.4.4 Hydrogen Pipeline Installation from HGP to HP

The hydrogen pipeline will run on a combination of existing pipe sleepers (made available by the removal of the existing crude line) and new pipe supports. Retrofitting the existing pipeline infrastructure to accommodate additional pipelines involves a series of carefully coordinated construction activities to ensure structural integrity, safety, and compliance with standards. A preliminary assessment of the existing pipe sleepers to verify their capacity to support the additional load and identify any areas requiring reinforcement has been undertaken by CIMA+ (CIMA Canada Inc., 2025). New pipe supports will be installed specifically designed for hydrogen service. Modifications to the existing supports and bracing will also be necessary to accommodate the routing and thermal expansion characteristics of the new pipeline. Electrical and instrumentation systems will also be updated or added as required to include hydrogen leak detection, pressure monitoring, and emergency shutoff capabilities.

2.3.4.5 Upgrades to Jetty and Tank Farm

To accommodate the shipments of MCH and toluene, the existing jetty must be modernized and reconfigured to meet the technical, safety, and logistical requirements of large-scale MCH export and toluene import. Upgrades to electrical supply, lighting, data connections, and control systems will support 24/7 terminal operations, remote monitoring, and integration with facility-wide energy management systems.

The current jetty will undergo structural assessment and reinforcement to handle the increased activity and tankers. This may involve upgrading piles, decks, mooring systems, and installing new loading platforms. One berth will be adapted for vessels designed to transport MCH/toluene, typically using the same class of tankers that handle petroleum products. These berths will feature robust fendering, mooring bollards, and gangway access for safe operations. Existing marine loading arms will be modified for compatibility with MCH and toluene to ensure secure, efficient product transfer. A new 609.6 mm (24 inch) toluene/MCH transfer pipeline designed in accordance with CSA B51 and/or CSA Z662 will run between the jetty and onshore storage tanks, and be equipped with leak detection and emergency shutoff systems.

Four existing storage tanks will be retrofit to store toluene and MCH to serve as a buffer between hydrogenation output and shipping schedules. Tanks to be retrofit are T-101, 103, 104, and 107. These tanks have historically been utilised for storing petroleum products. Given their specifications, these tanks are suitable for storing MCH and toluene. Detailed engineering evaluations in addition to preliminary evaluations already performed will be undertaken to ensure compliance with safety standards and optimise performance for LOHC storage (CIMA Canada Inc., 2025). Pumps and control systems will manage product temperature, pressure, and flow to ensure optimal loading conditions. Given the flammable nature of MCH and toluene, enhanced fire suppression systems, gas detection sensors, emergency venting, and spill containment infrastructure will be installed. Firewater systems will be incorporated for high-risk areas.

Tank infrastructure upgrades will be made to enhance safety and environmental protection. New tank floors will be installed, incorporating a leak detection system, and a sacrificial anode cathodic protection system installed to prevent corrosion and protect against potential environmental effects from spills. A new bottom-course nozzle will be added to each tank to maximise hydraulic efficiency, complete with a manual valve and a low point suction pipe extending to the tank's center. The berm containment area will be cleared and graded. Drainage slopes will be re-established to ensure a dry tank floor (CIMA Canada Inc., 2025).

Mitigation systems for potential marine spills, air emissions control, and stormwater management will be integrated to ensure regulatory compliance and environmental stewardship of the surrounding bay and coastline.

2.3.4.6 Laydown Areas

Laydown areas will be used for temporary storage and the inspection of Wind Farm components, materials, and equipment prior to installation/use. The proposed laydown area at the Bull Arm Fabrication Site will be capable of storing up to ten wind turbines at a time (i.e., blades, towers, nacelles, and hubs).

Other laydown areas will include the northwest corner of the Wind Farm area, where the access road and transmission line intersect with the turbine area. This laydown will be used for the storage of Wind Farm components after transport from the Bull Arm Fabrication Site, prior to construction.

2.3.4.7 Buildings and Batch Plant

In addition to the HGP and HP, several other buildings will be constructed to support the Project. These will include an electrical services building, an office building and parking lot next to the HGP. As well, a concrete batch plant will be situated in the center of the Wind Farm area. This will be a wet batch plant, where the ingredients will be mixed at the plant prior to being transported. Each turbine foundation will require approximately 640 m^3 of concrete. Associated with the facility will be storage silos for cement, bins for aggregates, and water tanks. An on-site materials laboratory will be constructed for tests of slump, strength, air content, and temperature. Construction and operation of the batch plant will conform with ASTM C94, the standard specification of ready-mixed concrete. The batch plant will be constructed on the western side of the Wind Farm area, just north of Lady Cove Pond.

2.3.4.8 Construction Planning and Development Schedule

The Project will follow a phased construction plan designed to align with seasonal conditions, regulatory requirements, and the integration of multiple infrastructure components. While the project is broadly divided into phases, many activities will overlap to optimize timelines, reduce costs, and manage resource availability. A range of factors can influence the construction schedule below, including seasonal weather constraints, permitting timelines and delays in approvals, supply chain availability for turbines, electrolyzers, and specialized equipment, labor availability and coordination of multiple contractors, and grid and infrastructure interconnection complications.

To mitigate these risks and maintain momentum, construction will be sequenced with parallel workstreams, such as road and foundation development starting while procurement and fabrication continue off-site. Table 2.3.4-2 below outlines the planned schedule of major activities and phases.

Table 2.3.4-2 Project Development Schedule.

Description	Phase	Duration (Months)	Schedule
Wind Farm	Construction	30	November 2026 – April 2029
	Commissioning	6	January 2029 – July 2029
HGP	Construction	23	November 2026 – September 2028
	Commissioning	3	December 2028 – February 2029
HP	Construction	18	November 2026 – December 2027
	Commissioning	6	October 2028 – March 2029
Transmission Line	Construction	23	November 2026 – September 2028
	Commissioning	6	June 2028 – November 2028

2.3.4.9 Water Supply

North Atlantic proposes to obtain water for construction purposes from Lady Cove Pond, with Little Mosquito Pond identified as a backup water supply (currently permitted under WUL-23-13359 for Bull

Arm Fabrication Inc). The Project will require a total water use of 31,225 m³ during the Construction Phase (estimated breakdown provided in Table 2.3.4-3), with 40% of water consumption expected in year 1 of construction and 60% expected in year 2. The proponent anticipated 80% of the annual water needs between May and October. A monthly estimate of water use is provided in Table 2.3.4-4. Prior to Project start-up, North Atlantic will apply for a water use licence from the NL DECC for water use during construction at Lady Cove Pond.

Table 2.3.4-3 Estimated breakdown of construction water requirements.

Item	Water Usage (m³)
Concrete - Foundation	6,468
Concrete - Electrolyser	2,331
Curing of Concrete	1,599
Filling - Compaction	12,169
Curing of Concrete Cube for Testing	540
Cleaning of Foundation Machineries / after Batching	110
Cleaning of Wind Turbine Generator Component	248
Dust Suppression	5,760
EHV, Collector, Substation, and O&M Building	2,000
Total	**31,225**

Table 2.3.4-4 Monthly estimate of construction water requirements.

Monthly Water Usage (m³)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Year 1	416	416	416	416	1,665	1,665	1,665	1,665	1,665	1,665	416	416	12,490
Year 2	624	624	624	624	2,498	2,498	2,498	2,498	2,498	2,498	624	624	18,735

2.3.4.10 Regulatory and Environmental Considerations during Construction

The Project is subject to a range of regulatory and environmental considerations at the provincial and federal levels. These requirements are designed to avoid or reduce negative environmental effects, document compliance with permits and approvals, and address community concerns.

The following are the key considerations for regulatory and environmental compliance during the Construction Phase:

- Wildlife and Habitat Protection: Where practicable, significant Construction Phase activities that may disturb nesting or breeding wildlife will be scheduled to avoid key breeding seasons. Buffer zones will be established around nests, wetlands, waterbodies, and habitat for Species at Risk (SAR) or Species of Conservation Concern (SCC), in consultation with the Newfoundland and

Labrador Wildlife Division (NLWD). When avoidance of the breeding season is not feasible, pre-clearing surveys will be conducted to identify birds, rare plants, and potential bat roosting trees.

- Water withdrawal: a water use licence will be applied for through NL DECC for construction-related water use at Lady Cove Pond. The water intake will be fitted with a screen to protect fish from impingement or entrainment. Measures will be taken to avoid pollution and to minimize disturbance of fish and fish habitat.
- Wetland and Waterbody Protection: Wetlands were mapped as part of the Ecological Land Classification (ELC) and will be avoided wherever possible (or buffered by 30 meters). Where construction must interact with a wetland, a Permit to Alter a Body of Water will be sought from NL DECC Water Resources Management Division (WRMD). Construction fencing and erosion control will also be implemented to ensure that the effects of the Project construction are limited in magnitude. Culverts, bridges, and erosion control will be used for stream crossings. For any work required to take place within 15 meters of a water body, North Atlantic will seek Ministerial approval for a Permit for Alterations to a Body of Water. Compensation/offsetting may be required by DFO if the waterbody is fish-bearing.
- Noise and Dust: North Atlantic will ensure that the workdays during Construction are kept to daytime hours to limit the disturbance to local communities and wildlife in areas with sensitive receptors. If dust becomes an issue during construction, appropriate measures will be taken (e.g., through wetting roads).
- Vegetation Clearing and Erosion Control: North Atlantic will ensure that erosion and sediment controls are in place during the Construction Phase, will restrict clearing to the extent possible, and will utilise matting and fencing to protect sensitive areas.
- Waste and Spill Management: North Atlantic commits to safe handling and storage of fuels, lubricants, oils, and other chemicals, in addition to construction waste. A Waste Management Plan is provided in Appendix N.

Throughout the Construction Phase, North Atlantic will ensure the use of the Mitigation Hierarchy. The four key steps in the Hierarchy are as follows:

(1) Avoidance: First, as part of Project planning, avoid unwanted interactions with the receiving environment. Incorporating this into the final Project layout/design will facilitate the avoidance of sensitive areas or negative effects.

(2) Minimization: If negative interactions with the Project are unavoidable, endeavour to reduce their magnitude, duration or extent. For example, while some disturbance is unavoidable, direct

interactions with wildlife can often be minimized by scheduling select construction activities for appropriate times of year that do not overlap with breeding seasons.

(3) Restoration: Disturbed areas will be rehabilitated to their original condition, or as closely to it as possible.

(4) Compensation: When residual negative effects remain following all reasonable actions, compensation will be considered as a last resort.

Portions of the PA, including the access road to the Wind Farm and transmission line route, overlap with the Centre Cove River Protected Public Water Supply Area (PPWSA) (SA-0878) for a linear distance of approximately 1 km. Ministerial approval will be sought for these small overlaps.

SAR and SCC will be considered at all stages of the Construction Phase. From the ELC (and subsequent habitat suitability maps), a comprehensive desktop review and Atlantic Canada Conservation Data Centre (AC CDC) data query, and from extensive field surveys for SAR and SCC, there is ample information to assess the risks associated with interactions of the Construction Phase with SAR and SCC. Any SAR or SCC occurrences or habitat known from previous studies, data queries, or original surveys will be avoided during the Construction Phase, either spatially, temporally (to avoid breeding season, usually) or both. BMPs will be followed, according to provincial and federal legislation regarding SAR and SCC, and consultations will be undertaken with the NL WD and the Canadian Wildlife Service prior to any activities that may interact with SAR or SCC or their habitats.

2.3.4.11 Quarry Sites

The Project will require a reliable and proximate source of construction aggregate for: access road construction and upgrades, concrete production for turbine pads and foundations, crane pads and laydown areas, substation and building foundations, transmission line foundations. To minimise environmental interactions, reduce haul distances, and streamline construction schedules, a strategically located local quarry will be necessary. At the time of registration of this Project with the Newfoundland and Labrador Environmental Assessment Division (NL EAD), geotechnical investigations were ongoing, so the precise location of the quarry has yet to be determined. However, a list of key considerations is provided below:

- To minimise the potential impacts of a new quarry on local communities (and the associated traffic), North Atlantic will seek to site the quarry within 10 km of the Wind Farm. This proximity to the Wind Farm will also minimise transportation time and reduce fuel use and emissions. The quarry must be accessible via a (relatively) easily constructed haul road to the Wind Farm. Proximity to the TCH will also be advantageous for equipment mobilisation and logistics.

- Preference will be given to reopening inactive quarries or expanding existing sites, as this option would have less environmental disruption, would likely already be permitted, and the geology of the sites would already be well established. The selected quarry site(s) must have certain rock types to adhere to engineering standards, including engineering/general fill, sub-base granulars (Class B aggregate for turbine pads and access roads), base granulars (Class A aggregate for turbine pads and access roads), rip-rap (for ditching, and for culvert and outlet structures). A Desktop Review and Field Reconnaissance effort will be necessary, employing geological surveys, LiDAR, and past resource maps to identify promising outcrops. Field assessments will involve testing rock quality and confirming overburden thickness.

- The selected quarry site will comply with the NL **Quarry Materials Act** and Environmental Assessment Regulations if the disturbed area exceeds certain thresholds (>5 ha).

- The quarry must be clear of environmental and regulatory obstacles. Avoidance of SAR or SCC habitats, waterbodies/wetlands, or other constraints will be mandatory for North Atlantic.

Once a quarry site has been selected, North Atlantic will apply for a quarry permit with the Mineral Lands Division of the Department of Industry, Energy, and Technology (NL IET). A Construction Plan will follow, which will outline the methodologies for stripping overburden, the drilling and blasting zones, the crushing/screening equipment to be employed, the locations of stockpiles, and the plans for erosion and sediment control.

2.3.4.12 Emissions and Energy Use

Noise, vibration, and light emissions will be generated during the Construction Phase (Table 2.3.4-3). Assessments of noise, vibration and light emissions during the Construction Phase are detailed further in Appendix J (Noise and Vibration Impact Assessment) and Appendix I (Light Impact Assessment).

Table 2.3.4-3 Noise, vibration and light emission sources: Construction Phase.

Emission	Source
Light	Mobile equipment headlights, mobile floodlights
Noise	Operation of mobile equipment and small stationary construction equipment (e.g., generators, compressors, compactors), blasting.
Vibration	Operation of mobile equipment and small stationary construction equipment (e.g., generators, compressors, compactors), blasting activities, site works (e.g., pile driving, site preparation, road construction)

Sound power levels generated during the Construction Phase are predicted to range between 87 and 145 A-weighted decibels (dBA). Construction Phase activities are not anticipated to generate sustained periods of low frequency noise (LFN). LFN has frequency content ranging between 16 and 200 hertz (Hz) and is not well perceived by the human ear (Health Canada, 2017). Vibration emissions are expected to be negligible during the Construction Phase. Light emissions, measured in terms of luminous flux, will range from 5,200 and 23,400 lumens (lum) during construction.

Emissions of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen oxides (NOx), and particulate matter (PM) will also be released during the Construction Phase. Emissions to air are generated via non-combustion and combustion processes, as detailed in Table 2.3.4-4.

Table 2.3.4-4 Air emission sources: Construction Phase.

Emission	Source
Carbon Dioxide (CO_2)	Operation of mobile and stationary construction equipment, blasting
Methane (CH_4)	
Nitrous Oxide (N_2O)	
Carbon Monoxide (CO)	
Sulfur Dioxide (SO_2)	
Nitrogen Oxides (NOx)	
Particulate Matter (PM)	Operation of mobile and stationary construction equipment, blasting, wind erosion of exposed surfaces, material handling

Air emissions released during the Construction Phase include GHGs and air pollutants. CO_2, CH_4 and N_2O are GHGs, which contribute to climate warming directly. The remaining three compounds, SO_2, NOx and PM are considered air pollutants. Both SO_2 and NOx are further categorised as indirect GHGs due to their contributions to climate warming by influencing atmospheric chemistry. It should be noted that NOx is generally determined by the summation of nitric oxide (NO) and nitrogen dioxide (NO_2). PM referenced in Table 2.3.4-4 considers three size fractions: (1) fine PM; (2) coarse PM; and (3) total suspended particulate (TSP). Fine PM is defined as particles with diameters less than or equal to 2.5 microns (μm) ($PM_{2.5}$), while coarse PM is less than or equal to 10 microns (PM_{10}). The magnitude of air emissions generated during the Construction Phase will be governed by fossil fuel consumption in combustion stationary and mobile equipment in the PA. Project-related air emissions will also be generated outside of the PA, as marine vessels required to transport major Wind Farm components from manufacturers.

Table 2.3.4-5 details annual fuel consumption requirements and associated GHG emissions for construction. GHG emissions are provided in terms of carbon dioxide equivalents (CO_2e), the sum of emissions of CO_2, CH_4 and N_2O following standardisation by global warming potentials (GWPs) unique to each GHG. Emission calculation methodology, associated assumptions, and rationale is provided in Appendix H1 (Emissions Inventory). Appendix H1 also details indirect emissions and emissions generated from less dominant sources (i.e., non-fossil fuel related emissions).

Table 2.3.4-5 Annual fuel consumption and emissions: Construction Phase.

Construction Activity	Annual Fuel Consumption (L)	Annual GHG Emissions (tonnes CO_2e)
Within PA[1]		
Stationary Combustion	405,000	1,089
Mobile Equipment	4,995,00	13,700
Outside of PA[2]		
Marine Transport	46,139,972[3]	83,341

[1] Projected to occur across two calendar years.
[2] Projected to occur across one calendar year.
[3] Provided as an estimate based on assumed routes and fleet, further details on estimation methods provided in Appendix H1.

Within the PA, annual fuel consumption demand is dominated by mobile equipment during the Construction Phase. A list of key construction equipment is provided in Table 2.3.4-6.

Table 2.3.4-6 Equipment list for the Construction Phase.

Equipment Category		
Wind	**Green Fuels Facility**	
Articulated Truck	Backhoe	Explosive Fasteners
Boom Truck	Compactor	Fork Truck
Water Truck	Welder	Generator
Compactor	Pickup Truck	Grinders and Cutters
Telehandler	Impact Pile Driver	Jack Hammers
Concrete Truck	Hydraulic Rock Breakers	Manlift
Crane	Vibratory Hammer	Concrete Saws
Drill	Flat Bed Truck	Concrete Vibrators
Excavator	Concrete Truck	
Fuel Truck	Concrete Pump Truck	
Grader	Crane	
High Deck Trailer	Air Tracks (blasting)	
Loader	Backhoe	
Pickup Truck	Blasting Equipment	
Skid Steer	Compressor	

2.3.4.13 Personnel requirements during the Construction Phase

The Project is expected to generate an estimated 1,200 full-time positions during the Construction Phase, requiring a variety of skills.

2.3.4.14 Transport, Storage, and Use of Hazardous Construction Materials

The transport, storage, and use of hazardous materials, fuels, lubricants, and waste management during the Construction Phase are subject to strict environmental and safety regulations, given the potential risks to human health and the surrounding ecosystem.

For hazardous construction materials, fuels, and lubricants (e.g., diesel fuel, hydraulic fluids, oils/greases, solvents/cleaners, paints/adhesives, batteries) storage will be in clearly labeled, sealed containers within spill-contained areas. Storage areas will be located away from waterbodies, watercourses, and/or environmentally sensitive areas. Fuel tanks will be double-walled and stored within secondary containment units. Transportation of any hazardous materials will comply with the Canadian Transportation of Dangerous Goods Regulations, and vehicles and drivers will be certified for this type of transport.

Anyone working on the Project who will be involved in transport, storage, or use of hazardous materials will receive WHMIS training. Spill kits and containment booms will always be mandatory onsite, and regular inspections and maintenance of machinery will be conducted to minimise the chance of leaks.

2.3.4.15 Construction Phase Solid and Liquid Waste Generation

The main waste streams, liquid and solid, are generally minimal compared to other types of energy projects, but they are still important for planning and permitting. In NL, waste management is regulated under the NL EPA, the Waste Management Regulations, and guidance documents from NL DECC.

Expected waste streams for the Project during Construction will include construction debris (wood, metal, concrete), packaging materials, scrap components, office waste, personal protective equipment (PPE), sanitary waste from site facilities, recyclables, and stormwater/runoff

HGP: Liquid waste from the HGP will potentially include impurities from feedwater like filtration sludge, cleaning solutions, and cooling water blowdown. Solid waste may include filter cartridges and membranes from the purification systems, and membranes/electrodes/catalysts from the electrolyzer.

HP: Liquid waste from the HP will potentially include thermal oil residues, carrier degradation products, and solvents/cleaners. Solid waste may include palladium (i.e., spent catalyst) which requires special handling. Spent catalysts or LOHC degradation products, must be managed through approved hazardous waste handlers. There could also be contaminated absorbents/filters from the purification or scrubbing processes.

2.3.5 Operation and Maintenance Activities

The O&M activities for the Project are multifaceted, covering renewable energy generation, water electrolysis, hydrogen handling, and chemical processing. Each phase of the value chain (i.e., Wind Farm, HGP, and HP) requires tailored strategies to ensure safe, efficient, and continuous operation. The activities associated with O&M are outlined in the following sections.

2.3.5.1 Wind Farm O&M Activities

O&M at the Wind Farm will involve a mix of technical servicing, hazardous materials management, and environmental compliance. Proper handling of fuels, lubricants, and hazardous materials, along with detailed maintenance planning and spill mitigation, is key to ensuring the long-term viability and regulatory compliance of the wind energy component of the Project. The turbines will require both routine and predictive maintenance to ensure maximum uptime, output, and safety.

Electrical maintenance will be required for the generator, transformer, cabling, and power converters, with tasks such as thermal imaging for hotspots, partial discharge testing, and relay calibration. The turbines will be equipped with SCADA systems for real-time performance monitoring, fault detection, and remote control of turbine operations. These systems also feed data into the hydrogen plant for energy balancing.

Due to Newfoundland's climate, anti-icing strategies such as heated blades and blade coatings may be employed. Seasonal site access challenges, such as snow accumulation or thaw cycles, will necessitate year-round road maintenance, snow clearing, and proactive planning for spare parts delivery and access for technicians. In addition, there will be periodic requirements for maintenance and repair of transmission lines, substations, and the access road network.

The following O&M activities will be required to keep the Wind Farm system operational:

Routine Operations and Maintenance Tasks: Scheduled maintenance activities will include the inspection and servicing of gearboxes, the yaw system, pitch mechanism, main shaft bearings, generators, and drive trains, tightening bolts and structural checks on the tower and nacelle, lubrication of moving parts, testing of electrical systems, control panels, and grid interfaces, blade inspection and cleaning. Blade inspection using Unmanned Aerial Vehicles (UAVs) (i.e., drones), and repair by rope-access technicians will be conducted annually, or after major storms to check for erosion, cracking, and lightning strike damage.

Corrective Maintenance Tasks: If faults or component failures occur, this may include repair or replacement of turbines, blades, nacelles, transformers, sensors, communication systems, and repairs to foundations or pads.

Storage, Transportation, and Use of Fuels, Lubricants, and Hazardous Materials: O&M activities may involve storing, moving, or using lubricants, coolants, cleaning agents, and fuels for backup systems or other regulated materials that must be safely handled (Table 2.3.5-1).

Table 2.3.5-1 List of fuels, fluids, and potentially hazardous materials for the O&M Phase.

Material	Use	Hazard
Gear oils and greases	Lubrication of gearboxes, bearings	Flammable, harmful to aquatic life
Hydraulic fluids	Pitch control systems	Potential contaminant if spilled
Diesel fuel or propane	Backup generators, cranes	Flammable, regulated storage
Cleaning solvents	Blade or nacelle maintenance	VOCs; fire risk
Battery electrolytes	Backup power systems	Corrosive, toxic

Storage of the materials noted above will follow the NFPA fire codes. In addition, hazardous materials will be stored in double-walled tanks with secondary containment. Spill kits and Material Safety Data Sheets (MSDS) will be kept on-site at the Wind Farm.

Transportation of hazardous materials will be conducted with service vehicles equipped for the task. Transportation will comply with Transportation of Dangerous Goods Regulations, and containers will be clearly labeled and secured during transit.

Spill containment trays, bundled pallets (i.e., a heavy-duty platform with a built-in secondary containment basin underneath to catch and contain leaks or spills from the containers stored on top and prevent those substances from contaminating soil or water), and automatic shutoff valves will be available on-site at all times, and workers will be trained in spill response procedures.

Remote monitoring systems (i.e., SCADA) will be used to lessen the need for frequent on-site visits. Periodically, maintenance crews may have to use snow machines or helicopters for difficult-to-reach turbines if the road becomes impassable for pickup trucks; however, access roads will be regularly cleared during the winter to ensure they remain passable by a 4x4 vehicle. Blade monitoring and maintenance may require rope access technicians or aerial lifts.

Environmental Management and Regulatory Compliance: Maintenance logs will be kept for each turbine and reports will be submitted to DECC as required. The Project will comply with the following legislative pieces and standards: the **NL EPA, OHS Regulations, CSA and IEC standards for turbine maintenance and materials handling, and spill reporting obligations** under provincial and federal law.

2.3.5.2 Hydrogen Generation Plant O&M Activities

At the HGP, the electrolysis system will use the renewable electricity from the Wind Farm to split purified water into hydrogen and oxygen through an electrochemical process in the electrolyzer. The O&M of the HGP are critical to ensuring the safe, efficient, and reliable production of hydrogen for the Project. This section outlines the operating procedures (SOPs) and the routine, periodic, and corrective maintenance tasks necessary to sustain optimal hydrogen production from the HGP.

Given the sensitivity of PEM systems to operational conditions, O&M activities are designed to support continuous performance monitoring, preventative upkeep, and rapid response to faults. These will include weekly system checks on water and hydrogen purity, membrane voltage degradation, and stack pressure balance. Quarterly inspections will be required for water pumps, valves, dryers, heat exchangers, sensors, and flow meters. Every seven to ten years the membrane (i.e., the thin material that keeps the gases apart and conducts ions) and stack (i.e., multiple electrolysis cells stacked together to increase hydrogen production capacity) will require replacement.

Specific operating procedures for the HGP will include those for startup, regular operation of the HGP, and shutdown, as described below.

Startup procedures: Several startup procedures will be required including visual inspections for leaks, valve positions, or unusual conditions; purging of the systems using nitrogen to rid the hydrogen and oxygen lines of residual gases; initiation of the cooling system to reach the required temperature; verification of the availability of sufficient deionized water; powering up the Programmable Logic Controller (PLC) and SCADA; initiating electrical current to the PEM stack and monitoring voltage during ramp-up; and venting hydrogen and oxygen until optimal purity targets are achieved.

Normal operating procedures: The day-to-day operations at the HGP will include activities like monitoring the dynamic load (i.e., calibrating the hydrogen output based on the wind power input); monitoring the stack voltage, hydrogen purity, water variables (e.g., flow rate, pressure), and temperature; venting of anode and cathode chambers for safety; and logging data to ensure compliance and performance.

Shutdown procedures: Activities involved in a shutdown of the HGP will include: a controlled DC power down; cooldown of the stack; release of system pressure; purge the system of hydrogen and oxygen; close valves and disable pumps and compressors; conduct a final inspection and record any anomalies observed; and prepare system for idle mode (or maintenance).

Preventative maintenance activities: The activities required for preventative maintenance will include tasks to be performed on a daily, weekly, quarterly, and annual basis. The daily tasks will include activities like checking the hydrogen and oxygen flow meters, conducting visual inspections for leaks, and monitoring the SCADA system for anomalies or alarms. Weekly, the deionized water levels and quality will require verification, and the cooling system and safety valves will require inspection. Monthly, the hydrogen purity sensors may require calibration, and the pre-filters and particulate traps with require inspection. Quarterly, the water purification cartridges will need replacement, the hydrogen dryers will require inspection/service, and emergency systems will require testing. Annually, a full PEM stack performance assessment will be conducted, an inspection of the membrane, replacement of seals and gaskets as necessary, and evaluation of the overall system performance relative to the production of hydrogen.

Corrective maintenance activities: Some necessary corrective activities will inevitably arise in the HGP during the O&M Phase. These activities may include events like a stack voltage imbalance, which would require the identification of underperforming cells in the stack, or if degradation were severe, would require stack replacement. Another corrective maintenance activity will be the replacement of any failed sensors. Leaks or system faults will require immediate shutdown, a purge of the system, and any repairs.

Safety and Compliance Activities: Safety and compliance activities for the HGP during the O&M Phase will include routine leak tests with hydrogen detectors, ventilation checks, and annual operator training on hydrogen safety and emergency procedures. For more information refer to the Emergency Response Plan (Appendix M) and the Hazardous Materials Training Plan (Appendix O).

In addition, hydrogen drying units, gas analysers, and pressurisation equipment will need to be calibrated regularly to maintain safe and efficient operation. Safety-critical equipment such as pressure relief valves, flame arrestors, and hydrogen detectors will require monthly testing and functional verification under the standards of the Canadian Standards Association (CSA) and International Electrotechnical Commission (IEC). The cooling system will remove the waste heat generated from the electrolysis process by circulating a closed-loop glycol/water mixture through heat exchangers in the system. The return glycol/water mixture is air cooled by radiators and fans. This system will require continuous monitoring for flow rate, heat exchanger fouling, and potential leaks.

2.3.5.3 Hydrogenation Plant O&M Activities

At the HP, hydrogen will be chemically bonded to an “unloaded” LOHC, toluene, which receives hydrogen using a catalytic hydrogenation reaction. The reaction takes place inside the reactor, where heat and a catalyst bond the hydrogen to the toluene to create methylcyclohexane (MCH), the “loaded” LOHC carrier.

Key O&M activities for the HP will include:

Catalyst changeouts: the reactor will use a catalyst which will lose activity over time due to coking, fouling, or sintering, or poisoning and will need to be changed out on a regular cycle. In addition, regular sampling and performance testing will be required.

Reactor maintenance: temperature control is critical, and heat exchanger efficiency will be maintained through regular descaling and pressure testing. Thermocouples will also be verified on a regular schedule.

Flaring: Flaring is expected to be infrequent and primarily limited to startup, shutdown, maintenance, or emergency conditions. Under normal operations, the process is designed to be closed loop and highly efficient, with minimal wastage; however, during transient phases, such as equipment commissioning, catalyst change-outs, or upset conditions (e.g., pressure relief events), controlled flaring may be required to safely dispose of excess hydrogen. The flare system will be engineered in accordance with industry standards (e.g., API 521) and regulatory requirements to ensure complete combustion of flared hydrogen, minimizing emissions and protecting worker and community safety. Additionally, advanced monitoring and control systems will be in place to reduce flaring frequency and volume, supporting the facility's environmental compliance and sustainability objectives.

LOHC degradation mitigation: Each time toluene is hydrogenated to form MCH, and later dehydrogenated, the chemical undergoes exposure to high heat, catalysts, and hydrogen gas. Over many cycles, side reactions can occur, producing byproducts or impurities (e.g., polyaromatics, resins, or acidic compounds), which can impair reaction efficiency, reduce catalyst life, and compromise hydrogen purity. A toluene purification system will be included at the HP due to the availability of excess heat. This system will manage the accumulation of side products generated during the hydrogenation and dehydrogenation process, ensuring the quality of toluene feed is maintained. A rigorous monitoring program will also be implemented to test for catalyst activity. Samples will be analysed using gas chromatography or distillation tests to ensure the compound is within specifications. In addition, periodic chemical analysis will be conducted to identify buildup of contaminants and trigger subsequent removal. Routine rheological testing will also be conducted to test viscosity and flow properties, which can affect the kinetics of the reaction and heat transfer. Viscosity increase often points to polymerisation or heavy residue formation. Some degradation of the toluene is inevitable over many cycles, so a fraction may have to be reconditioned or replaced.

Storage and handling systems maintenance: pumps, transfer lines, and storage tanks will be maintained under CSA and the American Petroleum Institute codes for hydrocarbon systems. Inspection of secondary containment (i.e., a system designed to contain the liquid if the primary container fails) and leak detection systems will be conducted on a regular schedule.

Maintenance of auxiliary systems: Scheduled maintenance will be required for instrument air compressors, nitrogen purge systems, and the HGP flare stack. Electronics and transformers at the HGP will require infrared scanning, oil sampling, and partial discharge checks. Control systems will require software updates, redundancy testing, and cybersecurity audits. Fire protection systems, including gas suppression, foam systems, and firewater pumps, will undergo weekly and monthly inspections per NFPA standards.

Waste Management and Environmental Monitoring: The O&M Phase will involve regular handling and disposal of treated water, discharged under a permit with regular effluent testing. This Phase will also include disposal of spent catalysts, contaminated filters, absorbents, chemical containers, and LOHC degradation fractions.

Environmental monitoring programs will include groundwater and surface water sampling, air quality monitoring (AQM) at the Come By Chance industrial site, inspections of secondary containment, and reporting of any reportable releases to the province.

Staffing and Training: During the O&M Phase, the majority of staff will be located at the HGP and HP in Come By Chance, but there will be a smaller crew dedicated to the Wind Farm for turbine maintenance and to monitor operations there. Maintenance staff will include mechanical, electrical, and chemical technicians, instrumentation technicians, wind turbine technicians, and administrative and custodial staff. A strong safety management system will be enforced at the HGP, HP, and Wind Farm, and aligned with ISO 45001 and Process Safety Management (PSM) standards, including near-miss reporting, maintenance logs, and regular safety audits.

Training programs will cover hydrogen safety, chemical handling, confined space entry, turbine maintenance, and high-voltage systems.

2.3.5.4 Regulatory Framework for Incremental Development

This Project is completely viable and stand-alone, with wind power generation sole-sourced from the proposed Wind Farm east of Sunnyside and hydrogen production and LOHC conversion, from the HGP and HP (respectively) at Come By Chance. However, North Atlantic will build some aspects of the Project to account for a doubling of hydrogen production from 30 ktpa to 60 ktpa. Notably this will include additional capacity at the HP to accommodate a potential future increase in production.

North Atlantic is committed to demonstrating that the Project is environmentally responsible and sustainable before proposing any increased levels of production. To this end, North Atlantic will provide sufficient monitoring data demonstrating that all emissions, discharges, and operational effects are within regulated limits and that mitigation measures are performing as predicted. These data will include:

- Regular monitoring reports (e.g., volatile organic compounds levels, noise, effluent, groundwater, SAR, birds and bats).
- Transparent records on LOHC integrity, spills, emissions.
- Analysis of efficacy of mitigations.

This information-driven review would inform any decision by the Province to approve a production increase, adjust permit limits, or delay/reject further development. Inevitably, the Province would, in any case, require a new Certificate of Environmental Approval (CEA), or would need to modify the existing one to accommodate a large increase in production. This process would require another registration document. North Atlantic is committed to following all necessary regulatory requirements if the time comes where production increases can be considered.

2.3.5.5 O&M Activities for the Substations and along the Transmission Lines

O&M activities for substations and transmission lines will help ensure reliable delivery of renewable electricity from the Wind Farm to the HGP and HP. These assets must operate safely, continuously, and in compliance with applicable standards and environmental regulations. Substations near the HGP and HP conversion sites must be regularly inspected, tested, and maintained. Transmission corridors must be kept clear, structurally sound, and environmentally compliant. Hazardous materials must be well-managed and documented. Activities will be logged and monitored via SCADA and reported as part of the project’s environmental and safety compliance framework.

The specific O&M activities for the substations and transmission lines will include:

Substation O&M Activities: There will be many routine maintenance tasks for the substations, including visual inspections for corrosion/wear/damage to components (e.g., transformers, switchgear, circuit breakers, busbars, and protection systems), thermal imaging surveys for hotspots on conductors, electrical testing (e.g., insulation resistance, transformer oil analysis, breaker timing), cleaning of insulators and switchgear, transformer maintenance (e.g., topping up or replacing dielectric oil, checking for leaks), testing of protection relays and SCADA systems.

Transmission Line O&M Activities: The transmission lines will carry high-voltage electricity from the Wind Farm to the HGP and HP. The lines will include towers/poles, conductors, insulators, grounding wires, and access roads. Routine tasks will include UAV and/or ground surveys for vegetation encroachment onto the transmission line, structural damage or corrosion of components, broken insulators, vandalism damage, and wildlife damage. Road maintenance will be required periodically for access roads. Thermal inspections (by UAV) will be required for routine checks of conductor temperatures. Periodic line tension checks will be necessary, along with vibration damper inspections.

Clearing of the transmission line ROW will occur outside of the breeding season for birds, if possible. Otherwise, nest surveys will be conducted prior to clearing, and any nests will be avoided until the young have fledged. Herbicides used for vegetation management will adhere to the NL Pesticides Control Regulations.

Corrective maintenance activities will be required for events like downed power lines, equipment failures at the substations or along the lines, or flashovers, and may require isolation of affected sections, containment of leaks, soil remediation, and documentation of the events.

O&M activities at the substations and along the transmission lines will be compliant with the Canadian Electrical Code (CEC), the Occupational Health and Safety Regulations, the **Environmental Protection Act**, and the NFPA fire codes and Transportation of Dangerous Goods Regulations.

2.3.5.6 O&M Activities for the Transport of Hydrogen

There will be three distinct stages for the transport of hydrogen/LOHC for the Project: (1) the transport of hydrogen from the HGP to the HP; (2) the transport of the LOHC from the storage tanks to the ship (and vice versa); and (3) the transport of the LOHC overseas for delivery to customers. Each stage will have its own O&M activities, as described below.

Pipeline

Once hydrogen is produced at the HGP it will be safely transported to the HP, where it will be chemically bound to toluene to produce MCH for transport overseas. To achieve this, the Project relies on a dedicated high-purity hydrogen pipeline designed to span the distance (just over a kilometer) between the two facilities. No storage tanks for hydrogen will be required at the HGP or HP. Hydrogen will be stored in the pipeline between the facilities and converted to MCH for storage in two of the four retrofitted tanks. The pipeline route was selected based on an existing pipeline corridor to minimize environmental interaction.

O&M activities associated with the pipeline will require a dedicated North Atlantic operations team who will monitor pipeline performance from a central control room using SCADA systems. Regular maintenance activities will include:

- Non-Destructive Evaluation and external inspections to ensure pipeline integrity;
- Leak detection drills and emergency response simulations; and
- Routine sensor and valve inspections.

Storage Tanks to the Port

Since MCH and toluene are liquids, their storage is akin to that of petrochemicals, and so retrofitted petroleum tanks at the Terminal will be ideal for this purpose, and storage will require no new infrastructure to be constructed and no new environmental interactions or concerns to be created. There will be a variety of O&M activities associated with the storage of MCH and toluene in the four existing storage tanks, and the transfer of MCH and toluene to/from the jetty for shipping. These activities will involve routine monitoring, preventative maintenance, safety systems, and logistics coordination to ensure the reliable, safe, and efficient handling of the LOHC. Each are described below.

Routine Operations and Maintenance Tasks: Level monitoring will be conducted on the tanks using radar or ultrasonic sensors, as well as temperature and pressure monitoring (to ensure the LOHC remains liquid and within safe parameters). Another routine task will be the operation of the vapor control systems (e.g., pressure relief valves). Maintenance tasks will include tank and tank accessory inspections to survey for leaks, corrosion, and ensure structural integrity. In addition, degassing and cleaning the tanks will be conducted during shutdowns of the facility.

Several routine O&M tasks will be associated with the pumping and transfer system to move the LOHC from tanks to the loading arm/jetty. Pump startup and shutdown procedures for the transfer of the product, along with flow monitoring, will be primary tasks. Pump and pipeline flushing will prevent contamination or buildup in the line. Seals will sometimes need replacement, and pumps will need servicing, along with regular lubrication and alignment checks. Valves and actuators will require inspection along transfer lines. Monitoring for leaks along transfer lines and ensuring that lines are correctly isolated, pressurized, or purged will also be a routine task.

At the loading arm there will be several pre-loading safety checks to conduct, as well as an inspection of the connection of the loading arm to the shipping vessel's manifold. Flow will be monitored in real-time and will have an emergency shutoff. Prior to departure, coordination with Transport Canada will be required to ensure the schedule is compliant, berthing is reserved at the destination, and customs clearances have been granted. Regular maintenance of the loading arm will require joint greasing on the loading arm, pressure and flow testing, instrument calibration, and emergency testing for the arm.

Environmental and Safety Systems O&M Activities: Several inspections will be necessary to ensure the safe transfer of the product from the storage tanks to the loading arm and the ship. Pre-loading inspections will include checks of all valves, gaskets, and couplings prior to transfer. In addition, confirmation of containment booms and spill kits will be a routine task.

Emergency procedures and communication protocols will be reviewed by North Atlantic employees working at the port and the shipping personnel. Forecasts for weather and tide conditions will be checked prior to loading. Drip trays and secondary containment vessels will be positioned beneath connections. Inspections for spills will be conducted around tanks, the pump, the loading arm, and the vessel.

If a spill occurs:

(1) Transfer will be stopped immediately.

(2) Emergency shut down of the loading arm will be activated.

(3) North Atlantic dock personnel will be notified and alarm protocols followed.

(4) Notify the appropriate regulatory bodies, including the NL DECC, the Canadian Coast Guard Marine Pollution Response, Transport Canada, and the Impact Assessment Agency of Canada.

(5) Booms and pads will be deployed around the source of the spill.

(6) Emergency release of the loading arm from the vessel (if necessary).

(7) For containment of small spills, portable containment trays and absorbents will be deployed. For larger spills and ocean spills, floating containment booms will isolate the spill, and skimmers will be used to recover the MCH or toluene (which has a lower density than seawater, so it floats).

(8) Coordinate response efforts with the Eastern Canada Response Corporation (ECRC) for Tier II and III incidents.

(9) Assist authorities in conducting a full investigation to determine the root cause of the spill and outline the corrective actions taken.

Fire can be a major hazard during MCH or toluene spills, particularly on the ocean surface near the jetty and loading operation, because MCH and toluene are highly flammable, has a low flash point, and produces vapors heavier than air which can build up in low areas. Therefore, ignition hazards must be carefully managed during an MCH or toluene spill. Engines, electrical equipment, and static electricity can ignite MCH and toluene vapor. CSA-approved equipment will be used, and gas detectors installed to monitor vapor concentrations at the loading arm as well as fire suppression systems. Emergency shutdown mechanisms will be in place. Hot work permit systems will be implemented to control ignition risk during maintenance.

Inspections of fire suppression equipment will occur regularly to ensure that suppression systems, sprinklers, and firewater monitors are in working order. Daily logs will provide documentation of activities and compliance, in addition to the regular documentation regarding maintenance schedules, inspection records, and certification of O&M personnel. See Appendix M – Emergency Response Plan for more details about emergency response.

LOHC Vessel Transport

As stated above, MCH and toluene are liquids with similar handling properties to petrochemicals, therefore, MR type tankers will be utilized for this Project.

For the 30,000 tpa production case, approximately one MR vessel per month will arrive at the NARL Logistics Terminal to unload the reformed toluene from the receiving facility in Europe to be used as the HP feedstock. This same vessel will then take the generated MCH for shipment to the receiving facility for reconversion into green hydrogen.

These activities will involve routine monitoring, preventative maintenance, safety systems, and logistics coordination to ensure the reliable, safe, and efficient handling of the LOHC. Vessel management procedures that are currently in place at the NARL Logistics Terminal will be performed, along with coordination with Transport Canada to ensure compliant schedule, berthing reservations and customs clearances.

2.3.5.7 Emissions and Energy Use

Cumulative noise and vibration emissions generated from the O&M Phase of the Wind Farm, HGP, and HP were evaluated in the 'Noise and Vibration Impact Study' (Appendix J). The study modelled effects at sensitive receptors with the greatest potential exposure to Project noise. The largest potential wind turbine model that is being considered for the Project was used in the modelling exercise as it corresponds to an anticipated greatest potential level of sound and vibration relative to sensitive receptors.

Noise sources for the O&M Phase are outlined in Table 2.3.5-2 and 2.3.5-3. Table 2.3.5-2 are presents noise sources in terms of linear sound power octave centre frequencies while Table 2.3.5-3 provides A-weighted sound power level (dBA) by octave band in Hz. Total sound power level in units of dBA are provided for each noise source.

Table 2.3.5-2 Noise sources with linear sound power level: O&M Phase.

Description	Linear Sound Power Octave band centre frequency, Hz									Total dBA
	31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Wind Turbine[1]	115	115	113	108	103	99	93	86	77	105.5
Flare	139	132	128	12	120	119	119	119	119	126

[1]Sound power level at hub height

Table 2.3.5-3 Noise sources with A-weighted sound power level: O&M Phase.

Source	Number of units[1]	Enclosure reduction[1]	A-weighted sound power level (dBA) by Octave Band (Hz)[1]									Total Sound Power Level (dBA)
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Hydrogen Generation Plant												
Transformer 6 MVA	57	-	55	74	86	89	94	92	88	83	73	98
Transformer 750 kVA	1	-	30	49	61	64	69	66	62	57	48	73
Transformer 45 kVA	3	-	34	53	65	67	73	70	66	61	52	76
Generator	1	-	65	70	83	105	105	102	98	96	85	110
Pump 40 kW	2	-	43	54	62	70	83	90	86	77	66	92
Pump 50 kW	2	-	44	55	63	71	84	91	87	78	67	93
Pump 500 kW	2	-	54	65	73	81	94	101	97	88	77	103
Pump 20 kW	2	-	40	51	59	67	80	87	83	74	63	89
Pump 40 kW EMotor	2	-	32	44	60	70	75	77	76	71	65	81
Pump 50 kW EMotor	2	-	33	45	61	71	76	78	77	72	66	82
Pump 500 kW DMotor	2	-	45	57	73	83	88	90	89	84	78	94
Pump 20 kW EMotor	2	-	40	51	59	67	80	87	83	74	63	89
Compressor 37 kW	1	-	55	68	73	77	82	86	86	80	72	91
Compressor 37 kW EMotor	1	-	28	40	56	66	71	73	72	67	61	78
Hydrogenation Plant												
Hydrogen Compressor	1		67	83	96	99	101	102	99	95	90	107
Makeup Gas Compressor	1	10	63	79	92	95	97	98	95	91	86	103
Recycle Gas Compressor	1	10	61	78	90	94	95	97	93	90	84	102
Charge Pump	1		60	74	84	93	101	102	100	97	92	107
Fire Water Pump	1		61	75	85	94	102	103	101	98	93	107
Hydrogen Compressor	1		67	83	96	99	101	102	99	95	90	107
First Stage Stabiliser Offgas Compressors	1		63	79	91	95	97	98	95	91	86	103
Second Stage Stabiliser Offgas Compressors	1		63	79	92	95	97	98	95	91	86	103
Third Stage Stabilizer Offgas Compressors	1		63	79	92	95	97	98	95	91	86	103
Recycle Liquid Pumps	1		51	65	75	84	92	93	91	88	83	97

Source	Number of units[1]	Enclosure reduction[1]	A-weighted sound power level (dBA) by Octave Band (Hz)[1]									Total Sound Power Level (dBA)
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Stabiliser Reflux Pumps	1		31	45	55	64	72	73	71	68	63	78
Stabiliser Net Bottoms Pumps	1		51	65	75	84	92	93	91	88	83	98
Oxygen Stripper Overhead Pumps	1		49	63	73	82	90	91	89	86	81	95
Oxygen Stripper Bottoms Pumps	1		43	57	67	76	84	85	83	80	75	90
Deheptaniser Reflux Pumps	1		43	57	67	76	84	85	83	80	75	90
Deheptaniser Net Overhead Pumps	1		25	39	49	58	66	67	65	62	57	71
Deheptaniser Bottoms Pumps	1		53	67	77	86	94	95	93	90	85	99
Rerun Net Overhead Pumps	1		37	51	61	70	78	79	77	74	69	84
Rerun Bottoms Pumps	1		25	39	49	58	66	67	65	62	57	71
Gasoline By-Product Storage Tank Pump	1		42	56	66	75	83	84	82	79	74	89
Diesel By-Product Storage Tank Pump	1		31	45	55	64	72	73	71	68	63	78
Byproduct Storage Sump Pump	1		25	39	49	58	66	67	65	62	57	71
Toluene Storage Pumps	1		50	64	74	83	91	92	90	87	82	96
Toluene Storage Pumps	1		50	64	74	83	91	92	90	87	82	96
Raw Water Pump	1		46	60	70	79	87	88	86	83	78	93
Boiler Feed Water Pump	1		53	67	77	86	94	95	93	90	85	99
Flare KO Drum Pump	1		39	53	63	72	80	81	79	76	71	86
Air Compressor	1		62	78	91	94	96	97	94	90	85	102
Fire Water Jockey Pump	1		34	48	58	67	75	76	74	71	66	81
Hydrogen Compressor Driver	1		64	76	92	102	107	109	108	103	97	113
Makeup Gas Compressor Driver	1	10	70	82	98	108	113	115	114	109	103	120
Recycle Gas Compressor Driver	1	10	66	78	94	104	109	111	110	105	99	116
Charge Pump Driver	1		66	78	94	104	109	111	110	105	99	116
Fire Water Pump Driver	1		50	62	78	88	93	95	94	89	83	99
Hydrogen Compressor Driver	1		46	58	74	84	89	91	90	85	79	96
First Stage Stabiliser Offgas Compressors Driver	1		37	49	65	75	80	82	81	76	70	87
Second Stage Stabiliser Offgas Compressors Driver	1		37	49	65	75	80	82	81	76	70	87
Third Stage Stabiliser Offgas Compressors Driver	1		37	49	65	75	80	82	81	76	70	87

Source	Number of units[1]	Enclosure reduction[1]	A-weighted sound power level (dBA) by Octave Band (Hz)[1]									Total Sound Power Level (dBA)
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Recycle Liquid Pumps Driver	1		41	53	69	79	84	86	85	80	74	91
Stabiliser Reflux Pumps Driver	1		24	36	52	62	67	69	68	63	57	74
Stabiliser Net Bottoms Pumps Driver	1		41	53	69	79	84	86	85	80	74	91
Oxygen Stripper Overhead Pumps Driver	1		39	51	67	77	82	84	83	78	72	89
Oxygen Stripper Bottoms Pumps Driver	1		35	47	63	73	78	80	79	74	68	84
Deheptaniser Reflux Pumps Driver	1		34	46	62	72	77	79	78	73	67	84
Deheptaniser Net Overhead Pumps Driver	1		19	31	47	57	62	64	63	58	52	69
Deheptaniser Bottoms Pumps Driver	1		43	55	71	81	86	88	87	82	76	92
Rerun Net Overhead Pumps Driver	1		29	41	57	67	72	74	73	68	62	79
Rerun Bottoms Pumps Driver	1		19	31	47	57	62	64	63	58	52	69
Gasoline By-Product Storage Tank Pump Driver	1		34	46	62	72	77	79	78	73	67	83
Diesel By-Product Storage Tank Pump Driver	1		24	36	52	62	67	69	68	63	57	74
Byproduct Storage Sump Pump Driver	1		19	31	47	57	62	64	63	58	52	69
Toluene Storage Pumps Driver	1		40	52	68	78	83	85	84	79	73	90
Toluene Storage Pumps Driver	1		40	52	68	78	83	85	84	79	73	90
Raw Water Pump Driver	1		37	49	65	75	80	82	81	76	70	87
Boiler Feed Water Pump Driver	1		43	55	71	81	86	88	87	82	76	92
Flare KO Drum Pump Driver	1		31	43	59	69	74	76	75	70	64	81
Air Compressor Driver	1		36	48	64	74	79	81	80	75	69	86
Fire Water Jockey Pump Driver	1		27	39	55	65	70	72	71	66	60	77
30MVA OFAF Three Phase Transformer	1		41	51	83	89	86	83	85	84	80	93
30 MVA OFAF Three Phase Transformer	1		41	51	83	89	86	83	85	84	80	93
1500 kVA Dry type Three Phase Transformer	1		15	25	57	63	60	57	59	58	54	68
1500 kVA Dry type Three Phase Transformer	1		15	25	57	63	60	57	59	58	54	68
2000 kVA OFAF Three Phase Transformer	1		18	28	60	66	63	60	62	61	57	70
2000 kVA OFAF Three Phase Transformer	1		18	28	60	66	63	60	62	61	57	70
400 kVA Dry type Three Phase Transformer	1		12	22	54	60	57	54	56	55	51	65
Standby Generator	1		59	77	91	102	108	111	112	107	100	116

Source	Number of units[1]	Enclosure reduction[1]	A-weighted sound power level (dBA) by Octave Band (Hz)[1]									Total Sound Power Level (dBA)
			31.5	63	125	250	500	1,000	2,000	4,000	8,000	
Substations												
Wind Farm 324 MVA substation	1	-	58	68	100	106	103	100	102	101	97	110
HGP 444 MVA substation	1	-	63	73	105	111	108	105	107	106	102	116
[1]Noise levels provided in this table include the required correction for equipment quantity and the specified enclosure reduction												

Noise generated during the O&M Phase will generally be constrained to the PA. Details of geographic reach of noise beyond the PA are provided in Appendix J. The acoustic environment in the LAA is not anticipated to change significantly during the O&M Phase. While total (i.e., baseline plus Project) day-night sound levels (L_{dn}) will deviate from baseline levels, values of L_{dn} will continue to be in compliance with limits set forth by Health Canada (Health Canada, 2017). Modelling data was used to assess whether LFN will be generated by the Project during the O&M Phase. Calculations performed in the Noise and Vibration Impact Study (Appendix J) indicate that LFN is not anticipated to be an issue for surrounding sensitive receptors.

Substantial vibration emissions are not anticipated during the O&M Phase. Project infrastructure will be setback from sensitive areas such that vibration effects will not be experienced by sensitive receptors (FPT [Federal-Provincial-Territorial] Committee on Health and the Environment Working Group on Wind Turbine Noise, 2012).

The Wind Farm, HGP, and HP will be outfitted with permanent lighting during the O&M Phase. Permanent lighting at the HP and HGP will be installed on infrastructure for safety purposes. Wind turbines will be equipped with navigation light fixtures, as necessary, to satisfy requirements of the Transport Canada Standard 621 – Obstruction Marking and Lighting (Standard 621 - Obstruction Marking and Lighting - Canadian Aviation Regulations (SOR/96-433), 2021). Other sources of artificial light include mobile equipment required for the O&M of the HP, HGP, and Wind Farm. The Light Impact Assessment (Appendix I) determined that only a portion of Project lighting would reach sensitive receptors. It is assumed that light would be attenuated by uneven terrain and surrounding vegetation, especially when foliage is in full bloom. The calculated light levels at the identified sensitive receptors are below the limits recommended by the Institution of Lighting Engineers (ILE) guidelines during both pre and post-curfew conditions.

Wind turbines will generate shadow flicker (SF), a phenomenon that occurs when sunlight shines through rotating wind turbine blades, generating an effect of pulsating light and shadow (Haac et al., 2022). SF effects are most pronounced when the sun is low on the horizon, during sunrise and sunset. The intensity of SF decreases with increasing distance from wind turbines, meaning that SF is most apparent to receptors closest to wind turbines. While provincial guidelines for SF currently do not exist, the Government of NL recently passed a Project Release Order that defines maximum SF levels. Released under the NL EPA, NL Regulation 18/24 stipulates that shadow flicker must not exceed 30 minutes per day, or 30 hours per year at residences (Newfoundland and Labrador Regulation 18/24, 2024). A conservative assessment of SF impacts was conducted using the 7.2 MW turbine at each of the 55 potential turbine sites. Based on SF Analysis (Appendix K), the maximum SF levels of 30 minutes per day / 30 hours per year will not be exceeded at sensitive receptors.

Combustion and non-combustion process emissions will be released to air during the O&M Phase. Consumption of fossil fuels in mobile equipment, emergency generator, and flare stacks will generate combustion emissions. Non-combustion process emissions will be vented to the atmosphere to maintain equilibrium of the HP and HGP. Vents at the HP and HGP will be designed such that releases occur at a safe location. Additionally, non-process, non-combustion emissions will be generated from operation of cooling towers at the HP and wind erosion of unpaved surfaces in the PA. Sources of air emissions during the O&M Phase are detailed in Table 2.3.5-4. In addition to emissions detailed in the Construction Phase (Section 2.3.4.1), nominal emissions of volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs) will be generated during the O&M Phase.

Table 2.3.5-4 Air emission sources: O&M Phase.

Emission	Source
Combustion Processes	
Carbon Dioxide (CO_2)	Operation of mobile equipment and emergency generator, flare stacks
Methane (CH_4)	
Nitrous Oxide (N_2O)	
Carbon Monoxide (CO)	
Sulfur Dioxide (SO_2)	
Oxides of Nitrogen (NO_x)	
Particulate Matter (PM)	
Volatile Organic Compounds (VOCs)	Operation of emergency generator
Polycyclic Aromatic Hydrocarbons (PAHs)	
Non-combustion Processes	
Oxygen (O_2)	Operation of HP and HGP
Hydrogen (H_2)	
Nitrogen (N_2)	
Water vapour (H_2O)	Operation of cooling tower
Particulate Matter (PM)	Wind erosion of unpaved surfaces, operation of cooling tower

Table 2.3.5-4 outlines sources that generate air emissions within the PA. Project-related emissions to air will also be generated outside of the PA. Such air emission sources include marine transport of MCH and toluene to and from the receiving facility and electricity consumption from NLH.

Air emissions during the O&M Phase are governed by fossil fuel combustion in mobile equipment, the emergency generator, and flare stacks. Annual fuel consumption requirements, along with GHG emissions associated with fuel combustion, are provided in Table 2.3.5-5. Appendix H1 (Emissions Inventory) details emission calculation methodology for metrics provided in Table 2.3.5-5, as well as indirect emissions and emissions generated from less dominant sources (i.e., non-fossil fuel related emissions). Annual fuel consumption and GHG emissions associated with mobile equipment, emergency generator use, and marine transport were calculated using inputs based on the 30 ktpa production case while flare stack calculations were based on the 60 ktpa LOHC production case.

Table 2.3.5-5 Annual fuel consumption and emissions: O&M Phase.

Operation and Maintenance Activity	Fuel Type	Annual Fuel Consumption (L)	Annual GHG Emissions (tonnes CO_2e)
Within PA			
Mobile Equipment	Diesel	35,584	98
Emergency Generator	Diesel	7,097	19
Flare Stacks	Off-gas[2]	2,974,990	3,362
Outside of PA			
Marine Transport	Diesel	7,932,722 [1]	36,020
[1] Provided as an estimate based on assumed routes and fleet. [2] Composition provided in Table 2.3.5-6			

Annual fuel consumption and GHG emissions for emergency generator used were calculated based on worst-case scenario: it was assumed that annual usage will not exceed 100 hours per year for the lifetime of the Project. Since the emergency generator will only run at full capacity during upset conditions (i.e., when electricity supply is interrupted), actual emissions are anticipated to be negligible. In addition to metrics provided in Table 2.3.5-5, GHG emissions were calculated for electricity consumption. For this analysis, it was assumed that the Project will require 120 MW of power from the provincial power grid, an annual grid energy draw of 322,000 MWh, amounting to 5,465 tonnes CO_2e per year.

The Project will require 7 MW of firm power to ensure an uninterrupted supply for critical systems such as safety infrastructure, control systems, and essential process equipment. Additionally, the Project will require 113 MW of non-firm power, supplied on an as-available basis, to support less critical or interruptible loads like electrolysis and auxiliary processes. This arrangement allows the Project to leverage surplus grid capacity when available, while minimizing strain on the provincial power system. Coordination with NLH and Newfoundland Power (NP) will be essential to manage supply reliability, grid integration, and long-term planning for both firm and non-firm power needs.

The HP will be equipped with two flares: one used during normal operations (‘LOHC flare’) and another for emergencies (‘emergency flare’). The LOHC flare will be used to maintain equilibrium of the plant, whereby a small purge stream of off-gas will be released from the hydrogenation unit to prevent excessive accumulation of light hydrocarbons. Off-gas will be directed to a flare knockout drum to allow liquids and solids entrained in the stream to settle prior to combustion in the flare. Purged off-gas will be safely flared to the atmosphere. The estimated composition of the off-gas is provided in Table 2.3.5-6. Maximum emission rates of the LOHC flare are provided in Appendix H2 (Air Dispersion Modelling Study).

Table 2.3.5-6 Estimated off-gas composition.

Component	Unit	Value
Hydrogen	wt %	12.19
Methane	wt %	66.82
n-Hexane	wt %	0.9
Methyl cyclopentane	wt %	0.14
Cyclohexane	wt %	0.14
n-Heptane	wt %	0.03
Dimethyl cyclopentane	wt %	Trace
Methyl cyclohexane	wt %	19.72
Ethyl cyclopentane	wt %	0.04
Dimethyl cyclohexane	wt %	0.02

The emergency flare will be used to manage process upsets, maintenance, start-up, and shutdown in rare emergency scenarios when the LOHC flare is not operational. There is no operational configuration where both flares are operating simultaneously.

Atmospheric discharges were also estimated for the cooling tower and emergency generator, should it be required during the O&M Phase. It was assumed that one cooling tower with five cells will be required to operate for the duration of the O&M Phase. The emergency generator will be required to supply 300 kW of standby (i.e., emergency) power to support the Project in the event of a power loss. It was assumed that the emergency generator will be used for a maximum of 96 hours per year (i.e., one day per quarter). Appendix H1 (Emissions Inventory) and H2 (Air Dispersion Modelling Study) details atmospheric discharges of all air contaminants, as well as calculation methodology and associated assumptions.

2.3.5.8 O&M Solid and Liquid Waste Generation

Expected waste streams for the Project during O&M will vary by component and will be subject to the same regulations noted under Section 2.3.4.14. Liquid waste from the HGP will potentially include impurities from feedwater like filtration sludge, cleaning solutions, and cooling water blowdown. Per Section 2.3.2.6, gasoline and diesel blending products will be produced as liquid byproducts in the HP. These liquid biproducts hold significant commercial value and will be marketed as such. Solid waste may include filter cartridges and membranes from the purification systems, and membranes/electrodes/catalysts from the electrolyzer. Liquid waste from the HP will potentially include thermal oil residues, carrier degradation products, and solvents/cleaners. Solid waste may include spent catalyst which requires special handling. Spent catalysts or LOHC degradation products, must be managed through approved hazardous waste handlers. There could also be contaminated absorbents/filters from the purification or scrubbing processes.

2.3.6 Decommissioning and Rehabilitation

The Project Decommissioning and Rehabilitation Plan (DRP) associated with all aspects of work within the PA will be developed and finalised once all Project infrastructure has been finalised to allow for a properly scoped plan prior to commencement of decommissioning and rehabilitation activities. Decommissioning and rehabilitation activities will aim to restore disturbed sites to the original state at the discretion of the landowner. The preliminary DRP will be dynamic, and wherever practical, rehabilitation measures will be implemented progressively as opportunities arise throughout the lifetime of the Project. All permits, licences, and other authorisations required for the decommissioning and rehabilitation will be obtained as required.

During all phases of the Project, equipment and infrastructure will be demobilised when it is no longer required or beyond reasonable repair. Equipment will be carefully removed, and infrastructure no longer required will be taken down in reverse order of setup. Demobilised materials and equipment will be removed from the site to an appropriate storage, transfer, recycling, or licensed waste management facility as per the Waste Management Plan (Appendix N).

After cessation of operations of the Project, North Atlantic sites will be fully demobilised and decommissioned. Note that North Atlantic's existing approved infrastructure, including the Terminal, jetty, and tank farm, will continue to be operational for purposes other than the Project, and are not considered further in this section. Similarly, public roads will remain. Rehabilitation activities aim to restore the land directly disturbed by the Project, in an environmentally responsible and safe manner, and typically include:

- Removal of all hazardous chemicals, reagents, and materials from the Wind Farm, HGP, and HP facilities for off-site disposal by a licensed waste management contractor;
- Demolition and removal of all above-grade buildings, foundations (to 300 mm below grade) and other infrastructure (e.g., overhead piping, electrical cables) no longer required;
- Reduction of waste via shipping and sale of salvageable material if prevailing salvage markets and scrap prices and associated economics permit;
- Removal and disposal of all non-salvageable and non-hazardous demolition debris into a licensed off-site waste disposal facility;
- Cleanup of all surface yards including removal and appropriate disposal of all equipment and materials;

- Assessment of soil contamination in the area of the surface facilities and implementation of appropriate management measures (i.e., remediation or Human Health and Ecological Risk Assessment) to address contaminated soils if identified;
- Removal of fences or gates, scarifying of gravel access roads and restoration of natural drainage patterns wherever practical;
- Overburden and topsoil replacement and re-contouring of land if required;
- Spreading of organic materials and seeding to re-establish vegetation on all site development areas; and
- Implementation of required corrective measures and monitoring to address environmental concerns as required to comply with environmental regulations in place at the time.

North Atlantic will continue to seek solutions and improve the decommissioning and rehabilitation strategy as the Project progresses, considering best available technologies. Rehabilitation methods will be adapted according to the ecosystemic functions of the original site. Specific decommissioning and rehabilitation practices are further discussed pertaining to select Project infrastructure and equipment below.

Decommissioning of the wind turbines will involve operational shutdown and electrical isolation. Blades will be detached using cranes and either cut into transportable pieces or removed whole. The nacelle, which houses the main components including the gearbox, generator, controller, and braking system, will then be removed from the tower using cranes. The tower will be dis-assembled in sections, followed by foundation removal. The foundation, typically composed of concrete and rebar, will be excavated to 300 mm below grade. Once all materials have been removed from the site to the appropriate storage, transfer, recycling, or waste management facility, the excavated area will be filled with suitable native soil. The site will be revegetated as necessary so that it is restored to original conditions.

Components of the disassembled wind turbines will be diverted from landfills where practices are established. For example, metals such as steel, copper, and aluminum can be recycled or repurposed. Used electronics, oils, and other hazardous wastes will be properly handled and disposed of according to applicable waste management and transportation guidelines. Wind turbine blades are typically composed of thermoplastic coatings, thermoset/glass and carbon fibre composites such as fibreglass or glass fibre-reinforced polymer (GFRP), balsa wood, and adhesives or resins (such as epoxy, polyester, or vinyl ester) (Muzyka et al., 2023). Repurposing or recycling of wind turbine blades are currently less straight-forward than other components of wind turbines, however most blades can be shredded or otherwise broken down prior to offsite removal to reduce transportation costs. Newer recycling technologies are emerging in North America, Europe, and Asia such as high-voltage pulse fragmentation, microwave pyrolysis, and fluidised bed gasification (Paulsen & Enevoldsen, 2021) so that constituents can be transformed into suitable feed materials for industries such as construction (concrete and asphalt) or manufacturing industries (Regen Fiber, 2025). Methods of mechanically recycling decommissioned blades include shredding or cutting into small pieces suitable for fillers or reinforcements in the production of cement (Khalid et al., 2023). Vestas, a major supplier of wind turbines, is testing a chemical recycling process for epoxy-based blades currently in operation in Europe with the goal of producing new wind turbine blades made from re-used blade material (Vestas Wind Systems A/S, 2023). Other manufacturers are studying different ways to produce blades with more recyclable resins or plant-based materials (Melody M. Bomgardner, 2020). Repurposing and recycling of wind turbine blades is a global sustainability challenge and is not an issue unique to this Project (Khalid et al., 2023). To that end, North Atlantic does not intend to bury or incinerate any wind turbine blades onsite and commits to exploring options for repurposing or recycling wind turbine components upon decommissioning, where possible.

The decommissioning and rehabilitation of the HGP and HP will involve the dismantlement of the electrolyzers, water treatment systems, and materials handling systems. Recyclable materials and components suitable for repurposing will be salvaged wherever possible. Buildings not designated for redevelopment or other uses beyond the end of Project life will be demolished, building foundations will be removed, and the sites will be cleaned and graded.

Above-ground pipelines and storage tanks associated with the Project will be purged, cleaned, disassembled or demolished as appropriate, and removed from site. Decommissioning of electrical infrastructure that is the property of North Atlantic will proceed once they are no longer required to support any rehabilitation activities at Wind Farm, the HGP, or HP. Electrical power distribution and/or transmission poles, towers, and cabling will be disassembled and removed. Powerlines and inactive conductors will be removed in a safe manner in accordance with approvals. Decommissioned electrical infrastructure will be considered for reuse or recycling wherever possible (such as wood or metals) or transported to an appropriate facility for disposal. Portions of this decommissioning activity will involve cranes and a specialist contractor. Underground electrical cables will be removed to 300 mm depth. Above-ground concrete footings will be removed and managed with other demolition concrete.

2.3.6.1 Emissions and Energy Use

The Decommissioning and Rehabilitation Phase of the Project will have similar fuel consumption requirements as the Construction Phase. As such, emissions generated from within the PA from fossil fuel consumption will be comparable to, and likely not exceed, those detailed in Section 2.3.5.1. Additionally, mobile equipment requirements for decommissioning and rehabilitation will be similar to those outlined in Table 2.3.5-1.

2.4 Alternative Methods of Carrying Out the Undertaking

North Atlantic considered several alternatives in the process of developing the optimal project – a project that is financially viable, employs proven but innovative technology, has minimal negative environmental effects and addresses sustainability objectives in an environmentally responsible manner.

One major alternative considered was the “no project” scenario. The Government of NL, through its wind energy process, awarded a Crown land reserve around the Isthmus of Avalon region to North Atlantic. The Project proposes to develop a Wind Farm in the Sunnyside area, with the HGP and HP located in Come By Chance, utilising the existing NARL Logistics Terminal. The failure or withdrawal of the Project would likely be viewed as a significant setback to the Province’s Renewable Energy Strategy. While the “no project” alternative would eliminate potential negative effects on the biophysical and socio-economic environments in the Placentia Bay and Trinity Bay regions, it would also prevent the Project’s anticipated benefits, particularly the socio-economic opportunities associated with the installation of an onshore Wind Farm to power the production of green hydrogen for export. Given the site-specific nature of the awarded Crown land reserve and existing infrastructure, relocation of the Project is not considered a viable alternative.

Several alternatives within the Project remain under evaluation, with final decisions pending as the design and technology is refined. Wind Farm alternatives include the selection of the wind turbine model and siting considerations for the wind turbines and associated linear features. Hydrogen production and transport alternatives include the selection of electrolysis technology, energy storage solutions, hydrogen carrier options, water supply selection, wastewater treatment system, and product storage, transfer, and shipment. Where multiple design and technology options remain under consideration, the evaluation of alternatives will consider the greatest potential for environmental interaction. This conservative approach ensures that if another alternative is selected in the future, it will likely result in equal or lesser environmental effects.

2.4.1 Wind Farm Alternatives

2.4.1.1 Wind Turbine Capacity Considerations

The Project has evaluated a range of wind turbine sizes and configurations to identify the optimal model, including wind turbines with rated capacities of 6.2, 6.8, and 7.2 MW. The selection process considered factors such as rated power capacity, rotor diameter, and tower height to ensure suitability for the site’s wind conditions. The preferred option for the Project is a wind turbine with a rated capacity of 7.2 MW. These wind turbines feature a rotor diameter of 162 m and stand approximately 119 m from base to hub. Final design configurations will depend on wind condition assessments and site-specific suitability analyses. As a result of the larger generating capacity of the 7.2 MW wind turbines, the Project will achieve higher annual energy production per wind turbine and will incur less in operational and capital expenditures. In contrast, achieving the Project's 324 MW generation capacity would require a greater number of 6.2 or 6.8 MW wind turbines, which may increase costs and complexity. The Project also considered wind turbines from multiple manufacturers (e.g., Vestas, Siemens Gamesa, General Electric, Nordex), ensuring flexibility in design and procurement.

2.4.1.2 Siting Considerations

The initial wind turbine layout was designed to maximise energy production based on a wind resource assessment using Wasp V11.06.0028 (Hatch, 2025). Wind turbines were grouped to minimise construction costs while maintaining appropriate distance to minimise wake effects. Further refinement of wind turbine location was guided by a combination of factors including:

- Greater than 1,000 m setback from dwellings, with greater than 1,500 m having been achieved in most locations;
- Conflicts with other land uses or users;
- Development restrictions (no placement of wind turbines inside of the PPWSA);
- Soil and foundation suitability; and
- Ease of access for both construction and ongoing maintenance.

Preliminary road and transmission line routes have been determined based on surface characteristics, including existing roads and trails, the presence of wetlands or sensitive habitats (particularly those supporting SAR), natural terrain gradients, and design requirements such as road grade and turning radius and constructability.

As additional site-specific information becomes available, there may be adjustments to the wind turbine layout and linear features to improve efficiencies for the Project, and to minimise physical disturbance to vegetation cover and topographical features. All infrastructure will remain within the PA and will be strategically located to minimise environmental effects and adhere to regulations.

2.4.2 Hydrogen Production and Transport Alternatives

2.4.2.1 Hydrogen and Energy Storage

Conventional design for wind-to-hydrogen production facilities dictates that both the HGP and HP will require minimum feeds of electricity and/or hydrogen to maintain system stability during periods of insufficient wind electricity generation. Various alternatives to provide this were evaluated in system optimization modelling.

LOHC technology has been selected as the hydrogen carrier partially due to its capability to handle variations in hydrogen flow rate to the facility. To demonstrate this, a HGP hydrogen production profile has been developed based on 22 months of measured wind data from the PA, thereby quantifying the maximum rate of change in hydrogen feed to the HP facility. LOHC technology licensors have developed HP dynamic process simulations based on the hydrogen production profile, which demonstrate LOHC technology can accept rates of change in hydrogen production of more than three times of that present in the hydrogen production profile. Further, LOHC technology licensors have provided process guarantees at the expected rates of change, for continuous turndown operation at 20% of maximum design hydrogen feed rate, and for warm-idle operation where no new hydrogen is fed to the HP and minimal power (<5 MW) is required to maintain system stability. As such, with the selection of LOHC as the carrier technology, the HGP and HP do not have a requirement for hydrogen storage or energy storage.

2.4.2.2 LOHC versus Ammonia

Alternative hydrogen carrier technologies were considered for hydrogen storage and overseas transport to international markets. Green hydrogen as ammonia was assessed in comparison to the proposed LOHC approach. The LOHC technology was determined to be safer, more technically viable, more economical, and more environmentally friendly for the Project.

The ammonia technology combines hydrogen generated from electrolysis with nitrogen. The derived ammonia exists in gaseous form under ambient conditions and will require intensive pressurisation (8.5 atm) and/or cooling (-33°C) to achieve liquefication. Alternatively, generated hydrogen can combine with toluene to generate MCH, which will stay in liquid form under ambient conditions and can be transported similarly to conventional liquid fuels. Although MCH and toluene are flammable and mildly toxic, adopting the LOHC technology will eliminate safety concerns associated with flammable toxic gas transport. Both technologies were further assessed on technology readiness, derived hydrogen purity, and energy consumption for conversion, with the LOHC technology deemed more favourable in all these aspects. LOHC technology can also utilise existing NARL Logistics infrastructure, which will reduce infrastructure investment, construction time, and additional land disturbance. Given the existing NARL Logistics Terminal setup and operation history, adopting LOHC technology presents the better option for the Project, as it will reduce cost, uncertainty, safety risks, and potential impact on undisturbed environments.

2.4.2.3 Water Supply Selection

Alternative water supplies were considered near the NARL Logistics Terminal, where the HGP and HP will be located; however, several constraints render these alternatives unviable. Supplying the electrolyzers with seawater is currently not technically and economically feasible. Alternative freshwater sources include Freshwater Pond approximately two km east of the Terminal, water within the Little Mosquito Pond watershed approximately six km east of the Terminal, and water within the Butcher's Pond PPWSA approximately five km northeast of the Terminal. Freshwater Pond has a smaller drainage area than Inkster's Pond industrial water supply area; withdrawing water from that pond will be more likely to encounter water deficiency, and lead to a greater percentage of outflow reduction to its downstream areas. Utilising water for hydrogen production at Little Mosquito Pond and Butcher's Brook watersheds will impact industrial operations at the Bull Arm Fabrication Site and Come By Chance's public water supply, respectively.

The existing industrial water supply at Inkster's Pond (licensed under WUL-14-057) will have sufficient water for both Braya and the Project needs (Appendix C). Utilising this existing industrial water supply will be the most technically feasible and economically viable option and will also minimise environmental impacts on other watersheds.

2.4.2.4 Wastewater Treatment System

Alternative wastewater treatment solutions for the demineralization wastewater from the HGP include constructing a new wastewater treatment plant and selecting a different outfall location. These alternatives were evaluated in comparison of utilising the existing wastewater treatment system to treat effluent from both Braya and the Project. The effluent dispersion model presented in Appendix B2 analyzed the effect on the marine environment if both the Project demineralization wastewater and surface water runoff from the HGP were directed to Braya's current outfall infrastructure (Figure 2.3.1-2). Sanitary effluent was not considered as it will be discharged to a new septic system as described in Section 2.3.1.4. This model evaluated the effects from the combined effluent stream from the Project (i.e., demineralization wastewater) and Braya. Potential changes to surface water runoff resulting from the Project were not incorporated in Appendix B2. However, Braya's existing effluent treatment system already collects and treats surface water runoff from the Come By Chance Industrial Site, so no significant changes to the model were anticipated.

This study utilizes three-dimensional near-field modelling to assess dilution patterns resulting from a proposed marine outfall discharge, with a focus on near-field mixing dynamics in the Bay of Come By Chance (Appendix B2). Simulations were conducted under typical summer and winter ambient conditions using the CORMIX model to evaluate temperature and salinity changes due to effluent dispersion. The primary objective was to evaluate compliance with the CCME CEQG at the boundary of the defined mixing zone.

According to CCME guidelines for the protection of aquatic life, human activities should not cause changes in the ambient temperature or salinity of marine and estuarine waters exceeding ±1°C or 10% of natural levels, respectively, at any given time, location, or depth (CCME, 1999b; CCME, 1999a).

Characteristics of the receiving water body were obtained through CTD and temperature profiling conducted during the marine baseline study (Appendix B1), supplemented with historical mooring data (Appendix B2). A conservative ambient current velocity of 5 cm/s and predicted effluent discharge parameters were incorporated into the model. Four base case scenarios (0.01°C for winter and 15.33°C for summer) and two additional high-temperature (32°C) scenarios were simulated, resulting in a total of six near-field modelling simulations.

The CCME guideline criteria for marine water temperature was met at relatively short distances from the discharge point in all but one scenario, high-temperature effluent discharge under summer conditions without current. Key findings from the simulations are summarized below:

1. Summer Scenario without Current (Scenarios 1 & 2 without Current):
    - For both Scenarios 1 and 2, temperature decreased to below 1°C within 159 seconds at a distance of 8.23 m from the source.
    - For Scenarios 1 and 2, salinity decreased to below 10% of ambient levels (3.00 PSU) within 10 and 8 seconds, at distances of 1.17 m and 0.97 m from the source, respectively.
2. Summer Scenario with Current (Scenarios 1 & 2 with Current):
    - For both Scenarios 1 and 2, temperature decreased to below 1°C within 29 seconds at a distance of 2.24 m from the source.
    - For Scenarios 1 and 2, salinity decreased to below 10% of ambient levels (3.00 PSU) within 4 and 3 seconds, at distances of 0.49 m and 0.38 m from the source, respectively.
3. Winter Scenario without Current (Scenarios 5 & 6 without Current):
    - For both Scenarios 5 and 6, temperature decreased to below 1°C within 23 seconds at a distance of 2.25 m from the source.
    - For Scenarios 5 and 6, salinity decreased to below 10% of ambient levels (3.05 PSU) within 13 and 4 seconds, at distances of 1.45 m and 0.53 m from the source, respectively.

4. Winter Scenario with Current (Scenarios 5 & 6 with Current):
    - For both Scenarios 5 and 6, temperature decreased to below 1°C within 7 seconds at a distance of 0.79 m from the source.
    - For Scenarios 5 and 6, salinity decreased to below 10% of ambient levels (3.05 PSU) within 5 and 2 seconds, at distances of 0.60 m and 0.27 m from the source, respectively.
5. High-Temperature Effluent Under Summer Scenario without Current (Scenarios 3 & 4 without Current):
    - For both Scenarios 3 and 4, temperature decreased to below 1°C within 3,319 seconds at a distance of 33.73 m from the source.
    - For Scenarios 3 and 4, salinity decreased to below 10% of ambient levels (3.00 PSU) within 10 and 8 seconds, at distances of 1.17 m and 0.97 m from the source, respectively.
6. High-Temperature Effluent Under Summer Scenario with Current (Scenarios 3 & 4 with Current):
    - For both Scenarios 3 and 4, temperature decreased to below 1°C within 128 seconds at a distance of 6.64 m from the source.
    - For Scenarios 3 and 4, salinity decreased to below 10% of ambient levels (3.00 PSU) within 4 and 3 seconds, at distances of 0.49 m and 0.38 m from the source, respectively.

The most challenging conditions for mixing and dispersion occurred in the high-temperature summer scenario without current, where compliance with temperature guidelines was achieved within 33.73 m from the effluent source. Among the remaining scenarios, the standard summer condition without current required the longest mixing distance (8.37 m) to achieve compliance. The longest mixing distance to achieve compliance for salinity occurred at 1.45 m where effluent salinity of 25.48 PSU and without current was used. Due to the severity of this model utilizing the outfall from Braya, a second model is presented and described in Section 3.2.2.7 where a new outfall location will be built on the north side of the jetty (Appendix B3). This is now considered the more favorable option as the model predicts less environmental impact compared to the alternative.

The existing wastewater treatment system has functioned well historically and met regulatory requirements at a petroleum refinery production of 130,000 barrels per day (bbl/d), until the refinery was closed in 2020 and reoperated in 2024 to produce renewable diesel at 18,000 bbl/d. With the downscaling and conversion of the crude oil refinery into renewable diesel and hydrogen production, the load of the wastewater treatment system has been reduced. Therefore, the existing wastewater treatment system will be sufficient for future needs.

2.4.2.5 Product Storage, Transfer, and Shipping

Alternative methods for storing, transferring, and shipping LOHC include constructing new storage tanks, transfer pipelines, and shipping infrastructure. These alternatives were assessed in comparison with upgrading and retrofitting the existing infrastructure at the NARL Logistics Terminal. The latter was determined to be more advantageous in environmental, technical, and economical aspects.

The existing infrastructure has historically supported a refinery production of 130,000 bbl/d. This system has stored and transferred flammable gases (e.g., propane) and liquids (e.g., gasoline) like hydrogen and LOHC. Conversion and repurposing of existing infrastructure at the Come By Chance Industrial Site has been completed with the start of the Braya Refinery to produce renewable diesel at 18,000 bbl/d in 2024, demonstrating the feasibility of future upgrades. Utilising and upgrading the existing system will also avoid additional land disturbance, thereby minimising the Project's environmental footprint.

2.4.3 Logistics Considerations

Logistics are a critical component of the Wind Farm development, involving the coordinated transport of large and delicate components such as blades, towers, and nacelles. This process will require detailed transportation planning to determine feasible routes that can accommodate oversized loads, accounting for road geometry, bridge clearances, turning radii, and weight restrictions. Environmental and community concerns will also be assessed with the aim to reduce disruption during transport operations.

Logistics execution will need to be managed closely with all stakeholders including but not limited to vendors, contractors, ocean carriers, port operators, heavy haulers, local authorities, utility providers, landowners, the North Atlantic team, and the overall Project team to make sure all cargo is delivered at each site in line with the construction schedule.

All deliveries to the Wind Farm site will be by road transport. The various equipment and components to be transported will require different types of trailers based on their dimensions and weights. It is important to note that different transporters may use different types of trailers and configurations. In addition to transportation, the physical readiness of the Wind Farm site is essential. Access roads must be built to handle the heavy equipment and large trucks delivering the components. Adequate staging areas, crane pads, and laydown yards must be established to support offloading and assembly.

Ocean transportation logistics will be a key part of Project planning. To avoid delays in executing the Project, ocean transportation will need to be planned and organised early. Since Newfoundland is an island, all materials and equipment sourced outside of the island will necessitate ocean transportation to a port of entry. Containerised cargo will transit via the ports of Montreal or Halifax before being redirected to the Port of St. John's as they are the only two ports with direct sailings to and from St. John's.

Breakbulk cargo such as the wind turbine components will transit via geared multipurpose vessels for unloading at the Bull Arm Fabrication Site, in St. John's, or tug berth located on the NARL Logistics Terminal depending on the sizes and weights, quantities, and timing. Most of the equipment associated with the HGP will be relatively small and should be transported in containers or on flat racks via the Port of St. John's. If opportunities for consolidating cargo in a port located in Canada or overseas are identified, and if beneficial, the Project may also consider chartering a small vessel and unload cargo for the HGP at the tug berth. A more detailed evaluation of the different ports and wharves that the Project can use to deliver cargo and overall shipping schedule will be undertaken as part of the next Project phase.

As the Project design progresses, a more detailed logistics study will need to be performed to develop the optimal logistics strategy for each section of the Project. Many other logistics factors will need to be considered, including the Incoterms Strategy, the customs clearance strategy for all international shipments, the transport and marine insurance coverage, and the packing, marking, and shipping requirements.

2.5 Regulatory Framework

Following the April 5, 2022, announcement by the Honourable Andrew Parsons, former Minister of Industry, Energy and Technology, which lifted the moratorium on wind development in NL, the private sector is now able to generate electricity from wind energy for both their own consumption and export. This proposed undertaking aligns with current government policy and is committed to meeting all applicable regulatory requirements.

The NL EPA and associated Environmental Assessment Regulations outline the primary environmental regulatory requirements for this and similar undertakings. This Registration is submitted as the initial step in the environmental regulatory process. Following a determination by the Minister under the NL EPA, additional permitting and approvals can be issued, as appropriate. Certain early-stage Project activities, such as the installation of meteorological towers to assess wind resource potential, may proceed in parallel, provided they comply with all relevant federal, provincial, and municipal permitting requirements. Typically, the remaining environmental permits and approvals are obtained once the Project receives release from the EA review process. These permits and approvals are listed in Section 2.5.2.

The Project will also be subject to applicable provisions of Federal legislation, even in cases where specific permits or approvals are not explicitly required, including:

- **Canadian Environmental Protection Act, 1999** (CEPA);
- **Fisheries Act**;
- **Species at Risk Act** (SARA);

- **Migratory Birds Convention Act, 1994** (MBCA);
- **Aeronautics Act**;
- **Canadian Navigable Waters Act**;
- Environmental Emergency Regulations; and
- Federal Policy on Wetland Conservation.

To minimise potential adverse environmental effects and enhance positive outcomes, principles of sustainability and environmental and social responsibility are integrated into North Atlantic's internal resource management plans. These plans are embedded within North Atlantic's organisational and approval framework. As outlined in Section 4.6, several such plans will apply throughout the Project. These management plans may also address conditions of approval under the environmental registration process.

Portions of the physical boundaries of the Project fall within the Town of Come By Chance and Town of Sunnyside municipal planning areas. The HGP and HP infrastructure will be located on existing North Atlantic property within the NARL Logistics Terminal. The linear roads and transmission lines are located on Crown land. The Wind Farm area is situated within the provincial Crown lands Wind Energy Land Reserve. Therefore, federal, provincial and municipal regulatory agencies will be involved in the permitting approval process.

2.5.1 Environmental Assessment

There are two processes that could apply to the Project – federal and provincial.

Federal

The Government of Canada **Impact Assessment Act, 2019** (IAA 2019) is the legislative basis for federal EA in Canada. Federal EA focuses on potential Project effects that are within federal jurisdiction, including on:

- Fish and fish habitat;
- Other aquatic species;
- Migratory birds;
- Federal lands;
- Effects that cross provincial or international boundaries;
- Effects on Indigenous peoples, such as their use of lands and resources for traditional purposes; and
- Changes to the environment that are directly linked to or necessarily incidental to any federal decisions about a project.

The Physical Activities Regulations issued under IAA 2019 list projects and industries which would be subject to federal EA. There are no evident triggers for federal assessment from the legislation for this Project. These regulations clearly exclude land-based wind energy developments. The Minister of Environment and Climate Change Canada (ECCC) may, however, designate a project that is not currently listed in the regulations if there is the potential for environmental effects in areas of federal jurisdiction or in response to public concerns about such effects.

Provincial

The NL EPA includes Environmental Assessment Regulations (Part 3), which specify the types of projects that require registration and review. In addition, the Minister has the authority to order an environmental impact assessment for any project. The North Atlantic Project is subject to Registration under the provincial environmental assessment process. On April 6, 2022, NL EAD issued "*Environmental Assessment Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects*", a guideline tailored specifically to the wind-to-hydrogen sector. This document supplements NL EAD's general guide, "*Environmental Assessment – A Guide to the Process*".

Once a project registration document is received and accepted, the Minister of Environment and Climate Change initiates a public and government review of the submission. Following this review, the Minister will decide whether the Project may proceed, potentially with terms and conditions and subject to other applicable legislation, or if further assessment is required.

2.5.2 Approvals

Table 2.5.2-1 provides a preliminary list of permits, approvals, licences, and authorisations that may be required for the Project. This list will be regularly monitored and updated throughout all phases of the Project.

Table 2.5.2-1 List of Potential Permit/Approval/Licence/Authorisation Requirements for the Project.

Permit / Approval / Licence / Authorisation	Legislation / Regulation Reference	Agency
Municipal		
Development Permit	**Urban and Rural Planning Act** • Town of Come By Chance Development Regulations • Town of Sunnyside Development Regulations	Town of Come By Chance and Town of Sunnyside
Provincial		
Environmental Assessment Approval	**Environmental Protection Act** and Environmental Assessment Regulations	Department of Environment and Climate Change -

Permit / Approval / Licence / Authorisation	Legislation / Regulation Reference	Agency
		Environmental Assessment Division
Certificate of Approval for Construction and/or Operation of Industrial Facilities	**Environmental Protection Act**	Department of Environment and Climate Change - Pollution Prevention Division, Industrial Compliance Section
Certificate of Approval for Generator Operation	**Environmental Protection Act** and Air Pollution Control Regulations	
Development Activity in a PPWSA	**Water Resources Act**	Department of Environment and Climate Change - Water Resources Management Division
Permit to Alter a Body of Water (Culvert, Bridge, Dam, Fording, Pipe Crossing/Water Intake, Stream Modification, Infilling/Dredging, Flood Risk Area, Miscellaneous works within 15 m)		
Water Use Licences		
Commercial Cutting Permit	**Forestry Act**	Department of Fisheries, Forestry, and Agriculture
Operating Permit		
Crown Lands Lease	**Lands Act**	Department of Fisheries, Forestry, and Agriculture - Lands Branch
Archaeological Investigation Permit	Archaeological Investigation Permit Regulations**, Historic Resources Act**	Department of Tourism, Culture, Arts and Recreation
Permit to Engage in an Economic Activity under the Endangered Species Act (Section 19)	**NL Endangered Species Act** (NL **ESA)**	Department of Fisheries, Forestry, and Agriculture – Wildlife Division
Permit to Control Nuisance Animals	**Wildlife Act**	
Quarry Development Permit	Quarry Materials Act, Quarry Materials Regulations	Department of Industry, Energy, and Technology, Mining and Mineral Development
Building Accessibility Registration Exemption Request and Fire and Life Safety Plans Review (National Building Code of Canada)	**Building Accessibility Act, Fire Protection Services Act**	Digital Government and Service NL
Certificate of Approval for Waste Management System (Landfill or Incinerator if applicable)	**Environmental Protection Act,** Air Pollution Control Regulations, Storage of PCB Wastes Regulations and Waste Management Regulations, 2003	
Certificate of Approval for a Sewage/Septic System	**Health and Community Services Act**	
Food Establishment Licence	**Food Premises Act** Food Premises Regulations	
Fuel Storage Tank Registration	Storage and Handling of Gasoline and Associated Products Regulations, 2003, **under the Environmental Protection Act**	
Blasters Safety Certificate	**Occupational Health and Safety Act**	

Permit / Approval / Licence / Authorisation	Legislation / Regulation Reference	Agency
Pressure System Permits (including Pressure Plant and Pressure Piping System Registrations)	**Public Safety Act,** Pressure Vessel and Compressed Gas Regulations	
Electrical Permits	**Public Safety Act,** Electrical Regulations	
Electrical System Interconnection	**Electrical Power Control Act**	NLH / Public Utilities Board of NL
Electrical Connection to Provincial Grid	**Public Utilities Act**	
Preliminary Permit to Develop Land (Highway Access Permit)	**Urban and Rural Planning Act,** Protected Road Zoning Regulations, & **Works, Services and Transportation Act**	
Used Oil or Glycol Storage Application for Registration / Approval	Used Oil and Used Glycol Control Regulations, Used Oil Control Regulations	
Certificate of Approval for Transportation of Waste Dangerous Goods / Hazardous Waste	**Environmental Protection Act**	Department of Environment and Climate Change; Pollution Prevention Division, Waste Management Section
Federal		
Fisheries Act Authorisation Permitting harmful alteration, disruption or destruction of fish habitat, and/or the death of fish.	**Fisheries Act**	Fisheries and Oceans Canada
DND Letter of Non-Objection	**Civil Air Navigation Services Commercialisation Act**	Department of National Defense
License to Store, Manufacture, or Handle Explosives	**Explosives Act**	Natural Resources Canada
Migratory Bird Permit	**Migratory Birds Convention Act**	Environment and Climate Change Canada – Canadian Wildlife Service
Nest Removal Permit		
Permits Authorising an Activity Affecting Listed Wildlife Species	**Species at Risk Act**	
Storage Tank Regulations	Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations, **Canadian Environmental Protection Act, 1999**	Environment and Climate Change Canada
Weather Radar Assessment	ECCC Guidelines for Wind Turbine and Weather Radar Siting	
Notice Regarding Substances Located at a Facility (Schedule 2)	Environmental Emergency Regulations, 2019	
Notice Regarding the Preparation of an Environmental Emergency Plan (Schedule 3)		
Notice Regarding the Bringing Into Effect of an Environmental Emergency Plan (Schedule 4)		
Notice Regarding Simulation Exercises (Schedule 5)		

Permit / Approval / Licence / Authorisation	Legislation / Regulation Reference	Agency
Reporting Requirements of the National Pollutant Release Inventory (NPRI)	**Canadian Environmental Protection Act, 1999**	
Land Use Approval (General)	**Civil Air Navigation Services Commercialisation Act**	Nav Canada
Land Use Approval (Cranes)		
Emergency Response Assistance Plan	**Transport of Dangerous Goods Act**	Transport Canada
Aeronautical Assessment for Obstruction Evaluation	**Aeronautics Act;** Canadian Aviation Regulations	
Approval under the Canadian Navigable Waters Act (CNWA)	**Canadian Navigable Waters Act (CNWA)**	

3.0 Environment

This section provides an overview of the biophysical and socio-economic environments in their current state, i.e., before the initiation of the proposed Project. Specifically, Section 3.1 provides a description of the baseline conditions and the various Valued Components (VCs) that may interact with the Project. These VCs include elements of the atmospheric, aquatic, terrestrial, and socio-economic environments, including land and resource use (LRU), and the status of heritage and cultural resources.

Section 3.2 describes the baseline studies conducted for the Project, including summaries of survey methods, synopses of results, and data gaps. The full reports for the baseline studies can be found in Appendices B through L.

Finally, Section 3.3 describes the predicted future condition of the environment over the expected lifespan of the Project were it not to proceed.

3.1 Description of Existing Environment and Valued Components

The PA has three main components, the NARL Logistics Terminal (the ‘Terminal’), the wind turbine area (the ‘Wind Farm’), and the ‘Linear Corridor’ comprising roads and transmission lines that link the two areas. Each component has a relatively different landscape context, both in terms of the level of anthropogenic influence as well as the ecotypes (i.e., habitat cover types) present. Generally, the level of historical human activity decreases from west to east within the PA, from the highly industrialized Terminal, along the Linear Corridor that parallels existing infrastructure, and finally to the relatively untouched rocky hilltops of the Wind Farm.

The proposed footprint for the new infrastructure at the Terminal is within the boundaries of the developed area used by the oil refinery over the past 50 years. The Linear Corridor will contain a transmission line to deliver electricity from the Wind Farm to the HGP and HP. The Linear Corridor will transit several habitat types ranging from rocky outcrop features of the Wind Farm, coniferous forests and wetlands along the corridor, and brownfield ecotypes at the Terminal.

VC selection was based on guidance provided by various regulatory agencies. Within each VC, Key Indicators (KIs) were assigned to encompass the full suite of potential and anticipated interactions with the Project. The focus of this section is to provide a baseline description of the suite of KIs for each VC.

3.1.1 Atmospheric Environment

The scope of the atmospheric environment VC includes regional climate, greenhouse gas (GHG) emissions, air quality, light, vibration, and noise. Information from regulatory agencies and baseline studies has been consolidated into the following subsections, to present an overview of existing atmospheric conditions.

3.1.1.1 Regional Climate

The 1991 to 2020 Climate Normals, averages, and extremes from the Dunville/Argentia meteorological station (Climate Identification (ID): 8401528 / 8400104) are presented in Table 3.1.1-1 (Government of Canada, 2024). Meteorological stations were also active at Come By Chance and Sunnyside, but data collection concluded in June 1995, therefore the longer timeframe data from the Dunville/Argentia station were used and considered representative of regional climatic conditions.

Daily average temperatures in Dunville/Argentia ranged from -2.8 to 16.4°C, with the lowest average temperatures in February and the highest in August. The average daily temperature drops below freezing in January and remains below zero until March. Annual average total precipitation in Dunville/Argentia was 1,133.3 mm. Monthly average precipitation ranged from 70.5 mm to 122.8 mm with the lowest in April and the highest in December. Wind speed and direction data were also collected, with average hourly wind speeds ranging from 19.1 km/h in July to 29.9 km/h in January. The prevailing wind direction was westerly in the fall and winter and southwesterly in the spring and summer, although winds can occur from all directions throughout the year.

Table 3.1.1-1 Dunville/Argentia Canadian Climate Normals (1991 to 2020).

Month	Temperature			Precipitation	Wind	
	Average (°C)	Maximum (°C)	Minimum (°C)	Total (mm)	Speed (km/h)	Most Frequent Direction
January	-2.5	0.7	-5.6	108.1	29.9	W
February	-2.8	0.3	-5.8	77.1	28.8	W
March	-0.9	2.1	-3.8	75.3	26.9	W
April	2.9	6.0	-0.2	70.5	23.3	SW
May	6.5	9.8	3.2	79.6	20.3	SW
June	10.3	13.6	6.9	77.4	19.3	SW
July	14.5	17.4	11.6	111.8	19.1	SW
August	16.4	19.1	13.6	84.8	19.6	SW
September	13.6	16.4	10.7	83.8	21.8	SW
October	9.0	11.7	6.3	119.6	24.9	W
November	4.9	7.6	2.2	122.4	26.7	W
December	0.6	3.4	-2.2	122.8	28.9	W
Year	6.0	9.0	3.1	1,133.3	24.1	SW

Extreme weather events recorded at the Dunville/Argentia are presented in Table 3.1.1-2 (Government of Canada, 2024). The maximum and minimum daily temperatures recorded were 29.0°C in July 1995, and -22.0°C in February 1994, respectively. The highest daily precipitation was recorded during Tropical Storm Chantal in July 2007, with 189.3 mm of rainfall. Significant snow depths were observed between November and April; the maximum recorded snow depth of 100 cm occurred in March 1995.

Table 3.1.1-2 Dunville/Argentia extreme weather events (1991 to 2020).

Month	Temperature		Precipitation	
	Extreme Maximum (°C)[1]	Extreme Minimum (°C)[1]	Extreme Daily Precipitation (mm)[1]	Extreme Snow Depth (cm)[1]
January	15.5 (2006)	-21.0 (1991)	65.4 (2003)	92 (1995)
February	14.0 (1996)	-22.0 (1994)	48.0 (2008)	90 (1995)
March	13.7 (2009)	-20.0 (1994)	49.0 (1993)	100 (1995)
April	17.8 (1998)	-11.0 (1994)	56.2 (1999)	27 (2016)
May	20.1 (2013)	-4.0 (1993)	66.6 (2002)	0
June	24.1 (2014)	0.0 (1993)	59.0 (1998)	0
July	29.0 (1995)	3.0 (1991)	189.3 (2007)	0
August	27.5 (1996)	2.5 (1991)	55.1 (2011)	0
September	24.7 (2009)	0.0 (1995)	52.4 (1992)	0
October	21.3 (2009)	-2.0 (1993)	45.8 (2002)	0
November	19.4 (2014)	-13.0 (1993)	56.1 (2007)	28 (2011)
December	16.0 (2008)	-18.5 (1993)	57.0 (1994)	50 (1995)

Notes
[1]Bracketed values indicate the year in which the extreme was recorded.

An indicative wind resource analysis exercise was conducted as part of a pre-feasibility study for the Project (Wood, 2022). The exercise considered reference datasets (Vortex FARM, Global Wind Atlas, ERA-5 mesoscale data) as well as wind climate observations. The annual wind rose presented in Figure 3.1.1-1, adapted from the indicative wind resource analysis exercise, illustrates that the predominant wind in the RAA is from the southwest.

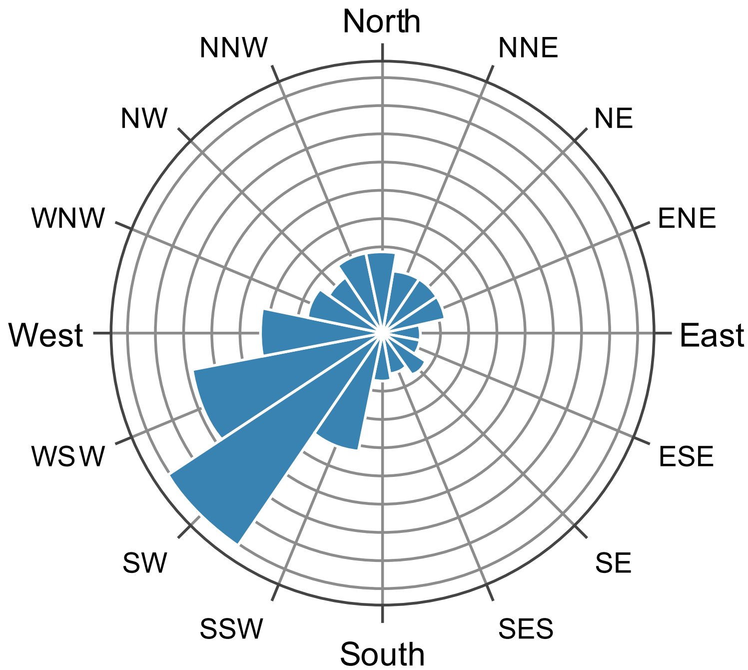


Figure 3.1.1-1 Wind rose adapted from indicative wind resource analysis.

Historical temperature and precipitation data were obtained from the Come By Chance meteorological station (Climate ID: 8401257). Come By Chance aggregated daily data is presented in Table 3.1.1-3 (Finnis, 2013; Finnis & Daraio, 2018). From 1985 to 1994, daily average temperatures ranged from -6.2°C to 15.6°C. January and February were the coldest months, whereas July and August were the warmest. The highest maximum temperature occurred in July, averaging 29.0°C, while the lowest minimum temperature (-27.0°C) occurred in February. The highest average rainfall occurred in June and October, totaling 1,361.2 mm and 1,381.3 mm, respectively. Snowfall was highest in January and February, with accumulations of 434.9 cm and 555.0 cm, respectively.

Table 3.1.1-3 Climate data from the Come By Chance meteorological station (1985 to 1994).

Month	Temperature			Precipitation	
	Average (°C)	Maximum (°C)	Minimum (°C)	Total Rain (mm)	Total Snow (cm)
January	-5.6	10.5	-25.0	686.4	434.9
February	-6.2	14.5	-27.0	746.6	555.0
March	-3.1	12.0	-25.0	816.7	367.8
April	2.1	20.0	-18.0	918.6	80.5
May	5.9	20.0	-8.0	951.4	2.5
June	9.9	24.5	-0.5	1,361.2	5.0
July	13.9	25.0	3.0	890.2	0
August	15.6	29.0	1.0	732.2	0
September	12.4	26.5	-1.0	995.0	0
October	7.9	23.0	-8.0	1,381.3	15.0

Month	Temperature			Precipitation	
	Average (°C)	Maximum (°C)	Minimum (°C)	Total Rain (mm)	Total Snow (cm)
November	2.5	16.0	-15.0	1,101.7	129.0
December	-2.6	14.0	-24.0	582.4	380.3

3.1.1.2 Climate Change Projections

The projected effects of climate change for NL were assessed using available observations and regional climate models (Finnis, 2013; Finnis & Daraio, 2018). Table 3.1.1-4 provides a summary of projected changes in key climate indices. Projected change from 20th century data (observed historical trends 1968 to 2000) to mid-century (2041 to 2070) and to late century (2071 to 2100) are presented below.

Table 3.1.1-4 Climate change projections for Argentia, NL.

Climate Index	Season [1]	20th Century Climate	Projection: 2041-2070		Projection: 2071-2100	
			Average	Uncertainty[2]	Average	Uncertainty[2]
Daily Mean Temperature (°C)	Winter	-1.0	2.3	1.3	4.3	1.7
	Spring	2.8	5.7	0.8	7.6	1.1
	Summer	13.6	16.6	1.3	18.4	1.8
	Fall	9.3	11.5	1.2	13.5	1.6
Daily Minimum Temperature (°C)	Winter	-3.82	0.00	1.48	2.24	1.86
	Spring	-0.15	3.10	0.67	5.06	1.01
	Summer	10.94	13.84	1.33	15.68	1.89
	Fall	6.68	8.84	1.18	10.91	1.62
Daily Maximum Temperature (°C)	Winter	1.73	4.55	1.12	6.41	1.53
	Spring	5.73	8.39	1.08	10.10	1.34
	Summer	16.35	19.44	1.29	21.13	1.80
	Fall	11.92	14.17	1.23	16.15	1.62
Number of Frost Days	Winter	72.5	44.3	14.9	22.9	18.7
	Spring	40.5	16.5	4.6	6.0	5.4
	Summer	0.0	0.0	0.0	0.0	0.0
	Fall	6.9	2.2	1.5	0.6	0.7
Maximum Heat Wave Duration (days)	Winter	0.0	0.2	0.2	0.1	0.2
	Spring	0.0	0.3	0.4	0.1	0.2
	Summer	0.0	0.0	0.1	0.1	0.1
	Fall	0.0	0.0	0.0	0.2	0.2
Mean Daily Precipitation (mm)	Winter	3.0	3.9	0.3	4.2	0.4
	Spring	2.1	2.9	0.2	3.1	0.2
	Summer	3.0	2.9	0.4	2.9	0.4
	Fall	3.4	3.7	0.2	3.6	0.3
Mean Precipitation Event Intensity (mm/day)	Winter	8.5	10.0	0.9	10.7	0.9
	Spring	8.0	8.8	0.3	9.3	0.3
	Summer	10.8	9.9	0.7	10.1	0.7
	Fall	10.8	11.7	0.5	11.9	0.7

Climate Index	Season [1]	20th Century Climate	Projection: 2041-2070		Projection: 2071-2100	
			Average	Uncertainty[2]	Average	Uncertainty[2]
Maximum 3-day Precipitation (mm)	Winter	44.0	58.6	7.7	63.6	9.2
	Spring	42.1	51.0	4.1	56.4	4.7
	Summer	63.5	58.6	7.1	63.2	9.3
	Fall	54.2	72.8	7.3	74.2	6.4
Maximum 5-day Precipitation (mm)	Winter	56.5	69.8	7.8	76.4	9.4
	Spring	48.9	60.1	4.1	67.1	4.9
	Summer	71.8	67.1	7.8	73.0	10.8
	Fall	66.3	83.0	7.7	85.3	8.0
Maximum 10-day Precipitation (mm)	Winter	84.8	101.9	10.1	111.6	12.5
	Spring	66.1	84.9	6.2	93.9	5.9
	Summer	91.2	93.9	12.0	98.0	14.0
	Fall	99.0	113.3	7.8	113.2	9.6
Number of Events with 10 mm or more Precipitation	Winter	8.5	11.9	1.0	13.0	1.2
	Spring	5.8	8.6	0.7	9.4	0.6
	Summer	8.9	8.3	0.9	8.3	0.7
	Fall	11.1	10.7	0.6	10.3	1.0
90th Percentile of Precipitation Events (mm)	Winter	9.0	12.1	1.0	13.6	1.4
	Spring	6.4	8.5	0.5	9.2	0.6
	Summer	8.0	8.0	0.8	7.9	1.1
	Fall	11.5	10.6	0.7	10.3	1.4
Maximum Number of Consecutive Dry Days	Winter	10.8	8.3	0.6	8.1	0.7
	Spring	23.6	11.0	0.6	10.6	0.7
	Summer	11.7	12.0	1.4	12.3	1.3
	Fall	11.6	10.9	1.0	11.0	1.2
Mean Dry Spell Length (days)	Winter	3.0	3.9	0.3	4.2	0.4
	Spring	2.1	2.9	0.2	3.1	0.2
	Summer	3.0	2.9	0.4	2.9	0.4
	Fall	3.4	3.7	0.2	3.6	0.3

Notes
[1] Winter = December-February, Spring = March-May, Summer = June-August, Fall = September-November
2 Uncertainty = standard deviation over the ensemble

The daily mean temperature, daily minimum temperature, and daily maximum temperature in Argentia are projected to increase across all assessed seasons. Compared to 20th century averages, daily mean temperatures are expected to increase by 2.2 to 3.3°C by mid-century and increase by 4.2 to 5.3°C by late century. The number of days with temperatures below freezing is projected to decrease, particularly during the winter and spring. Coastal regions are anticipated to experience more moderate changes due to the stabilizing influence of the Atlantic Ocean. Rising temperature trends suggest a shift from snow to rain as the primary form of precipitation. Precipitation analyses indicate that the cold season will experience fewer but more intense snowstorms, along with an increase in both frequency and intensity of rain events. Mean daily precipitation and mean precipitation event intensity are projected to increase in the winter, spring, and fall. Compared to 20th century averages, it is expected that mean daily precipitation increases between 0.2 and 1.2 mm will occur over the next century in the winter, spring, and fall, and a slight decrease of 0.1 mm is anticipated in summer. Projections show increases in maximum 3-day, 5-day, and 10-day precipitation expected in the winter, spring, and fall. The number of days with 10 mm or more of precipitation is projected to increase, with the most notable increases occurring in winter and spring. In contrast, slight decreases are anticipated during the summer and fall. The projections in general suggest a notable shift toward wetter conditions overall, which could have implications for seasonal water supply management. and ecosystem dynamics.

Sea-level rise projections for NL reflect the combined influence of global climate drivers, such as accelerated ice melt and thermal expansion, and localized geological factors, including crustal rebound. Relative sea levels are projected to rise by approximately 40 cm by 2049 and up to 90 cm by 2099 in Zone 2 compared to 1990 levels (Batterson & Liverman, 2010). Zone 2 encompasses the Isthmus of Avalon and extends westward, including the areas of Come By Chance and Sunnyside. This area faces heightened vulnerability to the effects of sea-level rise, including more frequent and severe flooding, increased coastal erosion, and consequent risks to coastal infrastructure and ecosystems.

3.1.1.3 Greenhouse Gas Emissions

GHGs are released into the atmosphere through both natural processes and human activities. These gases trap heat by preventing it from escaping into space, creating a warming effect known as the greenhouse effect. As the concentration of GHGs in the atmosphere has increased, temperatures have risen, leading to changes in climate patterns.

GHG emissions in NL primarily originate from key industrial sectors, including oil and gas, electricity generation, mining and mineral processing, transportation, manufacturing and industrial processing, and waste management. These industries contribute to the overall emissions profile of the province due mainly to their energy-intensive processes and the combustion of fossil fuels. Provincial GHG emissions are dominated by CO_2, CH_4, and N_2O; emissions of fluorinated gases such as HFCs, PFCs, and SF_6 are less abundant in comparison.

The **Management of Greenhouse Gas Act, 2016** requires industrial facilities in NL emitting 15,000 tonnes or more of GHGs annually to report their emissions to the NL DECC. GHG emissions are reported in terms of CO_2e, a standardized metric that allows for the comparison of emissions from different GHGs. Emissions are converted to units of CO_2e using the Global Warming Potential (GWP) metric. The GWP metric measures the amount of energy absorbed by the emission of one tonne of a GHG over a specified period of time, relative to the energy absorbed by one tonne of CO_2. For the 2023 reporting year, provincial GHG emissions totalled 3,116,659 tonnes of CO_2e (Newfoundland and Labrador Department of Environment and Climate Change NL DECC, 2023b).

The Braya Refinery is the only industrial source of GHG emissions in the PA that reports emissions to the NL DECC under the **Management of Greenhouse Gas Act, 2016**. In 2023, the facility emitted 24,085 tonnes of CO_2e, primarily from energy-intensive refining processes and fuel combustion. The Long Harbour Processing Plant, located in the RAA and operated by Vale Newfoundland and Labrador Limited, also reports emissions to the NL DECC. In 2023, it emitted 41,412 tonnes of CO_2e, largely attributable to the combustion of fuels used to generate heat and power for hydrometallurgical processing, as well as emissions from chemical reactions involved in the refining process. While other facilities in the RAA, such as NARL Logistics Terminal in Come By Chance and the Newfoundland Transshipment Terminal in Arnold's Cove, contribute to GHG emissions through their operations, these sources are not subject to the Management of GHG Reporting Regulations.

3.1.1.4 Air Quality

Ambient air quality in the province is generally good, with episodes of diminished air quality being rare and typically caused by long-range pollutant transport (smoke from wildfires in other regions), adverse meteorological conditions (high winds and precipitation), or industrial emissions. Ambient air quality is evaluated by comparing measurements to provincial and federal standards, specifically the NL Air Quality Standards (NL AQS) and the Canadian Ambient Air Quality Standards (CAAQS), established by the Canadian Council of Ministers of the Environment (CCME).

Air quality in NL is monitored through the National Air Pollution Surveillance (NAPS) network, a collaborative initiative between ECCC and NL DECC. As part of this program, NL DECC operates six AQM stations across the province. In addition to the NAPS network, NL DECC oversees the industrial monitoring network (IMN), which requires major industrial facilities in the province to monitor air quality near their operations for specific pollutants. Both the NAPS network and IMN monitor air contaminants to assess and manage air quality effectively.

Data collected from the NAPS network and the IMN stations are summarized annually by the NL DECC in ambient air monitoring reports (Newfoundland and Labrador Department of Environment and Climate Change NL DECC, 2022, 2023a, 2024). These reports provide air quality statistics, which are compared against the air quality standards set by the provincial Air Pollution Control Regulations, 2022. Braya operates AQM stations in Arnold's Cove, Come By Chance, Sunnyside, and along the Braya Property Boundary. These four AQM stations, located near the Braya Refinery, a converted renewable fuels production facility, and managed under the IMN, continuously monitor ambient concentrations of SO_2 and particulate matter less than 2.5 µm ($PM_{2.5}$). The NAPS monitoring station in Mount Pearl was used to supplement the desktop assessment of air quality in the RAA since IMN stations measure a subset of parameters necessary to characterize baseline air quality conditions. The Mount Pearl NAPS station monitors ambient levels of $PM_{2.5}$, particulate matter less than 10 µm (PM_{10}), ozone (O_3),NO, NO_2, NO_x, CO, and SO_2.

Ambient AQM data at the Mount Pear NAPS station from 2020 to 2023 (Newfoundland and Labrador Department of Environment and Climate Change NL DECC, 2022, 2023a, 2024) show that standards for SO_2, NO_2, and CO were consistently met, with no exceedances recorded. The 8-hour NL AQS for O_3 was exceeded once in 2020, 13 times in 2021, and 48 times in 2023. For $PM_{2.5}$ and PM_{10}, no exceedances occurred from 2020 to 2022. However, in 2023, there were 39 hourly exceedances for the 24-hour NL AQS for $PM_{2.5}$ and 28 hourly exceedances for the 24-hour NL AQS for PM_{10}, all attributed to wildfire smoke from Northern Alberta and the Northwest Territories in September 2023.

Ambient data at the Braya AQM stations from 2020 to 2023 (Newfoundland and Labrador Department of Environment and Climate Change NL DECC, 2022, 2023a, 2024) show that SO_2 concentrations consistently met NL AQS, while $PM_{2.5}$ levels occasionally exceeded the 24-hour NL AQS, primarily due to external factors such as wildfire smoke. SO_2 concentrations remained within the NL AQS from 2020 to 2023 at all four Braya AQM stations: Arnold's Cove, Come By Chance, Sunnyside, and Braya Property Boundary. No SO_2 exceedances were recorded at the Arnold's Cove, Come By Chance, and Sunnyside AQM stations. The Braya Property Boundary AQM station historically exceeded SO_2 air quality standards due to proximity to the Braya Refinery process area, but no exceedances were recorded from 2020 to 2023 since the Braya Refinery was non-operational during this period. At the Arnold's Cove AQM station, $PM_{2.5}$ concentrations met the 24-hour NL AQS in 2020 and 2021 but exceeded the NL AQS twice in 2022 and for 28 consecutive hours in September 2023. At the Come By Chance AQM station, $PM_{2.5}$ concentrations remained within the 24-hour NL AQS from 2020 to 2022, but exceeded the NL AQS for 22 consecutive hours in September 2023. At the Sunnyside AQM station, $PM_{2.5}$ concentrations exceeded the 24-hour NL AQS on multiple occasions. This included two exceedances in 2020, one in 2021, 74 hourly exceedances in 2022, primarily in March, and 27 hourly exceedances in 2023, all in September. The Braya Property Boundary AQM station, which typically records exceedances due to its proximity to the Braya Refinery, recorded one $PM_{2.5}$ exceedance of the 24-hour NL AQS in 2020, 42 hourly exceedances in 2022, and 33 consecutive hourly exceedances in September 2023. The exceedances at the Braya AQM stations in September 2023 were linked to wildfire smoke transported from northern Alberta and the Northwest Territories, significantly affecting provincial air quality. Despite the $PM_{2.5}$ 24-hour exceedances at the Braya AQM stations, annual $PM_{2.5}$ averages remained within the NL AQS limits.

A summary of the maximum concentrations recorded from 2020 to 2023 at the AQM stations in Mount Pearl and the Braya Refinery area is presented in Table 3.1.1-5. This table indicates that most of the maximum concentrations over the four-year period were well within the NL AQS, with the exception of elevated levels of $PM_{2.5}$, PM_{10}, and O_3 at the NAPS station in Mount Pearl and $PM_{2.5}$ at the Braya AQM stations in the Come By Chance area. Particulate matter exceedances in September 2023, at the AQM stations were largely attributed to long-range wildfire smoke from northern Alberta and the Northwest Territories. Elevated $PM_{2.5}$ concentrations from 2020 to 2022 at the Braya AQM stations were largely weather-related, driven by high winds and precipitation in most cases.

Table 3.1.1-5 Desktop study – ambient AQM results – maximum concentrations (2020 to 2023).

Operator	Monitoring Station	Air Contaminant	Units of Concentration	Averaging Time	Maximum Concentration (2020 to 2023)	NL AQS
NAPS	Mount Pearl	SO_2	ppb	1-hour	8.7	344
				3-hour	6.6	229
				24-hour	2.2	115
				1-year	0.3	23
		$PM_{2.5}$	µg/m³	24-hour	40.2	25
				1-year	5.2	8.8
		PM_{10}	µg/m³	24-hour	67.0	50
		NO_2	ppb	1-hour	40.3	213
				24-hour	11.7	106
				1-year	1.1	53
		CO	ppb	1-hour	1,700	30,582
				8-hour	800	13,107
		O_3	ppb	1-hour	63.3	82
				8-hour	51.6	44
Braya	Arnold's Cove	SO_2	ppb	1-hour	14.9	344
				3-hour	8.4	229
				24-hour	1.9	115
				1-year	0.7	23
		$PM_{2.5}$	µg/m³	24-hour	50.0	25
				1-year	5.7	8.8
	Come By Chance	SO_2	ppb	1-hour	7.9	344
				3-hour	5.5	229
				24-hour	4.8	115
				1-year	1.3	23
		$PM_{2.5}$	µg/m³	24-hour	32.6	25
				1-year	5.1	8.8
	Sunnyside	SO_2	ppb	1-hour	8.1	344
				3-hour	6.0	229
				24-hour	4.6	115
				1-year	0.9	23
		$PM_{2.5}$	µg/m³	24-hour	80.3	25
				1-year	5.3	8.8
	Braya Property Boundary	SO_2	ppb	1-hour	77.1	344
				3-hour	66.9	229
				24-hour	27.6	115
				1-year	2.4	23
		$PM_{2.5}$	µg/m³	24-hour	40.7	25
				1-year	5.3	8.8

3.1.1.5 Light

The ambient light environment in the PA, situated in a rural location, is classified as E2 (low district brightness areas) according to the ILE (The Institution of Lighting Engineers, 2005). The ILE guidelines were referenced as there are currently no regulations in NL addressing light emissions from industrial operations.

Light pollution refers to the disruption of the natural darkness of the night sky caused by human-generated artificial light. This phenomenon occurs when artificial light sources emit light that is scattered in the atmosphere by particles and air molecules. The scattering of this light increases the brightness of the night sky, diminishing its natural luminance. One of the most prominent and noticeable effects of light pollution is artificial skyglow, which manifests as a diffuse, hazy glow that obscures the visibility of stars and other celestial objects (DarkSky International, n.d.). This effect not only reduces opportunities for astronomical observations but also can disrupt natural ecosystems and wildlife behaviour, cause adverse health effects for people, and contribute to energy waste. In rural areas, light pollution is typically less pronounced than in urban centers. However, localized sources like industrial facilities, roadway lighting, and residential developments still contribute to artificial skyglow.

Regional levels of ambient light were assessed using modelling data and satellite observations of artificial light (Falchi et al., 2016a, 2016b). According to the New World Atlas of Artificial Sky Brightness, the artificial brightness in the PA ranges from 19.0 to 534 microcandelas per square meter (µcd/m^2). The total brightness in the PA varies from 0.193 to 0.708 millicandelas per square meter (mcd/m^2), equivalent to 193 to 708 µcd/m^2. The artificial brightness in the LAA ranges from 17.0 to 780 µcd/m^2. The total brightness in the LAA varies from 0.191 to 0.954 mcd/m^2, equivalent to 191 to 954 µcd/m^2. As a metric of comparison, 174 µcd/m^2 is considered to be a typical brightness of the night sky background during solar minimum activity (Falchi et al., 2016b). Ambient light levels in the PA can be further classified using the Bortle scale, a nine-level system that quantifies night sky brightness at a given location (Bortle, 2001). Based on this scale, the night sky brightness in the PA ranges from Rural Sky (Class 3) to Suburban Sky (Class 5).

Figure 3.1.1-2 illustrates the artificial sky brightness in the PA and LAA, as mapped using data from the New World Atlas of Artificial Night Sky Brightness. This dataset provides a visualization of light pollution levels, offering insight into the distribution and intensity of artificial illumination in the area. The highest concentration of artificial light within the LAA is observed at the Bull Arm Fabrication Site, historically used for large-scale construction and fabrication projects such as offshore oil platform assembly. The site features drydock and marine facilities, cranes and heavy equipment, and fabrication yards. These areas are illuminated to support operations, ensuring safety and productivity, which contributes to the local ambient light environment. The highest incidence of artificial light within the PA is associated with the Come By Chance Industrial Site (including the Braya Refinery and NARL Logistics Terminal). This site is an industrial hub with substantial lighting to accommodate its operations. The facility requires lighting to illuminate various areas, including processing units, tank farms and storage areas, loading and offloading facilities, and transport and access roads.

3.1.1.6 Noise

Ambient noise levels in the PA result from both biogenic and anthropogenic sources. Biogenic noise, such as wildlife calls and ocean sounds from wind and waves, is intermittent, whereas anthropogenic noise from industrial and construction activities is typically more continuous. Sources of anthropogenic noise include mechanical equipment, processing units, material handling and transport, and maintenance activities. Specifically, noise from Braya Refinery operations, including compressors, pumps, fans and blowers, ventilation systems, flare stack activity, and piping systems, contributes to elevated noise levels both during the day and at night. Ambient noise levels in the PA have been classified as ranging from quiet rural to urban residential (Health Canada, 2017).

3.1.1.7 Vibration

Ground-borne vibration is the transmission of energy through the ground in the form of oscillatory motion. It is caused by natural or human-induced activities and can affect nearby structures, equipment, or individuals. The vibration propagates as seismic waves through soil, rock, or other ground materials, often diminishing in intensity as the distance from the source increases. Ambient vibration levels in the PA are generally low, with intermittent vibrations resulting from construction and industrial activities in the region, particularly from Braya Refinery operations. These activities include the operation of pumps, compressors, and motors used in fuel processing, as well as heavy machinery involved in material handling. Additionally, vibrations may occur in pipelines, reactors, and storage tanks. Natural sources of vibration, such as volcanic activity and seismic events (resulting from tectonic plate movement), are considered negligible in this area.

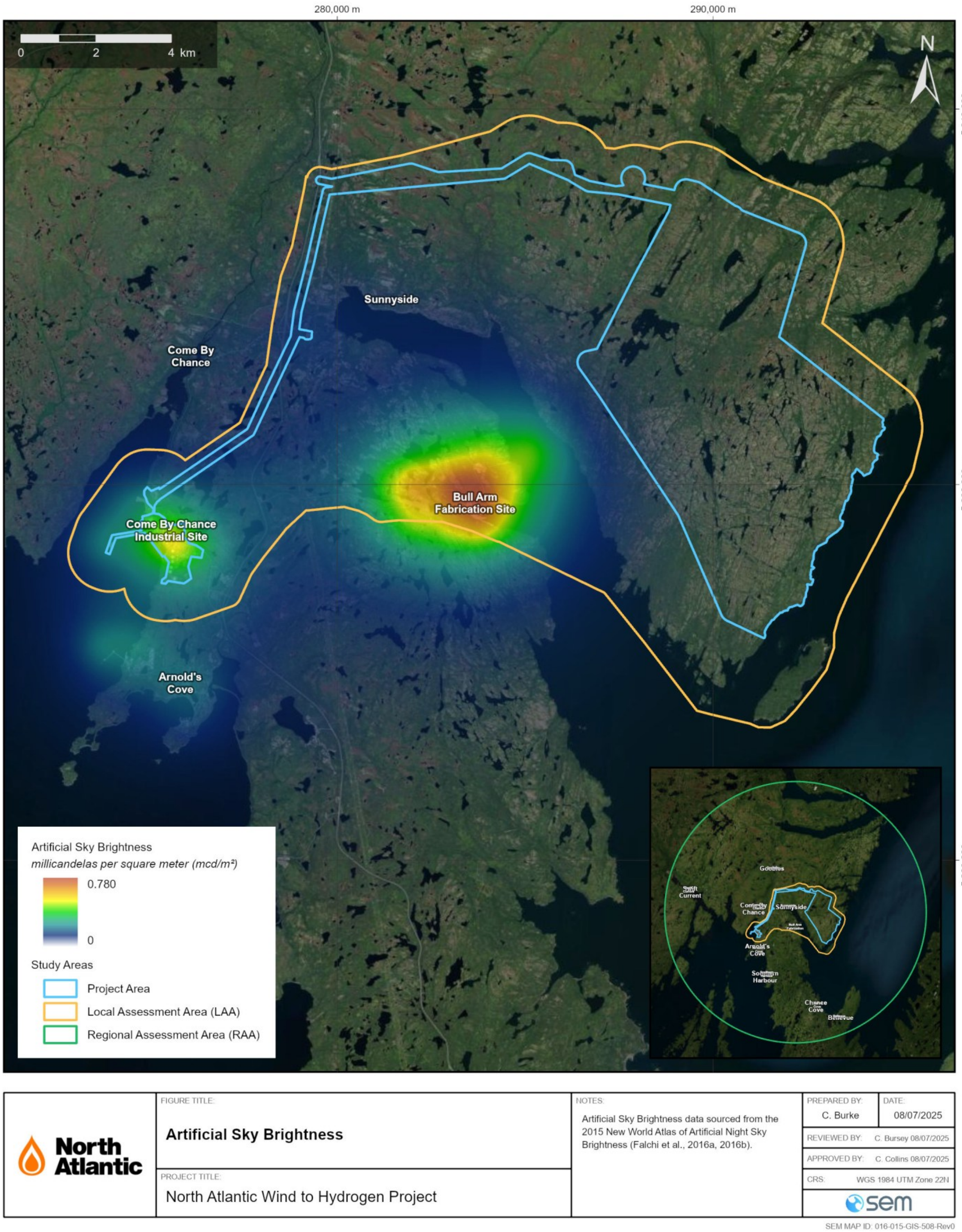


Figure 3.1.1-2 Artificial sky brightness.

3.1.2 Aquatic Environment

3.1.2.1 Aquatic Environment Introduction

The Aquatic Environment section has been developed in consideration of recommendations provided in Section 3.1.2 of the 'Environmental Assessment Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects' (Department of Environment and Climate Change, 2023). The section is focused on the following components:

- Groundwater Resources;
- Surface Water Resources;
- Freshwater Environment;
- Freshwater Sensitive Time Periods and Working Windows;
- Freshwater Conservation Concern;
- Marine Geology and Geomorphology;
- Physical Oceanography;
- Marine Fish and Fish Habitat;
- Marine Sensitive Time Periods and Working Windows; and
- Marine Conservation Concern.

The content of the Aquatic Environment section has been developed based on publicly available desktop information, reports, and on-line data resources. Additionally, the Water Resources VC includes surface water and groundwater quantities, drainage patterns, and water quality. The following subsections provide an overview of the existing water resources conditions, including regional baseline hydrology potentially affected by the Project, and local water quantity evaluations for Project water needs. Further details related to surface water resources can be found in Appendix C.

3.1.2.2 Groundwater

Surficial geology within the LAA consists of exposed bedrock, vegetation-covered bedrock, and glacial till deposited during the late Wisconsin glaciation (NL IET, 1990). These conditions result in shallow to no groundwater availability above the bedrock surface (AMEC, 2013). The underlying bedrock is primarily of Late Proterozoic and consists of subaerial volcanic rocks, marine siliciclastic sediments, and turbidites (NL IET, 1988, 2004). Due to their age and lithification, these rock formations exhibit very low, if any, permeability (AMEC, 2013). While faults trending south toward the coast may provide secondary permeability and potential groundwater flow paths, these features are located outside the Inkster's Pond Industrial Water Supply Area (hereafter referred to as the water supply watershed).

A review of publicly available information confirms that wells within and adjacent to the LAA are sparse and generally low yielding. There are no licensed or public groundwater supply wells located in the LAA. Groundwater potential in the region was further evaluated based on the Average Well Depth and Yield by Community data (NL DECC, 2005) from 1950 to 2005 in Arnold's Cove, Come By Chance, and Sunnyside. These nearby communities average well depths are 58.64, 77.38, and 73.41 m, and average groundwater yields of 2.58, 26.57, and 7.24 L/min, respectively.

Compared with the average outflow of 0.283 m³/s (17,000 L/min) recorded at the water supply watershed, the groundwater component represents less than 0.16% of the overall water yield. Overall, the combination of thin surficial rock and lithified bedrock results in a shallow and limited groundwater system. Where present, groundwater movement is controlled by topography and follows elevation gradients similar to surface water flow, with minimal contribution to the overall water balance in the area.

Regional groundwater quality (Table 3.1.2-1) was assessed using groundwater sampling data from public drinking water wells in Eastern Newfoundland available until 2020 (NL DECC, 2020). This dataset was compared against the Guidelines for Canadian Drinking Water Quality (GCDWQ) Health Canada (2020) to provide a general understanding of groundwater quality in the region. On average, all parameter averages were within the GCDWQ maximum acceptable concentrations, suggesting that groundwater quality in the region is generally potable.

Table 3.1.2-1 Summary of groundwater quality data in eastern Newfoundland.

Parameter	Units	Samples	Minimum	Maximum	Average	Median	GCDWQ
Alkalinity (as $CaCO_3$)	mg/L	1,205	0	220	84.7	88	N/A
Colour (A)	TCU	1,206	0	119	3.34	1	15
Conductivity	µS/cm	1,205	43	1580	284.71	270	N/A
Hardness (as $CaCO_3$)	mg/L	1,205	0	282	75.47	75	N/A
pH (A)	N/A	1,205	5.47	9.71	7.66	7.78	8.5
Total Dissolved Solids (A)	mg/L	1,206	0	1030	181.21	171	500
Turbidity (C)	NTU	1,206	0	205	0.74	0.2	1
Boron (C)	mg/L	1,209	0	0.2	0.02	0.02	5
Bromide	mg/L	1,206	0	1.03	0.02	0	N/A
Calcium	mg/L	1,209	0	103	23.61	23	N/A
Chloride (A)	mg/L	1,206	3	405	31.51	22	250
Fluoride (C)	mg/L	1,205	0	1.25	0.15	0.12	1.5
Potassium	mg/L	1,209	0	4	0.68	1	N/A
Sodium (A)	mg/L	1,209	2	195	28.21	20	200
Sulphate (A)	mg/L	1,206	0	116	11.87	10	500
Ammonia	mg/L	1,206	0	0.58	0.02	0	N/A
Dissolved Organic Carbon	mg/L	1,206	0	11.3	1.18	0.7	N/A
Nitrate and Nitrite (C)	mg/L	1,206	0	3.37	0.29	0.06	10

Parameter	Units	Samples	Minimum	Maximum	Average	Median	GCDWQ
Kjeldahl Nitrogen	mg/L	1,206	0	3.39	0.075	0.025	N/A
Total Phosphorus	mg/L	1,206	0	1.31	0.026	0.01	N/A
Aluminium	mg/L	1,209	0	0.86	0.03	0	N/A
Antimony (C)	mg/L	1,123	0	0.004	0.0002	0	0.006
Arsenic (C)	mg/L	1,225	0	0.044	0.003	0.001	0.01
Barium (C)	mg/L	1,210	0	1.66	0.05	0.02	2
Cadmium (C)	mg/L	1,210	0	0.006	0	0	0.007
Chromium (C)	mg/L	1,209	0	0.1	0.001	0	0.05
Copper (C)	mg/L	1,209	0	0.122	0.004	0.001	2
Iron (A)	mg/L	1,209	0	6.35	0.08	0	0.3
Lead (C)	mg/L	1,229	0	0.128	0.001	0	0.005
Magnesium	mg/L	1,209	0	19	4.06	3	N/A
Manganese (C)	mg/L	1,209	0	35.4	0.099	0.005	0.12
Mercury (C)	mg/L	1,209	0	0.0021	0.00002	0	0.001
Nickel	mg/L	1,209	0	0.006	0.0008	0	N/A
Selenium (C)	mg/L	1,210	0	0.023	0.0004	0	0.05
Uranium (C)	mg/L	1,122	0	0.02	0.0009	0	0.02
Zinc (A)	mg/L	1,209	0	5.53	0.009	0	5
Notes: A – Aesthetic C – Contaminant GCDWQ - Guidelines for Canadian Drinking Water Quality, N/A – not specified in GCDWQ							

3.1.2.3 Surface Water

Regional surface water quantities were characterized to establish baseline streamflow conditions and understand seasonal and spatial variability. Streamflow records at four Water Survey of Canada (WSC) stations within 50 km of the PA were analyzed to characterize regional hydrologic patterns. Monthly unit flow rates were calculated for each station based on their flow records and drainage areas (Table 3.1.2-2).

Regional hydrometric records show consistent seasonal trends, with lowest flows occurring in Summer and peak flows in Spring, primarily in April, corresponding with snowmelt. The regional annual unit flow averaged 37.2 L/s/km^2(Litres per second per square kilometre). Monthly average unit flow ranged from 16.1 L/s/km^2 in August to 69.4 L/s/km^2 in April. At the extremes, monthly 5th percentile unit flow ranged from 3.8 to 34.0 L/s/km^2, and monthly 95th percentile ranged from 36.8 to107.0 L/s/km^2.

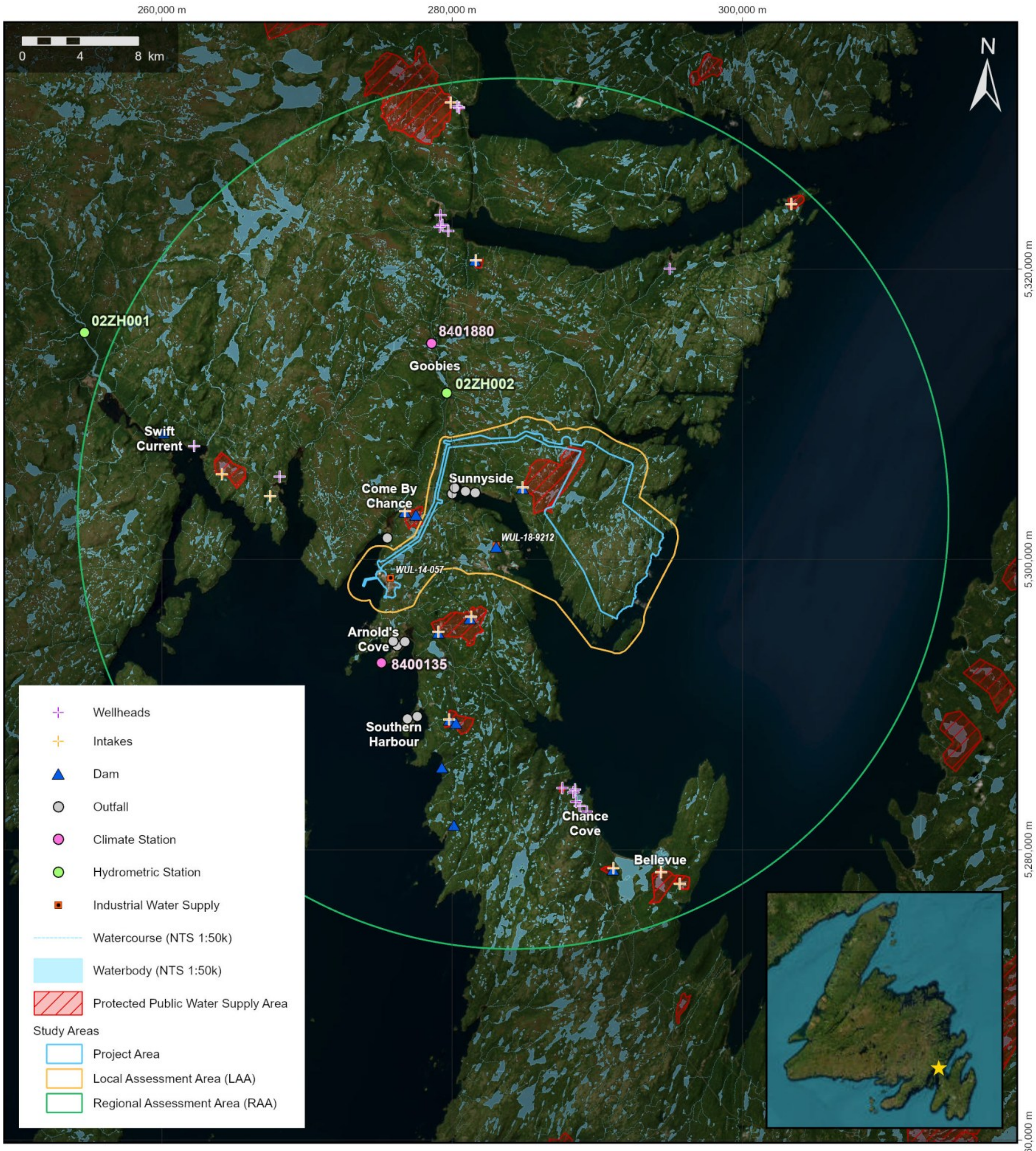
Table 3.1.2-2 Monthly unit flow rates at WSC stations.

Station	Drainage Area (km^2)	Unit Flow ($L/s/km^2$)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Pipers Hole River (02ZH001), 1953 to 2024	764.0	5th percentile	10.8	9.2	16.6	29.9	15.4	7.3	3.1	2.1	4.0	8.1	18.4	18.9	24.1
		Average	**35.2**	**37.0**	**41.0**	**66.8**	**38.1**	**18.9**	**12.9**	**11.6**	**18.5**	**30.4**	**43.5**	**41.7**	**32.9**
		95th percentile	79.9	84.2	80.4	109.2	68.2	40.5	31.3	34.0	45.7	63.8	68.9	68.6	41.3
Come By Chance River (02ZH002), 1970 to 2024	43.3	5th percentile	9.5	10.1	19.9	40.0	18.1	10.9	4.0	3.3	10.3	15.9	27.7	26.6	35.9
		Average	**43.9**	**45.1**	**53.0**	**85.7**	**44.8**	**27.5**	**20.9**	**20.6**	**32.9**	**48.0**	**60.2**	**56.5**	**44.9**
		95th percentile	91.5	108.3	107.8	130.9	80.3	57.5	48.4	52.1	81.1	89.8	95.1	106.3	55.7
Shoal Harbour River (02ZJ003), 1986 to 2024	106.0	5th percentile	10.2	11.6	17.0	32.6	15.7	7.5	3.5	2.1	3.6	7.2	17.6	15.5	21.2
		Average	**30.3**	**34.7**	**36.4**	**70.3**	**40.1**	**19.3**	**12.4**	**8.8**	**17.8**	**28.5**	**40.2**	**39.0**	**31.4**
		95th percentile	55.4	70.0	60.9	98.5	66.3	33.5	20.9	17.7	32.8	54.3	57.1	58.4	37.8
Rattling Brook (02ZK006), 2007 to 2024	32.7	5th percentile	18.5	23.0	24.1	33.3	13.6	11.5	9.2	7.7	9.7	15.8	21.6	31.4	31.6
		Average	**46.3**	**49.4**	**46.4**	**54.8**	**31.1**	**29.7**	**26.5**	**23.6**	**29.9**	**35.2**	**50.4**	**53.4**	**39.6**
		95th percentile	80.6	95.9	81.6	89.5	53.4	56.0	46.5	46.0	72.9	64.3	93.0	80.3	47.7
WSC Station Average		5th percentile	12.2	13.5	19.4	34.0	15.7	9.3	4.9	3.8	6.9	11.8	21.3	23.1	28.2
		Average	**38.9**	**41.6**	**44.2**	**69.4**	**38.5**	**23.9**	**18.2**	**16.1**	**24.8**	**35.5**	**48.6**	**47.7**	**37.2**
		95th percentile	76.9	89.6	82.7	107.0	67.0	46.8	36.8	37.5	58.2	68.1	78.5	78.4	45.6

The RAA includes many watersheds and contains a myriad of waterbodies and watercourses (Figure 3.1.2-1). Watershed boundaries are shown in Figure 3.1.2-2. Wetland areas were delineated in Ecological Land Classification, which is detailed in Section 3.2.3.2 and Appendix D3. There are two licensed industrial supplies within the LAA (Figure 3.1.2-1). To the west is Inkster's Pond for Braya under WUL-14-057. Inkster's Pond is an isolated waterbody with no inflow or outflow and is actively supplied by water pumped from Barrisway Pond. Inkster's Pond will serve as the source water for the Project operation and an assessment of water availability from this watershed was detailed in Appendix C. On the east is Little Mosquito Pond which provides process water to Bull Arm Fabrication Inc. under WUL-23-13359 (formerly under WUL-18-9212 for Nalcor Energy).

Also located in the LAA are two watersheds with PPWSA status. The Centre Cove River PPWSA (WS-S-0846) is on the east of the LAA and supplies Sunnyside and consists of Beaver Pond, Spurrels Pond, Third Long Pond, and Second Long Pond, with Butcher's Brook outflow regulated by a dam structure near the intake. Sunnyside also has four registered outfalls (4990-4, 4990-5, 4995-1, and 4995-3), all of which discharge into the ocean (Figure 3.1.2-1).

Butchers Brook PPWSA (WS-S-0184) is on the west of the LAA and services the community of Come By Chance. Its watershed includes Switch Pond (unregulated) and Siding Pond (regulated by a dam). Come By Chance has one registered outfall (1135-1), which also discharges to the ocean (Figure 3.1.2-1).



North Atlantic	FIGURE TITLE: Surface Water Resources and Uses	NOTES: Hydrometric Stations, Industrial Water Supplies, Protected Public Water Supply Areas, Intakes/ Wellheads, Dams and Outfalls sourced from NL Government's Water Resources Portal. Climate Stations sourced from Government of Canada website. Watercourse and Waterbody data sourced from Canadian NTS 1:50k series.	PREPARED BY: C. Bursey	DATE: 10/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: J. Crocker 10/06/2025	
			APPROVED BY: C. Collins 10/06/2025	
			CRS: WGS 1984 UTM Zone 22N	
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SEM MAP ID: 016-015-GIS-509-Rev0

Figure 3.1.2-1 Surface water resources and uses.

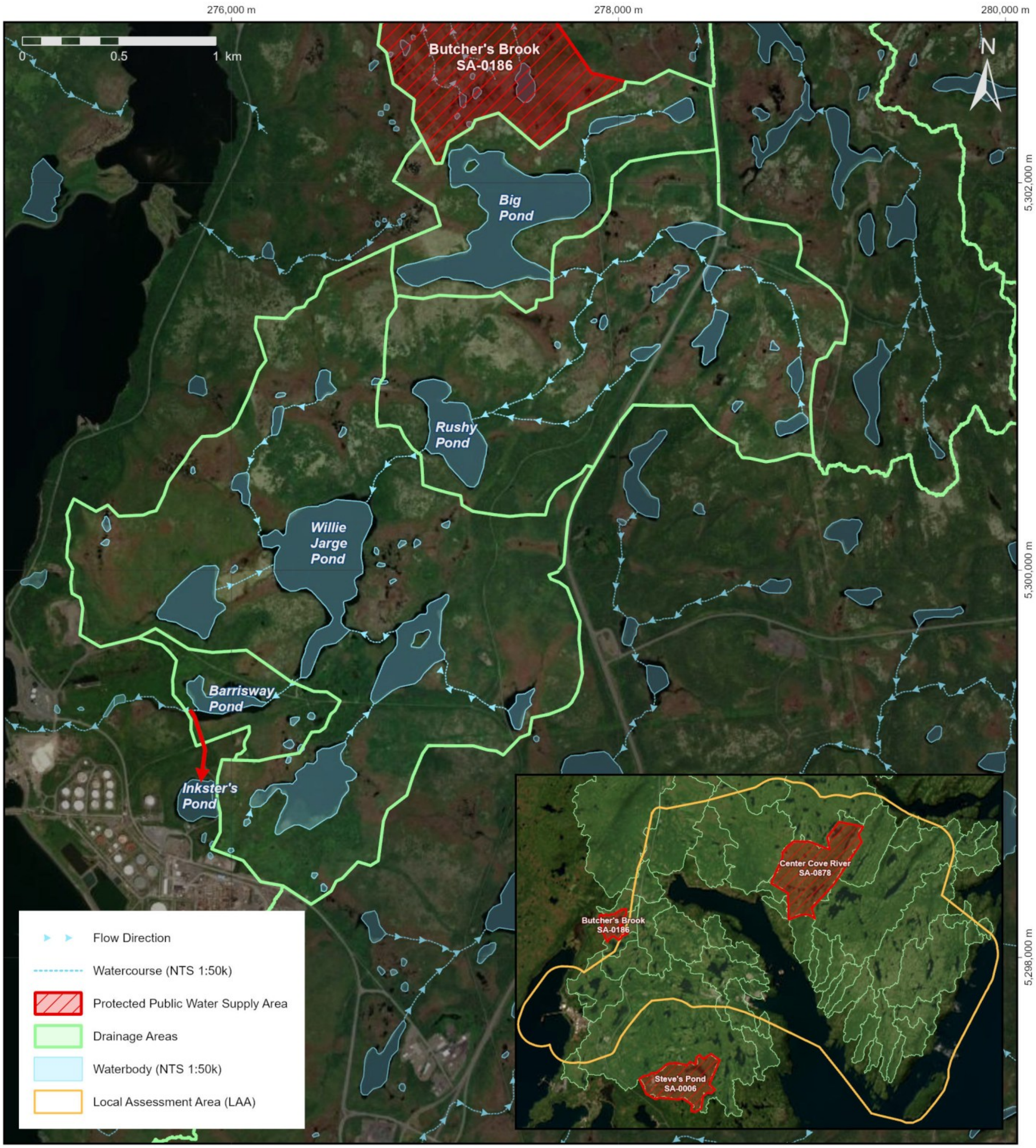


FIGURE TITLE:	NOTES:	PREPARED BY:	DATE:
Watersheds in the Local Assessment Area	Watersheds derived from NL 5m Digital Elevation Model and, in public drinking supply areas, supplemented with detailed watershed boundaries provided by Water Resources Management Division (NL Government). Watercourse and Waterbody data sourced from Canadian National Topographic System (NTS) 1:50k series.	C. Burke	10/06/2025
PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 10/06/2025	
		APPROVED BY: C. Collins 10/06/2025	
		CRS: WGS 1984 UTM Zone 22N	

SEM MAP ID: 016-015-GIS-510-Rev0

Figure 3.1.2-2 Watersheds in the Local Assessment Area.

3.1.2.4 Freshwater Environment

Freshwater Fish

Fish species in the PA and with the potential to occur in the RAA and LAA are discussed below. Fish species reported across the Placentia Bay side of the isthmus and Sunnyside Peninsula (e.g., surroundings of Arnold's Cove, Sunnyside, Come By Chance) include brook trout, brown trout (sea trout), rainbow smelt, American eel, Atlantic salmon/ouananiche, Arctic char, and stickleback sp. (i.e., blackspotted, threespine and ninespine sticklebacks) (NLDEC, n.d..; AMEC, 2007; PSPC, 2019) Fish community compositions in the isthmus and Sunnyside region potentially comprise both diadromous (i.e., catadromous and anadromous) and landlocked (freshwater resident) populations of various fish species.

There are 20 scheduled Atlantic salmon rivers in Placentia Bay (Salmon Fishing Area or SF10) of which five are located in the RAA including Black River, Come By Chance River, North Harbour River, Watson's Brook and Bellevue River. There are no schedule Atlantic salmon rivers within the LAA or PA. The Come By Chance River watershed is adjacent to the transmission line from the Wind Farm to the HGP and the transmission line from the Sunnyside substation to the HGP. Black River, North Harbour River and Watson's Brook are further west in the RAA but outside of the LAA and PA. Deer Harbour River is located on the Sunnyside Peninsula in Salmon Fishing Area SF6 with much of the watershed being within the PA. Bellevue River is located on the extreme edge of the RAA and drains into Trinity Bay near Bellevue.

Table 3.1.2-3 provides a list of fish species reported from the Northeastern inland region of Placentia Bay and the Avalon Peninsula. These species have the potential to occur in the RAA. Relative abundance from original surveys and documented occurrences in nearby waterbodies informed the classifications of occurrence in Table 3.1.2-3. Species for which no documented occurrences were found were categorized as rare and were unlikely to be found in the PA, LAA or RAA.

Table 3.1.2-3 Freshwater fish species with the potential to occur in the LAA.

Finfish	*Species Name*	Potential Occurrence in LAA
Catadromous Fish		
American eel	*Anguilla rostrata*	Occasional
Anadromous Fish		
Atlantic salmon (South NL Pop.)	*Salmo salar*	Occasional
Atlantic sturgeon (Maritimes Pop.)	*Acipenser oxyrinchus*	Rare
Brown trout (Sea trout)	*Salmo trutta*	Occasional
Rainbow smelt	*Osmerus mordax*	Occasional
Freshwater		
Arctic char (landlocked)	*Salvelinus alpinus*	Rare to Occasional
Brook trout	*Salvalinus fontinalis*	Common
Banded killifish (NL Pop.)	*Fundulus diaphanus*	Rare
Mummichog	*Fundulus heteroclitus*	Rare

Finfish	*Species Name*	Potential Occurrence in LAA
Ouananiche (landlocked salmon)	*Salmo salar*	Common
Rainbow trout	*Oncorhynchus mykiss*	Rare
Blackspotted stickleback	*Gasterosteus wheatlandi*	Rare
Ninespine stickleback	*Pungitius pungitius*	Rare to Occasional
Threespine stickleback	*Gasterosteus aculaeatus*	Common

The American eel in NL was designated "threatened" in 2012 (COSEWIC, 2012b) and has been listed under the provincial NL ESA as vulnerable. This catadromous species spends most of its life in freshwater and estuaries (brackish) but migrates to sea to spawn once sexual maturation is complete (Scott & Crossman, 1998). Bradbury et al., 1999 indicated that eels typically begin their spawning and down-stream migration in late summer/fall throughout much of eastern Canada. Scruton et al., 1997 reported that downstream migration of eels in Newfoundland generally occurs between mid-August and mid-October. American eels spawn in the Sargasso Sea with peak spawning occurring in mid-winter between January and March. Young eels (elvers) begin their upstream migration in most areas of insular Newfoundland in early June to mid-August (C. Bradbury et al., 1999; Scruton et al., 1997; Grant & Lee, 2004) indicated that up-stream migrating elvers tend to be bottom dwellers, hiding in burrows, snags, plant masses, under rocks or any other type of shelter, including burrowing directly into the substrate, and that soft, undisturbed bottom sediments provide critical shelter for migration. The habitat preferences of American eel indicate that freshwaters within the PA potentially provide overwintering, feeding and migratory habitats.

Atlantic salmon in Newfoundland exist in both anadromous (sea-run) and landlocked forms (ouananiche) (Smith, 1988). There is substantial variance in the timing of the upstream spawning migration in insular Newfoundland, ranging from May to October (Porter, 1975; Scruton et al., 1997). Newfoundland's anadromous populations of Atlantic salmon typically spawn in a stream characterizing a clean, well-aerated, gravel bottom riffle upstream of a pool (Scott & Scott, 1988; Smith, 1988; Gibson, 1993; Stanley & Trial, 1995; Scott & Crossman, 1998) between mid-October to mid-November (Scruton et al., 1997). Adults may return immediately to sea after spawning or overwinter in freshwater habitats, before migrating to sea in the spring (Smith, 1988). Eggs incubate over winter (Smith, 1988) for four or five months (Porter, 1975; Scruton et al., 1997). Hatching usually occurs between mid-April and early May in Newfoundland (Porter, 1975; Scruton et al., 1997). Downstream migration of over-wintering adults occurs in May and June (Porter, 1975). Young Atlantic salmon, after hatching, might remain within the substrate for several weeks (Randall, 1982), before moving to other habitats. Juveniles going to sea began to migrate downstream as smolt in the spring (May and June) (Porter, 1975; Scott & Scott, 1988; Scott & Crossman, 1998). Atlantic salmon overwinter at sea where they can undertake large scale migrations to feeding grounds off Labrador and western Greenland. Anadromous Atlantic salmon would be expected to be common in scheduled salmon rivers within the RAA. Outside of schedule salmon rivers within the RAA, Atlantic salmon were observed in the LAA but not within the PA or directly interacting with the Project activities.

There are well-established populations of landlocked Atlantic salmon, or ouananiche, in many of the inland Newfoundland waters (Grant & Lee, 2004). The ouananiche life history is comparable to sea-run Atlantic salmon, except adults remain in freshwater. Anadromous and landlocked salmon can differ in habitat preferences and feeding; however, there are no significant morphological differences between the two as juveniles (Riley et al., 1989). Freshwater populations spawn along rocky lake shorelines in insular Newfoundland (Scott & Crossman, 1964; Cowan & Baggs, 1988; Scruton et al., 1997) or migrate into tributary streams (Scott & Crossman, 1998; Hutchings, 1986; Einarsson et al., 1990) in moving water, usually above outlet streams and near the mouths of inlet streams (Scruton et al., 1996). Ouananiche most often spawns in Newfoundland between late September to early November (Leggett, 1965; Beak Consultants Limited, 1980; (Scruton et al., 1996; Scruton et al., 1997) the eggs hatch between early April and mid-June (Scruton et al., 1997). Ouananiche often return to the lake shortly after stream-spawning (Havey & Warner, 1970a; Scruton et al., 1996; Scruton et al., 1997) while some take up residence in tributary pools before returning to the lake the following spring (Scott & Crossman, 1964; Havey & Warner, 1970). Ouananiche will overwinter in both the deep warmer waters of ice-covered lakes as well as in the fast-flowing ice-free waters of inlets and outlets (Scruton et al., 1997). (Grant & Lee, 2004) and (Bradbury et al., 1999) reported that ouananiche YoY and juveniles usually reside in stream riffle 'nursery' areas before moving into lakes after two to three years. Ouananiche would be expected to be common in streams and waterbodies within the LAA and RAA.

Threespine sticklebacks are the most common stickleback species in the province and are relatively broadly distributed throughout most of Newfoundland and are most likely to be found in ponds or streams flowing through wetlands with fine substrates, and prefers shallow vegetated areas, usually over mud or sand (Grant & Lee, 2004; Scott & Crossman, 1998). This euryhaline species is tolerant of marine, brackish and freshwater environments, occupying mainly shallow waters in still or relatively slow-flowing zones (Scott & Crossman, 1998). Anadromous populations undergo a spring (May to June) spawning upstream migration into fresh or brackish water, with spawning generally occurring in June or July (W. Scott & Crossman, 1998). Some anadromous threespine sticklebacks leave the streams and/or estuaries and move into saltwater in the fall to overwinter (Coady & Power, 1973). Freshwater threespine stickleback resident populations also undergo migration in the spring (May to June) from deep to shallow waters of lakes or larger rivers into smaller, slower streams or backwaters (Scott & Scott, 1988; Scott & Crossman, 1998). Landlocked threespine sticklebacks spawn mainly in June and July (Scott & Scott, 1988). Shallow sandy bottoms are the preferred substrate for nest building with nests constructed of small sticks and plant debris. Eggs are sticky and form as one large cluster and hatch in about seven days. Incubation can vary by location from seven to 40 days, depending on the temperature (Grant & Lee, 2004). Males provide parental care during incubation up to when young are still in the vicinity of the nest (about two weeks after hatching) (Scott & Scott, 1988; Scott & Crossman, 1998), at the end of summer (early September). Threespine stickleback would be expected to be common in streams and waterbodies within the LAA and RAA.

Brook trout, also known as speckled trout, exists in both anadromous and landlocked form in Newfoundland. This fish is widely distributed in insular Newfoundland and usually utilizes lakes, ponds and tributaries for spawning, overwintering, and feeding. They may spend one or two months feeding at sea in relatively shallow water, close to their natal stream, while others spend their entire life in freshwater (Scott & Scott, 1988). There is evidence to two forms of brook trout coexist in some Newfoundland lakes; a primarily benthic feeding population that is relatively slow growing and short-lived and a larger-bodied, piscivorous population that is faster growing and longer-lived. Anadromous and freshwater residents generally have similar life histories. Migratory activities between both environments (freshwater and marine) can occur throughout the year (O'Connell, 1982), however, peak downstream migration of brook trout typically occurs in May or June, while upstream spawning migrations for both forms occur in July in Newfoundland. Brook trout normally spawns in shallow, gravel-bottomed, cool, clear headwater streams with clean, ventilated gravel. Spawning is also possible in lakes, along the shorelines particularly in gravelly areas subjected to spring upwellings and moderate water currents. Spawning takes place between late September and early November (Bradbury et al., 1999). Eggs incubate in the substrate over winter and hatch between April and mid-June (Cowan & Baggs, 1988; Scruton et al., 1997). Although growth rates are variable in Newfoundland, brook trout usually mature at two to four years of age. In streams brook trout prefer bank and in-stream cover, and in lakes are partial to cold, clear waters. Brook trout would be expected to be the most common and widely distributed species in streams and waterbodies within the LAA and RAA.

Brown trout are native to Europe, western Asia and northern Africa, and was first introduced to North America in Newfoundland in the 1860's. In Newfoundland, they were first introduced on the Avalon Peninsula and their range has expanded to include the Burin Peninsula, Trinity Bay and Bonavista Bay (Hustins, 2007). There are unconfirmed reports that suggest that the range may now extend to Notre Dame Bay, including the Exploits River along the north shore and to Fortune Bay along the south shore of the island (Westley et al., 2011). Brown trout are usually found in cool medium to fast streams with silt free rocky bottoms and pool and riffle areas. In Newfoundland, brown trout are typically observed in relatively slow and deep habitats (i.e., pools and river margins) and highly associated with riparian cover (Scruton et al., 2000). Lake and anadromous populations are also common. In many Newfoundland systems, brown trout exhibit an ad fluvial life history pattern: spawning in small tributaries followed by a shift to lakes for growth and maturation. Brown trout spawn from early October to mid-December in Newfoundland. They choose spawning sites in spring-fed headwaters, at the head of a riffle or at the tail of a pool that have good water flow and a gravel substrate. The eggs hatch around mid-April to mid-May but remain buried in the gravel as alevin. After the yolk sac has been mostly absorbed and the water has warmed, the young fish emerge the gravel as fry. It takes two to six years to for the fish reach sexual maturity. Some adults may migrate to lakes, estuaries or the ocean for their adult lives, but all brown trout return to streams to spawn. There are indications that stream size influences interactions between brown trout and brook trout with brown trout outcompeting brook trout in the main stem of rivers while brook trout have an advantage in headwater streams.

Freshwater Amphibians

Four species, including American toad (*Anaxyrus americanus*), mink frog (*Lithobates septentrionalis*), green frog (*Lithobates clamitans*) and wood frog (*Rana sylvatica*) are found in insular Newfoundland, and they all are considered exotic (NLDFFA, 2005; NatureWatch, 2025). American toads are mostly terrestrial and inhabit freshwaters only during the breeding season and as larvae. Toad breeding occurs in warm, shallow ponds, streams, river margins, and even large puddles and roadside ditches. The mink frog prefers large, cold, permanent ponds, lakes and slow-moving rivers with abundant vegetation. The green frog is mostly found in or near shallow, permanent waterbodies such as springs, swamps, brooks, and edges of ponds, or lakes. The wood frog prefers moist woodlands and vernal woodland pools (NatureWatch, 2025). The green frog is the most abundant amphibian in Newfoundland (NLDFFA, 2011). General status assessments have categorized the four species as exotic and secure in Newfoundland (NLDFFA, 2005).

3.1.2.5 Freshwater Sensitive Time Periods and Working Windows

This section summarizes the sensitive times of the year that fish populations are likely to be present and potentially vulnerable in the PA. Periods associated with important life history events (e.g., migrations, spawning and nursery) of brook trout, threespine stickleback, Atlantic salmon, both anadromous populations and ouananiche, brown trout, and American eel are provided in Table 3.1.2-4. These species are considered important owing to their likely presence in the RAA based on baseline study results and professional opinion.

Catadromous (e.g., American eel) and anadromous (e.g., Atlantic salmon, brook trout, threespine stickleback) forms of fish have more extensive migration patterns than freshwater resident populations. Sexually mature catadromous American eels undergo downstream migration from mid-August to mid-October. Young American eels migrate upstream from early June to mid-August, with August being the peak for migratory events. Anadromous Atlantic salmon and brook trout migration patterns extend from May to September, with a concentration of downstream migration in the spring (May and June) and upstream migration in summer and early fall (July to September). Brown trout would have a similar migration window, however, some populations on the Avalon Peninsula are known to migrate upstream during late with (March – April). Little research has been conducted about the marine life history of brown trout in insular Newfoundland but is documented in Europe that they remain relatively close to their natal rivers. Threespine stickleback has an upstream spawning migration in the spring (May and June) and downstream migration throughout the fall (September and October). Migratory activities between both environments (freshwater and marine) can occur throughout the year, however, peak downstream migration of brook trout typically occurs in May or June, while upstream spawning migrations for both forms occur in July (O'Connell, 1982).

Table 3.1.2-4 Summary of sensitive time associated with freshwater fish species of interest in the RAA.

Species	Life History Sensitive Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Freshwater Environment													
Brook trout (anadromous and landlocked)	Migrating	1	1	1	2	7	7	8	10	8	1	1	1
	Spawning	0	0	0	0	0	0	0	1	5	10	5	0
	Incubation, Hatching	2	3	4	10	10	7	0	0	0	0	0	2
Brown trout (anadromous and landlocked)	Migrating	0	0	7	7	10	10	9	9	8	0	4	4
	Spawning	0	0	0	0	0	0	0	0	1	10	10	1
	Incubation, Hatching	3	3	3	10	8	1	0	0	0	0	2	3
Threespine stickleback (anadromous and landlocked)	Migrating	0	0	0	1	10	10	1	2	8	7	1	0
	Spawning	0	0	0	0	1	10	10	1	0	0	0	0
	Egg incubation, Hatching	0	0	0	0	0	3	8	7	3	0	0	0
Atlantic salmon (anadromous)	Migrating	0	0	0	1	10	10	9	9	8	0	4	4
	Spawning	0	0	0	0	0	0	0	0	1	10	10	1
	Incubation, Hatching	3	3	3	10	8	1	0	0	0	0	2	3
Atlantic salmon (Ouananiche)	Migrating	0	0	0	0	0	0	1	5	5	4	3	3
	Spawning	0	0	0	0	0	0	0	0	5	10	7	0
	Incubation, Hatching	1	1	1	10	10	7	1	0	0	0	1	1
American eel (Catadromous)	Migrating	0	0	0	0	1	7	8	10	8	5	1	0

Peak Activity
10
9
8
7
6
5
4
3
2
1
0

Ouananiche and resident brook trout have a relatively limited migration compared to anadromous forms; they usually intensify their movement upstream before spawning. Ouananiche migration occurs throughout the summer and fall, with a high occurrence the two months before the peak of spawning (October).

American eel spawn in the open ocean (Sargasso Sea), while for both forms (anadromous and landlocked) of brook trout and Atlantic salmon spawning events occur in the fall and peak in October. Anadromous and landlocked threespine stickleback spawn between June and July.

Brook trout, Atlantic salmon, and brown trout eggs incubate over winter in streams or lakes and hatch in the spring (April and May), while threespine stickleback egg incubation lasts less than 40 days and hatching occurs in summertime.

Streams and waterbodies on the Sunnyside Peninsula and Isthmus areas potentially provide migratory, spawning, nursery, rearing, and feeding habitats for these five species of fish. Brook trout in these streams and waterbodies are likely resident and are not from anadromous stock while brown trout and Atlantic salmon may come from anadromous populations. The Project's freshwater components will interact with 18 stream crossings, two waterbodies, and four potential water supply ponds (Rushy Pond, Willie Jarge Pond, Barrisway Pond, Inkster's Pond). Stream crossings are expected to be affected the most during the Construction Phase (e.g., temporary watercourse perturbations including erosion, deposition of fines, addition of culverts and/or bridges, fording during Project Transmission Line installation), while the O&M Phase and Decommissioning and Rehabilitation Phase are expected to have lesser effect (e.g., transportation, maintenance).

3.1.2.6 Freshwater Conservation Concern

Freshwater Species at Risk and/or Species of Conservation Concern

Species listed under the SARA Schedule 1 are legally protected under Section 32(1), which states, 'no person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, and endangered species, or a threatened species.' SARA species are ranked as extirpated, endangered, threatened and of special concern. Prohibitions of NL ESA, 2002, Section 16, states, 'a person shall not disturb, harass, injure, or kill an individual of a species designated as threatened, endangered or extirpated.' The NL ESA designates species as extirpated, threatened, endangered, vulnerable, data deficient, or not at risk.

Information used to characterize the species of interest in the RAA and LAA included publicly available literature and information provided by the AC CDC. A request for information from the AC CDC was made in 2025 for the PA and up to 5 km surrounding Sunnyside Peninsula and Isthmus. Supporting documentation also included Committee on the Status of Endangered in Canada (COSEWIC) reports.

Two aquatic species have been designated by COSEWIC, or under SARA and/or NL ESA, that occur in the RAA, include American eel and Atlantic salmon (South NL population) (Table 3.1.2-5). Banded killifish, Atlantic sturgeon and mummichog also have designation under these conservation legislations (Table 3.1.2-5); however, their occurrence within the RAA is extremely unlikely.

The South Newfoundland population of Atlantic salmon are anadromous species, and their freshwater habitats provide spawning, nursery, rearing and migratory routes, while marine waters provide feeding, additional rearing and migratory corridor for maturation (COSEWIC, 2010). A key limiting factor for the Atlantic salmon population is the accessibility to migratory corridors while other threats include poor freshwater and marine survival, climate change, interception in other fisheries, poaching, migration barriers, land use practices, and many others (COSEWIC, 2010). The presence of Atlantic salmon in the RAA is expected in marine/coastal areas and freshwater scheduled salmon rivers. The baseline study for this Project showed the presence of juvenile Atlantic salmon at one site on the Sunnyside Peninsula in the LAA but does not directly interact with any Project infrastructure (Appendix B1).

COSEWIC (2010) has designated the South Newfoundland population of Atlantic salmon, to which Placentia Bay salmon belong, as *Threatened*. They indicated the numbers of small and large salmon had declined considerably over the preceding three generations, by 37% and 26%, respectively, for a net decline of 36%. COSEWIC (2010) identified commercial fisheries (including those in St. Pierre and Miquelon), illegal fisheries and bycatch, Atlantic salmon aquaculture, and lower marine survival due to changing marine conditions as potential threats and limiting factors. A population viability analysis related to conservation spawning requirements indicated there was a low probability (less than 30%) the South Newfoundland population of Atlantic salmon would meet spawning requirements for population recovery within the following 15 years (Calvert et al., 2013). The status of the Atlantic salmon stock on the Come By Chance River in 2022 was considered in the Cautious Zone, a stock status category between the lower reference point (LRP) and the upper stock reference (USR) (DFO, 2024a). Stocks above the USR are considered healthy while stocks below the LRP are considered in the critical zone. Stocks in the cautious zone require management actions to increase the population and prevent the stock from declining into the critical zone. Low marine survival for overwintering salmon is considered the greatest threat to Atlantic salmon abundance in NL (Dempson et al., 2017).

The American eel is part of a panmictic stock, meaning that individuals from the entire range for the species come together to reproduce as a single breeding population (ASMFC, n.d.). This catadromous species migrates downstream in late summer or autumn to marine waters and undertakes an extensive migration to the Sargasso Sea to spawn (Environment Canada, 2012). Glass eels (young eels) drift toward the continental shelf to eventually proceed into inshore waters and some young eels migrate upstream to freshwater habitats, while others remain in brackish or salt waters (Environment Canada, 2012). A key limiting factor for the American eel is the accessibility to migratory corridors while other threats include changing oceanic and regional coastal currents, climate change, migration barriers, hydroelectric dams and wind turbines, poor water quality, contamination, and interception in other fisheries (COSEWIC, 2012b). American eel has the potential to occur within the LAA, particularly in the lower reaches of streams that are interconnected to the shore.

Table 3.1.2-5 Aquatic species at risk and species of conservation concern.

Common Name	Species Name	IUCN Red List[1]	COSEWIC Status	SARA Status	NL ESA Status	Occurrence in LAA
Atlantic Salmon (South Newfoundland Pop.)	*Salmo salar*	Near Threatened	Threatened	Not Listed*	Not Listed	Occasional
American Eel	*Anguilla rostrata*	Endangered	Threatened	Not Listed*	Vulnerable	Occasional
Banded Killifish (Newfoundland Pop.)	*Fundulus diaphanus*	Least Concern	Special Concern	Special Concern	Vulnerable	Rare/None
Atlantic Sturgeon (Maritimes Pop.)	*Acipenser oxyrinchus*	Vulnerable	Threatened	Not Listed*	Not Listed	Rare/None
Mummichog	*Fundulus heteroclitus*	Least Concern	Not Listed	Not Listed	Vulnerable	Rare/None

Notes:
1 = IUCN Red List referred to the global specie, if not specified
NL = Newfoundland and Labrador,
Pop. = Population(s),
Not Listed* = Represent species not on the SARA list, although under consideration for addition in Schedule 1 of SARA;

Freshwater Habitats of Conservation Concern

No critical habitats (as defined by SARA or NL ESA) for these species were identified in the RAA.

Spawning habitats are important for reproduction and recruitment for salmonid populations and spawning locations and suitable spawning substrates are considered potentially limiting to fish production. No discrete spawning habitats were documented during the baseline survey in 2024. Pools, riffles and runs accounted for 42.8, 31.1, and 25.3% of habitats surveyed, respectively, while gravels accounted for 3.2% of the substrate types. It is likely that in small streams like those that occur in the Sunnyside Peninsula and Isthmus areas the spawning habitats/substrates would be distributed in patches rather than as discrete reaches.

Spawning areas would also be important for maintaining salmon populations in the six scheduled salmon rivers in the RAA. Porter (1975b) documented considerable evidence of spawning in these rivers, such as redds (i.e., sites selected by females for laying eggs). However, the geographical location of the spawning activity was not provided.

3.1.2.7 Marine Environment Introduction

Fish and fish habitat characteristics of the LAA and RAA within the marine environment are discussed in this section to consider potential interactions with the marine footprint of the Project. The LAA's marine component is situated in Placentia Bay, which is part of the Placentia Bay/Grand Banks (PBGB) Large Oceans Management Area (LOMA) under the Integrated Management Plan (DFO, 2007a; Fisheries and Oceans Canada, 2012a). Now referred to as the PBGB Integrated Management Area (PBGB IMA), this region spans approximately 550,000 km². Placentia Bay, along with the Coast of Bays, is one of two designated coastal management areas within the PBGB IMA (DFO, 2017c). The bay supports a diverse range of organisms and ecological communities, forming complex trophic interactions and food webs that extend from primary producers to apex predators.

3.1.2.8 Marine Geology and Geomorphology

Placentia Bay, located on the south coast of Newfoundland, is bordered by the Burin Peninsula to the west, the Avalon Peninsula to the east, and the Isthmus of Avalon to the north. The bay extends over 125 kilometers in a southwest-northeast direction and spans about 145 km at its mouth, covering approximately 5,000 square kilometers. It features well-defined channels with depths of 430 m, along with islands, shoals, reefs, and banks, and has an average depth of 125 m. Within 2 km of the shore of Come By Chance, depths range from 8 to 40 m and exceed 100 m within 5 km of the shore. Most of the seabed around Come By Chance and the LAA is relatively shallow, under 20 m (Navionics, 2023).

There is unrestricted water exchange between the Atlantic Ocean and the outer bay due to the absence of a sill at Placentia Bay's mouth. Contrarily, the flow is limited between the inner and outer bays because of three main islands situated between the two areas (MacIsaac et al., 2023). The bay is a glacially modified basin with a complex glacial history, shaped by ice from both the Burin and Avalon Peninsulas, resulting in notable seabed topography. The underlying bedrock consists of Late Proterozoic submarine and non-marine volcanic and sedimentary rocks (Shaw & Potter, 2015). The eastern side of the bay features glacially modified landforms, such as drumlins and mega-flutes. Seafloor sediments range from coarse-grained glacial deposits nearshore to fine-grained sediments in the bay's center, with thick Quaternary glaciomarine sediments overlaid by postglacial mud in the upper channels and eastern bay.

Placentia Bay features an irregular coastline with numerous smaller bays, inlets, islands (large and small), rocky headlands, platforms, and sandy gravel beaches. It is part of the DFO's Coastal Management Area due to significant recreational, commercial, and industrial traffic (Fisheries and Oceans Canada, 2012b). The bay is divided into an inner and outer bay, with the inner bay housing three large islands, Red Island, Long Island, and Merasheen Island, which create three north-trending channels: the Western, Central, and Eastern channels. These channels merge in the bay's center, with the Eastern Channel being the primary shipping route (Fisheries and Oceans Canada, 2012b).

The Bay of Come By Chance is relatively shallow close to shore at 1 to 8 m with a sudden drop to a low plateau extending outwards towards the rest of Placentia Bay. At about 2 to 3 km away from shore, there is a drop of over 100 m. This allows for larger shipping vessels to cross Placentia Bay and reach the port of Come By Chance. This formation is remnants of glacial drift that was stripped from glaciers in most of the surrounding site (DFO, 2007a).

The shores of Placentia Bay have been mainly shaped by strong winds, waves from weather systems, and seasonal ice cover (MacIsaac et al., 2023). Coastal landforms are categorized into five distinct categories: (1) Flats with mostly sand to gravel flatlands which tend to be wide and have low relief; (2) Steep shallow beaches of gravel to boulder size; (3) Sandy bars connecting smaller islands (called tombolos); (4) Lagoons; and (5) Estuaries.

3.1.2.9 Physical Oceanography

The following sections present an overview of key aspects of the physical oceanography of Placentia Bay and the RAA. This information is primarily drawn from MacIsaac et al. (2023), LGL Limited (2018), Ma et al. (2012), and references within these reports.

Tides

Tides reported by the Canadian Hydrography Service (Canadian Hydrographic Service, 2022) for Station 0815 (at the head of the bay at Come By Chance), in the LAA and RAA, Station 0835 (Argentia Harbour), and Station 0760 (Burin on the southwest coast of Placentia Bay) are presented in Table 3.1.2-6 (MacIsaac et al., 2023). Tides within Placentia Bay are semi-diurnal, meaning there are two high tides and two low tides each lunar day. On average, tidal ranges 1.5 to 1.6 m (Canadian Hydrographic Service, 2022). The tidal signal generally propagates from northeast to southwest, taking approximately a quarter-hour to traverse the bay.

Table 3.1.2-6 Summary of tidal range.

Station	Mean Water Level (m)	Range	
		Mean Tide	Large Tide
0815 Come By Chance	1.4	1.6	2.4
0835 Argentia	1.4	1.6	2.7
0760 Burin	1.2	1.5	2.3

Currents

Circulation in Placentia Bay typically follows a cyclonic pattern during the spring and summer months. Waters enter the bay along the eastern shore and exit through the western shore, creating a counterclockwise open gyre, from April to June (MacIsaac et al., 2023). Local wind patterns primarily influence these surface circulation patterns and speeds. The prevailing southwest winds throughout much of the year drive the counterclockwise near-surface currents. The general circulation exhibits seasonal variations, with stronger inshore currents during the fall and weaker currents in the spring and summer.

Currents in Placentia Bay are fastest at the mouth, with average speeds ranging from 19 cm/s in June and July to 29 cm/s in November. The upper limit speeds vary from 135 cm/s in February to 178 cm/s in November. At the Come By Chance SmartBay Buoy (currently inactive), located within the RAA, mean surface currents were around 8 cm/s, with upper limits of 11 cm/s in July and 23 cm/s in September. These speeds are much lower than those observed at the Pilot Boarding Station (PBS) near the Argentia Peninsula, where mean surface currents are approximately 22 cm/s, with upper limits of 33 cm/s in December and 48 cm/s in September (MacIsaac et al., 2023).

Throughout the year, Placentia Bay experiences a primarily southwest to west air flow. In winter, west to northwest winds prevail, shifting to a counterclockwise direction in March and April, leading to a dominant southwest wind by summer. As autumn approaches, winds shift slightly, becoming predominantly westerly again by late fall and continuing into winter. Mean wind speeds are generally lowest during the summer months and highest during the tropical cyclone season. Seasonal average and maximum wind speeds for Placentia Bay are shown in Table 3.1.2-7.

Table 3.1.2-7 Seasonal and maximum average wind speeds in Placentia Bay.

Season	Average Wind Speed		Maximum Average Wind Speed	
	m/s	km/hr	m/s	km/hr
Spring	8 to 9	29 to 32	27.5 to 30	99 to 108
Summer	6 to 7	22 to 25	25 to 27.5	90 to 99
Fall	8 to 9	29 to 32	30 to 32.5	108 to 117
Winter	10 to 11	36 to 40	25 to 27.5	90 to 99

Placentia Bay is susceptible to frequent storm surges and seiche waves due to high storm activity in southeastern Newfoundland and the bay's wedge-shaped geometry and large islands at the head of the bay (MacIsaac et al., 2023). Storm surges associated with very low-pressure storm systems passing through the region and strong winds blowing over the water surface results in high water levels that can cause severe flooding for low-lying coastal regions (LGL Limited, 2018).

Southeastern Newfoundland is prone to hurricanes and tropical storms between August and October due to its location along the major storm track routes. These cyclones, once moving over colder waters, transition into fast-moving extra-tropical cyclones, generating large waves and hurricane-force winds. The most intense storms typically approach from the south, fueled by the temperature differences between the Labrador Current and the Gulf Stream. Between 1961 and 2015, fifty-three tropical storms passed through the Placentia Bay region between, including five Category 1, two Category 2, and one Category 3.

Wave height varies significantly in Placentia Bay depending on time of year and storm condition (MacIsaac et al., 2023). Stronger wave conditions generally occur during the winter months. Annual wave heights range from 1.5 to 11.5 m at the mouth of Placentia Bay. Data from Red Island and the mouth of Placentia Bay show similar annual wave trends with the lowest wave heights in the spring and summer, and the largest in winter (Husky Energy, 2012). Waves predominantly come from the southwest throughout the year, both near Red Island and at the mouth of Placentia Bay. At the mouth of the bay, the minimum monthly mean wave height ranged from 0.2 m in June and July to 1.3 m in May through August. Near Red Island, the minimum monthly mean wave height was 1.0 m or less from April to September. The maximum monthly mean wave height was recorded in December, at 1.6 m near Red Island and 2.4 m at the mouth of the bay. The highest wave heights, occurring in March, ranged from 8.2 m near Red Island to 10.9 m at the mouth of Placentia Bay. Wave conditions in the more sheltered Bay of Come By Chance would be significantly lower than those recorded in the open waters near Red Island and the bay's mouth.

In Placentia Bay, there is a clear seasonal cycle that occurs from summer to winter and spring. In the Summer, there is stratification with relatively warm and fresh water on the surface with colder and saltier water below with an intrusion of deep and salty water entering the bay from June through October. Whereas in the winter and spring, the water column is well mixed (Ma et al., 2012). During the 2024 Baseline, the mean salinity average per month was consistent and measured at approximately 30.41, 30.97, and 30.45 psu in July, September, and December respectively. Salinity ranged from 28.31 psu in December to 31.10 psu in September, with a slight variation due to surface water runoff (Appendix B1). Saltier water is denser and tends to remain near the bottom of the water column. This layer remains relatively consistent throughout the year, though it can extend higher in the fall due to mixing across the entire water column. Mixing continues into the winter months (January to May), resulting in a nearly uniform salinity of 31 psu throughout the water column (MacIsaac et al., 2023).

In outer Placentia Bay, the water column is generally mixed and uniform during the winter and spring, but a strong thermocline develops in the summer. This thermocline typically persists from June to October, with mean monthly temperatures ranging from 10 to 14°C, extending to a depth of about 20 m. From late December to May, the water column remains highly mixed, with a mean monthly temperature of 2°C from the surface to 140 m, and near-zero temperatures below that (Stantec Consulting Ltd, 2012). Baseline data from 2024 in Come By Chance also demonstrated a thermocline in the water column in July and December, with a similar temperature range (Appendix B1). The temperature of the water column at three marine stations ranged from well stratified (11.25°C to 16.35°C) in the middle of July to relatively uniform (17.02°C to 17.71°C) near the end of September.

Marine Geophysical Considerations

Iceberg season and sea ice formation occur in southeastern NL from later winter to early spring. By mid-February in Placentia Bay, pack ice generally drifts from southern Labrador. Although not fully ice-covered, this ice can persist until late April. Most of the ice is less than 10 cm thick and considered new ice while some areas of Placentia can have ice with a thickness of 15 cm or more (LGL Limited, 2007). While Come By Chance is considered ice-free with year-round access, sea ice might still be present in the marine and coastal areas of the LAA and RAA between February and April (DFO, 2020a). In Trinity Bay, sea ice starts to form and drifts from Labrador between late winter to early spring and can last up until May (ECCC, 2015). This consists of pack ice depending on the winter season.

Due to the southern location, warmer temperatures, orientation, and circulation of the bay, Placentia Bay has low iceberg numbers (Colbourne et al., 2017). While Trinity Bay has a higher amount due to its location on the northern shores of NL with icebergs travelling from the Labrador Current (Sheldon et al., 2015). Between 2011 and 2021, a total of 64 icebergs were recorded within the RAA (International Ice Patrol, 1995). These icebergs were only present in five of the 11 years and all of them except one were found in Trinity Bay. The one iceberg located in the Placentia Bay region was in 2012.

Five regions in Placentia Bay have been identified based on shoreline biological communities (Catto et al., 1999). Two of these regions are located within the RAA: Northeast Placentia Bay (Argentia Harbour to North Harbour) and Swift Current Estuarine Region (Roughly North Harbour Point to Prowsetown).

Northeast Placentia Bay experiences north-flowing currents, but its highly convoluted and indented coastline, featuring numerous shoals, headlands, and small islands, offers significant protection from surf and ice erosion. While pack ice can be transported into the northern reaches of the bay, it rarely reaches areas north of Argentia. The region has a relatively low diversity of species, with zonation of perennial species occurring primarily in protected habitats like embayment's and sheltered coves. Despite the low species diversity, productivity is relatively high due to the influx of nutrients and phytoplankton into the area.

Swift Current Estuarine Region is subject to many salinity effects due to influxes of freshwater from Piper's Hole and other rivers in the area. The defined area is variable due to weather fluctuations but is mainly defined by *Zostera* communities and diagnostic perennial biological feature. Compared to the other four regions, this area contains more saltmarshes with moderate productivity. The freshwater that enters is low in nutrients.

Pack ice scour, landfast ice, substrate size, fog, temperature, seawater chemistry, and anthropogenic impacts are key factors that affect biological productivity and communities in Placentia Bay (Catto et al., 1999). These factors, combined with the influence of tides, winds, waves, and water currents, shape the bay's ecosystem. Anthropogenic impacts include, but are not limited to, sewage and fish waste, as well as the construction of wharves, breakwaters, causeways, roads, garbage disposal sites, and fishing. The Come By Chance Industrial Site, the Marystown shipyard, the former phosphorus plant in Long Harbour, and the former Argentia Naval Base are major industrial sites found in Placentia Bay. Additionally, the rise of aquaculture is causing concerns about effects on the surrounding region of Placentia Bay.

Hurricanes in Trinity Bay vary in frequence and strength yearly, which shapes the coastal morphology (Catto et al., 2003). Additionally, this area is very deep (>500 m) in some locations which is associated with the bathymetric depressions offshore. In contrast to Placentia Bay, the development of ice foots are common which prevents erosion of beach sediment in the winter.

3.1.2.10 Marine Fish and Fish Habitat

Marine Fish

Fish species in Placentia Bay are commonly associated with specific habitat types in nearshore areas. Species such as cod, cunner, winter flounder, lumpfish, and herring are frequently found in habitats like eelgrass beds, kelp forests, or cobble substrates. Soft sediment habitats, such as sand and mud, provide refuge for benthic species, including American plaice and winter flounder. Nearshore pelagic schools of capelin, herring, and sand lance are typically found near the surface, particularly at night, and play an important role as forage fish for higher trophic levels.

Several fish species also migrate seasonally to Placentia Bay. Atlantic herring, capelin, and Atlantic cod arrive in the spring, while Atlantic mackerel and possibly herring migrate in the autumn. Species like Atlantic salmon, brook trout, brown trout, and American eel migrate to and from rivers, using Placentia Bay as a feeding ground during the summer. Many species that occupy the shallow areas of Placentia Bay migrate to deeper waters in winter, including lobster, snow crab, and winter flounder. American plaice, Atlantic cod, cunner, winter flounder, lumpfish, wolffish, capelin, herring, mackerel, and sand lance all reproduce in Placentia Bay and rely on coastal habitats for spawning and refuge. DFO research vessel surveys in Argentia reported few fish and shellfish, with winter flounder, longhorn sculpin, little skate, snow crab, and rock crab occurring in very low numbers (Husky Energy, 2012).

Many of the marine finfish species in Placentia Bay have ecological and economic significance, particularly from a fisheries perspective. This section provides an overview of the life histories and ecological associations of finfish species of special interest in the RAA. Notable species include Atlantic cod (NL and Laurentian North (LN) populations), American plaice (NL Population), Atlantic herring, lumpfish, and capelin—all of which are important commercially and as key species in the food web of many fish, marine mammals, and birds.

Atlantic cod has historically been one of the world's most important food fisheries and, until recent years, was the most significant commercial species in NL. However, cod populations have dramatically declined over the past few decades, and inshore Atlantic cod are now more abundant than those in offshore areas (DFO, 2017a) The NL and LN populations of Atlantic cod were designated "Endangered" by COSEWIC in 2003 (COSEWIC, 2003)

The St. Pierre Bank Atlantic cod stock (Northwest Atlantic Fisheries Organization sub-division 3Ps) is part of the LN population (COSEWIC, 2003). This stock migrates seasonally between neighboring areas and between inshore and offshore sub-components. Some Newfoundland Shelf Atlantic cod populations migrate from relatively warm offshore waters to inshore coastal areas in the spring to feed primarily on capelin before returning offshore in the fall (COSEWIC, 2003). The Atlantic cod fishery in 3Ps typically runs from mid-May to the end of March, with seasonal closures usually occurring from March to mid-May to minimize impacts on spawning aggregations (DFO, 2021c). Spawning is broadly distributed in 3Ps and can occur near the shore of southern Newfoundland (including Placentia Bay), as well as offshore in Burgeo Bank, St. Pierre Bank, and the Halibut Channel (DFO, 2022d). Inshore cod spawning in Placentia Bay occurs in several bays, with spawning typically occurring from March to August (DFO, 2022d). Spawning timing is often synchronized with plankton blooms in spring and fall, particularly in spring when larvae food is more abundant. Juvenile cod settle in the demersal zone after the larval stage and remain there for one to four years. As they mature, young Atlantic cod begin seasonal migrations, initially swimming undirected in coastal waters, while adults migrate to specific locations based on temperature or feeding conditions (COSEWIC, 2003).

Capelin plays a critical role in the growth, condition, and reproductive success of northern cod (Rose & O'Driscoll, 2002). Capelin was found in 9.5% of the cod caught in Placentia Bay during January and June, constituting 22% of their diet, with cod in Placentia Bay showing better condition than those in neighboring bays.

American plaice (NL Population) on St. Pierre Bank (Northwest Atlantic Fisheries Organization sub-division 3Ps) and two other stocks (Northwest Atlantic Fisheries Organization division 2J3K, 3LNO) were designated "Threatened" by COSEWIC in 2009 (COSEWIC, 2009; Fisheries and Oceans Canada, 2011). These stocks have been under fishing moratoria since 1993, though they are allowed as bycatch in other fisheries (COSEWIC, 2009;Fisheries and Oceans Canada, 2011;Morgan et al., 2020), which contributes to the catch in Placentia Bay (3Psc). American plaice typically occupy all areas of the continental shelf and may inhabit non-preferential habitats to access rich feeding sites (COSEWIC, 2009). The NL population of American plaice migrates mainly before spawning, which occurs from the end of winter through spring, depending on location. Spawning in St. Pierre Bank, Grand Bank, and the Northeast Newfoundland Shelf typically occurs from March to May (COSEWIC, 2009), suggesting that American plaice in Placentia Bay may spawn during this period.

There are five coastal Atlantic herring stocks in east and southeast Newfoundland, one of which is the St. Mary's Bay-Placentia Bay (SMB-PB) stock (Wheeler et al., 2004, Fisheries and Oceans Canada, 2009a). Most stocks are dominated by spring spawners, with herring spawning in May and June. These demersal spawners deposit adhesive eggs on stable bottom substrates, typically in shallow (<20 m depth) coastal waters, often on gravel or rocky bottoms with an abundance of seaweed. Eelgrass has also been associated with herring spawning in some locations (Scott & Scott, 1988). Herring larvae are pelagic and make diel vertical migrations, while juveniles and adults avoid surface waters during daylight. Atlantic herring are visual feeders, consuming plankton during the day (Scott & Scott, 1988).

Lumpfish are semi-pelagic, migrating into shallow coastal waters to spawn in the spring and early summer before returning to offshore waters in late summer and early fall. Female lumpfish are commercially fished for their roe during the spawning season (Kearley, 2012). Lumpfish eggs adhere to substrates, and larvae hatch during May to June, attaching to macroalgae and hard surfaces. Juvenile lumpfish remain in coastal areas until age one, at which point they begin to adopt the semi-pelagic habits of adults and distribute offshore (Scott & Scott, 1988; Kearley, 2012b).

Capelin is a key species in the food web, providing vital sustenance for many fish, marine birds, and mammals. These pelagic fish undergo inshore-offshore migrations tied to spawning. Capelin typically overwinter in offshore waters, move shoreward in early spring to spawn on beaches, and return to offshore waters in the fall. Juvenile capelin are found in Newfoundland bays, but their larvae are rapidly carried out of the bays by surface currents (Fisheries and Oceans Canada., 2015). Capelin generally arrives in the head of Placentia Bay in June and July.

Five capelin stock complexes exist in the Newfoundland region, including the Saint-Pierre Bank stock, which spawns on the south coast of Newfoundland and in Placentia Bay (Carscadden et al., 1989). Spawning beaches require suitable substrate, with a preference for gravel, and eggs are deposited in the intertidal zone, though they can also be found in the subtidal zone (Carscadden et al., 1989). Capelin prefer gravel substrates ranging from 5 to 15 mm in diameter, though they will spawn on substrates from 2 to 25 mm in diameter.

A total of 31 capelin spawning beaches have been identified in Placentia Bay, eight of which are major sites with consistent spawning each year (Sjare et al., 2003). Notable capelin beaches include those at Fox Harbour (south of Come By Chance), Point Verde, southern Ship Cove, and Gooseberry Cove along the Cape Shore south of Come By Chance. Capelin larvae are most abundant near the islands in the center of Placentia Bay, while capelin biomass is highest in June in outer Placentia Bay. Highest capelin densities in January occur on the eastern side of outer Placentia Bay, and south of Merasheen and Red Islands (O'Driscoll et al., 2000). In March, highest densities are found in the western part of outer Placentia Bay and throughout the inner bay, with June densities distributed more evenly throughout outer Placentia Bay.

Marine Sharks

Sharks are present in the Placentia Bay marine area, but they are generally rarely observed. Six shark species occur in Newfoundland waters: Atlantic spiny dogfish, basking shark, porbeagle shark, shortfin mako shark, blue shark, and white shark. The porbeagle shark, designated as endangered by COSEWIC in May 2004, is known to inhabit southern Newfoundland waters, though it is most commonly found on continental shelves (COSEWIC, 2004; Scott & Scott, 1988). The shortfin mako shark, listed as threatened by COSEWIC in April 2006, is a pelagic species typically found in continental shelf habitats. The blue shark primarily inhabits oceanic pelagic and continental shelf environments. The Atlantic population of the white shark is designated as endangered under Schedule 1 of SARA and by COSEWIC. White sharks are relatively rare in Canadian waters, which represent the northernmost extent of their distribution (COSEWIC, 2006).

Given the shallow coastal waters, proximity to shorelines, and significant marine traffic in the area, no shark species are expected to be found commonly or occasionally near Come By Chance Harbour or the LAA. Additionally, the predominantly pelagic and offshore nature of shark distribution further limits their presence in these nearshore regions.

Marine Mammals

Eleven species are expected to regularly inhabit the bay, including eight cetacean species and three seal species. Several other species have been observed in the bay but are considered rare. Three species of baleen whales—humpback whale, fin whale, and minke whale—are regularly found in Placentia Bay. Two mysticete species, the blue whale and North Atlantic right whale, are considered rare visitors, and both are listed as Endangered under Schedule 1 of SARA. Although very rare and not expected to be in the RAA, occasional sightings of Bowhead Whales may occur in the area (CBC, 2014).

Placentia Bay is also home to five species of toothed whales that are either known to occur or expected to regularly occur. These include long-finned pilot whales, short-beaked common dolphins, Atlantic white-sided dolphins, white-beaked dolphins, and harbour porpoises. The harbour porpoise is considered a species of Special Concern by COSEWIC.

Three seal species—harbour, grey, and harp seals—are found in Placentia Bay. Harbour seals are present in small numbers year-round, while harp and grey seals are considered occasional visitors. Harbour seals favor the calm waters of bays and inlets, using inshore rocks and sandbars for resting. They are commonly observed throughout the coastal areas of Placentia Bay (Sjare et al., 2005). These seal species are not considered at risk by COSEWIC and are not listed under SARA.

Additionally, some river otters in Placentia Bay have adopted a predominantly marine lifestyle. The area from the southern tip of Merasheen Island to the head of Placentia Bay is home to one of the highest densities of river otters in Newfoundland (Goudie & Jones, 2007a).

Given the shallow waters that dominate the LAA, the proximity to shorelines, marine traffic, and the feeding behaviors of whales, seals, and river otters, it is unlikely that marine mammals will occur regularly or occasionally near the Come By Chance Harbour or interact with the Project's marine activities.

Marine Reptiles

Two species of marine reptiles may occur in Placentia Bay: Leatherback Sea turtles (Atlantic population) and Loggerhead Sea turtles. Leatherback sea turtles are regularly found in Placentia Bay and are listed as Endangered on Schedule 1 of SARA. Two key areas of important habitat have been identified for the Atlantic population of Leatherback Sea turtles: the southeastern Gulf of St. Lawrence and the waters south and east of the Burin Peninsula, including parts of Placentia Bay (DFO, 2020c). Loggerhead sea turtles, also listed as Endangered on Schedule 1 of SARA, may occasionally be found in Placentia Bay, though their occurrence is considered uncommon. Additionally, Husky Energy (2012) noted that Kemp's ridley sea turtles could potentially be present in the bay. Due to the migratory and feeding behaviors of sea turtles, it is highly unlikely that marine reptiles will have a substantial presence near the LAA.

Marine Shellfish

Placentia Bay supports a diverse range of shellfish species. Among these, snow crab and American lobster are the most economically important for the local fisheries (DFO, 2025d). These species are extensively fished throughout Placentia Bay, including in the RAA and, to some extent, the LAA. In addition to snow crab and lobster, sea scallops are also harvested both commercially and recreationally in the bay. Below is an overview of shellfish species of economic value found in the LAA.

Snow crab in Newfoundland waters typically inhabit depths ranging from 60 to 400 m on substrates of mud and gravel. The commercial fishery for snow crab has been highly profitable since the groundfish moratorium in 1992, although recent years have seen a decline in stock levels (DFO, 2016a). Snow crab mating occurs during the winter for first-time spawners and in spring and summer for repeat spawners (DFO, 2019b). Female snow crabs carry their eggs until hatching, which occurs in summer. The larvae are pelagic and may remain in the water column for months before settling to the seabed to continue development in the benthic habitat. In 2023, the snow crab fishing season in 3Ps ran from April to June, with the Placentia Bay North 3Psc fishery focusing on inshore snow crab stocks within the RAA.

American lobster has a continuous distribution around the island of Newfoundland, primarily inhabiting rocky habitats in depths ranging from 2 to 40 m (Ennis, 1984). The inshore lobster fishery occurs in water depths of 15–20 m during spring and early summer and remains an important source of income for many local fishers (DFO, 2016b). Lobster mating happens during the summer months, shortly after the female molts, and the developing eggs are carried on the underside of her abdomen. Hatching occurs the following summer, with the larvae assuming a pelagic existence. As planktonic larvae, they settle on the benthic habitat for further development to the adult stage (DFO, 2021a). American lobsters are incidental feeders, consuming a variety of prey, including crustaceans, echinoderms, mollusks, fishes, and polychaetes (DFO, 2021a). In 2023, the lobster fishery in 3Psc was the second most lucrative fishery in the area.

Sea scallops are primarily found in shallow coastal regions of Newfoundland, often in depths of less than 20 m, on sand/gravel or gravel/pebble substrates. These scallops are particularly abundant in sheltered sandy locations, such as the western part of Placentia Bay. Both commercial and recreational harvesting of sea scallops occurs in various areas around Newfoundland, including Placentia Bay, Fortune Bay, and St. Mary's Bay. Sea scallops are harvested nearshore in northern Placentia Bay, in depths less than 200 m. Their spawning typically occurs in September and October. Both eggs and larvae are planktonic, and the larvae develop a "foot" that allows them to attach to the substrate and continue their development. As juveniles, they detach and lie freely on the ocean floor to mature into adults (DFO, 2007b).

Overall, the marine environment within both the LAA and RAA is home to a wide array of benthic organisms. It also provides essential feeding grounds, migratory pathways, and possible spawning, nursery, or juvenile rearing areas for many fish and shellfish species. Species of special concern, such as American plaice (Newfoundland population) and Atlantic cod (Laurentian North population), as well as economically important species like snow crab and American lobster, carry out crucial life history processes within the RAA, particularly during the spring and summer months.

3.1.2.11 Marine Sensitive Time Periods and Working Windows

This section provides an overview of the sensitive periods for marine species commonly found in the marine environment near the LAA and RAA. These periods correspond to key biological activities such as migration, feeding, and spawning.

Table 3.1.2-8 outlines the critical timeframes for four species of special concern or high economic importance that may be present within the LAA. These species include Atlantic cod and American plaice, which are considered species of special concern in NL, and American lobster and snow crab, both of which hold significant economic value in Placentia Bay.

For Atlantic cod, the sensitive period occurs in the spring when inshore migration increases before spawning. Spawning typically takes place between March and August, peaking from late March to mid-May. After spawning, cod migrate to deeper waters for the winter. American plaice also experience increased migration in winter before spawning, which typically occurs between March and May.

Snow crab and lobster fisheries are active from April to June and May to July, respectively. Their spawning periods are from February to May for snow crab and from July to September for lobster. Both species experience up-slope migration during spawning, and their moulting phases make them particularly susceptible to disturbances.

Given the limited environmental alterations expected within the LAA and RAA in relation to the Project footprint, there are no identified restricted work periods for the four species of concern or economic importance.

Table 3.1.2-8 Sensitive time periods associated with potential marine organisms in the LAA.

Species	Life History Sensitive Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		Peak Activity
Marine Environment															10
Snow Crab	Molting, Spawning	6	10	10	10	7	4	4	1	0	0	0	1		9
	Hatching	0	0	2	5	10	2	1	0	0	0	0	0		8
American Lobster	Molting, Spawning	0	0	0	0	1	1	8	10	8	2	0	0		7
	Hatching	0	0	0	2	3	9	10	10	8	1	0	0		6
American plaice (NL Pop.)	Migrating	3	3	2	0	0	0	0	0	0	0	1	3		5
	Spawning	0	1	8	10	10	1	0	0	0	0	0	0		4
	Hatching	0	0	4	8	8	8	1	0	0	0	0	0		3
Atlantic cod (NL Pop.)	Migrating	1	2	4	5	5	5	4	1	0	0	1	3		2
	Spawning	0	1	4	10	10	7	4	2	0	0	0	0		1
	Incubation, Hatching	0	1	1	4	10	10	7	6	2	2	0	0		0

3.1.2.12 Marine Conservation Concern

Marine Species at Risk and/or of Conservation Concern

This section provides an overview of aquatic species of special interest that may be present in the RAA and LAA. It includes discussions on aquatic invasive species (AIS), species with conservation status (e.g., those listed under SARA or the NL ESA), and species of potential conservation concern in relation to the Project's marine component.

Aquatic Invasive Species

AIS encompass aquatic fish, invertebrates, and plants that are nonnative to the area and have been introduced (DFO, 2019e). This also includes species that may be native to other parts of Canada but are historically not native to specific regions. AIS can negatively impact an area and native species as they can multiply rapidly, once they've established. Marine transportation is a common culprit of introductions as AIS can be transferred to new locations through ballast water discharge and attaching to ship hulls (DFO, 2019e, Sardain et al., 2019). To prevent and mitigate the unintended transfer of invasive species, monitoring, reporting, and adherence to precautionary measured are advised (McKenzie et al., 2016).

From 2006 to 2024, there have been nine reports of AIS in the RAA, based on data from DFO (Table 3.1.2-9). Of these, nine have been detected within Placentia Bay, two of them in Trinity Bay. The presence of AIS in the RAA is determined through AIS mapping provided by DFO. An example of these maps is presented in Figure 3.1.2-3. This illustrates the current distribution of the European green crab across Placentia Bay and other parts of Newfoundland. Compared to the other AIS reported, the European Green Crab is most likely to be found in the RAA due to the number of historic sightings and their ecological traits. For example, this species is very devastating to the Eelgrass within the RAA as discussed in sections below.

Table 3.1.2-9 Aquatic invasive species identified in Placentia Bay.

Common Name	*Species Name*	Distribution in the RAA	Species Characteristics and Threats to Native Species
Coffin Box	*Membranipora membranacea*	Arnold's Cove Bar Haven Goose Cove Heart's Content Southern Harbour Swift Current Vitters Cove	Coffin box is a Bryozoan that lives in colonies and filter feeds. The abundance of this invertebrate can cover substances, blocking light and nutrients access to crucial plant species. This is devastating for kelp beds that are highly productive marine habitats that generally provide food and shelter for many native species (DFO, 2011a).
European Green Crab	*Carcinus maenas*	Arnold's Cove Bar Haven Come By Chance Goose Cove Great Brule North Harbour South Island Southern Harbour Swift Current Woody Island	The European green crab mainly feeds on shellfish, other crustaceans, has occasionally small juvenile finfish and eelgrass beds. This species is territorial and aggressive. The green crab will burrow into the sediment and cutting roots of eelgrass. The green crab has the capabilities to substantially alter habitats and biodiversity in Newfoundland (DFO, 2010).
Golden Star Tunicate	*Botryllus schlosseri*	Swift Current Arnold's Cove Garden Cove Goose Cove, Great Brule Peaches Cove Southern Harbour	Golden star tunicate is a filter feeder. This species can occupy native aquatic flora habitats, and because of their overgrowth, they can outcompete for light or food of the surrounding organisms. Mussels and scallops can also struggle with this invasive species as they feed on similar food (DFO, 2025f).
Japanese Skeleton Shrimp	*Caprella mutica*	Bar Haven	The Japanese skeleton shrimp is a small amphipod that inhabit artificial structure (eg. Buoys, mussel aquaculture socks, etc.). This species will compete for space and food with other species (e.g., Mussels) as they can reach 100,000 individuals per m^2 (DFO, 2023a).
Orange Ripple Bryozoan	*Schizoporella japonica*	Arnold's Cove North Harbour	Orange Ripple Bryozoan lives in colonies, that can span over large areas. They calcify as large sheets over substrates. Due to their ability to cover large amount of substrate,

Common Name	*Species Name*	Distribution in the RAA	Species Characteristics and Threats to Native Species
		Southern Harbour	this invasive species will outcompete other native organisms for space and food as they can smother mussels or oysters (Shalaeva, 2015).
Oyster Thief	*Codium fragile ssp. fragile*	Arnold's Cove North Harbour Soldier's Cove Southern Harbour	Oyster thief is an alga that grows on the seafloor, which can utilize habitats of native seaweed species. This can alter the natural habitat and flora biodiversity as their naturally tall height can outcompete entire kelp beds. This also affects of species, such as sea urchins, that use these kelp beds for nutrients and shelter from predators (DFO, 2013a).
Ribbed Bryozoan	*Juxtacribrilina mutabilis*	Arnold's Cove Sunnyside	Ribbed Bryozoan live in colonies and are polymorphic, where their morphology changes seasonally. Colonies of this species grow on eelgrass which can affect the growth of this flora, ultimately affecting the native ecosystem (Nemesis, 2025).
Vase Tunicate	*Ciona intestinalis*	Arnold's Cove Southern Harbour	Vase tunicate is a filter feeder. This invasive species feed on nutrients, bacteria, and other small organic matter, similar to bivalves. Additionally, their numbers can cover surrounding organisms, preventing them from accessing light, food, and space (DFO, 2013b).
Violet Tunicate	*Botrylloides violaceus*	Southern Harbour	The violet tunicate is a filter feeder. This invasive species feed on nutrients, bacteria, and other small organic matter, similar to bivalves. Additionally, their numbers can cover surrounding organisms, preventing them from accessing light, food, and space. The violet tunicate releases a chemical that makes it difficult for other species to attach to substrate (Fisheries and Oceans Canada, 2010).

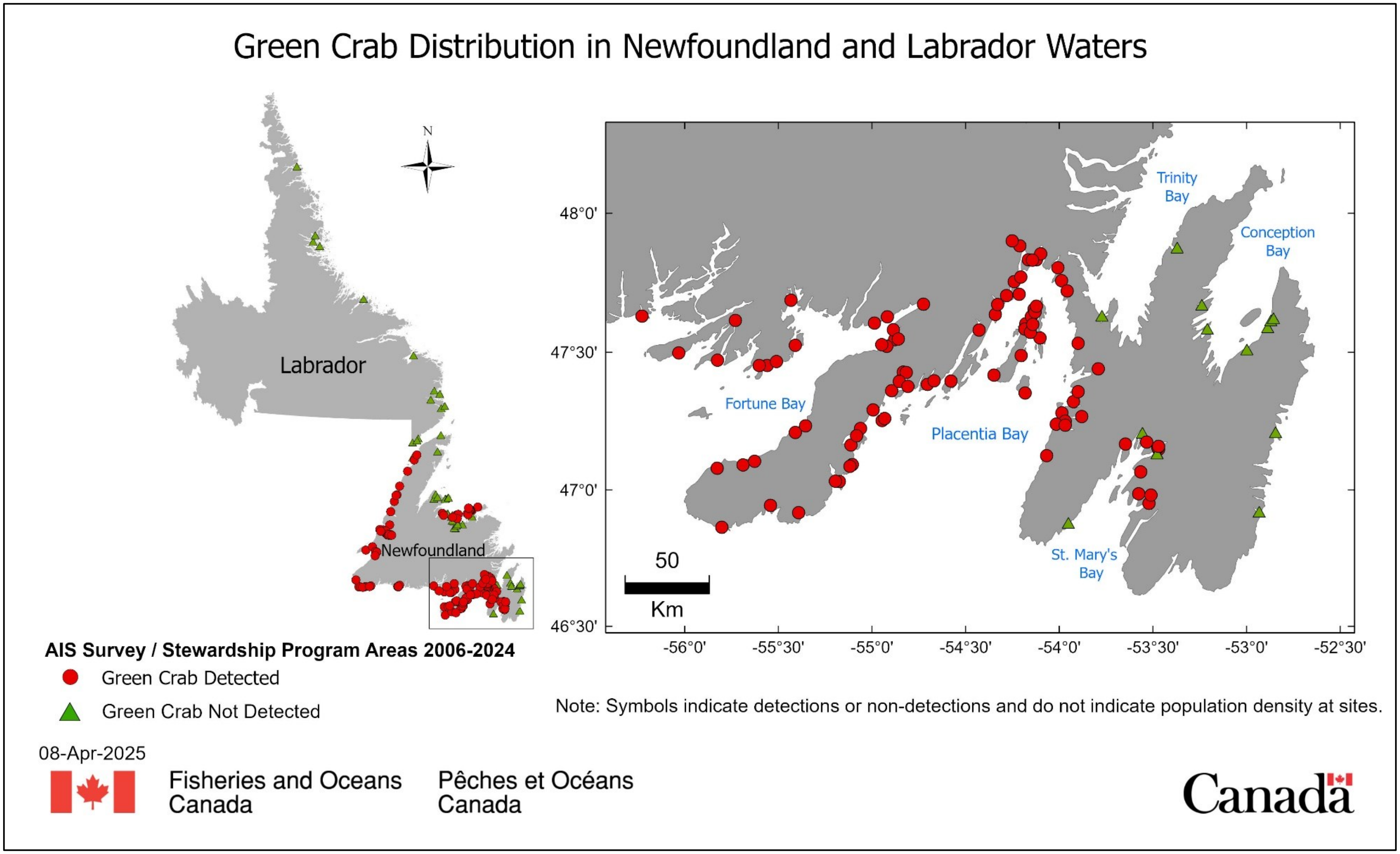


Figure 3.1.2-3 European green crab (*Carcinus maenas*) distribution in Placentia Bay.

Listed Species and/or of Conservation Concern

Species listed under Schedule 1 of the SARA are legally protected and classified as extirpated, endangered, threatened, or of special concern. Similarly, the NL ESA designates species as extirpated, threatened, endangered, vulnerable, data deficient, or not at risk.

To identify and characterize species of interest in the RAA and LAA, information was gathered from SARA and the NL ESA, as well as from the AC CDC based on a 2024 request. Supporting documentation included COSEWIC reports and publicly available literature. Additionally, aquatic invasive species, previously discussed, are also considered a special concern.

Table 3.1.2-10 lists 33 species of special concern in Placentia Bay and the Avalon Peninsula, including marine fish, mammals, and reptiles. However, only four species—two marine finfish and two diadromous fish—are native to the region and are expected to be found commonly in the RAA and LAA based on habitat use and reported sightings.

Table 3.1.2-10 Summary of marine species of special concern.

Common Name	Species Name	IUCN Red List[1]	COSEWIC Status	SARA Status	Occurrence in RAA
Marine Finfish					
Acadian Redfish (Atlantic Pop.)	*Sebastes fasciatus*	Endangered	Threatened	Not Listed	Rare
American Plaice (NL Pop.)	*Hippoglossoides platessoides*	Endangered	Threatened	Not Listed	Occasional
Atlantic (Striped) Wolffish	*Anarhichas lupus*	N/A	Special Concern	Special Concern	Rare
Atlantic Cod (Laurentian North Pop.)	*Gadus morhua*	Vulnerable	Endangered	Not Listed	Common
Atlantic Cod (NL Pop.)			Endangered	Not Listed	Occasional
Atlantic Spiny Dogfish	*Squalus acanthias*	Vulnerable	Special Concern	Not Listed *	Rare
Barndoor Skate	*Dipturus laevis*	Least Concern	Not Listed	Not Listed	Rare
Basking Shark (Atlantic Pop.)	*Cetorhinus maximus*	Endangered	Special Concern	Not Listed *	Rare
Bluefin Tuna (Atlantic Pop.)	*Thunnus thynnus*	Least Concern	Endangered	Not Listed	Rare
Cusk	*Brosme brosme*	Least Concern	Endangered	Not Listed *	Rare
Deepwater Redfish (Gulf of St. Lawrence - Laurentian Channel Pop.)	*Sebastes mentella*	Least Concern	Endangered	Not Listed	Rare
Grenadier (Roundnose)	*Coryphaenoides ru pestris*	Critically Endangered	Endangered	Not Listed*	Rare
Lumpfish	*Cyclopterus lumpus*	N/A	Threatened	Not Listed	Rare
Northern Wolffish	*Anarhichas denticulatus*	Endangered	Threatened	Threatened	Rare
Porbeagle Shark	*Lamna nasus*	Vulnerable	Endangered	Not Listed *	Rare
Shortfin Mako shark (Atlantic Pop.)	*Isurus oxyrinchus*	Endangered	Endangered	Not Listed *	Rare
Smooth Skate, (Laurentian-Scotian Pop.)	*Malacoraja senta*	Vulnerable	Special Concern	Not Listed *	Rare
Spotted Wolffish	*Anarhichas minor*	Near Threatened	Threatened	Threatened	Rare
Thorny Skate	*Amblyraja radiata*	Vulnerable	Special Concern	Not Listed	Occasional
Winter Skate	*Leucoraja ocellata*	Endangered	Not Listed	Not Listed *	Rare
Marine Mammals					
Baleen Whales					
Blue Whale (Atlantic Pop.)	*Balaenoptera musculus*	Endangered	Endangered	Endangered	Rare

Common Name	*Species Name*	IUCN Red List1	COSEWIC Status	SARA Status	Occurrence in RAA
Marine Finfish					
Bowhead Whale	*Balaena mysticetus*	Least Concern	Not Listed	Special Concern	Rare
Fin Whale (Atlantic Pop.)	*Balaenoptera physalus*	Vulnerable	Special Concern	Special Concern	Rare
Humpback whale (Western North Atlantic Pop.)	*Megaptera novaeangliae*	Least Concern	Not Listed	Not Listed (Sch1), Special Concern (Sch 3)	Rare
North Atlantic Right Whale	*Eubalaena glacialis*	Endangered	Endangered	Endangered	Rare
Sei Whale (Atlantic Pop.)	*Balaenoptera borealis*	Endangered	Endangered	Not Listed *	Rare
Toothed Whales					
Harbour Porpoise (Northwest Atlantic Pop.)	*Phocoena phocoena*	Least Concern	Special Concern	Not Listed (Sch1), Threatened (Sch 2), Under revision Dec, 2023	Rare
Killer Whale (Northwest Atlantic Pop.)	*Orcinus orca*	N/A	Special Concern	Not Listed *	Rare
Northern Bottlenose Whale (Davis Strait-Baffin Bay-Labrador Sea Pop.)	*Hyperoodon ampullatus*	Near Threatened	Special Concern	Not Listed *	Rare
Northern Bottlenose Whale (Scotian Shelf Pop.)			Endangered	Endangered	Rare
Sowerby's Beaked Whale	*Mesoplodon bidens*	Least Concern	Special Concern	Special Concern	Rare
Marine Reptiles					
Leatherback Sea Turtle (Atlantic Pop.)	*Dermochelys coriacea*	Vulnerable	Endangered	Endangered	Rare
Loggerhead Sea Turtle	*Caretta caretta*	Vulnerable	Endangered	Endangered	Rare

1) 1' = IUCN Red List referred to the global specie if not specified
2) Sources: (IUCN, 2024; COSEWIC, 2024; DFO, 2019a; Government of Newfoundland and Labrador, 2002; LGL Limited, 2019; SARA, 2024)
3) Notes: 'NL' = Newfoundland and Labrador. 'Pop.' = population(s), 'Not Listed*' = Represent species not on the SARA list, although under consideration for addition in Schedule 1 of SARA;

Marine Species of Concern

As presented in Table 3.1.2-10, the Laurentia North Population of Atlantic cod and the Newfoundland population of American plaice are likely to occur in the RAA and LAA. The Laurentia North Population of Atlantic cod utilize coastal habitats in Placentia Bay for spawning, feeding, nursing, and migration. Juvenile Atlantic cod have been observed in waters less than 15 m along the Eastern Placentia Bay coastline (LGL Limited, 2007). The Newfoundland Population of American plaice also utilize the Placentia Bay coastal habitats for spawning, feeding, nursing, and migration. The Marine Fish and Fish Habitat and the Marine Fishery sections of this section contains more in-depth detail about these two species. Information on their sensitive time periods can be found under the Sensitive Time Periods and Working Windows sections.

Other species listed under the SARA within Placentia Bay include white shark, northern wolffish, spotted wolffish, Atlantic wolffish, and banded killifish (LGL Limited, 2018). Although rare in Canada, one tagged white shark was recorded in Placentia Bay, near Merasheen and Red Islands. Additionally, wolffish have not been caught in recent years, either as bycatch during the commercial fisheries or during DFO's research vessel surveys, DFO caught several Atlantic wolffish during their surveys between 2010 and 2015. Banded killifish are found near Marystown in Placentia Bay. SARA classifies banded killifish as special concern, and they are classified as vulnerable under the NL ESA. Although possible, the presence of any of the above species in the LAA or RAA is very unlikely.

Marine Habitats of Conservation Concern

Placentia Bay is one of 14 designated Ecologically and Biologically Significant Area (EBSA) within the Placentia Bay-Grand Blanks Large Ocean Management Area (PBGB LOMA) (Fisheries & Canada, 2019). This designation encompasses both the RAA and the LAA. EBSAs are identified by DFO for their rare or endangered species, critical ecological communities, and vulnerable habitats (DFO, 2007a). EBSAs may eventually be designated as MPAs, otherwise they will continually be managed through other conservation measures (e.g., SARA).

The Placentia Bay EBSA stretches from St. Lawrence to St. Mary's Bay, with its seaward boundary expanded to include habitats for corals, sponges, and leatherback turtles. The area is home to vital ecological features, including salmon rivers, capelin spawning grounds, eelgrass meadows, and seabird colonies along the coast. Additionally, important habitats lie just outside the bay.

Two Significant Benthic Areas (SBAs) have been identified south of the bay (DFO, 2017d). These areas, sensitive to fishing, contain coral and sponge ecosystems that take a long time to recover. While not located near the RAA, they are still of high conservation value. Additionally, no Marine Protected Areas (MPAs) or critical habitats, as defined under SARA and the NL ESA, have been identified near the RAA or LAA (DFO, 2025i). However, within the RAA, Jack's Pond Provincial Park is a Protected Area. Although it is land based, the area is extended along the coastline. Nearby sensitive habitats include the Placentia Bay Extension EBSA, capelin spawning sites, eelgrass meadows, salt marshes, wetlands, and scallop beds. The Canadian Parks and Wilderness Society (CPAWS) has also recognized the Placentia Bay Extension and Bar Haven as 'Special Marine Areas' (Canadian Parks and Wilderness Society Newfoundland and Labrador, 2018).

Rivers such as Piper's Hole and Cape Rodger feed into Placentia Bay, supporting a genetically distinct salmon population (Bradbury et al., 1999). Capelin spawn on the bay's beaches, with over 80 spawning sites identified, including key locations on the eastern side and the southern Burin Peninsula (Sjare et al., 2003). These spawning areas are crucial to the bay's ecology, as capelin typically migrate in from offshore each spring, arriving in June and July.

Placentia Bay also supports leatherback turtle populations, accounting for 18% of sightings in the 2016 Northwest Atlantic International Sightings Survey (NAISS) (DFO, 2023c). The bay overlaps with areas important for blue whales (DFO, 2018), while its southern boundary is home to habitats for gorgonian corals and sponge communities, which are vulnerable to fishing impacts.

Eelgrass beds are vital to the bay's biodiversity, offering nursery habitats for fish, supporting migrating birds, and enhancing water quality. These beds that spread across the bay's shallow, sheltered areas, provide essential ecological functions such as sediment stabilization, water filtration, and habitat for marine life. However, they are at risk due to invasive species like the European green crab (Matheson et al., 2016). As an Ecologically Significant Species (Fisheries and Oceans Canada., 2009b), eelgrass is protected under the **Fisheries Act**. Matheson et al. (2016) examined the impact of European green crab invasion on designated eelgrass beds in Bar Haven North, Woody Island, Swift Current, North Harbour, Southern Harbour, and Great Brule, all within the RAA. More recently, in 2020 DFO mapped out three distinct eelgrass beds, two within Placentia Bay (Southern Harbour and Come By Chance) and one within Trinity Bay (Path End). A visual representation of both resources is presented in Figure 3.1.2-4 (DFO, 2023d).

Salt marshes, concentrated near Swift Current in the RAA, provide critical ecosystem services. They support wildlife, help stabilize sediments and protect coastlines from erosion. These sensitive habitats contribute to the bay's overall ecological health and resilience.

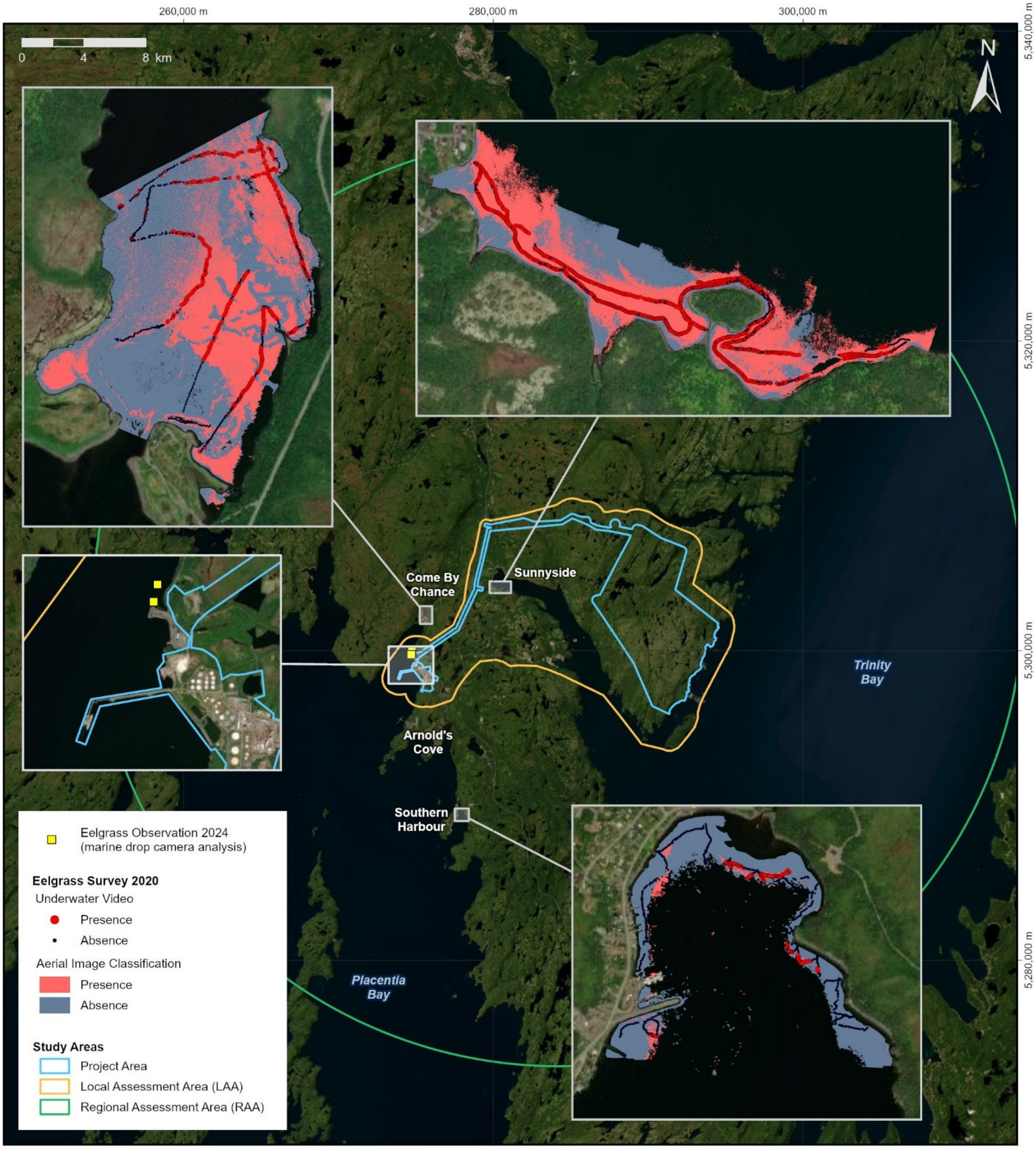


FIGURE TITLE:	NOTES:	PREPARED BY:	DATE:
Eelgrass Distribution in the RAA	2020 Eelgrass distribution sourced from the National Eelgrass Task Force (NETForce) dataset on the Government of Canada's Open Data Portal.	C. Burke	11/06/2025
PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY:	C. Bursey 11/06/2025
		APPROVED BY:	C. Collins 11/06/2025
		CRS:	WGS 1984 UTM Zone 22N

SEM MAP ID: 016-015-GIS-522-Rev0

Figure 3.1.2-4 The location and distribution of eelgrass beds.

3.1.3 Terrestrial Environment

The terrestrial environment of the PA consists of a suite of different habitat types, ranging from highly industrialized infrastructure at Come By Chance, to relatively undisturbed wild land leading up to and including the Wind Farm area.

The Project is situated within the Maritime Barrens ecoregion where cold summers, frequent fog, and strong winds are typical (Government of Newfoundland and Labrador, 2020). Further, the PA falls entirely within the Southeastern Barrens subregion. This subregion is largely dominated by heathlands interspersed with small forest stands. This landscape pattern is a result of frequent, widespread forest fires and intensive tree harvesting (PAA, 2008). The remaining forests are typically found in protected valleys and are notably scarce in this subregion as compared to elsewhere in the Maritime Barrens (PAA, 2008).

3.1.3.1 Flora

The PA is situated on the northern edge of the Southeastern Barrens subregion. The vegetation profile of these barrens is characterized as a dwarf shrub heath (PAA, 2008). Plant species such as sheep laurel (*Kalmia angustifolia*), rhodora (*Rhododendron canadense*), balsam fir (*Abies balsamea*), eastern larch (Larix *laricina*), and black spruce (*Picea mariana*) persist in sheltered valleys, while black crowberry (*Empetrum nigrum*) and lingonberry (*Vaccinium vitis-idaea*) inhabit exposed regions (PAA, 2008). The occasional forested areas are dominated by balsam fir (PAA, 2008).

There is a wide array of vegetation present in the PA, reflecting the variety of habitats present. Desktop research was carried out to inform field surveys, especially with respect to suspect rare plants that might be present. A data query was submitted to the Atlantic Canada Conservation Data Centre (AC CDC) and resulted in a listing of candidate “Species of Conservation Concern” (SCC - ranked as S1 to S3) that would require attention during field surveys.

In addition, range maps and local literature were consulted regarding the flora for insular Newfoundland. Works by Boland (Boland, 2011, 2017) were of special relevance in describing species utilization by habitat features. These texts contain information on many of the plant species found in insular Newfoundland, along with general habitat and identification cues. Additionally, sources such as The Biota of North America Program (Kartesz, 2015) described the potential floral species for the area.

3.1.3.2 Ecological Land Classification (ELC)

The ecotypes within the PA are consistent with those found throughout the Southeastern Barrens subregion, which is largely represented by kalmia heath and scattered coniferous forest stands. Ecotypes in Newfoundland are described in detail by Meades and Moores (Meades & Moores, 1994). This source was used in both desktop research and field work to understand and classify habitats within the PA. Open-source data, such as the NL DFFA Forestry Inventory and associated mapping products, was used to obtain a preliminary understanding of the habitat composition within the PA (NL DFFA, 2025). A full ArcGIS assessment, including the use of extensive online databases and detailed aerial imagery, was completed after the collection of ground-truthing data. The methodology and results of this assessment are described in Section 3.2.3 (and further in Appendix D3: ELC).

Soil types throughout Newfoundland influence the forest types and vegetation that exist on the surface (Meades & Moores, 1994). Agriculture Canada (1991) soil maps describe the soil composition of the PA as largely comprising mineral soils developed in moderately fine and course glacial till, dominated by shallow bedrock or exposed rocky outcrops in elevated areas. Organic soils occur in small pockets and are less than 2 m in depth. The valleys of the PA, while less dominant than the upland plateaus, are deep with steep edges. This creates high contrast in the soils between the upland rocky areas and plateaus, and the deep valleys. The north-northeast portion of the PA is predominately covered by bare rock with a mixture of Gleyed Humo-ferric Podzols and Placic Humo-ferric Podzols formed from gray slate in the remaining soiled areas (Agriculture Canada, 1991). This area is considered hilly and very stony. The soil types found within the PA are consistent with the dominantly upland/rocky barren terrain visible in the NL DFFA Forestry Inventory databases (NL DFFA, 2025).

3.1.3.3 Fauna

The Wind Farm and transmission line portions of the PA comprise habitat suitable for mammals such as:

- Artiodactyl (e.g., moose);
- Carnivora (e.g., foxes, coyotes);
- Rodentia (e.g., beavers, voles);
- Insectivora (e.g., shrews); and
- Lagomorpha (e.g., hares).

The order Chiroptera (e.g., bats) were also considered; however, the bat species possible for the PA are designated as SAR, and the surveys required to determine their presence are specialized. Therefore, bats are addressed under Section 3.1.3.5: Species at Risk and Species of Conservation Concern.

Desktop research was conducted to establish a list of mammal species that may be present in the PA. Additionally, a data request was made to the AC CDC, which returned no results for mammals. See Table 3.1.3-1 below for a list of mammals that could occur in the PA.

Table 3.1.3-1 Non-volant mammals possible for the Project Area.

Native Terrestrial Mammals		Non-native/Introduced Terrestrial Mammals	
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Vulpes vulpes	Red fox	*Mustela vison*	Mink
Mustela richardsonii	Short-tailed weasel	*Tamiasciurus hudsonicus*	Red squirrel
Microtus pennsylvanicus	Meadow vole	*Lepus americanus*	Snowshoe hare
Ursus americanus	Black bear	*Alces alces*	Moose
Lynx canadensis	Canada lynx	*Sorex cinereus*	Masked shrew
Castor canadensis	Beaver	*Tamias striatus*	Eastern chipmunk
Ondatra zibethicus obscurus	Muskrat	*Rattus norvegicus*	Norway rat
Lontra canadensis	River otter	*Myodes glareolus*	Bank vole
Martes americana atrata	Newfoundland marten	*Peromyscus maniculatus*	Deer mouse
Rangifer tarandus	Caribou	*Myodes gapperi*	Red-backed vole
Lepus arcticus	Arctic hare	*Mus musculus*	House mouse
		Canis latrans x Canis lycaon	Coyote (range expansion)

3.1.3.4 Avifauna

Resident and migratory species of avifauna utilizing the Isthmus of Avalon region include representatives from the orders Anseriformes (waterfowl), Galliformes (gamebirds), Gaviiformes (loons), Accipitriformes and Falconiformes (raptors), Charadriiformes (shorebirds), Columbiformes (doves), Gruiformes (rails), Strigiformes (owls), Coraciiformes (kingfishers), Piciformes (woodpeckers), and Passeriformes (perching birds). This section summarizes potential avian use of the PA/LAA. Avifauna survey effort is discussed in Section 3.2.3.4. Further details may be obtained from Appendix D1: Avifauna Baseline Study.

The PA, LAA, and RAA are located within the Atlantic Flyway (a route regularly used by large numbers of migrating birds), which is one of four major flyways in North America (Figure 3.1.3-1). Eastern Newfoundland in general does not experience immense numbers of migrating birds relative to other parts of the country, as most eastern avian migrants tend to funnel north and south through eastern mainland Canada.

Four different seasonal windows of bird activity were defined for the purposes of the avifauna study. These include early breeding birds/spring migration (April 15 to May 31); breeding season (June 1 to August 15); fall migration (August 16 to October 31); and overwintering/resident (November 1 to April 14). These temporal windows broadly encompassed bird movements and life histories throughout the year.

FIGURE TITLE: Major North American flyways	NOTES: Adapted from Washington State University-Everett with Everett Community College 2021-2022. Project Development Report 21 pp.	PREPARED BY: C. Burke	DATE: 11/06/2025
		REVIEWED BY: C. Bursey 11/06/2025	
		APPROVED BY: C. Collins 11/06/2025	
PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 World Mercator	
		sem	

SEM MAP ID: 016-015-GIS-524-Rev0

Figure 3.1.3-1 Major North American flyways.

Passeriformes, Piciformes, and Others

Birds from the order Passeriformes (also referred to as perching birds, or songbirds) encompass over half of all bird species. These birds use songs and calls to communicate, attract potential mates, and defend their territories during the breeding season. Piciformes (woodpeckers) use their beaks to drum on trees and other substrates and may have various vocalizations. Other avifauna grouped into this category include Galliformes (landfowl). These birds typically spend most of their time on the ground, and many are also known to construct their nests at ground level.

The avifauna in this category are typically found inland, with highly variable habitat preferences between species. There are many species that may possibly inhabit the PA, including but not limited to those listed in Table 3.1.3-2. This list was compiled based on local ornithological knowledge as well as desktop research, including anecdotal observations from sources like eBird and iNaturalist.

Table 3.1.3-2 Status and potential life cycle uses of the LAA by Passeriformes and Piciformes.

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Life Cycle Uses of the LAA	
				Breeding	Non-Breeding*
American Crow	*Corvus brachyrhynchos*	-	Least Concern	✓	✓
American Goldfinch	*Spinus tristis*	-	Least Concern	✓	✓
American Pipit	*Anthus rubescens*	-	Least Concern	✓	
American Redstart	*Setophaga ruticilla*	-	Least Concern	✓	
American Robin	*Turdus migratorius*	-	Least Concern	✓	✓
American Tree Sparrow	*Spizelloides arborea*	-	Least Concern		✓
Barn Swallow	*Hirundo rustica*	Vulnerable / Threatened	Least Concern	✓	
Bobolink	*Dolichonyx oryzivorus*	Vulnerable / Threatened	Least Concern	✓	
Black-and-white Warbler	*Mniotilta varia*	-	Least Concern	✓	
Black-backed Woodpecker	*Picoides arcticus*	-	Least Concern	✓	✓
Black-capped Chickadee	*Poecile atricapillus*	-	Least Concern	✓	✓
Black-throated Green Warbler	*Setophaga virens*	-	Least Concern	✓	
Blackpoll Warbler	*Setophaga striata*	-	Near Threatened	✓	
Blue-headed Vireo	*Vireo solitarius*	-	Least Concern	✓	
Blue Jay	*Cyanocitta cristata*	-	Least Concern	✓	✓
Brown Creeper	*Certhia americana*	-	Least Concern	✓	✓
Bohemian Waxwing	*Bombycilla garrulus*	-	Least Concern		✓
Boreal Chickadee	*Poecile hudsonicus*	-	Least Concern	✓	✓
Canada Jay	*Perisoreus canadensis*	-	Least Concern	✓	✓

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Life Cycle Uses of the LAA	
				Breeding	Non-Breeding*
Cedar Waxwing	*Bombycilla cedrorum*	-	Least Concern	✓	
Common Raven	*Corvus corax*	-	Least Concern	✓	✓
Common Redpoll	*Acanthis flammea*	-	Least Concern	✓	✓
Common Yellowthroat	*Geothlypis trichas*	-	Least Concern	✓	
Dark-eyed Junco	*Junco hyemalis*	-	Least Concern	✓	✓
Downy Woodpecker	*Dryobates pubescens*	-	Least Concern	✓	✓
Evening Grosbeak	*Coccothraustes vespertinus*	Vulnerable / Special Concern	Vulnerable	✓	✓
Fox Sparrow	*Passerella iliaca*	-	Least Concern	✓	✓
Golden-crowned Kinglet	*Regulus satrapa*	-	Least Concern	✓	✓
Gray-cheeked Thrush	*Catharus minimus*	Threatened	Least Concern	✓	
Hairy Woodpecker	*Dryobates villosus*	-	Least Concern	✓	✓
Hermit Thrush	*Catharus guttatus*	-	Least Concern	✓	
Horned Lark	*Eremophila alpestris*	-	Least Concern	✓	
Lapland Longspur	*Calcarius lapponicus*	-	Least Concern		✓
Lincoln's Sparrow	*Melospiza lincolnii*	-	Least Concern	✓	
Magnolia Warbler	*Setophaga magnolia*	-	Least Concern	✓	
Northern Waterthrush	*Parkesia noveboracensis*	-	Least Concern	✓	
Northern Flicker	*Colaptes auratus*	-	Least Concern	✓	✓
Palm Warbler	*Setophaga palmarum*	-	Least Concern	✓	
Pine Grosbeak	*Pinicola enucleator*	-	Least Concern	✓	✓
Pine Siskin	*Spinus pinus*	-	Least Concern	✓	✓
Purple Finch	*Haemorhous purpureus*	-	Least Concern	✓	✓
Red Crossbill	*Loxia curvirostra*	Threatened	Least Concern	✓	✓
Red-breasted Nuthatch	*Sitta canadensis*	-	Least Concern	✓	✓
Red-eyed Vireo	*Vireo olivaceus*	-	Least Concern	✓	
Ruby-crowned Kinglet	*Corthylio calendula*	-	Least Concern	✓	
Ruffed Grouse	*Bonasa umbellus*	-	Least Concern	✓	✓
Savannah Sparrow	*Passerculus sandwichensis*	-	Least Concern	✓	
Snow Bunting	*Plectrophenax nivalis*	-	Least Concern		✓
Song Sparrow	*Melospiza melodia*	-	Least Concern	✓	
Swainson's Thrush	*Catharus ustulatus*	-	Least Concern	✓	
Swamp Sparrow	*Melospiza georgiana*	-	Least Concern	✓	
Tree Swallow	*Tachycineta bicolor*	-	Least Concern	✓	
White-throated Sparrow	*Zonotrichia albicollis*	-	Least Concern	✓	
White-winged Crossbill	*Loxia leucoptera*	-	Least Concern	✓	✓
Willow Ptarmigan	*Lagopus lagopus*	-	Least Concern	✓	✓
Wilson's Warbler	*Cardellina pusilla*	-	Least Concern	✓	

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Life Cycle Uses of the LAA	
				Breeding	Non-Breeding*
Yellow Warbler	*Setophaga petechia*	-	Least Concern	✓	
Yellow-bellied Flycatcher	*Empidonax flaviventris*	-	Least Concern	✓	
Yellow-rumped Warbler	*Setophaga coronata*	-	Least Concern	✓	
Notes *Non-breeding can mean that it is a resident species that overwinters in the area, or a migratory species that uses the area as stopover habitat.					

Accipitriformes, Strigiformes, and Falconiformes

Accipitriformes, Strigiformes, and Falconiformes include most birds of prey, referred to as raptors (including eagles, falcons, hawks, osprey, and owls). These larger birds are territorial and often soar at high elevations both to hunt prey and deter other raptors from entering their territory. As such, it may be difficult to auditorily observe raptor species. Surveyors account for this by scanning the sky for soaring birds and searching cliffs and tall trees for nests using high-quality optics.

There are several raptor species that may possibly inhabit the PA, including but not limited to those listed in Table 3.1.3-3. This list was compiled based on local ornithological knowledge as well as desktop research, including anecdotal observations from sources like eBird and iNaturalist.

Table 3.1.3-3 Potential life cycle uses of the LAA by Accipitriformes, Strigiformes, and Falconiformes.

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Life Cycle Uses of the LAA	
				Breeding	Non-Breeding*
American Kestrel	*Falco sparverius*	-	Least Concern	✓	
Bald Eagle	*Haliaeetus leucocephalus*	-	Least Concern	✓	✓
Boreal Owl	*Aegolius funereus*	-	Least Concern	✓	✓
Great Horned Owl	*Bubo virginianus*	-	Least Concern	✓	✓
Gyrfalcon	*Falco rusticolus*	-	Least Concern		✓
Merlin	*Falco columbarius*	-	Least Concern	✓	
American Goshawk	*Astur atricapillus*	-	Least Concern	✓	✓
Northern Harrier	*Circus hudsonius*	-	Least Concern	✓	
Northern Hawk Owl	*Surnia ulula*	-	Least Concern	✓	✓
Osprey	*Pandion haliaetus*	-	Least Concern	✓	
Red-tailed Hawk	*Buteo jamaicensis*	-	Least Concern	✓	
Rough-legged Hawk	*Buteo lagopus*	-	Least Concern	✓	
Sharp-shinned Hawk	*Accipiter striatus*	-	Least Concern	✓	

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Life Cycle Uses of the LAA	
				Breeding	Non-Breeding*
Short-eared Owl	*Asio flammeus*	Threatened / Special Concern	Least Concern	✓	
Notes *Non-breeding can mean that it is a resident species that overwinters in the area, or a migratory species that uses the area as stopover habitat.					

Anseriformes, Charadriiformes, and other Waterbirds

Anseriformes (waterfowl), Charadriiformes (shorebirds), and other waterbirds include species that are adapted to aquatic and semi-aquatic environments, including both freshwater and/or marine areas. The order Anseriformes is made up of approximately 180 species of medium to large birds, including ducks, geese, swans, mergansers, and screamers. The order Charadriiformes is made up of approximately 350 bird species which all live and breed along shorelines, including plovers, sandpipers, and auks. Other avifauna in this category include those from the orders Coraciiformes (e.g., kingfishers) and Gaviiformes (e.g., loons).

There are many species in this group that may possibly inhabit the PA, including but not limited to those listed in Table 3.1.3-4. This list was compiled based on local ornithological knowledge as well as desktop research, including anecdotal observations from sources like eBird and iNaturalist.

Table 3.1.3-4 Potential life cycle uses of the LAA by Anseriformes, Charadriiformes, and other waterbirds.

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Habitat Use of the LAA		Potential Life Cycle Uses of the LAA		
				Marine	Freshwater	Breeding	Non-Breeding	Migration Only
American Black Duck	*Anas rubripes*	-	Least Concern	✓	✓	✓	✓	
American Golden-Plover	*Pluvialis dominica*	-	Least Concern	✓				✓
Barrow's Goldeneye	*Bucephala islandica*	Vulnerable / Special Concern	Least Concern		✓	✓		
Belted Kingfisher	*Megaceryle alcyon*	-	Least Concern	✓	✓	✓		
Black Guillemot	*Cepphus grille*	-	N/A	✓		✓	✓	
Black Scoter	*Melanitta americana*	-	Near Threatened	✓	✓			
Black-bellied Plover	*Pluvialis squatarola*	-	Least Concern	✓	✓			✓
Black-headed Gull	*Chroicocephalu s ridibundus*	-	Least Concern	✓	✓		✓	

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Habitat Use of the LAA		Potential Life Cycle Uses of the LAA		
				Marine	Freshwater	Breeding	Non-Breeding	Migration Only
Black-legged Kittiwake	*Rissa tridactyla*	-	Vulnerable	✓		✓		
Blue-winged Teal	*Spatula discors*	-	Least Concern		✓	✓		
Canada Goose	*Branta canadensis*	-	Least Concern		✓	✓	✓	
Caspian Tern	*Hydroprogne caspia*	-	Least Concern	✓	✓	✓		
Common Eider	*Somateria mollissima*	-	Near Threatened	✓		✓	✓	
Common Goldeneye	*Bucephala clangula*	-	Least Concern		✓	✓	✓	
Common Loon	*Gavia immer*	-	Least Concern	✓	✓	✓	✓	
Common Merganser	*Mergus merganser*	-	Least Concern		✓	✓	✓	
Common Murre	*Uria aalge*	-	Least Concern	✓		✓	✓	
Common Tern	*Sterna hirundo*	-	Least Concern	✓	✓	✓		
Double-crested Cormorant	*Nannopterum auritum*	-	Least Concern	✓	✓	✓	✓	
Dovekie	*Alle alle*	-	Least Concern	✓			✓	
Dunlin	*Calidris alpina*	-	Least Concern		✓			✓
Eurasian Wigeon	*Mareca penelope*	-	Least Concern		✓		✓	
Glaucous Gull	*Larus hyperboreus*	-	Least Concern	✓			✓	
Great Black-backed Gull	*Larus marinus*	-	Least Concern	✓	✓	✓	✓	
Great Shearwater	*Ardenna gravis*	-	Least Concern	✓			✓	
Great Cormorant	*Phalacrocorax carbo*	-	Least Concern		✓		✓	
Greater Scaup	*Aythya marila*	-	Least Concern	✓	✓	✓	✓	
Greater Yellowlegs	*Tringa melanoleuca*	-	Least Concern		✓	✓		
Green-winged Teal	*Anas crecca*	-	Least Concern		✓	✓	✓	
Harlequin Duck	*Histrionicus histrionicus*	Vulnerable / Special Concern	Least Concern	✓			✓	
Herring Gull	*Larus argentatus*	-	Least Concern	✓	✓	✓	✓	
Iceland Gull	*Larus glaucoides*	-	Least Concern	✓			✓	
Least Sandpiper	*Calidris minutilla*	-	Least Concern		✓	✓		

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Habitat Use of the LAA		Potential Life Cycle Uses of the LAA		
				Marine	Freshwater	Breeding	Non-Breeding	Migration Only
Lesser Black-backed Gull	*Larus fuscus*	-	Least Concern	✓			✓	
Lesser Yellowlegs	*Tringa flavipes*	Threatened / Not Listed	Least Concern		✓			✓
Long-tailed Duck	*Clangula hyemalis*	-	Least Concern	✓			✓	
Mallard	*Anas platyrhynchos*	-	Least Concern		✓	✓	✓	✓
Northern Fulmar	*Fulmarus glacialis*	-	Least Concern	✓		✓	✓	
Northern Gannet	*Morus bassanus*	-	Least Concern	✓		✓		
Northern Pintail	*Anas acuta*	-	Least Concern		✓	✓		
Parasitic Jaeger	*Stercorarius parasiticus*	-	Least Concern	✓				✓
Razorbill	*Alca torda*	-	Least Concern	✓		✓	✓	
Red-breasted Merganser	*Mergus serrator*	-	Least Concern	✓	✓	✓	✓	
Red-necked Phalarope	*Phalaropus lobatus*	Vulnerable / Special Concern	Least Concern		✓	✓		
Ring-necked Duck	*Aythya collaris*	-	Least Concern		✓	✓		
Ring-billed Gull	*Larus delawarensis*	-	Least Concern	✓	✓	✓		
Red Knot	*Calidris canutus*	Endangered / Endangered	Near Threatened	✓	✓			✓
Ruddy Turnstone	*Arenaria interpres*	-	Least Concern	✓	✓			✓
Sanderling	*Calidris alba*	-	Least Concern	✓	✓			✓
Semipalmated Plover	*Charadrius semipalmatus*	-	Least Concern		✓	✓		
Semipalmated Sandpiper	*Calidris pusilla*	-	Near Threatened		✓			✓
Short-billed Dowitcher	*Limnodromus griseus*	-	Vulnerable	✓	✓			✓
Sooty Shearwater	*Ardenna grisea*	-	Near Threatened	✓			✓	
Spotted Sandpiper	*Actitis macularius*	-	Least Concern	✓	✓	✓		
Thick-billed Murre	*Uria lomvia*	-	Least Concern	✓	✓		✓	
Whimbrel	*Numenius phaeopus*	-	Least Concern		✓			✓
White-rumped Sandpiper	*Calidris fuscicollis*	-	Least Concern		✓			✓
White-winged Scoter	*Melanitta deglandi*	-	Least Concern	✓			✓	

Species	Scientific Name	NL ESA / SARA	IUCN Red List	Potential Habitat Use of the LAA		Potential Life Cycle Uses of the LAA		
				Marine	Freshwater	Breeding	Non-Breeding	Migration Only
Wilson's Snipe	*Gallinago delicata*	-	Least Concern	✓		✓		

3.1.3.5 Species at Risk and Species of Conservation Concern

SAR are defined as those species protected by federal and/or provincial legislation. This includes any species listed under the NL ESA or the federal SARA. Species are listed under these Acts based on recommendations from the federal COSEWIC. COSEWIC is comprised of experts from government and non-government wildlife backgrounds who assess and classify species using both scientific data and Indigenous knowledge. In NL, additional guidance is sought from the provincial Species Status Advisory Committee (SSAC).

SCC are those species considered to be rare on a sub-national level, although they are not protected by federal or provincial legislation. In NL, SCC are identified and ranked by local experts from the AC CDC according to provincial data. Any species with an S-rank between S1 (critically imperiled) and S3 (vulnerable) are considered SCC. This includes species with an S-rank of S3S# (indicating uncertainty in the ranking), although species ranked from S1 to S3 are prioritized.

To support the baseline studies, an AC CDC data request was made for an area that included the PA but also extended to surrounding areas, including the LAA and some of the RAA. The AC CDC request returned results for the following SAR (Table 3.1.3-5) and SCC (Table 3.1.3-6). AC CDC results within a 5 km radius around the PA are also presented in Figure 3.1.3-2. The International Union for Conservation of Nature (IUCN) Red List of Threatened Species rankings are provided for context on the species range and rarity of SAR and SCC.

A brief discussion of the SAR thought to be possible for the PA is provided below the AC CDC results. Each of these components is discussed further in their respective baseline studies, appended to this Registration. The SAR and SCC observed in the PA throughout terrestrial baseline surveys are discussed further in Section 3.2.3.5.

Table 3.1.3-5 AC CDC results – Species at Risk.

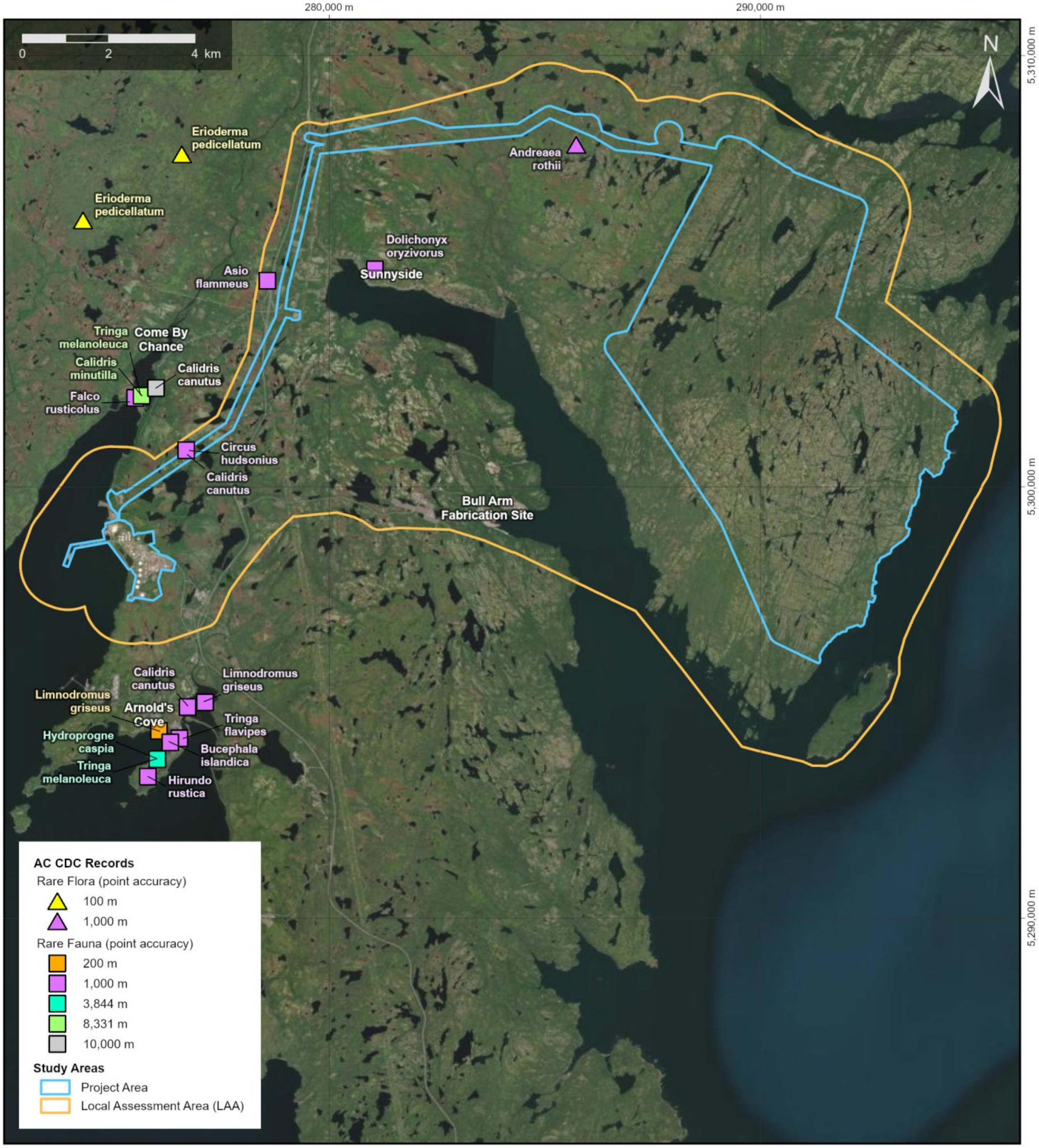
Scientific Name	Common Name	S-Rank	IUCN Status	Observation Date(s)
Avifauna				
Hirundo rustica	Barn Swallow	S2B, SUM	Least Concern	2011
Bucephala islandica	Barrow's Goldeneye	S1B, S2N, SUM	Least Concern	1993
Dolichonyx oryzivorus	Bobolink	S1B, SUM	Least Concern	1972; 2019
Histrionicus histrionicus	Harlequin Duck	S2B, S2N	Least Concern	2019

Scientific Name	Common Name	S-Rank	IUCN Status	Observation Date(s)
Tringa flavipes	Lesser Yellowlegs	S2S3M	Vulnerable	2016 to 2018; 2021; 2022
Catharus minimus	Newfoundland Gray-cheeked Thrush	S2B, SUM	Least Concern	1990
Loxia curvirostra	Red Crossbill	S1S2	Least Concern	2003; 2006
Calidris canutus	Red Knot	S2M	Near Threatened	1999; 2000; 2002-2011; 2015 to 2018; 2021; 2022
Phalaropus lobatus	Red-necked Phalarope	S3S4N	Least Concern	2022
Asio flammeus	Short-eared Owl	S2S3B	Least Concern	2015
Lichens				
Erioderma pedicellatum	Boreal felt lichen	S3	Critically Endangered	2003

Table 3.1.3-6 AC CDC results – Species of Conservation Concern.

Scientific Name	Common Name	S-Rank	IUCN Status	Observation Date(s)
Avifauna				
Melanitta americana	Black Scoter	S2B, S2N, SUM	Near Threatened	2020
Pluvialis squatarola	Black-bellied Plover	S3M	Vulnerable	2016; 2018; 2020 to 2022
Chroicocephalus ridibundus	Black-headed Gull	S1B, S3N, SUM	Least Concern	2010; 2016; 2020 to 2022
Hydroprogne caspia	Caspian Tern	S2B, SUM	Least Concern	1989; 2020
Phalacrocorax carbo	Great Cormorant	S3B, S3N	Least Concern	2016; 2020; 2021
Tringa melanoleuca	Greater Yellowlegs	S3B, S4M	Near Threatened	2019 to 2022
Falco rusticolus	Gyrfalcon	S2S3N, SUM	Least Concern	2011
Calidris minutilla	Least Sandpiper	S3B, S4M	Near Threatened	2016; 2021
Larus fuscus	Lesser Black-backed Gull	S3N, SUM	Least Concern	2022
Morus bassanus	Northern Gannet	S2B	Least Concern	2018; 2019
Accipiter atricapillus	American Goshawk	S3	Not Evaluated	2019
Circus hudsonius	Northern Harrier	S3B, SUM	Least Concern	2005
Buteo lagopus	Rough-legged Hawk	S2S3	Least Concern	2002
Arenaria interpres	Ruddy Turnstone	S2S3M	Near Threatened	2016 to 2018; 2020 to 2022
Calidris alba	Sanderling	S2N, S3M	Least Concern	2017; 2020 to 2022
Charadrius semipalmatus	Semipalmated Plover	S1B, S4M	Least Concern	2016; 2017; 2020 to 2022
Calidris pusilla	Semipalmated Sandpiper	S3M	Near Threatened	2016; 2021; 2022
Limnodromus griseus	Short-billed Dowitcher	S3M	Vulnerable	2016 to 2018; 2020; 2021
Numenius phaeopus	Whimbrel	S2S3M	Least Concern	2021
Calidris fuscicollis	White-rumped Sandpiper	S3M	Vulnerable	2016; 2017; 2020 to 2022
Flora				

Scientific Name	Common Name	S-Rank	IUCN Status	Observation Date(s)
Suaeda calceoliformis	American sea-blite	S1S2	Not Evaluated	1976
Fissidens bryoides	Lesser pocket moss	S2S3	Not Evaluated	1975
Carex adusta	Crowded sedge	S3	Not Evaluated	1894
Andreaea rothii	Dusky rock moss	S3S4	Not Evaluated	1890
Andreaea rupestris	Black rock moss	S3S5	Not Evaluated	1959
Prunella vulgaris	Self-heal	S3S5	Least Concern	2020



North Atlantic	FIGURE TITLE: AC CDC Results	NOTES: Rare flora and fauna records adapted from data/ mapping provided by the Atlantic Canada Conservation Data Centre (AC CDC).	PREPARED BY: C. Burke	DATE: 07/07/2025
			REVIEWED BY: C. Bursey 07/07/2025	
			APPROVED BY: C. Collins 07/07/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-525-Rev0

Figure 3.1.3-2 AC CDC results in the 5 km radius around the PA.

Flora

Of the 31 SAR plant species listed as present on the island of Newfoundland, only the water pygmyweed (*Tillaea aquatica* syn. *Crassula aquatica*) is considered a candidate for presence in the PA. Most SAR plant species are endemic to the western coast of Newfoundland, and many are specific to the limestone barrens found on the Great Northern Peninsula.

Tillaea aquatica is a very small semi-aquatic annual with rounded leaves and tiny white flowers (NL WD, 2021). It occurs in semi-aquatic anthropogenic environments (e.g., quarry pits, roadside ditches), and is known to prefer the coast (NL WD, 2021). This plant has only been observed on the Avalon and Burin Peninsulas in Newfoundland (Newfoundland and Labrador Wildlife Division, 2021); however, given the proximity of the NARL Logistics Terminal to both peninsulas, it was determined that the species may be present.

Fauna

There are four terrestrial SAR mammals known for NL, two of which are possible for insular Newfoundland – the Newfoundland marten and caribou (*Rangifer tarandus*). Only the Newfoundland marten is believed to be likely for the PA, based on historical data and habitat composition; however, there is a paucity of available survey data to inform this issue. Positive trends in Newfoundland marten populations have led to a wider use of traditional habitats across the island, and a new model projects that the PA has a 10.47 to 60% chance of marten occupancy, with one observation listed north of the PA near Long Beach (Hearn & Durocher, 2023). The marten is known to inhabit mature coniferous and mixedwood forest stands but may also use regenerating forest (Snyder & Bissonette, 1987).

There are no known caribou herds or migratory routes within the PA. Although historical data does not indicate that caribou are known for the area, it is possible that some individuals may use the area temporarily or as vagrants. It is not likely that the Project will impact the known caribou herds for the island of Newfoundland.

Avifauna

There are 23 avifauna SAR whose species range includes insular Newfoundland, ten of which are indicated in the AC CDC data. It is possible that any of these species could interact with the PA, given that birds are highly active in nature and most are known to migrate over large distances each year (see Figure 3.1.3-1). Even avifauna that remain in NL year-round, including the Red Crossbill *percna* (*Loxia curvirostra percna*), are irruptive and are known to move across various spatial ranges in search of food (COSEWIC, 2016b). Avifauna SAR observed in the PA are discussed in Section 3.2.3.5.

Bats

Five species of bats are considered possible for the PA. The little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*), referred to as resident bats, are common in Newfoundland and inhabit the island year-round. These *Myotis* genus bats are experiencing drastic declines due to White-nose Syndrome (WNS), a fungal disease that causes bats to wake during hibernation and die from starvation and freezing (COSEWIC, 2013; ECCC, 2018). WNS was discovered on the island of Newfoundland in 2018, and subsequently the little brown myotis and Northern myotis were emergency listed as Endangered under the NL ESA in 2021. The range of both species includes the entire province of Newfoundland, and NatureServe records indicate that there have been documented observations north of the PA (NatureServe Canada, n.d.-b, n.d.-a). In addition, anecdotal observations place the little brown myotis in the surrounding region, with a recent observation in Adeytown (iNaturalist [jplove], 2023).

Three migratory species, the hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and Eastern red bat (*Lasiurus borealis*), are known to migrate to Canada in the spring and summer (COSEWIC, 2023). All have been confirmed in NL, and all were listed as Endangered under the NL ESA in 2024. These migratory bat species may be possible, but unlikely to be present in the PA due to factors such as poor habitat connectivity.

Lichens

There are four SAR lichen known to exist in insular Newfoundland - the boreal felt lichen (*Erioderma pedicellatum*), vole ears lichen (*Erioderma mollissimum*, also known as graceful felt lichen), blue felt lichen (*Degelia plumbea*), and wrinkled-shingle lichen (*Pannaria lurida*). These are all epiphytic lichens that require a phorophyte (vegetative host) to exist. These lichens depend heavily on the quality of the environment, humidity levels, air quality, and the overall maturity and structure of suitable phorophytes within mature forests (Lauriault, 2020). This renders them highly susceptible to environmental changes and air pollution. While there is some high-potential habitat for these lichens present throughout the area, none are believed likely to exist based on factors such as poor habitat connectivity and compromised air quality. AC CDC data indicates that boreal felt lichen was observed in the region in 2003, but distant from the PA boundaries.

Insects

Four SAR insects are considered possible for the PA. The yellow-banded bumble bee (*Bombus terricola*) was once one of the most common bumble bees in Canada and has recently been observed on the island (ECCC, 2023a). The gypsy cuckoo bumble bee (*Bombus bohemicus*) and Suckley's cuckoo bumble bee (*Bombus suckleyi*) are rare for Eastern Canada and have not been observed in Newfoundland since 1979 and 2010, respectively (COSEWIC, 2014b, 2019). The transverse lady beetle

(*Coccinella transversoguttata*) is declining in eastern Canada, but anecdotal evidence suggests that it may be present near the PA (iNaturalist [kyrakendra], 2023). All four species are winged and capable of flight and could easily access the area if they are present in the region.

3.1.3.6 Geology

Baseline geological conditions were characterized within the LAA based on available surficial and bedrock geology maps. The wind turbine placement area lies over exposed or concealed bedrocks that have stabilized over 540 million years of lithification. Thicker glacial tills are deposited over the west of the LAA, which resulted in a rolling terrain with bogs and ponds.

Surficial Geology

The surficial geology is characterized based on the Surficial Geology Map of Insular Newfoundland (Liverman & Taylor, 1990). Unconsolidated surficial deposits in the PA were formed during the Late Wisconsin glaciation (NL IET, 1990) and include, from east to west, the following units:

- Exposed bedrocks: Characterized by little to no unconsolidated deposits or vegetation cover. Glacial tills are rare and typically less than 1.5 m thick. Ice scours and glacial striations are common, indicating past glacial erosion;
- Concealed bedrocks: Characterized by bedrocks covered by vegetation. Patchy glacial tills are present in this unit with a thickness generally below 1.5 m;
- Till veneer: Characterized by thin, poorly sorted till covering the bedrock. The unconsolidated glacial till deposits are typically less than 1.5 m in thickness, with grain sizes varying from clay to boulders; and
- Ridged till: Characterized by lineated till deposits over 1.5 m in thickness. This unit is composed of poorly sorted particles with poor to moderate drainage. Peat bogs and till veneer are common in the depressions between ridges.

Bedrock Geology

Insular Newfoundland is located at the northeastern end of the Appalachian Orogen, with the PA situated within the Avalon Zone (NL IET, 2004). This tectonic division is separated from the Gander Zone on its northwest by Dover Fault and Hermitage Bay Fault. Three major bedrock units were identified from east to west within the PA (NL IET, 1988, 1990). Listed in descending stratigraphic order, these are:

- Musgravetown Group sedimentary rocks: Late Proterozoic fluvial and shallow marine siliciclastic sedimentary rocks, with minor unseparated limestone and volcanic rocks;

- Musgravetown Group volcanic rocks: Late Proterozoic subaerial mafic and felsic volcanic rocks, with minor unseparated siliciclastic sedimentary rocks; and
- Connecting Point Group sedimentary rocks: Late Proterozoic sandstone and shale turbidites, with minor unseparated tillites, olistoliths, and volcanic rocks.

3.1.4 Land and Resource Use

Land and resource use (LRU) was selected as a VC due to the potential for the Project to interact with other ongoing and potential uses of lands and resources within or near the Project footprint.

3.1.4.1 Regulatory Framework

Many types of LRU near the Project are subject to regulatory requirements, policies, and guidance. Regulations and guidelines include: municipal and provincial land use zoning; designation of protected water supplies and waste disposal sites; Crown land tenure; and permitting of an array of activities (Table 3.1.4-1).

The Project will be subject to multiple permits, approvals, licences, and authorizations under federal, provincial and municipal legislation. Further details are provided in Section 2.5.

Table 3.1.4-1 Regulatory framework for LRU in the PA.

Theme	Federal	Provincial	Municipal	Permitting	Referral Agency(s)
Municipal Planning and Development Control	NA	**Urban and Rural Planning Act, 2000** Sunnyside Municipal Planning Area Come By Change Municipal Planning Area	Town of Sunnyside Development Regulations Town of Come By Chance Development Regulations	Town of Sunnyside and Town of Come By Chance are both incorporated municipalities with municipal plans and development regulations protected under the **Urban and Rural Planning Act, 2000**. Any development within municipal boundaries will require approval from the municipalities (Town of Sunnyside, 2013 and Town of Come By Chance, 2022a).	NL Municipal and Provincial Affairs (NL MAPA), Land Use Planning Town of Sunnyside Town of Come By Chance
Water Resources	NA	**Water Resources Act** Notice of Protected Water Supply Area of Center Cove River Water Use Charges Regulations	Town of Sunnyside Development Regulations	Approval from the NL DECC's WRMD is required for significant activities or developments in a PPWSA as outlined in the Policy for Land and Water Related Developments in Protected Water Supply Areas (Government of NL, 2025a). Under the NL **Water Resources Act**, a Water Use Licence is required for any non-domestic water withdrawal (NL DECC, 2022). Under Section 48 of the **Water Resources Act**, a Permit to Alter a Body of Water is required for any work (Including fording) in any body of water (including wetlands) prior to the start of construction.	NL Environment and Climate Change (NL DECC), Water Resources Management
Protected Roads	NA	**Urban and Rural Planning Act, 2000**	NA	The Protected Road Zoning Regulations outline requirements for development	NL MAPA, Land Use Planning

Theme	Federal	Provincial	Municipal	Permitting	Referral Agency(s)
		Protected Road Zoning Regulations		within regulation zones and provide regulatory mechanisms for areas without a zoning plan (NL MAPA, 2024a). Where a road has no zoning plan and is not encompassed by a municipal planning area, Section 6 of the Protected Road Zoning Regulations apply and are subject to applicable development regulations where they cross municipal zoning designations.	Digital Government and Service NL (DGSNL)
Dump Site/Dump Site Buffer	NA	**Environmental Protection Act** Waste Material Disposal Areas	NA	Provincial and federal requirements are outlined in the provincial Guidance Document for the Management of Impacted Sites under the authority of the **Environmental Protection Act, 2000** (Government of NL, 2025b). Any development within the buffer of a waste disposal site or former waste disposal site requires referral to the Impacted Sites Management Section of NL DECC, Pollution Prevention Division.	DGSNL NL DECC, Pollution Prevention Division Town of Sunnyside
Land Tenure	NA	**Lands Act** Sunnyside (Bull Arm) Special Management Area Regulations	NA	Crown land is available for various uses through the **Lands Act**, with surface rights conveyed through Crown title (NLFFA, 2024a). The NL and Canadian governments retain natural resource rights and may lease these rights to private enterprises for	NL Fisheries, Forestry and Agriculture (NLFFA), Crown Lands

Theme	Federal	Provincial	Municipal	Permitting	Referral Agency(s)
				extraction or renewable energy purposes (NLFFA, 2024b & 2024c).	
Wind Energy	NA	**Lands Act** Wind Energy Land Reserve Order Wind Hydrogen Hub Land Reserve Order	NA	*The* Wind Energy Land Reserve Order under the **Lands Act** establishes Crown land is made available for the development of wind energy infrastructure, such as wind turbines and associated facilities (NL IET, 2024).	NLFFA, Land Management
Forestry/Domestic Wood Harvesting	NA	**Forestry Act** Cutting of Timber Regulations	NA	According to the Cutting of Timber Regulations under the **Forestry Act**, Domestic Cutting Permits are for personal use, while Commercial Cutting Permits are for timber sales or barter. Applicants must show their venture's viability, and permits are issued based on the district's Sustainable Forest Management Plan (Government of NL, 2019).	NLFFA, Forestry
Electrical System	NA	**Public Utilities Act** **Electrical Power Control Act, 1994**	NA	Many utility corridors are located on tenured Crown lands, and engagement may be required regarding access and use these areas.	Newfoundland and Labrador Hydro (NLH) Labrador-Island Link Limited Partnership
Parks	NA	**Provincial Parks Act** Provincial Parks Regulations Jack's Pond Provincial Park Proclamation T'Railway Provincial Park Proclamation Off-road Vehicle Operation in the	NA	No development is permitted within the defined area of a Provincial Park under the **Provincial Parks Act** (Government of NL, 2006a). T'Railway Provincial Park, which was established by the Newfoundland T'Railway Provincial Park Proclamation (Government of NL, 2018)	parksNL NL Tourism, Culture, Arts and Recreation (NLTCAR), Provincial Parks

Theme	Federal	Provincial	Municipal	Permitting	Referral Agency(s)
		T'Railway Provincial Park Prohibition Order		under the **Provincial Parks Act.** Jack's Pond Provincial Park Reserve, established through *Jack's Pond Provincial Park Proclamation* (Government of NL, 2007).	
Cabins	NA	**Lands Act**	NA	Crown land for cabins and cottage developments is available through the **Lands Act**, although a Crown title conveys surface rights only (NLFFA, 2024c). Development on Crown land requires an application be made to the Crown Lands Administration (NL MAPA, 2024b).	NLFFA, Crown Lands
Hunting	**Migratory Birds Convention Act** Migratory Birds Hunting Regulations: Newfoundland and Labrador	**Wild Life Act** Wild Life Regulations	NA	Hunting in Newfoundland and Labrador (NL) is regulated under the **Wild Life Act** (Government of NL, 2023c) and Wild Life Regulations (Government of NL, 2023d). The province has Large Game Management Areas for moose, black bear, and caribou, and manages coyote and wolf hunting province wide. Small game management areas and zones apply to various species. Waterfowl hunting are also regulated by the federal **Migratory Birds Convention Act** (Government of Canada, 1994) and Migratory Birds Hunting Regulations (ECCC, 2024).	NLFFA, Wildlife ECCC, Canadian Wildlife Service

Theme	Federal	Provincial	Municipal	Permitting	Referral Agency(s)
				It is important to consult hunting parties prior to development, as hunting is a significant part of the NL diet.	
Trapping	NA	**Wild Life Act** Wild Life Regulations	NA	Trapping is regulated under the **Wild Life Act** (Government of NL, 2023c) and Regulations (Government of NL, 2023d) and Fur Bearing Animals and Coyote Trapping and Shooting Order (Government of NL, 2024a). It is important to consult trapping parties prior to development, as trapping is a significant part of the NL diet.	NLFFA, Wildlife
Angling	Canda Fisheries Act Recreational Fisheries Regulations	**Wild Life Act** Wild Life Regulations	NA	Angling for salmon and trout species is regulated by the Newfoundland and Labrador Fishery Regulations (Government of Canada, 2018) under the **Canada Fisheries Act** (Government of Canada, 1985a). It is important to consult fishing parties prior to development, as fishing is a significant part of the NL diet.	Fisheries and Oceans Canada (DFO), Conservation & Protection NLFFA, Wildlife

3.1.4.2 Land Use Planning and Development Control

The PA will encompass various lands, including municipal planning areas, protected roads, water supplies, and waste disposal sites, all of which are subject to regulatory oversight by various agencies. Development in these areas is regulated and typically requires permitting and/or consultation. Effective coordination with municipal authorities for any plan or zoning amendments and adherence to bylaws will ensure regulatory compliance and minimize disruptions to other users. Table 3.1.4-2 identifies development controls in the PA and referral agencies for obtaining necessary permits and approvals.

Table 3.1.4-2 Development control intersecting the PA.

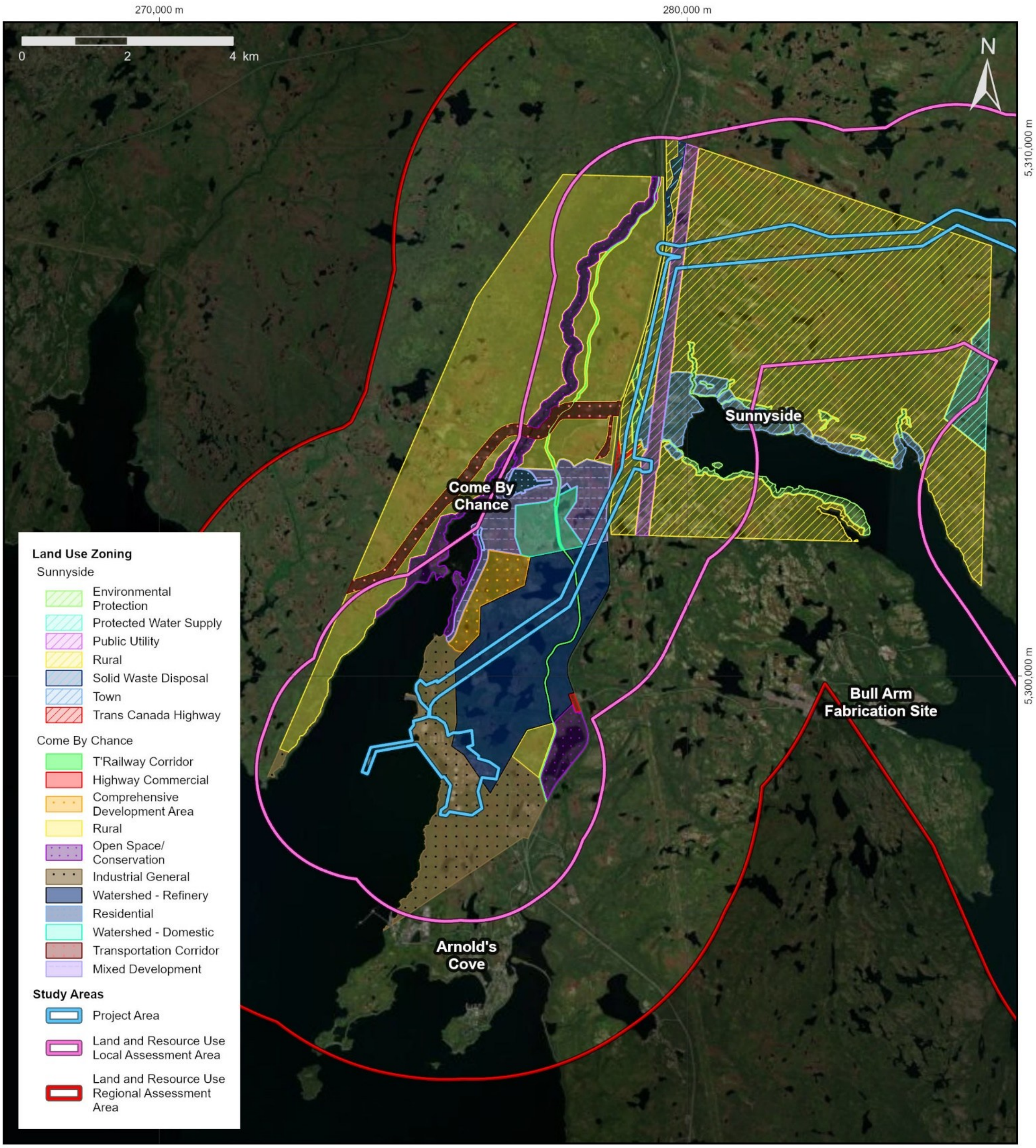
Agency	PA
Town of Sunnyside	Municipal Boundary/Planning Area Boundary
Town of Come By Chance	Municipal Boundary/Planning Area Boundary
NL Department of Municipal and Provincial Affairs, Land Use Planning	Route 1 Trans Canada Highway Protected Road Zone
NL Department of Environment and Climate Change, Water Resources	Center Cove River Protected Water Supply
Digital Government and Service NL	Dump Site/Dump Site Buffer (Sunnyside)

Municipal Zoning

The PA intersects the municipal planning areas of the Town of Sunnyside and the Town of Come By Chance. Each town has its own Municipal Plan and development regulations under the **Urban and Rural Planning Act, 2000**. The following sections discuss land use zoning in areas intersected by the Project.

Town of Sunnyside

The PA intersects five zoning designations in Sunnyside: Rural, Public Utility, Town, Trans-Canada Highway and Environmental Protection (Figure 3.1.4-1), (Town of Sunnyside, 2013). The built-up portions of the community (with homes and amenities) are generally within the Town zoning designation. The Town of Sunnyside development regulations identify permitted and discretionary land uses (i.e., uses that may be permitted by a decision of Town Council), within each respective zoning designation.



North Atlantic	FIGURE TITLE: Sunnyside and Come By Chance Zoning	NOTES: Contains information licensed under the Open Government Licence - Newfoundland and Labrador	PREPARED BY: C. Burke	DATE: 10/06/2025
			REVIEWED BY: C. Bursey 10/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		APPROVED BY: C. Collins 10/06/2025	
			CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-528-Rev0

Figure 3.1.4-1 Sunnyside and Come By Chance Zoning.

Town of Come By Chance

The PA intersects five zoning designations in Come By Chance, including Rural, Mixed Development, Watershed - Refinery, T'Railway Corridor, and Industrial General as shown in Figure 3.1.4-1. The PA does not intersect the stewardship agreement area in Come By Chance, which is zoned as Open Space/Conservation. The Town of Come By Chance land use regulations outline the permitted and discretionary land uses within each respective zoning designation intersected by the Project.

Protected Roads

Protected road designations under Section 61 of the **Urban and Rural Planning Act, 2000** regulate development within and access to designated areas along roadways on both Crown lands and private lands. The PA intersects a protected road: Route 1 TCH: Terra Nova National Park to Holyrood (Figure 3.1.4-2), which currently has no zoning plan. The proposed transmission line crosses the protected road area of the TCH.

Any proposed development adjacent to protected roads must conform with zoning regulations, intended to ensure traffic efficiency, public safety and consistent development (NL MAPA, 2024a). The Protected Road Zoning Regulations outline requirements for development within each zone and provide regulatory mechanisms for areas without a zoning plan. However, where a protected road crosses municipalities with municipal plans and development regulations (e.g., Sunnyside and Come By Chance), the municipal regulations apply.

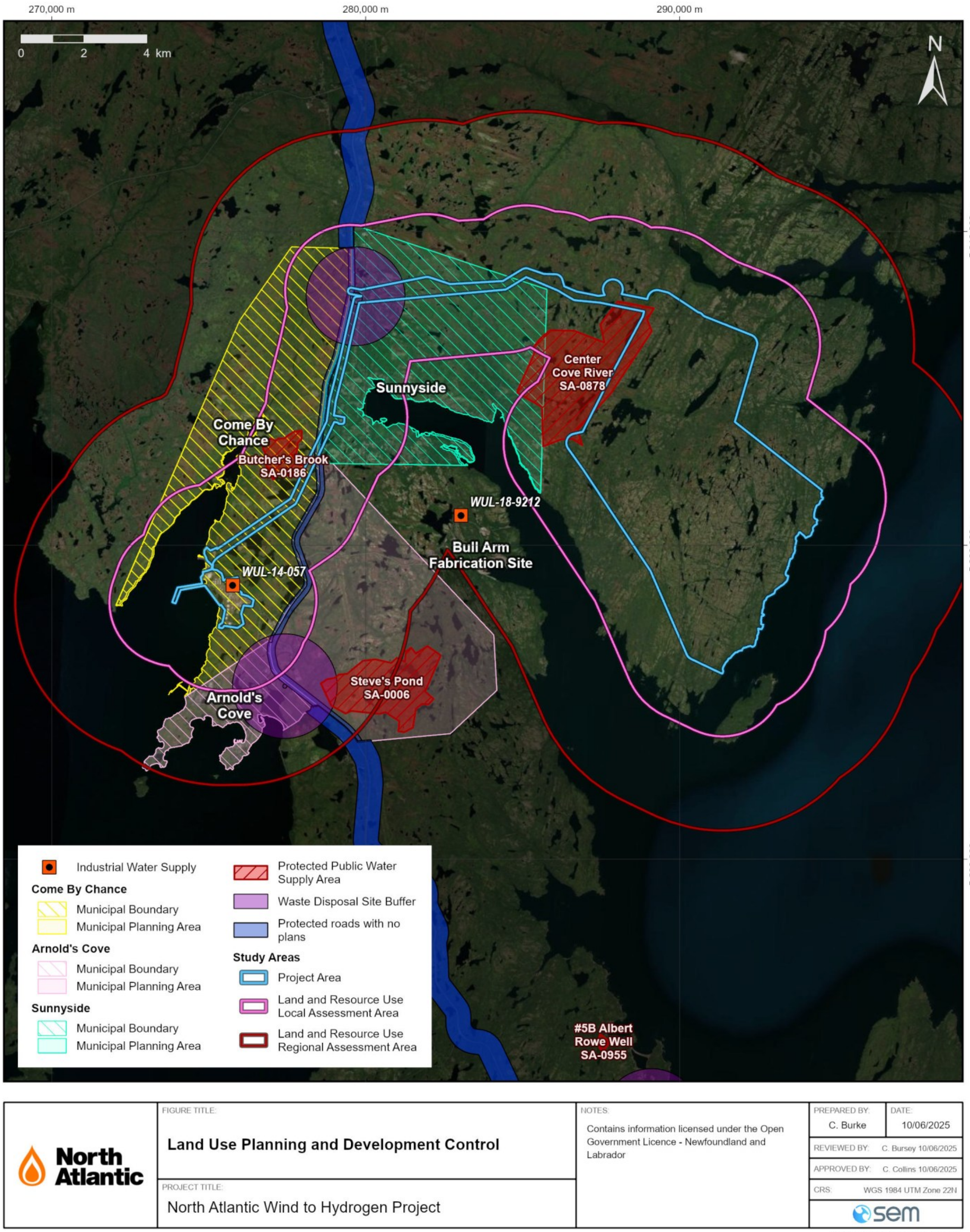


Figure 3.1.4-2 Land Use Planning and Development Control.

Water Resources

The PA encompasses a portion of Sunnyside's PPWSA (Center Cove River) inside the Municipal Boundary. The PA does not intersect with the PPWSA (Butcher's Brook) of the Town of Come By Chance. PPWSAs are governed by the NL **Water Resources Act** and any development proposal within such areas must consult the NL DECC WRMD (NL DECC, 2025a). According to the **Water Resources Act**, "a person shall not place, deposit, discharge, or allow to remain in that area material that might impair the quality of the water; fish, bathe, boat, swim or wash in, or otherwise impair the quality of the water; or use or divert water that may unduly diminish the amount of water available in that area as a public water supply."

The PA intersects the Inkster's Pond industrial water use licence for Braya valid until 2039 (NL DECC, 2025c). The Town of Come By Chance Municipal Plan (2022b) states that the area will be preserved in its natural state, but rural activities such as forestry, agriculture, mineral extraction, and recreational open spaces may be allowed as long as water quality remains sufficient for industrial processes and potable supplies. General industrial activities are permitted within the Refinery watershed, but only at locations along Refinery Road. In addition to the refinery operator, the Town of Come By Chance and all water supply users will need to be engaged to address any proposals within the Watershed - Refinery zone.

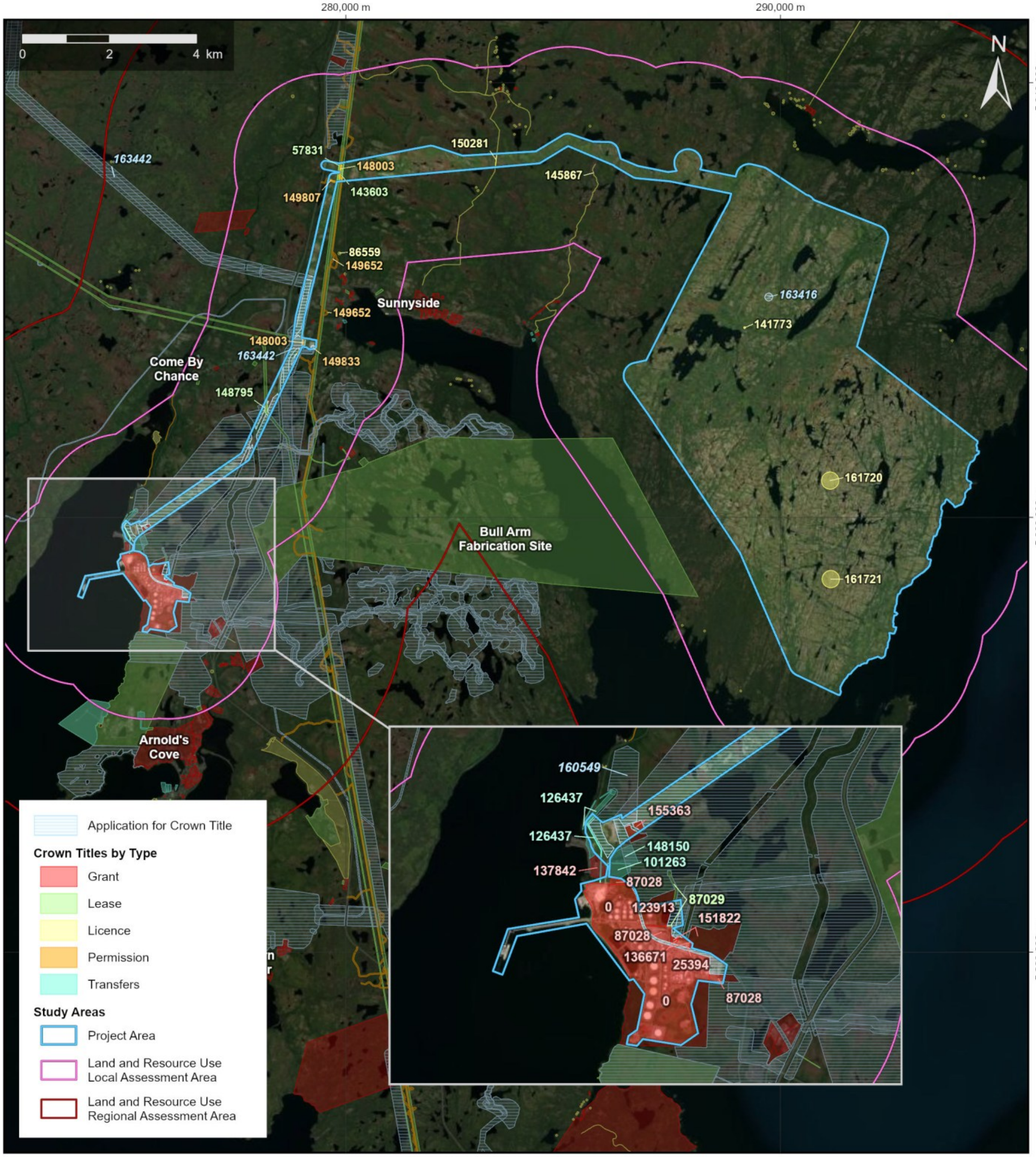
Former Waste Disposal Sites

The PA, specifically the transmission line, intersects the buffer of a waste disposal site or former waste disposal site in Sunnyside (Figure 3.1.4-2). In NL, such sites (e.g., waste disposal sites) are managed by the Impacted Sites Management Section of NL DECC, Pollution Prevention Division (NL DECC, 2025b). Provincial and federal requirements are outlined in the provincial *Guidance Document for the Management of Impacted Sites* under the authority of the **Environmental Protection Act, 2000** (Government of NL, 2025a).

Development within the Sunnyside Waste Management Site (solid waste disposal [SWD] Zone) must be reviewed and approved by the NL DECC, along with other relevant departments such as Digital Government and Service NL, before the Town will issue an approval (Town of Sunnyside, 2016).

Land Tenure

Various Crown titles and applications for Crown titles exist throughout the PA (Figure 3.1.4-3). The NL government (and government of Canada) retains rights to natural resources on Crown lands and may lease subsurface or surface rights to private enterprises to extract resources through mining, quarrying and forestry or to harness resources such as wind, solar and water for renewable energy. More than 30 parcels of tenured land (grants, licences, leases, transfers, permissions) and several applications are intersected by the PA (Table 3.1.4-3).



North Atlantic	FIGURE TITLE: Land Tenure in the Project Area	NOTES: Contains information licensed under the Open Government Licence - Newfoundland and Labrador	PREPARED BY: C. Burke	DATE: 10/06/2025
			REVIEWED BY: C. Bursey 10/06/2025	
			APPROVED BY: C. Collins 10/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
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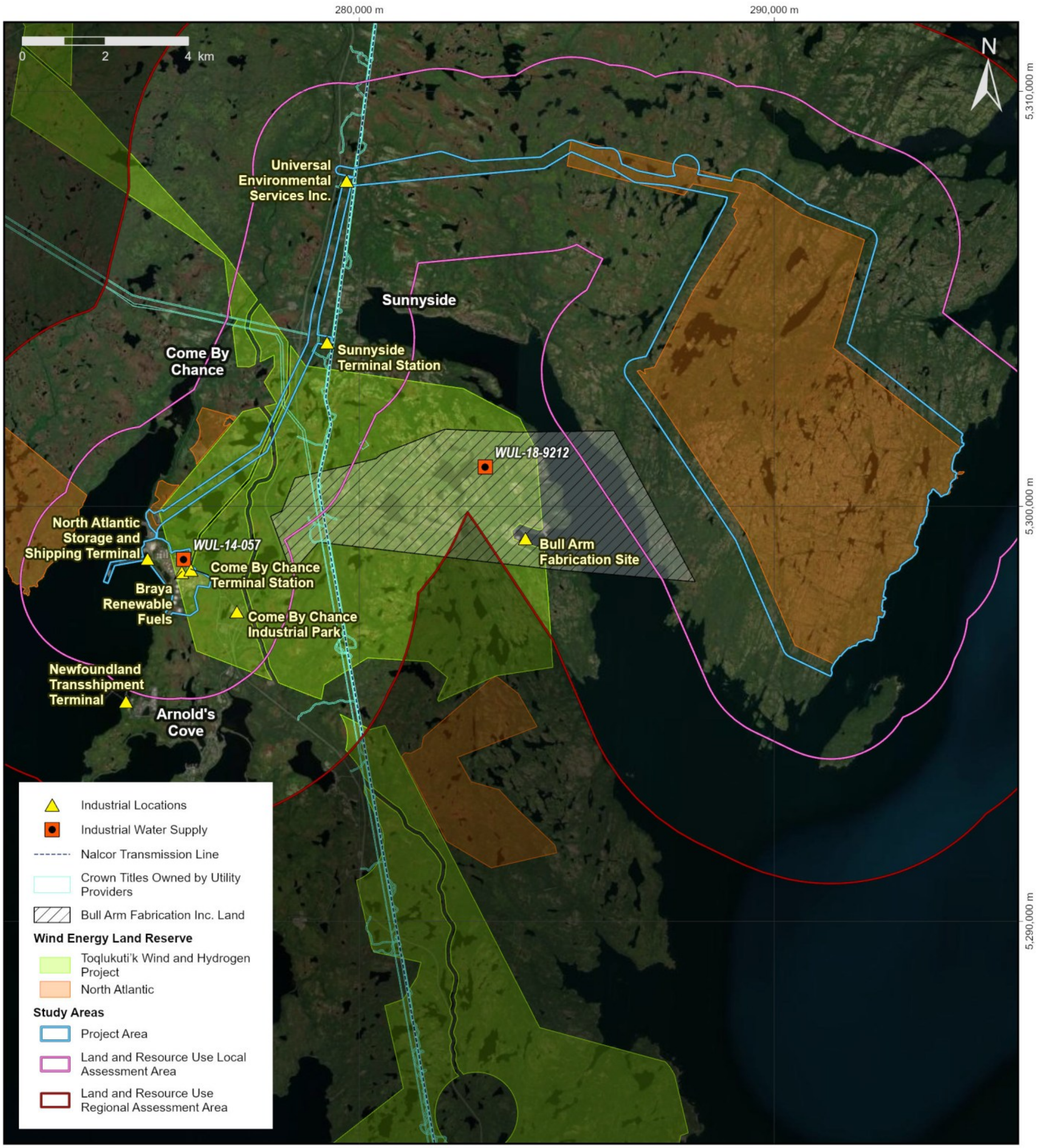
Figure 3.1.4-3 Land Tenure in the Project Area.

Table 3.1.4-3 Land tenure intersecting the PA.

Tenure Holder	#	PA
NA	163416	Application for Crown Title
NA	163442	Application for Crown Title
NA	160549	Application for Crown Title
Blair D. Snook	150281	Crown Title (Licence)
Daniel Stephen Bennett	141773	Application for Crown Title (Licence)
Department of Transportation and Infrastructure	148150	Crown Title (Transfers)
Environment and Conservation	101263	Crown Title (Transfers)
Eric B. Beck	86559	Crown Title (Licence)
J-1 Contracting Ltd.	137842	Crown Title (Grant)
Labrador-Island Link Limited Partnership	143603	Crown Title (Lease)
Labrador-Island Link Limited Partnership	148003	Crown Title (Permission)
Labrador-Island Link Limited Partnership	149807	Crown Title (Permission
Labrador-Island Link Limited Partnership	149652	Crown Title (Permission)
Labrador-Island Link Limited Partnership	149833	Crown Title (Permission)
NARL Logistics Limited Partnership	161721	Crown Title (Licence)
NARL Logistics Limited Partnership	161720	Crown Title (Licence)
NARL Logistics Limited Partnership	87029	Crown Title (Lease)
NARL Logistics Limited Partnership	87029	Crown Title (Lease)
NARL Refining Inc.	123913	Crown Title (Grant)
NARL Refining Inc.	151822	Crown Title (Grant)
NARL Refining Inc.	151822	Crown Title (Grant)
NARL Refining Inc.	151822	Crown Title (Grant)
Nfld.& Labrador Power Comm.	25394	Crown Title (Grant)
Newfoundland and Labrador Hydro	136671	Crown Title (Grant)
Newfoundland and Labrador Hydro	136671	Crown Title (Grant)
Newfoundland and Labrador Hydro	148795	Crown Title (Lease)
Newfoundland Power Inc.	57831	Crown Title (Lease)
Newfoundland Processing Ltd.	87028	Crown Title (Grant)
Newfoundland Processing Ltd.	87028	Crown Title (Grant)
Newfoundland Processing Ltd.	87028	Crown Title (Grant)
Provincial Building Company Limited	0	Crown Title (Lease)
Public Works & Government Services Canada	126437	Crown Title (Grant)
Public Works & Government Services Canada	126437	Crown Title (Grant)
Public Works & Government Services Canada	126437	Crown Title (Grant)
Town of Come By Chance	155363	Crown Title (Grant)
Town of Sunnyside	145867	Crown Title (Licence)
Source: (NL MAPA, n.d.)		

3.1.4.3 Industrial and Commercial Land Use

Most of the lands in the PA (especially around the Wind Farm) are undeveloped with a few exceptions. Various industrial sites (e.g., the Braya Refinery, Come By Chance Industrial Site, Bull Arm Fabrication Site, Newfoundland Transshipment Terminal, North Atlantic Storage and Shipping Terminal) are in the LAA (Figure 3.1.4-4). The Braya Refinery and Come By Chance Industrial Site area intersected by the PA (Table 3.1.4-4).



North Atlantic	FIGURE TITLE: Industrial and Commercial Land Use	NOTES: Contains information licensed under the Open Government Licence - Newfoundland and Labrador	PREPARED BY: C. Burke	DATE: 10/06/2025
			REVIEWED BY: C. Bursey 10/06/2025	
			APPROVED BY: C. Collins 10/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
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Figure 3.1.4-4 Industrial and Commercial Land Use.

Table 3.1.4-4 Commercial and industrial uses intersecting the PA

Commercial/Industrial User	PA
Toqlukuti'k Wind and Hydrogen Project	Wind Energy Land Reserve
North Atlantic Refining	Inkster's Pond Industrial Water Supply
NL Fisheries, Forestry and Agriculture, Forestry Services	Forestry Management Districts 1, 2

Wind Energy Land Reserves

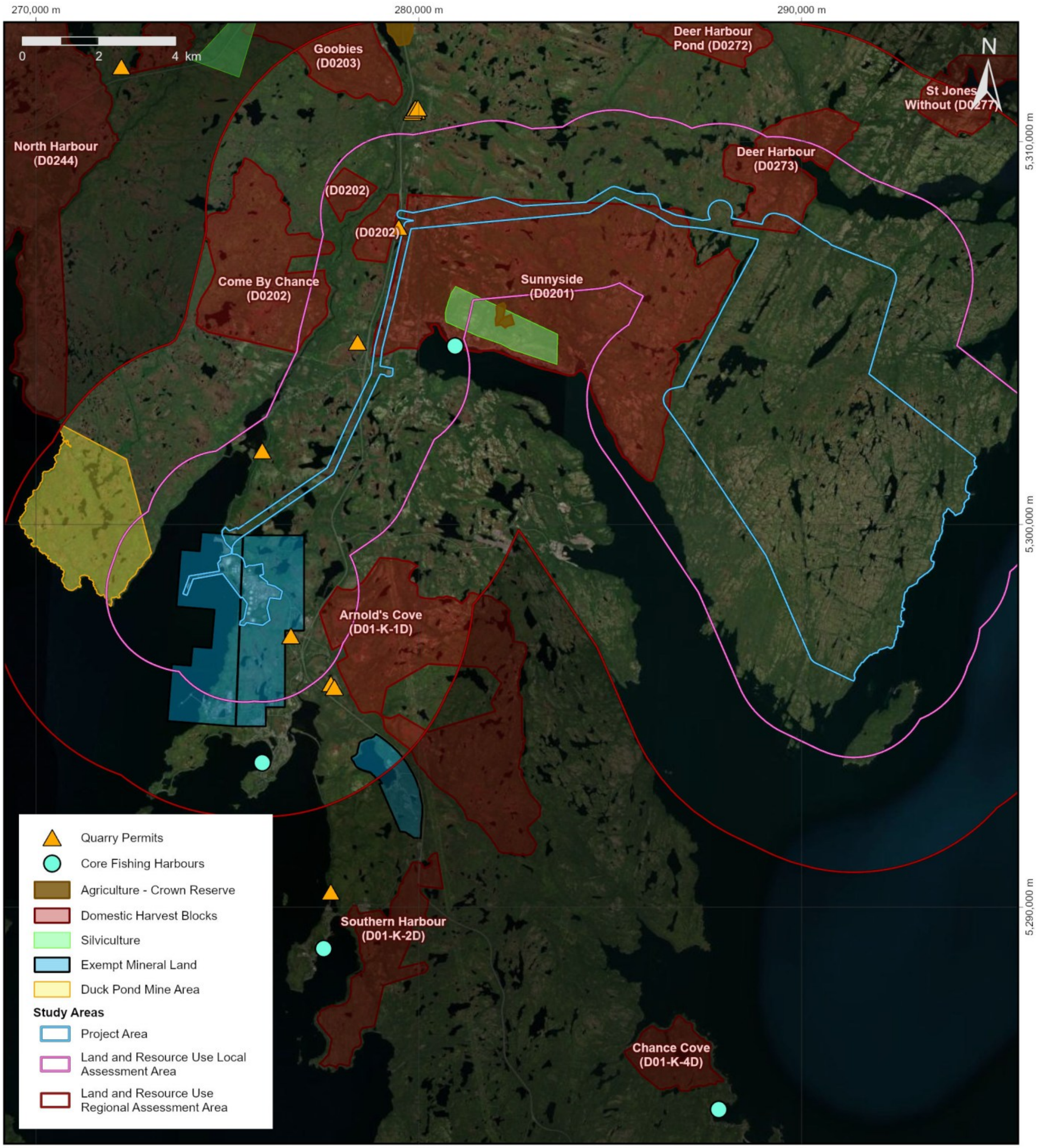
The *Wind Energy Land Reserve Order*, created under the **Lands Act**, aims to allocate Crown land for the development of wind energy infrastructure, including wind turbines and related facilities (NLIET, 2024). The PA intersects Wind Energy Land Reserves identified for Toqlukuti'k Wind and Hydrogen Project, along with those of this Project (Figure 3.1.4-4).

Electrical System

Newfoundland and Labrador Hydro (NLH) is the primary generator of electricity in the province, supplying most of the electricity distributed by Newfoundland Power (NP, 2024). The Labrador-Island Link is a high voltage direct current transmission system that delivers hydroelectricity from Muskrat Falls in central Labrador to Soldier's Pond in the eastern region (NLH, 2024). The PA intersects 11 Crown titles (i.e., leases, grants or permissions), which are utility corridors (Figure 3.1.4-4). These titles are held by NLH and Labrador-Island Link Limited Partnership (NLFFA, n.d.).

Forestry

In NL, the **Forestry Act** governs management, harvesting and protection of forests and forestry resources. The province is divided into 24 forest management districts (FMDs), which each prepare five-year operating plans. The Project is within FMDs 1 and 2. The PA does not intersect any commercial harvesting areas (Figure 3.1.4-5).



North Atlantic

FIGURE TITLE: Natural Resource Use

PROJECT TITLE: North Atlantic Wind to Hydrogen Project

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CRS: WGS 1984 UTM Zone 22N

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Figure 3.1.4-5 Natural Resource Use.

Agriculture

The PA does not intersect any agricultural lands (Figure 3.1.4-5).

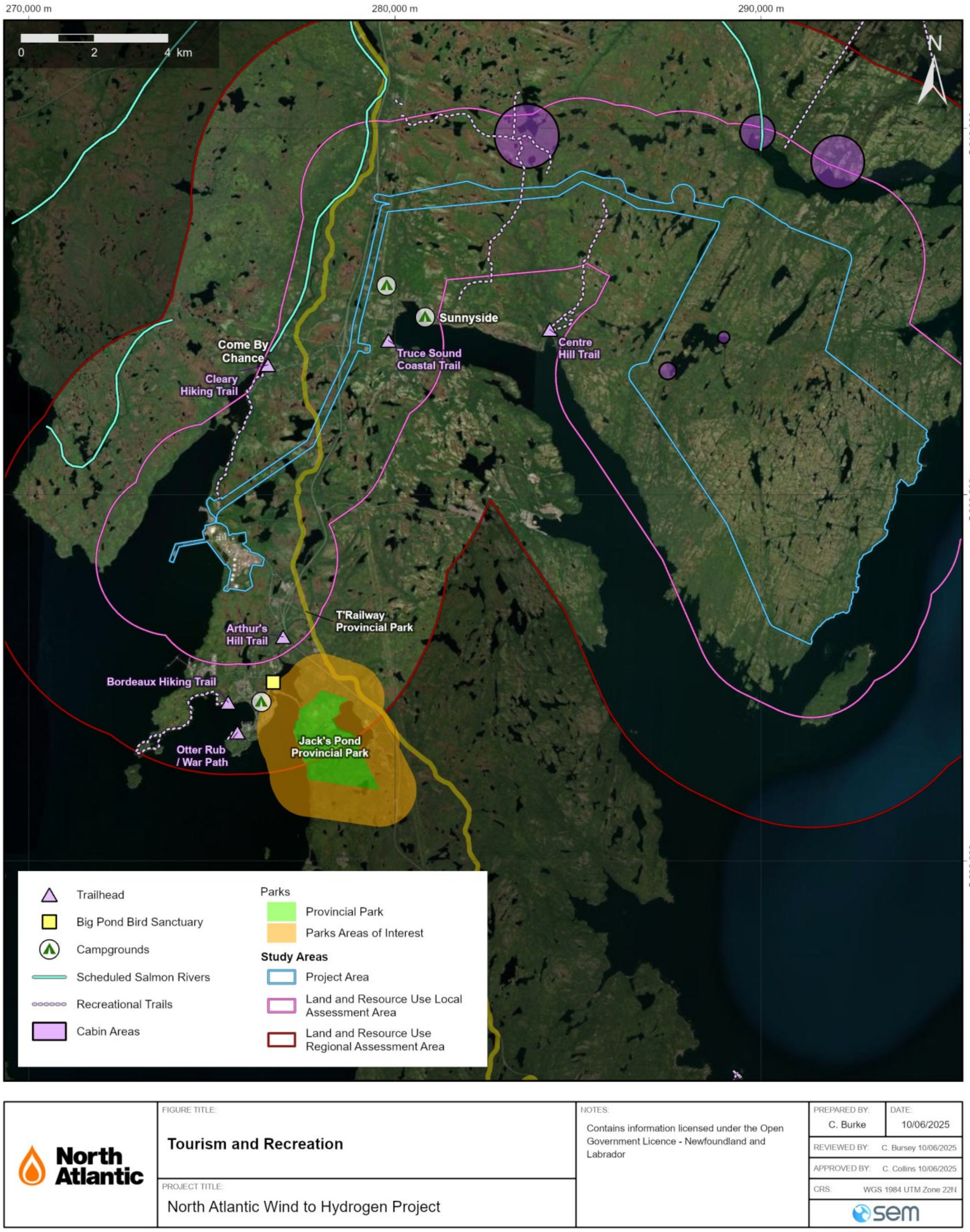


Figure 3.1.4-6 Tourism and Recreation.

Mining and Quarrying

Mining exploration and operations are regulated by the **Mining Act** (Government of NL, 2006b) and Mining Regulations (Government of NL, 2006c). No mineral exploration licences or mining leases are intersected by the PA and the "Duck Pond Mine Area" is the only mining interest identified in the RAA.

Quarrying in NL is regulated through the **Quarry Materials Act** and Quarry Materials Regulations. While 11 quarry permits are located throughout the LAA (four) and RAA (seven), mainly near roadways or in communities, none are intersected by the PA.

There are four mineral licences that overlap the Wind Farm area (licence numbers 035776M, 036699M, 036701M, and 033487M). The mineral licence holders have been contacted to discuss the potential interactions with the Project Phases. If required, agreements will be negotiated to address their concerns for ongoing and potential future mineral exploration within the PA.

3.1.4.4 Tourism and Recreation

Evaluation of tourism and recreation may include government interests and regulatory requirements but also encompasses consideration of the effects of Project activities that produce noise, dust, and light or other effects such as ice throw on those who partake in outdoor activities near the Project. Table 3.1.4-5 illustrates the tourism and recreational amenities intersecting the PA and LAA.

Table 3.1.4-5 Tourism and recreation amenities intersecting the PA and LAA.

Referral Agency	PA	LAA
NL Department of Tourism, Culture and Recreation, Parks Division Newfoundland T'Railway Council	T'Railway Provincial Park	T'Railway Provincial Park
Sunnyside RV Park	None identified	Recreational Vehicle Campground
Sunnyside of Life B&B RV and Tea	None identified	Bed and Breakfast and Recreational Vehicle Campground
Cabins	Lady Cove Pond, Gull Pond	Northeast of Sunnyside around Deer Harbour (Rockwood's Cove, Old Dock Pond, Goose Cove, Shoal Harbour) North of Sunnyside at Big Island Pond, Peddle's Pond, Centre Hill Pond
Town of Sunnyside	None identified	Centre Hill Trail
	None identified	Truce Sound Coastal Trail
Town of Come By Chance	None identified	Cleary Hiking Trail
	None identified	Chance Delta
Town of Arnold's Cove	None identified	Arthur's Hill Trail
Birdwatching	None identified	2 sites in Sunnyside (Sunnyside and Centre Cove)

Referral Agency	PA	LAA
	Braya Refinery	Come By Chance Estuary
Scenic Viewpoints	None identified	Centre Hill
	None identified	Placentia Bay Lookout
	None identified	Arthur's Hill Trail
Recreational Beaches	None identified	Long Beach, Come By Chance

Parks and Recreation Areas

Provincial parks and provincial park reserves are designated and protected through the **Provincial Parks Act** (Government of NL, 2006d). The only such park in the PA is the T'Railway Provincial Park, which is maintained by the Newfoundland T'Railway Council and the NL Snowmobile Federation.

Two facilities in the LAA offer services for camping, recreational vehicles (RV) and other amenities: Sunnyside of Life B&B and RV and Tea, Sunnyside RV Park, however neither is intersected by the PA (Figure 3.1.4-6).

Cottage Areas and Cabins

A number of cabins are in the LAA and RAA with few in the PA (at Gull Pond and Lady Cove Pond). Presumed cabins (mainly licences to occupy) are in the LAA near the coastline on the north and south side of Deer Harbour, the north side of Sunnyside at Big Island Pond, Peddle's Pond and Centre Hill Pond (NLFFA, n.d.).

Other Sites and Activities

The T'Railway Provincial Park is primarily used for hiking, walking, snowshoeing, bicycling, snowmobiling, and off-road vehicle riding (Figure 3.1.4-6). Other hiking trails are located in the LAA, particularly in or near Sunnyside, Come By Chance, and Arnold's Cove, with trailheads identified in Figure 3.1.4-6. The land and resource use survey results confirmed that these activities take place, see Appendix R for a summary of all survey results. For instance, two survey respondents, one from Sunnyside and the other from Goobies, indicated that they use ATVs either sometimes or regularly. The respondent from Sunnyside reported they only use an ATV in the springtime, whereas the other respondent indicated they use their ATV year-round.

Bird-watching sites are situated in the RAA at Sunnyside, Come By Chance, and Arnold's Cove. Three are in the LAA at Sunnyside and Come By Chance. Two respondents to the land and resource use survey reported they engaged in birdwatching or other nature observing activities. The Braya Refinery (intersected by the PA) was identified as having two recorded bird sightings. While, industrial sites may attract birds, they are generally not bird watching areas.

Several areas also offer several scenic viewpoints. The top of Centre Hill Trail in Sunnyside, at an elevation of 1,153 feet (384 meters), provides a panoramic view of the coast and inland areas (Jacks Pond Park, 2022). In Arnold's Cove, Arthur's Hill Hiking Trail offers a panoramic view of the town and its surroundings, while Placentia Bay Lookout provides views of Placentia Bay (NL Tourism, 2024).

Sea kayaking areas in the RAA are accessible at Peddle's Cove and Arnold's Cove (Mussio Ventures Ltd., 2014). Recreational beaches in the LAA include Sandy's Beach at Sunnyside and Long Beach at Come By Chance. The PA does not intersect these areas.

Harvesting

Harvesting activities, including hunting, fishing, and foraging, are widely popular in NL. Respondents to the land and resource survey indicated that they have harvested fish (i.e., salmon, brook trout, brown trout) and other species for recreation or food in the identified study areas (Sunnyside and Come By Chance) with some fishing activity in 2024. One respondent indicated that fishing is poor in the identified areas. The same respondent indicated that they sometimes pick blueberries and partridgeberries in the area in summer and fall. They often cut and haul firewood in fall and winter and engage in agricultural activity (has a plot in a community garden) in summer. Table 3.1.4-6 describes harvesting areas, including hunting Management Areas and zones, trapping areas, angling areas, and domestic wood harvest blocks intersecting the PA and LAA. It is within these areas that environment effects on biological resources may result in adverse effects on harvesting (e.g., air quality affecting plants, noise or light affecting availability of wildlife resources).

Table 3.1.4-6 Harvesting areas intersecting the study areas.

Management Area or Zone	PA	LAA
Big Game Hunting	Area 28 - Black River	Area 28 - Black River
	Area 29 - Bonavista Peninsula	Area 29 - Bonavista Peninsula
	Area 44 - Bellevue	Area 44 - Bellevue
Small Game Hunting	Remainder of Island	Remainder of Island
	Avalon / Swift Current	Avalon / Swift Current
	Island of Newfoundland	Island of Newfoundland
Waterfowl and Snipe Hunting	Inland Newfoundland	Avalon-Burin Coastal
Murre Hunting	Not applicable	No. 3
	Not applicable	No. 4
Fur Trapping	Island of Newfoundland	Island of Newfoundland
Beaver Fur Trapping	Zone 2: Trapline 46	Zone 2: Trapline 46
	Zone 3: Trapline 30	Zone 3: Trapline 30
	Zone 3: Trapline 33	Zone 3: Trapline 33
	Zone 3: Trapline 42	Zone 3: Trapline 42
Lynx Trapping	Zone B: Southern	Zone B: Southern
Coyote Trapping	Province-wide	Province-wide

Management Area or Zone	PA	LAA
Wolf Trapping	Island	Island
Salmon Fishing	Not applicable	70: Deer Harbour River and Tributary Streams
	Not applicable	91: Come By Chance River
Trout Angling	Trout Angling Zone 1: Insular Newfoundland	Trout Angling Zone 1: Insular Newfoundland
Domestic Harvest Block	Deer Harbour	Come By Chance
	Sunnyside	Arnold's Cove

Hunting and Trapping

In NL, hunting (i.e., big game, small game) and trapping are regulated under the **Wild Life Act** (Government of NL, 2023c) and Wild Life Regulations (Government of NL, 2023d). Waterfowl and snipe hunting is governed by the federal **Migratory Birds Convention Act** (Government of Canada, 1994) and Migratory Birds Hunting Regulations: Newfoundland and Labrador (ECCC, 2024).

The PA intersects Management Areas (MAs) for hunting moose, black bear, small game, waterfowl and snipe as well as areas for fur trapping. The LAA intersects similar harvesting management areas, and also coastal areas for hunting murres. While these MAs encompass the PA and LAA, they do not identify specific high-activity zones within the study areas. One respondent to the land use and resource survey indicated that the MAs have been used for hunting (i.e., moose, bear, coyote, ducks, geese, partridge, grouse and rabbits) and trapping (i.e., fox, coyote) in the last 50+ years. The respondent themselves also answered that they often engaged in hunting.

Angling

Angling for salmon and trout is a popular activity in NL, attracting many to rivers and lakes in open seasons. The LAA overlap with two salmon fishing areas (SFAs): Zone 6 Trinity Bay and Zone 10 Placentia Bay (Fisheries and Oceans Canada, 2024). Three designated salmon rivers intersect the LAA: 70 Deer Harbour River and Tributary Streams, Trinity Bay along with 91 Come By Chance River and 92 Watson's Brook, Placentia Bay. However, the PA does not intersect any of the designated salmon rivers.

In NL, trout angling offers opportunities to catch various species. Trout Angling Zone 1, which includes Insular Newfoundland, covers the RAA (Fisheries and Oceans Canada, 2024). Anglers may fish for speckled trout, brown trout, rainbow trout and ouananiche in Zone 1.

Domestic Wood Cutting

In NL, domestic wood harvesting is regulated under the Cutting of Timber Regulations (Government of NL, 2019) of the **Forestry Act**. Domestic harvest blocks are located through the RAA, but no commercial timber harvesting is located in the area (NLFFA, 2022a; NLFFA, 2022b). In and near Sunnyside, the PA intersects two domestic harvest blocks: FMD 2: Deer Harbour and Sunnyside. A respondent to the land use and resource survey indicated the harvest blocks in Sunnyside have been used for domestic wood cutting for the past 50+ years.

3.1.4.5 Indigenous Land Use

A literature review was conducted to better understand historical and contemporary traditional land uses by Indigenous peoples. This review is based solely on publicly available data and information pertaining to Indigenous peoples in Newfoundland.

Two First Nations are based on the Island of Newfoundland: Qalipu Mi'kmaq First Nation and Miawpukek First Nation. Qalipu First Nation, which originated from the Federation of Newfoundland Indians, has no reserve lands. Qalipu Mi'kmaq First Nation (IR34) was established as a landless band under the Indian Act in 2011 (Qalipu First Nation, 2021).

The mouth of Conne River on the south coast of Newfoundland was an historical encampment site for the Mi'kmaq, a nomadic people who lived throughout the current Atlantic provinces, Quebec and the State of Maine (MFN 2023). According to oral and written history, the settlement became a permanent community in 1822 and was established as Miawpukek Reserve in 1870. The Samiajij Miawpukek Indian Reserve (IR47) was officially established under the Indian Act in 1987.

The members of Qalipu Mi'kmaq First Nation originated from the nine Mi'kmaq Nations formerly represented by the Federation of Newfoundland Indians. Although Qalipu Mi'kmaq First Nation has no reserve lands, the First Nation indicates its members reside in 67 communities, primarily in central and western Newfoundland (Qalipu First Nation, 2021). The nearest community identified by the Qalipu First Nation, Swift Current, is outside the RAA.

Indigenous peoples' right to fish for food, social and ceremonial (FSC) purposes is collective rather than individual. These licences are issued by DFO, and catches may not be sold (DFO, 2022a). Designated Indigenous harvesters may catch what is needed for themselves and / or their community for FSC purposes. It appears Qalipu Mi'kmaq First Nation does not hold FSC fishing licences, but the First Nation is seeking to confirm its member's Aboriginal rights (DFO 2019).

Mi'kmaq Commercial Fisheries manages Qalipu Mi'kmaq First Nation's fishing enterprises, including ownership and operation of a 60-foot long-liner, The Navigator, based in Winterton, Trinity Bay (Qalipu Mi'kmaq First Nation, 2021). Sixteen small-boat licenses owned by Qalipu Mi'kmaq First Nation are provided to fishers in west coast communities. In exchange, Qalipu First Nation through Qalipu Development Corporation receives license fees and a percentage of catch revenue. There are plans to acquire additional licenses and enterprises, as well as enhanced and new species allocations.

Miawpukek First Nation holds FSC licences and communal commercial licences. The FSC licences are for harvesting of fish, shellfish, trout and seals in coastal waters of Bay d'Espoir and Northwest Atlantic Fisheries Organization's Division 3Ps, which includes a marine area from Placentia Bay west to Burgeo (DFO, 2019d). Traditional food sources of Miawpukek First Nation include seafood as well as caribou, moose, beaver, rabbits, muskrat, grouse, geese, ducks, blueberries, raspberries, Newfoundland tea berries, partridgeberries and bakeapples (Marathon Gold, 2020).

3.1.5 Heritage and Cultural Resources

A desktop Historic Resources Overview Assessment (HROA) was conducted in 2025 and researched the physiographic setting and cultural / historical sequence of Newfoundland with a focus on the isthmus of the Avalon Peninsula and Deer Harbour Peninsula within the RAA and encompassing the LAA, and the PA.

The background and contextual data compiled indicates early human presence within the LAA extending back as early as 6,000 years before present (BP). This presence includes occupations by several different First Nations and Pre-Inuit Indigenous cultures during the Pre-contact and historic periods, and by peoples of European descent starting sometime after 500 BP (1500 Common Era [CE]). Given the longstanding human use and occupation of the region, as confirmed from the review of archaeological data, historic documentation, and aerial imagery, it is likely that early cultural resources from one or more of the cultural groups mentioned above could exist within the LAA.

There are 66 registered archaeological sites within the RAA, 12 of which fall within the LAA. The one registered archaeological site within the PA is ClAk-02 or the Sunnyside Hills site. The nearest registered archaeological site to the PA is ClAl-04 or the Bay Bulls Arm Telegraph Station, located approximately 110 m east of the proposed transmission line corridor that traverses the Isthmus of Avalon. The registered archaeological sites within the LAA are shown in Figure 3.1.5-1.

The HROA predictive modelling identified twenty locations within the PA that were identified as High Potential Areas (HPAs), with the remainder of the PA being ascribed low archaeological.

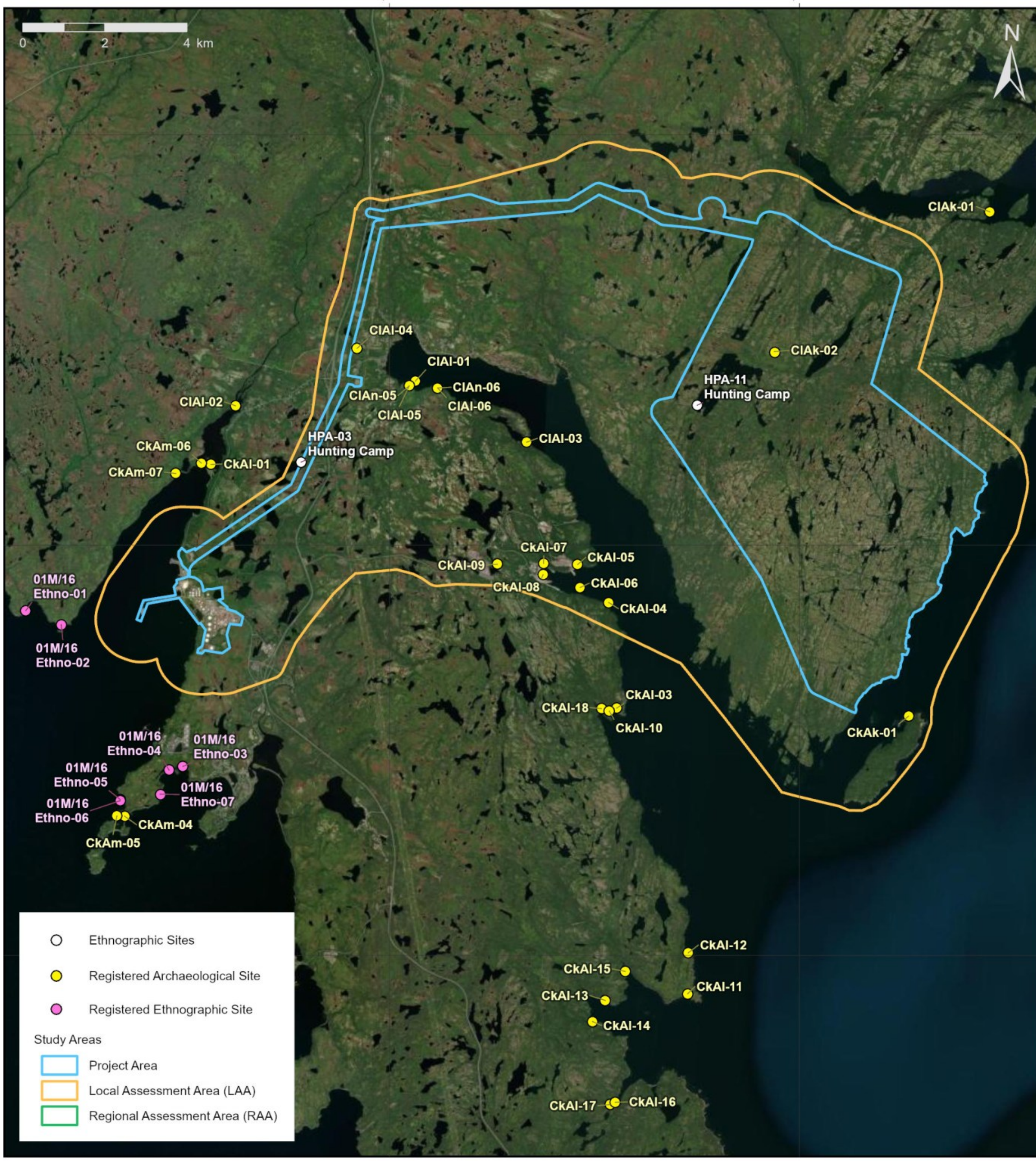
A subsequent Heritage Resources Impact Assessment (HRIA) of the twenty identified HPAs within the Study Area was conducted. This phase is designed to confirm or revoke the ascription of high archaeological resource potential made during the HROA.

The field activities of the HRIA identified one remaining area of high potential within HPA-04. It also confirmed continued high potential within the two registered archaeological sites, ClAk-02 (encompassed by HPA-12) and ClAl-04 (HPA-05) (see Figure 3.1.5-1). All other HPAs were revoked and reclassified as exhibiting low archaeological resource potential. A summary of information regarding the remaining HPAs is presented below in Table 3.1.5-1. HPA-04 and HPA-12 are the only remaining HPAs within the PA, see Figure 3.1.5-2.

The HRIA also recorded the presence of two ethnographic locations within the PA (HPA-03 Hunting Camp and HPA-11 Hunding Camp) which were recorded for the PAO and do not require any avoidance or mitigation measures (Figure 3.1.5-1). Although fossils are protected under the **Historic Resources Act** (1985) and are inventoried by the Provincial Archaeology Office (PAO), per engagement with the PAO, the potential for any such resources to be present within the PA is Low.

Table 3.1.5-1 Areas of high historic resources potential.

Reference Code	Area Description	Area (ha)
HPA-04	Happy Pond	3.8
HPA-05	Archaeological Site ClAl-04	0.8
HPA-12	Archaeological Site ClAk-02	0.8



North Atlantic	FIGURE TITLE: Registered Archaeological Sites	NOTES:	PREPARED BY: C. Burke	DATE: 10/07/2025
			REVIEWED BY: C. Bursey 10/07/2025	
			APPROVED BY: C. Collins 10/07/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
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SEM MAP ID: 016-015-GIS-536-Rev0

Figure 3.1.5-1 Registered archaeological sites.

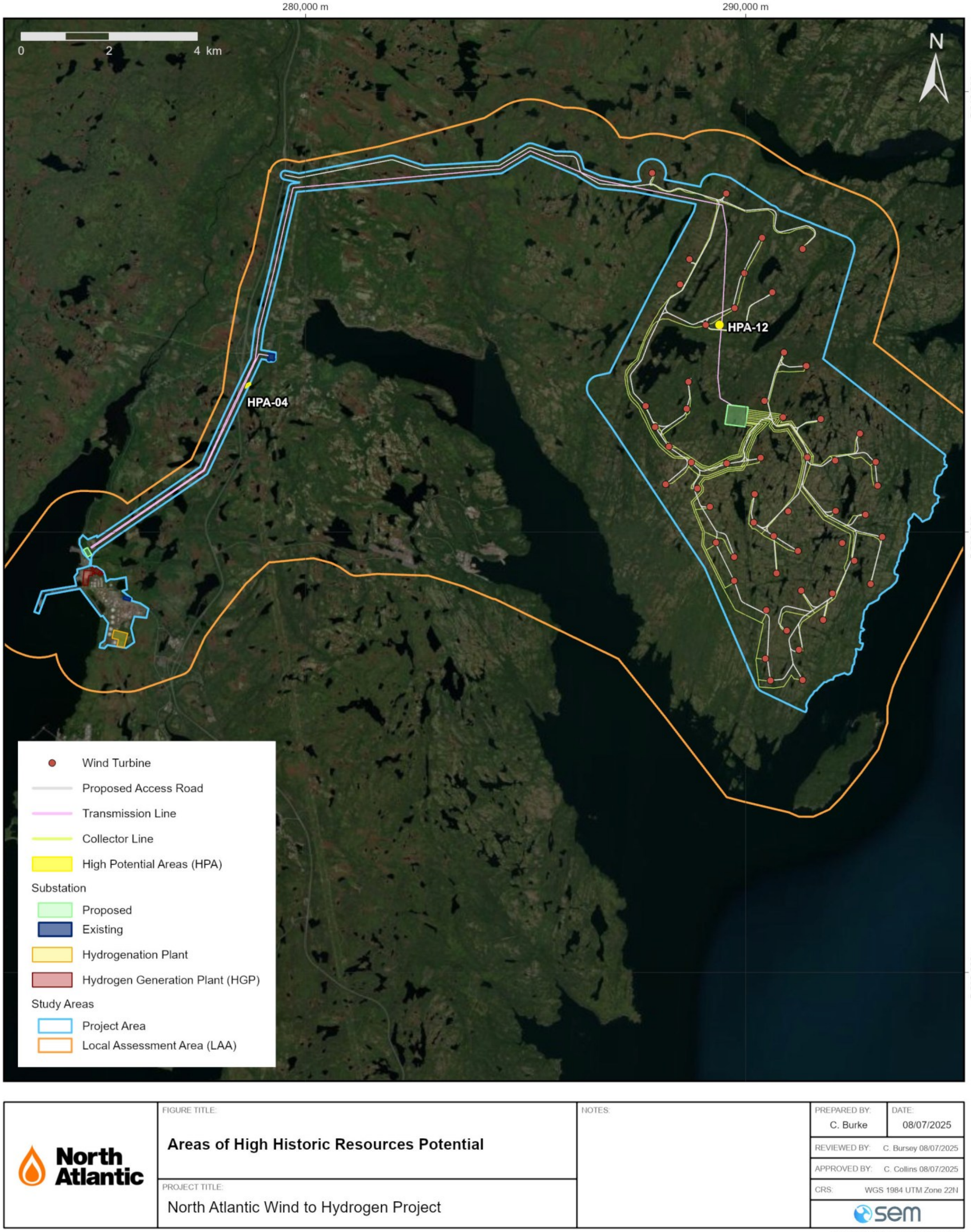

Figure 3.1.5-2 Areas of high historic resources potential in the PA.

3.1.6 Socio-Economic Environment

The socio-economic environment VC contains 6 KIs – Population Demographics, Community Health and Wellbeing, Infrastructure and Services, Economy, Employment, and Business. Community services, infrastructure, and community health and wellbeing could be affected by all phases of the Project. Economic conditions such as major industries, employment and business may also be affected by all phases of the Project.

3.1.6.1 Communities Baseline

The communities baseline aims to provide a comprehensive overview of current socio-economic conditions, infrastructure, and community resources within the Project study areas, serving as a foundation for the effects assessment, Project planning and addressing Project-related issues. A full socio-economic baseline report was prepared for the purposes of effects assessment and can be consulted in Appendix G.

3.1.6.2 Spatial Boundaries

The spatial boundaries for Communities Baseline include the PA as defined in Section 2.1.1.1, the LAA and RAA as defined below.

The LAA selected for the socio-economic environment baseline coincides with data and information available from Statistics Canada (Census of Canadian Population) and NL Statistics Agency (Community Accounts) for the NL Eastern Health Authority, which includes the five most important communities for the Project: Towns of Sunnyside, Come By Chance, Arnold's Cove, Southern Harbour and Clarenville (Figure 3.1.6-1).

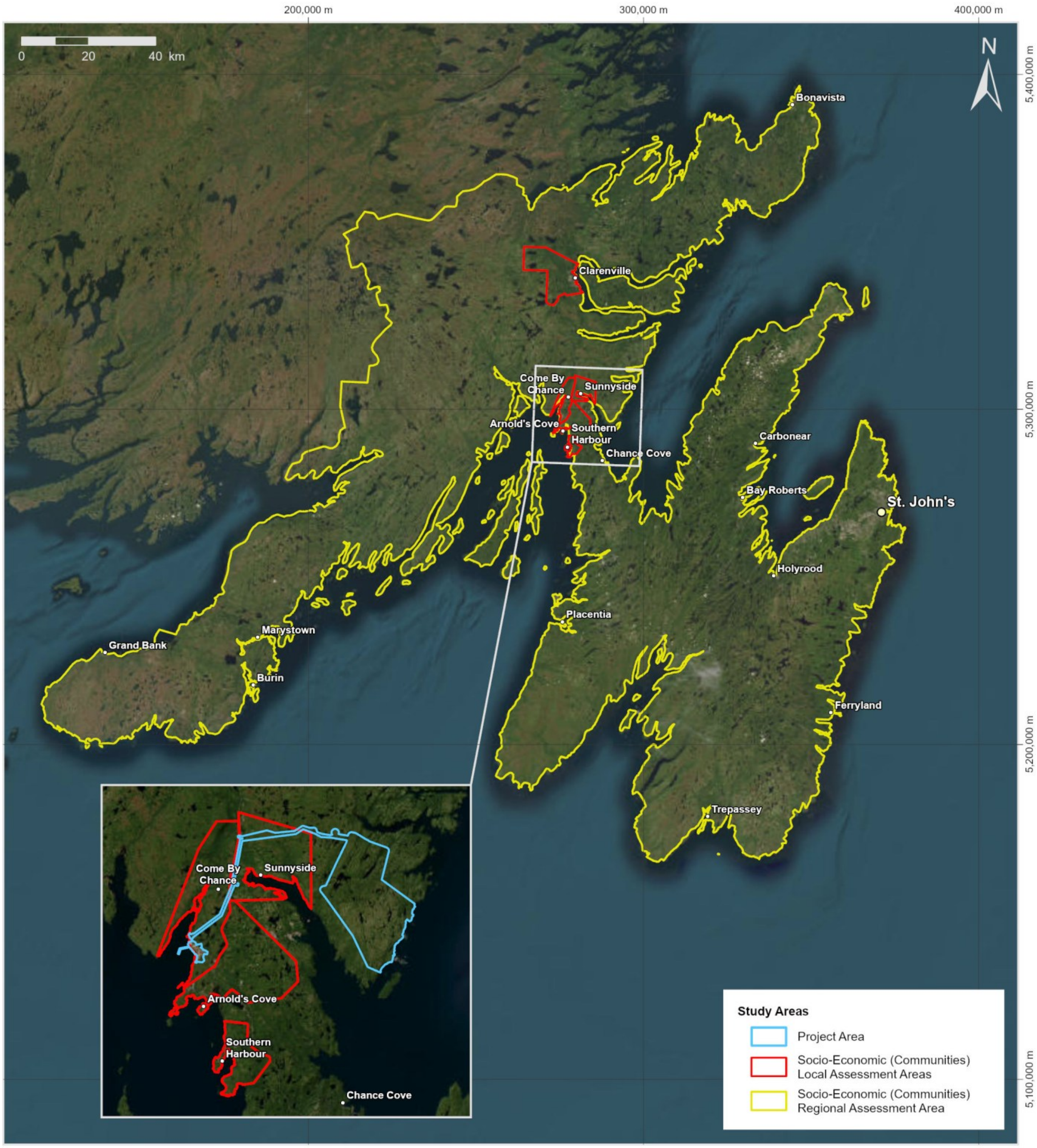

FIGURE TITLE: Study Areas: Communities	NOTES: Contains information licensed under the Open Government License - Newfoundland and Labrador	PREPARED BY: C. Bursey	DATE: 13/06/2025
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		APPROVED BY: C. Collins 13/06/2025	
PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	

Figure 3.1.6-1 Study Areas: Communities.

The RAA selected for the socio-economic environment encompasses the Eastern Region as some of the services and infrastructure required for the Project are not available in the LAA. Likewise, due to small populations in the LAA, a portion of the construction workforce is anticipated to come from the eastern region.

3.1.6.3 Population Demographics

Limited data are available for small communities such as those in the LAA. The following sections presents information on population age, ageing, in-migration and diversity.

Population Trends

Clarenville (population of 6,704 in 2021) is the largest of the five communities in the LAA. While Arnold's Cove had a population of nearly 1,000 in 2021, Sunnyside, Come By Chance and Southern Harbour each had less than 500 inhabitants.

Between the 2016 and 2021 censuses, the population of Clarenville, Sunnyside, Arnold's Cove and Southern Harbour all increased, as did the eastern region and NL. The population of Come by Chance decreased in the last census.

Much of the population growth in NL is due to in-migration from other provinces and immigration from other countries. Birth and death data are not available for each of the communities in the LAA, but they are for eastern region and NL. In 2021 and 2022, the number of deaths in the eastern region exceeded the number of births resulting in net natural population decline, and similar trends were experienced in NL generally.

The lack of natural population growth is indicative of an aging population in the eastern region and NL. In 2021, the median age in NL was 48.4 years, two years above the eastern region's median age. The four smaller communities in the LAA had higher median ages than the other jurisdictions in 2021. Clarenville's median age was 45.2 in the same year.

In 2021, Arnold's Cove, Clarenville, the eastern region and NL had a net surplus of in-migration over the previous year. In 2021, 4.3% of Arnold Cove's population had migrant status, like larger jurisdictions such as the eastern region, where 4.2% of the population were migrants, and NL, where 4% of the population were migrants. Sunnyside, Come By Chance and Southern Harbour showed limited to no in-migration.

Diversity

Diversity data show small percentages of immigrants, visible minorities, or Indigenous peoples in Clarenville, the eastern region, and NL. Population diversity was lowest in the four smaller communities in the LAA (Sunnyside, Come By Chance, Arnold's Cove, and Southern Harbour) in 2021 (Statistics Canada, 2023). Clarenville and the eastern region had slightly higher diversity compared to the smaller communities. Clarenville's population included 2.7% as immigrants and 3.3% as visible minorities.

The eastern region had slightly higher percentages, with 3.5% immigrants and 4.3% visible minorities (Statistics Canada, 2023). In 2021, people in the eastern region who identified as part of a visible minority came from countries in Asia, Europe, the Americas, and Africa.

3.1.6.4 Community Health and Wellbeing

The following provides a summary of key issues related to the Community Health and Wellbeing VC as identified through the baseline study, issues identified by regulators, or concerns expressed by the public or stakeholders during engagement activities for the Project.

Health Status

Limited information is available on the health status of people in the small communities of the LAA. Some information is available for the eastern region.

An indicator of well-being is how a person rates their own health status. In 2022, Eastern Health conducted a survey examining the health status of the regional population. Most participants rated their physical condition as 'very good' (38.4% of participants) or 'good' (29.7% of participants) and their mental health also as 'very good' (34.8% of participants) or 'good' (29.9% of participants) (Eastern Health, 2022). In the same survey, respondents identified the top three things they would like to do to improve their physical and/or mental health including: eating healthier/eat more fruits and vegetables, start/increase exercise and reduce stress. High costs were identified as the main barrier to achieving these three things.

According to a survey from 2015 and 2016, the most common chronic health conditions in NL were arthritis (28.8% of population), high blood pressure (23.7% of population) and back problems (22.2% of population) (NLSA, 2025). In addition, 10.2% of the population reported having a non-physical chronic mood-disorder such as depression and 12.1% of the population had an anxiety disorder.

In 2020 and 2021, diseases of the circulatory system were responsible for the highest percentage (13.2%) of hospital morbidity/separations within the Eastern Health Authority (NLSA, 2025). Similarly, at the provincial level, these diseases accounted for the highest percentage at 14.0%. Diseases of the digestive system, neoplasms (cancer) and injury or poisoning were the other most common diagnoses in the Eastern Region preceding hospital morbidity/separations.

Smoking, drinking alcohol, and obesity present risks for chronic illnesses and remain barriers to the health of the population of the Province and the Eastern Region. More than 16% (16.6%) of people in the

Eastern Region were daily smokers in 2015 and 2016, slightly lower than the Province's rate of 18.2% (NLSA, 2025). The rate of people consuming five drinks or more on one occasion at least once a month within 12 months prior to the survey was 33.4% in the Eastern Region and 34.8% in NL. Obesity is an important health concern for the province with 66.7% of adults suffered from obesity or being overweight in NL and 63.2% in the Eastern Region in 2015 and 2016.

Social Determinants of Health

Social determinants of health (e.g., gender, race, immigration status, education, income, food security housing and access to health services) are identified as likely to affect health and wellbeing. Gender, race, immigration status and other social identity factors may also influence various determinants of health.

Education Level

Achievement in education and training leads to enhanced employment opportunities and higher income, thereby improving quality of living through quality housing and food security. In 2021, people in Clarenville and the RAA were more likely to pursue university education compared to those in Sunnyside, Come By Chance, Arnold's Cove, Southern Harbour, and NL generally (Statistics Canada, 2023). Sunnyside residents were more inclined towards trades training, while Southern Harbour had the highest proportion of residents without any formal education. Sunnyside, Come By Chance, Arnold's Cove, and Southern Harbour had more residents with apprenticeship diplomas compared to NL overall.

Women+ (a term used to include women and/or girls, as well as some non-binary persons) had higher school and university education levels than men+ (a term used to include men and/or boys, as well as some non-binary persons) in Arnold's Cove, Clarenville, Eastern Region, and NL (Statistics Canada, 2023). Men+ across all jurisdictions were more likely to hold apprenticeship or trades certificates or diplomas. Few residents of Come By Chance or Southern Harbour had university degrees. The most common field of study in NL was "Architecture, Engineering and Related Trades," dominated by men+. Women+ were more likely to pursue "Education," "Business Management and Public Administration," or "Health and Related Fields."

In the Eastern Region, education levels varied noticeably by gender and field of study. For example, men+ had higher education levels in "Business, Management and Public Administration" and "Architecture, Engineering and Related Trades," while women+ had higher education levels in "Health and Related Fields" (Statistics Canada, 2023).

Income

In 2020, the median total income of households in NL was $71,500 (Statistics Canada, 2023). The Eastern Region had a higher median total income of $75,500, while Clarenville reported $72,000. Based on available data, Sunnyside had the lowest income, with a median total income of $62,400. The lower income level in Sunnyside may be attributed to its higher unemployment rate of 25.0% and an older population, many of whom rely solely on retirement income. Household income generally increased in NL between 2015 and 2020, but Sunnyside had lower median after-tax income. The NL gender wage gap in 2021 was $7,400 with higher disparities between men+ and women+ observed in Sunnyside ($13,000), Arnold’s Cove ($10,200), and Southern Harbour ($8,200).

Food Security

Nutritious food promotes health and reduces the potential for chronic illnesses. Community-based organizations in the LAA provide services to those in need. For instance, the Salvation Army operates food banks in Clarenville and Arnold’s Cove, the latter serving communities on the Isthmus of Avalon (United Way, 2024). Usage data were not available, but food security is most often attributed to having low income and increased cost of living. Food prices have increased and demand at Canada's food banks has peaked to previously unseen levels. In 2024, food bank usage in NL increased by 6% compared to 2023 and by more than 90% since 2019 (Food Banks Canada, 2025). In NL, an increase of 33% in total visits has been experienced between 2019 and 2024 and more than 44% since 2019 (Food Banks Canada, 2025). However, total visits to food banks in NL decreased by 7.71% between 2023 and 2024. Food bank usage in NL increased appreciably between 2019 and 2024, although there was a slight decrease in food bank visits between 2023 and 2024, possibly indicating a reversal of the trend.

3.1.6.5 Infrastructure and Services

This section discusses community and regional services such as transportation, water and sewer, waste management, utilities and communications, prevention and emergency services and recreation. Capacity issues are identified where information is available.

Housing and Accommodations

Safe and affordable housing is crucial for health and wellbeing. In 2016, the RAA had 155,452 private dwellings, with 131,074 occupied by usual residents (Statistics Canada, 2023). By 2021, the number of private dwellings increased to 159,580, with 136,035 occupied by usual residents. This increase is likely due to population growth and smaller household sizes requiring more homes for a similar number of people. Single-detached houses are the most common type of dwelling in the RAA, with Sunnyside and Southern Harbour having particularly high rates of single-detached houses. Apartments and flats in duplexes are more common in Clarenville and the Eastern Region.

Sunnyside and Southern Harbour had the highest home ownership rates in the LAA (Statistics Canada, 2023). Housing conditions are generally favorable in NL and the LAA, with most housing considered suitable and not in need of major repairs. Overcrowding is minimal, with small percentages of households having five or more persons. From 2016 to 2021 the average household size decreased in the LAA and RAA.

Households in core housing need are defined as those living in unsuitable, inadequate or unaffordable dwellings. Renters are more likely to be in core housing need than homeowners. In NL, 4% of owner households and 20.8% of renter households were in core housing need in 2021. Despite rising housing costs, fewer people in NL spent 30% or more of their income on housing in 2021 compared to 2016, a trend that is attributed to higher homeownership rates.

Housing value in the communities of Sunnyside, Come By Chance, and Arnold’s Cove are lower than those in Clarenville, the Eastern Region, and NL (Statistics Canada, 2023). This is likely because housing values tend to be higher in the Northeast Avalon region, which includes St. John’s and suburban communities. Housing is most affordable in Sunnyside and Southern Harbour where few or none (0%) spent more than 30% or more of their income on housing. Arnold’s Cove has a higher percentage of tenant households living in subsidized housing, which may be because the community has publicly funded housing. In 2021, 40.0% of tenant households in Arnold’s Cove received housing subsidies, compared to 11.5% in Clarenville, 18.8% in the Eastern Region and 19.6% in NL.

NL Tourism lists nearly 400 facilities offering short-term accommodations in the Eastern Region including more than 100 in St. John’s (NL Tourism, 2025). In St. John’s, larger hotels are operated by brands (e.g., Best Western, Marriott, Delta, DoubleTree, Hilton, Holiday Inn, Ramada and Sheraton) that often support business travellers. Boutique hotels and small inns tend to cater to vacationers. Short-term rentals in private housing are also available but may not be comprehensively listed on the provincial tourism website. Various accommodation options are available in the LAA with most capacity for travellers in Clarenville and Arnold’s Cove. Other facilities are in nearby communities (e.g., Goobies, Gin Cove, George’s Brook and Swift Current). Campgrounds and RV parks are presented separately in the Land and Resource Use Baseline Study (Appendix R).

Health and Social Services

The Eastern Region offers acute care at nine hospitals, nine health centres, and eight community services and clinics (Eastern Health, 2025a). In the RAA, emergency medical services are available at several locations including Dr. G.B. Cross Memorial Hospital in Clarenville, St. Clare’s Mercy Hospital and Health Sciences Centre in St. John's (NL Health Services, 2025). Provincially, NL Health Services provides integrated road ambulance services through 911, connecting to the Provincial Medical Communications Centre (NL Health Services, 2024). Provincial air ambulance services are offered with two dedicated airplanes and supplementary aircraft, along with contracted helicopter services in areas not accessible by fixed-wing aircraft (NLHCS, 2024).

NL Health and Community Services, Mental Health and Addictions Division provides mental health and addiction programs through NL Health Services and community-based organizations (NLHCS, 2025). Mental health and addiction services in the Eastern Region include Doorways, which offers access to counseling (in-person, by phone or video call) without referral. Free naloxone kits are distributed in case of opioid overdoses (Eastern Health, 2025b). The Mental Health and Addictions Systems Navigator helps individuals find appropriate services. “Bridge the gapp” is an online platform offering self-help information, programming and a directory of services, and the 811 Healthline is also available for mental health crises or addictions (2025).

Though health care access data for LAA and RAA were not available, comparisons between NL and Canada are provided. In NL, access to a regular health care provider is slightly lower than the Canadian average, but access to some services (e.g., hip fracture surgery) is higher (Canadian Institute for Health Information, 2024). Wait times for mental health counselling are longer in NL than the rest of Canada, with children (17 years and younger) facing a median wait time of 62 days in 2023 to 2024, significantly longer than the national median of 24 days (Canadian Institute for Health Information, 2025).

Access to health care means receiving timely care without barriers. In NL, health care is mainly a public service. However, higher income, secure employment and employer supported benefits and wellness programs help to ensure enhanced health care access and the ability to purchase more nutritious food and participate in physical activities.

Education and Training

NL Schools operates over 250 public schools across the province, with more than 63,000 English-speaking students enrolled for the 2024 to 2025 school year (NL Schools, 2025a). Conseil scolaire francophone runs six public schools, with a total enrolment of over 350 students (Conseil scolaire francophone provincial, 2025). In the LAA, Tricentia Academy in Arnold’s Cove serves Kindergarten to Level 4 students from several communities, while Clarenville has three schools (all levels) catering to students in the town and surrounding areas (NL Schools, 2025b).

The College of the North Atlantic (CNA) has 17 campuses in NL, including one in Clarenville and seven others in the RAA, offering diverse programs such as carpentry, nursing, and hydrogen technician (CNA, 2025). Two private colleges, Keyin College and Academy Canada Career College, offer post-secondary education in the Eastern Region. Keyin College has five campuses, including St. John’s and Bay Roberts, and provides programs in health, business, IT, and adult basic education (Keyin College, 2025). Academy

Canada has three campuses, offering programs in trades, business, health, and more, with adult basic education available at 14 locations (Academy Canada, 2025).

Transportation

The LAA communities are connected by road, air and marine transportation infrastructure and services (Figure 3.1.6-2). Sunnyside, Come By Chance, Arnold's Cove, Southern Harbour and Clarenville are all accessed via local roads off the Trans-Canada Highway. The only airport in the RAA with regularly scheduled services by commercial carriers is St. John's International (NL Department of Transportation and Infrastructure, 2021a). In the Eastern Region, landing strips are located at various sites including Clarenville, Winterland, Harbour Grace and Bell Island. Heliports are at Long Pond and St. John's (Health Sciences Centre and St. John's International Airport). Water aerodromes are located at Thorburn Lake and St. John's (i.e., Paddy's Pond).

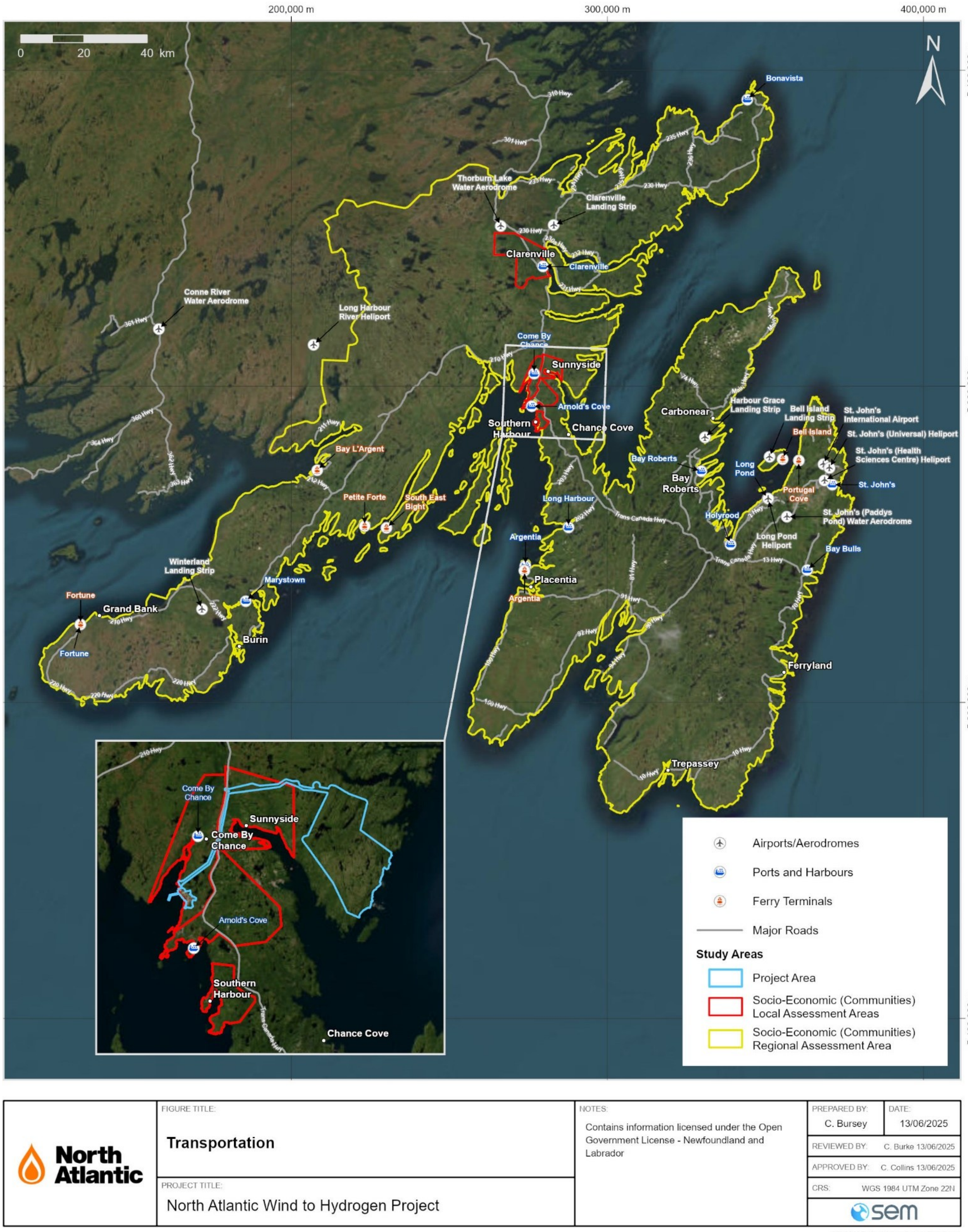


Figure 3.1.6-2 Transportation Overview.

Marine industrial ports in the Eastern Region include Bonavista, Clarenville, Come By Chance, Arnold's Cove, Bay Roberts, Long Harbour, Argentia, Holyrood, St. John's and Bay Bulls. Ferry services in the RAA are operated out of Argentia, Bay L'Argent, Fortune, Petite Forte/South East Bight and Portugal Cove/Bell Island (NL Department of Transportation and Infrastructure, 2021b).

Municipal/Regional Infrastructure and Services

Water and Sewer

The Towns of Sunnyside, Come By Chance, Arnold's Cove, Southern Harbour and Clarenville have provincially protected public water supplies (NL DECC, 2025a). In addition, an onsite water supply provides water to the Bull Arm Fabrication Site for potable drinking water, firefighting and industrial use (Oil and Gas Corporation of NL [OilCo], 2022). The PA intersects Sunnyside's provincially protected water supply.

The towns of Come By Chance and Clarenville hold permits to operate public wastewater systems with secondary treatment provided in Clarenville (NL DECC, 2025b; Government of NL, 2023b). Sunnyside has a municipal sewage collection system with primary treatment through septic tanks for about 58% of the population (Town of Sunnyside, 2007; Government of NL, 2023b). The majority of Arnold's Cove has a municipal sewage collection system with 65% of the population having primary treatment through septic tanks (Town of Arnold's Cove, 2024; Government of NL, 2023b). No sewage collection or treatment information was available Southern Harbour.

Waste Management

The Eastern Regional Service Board (ERSB) provides waste management services to 191 communities in the Eastern Region including Sunnyside, Come By Chance, Arnold's Cove and Southern Harbour (ERSB, 2024). Each household is charged an annual fee for curbside collection of domestic waste, recycling and bulk garbage (seasonal) as well as household hazardous waste collection events. ERSB operates a waste recovery facility at Sunnyside for collection and transport of waste to the Robin Hood Bay regional waste management facility in St. John's (Town of Sunnyside, 2017a).

The Town of Clarenville provides collection services for domestic waste weekly and recycling biweekly with seasonal curbside bulk garbage/metal collection (Town of Clarenville, 2025). The Clarenville waste transfer station, operated by ERSB, accepts waste from commercial haulers and bulk waste from residents for delivery to the Robin Hood Bay waste management facility in St. John's. Businesses in the LAA are expected to deliver their own waste, or use contracted services (permitted waste haulers), to the Clarenville transfer station or to Robin Hood Bay, which is the only landfill in the Eastern Region that accepts domestic and industrial/commercial/institutional waste (Robin Hood Bay, 2024). Construction and demolition materials may be accepted for free with conditions.

Utilities and Communications

Communities in the LAA and RAA receive electricity through NP or NLH via a system of generating facilities including the Holyrood thermal plant and gas turbine plants along with renewable energy sources such as hydro and wind (NL Hydro, 2015). In the Eastern Region, the energy distribution system mainly includes 230 kv lines with a 138 kv system on the Burin Peninsula. Terminal stations are in Clarenville, Sunnyside and Come By Chance and many other communities in the RAA.

Various communications services are available. Three major service providers (Bell Aliant, Rogers and Eastlink) offer combinations of internet, wireless, mobile, land line telephone, cable/satellite television and home security services to homes and businesses in NL (Bell Alliant, 2025; Rogers, 2025; Eastlink, 2025).

Prevention and Emergency Services

Prevention of crime and safety issues, along with timely response to incidents, requires sufficient capacity in services such as policing, fire, and emergency medical services. In NL, the Royal Canadian Mounted Police (RCMP) operates 42 detachments, with the NL headquarters in St. John's and 11 detachments in the RAA (RCMP, 2024). The Clarenville detachment is the only one in the LAA, while the Royal Newfoundland Constabulary polices the Northeast Avalon portion of the RAA. NL has a lower ratio of police personnel relative to its population compared to the Canadian average (Statistics Canada, 2024).

Fire departments in the LAA are in Sunnyside, Come By Chance, Arnold’s Cove, Southern Harbour, and Clarenville, with Clarenville having a professional chief and volunteer firefighting team, and the other locations having volunteer fire departments (NL Association of Firefighters, 2025). A 2015 report rated the Arnold’s Cove and Clarenville fire departments as Acceptable for both offensive interior fire suppression/rescue and defensive exterior response (NL Fire and Emergency Services [NLFES], 2015).

Recreation

Sunnyside, Come By Chance, and Southern Harbour offer limited sports and recreation facilities but provide various community-based activities (Town of Sunnyside, 2017b; Town of Come By Chance, 2025; Town of Southern Harbour, 2025). Arnold’s Cove and Clarenville have public libraries and additional sports facilities. Hiking trails are available in all five communities (Town of Arnold’s Cove, 2024; Town of Clarenville, 2025; Town of Sunnyside, 2017; Town of Come By Chance, 2025; Town of Southern

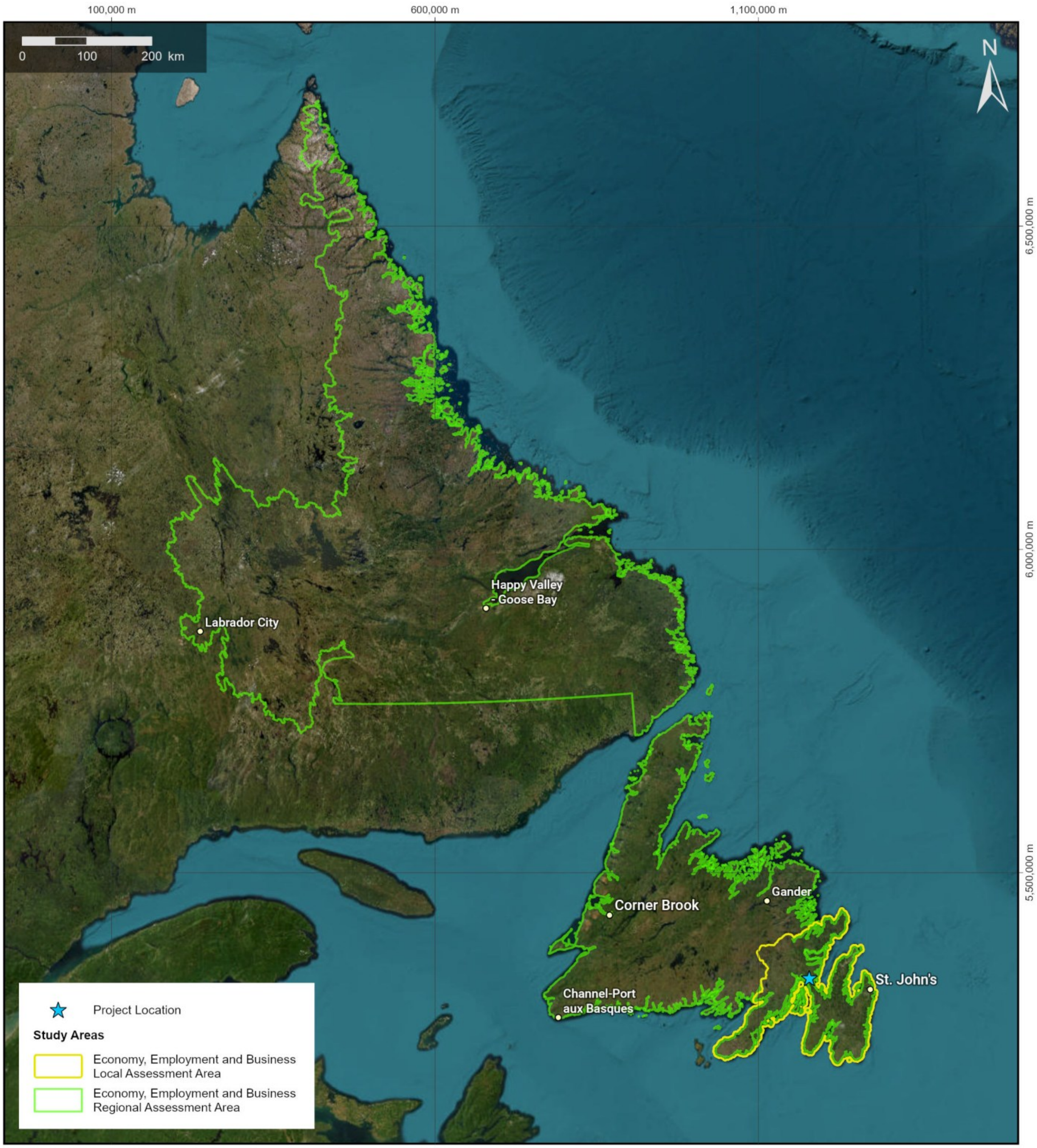
Harbour, 2025). Clarenville also offers a multi-use trail system and winter sports at White Hills Resort (Discovery Trail Association, 2025; Alpine Development Alliance Corporation, 2024).

3.1.6.6 Economy, Employment, and Business Baseline

The following sections provide a summary of key information related to the Economy, Employment, and Business KIs as identified in the baseline study, through regulators, or concerns expressed by the public or stakeholders during engagement activities for the Project. More detailed information can be found in the socio-economic baseline report (Appendix G).

3.1.6.7 Spatial Boundaries

For the assessment of Project effects on Economy, Employment, and Business, the LAA is the Eastern Region (Figure 3.1.6-3). The Eastern Region is the area most likely to provide labour, goods and services required for Project construction and operation.



North Atlantic	FIGURE TITLE: Study Areas: Economy, Employment and Business	NOTES: Contains information licensed under the Open Government Licence - Newfoundland and Labrador	PREPARED BY: C. Bursey	DATE: 12/06/2025
			REVIEWED BY: C. Burke 12/06/2025	
			APPROVED BY: C. Collins 12/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: NAD 1983 CSRS UTM Zone 20N	
			sem	

SEM MAP ID: 016-015-GIS-540-Rev0

Figure 3.1.6-3 Study Areas: Economy, Employment and Business.

The RAA is the province of NL as some of the services and infrastructure needed for the Project are not available in the LAA and a portion of the construction workforce is anticipated to come from throughout NL. The province was selected as the RAA given the potential economic effect of the Project (i.e., Gross Domestic Product (GDP)) on the provincial economy.

3.1.6.8 Economy of the RAA and LAA

The four largest contributors to NL GDP are “Oil Extraction”, “Finance, Insurance, Real Estate & Business Support Services”, “Health Care and Social Assistance”, and “Public Administration” (Statistics Canada, 2023). Together, these make up 52.5% of GDP. In 2023, employment in NL increased by 4,200 person-years, or 1.8%, compared to 2022. The four sectors with the highest person-years of employment were “Construction”, “Retail Trade”, “Healthcare and Social Assistance”, and “Public Administration”.

Communities throughout the LAA are known for traditional natural resource-based industries (e.g., fishing, seafood processing and forestry) but also for various industrial developments, including those at Come By Chance, Arnold’s Cove, Bull Arm, Long Harbour, Placentia and Marystown. While the Northeast Avalon (metropolitan St. John’s) is the main retail, government, commercial and industrial focus of the Eastern Region, other larger communities (e.g., Clarenville, Bay Roberts, Carbonear, Placentia, Bonavista, Marystown) serve as local service centres.

The NL oil and gas exploration and extraction activities are primarily offshore, such as in the Jeanne d’Arc Basin. Four operating projects are supported by industrial facilities in the Eastern Region, including A. Harvey & Company Ltd. Marine Base Division in St. John’s (A. Harvey & Company Ltd., 2025) and the Pennecon Energy marine terminal in Bay Bulls (Pennecon Energy, 2025). No mining or exploration activities occur directly in the PA, and the Duck Pond Mine Area is the only mining interest nearby. The Eastern Region hosts several mining related operations, including Vale’s Long Harbour Processing Plant, Canada Fluorspar's developing operation at St. Lawrence, and Trinity Resources' Pyrophyllite mine at Manuels (Government of NL, 2024b).

Major capital projects include natural resource developments, infrastructure and housing projects. In 2023, the Government of NL identified 40 major capital investments, with 13 projects in the Eastern Region, mostly in St. John’s (Government of NL, 2024c).

The seafood industry remains vital to NL's economy, especially in rural areas. The DFO Small Craft Harbours Program identifies 109 core fishing harbours in the Eastern Region (DFO, 2024b). In addition, 12 aquaculture licenses were identified at nine locations in the Eastern Region (NL Department of Fisheries Forestry and Agriculture, 2025).

NL's tourism infrastructure is well-developed, with significant investments in accommodations and facilities for leisure and business travelers. The Eastern Region and Avalon offer various short-term accommodations, totaling over 1.5 million room nights in 2023 (NL Department of Tourism, Culture, Arts, and Recreation, 2024a, 2024b).

The Isthmus of Avalon has a robust economy, supported by activities at Come By Chance and Arnold's Cove. Key industrial developments in the eastern region (outside of the Northeast Avalon) include Universal Environmental Services Inc., Bull Arm Fabrication Site, NARL Logistics Terminal, the Braya Refinery, IMTT Newfoundland Transshipment Terminal Ltd., Arnold's Cove Industrial Park, Long Harbour Processing Plant, Long Harbour Industrial Supply Park, Port of Argentia Industrial Park, Grieg Seafood Newfoundland, and Marbase Marystown Inc.

3.1.6.9 Employment

In 2021, the most dominant industries in the Eastern Region and NL based on labour force size were "Health care and social assistance", "Retail trade", "Public administration", "Construction", and "Educational services" (Statistics Canada, 2023). These sectors accounted for nearly 53% of employment in the LAA and the RAA. The Northeast Avalon in the Eastern Region hosts large organizations such as provincial government headquarters, medical facilities, post-secondary institutions, and various businesses, employing many people. Gender representation varies by economic sector, with more pronounced gender norms in NL compared to the Eastern Region.

Labour Supply

In 2020, employment rates in the LAA and RAA were similar for men+ and women+. The unemployment rate for women+ was 5% lower than for men+ in the Eastern Region and 5.6% lower in NL (Statistics Canada, 2023). Men+ were more likely to be engaged in part-time, casual, short-term or seasonal work, and women+ were more likely to be employed in full-time, year-round, permanent positions in both jurisdictions. This could be attributed to higher participation of men+ in the construction (short-term) and fishing (seasonal) industries. The rate of self-employment is relatively low for the overall population but remains three times higher for men+ than women+.

Due to low birth rates and out-migration, the populations in the examined jurisdictions are aging and showing little growth. The NL population over 65 is expected to increase from 24% in 2023 to 27% by 2033 (BuildForce Canada, 2024). The percentage of younger workers (ages 15 to 24) is expected to remain at 11%. Recruitment will be challenging as retirements outpace new workers, increasing competition for younger employees. Population stability has been maintained by immigration and in-migration from other provinces. In 2023, NL experienced a notable influx of permanent and non-permanent residents, including international students who may stay post-graduation. Future growth will depend on immigration to ease labour market pressures.

BuildForce Canada's (2025) 10-year construction workforce outlook for NL forecasts 6,100 retirements and 4,500 new entrants, resulting in a loss of 1,600 workers. The non-residential construction market is expected to grow due to institutional developments (e.g., health care and education) and major initiatives like power generation projects and the Bay du Nord offshore oil and gas project. The non-residential sector is expected to grow by 63% between 2026 and 2032. A slowdown is anticipated in 2029 until construction for the Bay du Nord project begins. If the proposed developments proceed, they will require an increase of 2,200 construction workers. This, along with anticipated retirements of 6,100, would result in hiring requirements for 8,300 workers.

Employment Equity and Diversity

The construction industry and other sectors will need to expand recruitment programs to attract workers. Recruitment of individuals from groups (e.g., women, Indigenous peoples and immigrants) who have been traditionally under-represented in the construction sector will have a positive effect on labour supply.

In 2023, about 2,710 women were employed in the NL construction industry, with 29% working on site and 71% in administrative roles (BuildForce Canada, 2024). Women made up 790 of the 16,900 tradespeople across all sectors. They were more strongly represented in non-residential construction and new housing, making up nearly 6% of the workforce. The top trades for women were electrician (34%), trade helper and labourer (32%), construction manager (11%), carpenter (8%) and contractor or supervisor (6%).

In 2021, Indigenous workers accounted for approximately 9% of the NL construction labour force (BuildForce Canada, 2024), which was consistent with 2016 employment in construction. However, the general labour force had increased the number of Indigenous workers from 2016 to 2021.

As of 2022, new Canadians accounted for approximately 6% of the NL workforce. While NL has been successful in attracting and integrating immigrants, the share of immigrants in the NL workforce is below that of the Canadian average (BuildForce Canada, 2024). In 2022, the proportion of immigrants (1.3%) in the NL construction labour force was less than 25% of the immigrant share in the general NL labour force. NL is anticipated to receive 51,300 new immigrants between 2024 and 2033, who will make up an increasing share of the NL working-age population.

3.1.6.10 Business

This study identified eight general business organizations (i.e., chambers of commerce or boards of trade) in the Eastern Region representing more than 1,800 members (Table 3.2-1). Based on the available member databases, these businesses provide industrial services (e.g., heavy and general industry), business services (e.g., financial, legal, information technology, communications), transportation, storage and logistics, safety and security, marine services, consulting and engineering services, construction, travel, accommodations and food services, all of which support industrial projects.

Table 3.2-1 General business development organizations in the LAA.

Organization	Area Served	# Members
Arnold's Cove Area Chamber of Commerce	Isthmus area including Sunnyside, Come By Chance, Arnold's Cove, and Long Harbour, Goobies, Chapel Arm	46
Clarenville Area Chamber of Commerce	Clarenville and surrounding area	107
Placentia Area Chamber of Commerce	Placentia area including Long Harbour	137
Bonavista-Trinity Regional Chamber of Commerce	Bonavista Peninsula	137
Burin Peninsula Chamber of Commerce	Burin Peninsula	125
Conception Bay Area Chamber of Commerce	Conception Bay South, Conception Bay Centre	197
Mount Pearl-Paradise Chamber of Commerce	Mount Pearl, Paradise	259
St. John's Board of Trade	St. John's	800+
Source: (Arnold's Cove Area Chamber of Commerce, 2024; Clarenville Area Chamber of Commerce, 2021; Placentia Area Chamber of Commerce, 2020; Bonavista-Trinity Chamber of Commerce, 2022; Burin Peninsula Chamber of Commerce, 2025; Conception Bay Area Chamber of Commerce, 2023; Mount Pearl – Paradise Chamber of Commerce, 2025; St. John's Board of Trade, 2025)		

Near the Project, the Arnold's Cove Area Chamber of Commerce includes nearly 50 members, many of whom support the existing industrial facilities at Come By Chance and Arnold's Cove. Come By Chance industrial suppliers include Ameil Constructors Ltd. (2020) (industrial piping, plant fabrication, industrial facility maintenance), Camin Cargo Control (2023) (testing, inspection, fuel additives, sample submission, aviation and sustainable fuels, marine fuel analysis) and Canadian Maritime Agency Ltd. the shipping agent for NARL Logistics Terminal and IMTT NTL, Ltd.

Clarenville has a larger and more generalized business community. The Clarenville Area Chamber of Commerce lists 107 members (Clarenville Area Chamber of Commerce, 2021). Some of these companies offer services (e.g., industrial manufacturing, equipment rental, consulting engineering, electrical services, accommodations, transportation, carpentry, electrical, food services, financial and legal services, printing, office supplies, information technology, telecommunications, automotive rentals/sales and service) to industry and/or workers.

Industrial Parks

Throughout the LAA, various municipalities and other organizations prepare and supply land to stimulate opportunities for industrial and commercial development and diversify their tax base. The nearest industrial parks to the Project are in Arnold's Cove, Long Harbour and Placentia.

Industrial parks and lands are located throughout the Eastern Region in communities such Bay Roberts, Carbonear, Holyrood, Conception Bay South, Paradise and Torbay (Town of Bay Roberts, 2025; Town of Carbonear, 2025; Blue Ocean Developments, 2025; Town of Conception Bay South, 2025; Town of Paradise, 2022; Town of Torbay, 2016). Mount Pearl industrial areas include Donovans Business Park, Beclin Business Park and Kenmount Business Park (City of Mount Pearl, 2019). In St. John's, the main industrial parks and lands are around the Airport and the harbour, Kenmount Road, O'Leary Avenue, Logy Bay Road and East White Hills Road (City of St. John's, 2014).

Capacity and Growth

Businesses in the region offer a broad range of services, however, their total capacity is unknown, which also makes their growth potential unknowable. The Project is expected to draw more workforce and business interest to the area, potentially stimulating additional growth through increased activity and investment. Consequently, surrounding businesses may experience accelerated growth and new opportunities.

3.2 Baseline Studies

Table 3.2-1 provides a summary of baseline studies conducted for the Project to generate information and data required to support the evaluation of environmental effects, to develop mitigation measures, or to provide baseline for follow up monitoring programs. In many cases, a study addressed more than one of these purposes. Summaries of each original baseline study are provided in the following subsections, as well as a brief description of plans for further and ongoing studies.

Table 3.2-1 Index of baseline studies completed for the Project.

Valued Component	Key Indicator	Desktop Research Completed (Y/N)	Desktop Modelling Completed (Y/N)	Original Baseline Study Conducted (Y/N)	Corresponding Appendix (Letter – Title)
Atmospheric Environment	Regional Climate	Y	N	N	N/A
	Greenhouse Gas (GHG) Emissions	Y	Y	N	H1 - Emissions Inventory
	Air Quality	Y	Y	Y	A - Atmospheric Environment Baseline Study, H1 - Emissions Inventory, H2 – Air Dispersion Modelling Study
	Light	Y	Y	N	I – Light Impact Assessment

Valued Component	Key Indicator	Desktop Research Completed (Y/N)	Desktop Modelling Completed (Y/N)	Original Baseline Study Conducted (Y/N)	Corresponding Appendix (Letter – Title)
	Sound Quality (Noise)	Y	Y	Y	J – Noise and Vibration Impact Study
	Vibration	Y	N	N	J – Noise and Vibration Impact Study
Aquatic Environment	Groundwater Resources	Y	N	N	N/A
	Surface Water Resources	Y	Y	Y	C - Surface Water Study
	Freshwater Environment	Y	Y	Y	B1 - Aquatic Environment Component Study
	Marine Environment	Y	Y	Y	B1 - Aquatic Environment Component Study B2 - Ocean Dispersion Model Report B3 - Ocean Dispersion Model Report
	Fisheries and Aquaculture	Y	N	N	B1 - Aquatic Environment Component Study
	Species at Risk	Y	N	N	N/A
	Habitats of Conservation Concern	Y	N	N	N/A
	Marine Biosecurity	Y	N	N	N/A
Terrestrial Environment	Wetlands	Y	Y	Y	D3 - Ecological Land Classification Component Study
	Vegetation and Rare Flora	Y	Y	Y	D6 - Rare Plants Component Study, D5 - Rare Lichens Component Study
	Avifauna	Y	Y	Y	D1 - Avifauna Component Study
	Bats	Y	Y	Y	D2 - Bat Component Study
	Mammals	Y	N	Y	D4 - Mammals Component Study
	Species at Risk	Y	Y	Y	Terrestrial Environment Baseline Studies D 1-2, 5-6

Valued Component	Key Indicator	Desktop Research Completed (Y/N)	Desktop Modelling Completed (Y/N)	Original Baseline Study Conducted (Y/N)	Corresponding Appendix (Letter – Title)
	Areas of Conservation Concern	Y	N	N	N/A
	Soils and Terrain	Y	N	N	N/A
Land and Resource Use	Land Use Planning and Development Control	Y	N	Y	R – Land and Resource Use
	Industrial Land Use	Y	N	Y	
	Tourism and Recreation	Y	N	Y	
	Harvesting	Y	N	Y	
	Indigenous Land Use	Y	N	Y	
Heritage and Cultural Resources	Historic and Archaeological Resources	Y	Y	Y	F – Heritage Resources Impact Assessment
	Paleontological Resources	Y	N	N	
Socio-Economic Environment	Population Demographics	Y	N	N	G – Socio-Economic Baseline Study
	Community Health and Wellbeing	Y	N	N	
	Infrastructure and Services	Y	N	N	
	Economy	Y	N	N	
	Employment	Y	N	N	
	Business	Y	N	N	
Human Health and Quality of Life	Shadow Flicker	Y	Y	N	K – Shadow Flicker Impact Assessment
	Ice Throw	Y	Y	N	L – Ice Throw Analysis

3.2.1 Atmospheric Environment

3.2.1.1 Air Quality

A baseline ambient air quality survey was conducted during the summer of 2024 at three locations - the Come By Chance Municipal Building (Come By Chance), the Sunnyside Community Centre (Sunnyside), and the NARL Logistics Terminal (North Atlantic Fenceline). The focus of the survey was to complement ongoing monitoring at Braya AQM stations. A summary of parameters monitored, and corresponding results is provided in Table 3.2.1-1 and 3.2.1-2. All measured parameters were within NL AQS.

Concentrations of NO_2 were determined using month-long deployment of passive air samplers (Table 3.1.2-2). For comparison with NL AQS, measured 1-month exposure concentrations were converted to 1-hour, 24-hour, and 1-year concentrations in accordance with the Air Dispersion Modelling Guideline for Ontario (Ontario Ministry of the Environment and Climate Change, 2017). The results at all sites were within NL AQS.

Table 3.2.1-1 Field study – baseline ambient air quality survey results – PM_{10}, TSP, and metals.

Sampling Details		Monitoring Results (µg/m³)								
		Particulate Matter		Total Metals						
Site	Date	PM_{10}	TSP	Arsenic (As)	Cadmium (Cd)	Copper (Cu)	Lead (Pb)	Nickel (Ni)	Vanadium (V)	Zinc (Zn)
Come By Chance	August 13	6.8	7.7	ND	ND	0.0015	ND	ND	ND	ND
	August 14	5.0	5.1	ND	ND	0.0014	ND	ND	ND	ND
	August 15	5.0	6.2	ND	ND	0.0017	ND	ND	ND	ND
Sunnyside	August 20	12.6	13.0	ND	ND	0.0020	ND	ND	ND	ND
	August 21	6.4	7.2	ND	ND	0.0017	0.0019	ND	ND	ND
	August 22	8.2	9.0	ND	ND	0.0050	ND	ND	ND	ND
North Atlantic Fenceline	August 26	7.7	9.7	ND	ND	0.0013	ND	ND	ND	ND
	August 27	10.2	13.8	ND	ND	0.0020	ND	ND	ND	ND
	August 28	13.4	18.6	ND	ND	0.0023	ND	ND	ND	ND
RDL		1.2	30	0.0020	0.00040	0.0012	0.0012	0.0020	0.0012	0.020
NL AQS		50	120	0.3	2	50	2	2	2	120

NOTES
µg/m³ = micrograms per cubic metre, ND = not detected

Table 3.1.2-2 Field study – baseline ambient air quality survey results – NO_2.

Sampling Details			Monitoring Results (ppb)			
			Nitrogen dioxide (NO_2)			
Site	Start Date	End Date	1-month	1-hour	24-hour	1-year
Come By Chance	2024-08-27 11:57	2024-09-26 11:10	0.2	1.3	0.5	0.1
Sunnyside	2024-08-27 12:25	2024-09-26 11:40	0.1	0.6	0.3	<0.1
North Atlantic Fenceline	2024-08-27 12:58	2024-09-26 11:55	0.3	1.9	0.8	0.1
RDL			0.1			
NL AQS			-	213	106	53

NOTES
ppb=parts per billion
Results converted to 1-hour, 24-hour, and 1-year exposure periods for guideline comparison

3.2.1.2 Light

Baseline studies of ambient light were not undertaken due to the location of the Project infrastructure. The HGP and HP are located on the Come By Chance Industrial Site that already experiences significant levels of artificial lighting. The proposed Wind Farm will be constructed within the Wind Hydrogen Hub Crown Lands Reserve in Sunnyside. Wind turbines will be placed at sufficient setback from sensitive receptors. All Project infrastructure will incorporate lighting systems designed to meet the minimum requirements set by Transport Canada, minimizing potential impacts on the surrounding environment.

3.2.1.3 Noise

A baseline noise assessment was conducted at six monitoring locations, two within the PA and four within the RAA: Sunnyside, proximate to the Wind Farm PA; Come By Chance, proximate to the HGP and HP and in Rantem, Upshall, Jack's Pond, and Arnold's Cove. Baseline noise measurements were used to determine daytime (07:00 to 23:00) and nighttime (23:00 to 07:00) sound pressure levels (L_d and L_n, respectively), and to establish the day-night average sound pressure levels (L_{dn}). Measurements were reported in A-weighted decibels (dBA), units that reflect frequencies most audible to the human ear. A summary of baseline noise levels is provided in Table 3.1.2-3.

Table 3.1.2-3 Baseline noise levels.

Monitoring Location ID	Location name	Monitoring time range		Measured Noise Levels (dBA)		
		Start	End	Day; L_d	Night; L_n	Day-Night; L_{dn}
N1	Rantem, NL	2024-02-03	2024-02-09	51	41	51
N2	Come By Chance, NL	2024-01-26	2024-01-29	48	49	55
N3	Upshall, NL	2024-01-31	2024-02-03	38	31	40
N4	Jacks Pond, NL	2024-01-15	2024-01-17	47	45	52
N5	Arnolds Cove, NL	2024-01-24	2024-01-27	52	55	61
N6	Sunnyside, NL	2024-08-06	2024-08-09	42	35	44

Baseline values of L_{dn} ranged from quiet rural (< 45 dBA) to urban residential (58 to 62 dBA) as defined by Health Canada (Health Canada, 2017).

In addition to measuring ambient noise levels, the assessment included an evaluation of low frequency noise (LFN). LFN, which falls within the frequency range of 16 to 200 hertz (Hz), can originate from both biogenic and anthropogenic sources. LFN is determined by comparing simultaneous A-weighted and C-weighted sound pressure level measurements. A difference greater than 10 decibels (dB) between these measurements, expressed in C-weighted decibels (dBC), indicates the presence of LFN. The presence of LFN, though intermittently detected, was confirmed at all monitoring locations during the baseline noise assessment. The presence of LFN is likely attributable to biogenic (e.g., high winds) and anthropogenic (e.g., road traffic, industrial operations) sources, which are ubiquitous in the RAA (Alberta Energy Regulator, 2023).

3.2.1.4 Vibration

Baseline vibration levels were not measured due to the siting of Project infrastructure. Vibration impacts during Construction and O&M Phases are not expected to generate substantial vibration levels at sensitive receptors. This is due to setbacks from sensitive receptors exceeding the ZOI of vibration intensive activities.

3.2.2 Aquatic Environment

3.2.2.1 Aquatic Environment Introduction

The Aquatic Environment section has been developed in consideration of recommendations provided in Section 3.1.2 of the 'EA Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects' (ECCC, 2023b). This section focuses on the following components:

- Water Resources;
- Freshwater Environment;
- Freshwater Fisheries;
- Freshwater Sensitive Time Periods and Working Windows;
- Marine Water Quality;
- Physical Oceanography;
- Marine Navigation and Ship Traffic;
- Marine Biosecurity;
- Marine Fish and Fish Habitat; and
- Marine Fisheries and Aquaculture.

The content of the Aquatic Environment section has been developed based on both field data, as collected in the Aquatic Environment Baseline Study in 2023 (Appendix B1). Additionally, a Surface Water Study (Appendix C) was prepared based on baseline field monitoring data and publicly available desktop information.

This section of the report specifically describes components of the Aquatic Environment within the RAA, LAA and PA associated with the wind turbine locations, access roads and Project interconnect lines.

3.2.2.2 Water Resources

Water Quantity

Surface water quantities were evaluated through a baseline field monitoring program conducted from May 2024 to May 2025. Water level loggers and ancillary equipment were installed at six monitoring locations in the PA (Rushy Pond and outlet, Willie Jarge Pond and outlet, Barrisway Pond and outlet) to provide continuous water level recordings from which streamflow rates can be calculated. Additionally, topographic and bathymetric surveys were completed at all ponds except Rushy Pond.

During site visits, staff gauge readings were taken and used to calibrate the continuous water level records. As well, streamflow measurements were obtained and used to develop preliminary rating (i.e., stage-discharge) curves (WSC, 2016). Unit flow rates were calculated based on each pond’s drainage area and compared with the regional hydrometric station records.

Daily average precipitation during the baseline monitoring period was within 10% of the long-term average, and both low and high flow conditions were captured. The baseline monitoring program included a 120-day low flow period between June 26 and October 24, 2024, which exhibited lower flows than historical 5th percentiles at the regional hydrometric stations. Hydrologic models were developed and calibrated using the baseline monitoring records. Water storage, availability, and drawdowns were simulated under both existing and proposed future water withdrawal scenarios. These models incorporated precipitation and evapotranspiration data from January 2000 to April 2025. Modelled results indicated that future Project operation withdrawals can be sustained for all modelled climatic conditions.

Water Quality

Baseline water quality data were collected from the water supply ponds located in the PA, with the focus on three waterbodies; Rushy Pond, Willie Jarge Pond, and Barrisway Pond. Outflow surface samples were collected in May, July, and October 2024. Laboratory analyses included total metals, inorganic parameters, and calculated chemical parameters. Water quality results were evaluated against the CCME CEQG for the protection of aquatic life. Baseline water quality results related to stream crossings are discussed in detail in Section 3.2.2.2.

Most metals were below reportable detection limits (RDLs) across all sampling events. Metals not detected in any sample included antimony, arsenic, beryllium, bismuth, boron, cadmium, cobalt, lead, molybdenum, nickel, phosphorus, selenium, silver, thallium, tin, uranium, vanadium, and zinc. While barium, calcium, chromium, magnesium, potassium, sodium, strontium, and titanium were detected in nearly all samples, there are no guidance values set by the CCME CEQG for these metals.

Copper and manganese were detected but remained within CEQG thresholds in all samples. Aluminum was present in all samples and exceeded the CEQG threshold (5 micrograms per litre (µg/L) if pH < 6.5 and 100 µg/L if pH ≥ 6.5) in two samples in July and three samples in October. Iron concentrations exceeded the CCME CEQG (300 µg/L) threshold in two samples in May and three in October. These exceedances are naturally occurring in the environment and likely due to the bedrock within this area and the mineral deposits that are leeching into the water as there are no large facilities to justify the high concentrations of aluminum and iron.

Water samples were also analyzed for inorganic and calculated chemical parameters. Chloride concentrations were all within the acceptable limits and ranged from 9.0 to 12.0 mg/L. Laboratory pH values ranged from 6.39 to 7.18 and were generally within the CCME CEQG pH range of 6.5 and 9.0.

Nitrates and nitrites were below detection in all samples. Exceedances of the CEQG threshold for ammonia nitrogen (0.016 mg/L) were observed at Barrisway Pond in May and at Willie Jarge Pond in October. High concentrations of ammonia nitrogen are primarily due to higher levels of organic matter being decomposed in the natural environment and would be considered background levels. Parameters such as alkalinity, colour, turbidity, conductivity, TSS, total dissolved solids (TDS), and hardness were also evaluated. These results are discussed in more detail in the Aquatic Baseline Study Report (Appendix B1).

3.2.2.3 Freshwater Environment

Freshwater fish and fish habitat information required to support this Registration was acquired through publicly available desktop information sources and reports, supplemented by a 2024 field survey program that quantified fish and fish habitat within the PA and focused on potential Project interaction sites (stream crossings) (Figure 3.2.2-1). All freshwater sites that were likely to interact with Project infrastructure were visited in the field with the exception of only a few which had redundant effort (i.e., in very close proximity to another field verified site). Further justification of site selection and details of the freshwater environment gathered through baseline studies can be located in Appendix B1. The following section provides a summary of the baseline studies completed for the freshwater environment in the PA.

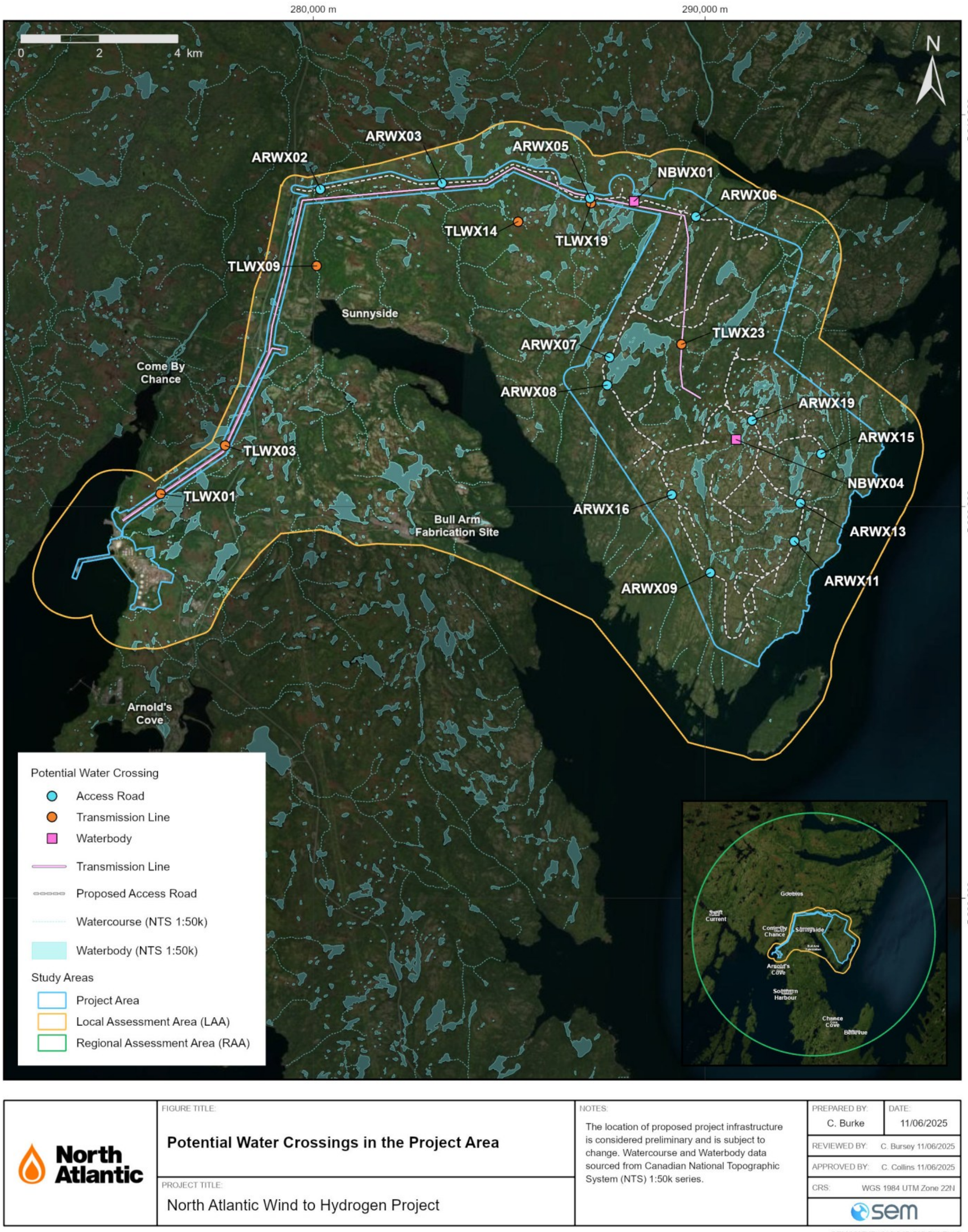


Figure 3.2.2-1 Potential water crossings in the Project Area.

Sunnyside Peninsula Aquatic Habitat

Mesohabitat types were determined at 18 crossing sites (12 roads, six transmission lines), and three water supply pond outlet streams (Table 3.2.2-1). Pool and run habitat were present at all crossing sites while riffles were present at 17 of 18 sites. The dominant mesohabitat type for all streams was pools, followed by runs and riffles, representing an average of 42.8%, 31.1%, and 25.3%, respectively. PA Selection criteria for road crossings call for relatively flat terrain, hence it was not surprising that there was no rapids or cascade habitat identified at any of the stream crossing sites.

Table 3.2.2-1 Summary of mesohabitat types at stream crossing sites, 2024.

Stream ID	Habitat Type (%)				
	Pool	Riffle	Run	Steady	Rapids
ARWX02	20	40	40	0	0
ARWX03	40	0	60	0	0
ARWX05	10	20	70	0	0
ARWX06	30	30	40	0	0
ARWX07	30	35	35	0	0
ARWX08	60	10	30	0	0
ARWX09	70	20	10	0	0
ARWX11	35	35	30	0	0
ARWX13	35	30	35	0	0
ARWX15	50	30	20	0	0
ARWX16	20	45	35	0	0
ARWX19	50	25	25	0	0
TLWX01	70	10	20	0	0
TLWX03	60	15	25	0	0
TLWX09	20	50	30	0	0
TLWX14	85	5	10	0	0
TLWX19	35	35	30	0	0
TLWX23	20	20	60	0	0
Rushy Pond outlet stream	49	18	33	0	0
Willie Jarge Pond outlet stream	40	15	45	0	0
Barrisway Pond outlet stream	100	0	0	0	0
Statistic	**Pool**	**Riffle**	**Run**	**Steady**	**Rapids**
Minimum	10	0	0	0	0
Maximum	100	50	70	0	0

Surveys at the stream crossing sites generally extended a total length of 150 m, 50 m above and 100 m below each crossing location, but in some cases were shortened due to accessibility constraints. Overall, the length of stream survey ranged from 44 to 210 m, averaging 115.9 m. Wetted width ranged from 1.2 to 7.1 m. Streams were shallow with average depths ranging from 3.2 to 31.8 cm. Water velocities ranged from 0.003 to 0.183 m/s, while discharge ranged from 0.00044 to 0.07430 m^3/s (Table 3.2.2-2).

Table 3.2.2-2 Summary of stream and flow characteristics at the stream crossing sites, 2024.

Stream ID	Average Width (m)	Total Length (m)	Total Area (m^2)	Discharge (m^3/s)	Velocity (m/s)	Average Depth (m)
ARWX02	2.6	182	473.2	0.00481	0.062	3.2
ARWX03	1.7	44	74.8	0.00442	0.009	31.8
ARWX05	1.5	62	93	0.00603	0.054	6.3
ARWX06	1.3	200	260	0.00156	0.018	4.9
ARWX07	1.6	70	112	0.00044	0.004	4.9
ARWX08	1.4	70	98	0.00288	0.017	7.2
ARWX09	3.1	143	443.3	0.00373	0.015	4.9
ARWX11	3.4	117	397.8	0.01500	0.044	11.9
ARWX13	3.1	143	443.3	0.00227	0.007	8.3
ARWX15	4.7	210	987	0.00122	0.003	10.9
ARWX16	2.2	120	264	0.00136	0.005	13.1
ARWX19	3.8	100	380	0.00586	0.007	21.8
TLWX01	1.4	75	105	0.00513	0.022	13.1
TLWX03	1.2	140	168	0.00307	0.047	4.3
TLWX09	7.1	75	532.5	0.07430	0.183	7.4
TLWX14	1.5	80	120	0.00418	0.021	11.6
TLWX19	1.25	138	172.5	0.00811	0.033	14.8
TLWX23	4.4	118	519.2	0.01020	0.011	9.8
Statistic	**Average Width (m)**	**Total Length (m)**	**Total Area (m^2)**	**Discharge (m^3/s)**	**Velocity (m/s)**	**Average Depth (m)**
Minimum	1.2	44	74.8	0.00044	0.003	3.2
Maximum	7.1	210	987	0.0743	0.183	31.8

Table 3.2.2-3 provides the distribution of substrate types at the stream crossings and LAA sites. The most common substrate type in the streams was boulder. Boulder substrate type was present in all stream sites ranging from 5% to 95%, averaging 45.6%. Silt and clay were the next most abundant substrate types being present in nine streams and ranging from 0% to 100% (mean of 20.4%). Rubble was present in 14 streams, ranging from 0% to 40% (mean of 11.4%) while bedrock was present in five streams, ranging from 0% to 70% (mean of 10.7%). Cobble and gravel were less abundant, being present in 12 (0% to 30%, mean of 8.3%) and six (0% to 25%, mean of 32.2%) streams respectively. Sand was not present in any stream (Table 3.2.2-3).

Table 3.2.2-3 Summary of substrate types upstream and downstream of stream crossing sites, 2024.

Stream ID	Section	Substrate Type (%)						
		Silt/Clay	Sand	Gravel	Cobble	Rubble	Boulder	Bedrock
ARWX02	Upstream	0	0	20	60	0	20	0
	Downstream	0	0	20	60	0	20	0

Stream ID	Section	Substrate Type (%)						
		Silt/Clay	Sand	Gravel	Cobble	Rubble	Boulder	Bedrock
ARWX03	Upstream	80	0	0	0	10	10	0
	Downstream	80	0	0	0	0	20	0
ARWX05	Upstream	0	0	0	10	20	70	0
	Downstream	0	0	10	0	30	60	0
ARWX06	Upstream	100	0	0	0	0	0	0
	Downstream	50	0	0	0	0	50	0
ARWX07	Upstream	0	0	0	20	20	60	0
	Downstream	10	0	25	20	25	20	0
ARWX08	Upstream	90	0	0	0	0	10	0
	Downstream	50	0	0	0	0	50	0
ARWX09	Upstream	0	0	0	5	0	95	0
	Downstream	0	0	0	20	30	50	0
ARWX11	Upstream	0	0	0	5	0	90	5
	Downstream	0	0	0	0	5	95	0
ARWX13	Upstream	0	0	5	10	10	75	0
	Downstream	0	0	5	0	15	80	0
ARWX15	Upstream	0	0	0	5	5	60	30
	Downstream	0	0	0	0	10	30	60
ARWX16	Upstream	0	0	0	10	20	50	20
	Downstream	0	0	0	10	10	30	50
ARWX19	Upstream	0	0	0	10	20	30	40
	Downstream	0	0	0	0	10	40	50
TLWX01	Upstream	20	0	0	0	0	80	0
	Downstream	20	0	0	0	0	80	0
TLWX03	Upstream	0	0	10	20	30	40	0
	Downstream	95	0	0	0	0	5	0
TLWX09	Upstream	0	0	10	0	30	40	20
	Downstream	0	0	10	30	40	10	10
TLWX14	Upstream	40	0	0	0	10	50	0
	Downstream	70	0	0	0	10	20	0
TLWX19	Upstream	0	0	0	10	10	80	0
	Downstream	20	0	0	0	30	50	0
TLWX23	Upstream	0	0	0	10	10	50	30
	Downstream	0	0	0	0	10	20	70
Rushy Pond outlet stream	Downstream	20	4	5	10	6	55	0
Willie Jarge Pond outlet stream	Downstream	5	0	75	10	0	10	0
Barrisway Pond outlet stream	Downstream	85	5	0	7.5	0	2.5	0
Minimum		0	0	0	0	0	0	0
Maximum		100	0	25	60	40	95	70

The vegetation types (habitat ecotypes) adjacent to the water crossings and waterbodies studied were encompassed by a diverse range of ecotypes, each characterized by distinct vegetation communities and habitats systems. Spatially dominant species vary across these ecotypes, with balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*) prevailing in mature coniferous forests, while heath species such as kalmia and crowberry define the Barren ecotype. Wetlands, including bogs and fens, are key landscape features providing crucial ecosystem services, often comprising of Sphagnum mosses and other aquatic-adapted flora. Notably, riparian vegetation plays a vital role in transitional zones, particularly within coniferous scrub areas where black spruce forms dense, stunted growths influenced by wet soils and nutrient limitations. Field surveys conducted in August 2024 confirmed the presence of several species though no SAR were observed. Field surveys across the assessed sites indicate that graminoids, such as sedges, were the most commonly recorded riparian vegetation. They were observed in the majority of study sites, highlighting their widespread presence in the riparian zones of the LAA and RAA. In contrast, leatherleaf (*Chamaedaphne calyculata*) and Kalmia species (including *Kalmia angustifolia*, or sheep laurel) were among the least frequently observed riparian vegetation types.

Water Quality

Table 3.2.2-4 provides the in-situ water quality for all 18 stream crossings obtained in August and September of 2024. Parameters collected include temperature (°C), pH, dissolved oxygen (%), salinity (parts per trillion [ppt]), conductivity (μS/cm) and turbidity (Formazin turbidity units [FNU]). Twelve of the sites were sampled on two occasions as water temperatures exceeded 20°C and were too warm for electrofishing and the site had to be revisited when cooler for fish sampling. Water temperatures ranged from 11.9 to 25.9°C, with a mean of 19.84°C. Stream pH ranged from 5.13 to 7.10 (mean of 6.31) with the most basic pH recorded at TLWX09 while the most acidic pH was recorded at ARWX16. Dissolved oxygen, as % saturation, ranged from 53.0 to 114.3. Dissolved oxygen was generally greater than 85% at most sites while ARWX16 had relatively low dissolved oxygen when compared to other sites, 53.0 and 63.6%, suggesting some factor reducing oxygen saturation. Conductivity ranged from 17.7 to 54.2 μS/cm, averaging 26.42 μS/cm. Turbidity ranged from 0.15 to 9.17 FNU (mean of 1.55 FNU), with highest turbidity at sites ARWX08 (9.17) and ARWX16 (7.62).

Table 3.2.2-4 Summary of in situ water quality parameters at stream crossing sites, 2024.

Stream ID	Date	Temperature (°C)	pH	Dissolved Oxygen (%)	Salinity (ppt)	Conductivity (μS/cm)	Turbidity (FNU)
ARWX02	5-Aug-24	18.6	6.76	95.3	0.02	43.5	2.7
	11-Sep-24	11.9	6.52	97.9	0.02	34.7	1.67
ARWX03	9-Aug-24	16.1	6.31	93.0	0.01	31.4	0.63
ARWX05	8-Aug-24	22.3	6.5	94.6	0.01	20.5	0.15
	12-Sep-24	19	6.53	97.0	0.01	21.4	0.21
ARWX06	11-Sep-24	19.6	6.38	98.0	0.01	26.3	0.49
ARWX07	3-Sep-24	23	6.14	83.0	0.01	21.3	1.17

Stream ID	Date	Temperature (°C)	pH	Dissolved Oxygen (%)	Salinity (ppt)	Conductivity (µS/cm)	Turbidity (FNU)
	11-Sep-24	18.7	6.71	98.1	0.01	23.5	2.77
ARWX08	9-Aug-24	22.7	6.25	97.1	0.01	30.9	9.17
	8-Sep-24	18.4	6.41	95.6	0.01	20.2	4.13
ARWX09	1-Aug-24	23.3	6.03	82.4	0.01	26.1	-
	10-Sep-24	17.5	6.25	93.5	0.01	24.4	0.56
ARWX11	10-Sep-24	17.3	6.2	98.4	0.01	24.9	0.37
ARWX13	1-Aug-24	25.9	6.15	100.4	0.01	22.8	-
	10-Sep-24	18	6.2	98.4	0.01	24.9	0.37
ARWX15	3-Aug-24	23.4	6.02	92.4	0.01	24.3	1.38
	11-Sep-24	18.3	-	-	-	-	-
ARWX16	3-Aug-24	20.6	5.13	53.0	0.01	21.5	-
	11-Sep-24	15.9	5.63	63.6	0.01	23.7	7.62
ARWX19	3-Aug-24	22.8	6.13	96.4	0.01	20.4	1.23
	11-Sep-24	18.1	5.63	97.6	0.01	21	0.44
TLWX01	8-Aug-24	25.4	6.62	114.3	0.01	29.4	0.27
	12-Sep-24	19.2	6.3	85.6	0.01	35.5	0.8
TLWX03	5-Sep-24	20.4	6.36	93.8	0.01	25.4	1.21
	13-Sep-24	15.2	6.9	94.8	0.01	28.6	0.47
TLWX09	8-Aug-24	18.5	7.1	99.2	0.01	54.2	0.38
TLWX14	9-Aug-24	18	6.19	88.2	0.01	29	1.36
TLWX19	8-Aug-24	22.6	6.3	96.6	0.01	19.8	1.3
	12-Sep-24	19.2	6.71	99.3	0.01	21.1	0.2
TLWX23	9-Aug-24	25.2	6.42	101	0.01	24.3	0.55
	11-Sep-24	19.8	6.58	101.1	0.01	17.7	0.23
Statistic		**Temperature (°C)**	**pH**	**Dissolved Oxygen (%)**	**Salinity (ppt)**	**Conductivity (µS/cm)**	**Turbidity (FNU)**
Minimum		11.9	5.13	53.0	0.01	17.7	0.15
Maximum		25.9	7.10	114.3	0.02	54.2	9.17
Mean		19.8	6.31	93.3	0.01	26.4	1.55

Analytic water quality was assessed in a laboratory in the 18 streams and two waterbodies studied (Table 3.2.2-5). The sum of nitrate + nitrite, nitrate, and orthophosphate were undetected in all sites while ammonia was detected at six sites ranging from 0.088 to 0.21 mg/L. pH ranged from 5.3 to 7.19, alkalinity ranged from 2 to 12 mg/L and was not detected at seven sites. Colour ranged from 38 to 310 True colour units (TCU). TSS ranged from 1.2 to 8.0 mg/L and was not detected at 11 sites. Total organic carbon ranged from 2.9 to 27.0 mg/L. Turbidity ranged from 0.39 to 9.2 FNU, conductivity ranged from 18 to 56 µS/cm; chloride ranged from 2.6 to 77.5 mg/L; and silica ranged from 0.58 to 6.30 mg/L.

Total metals were assessed in the 18 streams and two waterbodies studied (Table 3.2.2-6). Antimony, beryllium, bismuth, boron, chromium, molybdenum, nickel, phosphate, selenium, silver, thallium, tin, uranium, and zinc were undetected in all samples. Aluminum, barium, calcium, iron, magnesium, manganese, sodium, and strontium were detected in all streams while other parameters including arsenic (n=1), cadmium (n=2), cobalt (n=1), copper (n=8), potassium (n=11), titanium (n=10), and vanadium (n=2) were detected in a portion of samples. All aluminum concentrations exceeded CCME and CEQG in all samples ranging from 49 to 460 µg/L. Iron exceeded CCME CEQG at 11 sites and ranged from 100 to 5,900 µg/L. Manganese exceeded CCME and CEQG at one site (540 µg/L). CCME CEQG were not exceeded for arsenic, cadmium, copper, and lead at any site where those metals were detected. Further details regarding the concentrations of metals detected at these sites can be found in Appendix B1.

Table 3.2.2-5 Summary of laboratory water quality results (organics and inorganics) at stream crossing sites, 2024.

Site ID	pH	Total Alkalinity (as CaCO3)	Colour	Total Suspended Solids	Total Organic Carbon (C)	Turbidity	Conductivity	Dissolved Chloride (Cl-)	Nitrate + Nitrite (N)	Nitrite (N)	Nitrogen (Ammonia)	Orthophosphate (P)	Reactive Silica (SiO2)
Unit	pH	mg/L	TCU	mg/L	mg/L	NTU	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
RDL	-	2	25	1.5	0.5	0.1	1	1	0.05	0.01	0.05	0.01	0.5
CCME CEQG	6.5 - 9.0	-	-	-	-	-	-	120.0	-	0.197	0.016	-	-
ARWX02	6.21	5.2	310	8	27	9.2	34	5.8	ND	ND	ND	ND	6.3
ARWX03	6.68	6.4	170	2	18	2.9	31	3.2	ND	ND	0.088	ND	3
ARWX05	6.39	3.1	41	ND	6.9	0.39	21	2.6	ND	ND	0.15	ND	1.2
ARWX06	6.15	2.1	92	ND	14	0.72	27	4.2	ND	ND	ND	ND	2.6
ARWX07	6.58	3.1	66	2	11	0.57	23	3.1	ND	ND	ND	ND	0.8
ARWX08	6.77	5.1	52	ND	10	0.88	31	4	ND	ND	ND	ND	1.4
ARWX09	5.87	ND	170	1.4	15	0.51	24	4	ND	ND	ND	ND	2.3
ARWX11	5.43	ND	190	ND	15	0.41	24	4.1	ND	ND	ND	ND	2.1
ARWX13	5.56	ND	220	1.2	17	0.49	22	3.6	ND	ND	ND	ND	2.2
ARWX15	5.87	2.2	91	2.4	9.9	0.42	24	4.4	ND	ND	ND	ND	1.1
ARWX16	5.51	ND	230	ND	21	0.71	23	3.4	ND	ND	ND	ND	2.8
ARWX19	5.73	ND	130	ND	13	0.59	22	3.7	ND	ND	ND	ND	1.2
NBWX01	6.29	2	45	ND	7.6	0.67	18	3.3	ND	ND	ND	ND	0.82
NBWX04	5.69	ND	140	3	13	1.5	21	4.4	ND	ND	0.1	ND	1.6
TLWX01	6.46	4.7	190	ND	21	1.8	35	4.1	ND	ND	0.21	ND	2.2
TLWX03	6.24	2.9	38	ND	5.9	0.75	28	4.9	ND	ND	ND	ND	0.58
TLWX09	7.19	12	130	ND	14	3.2	56	7.5	ND	ND	ND	ND	5.1
TLWX14	6.70	4.7	81	2	11	1.5	28	2.7	ND	ND	ND	ND	1.9
TLWX19	6.58	3.5	39	ND	7.3	1.4	21	2.7	ND	ND	ND	ND	0.98
TLWX23	6.00	ND	61	2.8	7.9	0.51	23	4.1	ND	ND	ND	ND	1.2

Table 3.2.2-6 Summary of laboratory water quality results (metals) at stream crossing sites, 2024.

Site ID	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)	Boron (B)	Cadmium (Cd)	Calcium (Ca)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)	Iron (Fe)	Lead (Pb)	Magnesium (Mg)	Manganese (Mn)	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Selenium (Se)	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Uranium (U)	Vanadium (V)	Zinc (Zn)
UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
RDL	5.0	1.0	1.0	1.0	0.10	2.0	50	0.010	100	1.0	0.40	0.50	50	0.50	100	2.0	2.0	2.0	100	100	0.50	0.10	100	2.0	0.10	2.0	2.0	0.10	2.0	5.0
CCME CEQG	See Note	No	5	-	-	-	1,500	0.04	-	-	-	2.00	300	1	-	430	73	25	-	-	1	0	-	-	1	-	-	15	-	6
ARWX02	460	ND	2.4	3.9	ND	ND	ND	0.014	3,100	ND	1.1	ND	5,900	0.69	890	320	ND	ND	ND	180	ND	ND	3,700	10	ND	ND	11	ND	4.1	ND
ARWX03	200	ND	ND	4.2	ND	ND	ND	ND	2,400	ND	0.55	ND	1,600	ND	630	380	ND	ND	ND	ND	ND	ND	3,000	9.1	ND	ND	3.0	ND	ND	ND
ARWX05	100	ND	ND	16	ND	ND	ND	ND	1,200	ND	ND	ND	160	ND	310	68	ND	ND	ND	110	ND	ND	2,200	5.6	ND	ND	ND	ND	ND	ND
ARWX06	300	ND	ND	2.4	ND	ND	ND	ND	1,200	ND	ND	0.51	650	ND	470	29	ND	ND	ND	120	ND	ND	3,300	6.5	ND	ND	3.2	ND	ND	ND
ARWX07	160	ND	ND	4.6	ND	ND	ND	ND	1,300	ND	ND	ND	210	ND	410	21	ND	ND	ND	ND	ND	ND	2,700	5.2	ND	ND	ND	ND	ND	ND
ARWX08	120	ND	ND	2.0	ND	ND	ND	ND	1,700	ND	ND	ND	450	ND	510	84	ND	ND	ND	ND	ND	ND	3,700	7.0	ND	ND	ND	ND	ND	ND
ARWX09	420	ND	ND	5.4	ND	ND	ND	ND	1,000	ND	ND	1.1	420	ND	370	18	ND	ND	ND	ND	ND	ND	3,200	5.6	ND	ND	3.2	ND	ND	ND
ARWX11	450	ND	ND	1.9	ND	ND	ND	ND	720	ND	ND	1.0	270	ND	330	8.2	ND	ND	ND	ND	ND	ND	3,100	3.8	ND	ND	2.7	ND	ND	ND
ARWX13	440	ND	ND	2.1	ND	ND	ND	ND	620	ND	ND	0.71	320	ND	320	14	ND	ND	ND	ND	ND	ND	2,900	3.7	ND	ND	4.0	ND	ND	ND
ARWX15	250	ND	ND	1.4	ND	ND	ND	ND	830	ND	ND	0.54	120	ND	370	11	ND	ND	ND	110	ND	ND	2,900	4.7	ND	ND	ND	ND	ND	ND
ARWX16	400	ND	ND	12	ND	ND	ND	ND	710	ND	ND	0.65	660	ND	350	24	ND	ND	ND	ND	ND	ND	2,500	4.4	ND	ND	3.4	ND	ND	ND
ARWX19	280	ND	ND	4.8	ND	ND	ND	ND	700	ND	ND	0.67	290	ND	330	12	ND	ND	ND	ND	ND	ND	2,500	4.2	ND	ND	2.3	ND	ND	ND
NBWX01	120	ND	ND	2.1	ND	ND	ND	ND	960	ND	ND	ND	100	ND	360	12	ND	ND	ND	180	ND	ND	2,000	2.9	ND	ND	ND	ND	ND	ND
NBWX04	320	ND	ND	6.0	ND	ND	ND	0.010	780	ND	ND	0.68	450	ND	370	24	ND	ND	ND	120	ND	ND	2,800	4.8	ND	ND	3.2	ND	ND	ND
TLWX01	150	ND	ND	2.0	ND	ND	ND	ND	1,800	ND	ND	ND	2,500	ND	690	66	ND	ND	ND	210	ND	ND	4,800	7.9	ND	ND	ND	ND	4.1	ND
TLWX03	49	ND	ND	1.9	ND	ND	ND	ND	1,000	ND	ND	ND	140	ND	420	32	ND	ND	ND	140	ND	ND	3,200	4.7	ND	ND	ND	ND	ND	ND
TLWX09	140	ND	ND	4.8	ND	ND	ND	ND	4,600	ND	ND	ND	1,800	ND	970	290	ND	ND	ND	160	ND	ND	6,400	13	ND	ND	3.2	ND	ND	ND
TLWX14	120	ND	ND	21	ND	ND	ND	ND	1,900	ND	ND	ND	1,100	ND	590	540	ND	ND	ND	120	ND	ND	2,600	7.3	ND	ND	ND	ND	ND	ND
TLWX19	110	ND	ND	16	ND	ND	ND	ND	1,200	ND	ND	ND	120	ND	310	33	ND	ND	ND	120	ND	ND	2,200	5.5	ND	ND	ND	ND	ND	ND
TLWX23	170	ND	ND	1.6	ND	ND	ND	ND	800	ND	ND	ND	160	ND	390	20	ND	ND	ND	110	ND	ND	2,700	4.3	ND	ND	ND	ND	ND	ND

Note = 5 μg/L if pH < 6.5, = 100 μg/L if pH ≥ 6.5, CCME CWQG exceedances are shaded.

A total of 145 fish were captured from the 18 stream sites representing five species with no more than two species captured at any one location (Table 3.2.2-7). Zero fish were captured at four sites. Brook trout was the most common and abundant species with a total of 125 fish (84% of the total) captured at all 14 sites where fish were captured. Atlantic salmon were the next most abundant species with 14 fish (9% of the total) captured at only one site which is not present in the PA (TLWX09). Two American eels (1% of the total) were caught at ARWX07, three threespine stickleback (2% of the total) were present at TLWX03 and one brown trout (<1% of the total) was collected at TLWX23. It is possible the Atlantic salmon and brown trout captured at TLWX09 and TLWX23, respectively, are from anadromous stock, while the American eel, being catadromous, suggest site ARWX07 may be accessible from the ocean. Fish captured at TLWX sites are within the LAA but not the PA and therefore not directly associated with any planned Project infrastructure.

Table 3.2.2-7 Summary of fish catches at the stream crossing sites, 2024.

Stream ID	Brook Trout	Brown Trout	Atlantic Salmon	American Eel	Threespine Stickleback	Total
ARWX02	10	0	0	0	0	10
ARWX03	3	0	0	0	0	3
ARWX05	4	0	0	0	0	4
ARWX06	12	0	0	0	0	12
ARWX07	5	0	0	2	0	7
ARWX08	7	0	0	0	0	7
ARWX09	17	0	0	0	0	17
ARWX11	No fish captured					0
ARWX13	No fish captured					0
ARWX15	No fish captured					0
ARWX16	No fish captured					0
ARWX19	6	0	0	0	0	6
TLWX01	3	0	0	0	0	3
TLWX03	13	0	0	0	3	16
TLWX09	9	0	14	0	0	23
TLWX14	15	0	0	0	0	15
TLWX19	10	0	0	0	0	10
TLWX23	11	1	0	0	0	12
Total	125	1	14	2	3	145
Percent (%)	86.2	0.7	9.7	1.4	2.1	100
Minimum	3	0	0	0	0	0
Maximum	17	1	14	2	3	23
Mean	9	0	1	0	0	8

Table 3.2.2-8 provides a summary of the meristic characteristics of the fish community at stream crossing sites from baseline studies in 2024. The 125 brook trout captured at 14 sites ranged in length from 43 to

153 mm while the mean from each site ranged from 53.7 to 101.8 mm. The range in weight was from ≤ 1 to 38 grams (g) while the mean from each site ranged from ≤ 1.0 to 13.3 g. There were four ages present at the sites; 0+ (young-of-the-year [YoY]), 1+, 2+ and 3+ years old. Brook trout YoY were present at all sites. The one brown trout captured was 66 mm in length, weighed ≤ 1 g and was a YoY. The 14 Atlantic salmon captured at one site ranged in length from 47 to 129 mm (mean of 77.8 mm) and in weight from ≤ 1 to 21 g (mean of 6.9 g) and two age classes (0+ and 2+) were represented. The two American eels captured at one site were 580 and 600 mm, and 423 and 479 g, respectively. Three threespine stickleback captured at one site ranged in length from 34 to 65 mm. The presence of salmonid YoY provides evidence of successful spawning in proximity to the stream crossing sites. While critical spawning habitat was not identified (e.g., highly oxygenation, gravel substrates), sites evidently represent suitable rearing habitats for juvenile salmonids. Due to the marginal size of most streams in the PA it is assumed that most fish utilize nearby ponds for over-wintering.

Table 3.2.2-8 Summary of meristic characteristics of the fish community at stream crossing sites, 2024.

Site ID	Catch	Length			Weight			Age Classes
		Minimum	Maximum	Mean	Minimum	Maximum	Mean	
Brook Trout (n=125)								
ARWX02	10	58.0	135.0	93.0	≤ 1.0	29.0	10.9	0, 1, 2
ARWX03	3	55.0	146.0	85.7	≤ 1.0	38.0	13.3	0, 3
ARWX05	4	53.0	69.0	62.8	≤ 1.0	6.0	4.0	0
ARWX06	12	52.0	153.0	97.6	≤ 1.0	33.0	13.1	0, 1, 2
ARWX07	5	57.0	66.0	60.8	≤ 1.0	≤ 1.0	≤ 1.0	0
ARWX08	7	44.0	69.0	54.9	≤ 1.0	≤ 1.0	≤ 1.0	0
ARWX09	17	55.0	100.0	71.9	≤ 1.0	10.0	4.5	0, 1
ARWX19	6	54.0	130.0	68.8	≤ 1.0	31.0	7.7	0, 1
TLWX01	3	60.0	68.0	64.7	≤ 1.0	≤ 1.0	≤ 1.0	0
TLWX03	13	44.0	88.0	59.1	≤ 1.0	7.0	3.3	0, 1
TLWX09	9	82.0	128.0	101.8	7.0	22.0	12.1	0, 1, 2
TLWX14	15	39.0	153.0	74.8	≤ 1.0	35.0	7.6	0, 1, 2
TLWX19	10	57.0	76.0	67.1	≤ 1.0	4.0	3.4	0, 1
TLWX23	11	43.0	62.0	53.7	≤ 1.0	≤ 1.0	≤ 1.0	0
Brown Trout (n=1)								
TLWX23	1	66.0	66.0	66.0	≤ 1.0	≤ 1.0	≤ 1.0	0
Atlantic Salmon (n=14)								
TLWX09	14	47.0	129.0	77.8	≤ 1.0	21.0	6.9	0, 2
American Eel (n=2)								
ARWX07	2	580	600	590	423	479	451	N/A
Threespine Stickleback (n=3)								
TLWX03	3	34.0	65.0	46.3	≤ 1.0	≤ 1.0	≤ 1.0	N/A

Freshwater Plankton

A baseline assessment of phytoplankton and zooplankton communities were conducted in the two waterbodies within the PA that are within the designated 30 m buffer of a potential access road (NBWX01 and NBWX04). Phytoplankton were categorized in five size fractions (< 2.1, 2.1 to 10, 10.1 to 20, 20.1 to 64 and > 64 µm) and had a mean biomass of 0.60, 12.2, 32.1, 363.1 and 29.2 mg/m^3, respectively, which represented 0.1%, 2.8%, 7.3%, 83.0% and 6.7% of the community, respectively. At NBWX01, the single genus with the highest biomass was *Gymnodinium* sp., which represented 55.9% of the total phytoplankton biomass, followed by *Cosmarium* sp. (27.4 mg/m^3, 13.0%) and *Cryptomonas marssonii* (10.3 mg/m^3, 4.9%). At NBWX04, the single genus with the highest biomass was *Xanthidium* sp., which represented 20.9% of the total phytoplankton biomass, followed by *Cladophora* sp. (110.9 mg/m^3, 16.7%) and *Euastrum pulchellum* (62.1 mg/m^3, 9.4%).

The mean zooplankton biomass (µg/m^3) for NBWX01 and NBWX04 for each major taxonomic group of Copepods, Cladocerans and Rotifers was 1,832.4, 399.7 and 0 µg/m^3, respectively, which represented 82.1%, 17.9% and 0% of the zooplankton community. At NBWX01, *Leptodiaptomus minutus* (Calanoida) was the single genus with the highest biomass (2,284.0 µg/m^3), representing 56.6% of the total zooplankton biomass, followed by *Epischura novadensis* (Calanoida, 752.3 µg/m^3, 18.6%) and *Bosmina longitostris* (Cladocera, 356.9 µg/m^3, 8.8%). At NBWX04, Cyclopoid (nauplii) was the single group with the highest biomass (116.9 µg/m^3), representing 33.5% of the total zooplankton biomass, followed by *Bosmina lonirostris* (Cladocera, 71.8 µg/m^3, 20.6%) and *Epischura novadensis* (Calanoida, 43.0 µg/m^3, 12.3%).

Planktonic organisms with the potential to occur in the LAA and RAA are expected to have a similar species composition as freshwaters in the PA due to proximity in watersheds.

Freshwater Benthic Invertebrates

The benthic invertebrate species occurring in the PA freshwater habitats are discussed below.

The characteristics of the benthic invertebrate community at 16 stream crossing sites is provided in Table 3.2.2-9. A benthic invertebrate sample could not be obtained at crossings ARWX03 and ARWX15 as the substrate was too coarse. The abundance of benthic invertebrates ranged from 50 (TLWX14) to 1,628 (ARWX07) individuals, averaging 505.5 with abundance exceeding 500 individuals in five of 15 streams (31%). Richness, or the number of unique taxa at a site, ranged from 15 (TLWX14) to 36 (ARWX13) taxa, averaging 26.19. Density (number of individuals per m^2) ranged from 185.0 (TLWX14) to 6,023.6 (ARWX07), averaging 1.870.4. The proportion (%) of EPT (Ephemeroptera, Plecoptera and Trichoptera) taxa at each site ranged from 3.7 (ARWX13) to 43.0 (TLWX23), averaging 19.3%. The EPT index measures species that are considered sensitive to pollution and are representative of good environmental conditions when present. The dominant taxonomic group at each site included Diptera (n=9), Coleoptera (n=3), Pelecypoda (n=3), while Diptera and Pelecypoda were co-dominant at one site. Stream crossing TLWX14 had the lowest abundance, richness, and density of all study sites.

Benthic organisms with the potential to occur in the LAA, RAA and along the Project transmission lines are expected to have a similar species composition as freshwaters in the PA due to adjacency of watersheds.

Table 3.2.2-9 Summary of benthic invertebrate populations of major taxonomic groups from stream crossing sites on the Sunnyside Peninsula, 2024.

	ARWX02	ARWX05	ARWX06	ARWX07	ARWX08	ARWX09	ARWX11	ARWX13	ARWX16	ARWX19	TLWX01	TLWX03	TLWX09	TLWX14	TLWX19	TLWX23	Minimum	Maximum	Mean	Std. Dev.
Benthic Metric																				
Abundance	211	483	120	1,628	287	469	993	586	54	429	460	450	160	50	1,024	684	50	1,628	505.50	418.85
Richness	23	26	21	31	27	26	29	36	16	24	32	23	27	15	28	35	15	36	26.19	5.91
Density	780.7	1,787.1	444	6,023.6	1,061.9	1,735.3	3,674.1	2,168.2	199.8	1,587.3	1,702	1,665	592	185	3,788.8	2,530.8	185	6,023.6	1,870.35	15,49.73
EPT Index	4.27	25.05	29.17	7.62	23.34	13.22	34.54	13.14	3.70	11.66	17.39	30.89	26.25	12.00	14.06	42.98	3.7	43.0	19.3	11.4
Major Taxa (%)																				
Tricladida	0.0	0.0	0.0	0.5	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.9	0.1	0.2
Oligochaeta	0.0	5.0	0.0	0.2	2.4	1.1	1.6	2.2	0.0	0.0	2.8	2.0	0.0	12.0	0.0	0.0	0.0	12.0	1.8	3.1
Nematoda	0.0	1.7	0.0	0.5	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	12.0	0.9	3.0
Hirudinea	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.2	1.9	3.7	0.4	0.2	0.0	0.0	0.0	0.0	0.0	3.7	0.5	1.0
Gastropoda	0.0	0.0	0.8	1.0	0.0	0.0	0.0	0.0	0.0	6.5	0.0	1.8	0.0	0.0	0.0	0.0	0.0	6.5	0.6	1.7
Pelecypoda	1.9	0.0	0.0	1.5	40.4	0.2	0.0	0.2	0.0	0.0	34.8	22.0	0.6	0.0	2.7	7.6	0.0	40.4	7.0	13.2
Acari - Hydracarina	3.8	3.3	15.0	0.0	2.8	1.7	0.8	0.0	0.0	0.0	0.9	0.0	5.0	4.0	0.0	1.2	0.0	15.0	2.4	3.8
Cladocera	1.9	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	3.6	0.5	1.1
Copepoda - Cyclopoida	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.2	0.5	1.8
Amphipoda	0.0	0.0	0.8	0.2	2.4	9.6	1.6	0.0	0.0	0.0	1.5	1.8	0.0	4.0	0.0	3.1	0.0	9.6	1.6	2.5
Collembola	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.8	1.2	0.0	3.7	0.4	1.0
Ephemeroptera	0.5	8.3	9.2	1.7	19.2	7.7	23.4	8.4	1.9	0.0	14.1	12.4	16.9	0.0	7.4	8.5	0.0	23.4	8.7	7.1
Odonata - Zygoptera	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	1.9	0.1	0.5
Odonata - Anisoptera	0.0	0.2	0.0	0.0	0.7	0.0	0.2	0.0	0.0	0.0	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.7	0.1	0.2
Plecoptera	0.5	4.1	0.8	0.0	0.0	0.9	2.4	1.0	0.0	0.0	0.7	0.0	1.9	0.0	0.0	0.0	0.0	4.1	0.8	1.2
Trichoptera - pupa	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	11.7	0.0	0.2	0.0	0.0	0.0	0.0	0.0	11.7	0.8	2.9
Trichoptera	3.3	12.6	19.2	5.9	4.2	4.7	8.4	3.8	1.9	0.0	2.6	18.2	7.5	12.0	6.6	34.5	0.0	34.5	9.1	8.8
Coleoptera	0.5	41.0	39.2	25.1	0.3	4.5	33.8	21.7	11.1	66.4	6.5	2.0	3.8	2.0	39.1	13.7	0.3	66.4	19.4	19.6
Diptera	85.8	23.2	10.0	60.4	24.7	68.0	25.8	60.6	77.8	0.0	34.8	35.3	61.9	48.0	40.6	28.9	0.0	85.8	42.9	24.4
Terrestrial	1.9	0.0	5.0	0.0	1.7	0	0.8	2.0	3.7	0.0	0.4	0.0	2.5	6.0	2.3	1.2	0.0	6.0	1.7	1.9

3.2.2.4 Freshwater Fisheries

Commercial, recreational, and Indigenous fisheries activities may occur near or within the RAA. There is potential for commercial freshwater fisheries for American eel and rainbow smelt. Species potentially fished recreationally or under communal Food, Social or Ceremonial (FSC) licences, as issued by DFO under the Aboriginal Communal Fishing Licences Regulations, that may occur within the RAA include American eel, Arctic char, Atlantic salmon, brook trout, brown trout, ouananiche, and rainbow smelt.

Freshwater Commercial Fisheries

Only permanent residents of NL are eligible for commercial fishing licenses and applicants must meet eligibility requirements, including having a valid professional fisher certification level. Most fisheries are limited entry, so new licenses are not available. The province of NL is not reported in the Freshwater Commercial Fisheries Landings data maintained by DFO. However, commercial fisheries data for Atlantic salmon, rainbow smelt, and American eel, are reported in the Seafisheries Commercial Landings data (Fisheries and Oceans Canada, 2022a). No commercial Atlantic salmon and rainbow smelt fisheries landings (quantity or value) were reported for Newfoundland from 2014 to 2021. Rainbow smelt are not under moratorium in Newfoundland; however, there are no new commercial licences available and previously issued commercial smelt licences are site specific (DFO, 2025h). Commercial smelt fishing has the potential to occur near the RAA if a licence condition allows it. There has been no commercial salmon fishing in Newfoundland since the 1992 moratorium with all commercial fisheries closed due to declines in stock abundance (DFO, 2022e).

The American eel fishery is primarily targeted at both the yellow and silver eel life stages. Commercial American eel fisheries in NL reported relatively small and variable landings between 2014 and 2021, ranging from 22 MT (2019) to 53 MT (2018), over the period from 2014 to 2019, averaging 36.5 MT. The commercial eel fishery did not meet the confidentiality requirements in 2021, and no landings were reported (DFO, 2025c; DFO, 2022c). American eel landings have decreased considerably since peak harvests in the early 1990s (e.g., 147 MT in 1990, NLDECC, 2010). Commercial American eel fisheries are generally concentrated at the mouths of rivers. The opening dates for the commercial eel fishery in 2022 were July 1 (eel pot) and August 15 (fyke nets), with a closing date of October 31 (Fisheries and Oceans Canada, 2022b). No new commercial eel licences are being issued (DFO, 2025h) consequently, the number of licences has decreased over time.

It is not expected that commercial freshwater fisheries will occur at a significant level within the RAA. There is a moratorium on commercial fishing for Atlantic salmon, and it is unlikely that the moratorium would ever be lifted. Rainbow smelt are not represented in the commercial freshwater or marine fisheries landings for NL. American eel has been included in the province's commercial marine fishery landings over the last few decades. A total of 154 commercial eel licences were issued in 2009 of which only 40 licensed fishermen reported sales, with most reported landings from Northwest Atlantic Fisheries Organization division 4R (Wildlife Division, 2010). No new commercial licenses are being issued for eels.

Freshwater Indigenous Fisheries

Licenses for Indigenous fisheries for food, social and ceremonial (FSC) purposes are issued by DFO under the Aboriginal Communal Fishing Licences Regulations. This type of licence allows the licence holder to catch what is needed for themselves and/or their community for FSC purposes (DFO, 2022d). A communal FSC licence allows Indigenous harvesters the right to fish for FSC purposes over all other fishery uses, and it takes priority after conservation purposes (DFO, 2022a). The restrictions for fish species and size, along with the locations fished, are specified in the licence conditions.

No established First Nation is located within the RAA. The Miawpukek First Nation and the Qalipu Mi'kmaq First Nation are located in insular Newfoundland. The Miawpukek (Miawpukek Mi'kamawey Mawi'omi) community is the closest First Nation group to the RAA. The Samiajij Miawpukek reserve is located in Conne River, adjacent to Bay d'Espoir on the south coast of the island of Newfoundland, and they hold a FSC for various species. Miawpukek First Nation holds a FSC communal salmon fishing licence but has opted not to harvest salmon under this licence since 1997 due to conservation concerns (DFO, 2022a). Indigenous fishers also have access to salmon for FSC purposes through the recreational fishery (DFO, 2020b).

The Miawpukek First Nation has a FSC license for Atlantic salmon and American eel and these species are known to occur in the RAA. It is, however, unlikely that a substantial Indigenous fishery would occur within the RAA given the distance from the Samiajij Miawpukek reserve in Conne River, which is situated approximately 140 km northwest of the RAA.

Freshwater Recreational Fisheries

The freshwater recreational fishery in NL is governed through the federal **Fisheries Act** and its regulations (Fishery (General) Regulations and the NL Fishery Regulations) and the **NL Wild Life Act** and its' associated regulations. DFO is responsible for the management of Atlantic salmon fisheries in NL, while the NL FFA (formerly Fisheries and Land Resources, Wildlife Division), is responsible for the issuance of licences for inland fisheries (DFO, 2020b). Atlantic salmon licenses are required for residents and non-residents in NL, while trout and other recreational fish licenses are only required for non-residents. The regulations govern daily and yearly quotas, possession limits, and length limit for species fished in inland and tidal waters.

No outfitters are located within the RAA (Province of Newfoundland and Labrador, n.d.). Recreational license holders would have access to scheduled salmon rivers within and near the RAA. Six scheduled salmon rivers, listed on Schedule 1 of the NL Fishery Regulations, are found within the RAA (Table 3.2.2-10). American eels are also fished recreationally (NLDECC, 2010); however, in 2011, all licenses were within the Bay St. George/Port aux Port Bay area (DFO, 2025h). No new recreational eel licences are being issued (DFO, 2025h), consequently the number of licences has decreased over time. Rainbow smelt are recreationally fished between October 1 to March 31, often through the ice in winter using nets, trap nets, or seines.

Recreational fisheries take place in the RAA for Atlantic salmon, brook (speckled) trout, Arctic char, rainbow smelt, brown trout, ouananiche (landlocked Atlantic salmon) and other species. The entire island of Newfoundland is in Trout Angling Zone 1, which includes the RAA, which regulates fishing for brook trout, brown trout, rainbow trout, rainbow smelt, and ouananiche. The recreational fishery for Atlantic salmon is managed through a system of scheduled salmon rivers and SFAs with angling requirements (e.g., fly fishing only, barbless hooks, catch and release) specified for each scheduled river.

Scheduled salmon rivers found in the RAA within SFA 10 in the upper end of Placentia Bay include Black River, Come By Chance River, Watson's Brook, and North Harbour River. Portions of the Come By Chance River watershed may interact with the transmission line from the Wind Farm to the HGP. One scheduled salmon river within SFA 6, Deer Harbour River, is located within the PA on the Sunnyside Peninsula. Bellevue River is within the southern limit of the RAA within SFA 6 and draining into Trinity Bay near Bellevue Beach. Each scheduled salmon river in the RAA is Class 2 and has a salmon retention limit of one fish and a catch-and-release limit of three fish per season (Table 3.2.2-10) (DFO, 2025h).

Table 3.2.2-10 Scheduled salmon rivers within the RAA/LAA and Project Area.

Salmon Scheduled Rivers	RAA	LAA	PA	SFA	Class
Black River	✓	N/A	N/A	10	2
Come By Chance River	✓	N/A	N/A	10	2
Watson's Brook	✓	N/A	N/A	10	2
North Harbour River	✓	N/A	N/A	10	2
Deer Harbour River	✓	N/A	N/A	6	2
Bellevue River	✓	N/A	N/A	6	2
Source: Anglers' Guide 2024-2025 (DFO, 2025h)					

Grieg Seafoods Newfoundland has been operating a counting fence, on behalf of DFO, on the Come By Chance River since 2021 as part of its environmental effects monitoring plan (EEMP) on the genetic and ecological interactions of escaped farmed Atlantic salmon with wild Atlantic salmon. Table 3.2.2-11 provides the counts of upstream migrating anadromous Atlantic salmon from 2021 to 2024. DFO also ran a two-way counting fence (counting both upstream and downstream migrants) on the Come By Chance River in 1971 and 1972. In 1971, 22 adult salmon and 3,552 salmon smolts were counted while in 1972, nine adult salmon and 8,347 salmon smolts were counted (Moores & Ash, 1984). In 1971 and

1972, only nine and eight small salmon, respectively, were angled on the Come By Chance River, in spite of 192 and 528 rod days of effort, respectively.

Table 3.2.2-11 Number of small and large Atlantic salmon counted on the Come By Chance River from 2021 to 2024.

Year	Total Count	Large Salmon (<63 cm)	Small Salmon (≥63 cm)	Notes
2021	78	21	57	Partial count, fence was inoperable for several weeks due to high flow conditions
2022	187	24	163	
2023	179	N/A	N/A	
2024	132	N/A	N/A	Count as of September 15, 2024

Table 3.2.2-12 provides a summary of the catches of Atlantic salmon in the recreational fishery from 2012 to 2016 for rivers in SF10. These catches are a considerable increase from catches in 1971 and 1972, although the effort in 2012 to 2016 was also much greater.

Table 3.2.2-12 Number of Atlantic salmon retained and released on scheduled salmon rivers in SFA 10 from 2012 to 2016.

Scheduled Salmon River	Effort (Rod Days)	Number Salmon Retained	Number Salmon Released	Total Number Salmon	Catch per Unit Effort (CPUE)
Come By Chance River	2,961	279	648	927	0.31
North Harbour River	1,641	263	215	478	0.29
Watson’s Brook	96	3	55	58	0.60

The prevailing recreational species captured in freshwater in NL was brook trout according to the 2015 Survey of Recreational Fishing in Canada (DFO, 2019c). The recreational fishery for brook trout in NL has continually produced some of the highest resident participation rates, on a per capita basis, of any similar fisheries in Canada (Clark & Perry, 2014). Residents do not require a license to participate in the recreational fishery, consequently data are not collected on recreational catches.

It is expected that recreational freshwater fisheries will continue to occur at a significant level within the RAA. Recreational fishing is mainly focussed on brook trout, and to a lesser extent, on ouananiche and brown trout, while anadromous Atlantic salmon are fished in the six scheduled salmon rivers. Recreational fishing for American eel has the potential to occur in the RAA although no new licences are being issued by DFO.

Aquaculture Impacts

In southern Newfoundland (Conne River, SFA 11), recent work has documented extensive hybridization with aquaculture escapees (Keyser et al., 2018, Sylvester et al., 2018, Wringe et al., 2018), reduced survival of the hybrid offspring (Sylvester et al., 2019; Crowley et al., 2022) and predicted negative impacts on wild populations (Bradbury et al., 2020). There are concerns that the Grieg Seafood operations could have similar effects on wild Atlantic salmon populations in Placentia Bay. Grieg Seafood Newfoundland has addressed this concern by operating a salmon counting fence on behalf of DFO, on Come By Chance River since 2021 and a fishway on Bay de L'Eau river since 2023.

3.2.2.5 Freshwater Sensitive Time Periods and Working Windows

Brook trout, Atlantic salmon, and brown trout migration and spawning are particularly important considering their confirmed presence during baseline studies in the LAA. Habitat alteration of salmon and trout streams, including near pond's outlets and shorelines, should be avoided during the spawning period (September 1 - November 30). Perturbation of trout, salmon, and eel migrations at stream crossings during spring and summer should also be avoided from May to September. Threespine stickleback most often migrate and spawn in the spring and summer so a similar avoidance period (May to September) should be considered. DFO recommends not carrying out in-water work in tributaries and headwaters of rivers on the island of Newfoundland from October 1 to May 31 (spawning, incubating and hatching period). It is therefore likely that most instream work will be conducted between May 31 and September 1 and mitigation measures (e.g., such as a fish relocation plan), may need to be implemented during this period to minimize interference with fish migration and rearing.

3.2.2.6 Marine Water Quality

The following section provides an overview of water quality data assessed during the 2023 Braya Environmental Effects Monitoring Program (Braya, 2024a), 2024 Braya Environmental Effects Monitoring Program (Braya, 2024b), and *in-situ* water quality (Appendix B1) at three stations: Marine Station 1 (MS1), Marine Station 2 (MS2), and Marine Station 3 (MS3). The average measurements for subsurface, mid-water column, and near bottom samples were similar across all three stations during the summer of 2023 (Appendix B1). The CTD and temperature models conducted in 2024 were consistent across all marine station sites.

In Come By Chance, TOC was not detected in 2023 but ranged from 1.4 mg/L to 6.4 mg/L at MS1. Mean TSS ranged from 4.4 mg/L at MS3 to 11.0 mg/L at MS2 and MS3 in 2023 and 1.7 mg/L at MS2 to 2.9 mg/L at MS1. pH levels were consistently basic across all three sites both years, with values of 8.02 at MS1, 8.07 at MS2, and 8.11 at MS3 in 2023 and 8.02 at MS1, 8.07 at MS2, and 8.11 at MS3 in 2024. Turbidity ranged from 0.33 FNU at MS1 to 0.62 FNU at MS3 in 2023 and 0.31 NTU at MS2 to 1.03 at MS1 in 2024. Ammonia was not detected at MS2 or MS3, but was present at MS1, with concentrations of 0.05 mg/L at the mid-column and 0.056 mg/L at near bottom in 2023. In 2024, ammonia was detected at all three marine stations, ranging from 0.051 mg/L at MS3 to 0.4 mg/L at MS2.

In 2023, Chlorophyll 'a' concentrations were comparable across sites, ranging from 0.35 µg/L at MS1 to 0.75 µg/L at MS2. Chlorophyll 'a' levels at the subsurface were higher than those in the mid-water and near-bottom samples at all stations, except for MS2, where the highest concentration was found mid-column. In 2024, Chlorophyll ‘a’ concentrations were comparable across sites and was slightly higher than in 2023. Values ranged from 0.95 µg/L at MS1 to 1.07 µg/L at MS3. Secchi depth ranged from 9.7 m at MS2 to 10.8 m at MS1.

CTD and temperature profiles illustrated a general warming and cooling trend throughout the water column. September consisted of the highest temperatures and was well mixed. In December, temperatures were at their lowest with a subtle temperature gradient, compared to July, was detected, with colder surface temperatures and warmer waters near the substrate. In July, a thermocline was observed with warmer surface temperatures and colder deeper waters. Temperature and salinity profiles were similar across marine stations with the exception of the most northern station that showed evidence of freshwater influence within the first 2 m of water in July and December.

3.2.2.7 Physical Oceanography

Dispersion Modelling Study

Appendix B3 presents information on dispersion of effluent if North Atlantic were to create new outfall north of the Jetty (Figure 2.3.1-2). A second option was also considered where both effluent discharge from North Atlantic and Braya were combined in Braya’s existing outfall infrastructure. Results for this dispersion model are provided as Appendix B2 and discussion on why it was not selected is presented in Section 2.4.2.4 Wastewater Treatment System. Stormwater inputs were not incorporated into the dispersion model presented in Appendix B3 for the HGP area. A stormwater assessment for this location will be completed in the next phase of detailed design. Stormwater is not expected to significantly influence effluent concentrations or alter model outcomes for the HGP area. Additionally, changes in stormwater effluent due to the Project were not incorporated into Appendix B2, however, Braya’s effluent was incorporated which currently treats the stormwater from the existing area and is therefore not likely to have significant changes on the model.

This study employs three-dimensional near-field modelling to assess dilution patterns from a preliminary marine outfall discharge location, with a focus on near-field mixing dynamics in the Bay of Come By Chance (Appendix B3). Simulations were conducted under typical summer and winter ambient conditions using the Visual Plumes model to evaluate temperature and salinity changes due to effluent dispersion. The primary objective was to evaluate compliance with the CCME CEQG at the mixing zone boundary.

The CCME guidelines for the protection of aquatic life indicate that human activities should not cause changes in the ambient temperature or salinity of marine and estuarine waters exceeding ±1°C or 10% of natural levels, respectively, at any given time, location, or depth (CCME, 1999a; CCME, 1999b).

Characteristics of the receiving water body were obtained through CTD and temperature profiling conducted during the marine baseline study (Appendix B1), supplemented with historical mooring data (Schillinger et al., 2000) (Appendix B3). A conservative ambient current velocity of 5 cm/s and predicted effluent discharge parameters were incorporated into the model. Four base case scenarios (2.0 °C, 30.5 PSU for winter and 20.0 °C, 30 PSU for summer) were simulated.

The simulation adopted a conservative 5 cm/s surface current to minimize ambient current effects on dispersion. Tidal reversal timescales (order of hours) substantially exceed the effluent's regulatory mixing period (order of minutes), consequently, current direction reversals were excluded from simulations.

The CCME guideline criteria for marine water temperature and salinity were met at relatively short distances from the discharge point in all scenarios. Key findings from the simulations are summarized below:

1. *Summer Scenario without Current (Scenarios 1 & 2 without Current):*
    a. In Scenario 1 with an effluent temperature of 0.3 °C, the change in temperature decreased to below 1 °C within 14 seconds at a distance of 3.66 m from the discharge point.
    b. In Scenario 2 with an effluent temperature of 32.0 °C, the change in temperature dropped below 1 °C within 4 seconds at a distance of 2.07 m from the source.
    c. For both Scenarios 1 and 2, the change in salinity decreased to less than 10% of the ambient level (i.e., ≤ 3.00 PSU) almost immediately at the point of discharge.
2. *Summer Scenario with Current (Scenarios 1 & 2 with Current):*
    a. In Scenario 1 with an effluent temperature of 0.3 °C, the change in temperature decreased to below 1 °C within 10 seconds at a distance of 3.06 m from the discharge point.
    b. In Scenario 2 with an effluent temperature of 32.0 °C, the change in temperature dropped below 1 °C within 4 seconds at a distance of 2.00 m from the source.
    c. For both Scenarios 1 and 2, the change in salinity decreased to less than 10% of the ambient level (i.e., ≤ 3.00 PSU) almost immediately at the point of discharge.
3. *Winter Scenario without Current (Scenarios 3 & 4 without Current):*
    a. In Scenario 3 with an effluent temperature of 0.3 °C, the change in temperature decreased to below 1 °C within 0.1 seconds at a distance of 0.13 m from the discharge point.

b. In Scenario 4 with an effluent temperature of 32.0 °C, the change in temperature dropped below 1 °C within 23 seconds at a distance of 5.22 m from the source.

c. For both Scenarios 3 and 4, the change in salinity decreased to less than 10% of the ambient level (i.e., ≤ 3.05 PSU) almost immediately at the point of discharge

4. *Winter Scenario with Current (Scenarios 3 & 4 with Current):*

   a. In Scenario 3 with an effluent temperature of 0.3 °C, the change in temperature decreased to below 1 °C within 0.1 seconds at a distance of 0.13 m from the discharge point.

   b. In Scenario 4 with an effluent temperature of 32.0 °C, the change in temperature dropped below 1 °C within 16 seconds at a distance of 4.12 m from the source.

   c. For both Scenarios 3 and 4, the change in salinity decreased to less than 10% of the ambient level (i.e., ≤ 3.05 PSU) almost immediately at the point of discharge.

The most challenging conditions for mixing and dispersion occurred in the high-temperature winter scenario without current, where compliance with temperature guidelines was achieved within 5.22 m from the effluent source. For all scenarios, compliance for salinity occurred almost immediately at the point of discharge.

Although not impossible, periods of no or little current is very unlikely in this location. As illustrated in Appendix B1, regular upwelling and downwelling processes occur within the RAA and have likely resulted from a combination of atmospheric and oceanographic processes that occur in this area. In addition, Piper's Hole and other rivers in the area near the effluent outfall site help with regular mixing of the water.

The high-temperature scenarios (32 °C effluent) represent the theoretical maximum discharge temperature from the North Atlantic, though such an event is considered unlikely. However, in the rare case that such a discharge occurs, significant thermal impacts could be observed within the 5.22 m range in winter. Due to the ecological characteristics of the region, particular attention is warranted for sedentary and stenothermal species, which are unable to relocate from the impacted area. More mobile organisms such as marine mammals, reptiles, adult fish, and shellfish can likely avoid the thermal plume.

Elevated temperatures can alter various physical properties of seawater, including compressibility, viscosity, vapor pressure, thermal conductivity, speed of sound, electrical conductivity, osmotic pressure, and gas solubility (CCME, 1999b). A major biological concern is the reduction in dissolved oxygen as water temperatures rise, which can lead to partial suffocation and decreased productivity among marine organisms.

Algae and seagrass species have varying thermal tolerances. Of note, eelgrass, an Ecologically Significant Species of seagrass in Placentia Bay (Fisheries and Oceans Canada, 2009b), can survive temperatures up to 30 °C (Luning and Freshwater 1988). However, other stenothermal species, such as some brown algae (e.g., *Alaria esculenta*; (Tyler-Walters, n.d.)) may not withstand prolonged exposure to elevated temperatures, resulting in possible lethal consequences.

Benthic species, including blue mussels and barnacles, are sedentary organisms that may inhabit the affected area. Video analysis (Appendix B1) identified eight types of benthic macrofauna: Cunner, Winter flounder, Atlantic codfish, sea star, Hermit crab, crab, sea anemone, and sea urchin. However, plume modelling suggests that even with temperature increases exceeding 1°C, thermal changes are unlikely to reach the seabed with sufficient intensity to critically impact these species as the temperature plume will rise to the surface of the water rather than remain at elevated temperatures near the seabed.

Increased temperatures may also promote blooms of plankton and certain algae species, potentially disrupting ecological balance by increasing competition for sunlight and oxygen. Additionally, thermal changes can interfere with the spawning and development of fish and crustacean larvae (CCME, 1999). As noted in Section 3.1.2.11 Marine Sensitive Time Periods and Working Windows, these sensitive life stages occur at specific times throughout the year. If discharges coincide with these periods, negative impacts on local populations may occur.

For invasive species such as the Green Crab, already present in the RAA, prolonged exposure to warmer, brackish water could create favorable conditions for population expansion. As discussed in Section 3.1.2.12 Marine Conservation Concern (Aquatic Invasive Species), Green Crabs pose a significant threat to native species, particularly eelgrass, and their proliferation could have detrimental effects on local ecosystems.

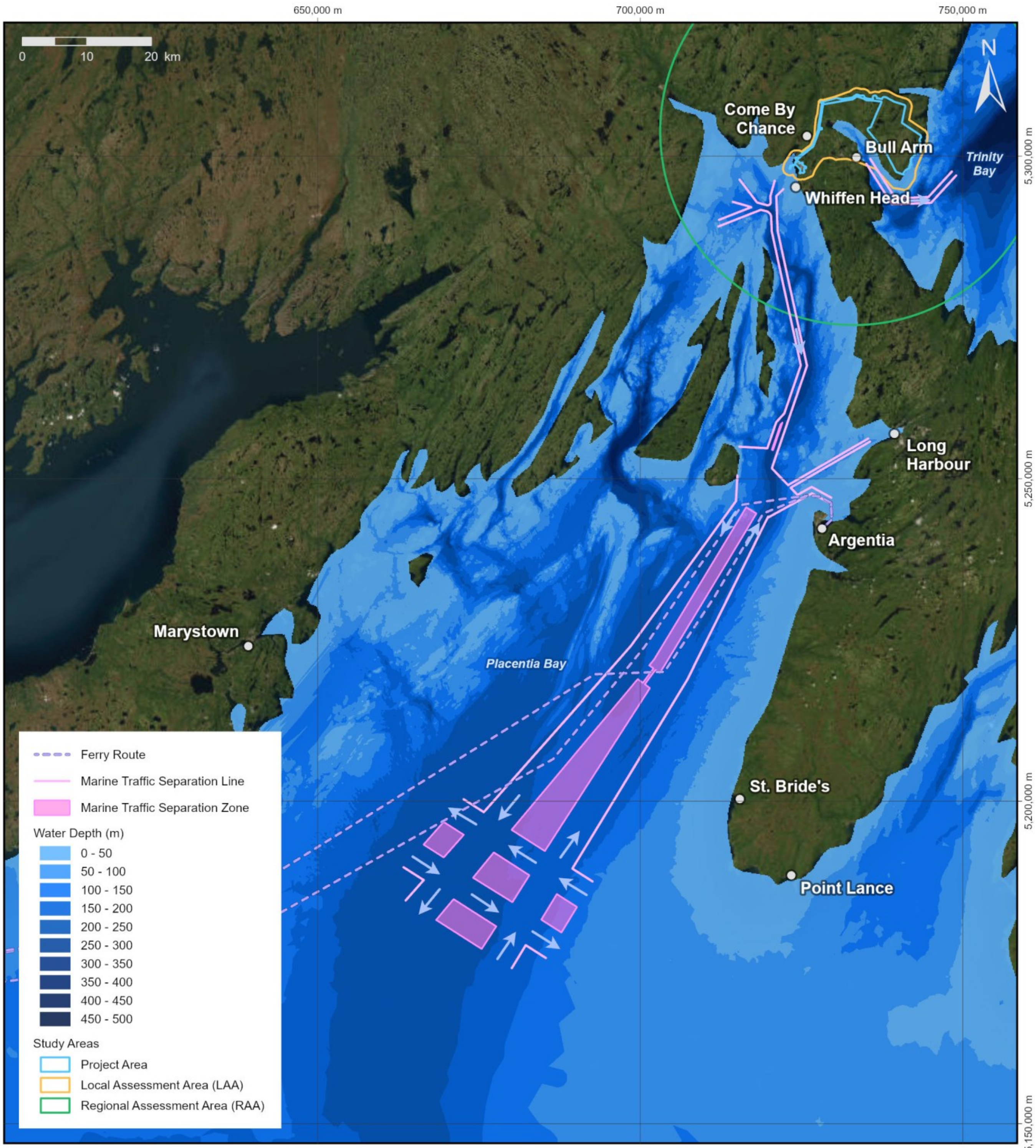
The salinity from the effluent is affecting a short distance for a short period of time and is therefore not likely to affect the surrounding ecosystem.

3.2.2.8 Marine Navigation and Ship Traffic

The following section provides an overview of marine navigation in Placentia Bay and Trinity Bay, as well as within the RAA and LAA, including an examination of marine routes and traffic density in the region, followed by a projection of marine traffic at Come By Chance.

The Port of Placentia Bay and Come By Chance Industrial Site provide navigable waterways for commercial and industrial activities. The Port of Come By Chance features deep-water docking allowing the Port to accommodate considerably larger vessels and heavy-lift shipments from an array of industries, including the Braya Refinery, Come By Chance Industrial Park, Newfoundland Transshipment Terminal, and NARL Logistics Terminal. The Port of Bull Arm was built to support the fabrication site for offshore oil projects. This location is ideal for industrial practices due to its accessibility, deep waterways, and calm waters in the surrounding area. Both the Port of Come By Chance and Bull Arm remains accessible year-round and plays a vital role in supporting current and future commercial activities.

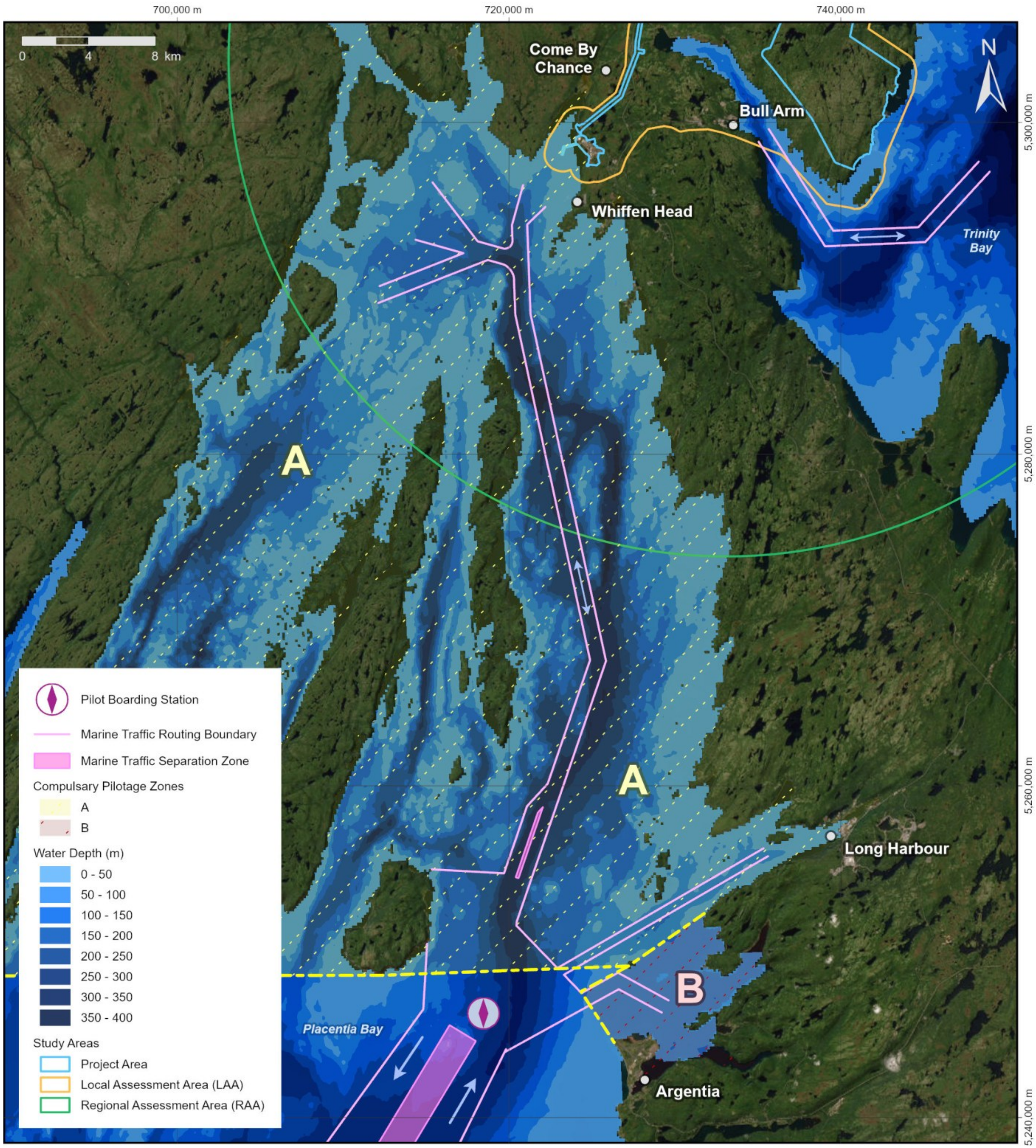
In Placentia Bay, the deep waters of the Eastern Channel between Long Island and the Avalon Peninsula, is divided into two-way shipping lanes (Figure 3.2.2-2). General traffic using these lanes include tankers, ferries, container ships, bulk carriers, cargo ships, and fishing vessels (DFO, 2017b). Vessels longer than 20 meters entering the bay are required to report to the Canadian Coast Guard's Marine Communications and Traffic Services (MCTS). Placentia Bay is designated as a compulsory pilotage area under the Atlantic Pilotage Authority (Atlantic Pilotage Authority, n.d.). There are two registered pilot areas (zones) past the Pilot Boarding Station (PBA); one being Placentia Bay – Zone A (North of the PBA) and the other Argentia – Zone B (East of PBA). The navigation corridors in Placentia Bay, near Come By Chance and Bay of Come By Chance are outlined in Figure 3.2.2-3. Identified by the National Centre of Expertise on Maritime Pilotage, the major ports in Placentia Bay include Come By Chance, Whiffen Head, Argentia, Marystown, and Long Harbour. The one major port in Trinity Bay is the Port of Bull Arm.



North Atlantic	FIGURE TITLE: Shipping Lanes in Placentia Bay	NOTES: Water depth sourced from Canadian Hydrographic Service (CHS) Non-Navigational (NONNA) bathymetric data. Traffic routes sourced from CHS/Department of Fisheries and Oceans (DFO) on Government of Canada's Open Data Portal.	PREPARED BY: C. Burke; DATE: 11/06/2025; REVIEWED BY: C. Bursey 11/06/2025; APPROVED BY: C. Collins 11/06/2025; CRS: WGS 1984 UTM Zone 21N; sem
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		

SEM MAP ID: 016-015-GIS-512-Rev0

Figure 3.2.2-2 Shipping lanes in Placentia Bay.



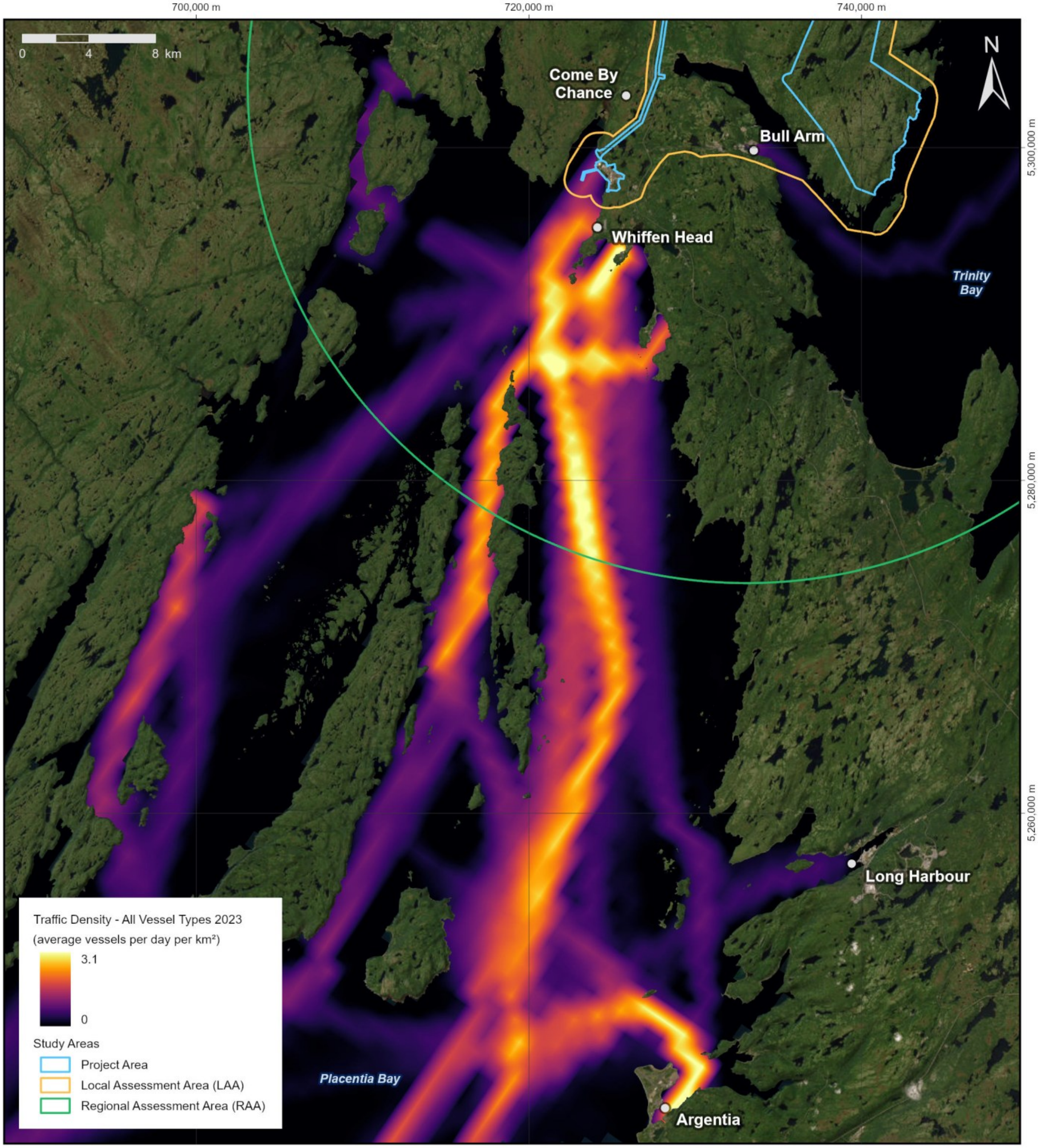
North Atlantic	FIGURE TITLE: Navigation Corridors in Placentia Bay and Trinity Bay	NOTES: Water depth sourced from Canadian Hydrographic Service (CHS) Non-Navigational (NONNA) bathymetric data. Traffic routes sourced from CHS/DFO on Government of Canada's Open Data Portal. Compulsory Pilotage Area information sourced from Atlantic Pilotage Authority webpage.	PREPARED BY: C. Burke	DATE: 11/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 11/06/2025	
			APPROVED BY: C. Collins 11/06/2025	
			CRS: WGS 1984 UTM Zone 21N	
			sem	

SEM MAP ID: 016-015-GIS-513-Rev0

Figure 3.2.2-3 Navigation Corridors in Placentia Bay and Trinity Bay.

Information provided by the Automatic ID System is supplied in Figure 3.2.2-4 to illustrate the 2023 marine traffic density in Placentia Bay and Trinity Bay (Government of Canada, 2025). This global tracking system monitors vessel ID and positional information remotely via a system that is required on all international vessels greater than 300 gross tonnage, 500 gross tonnage for non-internation voyages, and all passenger ships. The data illustrates the average vessels per day per square kilometer for 2023 with brighter colours representing higher traffic densities. It is evident that there is high vessel traffic in Come By Chance and the LAA, however, there is less traffic in Trinity Bay. Within the LAA in Trinity Bay, vessels navigating the harbour per day in a km^2 cube ranged from 0 to 0.41 day/km^2. Within the LAA in Placentia Bay, vessels navigating the harbour per day in a km^2 cube ranged from 0 to 0.77 day/km^2.

Figure 3.2.2-5 shows the locations of small craft harbours (i.e., core fishing harbours) within and around the RAA, along with additional potential embarkation sites for small craft. These include wharves and launch sites where recreational boats, small fishing vessels, and other leisure crafts can access and navigate the waters of the RAA and LAA. The core fishing harbours in the RAA include Fairhaven, Arnold’s Cove, North Harbour, and Garden Cove in Placentia Bay and Chance Cove, and Sunnyside in Trinity Bay. Four main ports are situated within the RAA including Port of Arnold’s Cove, Whiffen Head, Come By Chance, and Bull Arm.



North Atlantic	FIGURE TITLE: **Marine Traffic Density in Placentia Bay and Trinity Bay**	NOTES: Density map produced using 2023 Automatic Identification System (AIS) data published by DFO on the Government of Canada Open Data Portal.	PREPARED BY: C. Burke	DATE: 11/06/2025
			REVIEWED BY: C. Bursey 11/06/2025	
			APPROVED BY: C. Collins 11/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 21N	
			sem	

SEM MAP ID: 016-015-GIS-514-Rev0

Figure 3.2.2-4 Marine traffic density in Placentia Bay and Trinity Bay.

Figure 3.2.2-5 Small craft harbours and adjacent embarkation sites.

Table 3.2.2-13 and Table 3.2.2-14 represents the average number of vessels per day each month from 2013 to 2023 in a 1 km^2 cube around the Port of Come By Chance and Port of Bull Arm, respectively (DFO, 2024c). The cubes selected were the closest to the port sight and the vessel traffic near the area were assumed to have docked at the respective port. The dark blue squares are the highest months for vessel traffic per year, and the light blue squares are the lowest months for vessel traffic per year. Additionally, the highest (dark blue) and lowest (light blue) for vessel traffic across all years are indicated in the last column.

At the Port of Come By Chance, the month with the lowest vessel count per day was April and June in 2023, and July of 2020 (0.03 day/km^2) (Table 3.2.2-13). The lowest average across all months occurred in 2023 with an average of 0.06 vessels a day/km^2. Conversely, the month with the highest vessel count per day was June 2016 with an average of 3.30 day/km^2. The highest year across all months was 2019 (2.57 day/km^2). Overall, there has been a downward trend of vessels docking at the Port of Come By Chance over the 10-year period. For this Project, LOHC vessels, and possibly tugboats if required, will be shipping product from the NARL Logistics Terminal 12 – 15 times a year.

Table 3.2.2-13 Daily average marine traffic at the Port of Come By Chance from 2013 to 2023.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2013	1.61	1.39	1.19	1.07	1.23	1.73	1.10	1.26	1.40	0.84	1.13	1.45	1.28
2014	1.23	1.54	1.19	1.20	1.16	1.00	1.26	1.45	0.47	0.84	1.57	1.52	1.20
2015	1.77	2.50	2.32	2.23	2.52	1.83	2.77	2.10	2.07	2.26	2.03	2.10	2.21
2016	2.68	1.76	2.48	2.70	1.77	3.30	2.65	1.87	1.37	1.87	2.47	2.71	2.30
2017	2.16	2.18	2.26	2.77	2.71	2.60	2.35	2.71	2.37	2.52	2.87	2.81	2.52
2018	2.65	2.46	2.26	2.80	3.16	2.13	2.58	1.90	2.63	2.48	2.27	2.42	2.48
2019	2.77	2.11	2.42	2.20	2.55	2.37	2.94	2.32	2.33	2.77	3.07	3.00	2.57
2020	0.24	0.17	0.19	0.06	0.04	0.09	0.03	0.04	0.09	0.07	0.10	0.05	0.10
2021	0.68	0.61	0.84	1.03	0.45	0.60	0.90	0.68	0.90	1.55	0.70	0.94	0.82
2022	0.48	0.46	0.29	0.33	0.35	0.37	0.48	0.52	0.43	0.52	0.57	0.52	0.44
2023	0.04	0.07	0.04	0.03	0.04	0.03	0.04	0.06	0.10	0.10	0.12	0.08	0.06

Notes:
Dark blue squares are the highest months for vessel traffic per year, and the light blue squares are the lowest months for vessel traffic per year.

At the Port of Bull Arm, there were over 20 months with an average of zero vessels per day (Table 3.2.2-14). The year with the highest consecutive low vessel traffic was in 2018 where all months, except for December, averaged 0.0 day/km^2 of vessels around the port. The years of 2018 and 2023 had the lowest average across all months at 0.03 day/km^2. The month with the highest vessel counts per day was January 2016 with an average of 6.26 day/km^2. The highest year across all months was 2016 (5.08 day/km^2). During the previous ten-year period, vessel traffic peaked in 2016. Vessel traffic decreased rapidly to less than 0.5 day/km^2 by 2018 following the completion and relocation of the Hebron gravity-based structure in 2017 (ExxonMobil Canada Properties, 2025).

Table 3.2.2-14 Daily average marine traffic at the Port of Bull Arm from 2013 to 2023.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
2013	0.00	0.18	0.10	0.03	0.10	0.20	0.03	1.35	1.03	0.58	0.33	0.58	0.38
2014	0.29	0.39	0.42	0.43	0.35	1.20	1.29	1.23	1.37	1.39	1.93	1.90	1.02
2015	4.39	4.21	5.13	4.67	5.06	4.60	4.19	4.94	4.70	5.03	5.33	5.00	4.77
2016	6.26	5.59	5.84	5.87	4.39	5.00	4.55	4.39	4.63	4.81	4.50	5.19	5.08
2017	4.74	3.75	4.45	4.13	5.71	2.80	0.10	0.10	0.00	0.00	0.00	0.00	2.15
2018	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.03
2019	0.71	0.79	0.52	0.30	1.52	0.30	0.00	0.06	0.00	0.13	0.73	0.45	0.46
2020	0.04	0.12	0.04	0.00	0.05	0.08	0.02	0.01	0.02	0.01	0.05	0.04	0.04
2021	0.39	0.14	0.29	0.47	0.23	0.30	0.52	0.65	0.23	0.35	0.80	0.81	0.43
2022	0.16	0.25	0.13	0.03	0.03	0.17	0.52	0.13	0.27	0.10	0.03	0.03	0.15
2023	0.00	0.00	0.01	0.07	0.05	0.06	0.08	0.07	0.03	0.02	0.02	0.00	0.03

Notes:
Dark blue squares are the highest months for vessel traffic per year and the light blue squares are the lowest months for vessel traffic per year.

Cargo ships involved in Project construction must obtain the necessary certification and approval to operate in Canadian and Newfoundland waters. Both national and international vessels navigating these waters are subject to regulations under the **Canadian Navigable Waters Act**, the **Canada Shipping Act, 2001**, the **Transportation of Dangerous Goods Act**, and various other relevant legislation.

To ensure effective communication between marine vessels and shore bases, communication systems will be required. The MCTS broadcasts from the Placentia Centre, providing crucial navigation support in Placentia Bay. The MCTS offers a range of free services, including:

- Messages pertaining to weather or ice conditions and forecasts;
- Messages concerning aids to navigation;
- Eastern Canada Vessel Traffic Services Zone (WCAREG) messages;
- Messages reporting pollution; and
- Radio-medical messages.

3.2.2.9 Marine Biosecurity

Marine biosecurity involves minimizing the risks of introduction and spreading of marine pests and diseases through external sources. Marine biodiversity and ecosystems in Newfoundland are threatened from these risks. One of the most significant biosecurity risks to Newfoundland's ports is aquatic invasive species (AIS).

To protect Canadian waterbodies from introduction and spread of AIS, AIS Regulations (2015) was put in place under the Fisheries Act. Additionally, federal, provincial, and territorial legislation provide management tools to help AIS concerns. These include the prohibiting of activities such as importation, possession, transportation, release, and introduction of AIS (DFO, 2019a). Introduction and spread of marine AIS occur through shipping, recreational and commercial boating, live bait use, aquarium and water garden trade, live food use for human consumption, unauthorized importation, and waterbody diversions, necessitating extra precautions during these events (DFO, 2004).

In terms of the Project, shipping vessels will be the main concern for AIS introduction and spread. AIS can be transported via vessel cargo, hull biofouling, and ballast water. Both ballast water discharge and biofouling can inadvertently introduce and spread harmful species and pathogens into the RAA (Transport Canada, 2022).

To address this risk, Canada implemented the Ballast Water Regulations (SOR/2021-120) under the Canada Shipping Act (2001) and the Fisheries Act. These regulations, which came into force on June 23, 2021, helped Canada's ability to protect its environment and economy from AIS(Transport Canada, 2019). Transport Canada oversees ballast water management, a critical measure in preventing new AIS arrivals. These regulations apply to all vessels designed or constructed to carry ballast water, including, Canadian vessels operating anywhere in the world, and non-Canadian vessels navigating in Canadian waters, including international ships (Transport Canada, 2021). These regulations will apply to all vessels carrying ballast water in the RAA.

To mitigate the potential spread of AIS, North Atlantic will adhere to recommended best practices and guidelines. Shipping vessels will be inspected for biofouling by AIS such as Vase tunicate and European green crab. The following measures will be implemented to prevent AIS introduction and spread:

- Raising AIS awareness in frequently traveled waters;
- Taking precautions with vessel traffic and gear movement between affected and unaffected areas;
- Cleaning, draining, and drying gear and ropes to prevent waterborne AIS transfer between locations;
- Conducting routine vessel maintenance, including hull cleaning and the use of antifouling paint to prevent biofouling; and
- Identifying and reporting AIS sightings to DFO.

3.2.2.10 Marine Fish and Fish Habitat

Marine Plankton

Plankton refers to small, passive organisms in aquatic environments, some of which drift with ocean currents and tides throughout their entire life cycle. Others are only classified as plankton during their early life stages, until they grow large enough to swim against the currents (NOAA, 2023). In the RAA/LAA, plankton can be divided into two subcategories: zooplankton and phytoplankton, which are discussed further below.

Phytoplankton blooms in the Northwest Atlantic Ocean are typically marked by spring and fall events (LGL Limited, 2018). Time-series analyses of coastal station primary production show that during the spring bloom, larger phytoplankton species, often diatoms, dominate. As the summer progresses and temperatures rise, there is a shift toward a higher cell density of smaller phytoplankton species. These shifts generally follow a recurring annual cycle: picophytoplankton (ranging from 0.2 to 2 µm) appear before the spring bloom, followed by diatoms during the bloom itself, and then other phytoplankton species, such as coccolithophores and golden-brown algae (e.g., haptophytes), after the spring bloom. In the fall, smaller phytoplankton species dominate once again. In 1998, chlorophyll 'a' concentration in water samples from Placentia Bay were analyzed to estimate phytoplankton standing crop. The results showed that chlorophyll 'a' concentrations were higher in the inner bay than the outer bay, with the peak concentrations occurring in April.

Phytoplankton samples were collected at three stations in Come By Chance on September 19, 2024. The mean most dominant phytoplankton group was dinoflagellates, which made up 81.17% of the phytoplankton community, followed by diatoms (11.61%), golden algae (2.38%), cryptomonads (2.01%), unclassified algae (1.64%), green algae (0.77%) and blue-green algae (0.01%). Cells in the size class >30 µm made up 61.3% of the phytoplankton community, followed by size class 10 to 30 µm (29.8%) and 0 to 10 µm (8.9%).

Zooplankton community structure is heavily influenced by factors such as depth, temperature, and season. There is considerable variation in community complexity across the Northwest Atlantic Region, including areas like the Gulf of St. Lawrence, Scotian Shelf, and NL Shelves (DFO, 2022b). While copepods are the most abundant group in the region (Davis, 1986; DFO, 2022b), non-copepod organisms also make significant contributions to overall zooplankton abundance (DFO, 2022b). Two copepod taxa, *Calanus finmarchicus* and *Pseudocalanus* spp., represent distinct broad groups with similar life histories and serve as key bioindicators for assessing the condition of zooplankton communities and shifts in community structure on the NL Shelves (DFO, 2022b). Given their proximity and shared physical oceanographic characteristics, zooplankton communities in the Newfoundland Shelves are likely to extend into the RAA and LAA.

In Placentia Bay, the zooplankton community is dominated by copepods, krill, amphipods, euphausiids, and planktonic eggs and larval stages of fish and invertebrates. The abundance of these organisms peak between mid-April and mid-June (Husky Energy, 2012). The distribution of pelagic eggs and early larval stages follows a passive drift pattern, while later larval stages tend to concentrate on the western side of the bay. The highest densities of American plaice and Atlantic cod eggs are found in the western part of Placentia Bay, with Atlantic cod egg concentrations peaking in early spring.

Table 3.2.2-15 shows the major zooplankton taxa found in the LAA during the 2024 aquatic baseline study (Appendix B1). Samples were collected at three different sites within the LAA, and Arthropoda was the most dominant taxa (50.73%) followed by Cnidaria (23.38%) and Chordata (20.58%). Zooplankton community composition from Come By Chance Harbour (LAA) concurred with DFO (2022) and showed that copepods were by far the most abundant group of zooplankton. Over two thirds of the Arthropoda biomass was associated with the Copepod taxa, and it contributed 34.50% of the total biomass. Davis (1986) conducted extensive characterization the zooplankton in Placentia Bay and all major taxa from the baseline study were represented in categories described by Davis (1986). Species of zooplankton found in Placentia Bay (Davis, 1986) coincided with species of high abundance collected in September during the baseline study including *Temora longicornis*, *Centropages hamatus*, *Oithona* sp., *Acartia* sp., Calanoida indet., *Pseudocalanus* sp. complex, *Evadne* sp., and *Obelia* sp.

Table 3.2.2-15 Major marine zooplankton taxa found in the LAA, 2024.

Phylum (Class)	Biomass (%)
Bryozoa (Cyphonautes)	0.43
Chaetognatha	0.00
Cnidaria	23.38
Arthropoda • (Non-Copepoda) • (Copepoda)	50.73 (16.23) (34.50)
Echinodermata	0.03
Mollusca	4.85
Chordata	20.58
Total Biomass	100.00

Marine Benthos

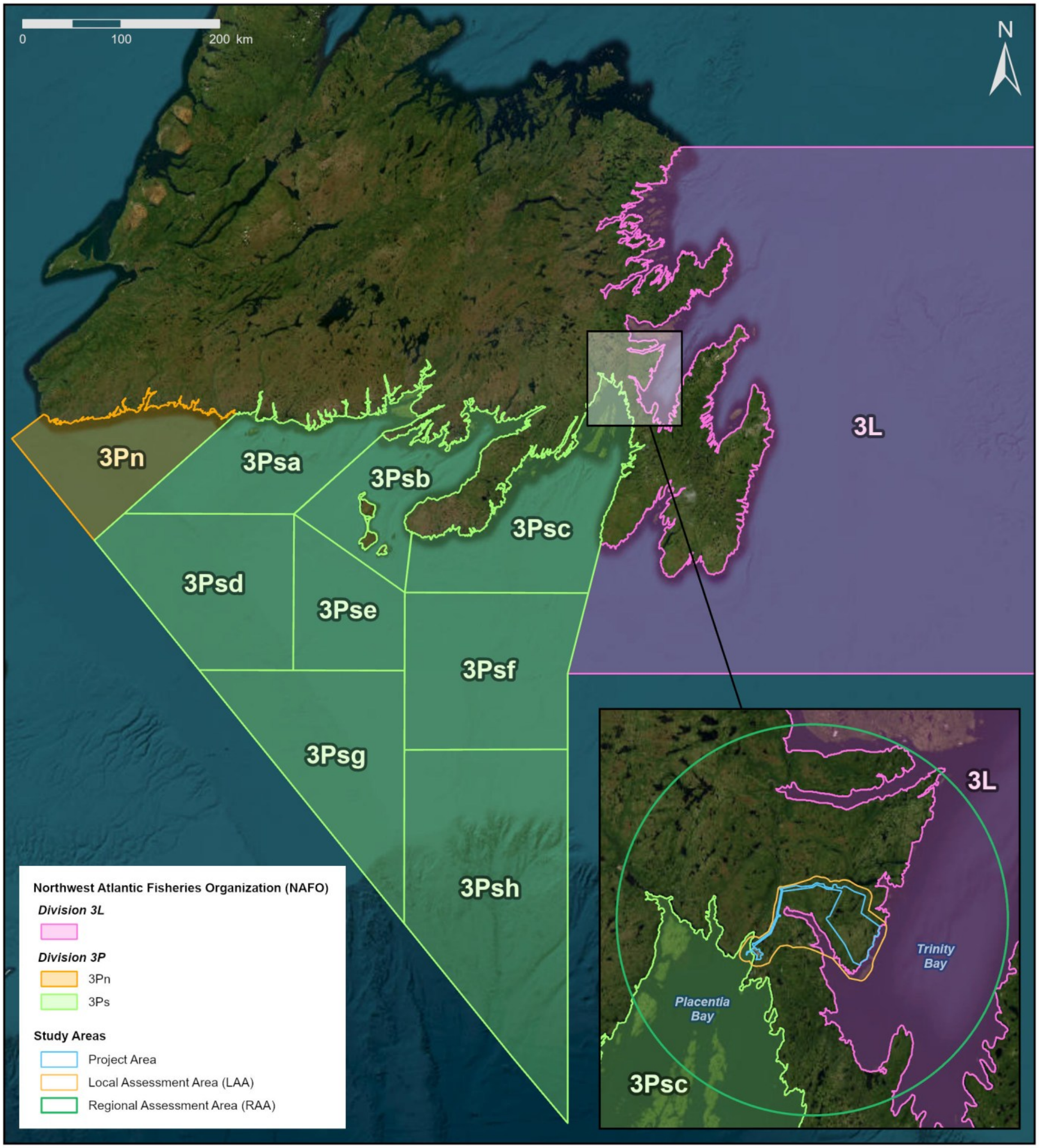
Benthos communities are made up of both epifauna, which dwell on the surface, and infauna, which burrow into the seafloor. The benthic communities within the Placentia Bay marine ecosystem encompass intertidal, shallow subtidal, and subtidal bottom-dwelling organisms. In the intertidal and shallow subtidal habitats, dominant fauna includes blue mussels, green sea urchins, common periwinkles, barnacles, frilled anemones, horse mussels, and various species of amphipods and isopods. In deeper areas of the bay, the community shifts to include polychaetes, amphipods, sand dollars, sea urchins, sea stars, scallops, mussels, and brittle stars. In recent years, the invasive European green crab has also become a notable presence within the benthic community.

Infauna such as polychaetes and other annelids, along with epifauna like echinoderms (e.g., sea stars, brittle stars, mud stars, sea urchins, sand dollars, and sea cucumbers), tunicates, shellfish (e.g., shrimps, snow crabs, lobsters), gastropods (e.g., whelks), bivalves (e.g., horse mussels, scallops, mussels), sea anemones, sponges, soft corals, bryozoans, and hydrozoans, can be expected to inhabit the RAA (LGL Limited, 2018).

The sediment at the sampling sites in the LAA was mainly composed of well sorted coarse sand and cobble, which likely contributed to the relatively low number of benthic invertebrates in collected samples. Samples of the benthic community in Come By Chance Harbour were collected in the 2023 Braya EEM baseline study (Appendix B1) and were limited to sampling infauna. Average abundance and richness were 38 organisms and 2.8 taxa, respectively. The benthic community included polychaete worms, echinoderms, amphipods, oligochaetes and nematodes. Simpson's Diversity and Evenness Indexes were 0.569 and 0.730, respectively, indicating relatively low diversity.

3.2.2.11 Marine Fisheries and Aquaculture

An overview of the fishing activities within Placentia and Trinity Bay are provided in the following section. These two areas overlap with the RAA and LAA (Placentia Bay only) and will provide an overview of the potential interactions that the fishing industry and the Project have. Commercial, recreational, and Indigenous fisheries occur throughout Newfoundland. In addition, seafood processors and aquaculture are an important part of the industry that occurs within the RAA. Placentia Bay, which will be discussed at length due to the wastewater location and the overlap with the RAA and LAA, is located in the Northwest Atlantic Fisheries Organization sub-division 3Ps. The 3Ps is further divided into three unit areas: 3Psa, 3Psb, and 3Psc (Figure 3.2.2-6). This Bay is specifically located in 3Psc. Trinity Bay is in the Northwest Atlantic Fisheries Organization division 3L. These divisions have fishing activity guidelines based on weather and ice conditions, availability of resources, harvesting plans, and fishing licenses and management that will indicate when and what fishing activities will occur throughout the year.



North Atlantic	FIGURE TITLE: Northwest Atlantic Fisheries Organization 3P and 3L Divisions	NOTES: Northwest Atlantic Fisheries Organization (NAFO) divisions and subdivisions sourced from the Government of Canada's Open Data Portal. The boundaries of unit areas (3Psa to 3Psh) are adapted from Department of Fisheries and Oceans (DFO) publications.	PREPARED BY: C. Burke; DATE: 11/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 11/06/2025
			APPROVED BY: C. Collins 11/06/2025
			CRS: WGS 1984 World Mercator
			sem

SEM MAP ID: 016-015-GIS-527-Rev0

Figure 3.2.2-6 Northwest Atlantic fisheries organization 3P and 3L divisions.

Marine Commercial Fisheries

Over the past three decades, commercial fisheries have experienced significant shifts, transitioning from a groundfish-based industry to a shellfish-dominated one, and more recently, back to a focus on groundfish. From 1993 to 1996, a harvesting moratorium on Atlantic cod in 3Ps was in place. Before this moratorium, Atlantic cod made up approximately 50% to 70% of the annual catch (1986 to 1993), while snow crab accounted for less than 1%. After the moratorium, cod's share of the annual catch dropped to 5%, while snow crab's proportion increased to around 10% to 23%. Although a limited cod fishery was reinstated in 1987, cod and snow crab have remained the principal species harvested in 3Ps, together making up 50% to 75% of the annual catch.

Commercial fisheries data for Northwest Atlantic Fisheries Organization unit area 3Psc is summarized in Tables 3.2.2-16 and 3.2.2-17 (DFO, 2025a). This data includes landed weight (kg) and their corresponding monetary values (CAD) for species fished in the Placentia Bay area from 2018 to 2024, respectively. While this area extends beyond the Project's RAA and LAA, the data still provides valuable insights into potential interactions and trends related to both the fisheries and the Project. The top three species by landed weight were snow crab (15,512,894 kg), Atlantic cod (7,769,066 kg), and Atlantic herring (4,610,249 kg). In terms of landed value, the top three species were snow crab ($149,488,599.25 CAD), American lobster ($12,123,564.36 CAD), and Atlantic cod ($11,690,983.82 CAD). Snow crab was the dominant species in both landed weight and value and is also a common catch for fixed gear, which is widely used throughout the RAA (DFO, 2023c).

Commercial fisheries data was also obtained through the online Canada Marine Planning Atlas (DFO, 2023e) to give a visual representation of fishing activity adjacent to the RAA. Fisheries in Placentia Bay utilize both mobile gear (typically towed by vessels) and fixed gear (set out and left by the fisher, often anchored or weighted in place).

Table 3.2.2-16 Landed weight (kg) recorded in the 3Psc commercial fishery from 2018 to 2024.

Species	2018	2019	2020	2021	2022	2023	2024	Total
American plaice	22,475	16,803	14,498	O/L	O/L	1,763	956	56,496
Capelin	-	O/L	-	-	-	-	-	-
Clams, Stimpsons surf	-	-	-	-	O/L	-	-	-
Cod, Atlantic	2,727,138	2,077,822	1,327,311	458,109	497,550	457,477	223,660	7,769,066
Crab, Queen/Snow	749,838	1,103,765	1,259,145	2,170,861	3,165,117	3,364,383	3,699,785	15,512,894
Greysole/witch flounder	O/L	O/L	O/L	-	-	O/L	-	-
Haddock	12,505	O/L	47.9	O/L	O/L	O/L	6,646	19,199
Hake, white	3,263	O/L	O/L	O/L	O/L	O/L	15,501	18,764
Halibut, Atlantic	9,138	5,632	6,920	2,647	O/L	3,823	2,395	30,555
Herring, Atlantic	O/L	O/L	670,494	O/L	785,189	2,112,947	1,041,619	4,610,249
Lobster (American)	14,263	27,566	10,315	7,567	8,622	30,896	78,666	177,895
Monkfish (Am angler)	O/L	O/L	O/L	O/L	-	-	O/L	-
Pollock	31,071	9,193	O/L	O/L	-	-	O/L	40,264
Redfish	7,244	280	153	O/L	O/L	O/L	-	7,677
Scallop, Iceland	O/L	-	-	O/L	O/L	-	O/L	-
Scallop, Sea	O/L	O/L	O/L	236,221	O/L	26,948	94,191	357,360
Sea cucumber	-	-	O/L	-	-	-	O/L	-
Sea Urchins	O/L	O/L	-	-	-	-	-	-
Seal fat	-	O/L	-	-	-	-	-	-
Seal skins, harp, beater (no.)	-	O/L	-	-	-	-	-	-
Shark, blue	O/L	-	-	-	-	-	-	-
Shark, mako (Shortfin)	-	-	-	O/L	-	-	-	-
Skate	O/L	O/L	O/L	O/L	-	-	-	-
Squid, Illex	-	O/L	O/L	-	-	-	-	-
Tuna, bluefin	-	-	-	O/L	O/L	O/L	O/L	-
Turbot/Greenland halibut	O/L	O/L	O/L	O/L	O/L	O/L	O/L	-
Whelks	O/L	O/L	O/L	O/L	O/L	282,679	1,335,235	1,617,914
Winter flounder	O/L	O/L	O/L	O/L	O/L	O/L	O/L	-

Species	2018	2019	2020	2021	2022	2023	2024	Total
Wolffish, Striped/ Atlantic	O/L	O/L	-	-	-	-	-	-
Yellowtail flounder	O/L	O/L	O/L	O/L	-	-	-	-
Other Landings (O/L)	1,441,203	2,076,983	243,823	1,455,178	412,014	6,750	73,275	5,709,227

Source: Economic Analysis and Statistics (DFO, 2025a)
Notes:
"-" = No data available
O/L = Categorized as Other Landings, did not meet confidentiality requirements specified within the **Statistics Act** and DFO policies.

Table 3.2.2-17 Landed value (CAD) recorded in the 3Psc commercial fishery from 2018 to 2024.

Species	2018	2019	2020	2021	2022	2023	2024	Total
American plaice	16,801.15	11,932.58	10,747.36	O/L	O/L	1,165.62	702.58	41,349.29
Capelin	-	O/L	-	-	-	-	-	-
Clams, Stimpsons surf	-	-	-	-	O/L	-	-	-
Cod, Atlantic	3,751,807.74	3,271,372.12	1,907,720.22	644,110.82	894,304.06	800,996.01	420,672.85	11,690,983.82
Crab, Queen/Snow	7,966,089.86	12,969,738.03	101,976.57	35,271,928.61	47,930,629.90	16,488,256.05	28,759,980.23	149,488,599.25
Greysole/witch flounder	O/L	O/L	O/L	-	-	O/L	-	-
Haddock	12,189.74	O/L	40.57	O/L	O/L	O/L	5,616.60	17,846.91
Hake, white	2,917.17	O/L	O/L	O/L	O/L	O/L	20,129.37	23,046.54
Halibut, Atlantic	86,335.22	56,345.98	54,756.27	21,593.78	O/L	38,234.37	25,665.78	282,931.40
Herring, Atlantic	O/L	O/L	233,551.02	O/L	346,032.50	847,792.95	452,381.54	1,879,758.01
Lobster (American)	199,306.96	386,368.89	9,631,302.85	128,646.42	148,050.64	505,252.99	1,124,635.61	12,123,564.36
Monkfish (Am angler)	O/L	O/L	O/L	O/L	-	-	O/L	-
Pollock	22,368.67	5,734.45	O/L	O/L	-	-	O/L	28,103.12
Redfish	6,001.54	235.28	109.70	O/L	O/L	O/L	-	6,346.52
Scallop, Iceland	O/L	-	-	O/L	O/L	-	O/L	-
Scallop, Sea	O/L	O/L	O/L	707,442.30	O/L	77,323.74	328,490.85	1,113,256.89
Sea cucumber	-	-	O/L	-	-	-	O/L	-
Sea Urchins	O/L	O/L	-	-	-	-	-	-
Seal fat	-	O/L	-	-	-	-	-	-
Seal skins, harp, beater (no.)	-	O/L	-	-	-	-	-	-

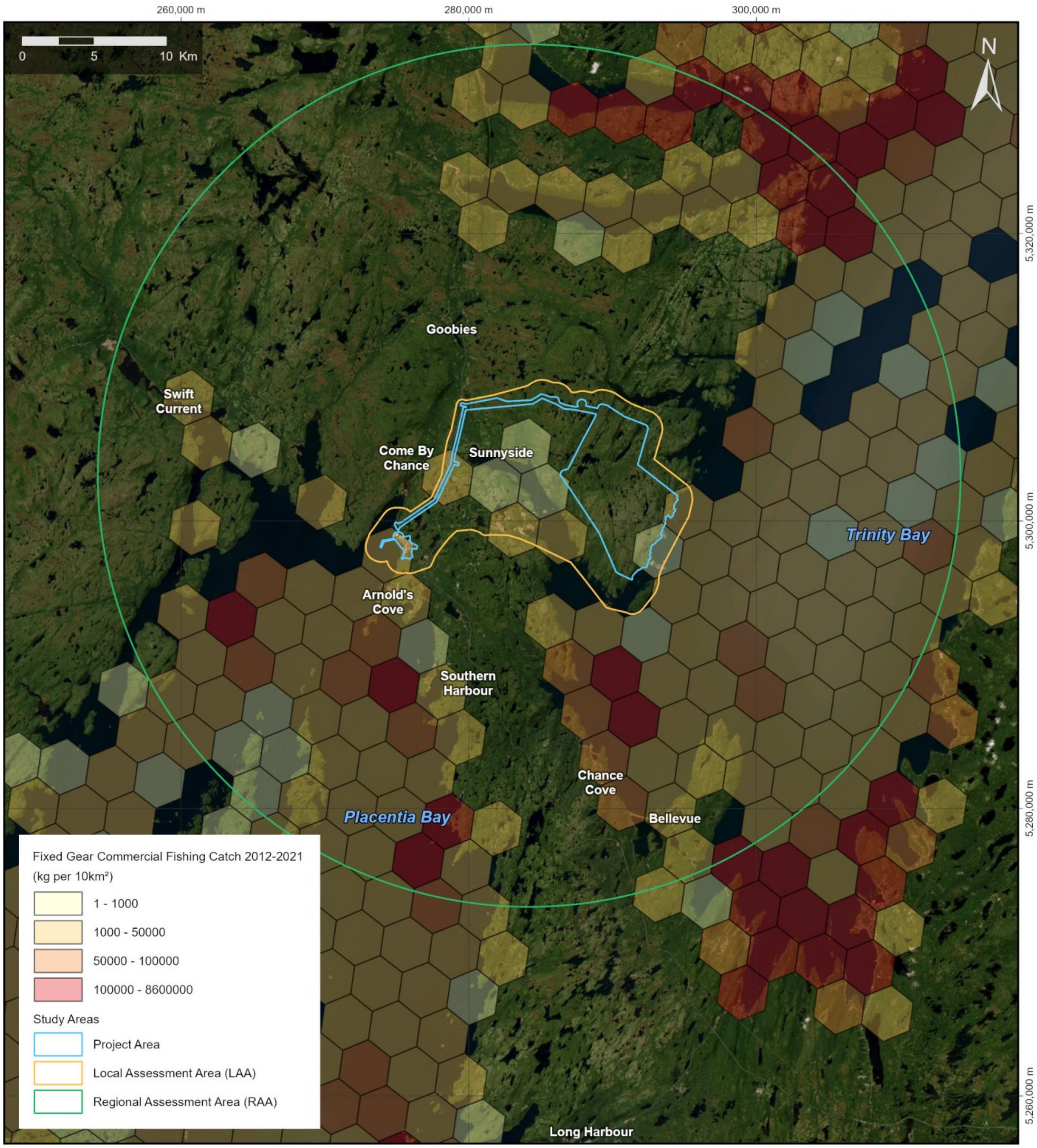
Species	2018	2019	2020	2021	2022	2023	2024	Total
Shark, blue	O/L	-	-	-	-	-	-	-
Shark, mako (Shortfin)	-	-	-	O/L	-	-	-	-
Skate	O/L	O/L	O/L	O/L	-	-	-	-
Squid, Illex	-	O/L	O/L	-	-	-	-	-
Tuna, bluefin	-	-	-	O/L	O/L	O/L	O/L	-
Turbot/Greenland halibut	O/L	O/L	O/L	O/L	O/L	O/L	O/L	-
Whelks	O/L	O/L	O/L	O/L	O/L	643,759.40	2,917,167.03	3,560,926.43
Winter flounder	O/L	O/L	O/L	O/L	O/L	O/L	O/L	-
Wolffish, Striped/ Atlantic	O/L	O/L	-	-	-	-	-	-
Yellowtail flounder	O/L	O/L	O/L	O/L	-	-	-	-
Other Landings (O/L)	616,079.99	1,136,313.19	421,619.44	630,894.67	1,275,625.72	86,748.82	126,491.79	4,293,773.62

Source: Economic Analysis and Statistics (DFO, 2025a).
Notes:
"-" = No data available
O/L = Categorized as Other Landings, did not meet confidentiality requirements specified within the **Statistics Act** and DFO policies.

Figures 3.2.2-7 and 3.2.2-8 illustrates the concentration of fixed and mobile fishing gear used within the RAA between 2012 and 2021 (DFO, 2023c). In both Placentia and Trinity Bay, fixed gear is more commonly used than mobile gear, with mobile gear concentrated along the shoreline. While beach and bar seines (in Trinity Bay), dredging (northwest of Placentia Bay), trap nets, and pots were also used throughout the RAA, the most prevalent fishing methods are gillnets, handlines (Placentia Bay only), longlines targeted for groundfish (Placentia Bay only), and purse or tuck seines. Between 2019 and 2022, fixed and mobile gear equally contributed to landings of groundfish in 3Ps (DFO, 2021b).

Atlantic cod is one of the highest landing weights of Placentia and Trinity Bay with areas of over 5,745 kg/km2 caught (DFO, 2021c). Atlantic herring also has a high concentration of landings in Placentia Bay and north of Trinity Bay. Capelin landings are concentrated from Chance Cove to Bulls Arm, with possible capelin catches in Placentia Bay, though specific areas are not disclosed to protect fisher privacy. Small concentrations of Scallops (Placentia Bay only) and Queen Snow crab have been caught in the RAA. Over the past 25 years, snow crab landings have declined across NL (Pantin et al., 2022).

From 1996 to 2007, DFO gathered interview data from residents with extensive knowledge of the fisheries and the region to create the Community-Based Coastal Resource Inventory (DFO, 2023b). This data reveals that the most significant fisheries within the RAA are American lobster, snow crab, Atlantic cod, and flounder (including witch flounder and winter flounder). Figure 3.2.2-9 show the locations of these fisheries within the RAA and LAA.



North Atlantic	FIGURE TITLE: Commercial Fishing Catch by Fixed Gears	NOTES: The data was obtained from Statistical Services, Fisheries and Oceans Canada (DFO) and consists of commercial species/gear type landings data from 2012 to 2021 Sourced from the 'Eastern Canada Commercial Fishing' dataset published on the Government of Canada's Open Data portal.	PREPARED BY: J. Crocker; DATE: 11/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 11/06/2025
			APPROVED BY: C. Collins 11/06/2025
			CRS: WGS 1984 UTM Zone 22N
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Figure 3.2.2-7 Commercial fishing catch by fixed gears.

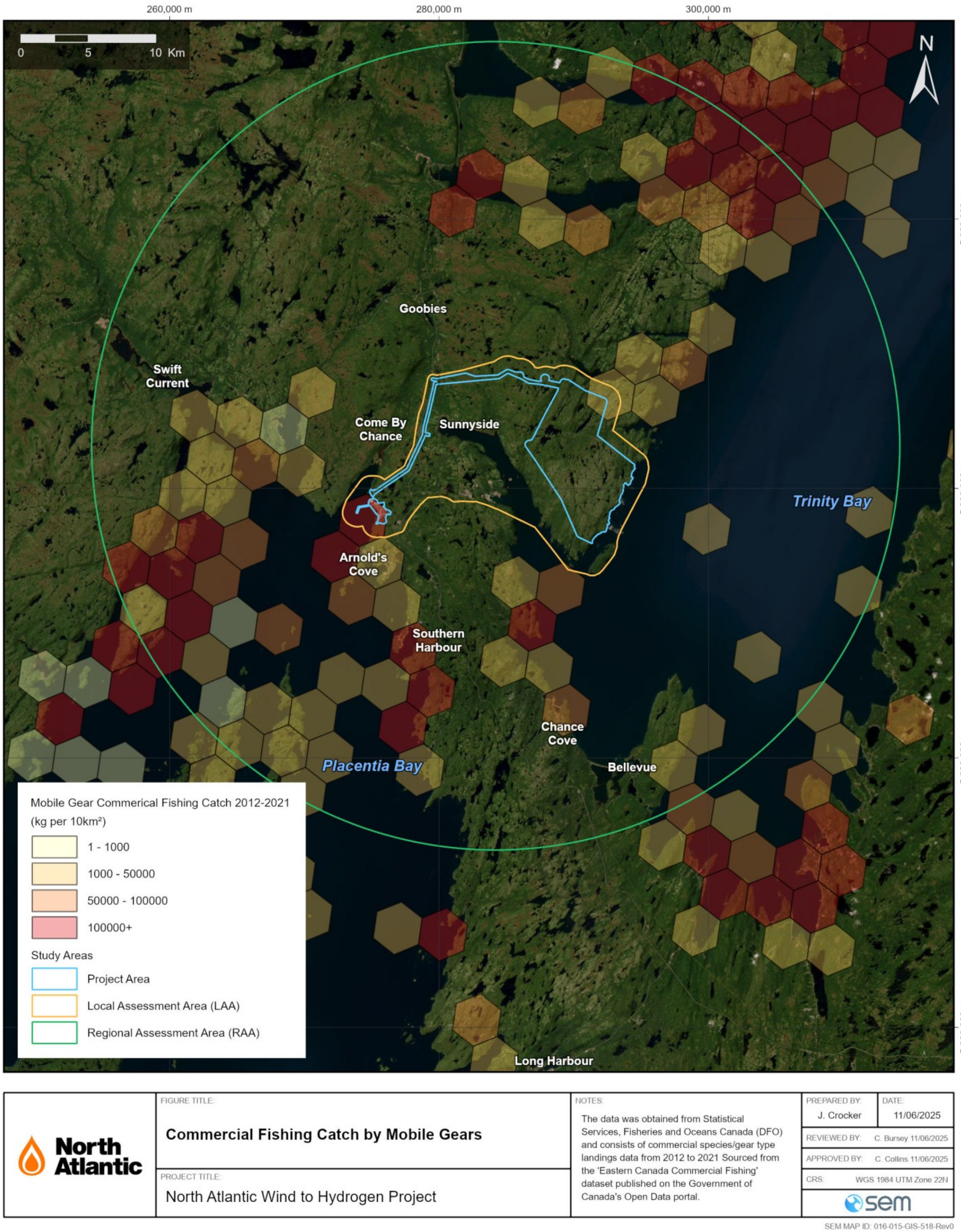

Figure 3.2.2-8 Commercial fishing catch by mobile gears.

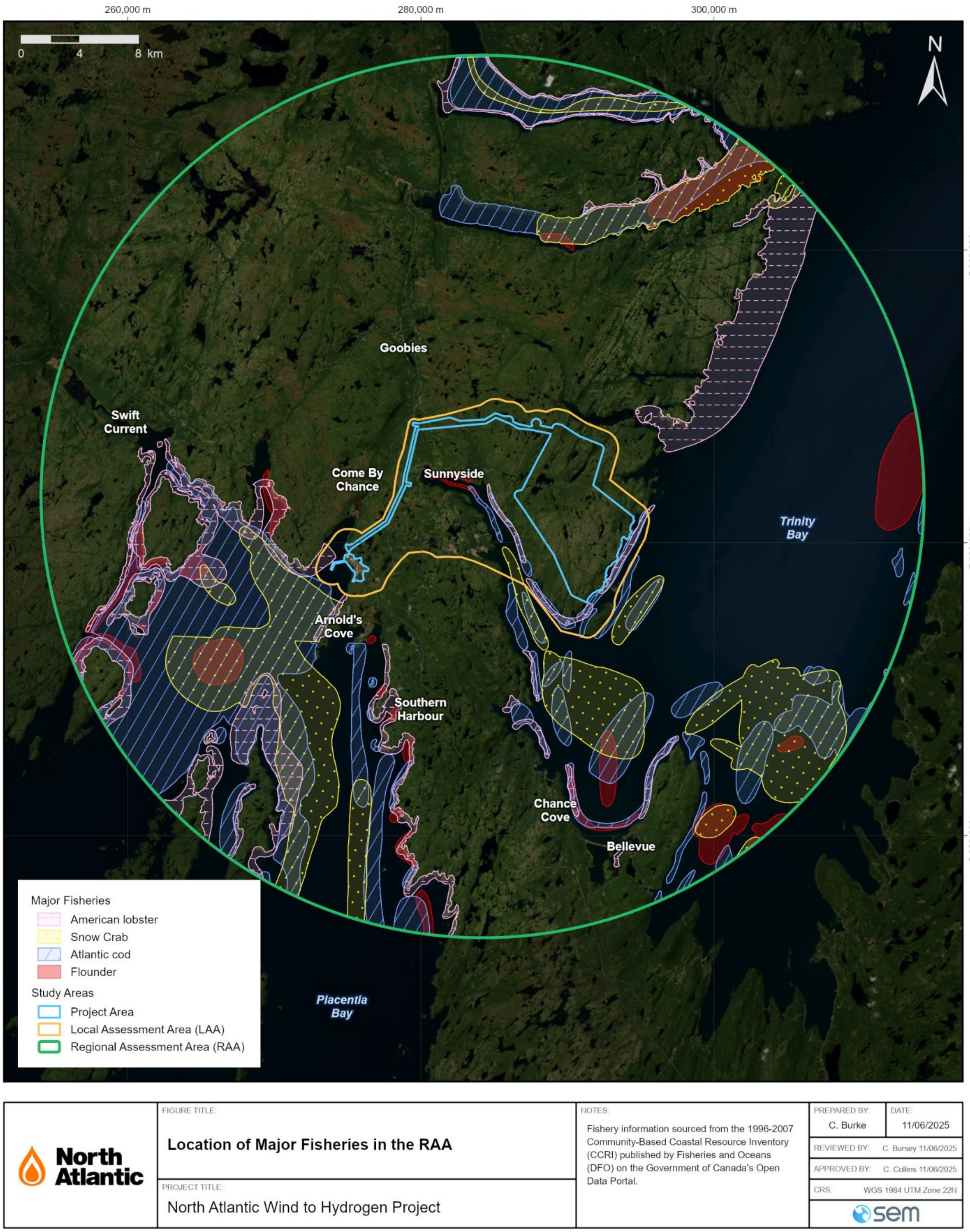

Figure 3.2.2-9 Location of major fisheries in the RAA.

As highlighted by DFO correspondence, the online Canada Marine Planning Atlas, and the Community-based Coastal Resource Inventories, snow crab and Atlantic cod are highly sought after in the commercial fishery. Figures 3.2.2-10 and 3.2.2-11 illustrates the density of snow crab and Atlantic cod in the RAA and LAA from 2012 to 2021, respectively. These species are expected to continue to be fished throughout the Project's lifespan in the RAA, LAA, and surrounding area.

Commercial fishing seasons vary by species. Some species have set time frames for fishing, while others are governed by quotas and close once the limit is reached. Table 3.2.2-18 outlines the 2024 fishing seasons for 3Ps commercial fisheries (DFO, 2025d). Most groundfish species have long fishing seasons; for example, the Atlantic cod season runs from mid-May to March. In contrast, the shellfish fishery seasons are shorter, with higher-value species like snow crab and American lobster being fished for only three to four months. The fishing season in Placentia Bay is year-round.

Table 3.2.2-19 shows the commercial fishing seasons for each species from 2018 to 2024, based on their economic value (DFO, 2025a). Dark blue indicates the open fishing seasons for the three highest-value species: snow crab, American lobster, and Atlantic cod. The next three highest-value species, Atlantic halibut, Atlantic herring, and scallops, and their open seasons are represented in light blue. The peak months for total landings in Placentia Bay are June and July, primarily driven by cod fishing activities. Snow crab significantly influences the highest landing values, which occur from May to June (Husky Energy, 2012).

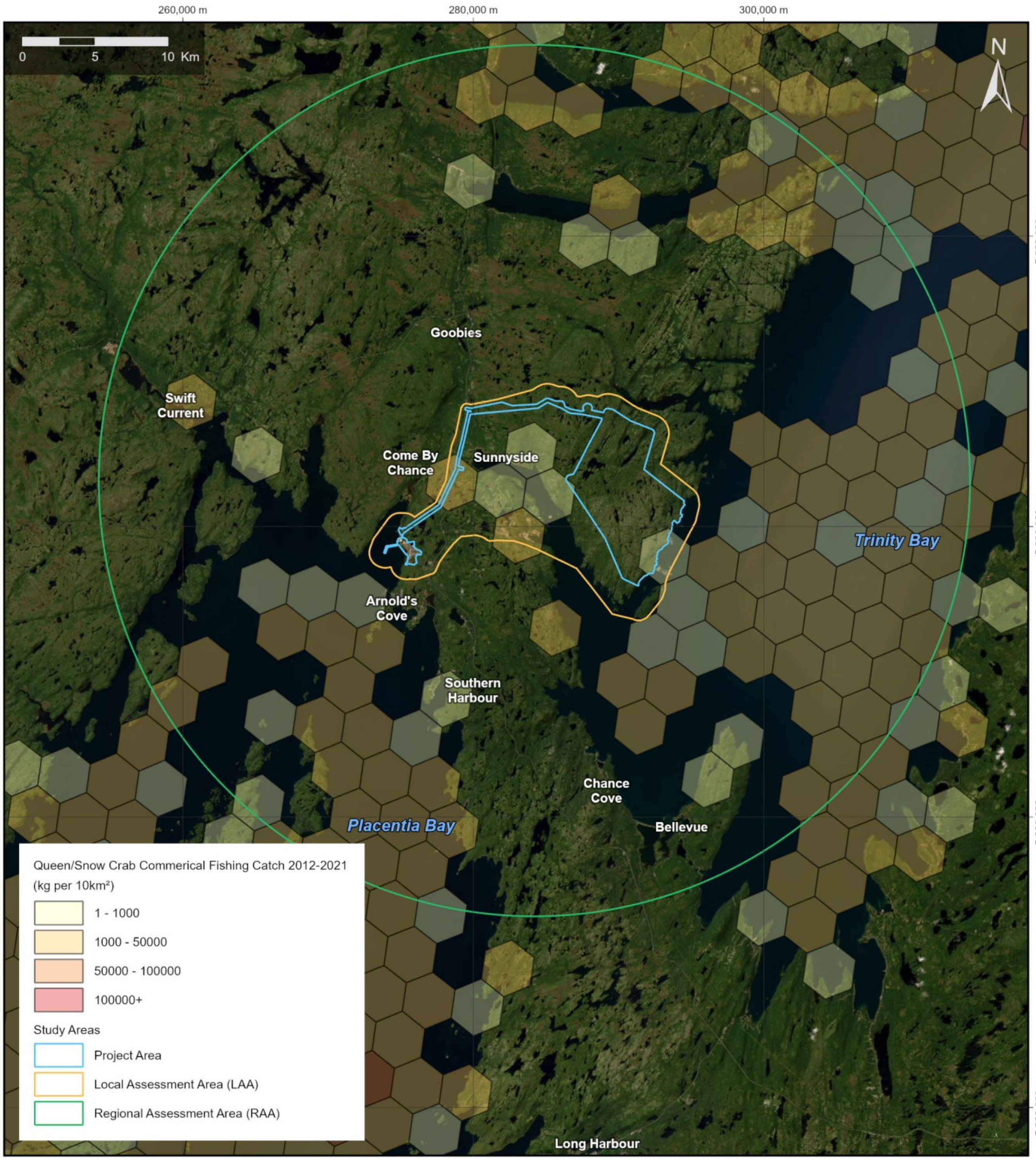

	FIGURE TITLE: Density of Commercial Fishing Catch of Snow/ Queen Crab	NOTES:	PREPARED BY: J. Crocker	DATE: 11/06/2025
North Atlantic	PROJECT TITLE: North Atlantic Wind to Hydrogen Project	The data was obtained from Statistical Services, Fisheries and Oceans Canada (DFO) and consists of commercial species/gear type landings data from 2012 to 2021 Sourced from the 'Eastern Canada Commercial Fishing' dataset published on the Government of Canada's Open Data portal.	REVIEWED BY: C. Bursey 11/06/2025	
			APPROVED BY: C. Collins 11/06/2025	
			CRS: WGS 1984 UTM Zone 22N	
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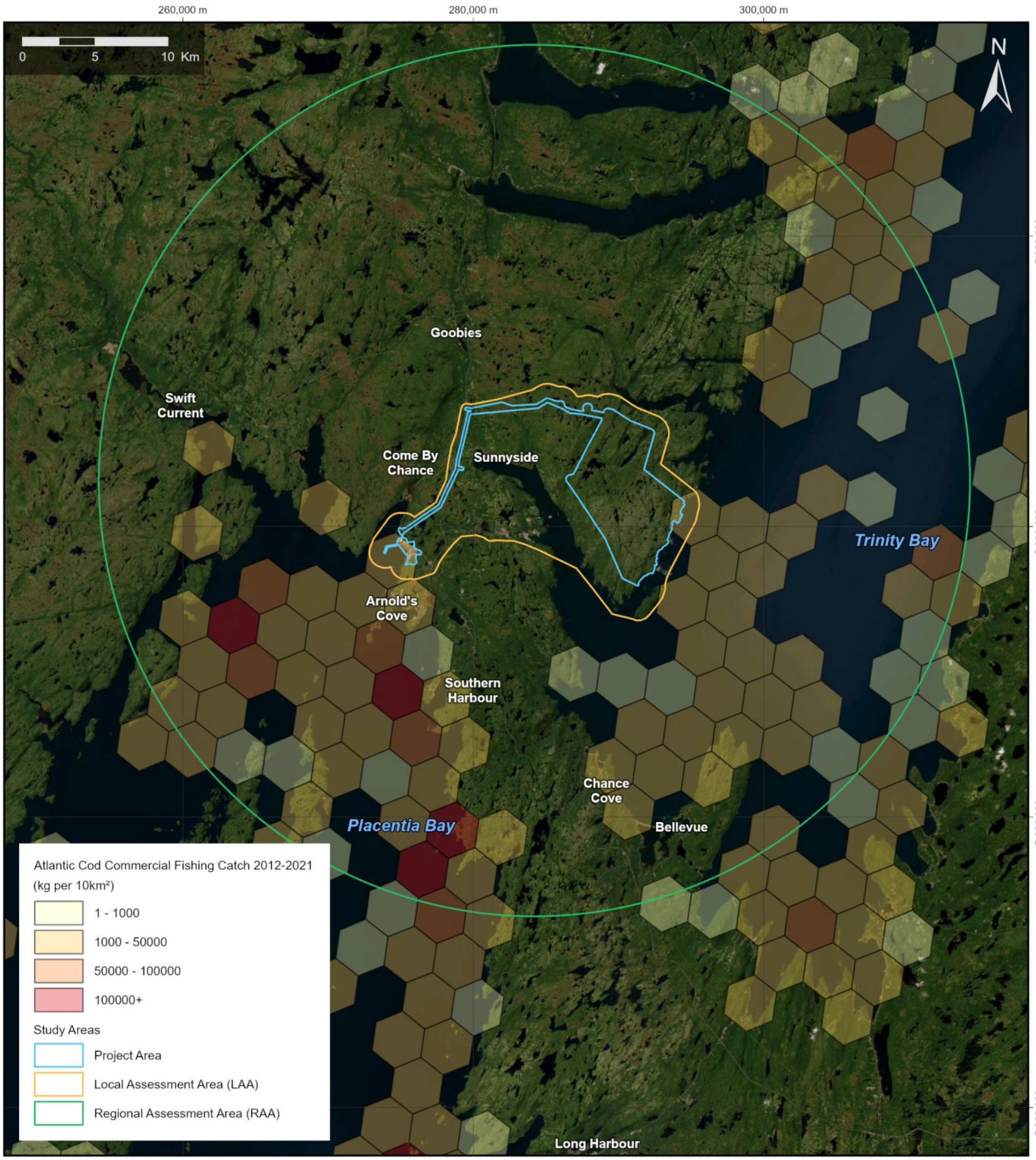
Figure 3.2.2-10 Density of commercial fishing catch of snow/queen crab.



North Atlantic	FIGURE TITLE: **Density of Commercial Fishing Catch of Atlantic Cod**	NOTES: The data was obtained from Statistical Services, Fisheries and Oceans Canada (DFO) and consists of commercial species/gear type landings data from 2012 to 2021 Sourced from the 'Eastern Canada Commercial Fishing' dataset published on the Government of Canada's Open Data portal.	PREPARED BY: J. Crocker; DATE: 11/06/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 11/06/2025
			APPROVED BY: C. Collins 11/06/2025
			CRS: WGS 1984 UTM Zone 22N
			sem

SEM MAP ID: 016-015-GIS-520-Rev0

Figure 3.2.2-11 Density of commercial fishing catch of Atlantic cod.

Table 3.2.2-18 Marine commercial fisheries seasons in 3Ps in 2024.

Fixed Fishing Equipment	
Species Common Names (Area)	**Commercial Fishing Season Date**
Atlantic halibut (3Ps - all units)	Mid-May to March 31
Atlantic cod (3Ps units (b) and (c))	Mid-May to February 28.
Greenland halibut (Turbot) (3Ps - all units)	Mid-May to March 31; fishing not authorized in water depths less than 183 m
Lobster (Lobster Fishing Area 10 – 3Ps unit (c))	May 4 to July 5
Redfish (3Ps - all units)	Fishing is authorized in Northwest Atlantic Fisheries Organization Sub-Division 3Ps units (a) and (b) for fixed gears, not in unit (c) (Bycatch only)
Skate/Monkfish (3Ps units (a), (b) and (c))	April 1 to March 31, but only open during periods when Atlantic halibut retention is prohibited.
Snow/Queen crab (3Ps - all units)	April 6 to July 7
White hake (3Ps unit (c))	Fishing is not authorized in Northwest Atlantic Fisheries Organization Sub-Division 3Ps unit (c) (Bycatch only)
Winter flounder (Blackback) (3Ps- units (a), (b), and (c))	Mid-May to March 31; fishing not authorized in water depths over 55 m
Mobile Fishing Equipment	
Species Common Names	**Commercial Fishing Season Date**
Herring (Herring Fishing Area 10 - 3Ps unit (c))	Summer April 1 to June 30, Fall August 15 to March 31
Redfish (3Ps units (a), (b), (c), (e), (f), (g), and (h) portion of Redfish Unit 2)	July 1 to March 31
Scallop (Scallop Fishing Areas 10 - 3Ps unit (c))	April 23 to Dec 31
Skate (3Ps - all units)	April 1 to March 31
Grey sole/witch flounder (3Ps - all units)	April 1 to March 31

Source: DFO, 2024c
Notes:
Dates of fishing season are subject to change. For some fisheries, specific dates for openings and closings will be determined in consultation with industry through the normal Conservation Harvesting Plan (CHP) process (DFO, 2023d). Some specific opening dates are determined annually in consultation with the Fish Food and Allied Workers (FFAW)/industry, while other fisheries openings may be delayed or staggered due to the DFO research vessel science survey. The 2023 to 2024 season Northwest Atlantic Fisheries Organization Sub-Division 3Ps for groundfish mobile and fixed gear vessels, less than 27.4 m have been used to represent various groundfish (e.g., Atlantic halibut, Atlantic cod, Greenland halibut, monkfish, redfish, skate, white hake, and winter flounder).

Table 3.2.2-19 Top commercial fisheries by season in 3Psc, 2024.

Species Common Names	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlantic Halibut												
Atlantic Cod												
Atlantic Herring												
American Lobster												
Scallop												
Snow/Queen Crab												

Source: DFO, 2024c
Notes:
White cells represent an open fishing season. Light blue cells represented the less valuable species economically while blue represents the three species of highest economic importance for the period 2018 to 2024, (DFO, 2025a). Colour-crossed cells indicate that the fishing season started or ended mid-month. Crossed cells represent a closed fishing season.

Marine Recreational Fisheries

Table 3.2.2-20 outlines the recreational fisheries in the province, including required licensing and seasonal dates for specific fisheries.

In NL, DFO regulates recreational fisheries in coastal waters, including saltwater, marine, and brackish areas. Depending on the species, residents may need a recreational fishing license. Regulations and management measures apply to various species, including mussels, clams, squid, mackerel, capelin, trout, smelt, groundfish species, seals (for personal use), scallops, and sharks.

Table 3.2.2-20 Marine and coastal recreational fisheries in NL.

Species Common Name	Licence Required?	Season Date
Mussel	No	Open year-round
Clams	No	Open year-round
Squid	No	Open year-round
Mackerel	No	April 1 to December 31
Capelin	No	Open year-round
Trout (Coastal Waters)	No	Open year-round
Smelt (Coastal Waters)	No	Open year-round
Groundfish	No	The season is announced annually in spring, with an opening first date in July continuing to September
Seal (Personal Use)	Yes	TBD
Scallop	Yes	January 1 to December 31
Shark	Yes	April 1 to December 31

Source: (DFO, 2025d)

Groundfish, particularly Atlantic cod, are the primary target of recreational fisheries in insular Newfoundland due to their cultural and historical significance. Recreational groundfish fishing is permitted by DFO within designated Northwest Atlantic Fisheries Organization divisions, including the RAA (Northwest Atlantic Fisheries Organization unit area 3Psc) (DFO, 2025b). Retained groundfish species (up to a limit of five) include Atlantic cod, flounder species (e.g., winter, witch, and yellow flounders), American plaice, pollock, haddock, redfish, turbot (Greenland halibut), skate, and white hake. Sculpins and cunners must be released. The retention of Atlantic halibut, Spotted and Northern wolffish, and shark species is prohibited.

Recreational fishing activity along the coast of the PA (i.e., Come By Chance, Arnolds Cove, etc.) may fluctuate due to factors such as private land access and marine traffic at local docks, including those at Arnold’s Cove, Whiffen Head, Come By Chance, and Bull Arm. There may be a noticeable increase in recreational fishing in this region from July to October due to the groundfish fishing season.

Marine Indigenous Fisheries

The closest Indigenous community to the Project is the Miawpukek First Nation, located at the mouth of Conne River on the south coast of insular Newfoundland. Miawpukek operates and collaborates with various enterprises in the seafood sector, including both fisheries and aquaculture, such as Netukulimk Fisheries Ltd. and Miawpukek First Nation’s partnership with RS Marine Ltd. (Government of NL, 2023).

Miawpukek First Nation holds commercial fishing licenses in 3Ps and possesses enterprises and additional licenses that provide access to other divisions, including 3KL, 3LN, and Areas 4-33 (Equinor, 2017). Their primary harvest is snow crab, but they also have opportunities to harvest sea cucumber, groundfish, whelk, bluefin tuna, cunners, and other species (Government of NL, 2023). Additionally, Miawpukek First Nation holds a Food, Social, and Ceremonial (FSC) license covering a portion of 3P, extending from the south coast to Bay d’Espoir. This license permits the harvest of scallop, lobster, mackerel, herring, rainbow trout, brook trout, Atlantic cod, Atlantic salmon American eel, rainbow smelt, capelin, seal (harp, grey, and harbour), snow crab, whelk, and redfish (Equinor, 2017). The south coast of Bay d’Espoir is located within Northwest Atlantic Fisheries Organization unit area 3Psa, west of the Burin Peninsula.

Miawpukek First Nation is also engaged in the commercial fishery through its collaboration with Clearwater Seafoods, one of the largest wild seafood companies. As a member of the Mi’kmaq Coalition, Miawpukek contributed to acquiring 50% of Clearwater Seafoods in 2021.

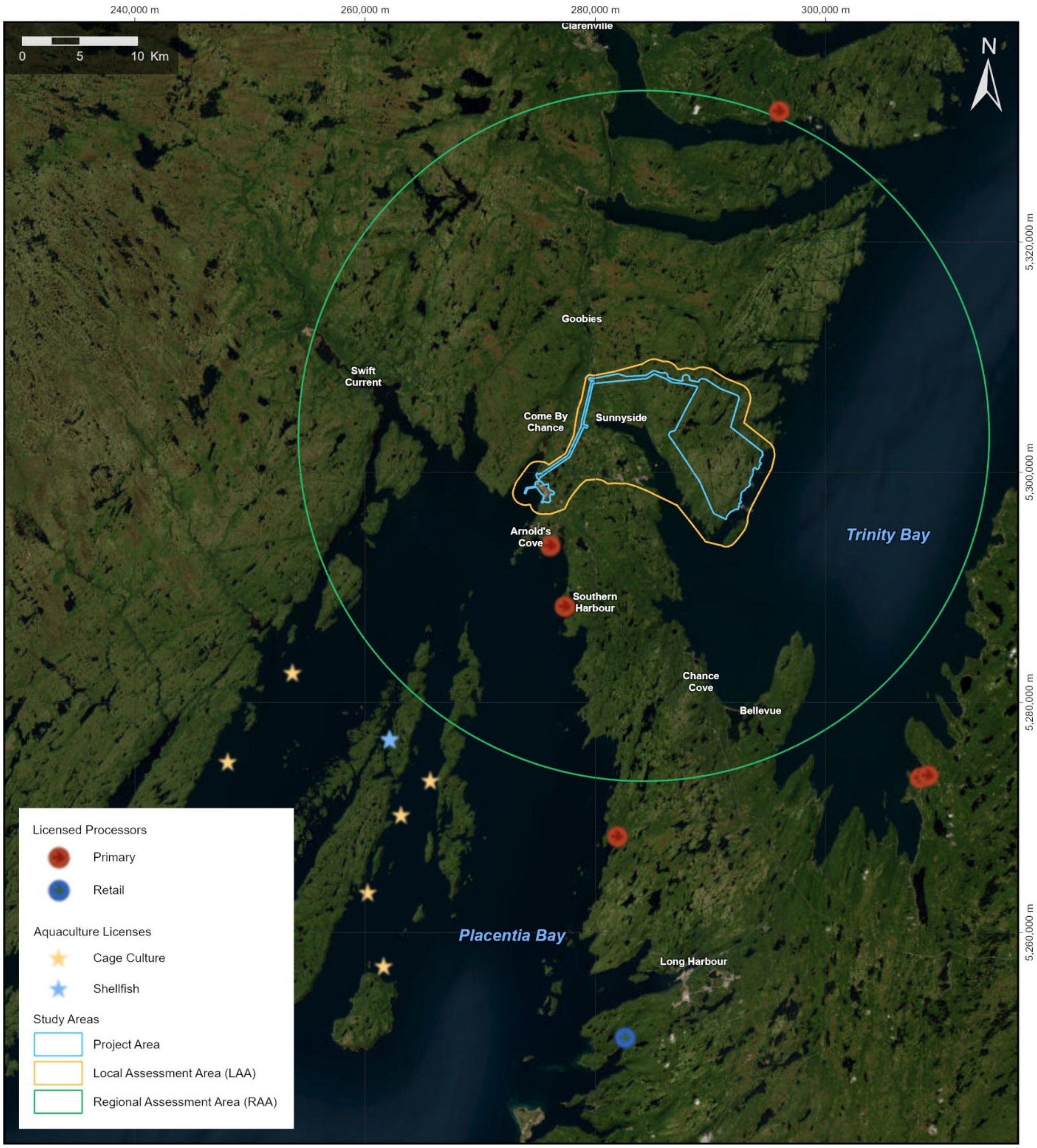
In the aquaculture sector, Miawpukek First Nation is actively assessing the bioavailability of cunners as cleaner fish to address sea lice issues in aquaculture (Government of NL, 2023). They are also involved in monitoring traditional harvests, commercial fisheries, food fisheries, and various species across the province, including Atlantic salmon, American eel, and northern wolfish (Miawpukek First Nation, 2025). Given their extensive participation in commercial, recreational, and Indigenous fisheries, Miawpukek First Nation is a significant stakeholder in Newfoundland's fisheries, with potential involvement in fisheries within 3Psc and freshwater resources near the RAA.

Aquaculture and Fish Processing

Potential interactions with the aquaculture industry and seafood processors within Placentia Bay and the RAA are outlined below. In NL, farmed aquatic species include finfish such as Atlantic salmon, steelhead trout, and Atlantic cod, as well as shellfish like blue mussels and American oysters (Gov. NL, n.d.). Atlantic salmon is the primary salmonid species cultivated in the province. The finfish aquaculture sector operates marine-based cage sites along the south coast and is dominated by three large multinational companies: Mowi Canada East, Cooke Aquaculture, and Grieg Seafood. This region is the only suitable area in the province for salmonid culture, as its bays and fjords, including Placentia Bay, remain ice-free year-round (Gov. NL, n.d.).

Figure 3.2.2-12 provides details on the location and type of aquaculture sites, as well as licensed seafood processors in Placentia Bay and areas adjacent to the RAA. Placentia Bay hosts two land-based and 16 marine-based licensed aquaculture sites. The two land-based facilities near Marystown function as hatcheries and are owned by Marbase Cleanerfish Ltd. and Grieg NL Nurseries Ltd. (DFO, 2025i). Most marine-based sites are concentrated along the western coast of Placentia Bay and within the Western and Central Channels near Merasheen Island. Of the 16 licensed marine-based cage culture sites for Atlantic salmon production, 14 are operated by Grieg Marine NL Ltd. and Grieg Newfoundland Salmon Ltd. These aquaculture sites are in inshore waters, typically within sheltered coves or along protected shorelines. Their placement is influenced by environmental conditions, proximity to other human activities, nearby community sewage outfalls, and access to essential services such as roads and electricity. Although, none of the marine cage sites in Placentia Bay are located within the RAA, there is a major concern for escapes to interact and potentially interbreed with wild salmon in surrounding Placentia Bay Rivers. This could include four rivers in the RAA.

Several licensed seafood processors operate along the Placentia Bay coast, including Dandy Dan's Fish Market Limited (Ship Harbour), Avalon Ocean Products Incorporated (Fair Haven), Quin-Sea Fisheries Limited (Southern Harbour), and Icewater Seafoods Inc. (Arnold's Cove) (DFO, 2025i). Among these, two fish processing plants, Icewater Seafoods Inc. and Quin-Sea Fisheries Limited, operate within the RAA (Figure 3.2.2-12).



North Atlantic	FIGURE TITLE: **Aquaculture Sites and Fish Processors in Placentia Bay**	NOTES: Fishing data sourced from Statistical Services, Fisheries and Oceans Canada (DFO). Licensed Fish Processors and Aquaculture Sites in Newfoundland and Labrador (Department of Fisheries, Forestry and Agriculture Geohub.	PREPARED BY: J. Crocker	DATE: 11/06/2025
			REVIEWED BY: C. Bursey 11/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		APPROVED BY: C. Collins 11/06/2025	
			CRS: WGS 1984 UTM Zone 22N	
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Figure 3.2.2-12 Aquaculture sites and fish processors in Placentia Bay.

3.2.3 Terrestrial Environment

This section provides a synopsis of the terrestrial environmental baseline studies conducted throughout the PA, including survey methodologies and results. A more detailed overview of the terrestrial component studies is presented in Appendices D1 through D7.

3.2.3.1 Flora

Rare plant surveys were conducted in August 2024. The PA hosts a range of ecotypes, including mature and regenerating forests, wetlands, and barrens. Satellite imagery and ELC mapping was used to inform the selection of survey sites. Rare flora surveys were conducted throughout representative portions of the PA with the intention of achieving adequate geospatial and ecological coverage. Wetlands and rocky barren outcrops were prioritized by surveyors as these habitats are more likely to host rare plants. All plant species were recorded during each transect to ensure that no observations were missed. Although no plant SAR were observed, several SCC were recorded (discussed in Section 3.2.3.5). A full list of plants identified in the PA is provided in Appendix D6: Rare Plants.

Forests within the PA are dominated by two main coniferous species, balsam fir (*Abies balsamea*) and black spruce (*Picea mariana*). Coastal areas and open areas, especially those previously deforested and left exposed, may host mature white spruce (*Picea glauca*) as the dominant coniferous species; however, these areas represent a smaller portion of the PA. Eastern larch (*Larix laricina*), and white birch (*Betula papyrifera*) are common throughout, with large patches of mixedwood forest or pure stands of white birch peppered throughout sloped valleys.

Upland barrens at the summit of elevated rocky ridges descend to heavily forested mid-slopes and lower valley hillsides. These valleys dissect rocky upland barrens throughout the eastern portion of the PA, often following streams and small rivers or wetlands. Here, large intact coniferous forests exist in wide low-lying valleys, and trees reach mature heights. However, most forested habitat within the PA occupies elevated, exposed terrain. Heavy wind and lack of soil development means that most forest is of a shorter height class, stunted by the typical factors influencing growth of the balsam fir and black spruce forests within the Maritime Barrens ecoregion. Coniferous forest in the proposed Wind Farm area exists as stunted, densely growing patches of coniferous scrub, rarely exceeding 12 m in height.

3.2.3.2 Ecological Land Classification

The Project ELC was completed using both a comprehensive GIS analysis and field verification program. A preliminary GIS analysis was used to guide the selection of field verification sites, which were chosen to represent adequate coverage of the PA on an ecological and geospatial basis. ELC classifications were also conducted opportunistically with other terrestrial field surveys, allowing for greater coverage of the PA. In total, 56 points were surveyed and categorized across the PA.

At each survey site, a 10 m radius surrounding the observer was surveyed for vegetation and significant abiotic features. Each plant species within the herb layer (<1 m height), shrub layer (>1 m to 5 m height), and tree layer/canopy (>5 m) was identified, and their relative abundance was estimated within the plot. The indicator of abundance for each species was relative to the surrounding species and expressed on a scale of 1 to 100% dominance of the survey area. Topographic characteristics, moisture regimes, and other significant features were noted outside of the 20 m zone where it aided in the classification of the area. Wetlands were characterized as per the Canadian Wetland Classification System (CWCS), which uses the following five classes: (i) bog; (ii) fen; (iii) swamp; (iv) marsh; and (v) shallow water wetlands (National Wetlands Working Group, 1997). However, for the purposes of this study, wetlands were not differentiated in the final ELC.

Field data was represented in Excel spreadsheets, which were combined with geospatial data to produce a highly detailed map of the ecotypes within the PA. Geospatial data was analyzed in ArcGIS and refined several times. The following data sources were used to produce the ELC:

- NL DFFA Land Cover databases and tables (NL FFA, 2025);
- Canadian Wetland Inventory Map version 3A (CWIM3A) (Natural Resources Canada, 2024);
- NL aerial imagery (30 cm resolution) (purchased from the Government of NL).
- NL 5 m Digital Elevation Model (DEM) (NL FFA, 2021); and
- 56 ground-truthing points and associated habitat data collected during field surveys.

Draft mapping products were analyzed with the assistance of terrestrial biologists familiar with the PA before finalization. The end products include a detailed inventory of the ecotypes present (Table 3.2.3-1) and an ELC map of the PA (Figure 3.2.3-1). In total, 13 ecotypes were identified, including Rocky Barren, Coniferous Scrub, Wetland, Mature Coniferous Forest, Open Water, Developed/Disturbed Land, Open Coniferous Forest, Mixedwood Forest, Open Mixedwood Forest, Mature Deciduous Forest, Coastline, Deciduous Scrub, and Regenerating Forest. Each ecotype is described further below – note that the Open Coniferous Forest and Open Mixedwood Forest ecotypes are described together.

The ELC was used to plan the field surveys of the other VCs included in this Registration. Specialized ecotypes like wetlands, forests on wetland fringes, and rocky outcrops have elevated potential for the occurrence of rare plant or lichen species, and wildlife species of interest like the Newfoundland muskrat (*Ondatra zibethicus obscurus)*. Ecotypes known to provide suitable habitat for rare species were targeted with other terrestrial surveys. For example, coniferous forests adjacent to Wetlands surveyed for boreal felt lichen during rare lichen surveys, and Mature Coniferous Forest stands were surveyed for Red Crossbill *percna* during avifauna surveys.

Table 3.2.3-1 Ecotype composition, Project Area.

Ecotype	Area (m^2)	Area (ha)	Percentage Cover (%)
Rocky Barren	22,101,167	2,210	36.82%
Coniferous Scrub	15,942,549	1,594	26.56%
Wetland	7,033,447	703	11.72%
Mature Coniferous Forest	5,228,898	523	8.71%
Open Water	4,407,146	441	7.34%
Developed/Disturbed Land	1,768,558	177	2.95%
Open Coniferous Forest	1,378,295	138	2.30%
Mixedwood Forest	922,094	92	1.54%
Open Mixedwood Forest	594,623	60	0.99%
Mature Deciduous Forest	194,331	19	0.32%
Coastline	165,206	17	0.27%
Deciduous Scrub	119,291	12	0.20%
Regenerating Forest	23,899	2	0.04%
ELC Total:	**59,879,504**	**5,988**	**99.75%***
Total Surface Area:	**60,031,706**	**6,003**	**100%**

Notes
*The discrepancy between total ELC area (5,988 ha) and Project Area (6,003 ha) resulting in 99.75% total area coverage is attributed to variable marine coastal boundaries (tidal influence), which was not classified in the ELC.

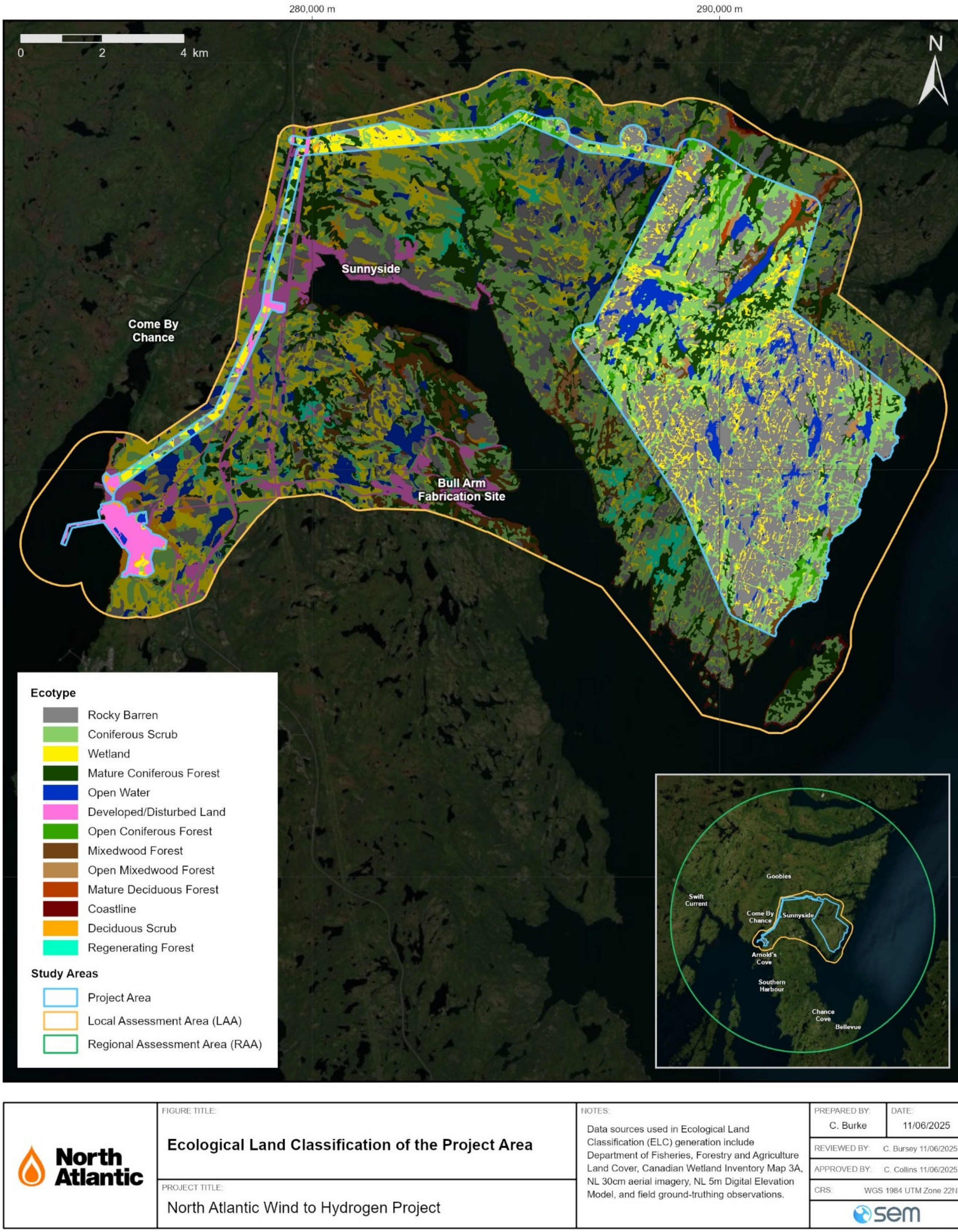


Figure 3.2.3-1 Ecological land classification of the Project Area.

Rocky Barren

The Rocky Barren ecotype (Figure 3.2.3-2) in the PA can be described as areas of upland, relatively dry sites where the vegetation layer is restricted to low shrubs and herbs. Much of the ground cover consists of non-vascular plants and lichens, often dominated by *Cladonia* lichens or mosses such as *Raccomitrium* spp. The shrub layer is dominated by heath such as kalmia, crowberry, and other ericaceous shrubs. Where trees exist, they are often coniferous and stunted, existing in the shrub layer even as mature trees. The Rocky Barren ecotype has been separated into three subtypes:

- Cladonia Barren – Dominated by non-vascular lichens and mosses with sparse heath patches. *Cladonia* lichens are often represented by four species: *Cladonia alpestris, Cladonia arbuscula, Cladonia angiferina*, and *Cladonia mitit*.
- Rocky Upland – Largely bare rock with pockets of non-vascular plants (as in *Cladonia* barrens) often existing at the highest elevations and on rapidly transitioning "tolts".
- Heath – The transitional zone between coniferous scrub and upland barrens. Non-vascular plants such as *Cladonia* lichens and mosses occur on ground level; crowberry heath, lingonberry, juniper, and kalmia dominate the herb layer; and sparse black spruce and alder may occur in the shrub layer.

Figure 3.2.3-2 Rocky barren in the Project Area.

Coniferous Scrub

The Coniferous Scrub ecotype (Figure 3.2.3-3) is used to classify stunted, shrub-like coniferous trees. In the PA, Coniferous Scrub predominately exists within transitional zones from Wetland to Mature Coniferous Forest. In these areas, coniferous trees such as black spruce and balsam fir grow close together but are stunted due to environmental conditions (e.g., nutrient deficiency, wind erosion), remaining between 0 and 3.5 m in height. Coniferous Scrub grows densely and in numerous layers, with wet soils and *Sphagnum* spp. mosses common throughout.

Figure 3.2.3-3 Coniferous scrub in the Project Area.

Wetland

Wetlands (Figure 3.2.3-4) are essential landscape features that provide critical ecosystem services like water storage and runoff delay, flood prevention, water purification, groundwater recharge, and carbon sequestration. These ecosystem services help to support local communities, biodiversity, water management, and climate change management, and provide critical wildlife habitat for a myriad of species.

Wetlands are abundant throughout the PA, mainly existing in the form of basin fens and bog complexes, although numerous other subtypes were derived. Sphagnum moss (*Sphagnum* spp.), sedges (*Carex* spp.), bog cranberry (*Vaccinnium oxycoccos*), and other obligate wetland herbs and graminoid spp. make up most of the herbaceous vegetation in Wetlands within the PA. Increased diversity and shrub growth can be observed at the transition point between fens and bogs and riparian ecosystems. Wetlands were typically in the western portion of the PA, becoming smaller and more scattered in the east. Wetlands were commonly observed in the deep, forested valleys that bisect the PA, existing here as fens, marshes, and shallow pools of water. Six subtypes of Wetland were identified within the PA: bog, fen, marsh, treed bog, treed fen, and swamp.

Figure 3.2.3-4 Wetland-fen in the Project Area.

Mature Coniferous Forest

The Mature Coniferous Forest ecotype (Figure 3.2.3-5) was abundant particularly along the proposed linear corridor (transmission line and access road) from Come By Chance to the Wind Farm PA. Black spruce and balsam fir dominate the tree stratum of this ecotype. The shrub layer is typically limited in the understory due to dense canopy cover. In breaks between the canopy, immature balsam fir and shrubs like sheep laurel (*Kalmia angustifolia*), Labrador tea (*Rhododendron groenlandicum*) and lowbush blueberry (*Vaccinium angustifolium*) can typically be observed. Herbaceous vegetation often consists of bunchberry (*Cornus canadensis*), twinflower (*Linnea borealis*), yellow clintonia (*Clintonia borealis*), and creeping snowberry (*Gaultheria hispidula*). Ground cover mainly consists of feathermoss species such as Schreber's moss (*Pleurozium schreberi*), stairstep moss (*Hylocomium splendens*) and plume moss (*Ptilium crista-castrensis*). Four subtypes were identified in the PA, based on the dominant canopy and substrate/herb layer species present: Balsam fir feathermoss, balsam fir sphagnum, balsam fir feathermoss/sphagnum, and black spruce feathermoss.

Figure 3.2.3-5 Mature coniferous forest in the Project Area.

Open Water

The Open Water ecotype (Figure 3.2.3-6) was scattered throughout the PA in the form of ponds, rivers, streams, and open-water wetlands. Aquatic resources within the PA are described further in Sections 3.1.2 and 3.2.2.

Figure 3.2.3-6 Open water in the Project Area.

Developed/Disturbed Land

The Developed/Disturbed Land ecotype encompasses all habitats that have been altered by human activity. The prevalence of Developed/Disturbed Land in the PA varies greatly between the highly industrialized Come By Chance Industrial Site area and the relatively undisturbed wild lands of the Wind Farm area.

Across the proposed Wind Farm area, there is little disturbance aside from historical small-scale wood harvesting, a few abandoned cabins, and campsites. There are a few instances of flattened meadows where forestry camps once existed, typically located on flood plains where streams meet lacustrine environment, as is visible in Figure 3.2.3-7 below.

Figure 3.2.3-7 Developed/disturbed land in the Project Area.

Open Coniferous and Open Mixedwood Forests

Open Coniferous and Open Mixedwood (Coniferous and Deciduous) Forests (Figure 3.2.3-8) within the PA are defined as open forested areas that have been previously deforested or disturbed by anthropogenic or natural forces. In this ecotype, ample space exists between trees, contrasting the young, dense growth of Regenerating Forests (discussed below). In the PA, the canopy within Open Forest ecotypes is mostly or fully open, and dominant vegetation is represented in the shrub and herb layer. Stunted trees receive abundant sun and experience generally low competition for space, with dead standing and felled trees common throughout. Meadows exist throughout the Open Forests in the PA, typically consisting of native meadow species such as goldenrod spp., meadowsweet (*Filipendula ulmaria*), bluejoint reedgrass (*Calamagrostis canadensis*), hawkweed, and other native herbs and graminoid species. In upland Open Coniferous Forest, heath species such as sheep laurel, Labrador tea, lowbush blueberry, and rhodora (*Rhododendron canadense*) dominate the herb layer and sometimes reach into the shrub layer.

Figure 3.2.3-8 Open coniferous forest in the Project Area.

Mixedwood Forest

Mixedwood Forests (Figure 3.2.3-9) contain both deciduous and coniferous trees, with neither comprising more than 75% of the canopy (Meades & Moores, 1994). White birch was the most prevalent deciduous species in these stands, while balsam fir and/or black spruce comprised the coniferous component. Understory vegetation at the herb layer consists of *Dryopteris* ferns and *Lycopodium* mosses, with sparse black spruce regen in the herb layer and balsam fir regen sometimes reaching into the shrub layer. Mixedwood Forests are sparse in the PA, often observed as small pockets found along valleys, typically between large Mature Coniferous Forest stands.

Figure 3.2.3-9 Mixedwood forest in the Project Area.

Mature Deciduous Forest

Although relatively uncommon in the PA, several small stands of Mature Deciduous Forest (Figure 3.2.3-10) exist. These stands are dominated by white birch with only sparse conifers present. Birch thickets often exist as secondary growth after a deforestation event, especially where favourable soil conditions exist (Meades & Moores, 1994). The dominant understory within Mature Deciduous Forest stands consists of ferns and non-vascular feathermosses with sparse herbaceous vegetation and shrubs.

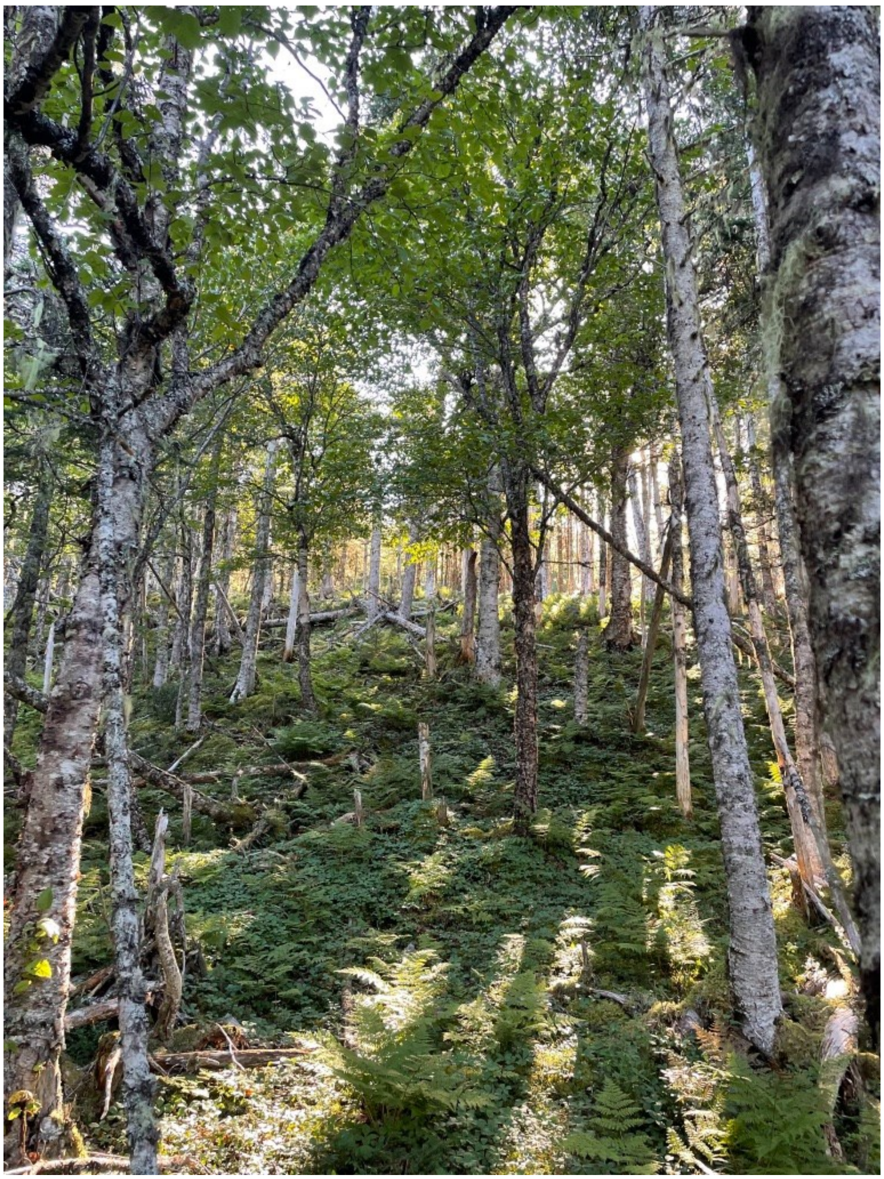


Figure 3.2.3-10 Mature deciduous forest in the Project Area.

Coastline

A strip of Coastline is present in the eastern portion of the PA, but otherwise the Project boundary does not extend to the coast. The Coastline here exists mainly as rocky cliffs that drop steeply to the ocean below. The most dominant neighbouring ecotypes along the Coastline are Open Coniferous Forest, Coniferous Scrub, and Rocky Barren. The elevation, exposure, and erosion create similar vegetation communities here as in upland sites. In several areas where stream valleys meet the sea or flatter topography allows for the accumulation of eroded beach stone, small rocky beaches occur. Figure D3-3.3-14 illustrates a representative strip of coastline along Bull Island in the LAA.

Figure 3.2.3-11 Coastline in the LAA (Bull Island).

Deciduous Scrub

Deciduous Scrub (Figure 3.2.3-12) describes low-growing areas of deciduous herb-layer and shrub-layer trees and shrubs between 0 and 5 m in height (shrublands). Secondary succession of areas previously cleared of vegetation will often form a shrubland dominated by rapidly invading pioneer species such as alders, willows, and other shrubs. Deciduous Scrub within the PA is more likely associated with moist conditions where alder-swamps may exist in riparian zones along fens, streams, and near marshy lacustrine environments (Meades & Moores, 1994).

Figure 3.2.3-12 Deciduous Scrub in the Project Area.

Regenerating Forest

This ecotype is a generalized classification for Coniferous Forest stands between 10 and 20 years old. While Regenerating Forest (Figure 3.2.3-13) could classify many previously disturbed sites, this ecotype is specific to areas with densely growing conifers up to 6.5 m tall that exhibit minimal signs of deforestation or stunting due to environmental factors (i.e., wind exposure, erosion). In the PA, Regenerating Forest is typically represented by a mixture of black spruce and balsam fir, with early successional white birch growth throughout.

Figure 3.2.3-13 Regenerating Forest in the Project Area.

3.2.3.3 Fauna

General mammal surveys were conducted concurrently with other terrestrial field surveys, allowing for a large portion of the PA to be covered, including a wide variety of habitat types. Surveyors took note of visual and auditory observations, as well as mammal sign like tracks, scat, and browsing. These surveys were designed to determine the presence/absence of mammals within or adjacent to the PA, and to establish an understanding of the relative use of each habitat type within the PA. Results from the general mammal surveys are summarized in Table 3.2.3-2.

Species-specific surveys were conducted for the American marten (*Martes americana atrata*) and Newfoundland muskrat (*Ondatra zibethicus obscurus*), at the request of NL WD. Survey methodology was provided by NL WD and followed strictly. Hair snag traps were deployed throughout ten locations in the PA thought to represent suitable marten habitat. Although they did not result in the collection of marten hairs, several short-tailed weasel (*Mustela richardsonii*) hair strands were collected.

Muskrat surveys involved detailed inspections of the margins of suitable wetlands and waterbodies for sign of muskrat habitation. Seven sites were investigated in various locations throughout the PA. While no muskrats were directly observed, several survey sites were noted to contain ample evidence of muskrat habitation. Further details on marten and muskrat surveys are provided in Appendix D4: Mammals Baseline Study.

Table 3.2.3-2 Mammals observed in the Project Area.

Common Name	Scientific Name	Observation Types
Moose	*Alces alces*	Visual observation, tracks, Rut pit and other rut sign, antler scrapes, scat, game trail, browse, shed antlers
Red squirrel	*Tamiasciurus hudsonicus*	Visual observation, tracks, call, scat, cache, nests
Snowshoe hare	*Lepus americanus*	Visual observation, tracks, game trail, scat, browse
Coyote	*Canis latrans x Canis lycaon*	Tracks, kill site, game trail
Canada lynx	*Lynx canadensis*	Tracks
Masked shrew	*Sorex cinerus*	Visual observation, tracks, scat
Short-tailed weasel	*Mustela richardsonii*	Tracks, hair snags
Beaver	*Castor canadensis*	Visual observation, tracks, cache, dams, lodges, game trail, chews, downed trees
Vole spp.*	*Microtus pennsylvanicus, Clethrionomys gapperi*	Tracks, game trail (tunnels)
Red fox	*Vulpes vulpes*	Tracks, scat, kill site
Black bear	*Ursus americanus*	Visual observation, tracks, scat
Muskrat	*Ondatra zibethicus obscurus*	Cache, burrows, houses, chews/browse, game trails
River otter	*Lontra canadensis*	Tracks, burrow/trails

Notes
*Vole spp. could not be identified to species based on tracks but is likely either *Microtus pennsylvanicus* or *Clethrionomys gapperi.*

3.2.3.4 Avifauna

Avifauna surveys were conducted throughout the PA in 2024, beginning in January and continuing at regular intervals through to November. Field surveys recommenced in January 2025, and observations from 2024 through to June 2025 are included here. Field survey efforts to date include the use of point count surveys, atlassing transects, targeted seabird surveys, and sky scans for raptors, where applicable. Point counts are the most frequent form of survey used, and were undertaken throughout various habitat types in the PA. Point count surveys involve spending ten minutes in a designated location and noting each bird species observed (both visually and/or auditorily) within a 150 m radius. Observations are made within 360 degrees surrounding the observer, and the birds' flying height and direction are noted if visible. The same point count locations were surveyed repeatedly where possible, with some variation as necessary. When determining field survey locations, it was ensured that habitat types with a heightened potential to host SAR (e.g., coniferous forest for Red Crossbill *percna*) were represented.

Two autonomous recording units (ARUs), devices designed to identify and record bird vocalizations (e.g., calls, songs), were deployed in the PA from May to October 2024. PA ARU 1 was deployed in a small wetland valley surrounded by rocky barrens, while PA ARU 2 was deployed on a slope above mature mixedwood forest and marshy habitat, below a mountaintop barren. Additional units have been deployed in 2025 to ensure extensive coverage throughout the PA. ARUs were preprogrammed to be active at various points throughout the night, morning, and evening. Data was stored in folders, organized in Excel, and analyzed using Bioacoustics software with regular manual confirmation by a biologist. Acoustic monitoring results from 2025 will be provided to the appropriate regulatory authorities once data collection and analysis are complete.

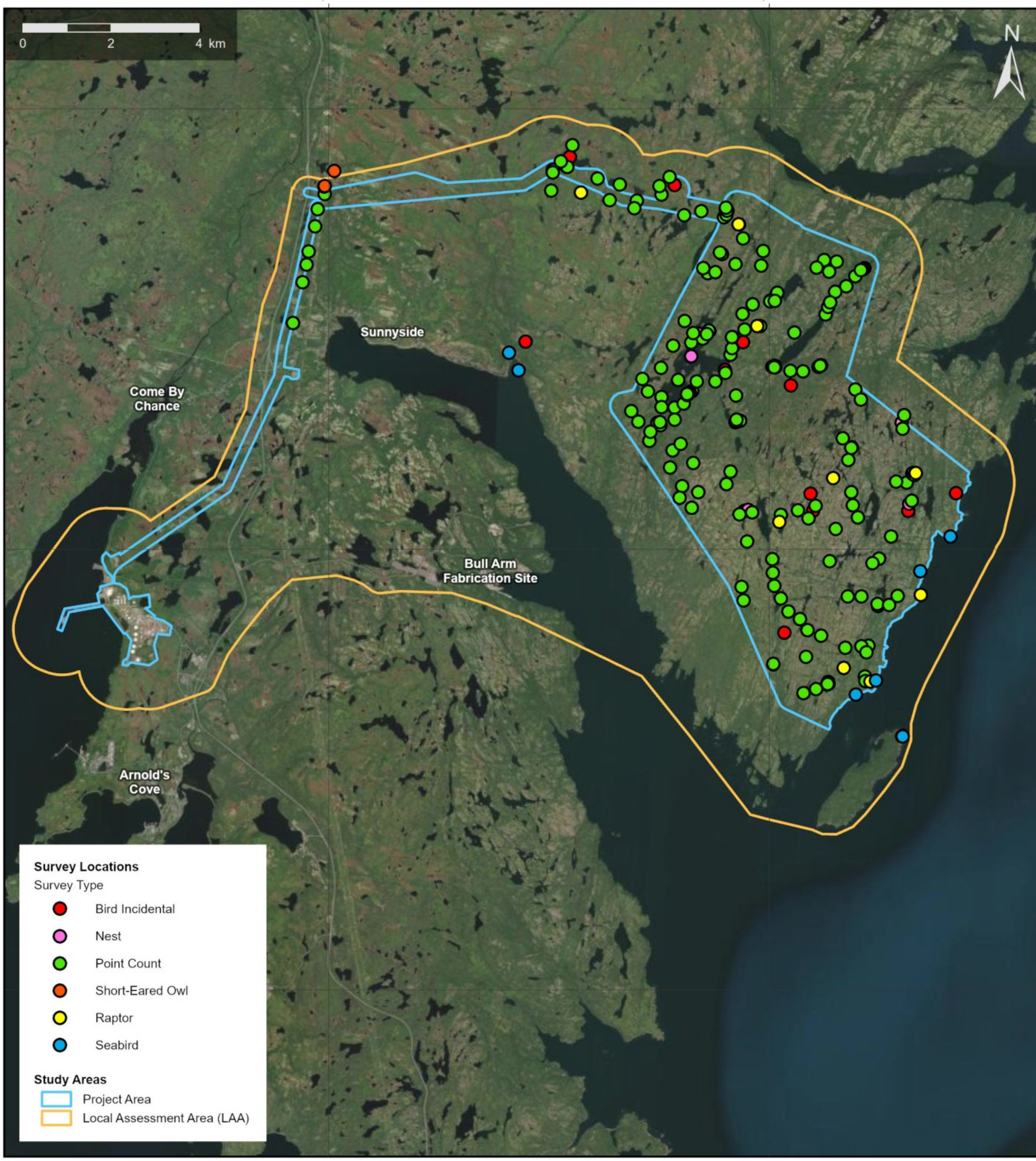
The avifauna species observed to date in the PA are presented in Table 3.2.3-3. This table is inclusive of both field survey and acoustic monitoring efforts (field survey efforts current to June 2025, acoustic monitoring efforts inclusive of 2024). Survey effort is represented in Figure 3.2.3-14. The total number of avifauna vocalizations recorded by date on PA ARU 1 and PA ARU 2 are presented in Figure 3.2.3-15. Additional information about the avifauna survey program can be found in Appendix D1: Avifauna Baseline Study.

Table 3.2.3-3 Avifauna species observed to date in the Project Area.

Common Name	Scientific Name	Field Surveys	PA ARU 1	PA ARU 2	Total
Passeriformes, Piciformes, and Others					
American Crow	*Corvus brachyrhynchos*	24	0	0	**24**
American Goldfinch	*Spinus tristis*	1	3	1	**5**
American Pipit	*Anthus rubescens*	0	61	98	**159**
American Redstart	*Setophaga ruticilla*	1	3	6	**10**
American Robin	*Turdus migratorius*	17	15	557	**589**
American Tree Sparrow	*Spizelloides arborea*	0	113	42	**155**

Common Name	Scientific Name	Field Surveys	PA ARU 1	PA ARU 2	Total
Black-and-white Warbler	*Mniotilta varia*	30	3	876	**909**
Black-backed Woodpecker	*Picoides arcticus*	2	0	0	**2**
Black-capped Chickadee	*Poecile atricapillus*	46	1	171	**218**
Blackpoll Warbler	*Setophaga striata*	127	4,258	13,445	**17,830**
Black-throated Green Warbler	*Setophaga virens*	2	0	10	**12**
Blue Jay	*Cyanocitta cristata*	2	0	1	**3**
Bohemian Waxwing	*Bombycilla garrulus*	0	25	35	**60**
Boreal Chickadee	*Poecile hudsonicus*	87	16	1,252	**1,355**
Brown Creeper	*Certhia americana*	0	44	60	**104**
Canada Jay	*Perisoreus canadensis*	41	0	159	**200**
Cedar Waxwing	*Bombycilla cedrorum*	0	11	3	**14**
Common Raven	*Corvus corax*	27	4	118	**149**
Common Redpoll	*Acanthis flammea*	19	63	34	**116**
Common Yellowthroat	*Geothlypis trichas*	80	96	37	**213**
Dark-eyed Junco	*Junco hyemalis*	57	210	833	**1,100**
Downy Woodpecker	*Dryobates pubescens*	5	0	47	**52**
Evening Grosbeak	*Coccothraustes vespertinus*	0	0	70	**70**
Fox Sparrow	*Passerella iliaca*	21	1	45	**67**
Golden-crowned Kinglet	*Regulus satrapa*	49	9,364	7,970	**17,383**
Hairy Woodpecker	*Leuconotopicus villosus*	12	2	165	**179**
Hermit Thrush	*Catharus guttatus*	210	444	20,035	**20,689**
Horned Lark	*Eremophila alpestris*	0	0	5	**5**
Lapland Longspur	*Calcarius lapponicus*	0	10	15	**25**
Lincoln's Sparrow	*Melospiza lincolnii*	1	11	13	**25**
Magnolia Warbler	*Setophaga magnolia*	5	3	1	**9**
Northern Flicker	*Colaptes auratus*	12	0	329	**341**
Northern Waterthrush	*Parkesia noveboracensis*	52	2	646	**700**
Palm Warbler	*Setophaga palmarum*	5	53	34	**92**
Pine Grosbeak	*Pinicola enucleator*	9	7	656	**672**
Pine Siskin	*Spinus pinus*	10	46	156	**212**
Purple Finch	*Haemorhous purpureus*	6	0	1	**7**
Red Crossbill	*Loxia curvirostra percna*	8	14	6	**28**
Red-breasted Nuthatch	*Sitta canadensis*	4	486	862	**1,352**
Ruby-crowned Kinglet	*Corthylio calendula*	23	0	152	**175**
Ruffed Grouse	*Bonasa umbellus*	2	2	1	**5**
Savannah Sparrow	*Passerculus sandwichensis*	55	4,002	51	**4,108**
Snow Bunting	*Plectrophenax nivalis*	0	0	3	**3**
Swainson's Thrush	*Catharus ustulatus*	2	0	1	**3**
Swamp Sparrow	*Melospiza georgiana*	99	1,412	92	**1,603**

Common Name	Scientific Name	Field Surveys	PA ARU 1	PA ARU 2	Total
Tree Swallow	*Tachycineta bicolor*	0	1	0	**1**
White-throated Sparrow	*Zonotrichia albicollis*	455	3,027	8,722	**12,204**
White-winged Crossbill	*Loxia leucoptera*	144	188	483	**815**
Willow Ptarmigan	*Lagopus lagopus*	2	0	0	**2**
Wilson’s Warbler	*Cardellina pusilla*	10	0	2	**12**
Woodpecker spp.	N/A	10	0	0	**10**
Yellow-bellied Flycatcher	*Empidonax flaviventris*	161	60	4,065	**4,286**
Yellow-rumped Warbler	*Setophaga coronata*	79	188	4,258	**4,525**
Accipitriformes, Strigiformes, and Falconiformes					
American Goshawk	*Astur atricapillus*	4	0	8	**12**
Bald Eagle	*Haliaeetus leucocephalus*	57	0	0	**57**
Great Horned Owl	*Bubo virginianus*	0	106	84	**190**
Merlin	*Falco columbarius*	1	0	14	**15**
Northern Harrier	*Circus hudsonius*	4	0	0	**4**
Osprey	*Pandion haliaetus*	4	0	2	**6**
Sharp-shinned Hawk	*Accipiter striatus*	1	0	18	**19**
Anseriformes, Charadriiformes, and Others					
American Black Duck	*Anas rubripes*	8	0	0	**8**
Belted Kingfisher	*Megaceryle alcyon*	3	2	1	**6**
Blue-winged Teal	*Spatula discors*	0	0	1	**1**
Canada Goose	*Branta canadensis*	61	17	142	**220**
Common Loon	*Gavia immer*	182	21	971	**1,174**
Common Tern	*Sterna hirundo*	13	0	1	**14**
Eurasian Wigeon	*Mareca penelope*	0	0	3	**3**
Great Black-backed Gull	*Larus marinus*	2	6	0	**8**
Greater Yellowlegs	*Tringa melanoleuca*	2	83	24	**109**
Green-winged Teal	*Anas carolinensis*	0	0	10	**10**
Herring Gull	*Larus smithsonianus*	31	0	1	**32**
Long-tailed Duck	*Clangula hyemalis*	0	2	0	**2**
Mallard	*Anas platyrhynchos*	0	5	27	**32**
Ring-billed Gull	*Larus delawarensis*	11	2	0	**13**
Ring-necked Duck	*Aythya collaris*	0	0	1	**1**
Ruddy Turnstone	*Arenaria interpres*	0	1	0	**1**
Spotted Sandpiper	*Actitis macularius*	4	0	2	**6**
Wilson's Snipe	*Gallinago delicata*	3	0	1	**4**



North Atlantic	FIGURE TITLE: Avifauna Survey Effort in the Project Area	NOTES:	PREPARED BY: J. Crocker	DATE: 09/07/2025
			REVIEWED BY: C. Bursey 09/07/2025	
			APPROVED BY: C. Collins 09/07/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-527-Rev0

Figure 3.2.3-14 Avifauna survey effort in PA, January 2024 – June 2025.

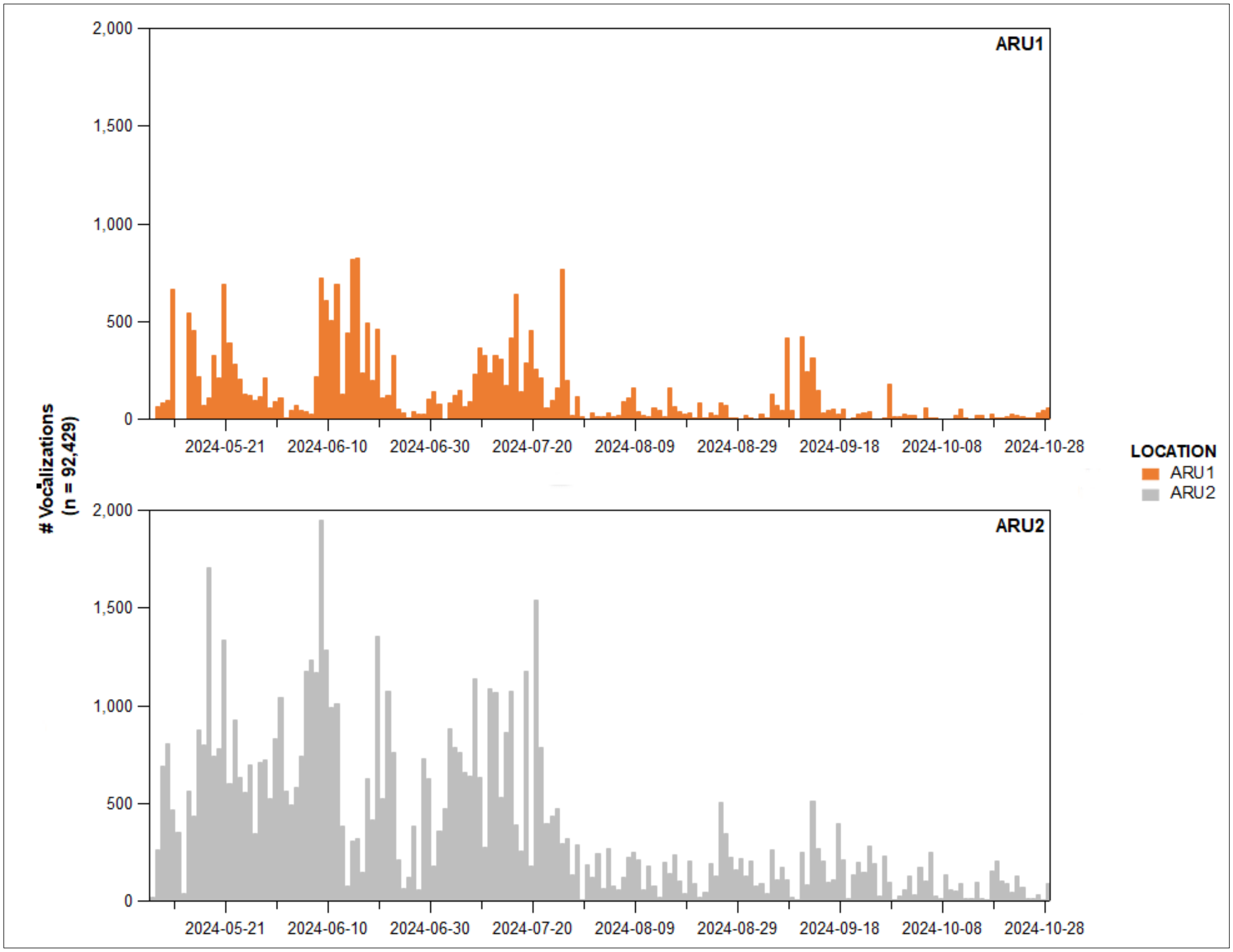


Figure 3.2.3-15 Total number of vocalizations by date.

3.2.3.5 Species at Risk and Species of Conservation Concern

Any SAR or SCC observed during terrestrial field efforts in the PA are discussed below. As defined under Section 3.1.3.5, SAR are those species protected by federal and/or provincial legislation, and SCC are those species considered to be rare on a sub-national level, although they are not similarly protected. In NL, SCC are identified and ranked by local experts from the AC CDC according to provincial data. Any species with an S-rank between S1 (critically imperiled) and S3 (vulnerable) are considered SCC.

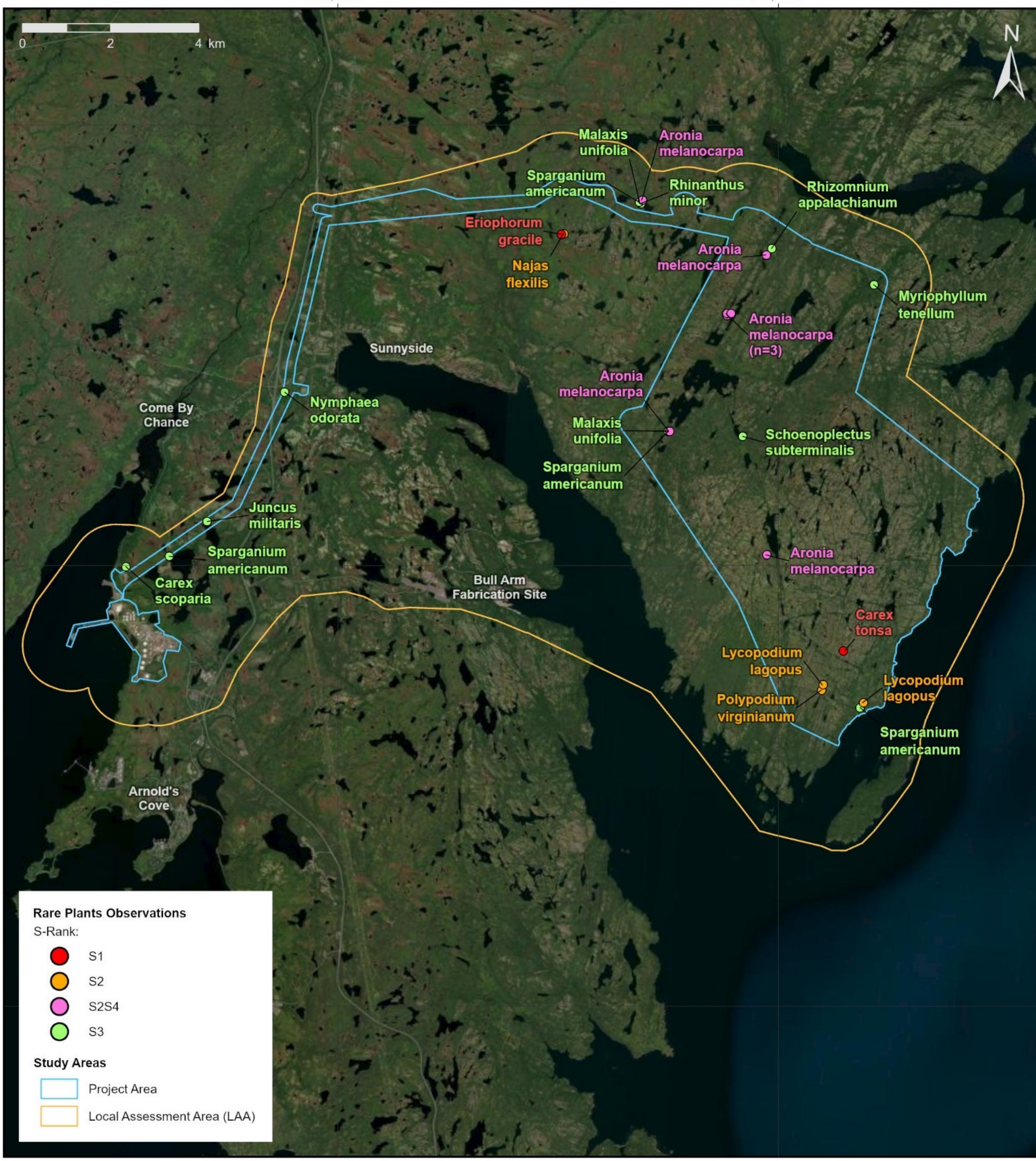
Flora

Water pygmyweed was thought possible for the PA; however, surveyors assessed potential habitat in the Come By Chance Industrial Site area and did not locate this species. None of the plant SCC identified in the AC CDC request were located within PA boundaries. However, the rare flora surveys did result in the identification of thirty-six (36) SCC. Although surveyors noted plants ranked from S1 to S3S#, those ranked between S1 and S3 were prioritized during rare plant surveys. S1 and S2 plants (Figure 3.2.3-17) are discussed further below (refer to Appendix D6: Rare Plants Baseline Study for further information on plants ranked S3). Table 3.2.3-4 presents all SCC observed, ordered by S-rank. Figure 3.2.3-16 provides the locations of rare plants ranked between S1 and S3. Note that the PA boundaries were altered in early March 2025 to amalgamate the transmission line and access road corridors, and thus some plant observations fall slightly outside of the PA.

Table 3.2.3-4 SCC observed in the Project Area, August 2024.

Scientific Name	Common Name	S-Rank
Carex tonsa	Shaved sedge	S1
Eriophorum gracile	Slender cotton-grass	S1
Lycopodium lagopus	One-cone clubmoss	S2
Najas flexilis	Wavy water-nymph	S2
Polypodium virginianum	Rock polypody	S2
Aronia melanocarpa	Black chokeberry	S2S4
Carex scoparia	Pointed broom sedge	S3
Juncus militaris	Bayonet rush	S3
Nymphaea odorata	American water-lily	S3
Malaxis unifolia	Green adder's-mouth	S3
Rhinanthus minor	Little yellow-rattle	S3
Sparganium americanum	American bur-reed	S3
Rhizomnium appalachianum	Appalachian leafy moss	S3
Myriophyllum tenellum	Slender water-milfoil	S3
Schoenoplectus subterminalis	Water clubrush	S3
Scirpus cyperinus	Cottongrass bulrush	S3S4
Eleocharis acicularis	Least spike-rush	S3S4
Carex interior	Inland sedge	S3S4

Scientific Name	Common Name	S-Rank
Diapensia lapponica	Lapland diapensia	S3S4
Gaylussacia bigeloviana	Dwarf huckleberry	S3S4
Bartonia paniculata ssp. iodandra	Twining screwstem	S3S4
Huperzia selago	Fir clubmoss	S3S4
Taxus canadensis	Canada yew	S3S4
Mnium hornum	Swan's-neck leafy moss	S3S4
Ulota crispa	Crisped pincushion moss	S3S4
Bartonia paniculata	Twining screwstem	S3S4
Potamogeton pusillus	Small pondweed	S3S4
Ribes hirtellum	Smooth-stemmed gooseberry	S3S4
Sparganium hyperboreum	Northern bur-reed	S3S4
Stuckenia filiformis	Slender-leaved pondweed	S3S4
Pellia epiphylla	Common pellia	S3S5
Ptilidium pulcherrimum	Naugehyde liverwort	S3S5
Ptilidium ciliare	Northern Naugehyde liverwort	S3S5
Scapania nemorea	Grove earwort	S3S5
Deschampsia cespitosa	Tufted hairgrass	S3S5
Prunella vulgaris	Self-heal	S3S5



North Atlantic	FIGURE TITLE: Rare Plants Observed in the Project Area	NOTES: All rare plant observations displayed on this map were recorded in August 2024.	PREPARED BY: C. Burke	DATE: 06/06/2025
			REVIEWED BY: C. Bursey 06/06/2025	
			APPROVED BY: C. Collins 06/06/2025	
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-405-Rev0

Figure 3.2.3-16 Locations of rare plants observed in the Project Area, August 2024.

Carex tonsa is a densely tufted green sedge with inconspicuous flowering spikes (SSAC, 2008). *Carex tonsa* specimens observed in Newfoundland are noted to have especially short and uncommon spikes (SSAC, 2008). In Newfoundland this species is typically found in dry, open areas with sparse vegetation and sandy, silty, or pebbly soil (e.g., fields, barrens, roadsides) (SSAC, 2008). This plant was observed once within the PA at UTM 22T 291496 E, 5298058 N.

Eriophorum gracile is a perennial with a thin stem and white, fluffy branched flowers (MDFW, 2019). The plant appears grass-like and produces between two to five flowers, supported by a creeping rhizome (MDFW, 2019). *Eriophorum gracile* typically occurs in wet swamps or peatlands (MDFW, 2019). Only one specimen was observed in the PA at UTM 22T 285092 E, 5307515 N in a seepy fen adjacent to a creek.

Lycopodium lagopus is an evergreen clubmoss with a creeping horizontal stem from which erect vertical stems protrude (FNA, 1993). Hair-like leaves cover the horizontal and vertical stems, and this species is known to typically host only one strobilus (FNA, 1993). *Lycopodium lagopus* typically grows in damp, mossy areas such as peatbogs (FNA, 1993). This plant was observed in two locations in the PA, located roughly 50 m apart. Two specimens were observed at UTM Zone 22N, 291910 E, 5296888 N. Less than five were observed at UTM Zone 22N, 290995 E, 5297292 N (approximate values are provided when the number of individual plants cannot be accurately distinguished in the field without disturbing the site).

Najas flexilis is an aquatic annual with 10 to 35 mm long leaves that taper into a slender point (Lesica et al., 2012). They produce smooth seeds that are sometimes spotted (Lesica et al., 2012). *Najas flexilis* can be found in freshwater lakes or valleys, often in shallow water (Lesica et al., 2012). This plant was observed once in the PA at UTM Zone 22T, 285117 E, 5307530 N in a shallow pool along a creek that ran through a fen.

Polypodium virginianum is a fern that produces solitary fronds up to 40 cm long (Boland, 2017). Its fronds are smooth, leathery, and pinnatifid, with sori on the underside of the fronds, on either side of the midvein (Boland, 2017). *Polypodium virginianum* in Newfoundland is typically found in rocky habitat like cliff edges, crevices, or on mossy rocks (Boland, 2017). This plant was observed only once in the PA in a wooded rock gully at UTM Zone 22N, 290968 E, 5297169 N.

Aronia melanocarpa is a small shrub with dark oval leaves (Kask, 1987). This plant produces white flowers and black berries, which gradually lighten to red as the season progresses (Kask, 1987). *Aronia melanocarpa* prefers moist soil (e.g., bogs) but can grow in a variety of conditions, including rocky terrain (Kask, 1987). This plant was observed seven times throughout the PA, in the locations listed below (UTM Zone 22T):

- 289714 E, 5300243 N.

- 287508 E, 5303048 N.
- 288817 E, 5305673 N.
- 288811 E, 5305716 N.
- 288909 E, 5305723 N.
- 289710 E, 5307049 N.
- 286897 E, 5308293 N.

Eriophorum gracile | *Lycopodium lagopus* | *Najas flexilis*

Aronia melanocarpa | *Polypodium virginianum* | *Carex tonsa*

Figure 3.2.3-17 Plant SCC ranked S1 to S2 observed in the Project Area, August 2024.

Avifauna

Three avian SAR were observed in the PA - Red Crossbill *percna*, listed as Threatened under the SARA and NL ESA, Evening Grosbeak (*Coccothraustes vespertinus*), listed as Special Concern under the SARA and Vulnerable under the NL ESA, and Short-eared Owl (*Asio flammeus*), listed as Special Concern under the SARA and Threatened under the NL ESA. In addition, fourteen SCC were observed. Table 3.2.3-5 presents a list of all SCC observed, ordered by S-rank. The three SAR, as well as any SCC ranked between S1 and S2, are discussed further below (refer to Appendix D1: Avifauna Baseline Study for further information on avifauna ranked S3). The locations of avian SAR observations are illustrated in Figure 3.2.3-20. Note that Red Crossbill were observed on PA ARU 1 and PA ARU 2, whereas Evening Grosbeak was only observed on PA ARU 2.

Table 3.2.3-5 Avifauna SCC observed in the Project Area.

Common Name	Scientific Name	S-rank
Blue-winged Teal	*Spatula discors*	SUB, S1M
Long-tailed Duck	*Clangula hyemalis*	S2B, S5N
Snow Bunting	*Plectrophenax nivalis*	S2N, S5M
Common Redpoll	*Acanthis flammea*	S2S3B, S4N, SUM
Ruddy Turnstone	*Arenaria interpres*	S2S3M
American Goshawk	*Astur atricapillus*	S3
Brown Creeper	*Certhia americana*	S3
American Pipit	*Anthus rubescens*	S3B, S4M
Greater Yellowlegs	*Tringa melanoleuca*	S3B, S4M
American Tree Sparrow	*Spizelloides arborea*	S3B, SUM
Horned Lark	*Eremophila alpestris*	S3B, SUM
Mallard	*Anas platyrhynchos*	S3B, SUM
Northern Harrier	*Circus hudsonius*	S3B, SUM
Belted Kingfisher	*Megaceryle alcyon*	S4B, S3N, SUM

Red Crossbill percna

Red Crossbill *percna* is a subspecies of Red Crossbill (*Loxia curvirostra*). The species range of this small finch is restricted to insular Newfoundland, the surrounding islands, and Anticosti Island in Quebec (COSEWIC, 2016b). These birds overwinter in NL and are thought to be non-migratory, although they are known to move across various spatial scales in search of food (COSEWIC, 2016b). Red Crossbill *percna* are dependent on conifer forests as their beaks are specially adapted to eat cone-obligate seeds produced by coniferous trees, such as red pine (*Pinus resinosa*), white pine (*Pinus strobus*), and black spruce (COSEWIC, 2016b).

Red Crossbill *percna* was observed seven times during field surveys in the PA in 2024, including two observations during winter (March 20), four during breeding season (June 21), and one during fall (October 18). All observations were made in or near mature coniferous forest stands. The observations on March 20 were in the LAA outside of the PA, but are included due to proximity to the PA boundary. One Red Crossbill was observed incidentally on June 26, 2025 in the LAA proximal to the PA boundary. Both PA ARU 1 and PA ARU 2 captured Red Crossbill *percna* vocalizations, with 14 and 6 recordings respectively. Figure 3.2.3-18 demonstrates the Red Crossbill vocalizations by date for both ARUs.

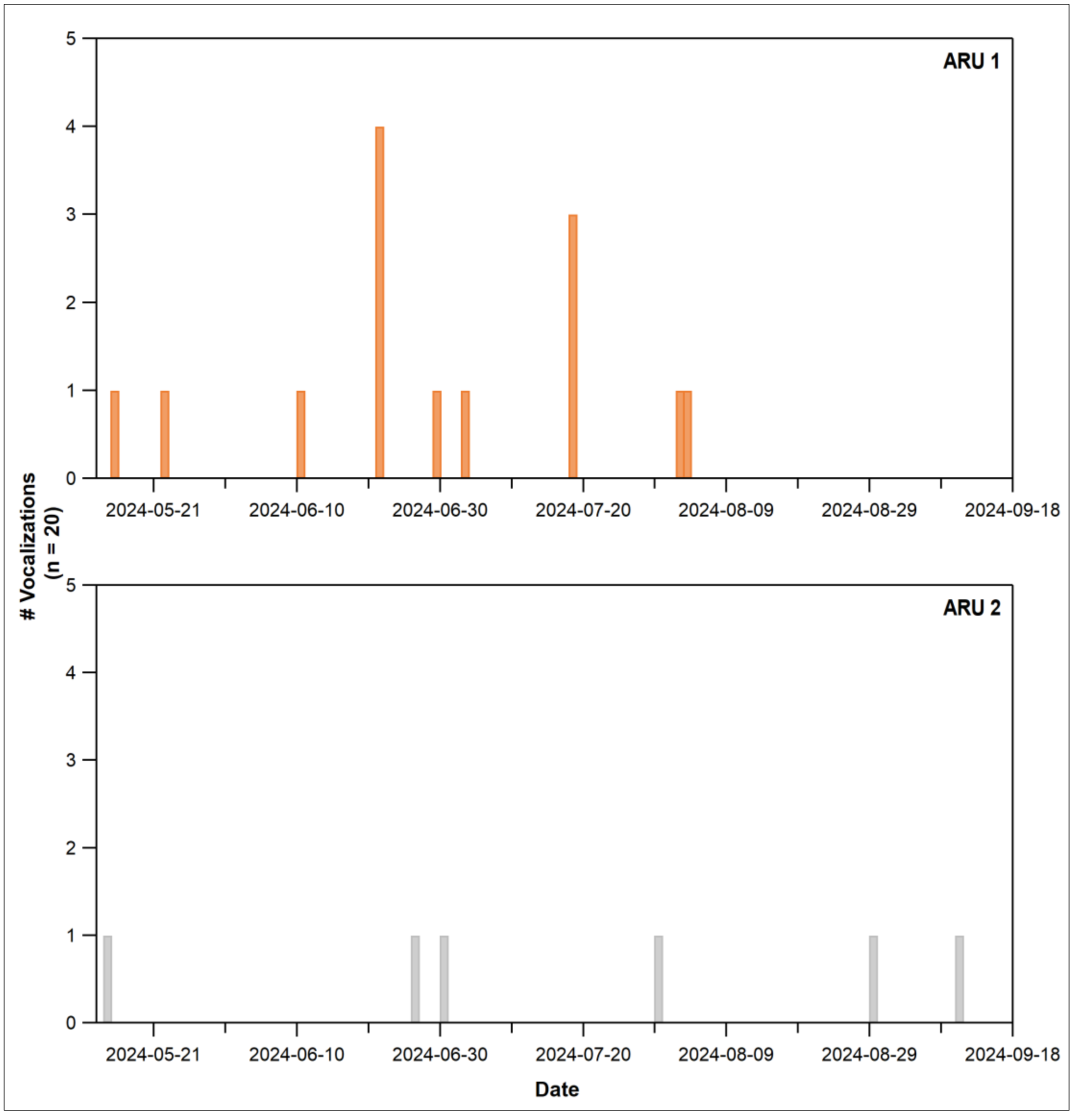


Figure 3.2.3-18 Red Crossbill *percna* vocalizations by date.

Evening Grosbeak

Similar to Red Crossbill *percna*, Evening Grosbeak is a forest-dwelling finch that inhabits Newfoundland year-round. Evening Grosbeak prefers mature mixedwood forests with fir and white spruce, foraging mainly on invertebrates (COSEWIC, 2016a). Their populations are thought to correlate with the occurrence of spruce budworm (*Choristoneura fumiferana*) (COSEWIC, 2016a).

Evening Grosbeak was not observed during field surveys, but was recorded on PA ARU 2, with 70 vocalizations over the course of its deployment. This is likely because the mature mixedwood forest situated below PA ARU 2 provides more suitable habitat than the upland wetland habitat represented by

PA ARU 1. Most vocalizations were recorded in the fall. Figure 3.2.3-19 demonstrates the Evening Grosbeak vocalizations by date for PA ARU 2.

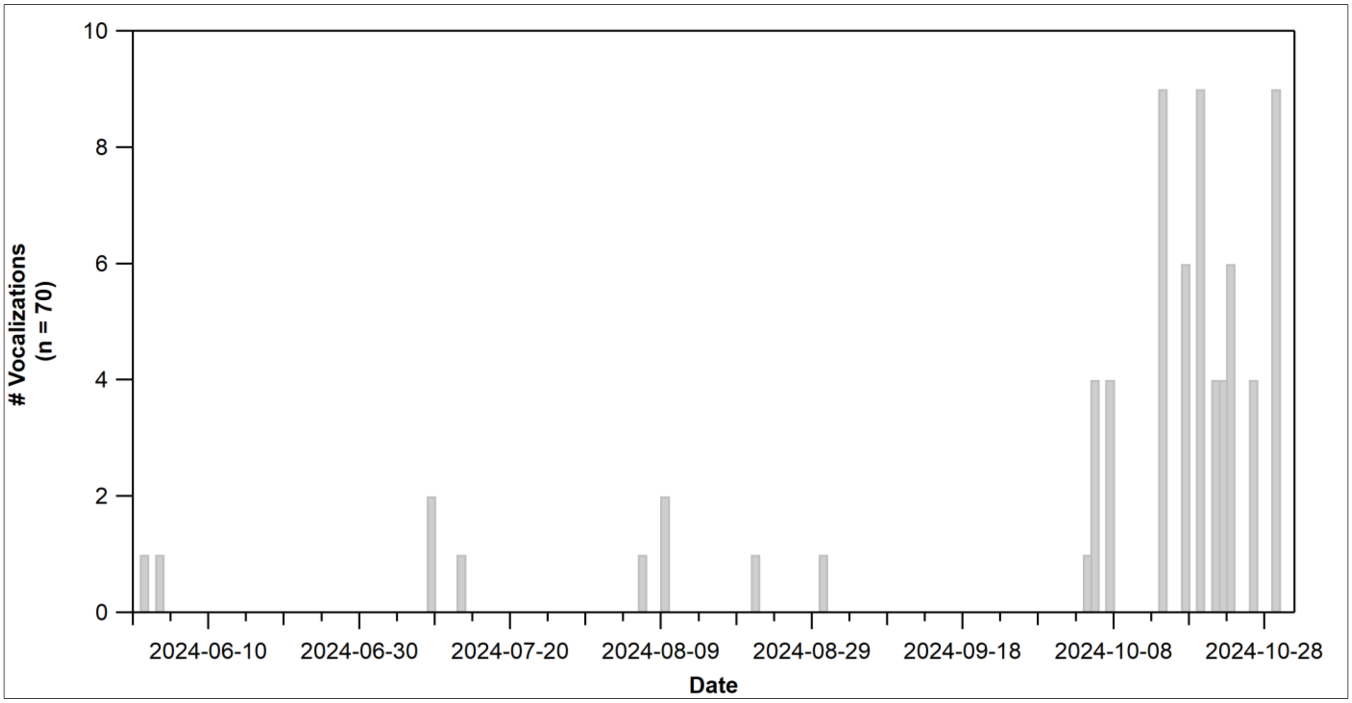


Figure 3.2.3-19 Evening Grosbeak vocalizations by date.

<u>Short-eared Owl</u>

The Short-eared Owl (*Asio flammeus*) is a nomadic owl thought to breed in NL and overwinter in the U.S., although species-specific studies have been limited. Short-eared Owl typically breeds in open habitat (e.g., grasslands) of at least 50-100 ha, preying primarily on small mammals like voles and other rodents (COSEWIC, 2021).

A dedicated Short-eared Owl (*Asio flammeus*) survey was completed on June 25, 2025 along the existing NLH transmission line. Surveyors observed one Short-eared Owl (heard at UTM 22T, 0279966 E, 5308209 N, and seen at UTM 22T, 0279931 E, 5308424 N). The observations were made in the LAA close to the PA boundary (~80 m), so it is reasonable to assume that it may also be using habitats within the PA.

Figure 3.2.3-20 Locations of avian SAR observed in the PA.

Blue-winged Teal (*Spatula discors*) is a dabbling duck that nests in herbaceous vegetation (often across grasslands) in Canada and the U.S. in the summer before migrating south to forage in marshy wetlands and small, calm waterbodies during the winter (Ehrlich et al., 1988). They may use NL as a migratory stopover or to breed, although they are less common in eastern Canada. Blue-winged Teal was recorded once on PA ARU 2 on August 11, 2024.

Long-tailed Duck (*Clangula hyemalis*) is a diving duck that can dive to depths of 200 feet to catch fish and invertebrates (Ehrlich et al., 1988). These ducks breed on Arctic tundra and overwinter on large freshwater lakes or along the ocean coastline (Ehrlich et al., 1988). Long-tailed Duck can be found overwintering in NL beginning in the October, before leaving again in May. PA ARU 1 recorded two Long-tailed Duck vocalizations on May 9, 2024.

Snow Bunting (*Plectrophenax nivalis*) is a ground-dwelling passerine bird considered to be an Arctic specialist. They breed on rocky shores and tundra in the Arctic during the summer, and tend to overwinter in grassy, open fields, lake shores, or coastal beaches (Ehrlich et al., 1988). They are known to migrate in the late fall and early spring. Three Snow Bunting vocalizations were recorded on PA ARU two – one on August 10, one on September 8, and one on September 28, 2024.

Common Redpoll *(Acanthis flammea)* is a small passerine finch that can be found across a range of habitats, although they are preferential to open areas such as open coniferous forest or scrubby fields (Ehrlich et al., 1988). Common Redpoll demonstrates an irregular migration pattern, moving south to find food as necessary (Ehrlich et al., 1988). Common Redpoll was observed 18 times during fall and winter field surveys in the PA in 2024, and once during breeding season surveys in June 2025. In addition, both PA ARU 1 and PA ARU 2 recorded vocalizations, with 63 and 34 recordings, respectively. Table 3.2.3-6 below demonstrates the number of vocalizations recorded during each bird seasonal window (defined for the purpose of the avifauna study – outlined in Section 3.1.3.4).

Table 3.2.3-6 Number of Common Redpoll vocalizations per bird season.

Detector	Bird Season		
	Early Breeders/Spring Migration	Breeding Season	Fall Migration
PA ARU 1	39	12	12
PA ARU 2	4	10	20

Ruddy Turnstone *(Arenaria interpres)* are small, short-legged shorebirds that breed along rocky coasts and on tundra in the Arctic but can migrate as far south as Tierra del Fuego to overwinter (Ehrlich et al., 1988). These birds are typically found on ocean coastlines during winter but are also known to use freshwater shorelines during migration. Ruddy Turnstone uses NL as a stopover site during migration, or less commonly for overwintering. One Ruddy Turnstone vocalization was recorded on PA ARU 1 on October 16, 2024.

Bats

Three Titley Scientific bat detectors were deployed in the PA from May 8 to October 11, 2024. Detector locations were chosen to target a range of potential habitat uses. SS Bat 1 was placed on the margin of a marsh system, SS Bat 2 was installed 50 m high on a MET tower, and SS Bat 3 was in a small bog surrounded by a barren rocky outcrop. In total, 593 bat calls were recorded across the three detectors. Only the little brown myotis (214 detections) and Northern myotis (66 detections) were identified. There were 311 *Myotis* detections that could not be identified to species, and it is likely that most of these calls were from the little brown myotis. An additional bat monitoring survey is ongoing through 2025, building upon the results of the 2024 monitoring efforts and with a focus on greater spatial coverage across the PA, especially the Wind Farm area.

Bat calls per night and per night hour from the PA in 2024 are presented in Table 3.2.3-7 and 3.2.3-8.

Table 3.2.3-7 Bat call detections per night, 2024.

Species	Month					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
Little brown myotis (*Myotis lucifugus*)						
SS Bat 1	0.065	0.733	1.871	1.194	0.6	-
SS Bat 2	-	-	0.161	0.032	-	-
SS Bat 3	-	-	3.125	0.903	0.161	0.387
Northern myotis (*Myotis septentrionalis*)						
SS Bat 1	-	0.3	0.129	0.194	0.233	-
SS Bat 2	-	-	-	-	-	-
SS Bat 3	-	-	1.5	0.742	0.167	-
Myotis spp.						
SS Bat 1	0.065	0.6	0.968	2.161	0.333	-
SS Bat 2	-	-	0.065	-	-	-
SS Bat 3	0.032	0.067	10.75	2.58	0.3	0.161
High F Bat						
SS Bat 1	-	0.033	-	-	-	-
SS Bat 2	-	-	-	-	-	-
SS Bat 3	-	-	-	-	-	-
Notes Due to technical malfunctions with the detector, SS Bat 3 only recorded eight nights' worth of data in July and missed a few nights in June. The detector was out of order from June 21 to July 24.						

Table 3.2.3-8 Bat call detections per night hour, 2024.

Species	Month					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
Little brown bat (*Mytois lucifugus*)						
SS Bat 1	0.007222	0.091625	0.220118	0.113714	0.048	-

Species	Month					
	May	Jun.	Jul.	Aug.	Sep.	Oct.
SS Bat 2	-	-	0.018941	0.003048	-	-
SS Bat 3	-	-	0.367647	0.086	0.01288	0.02669
Northern myotis (*Myotis septentrionalis*)						
SS Bat 1	-	0.0375	0.015176	0.018476	0.01864	-
SS Bat 2	-	-	-	-	-	-
SS Bat 3	-	-	0.176471	0.070667	0.01336	-
Myotis spp.						
SS Bat 1	0.007222	0.075	0.113882	0.254235	0.02664	-
SS Bat 2	-	-	0.007647	-	-	-
SS Bat 3	0.003556	0.008375	1.264706	0.245714	0.024	0.011103
High F Bat						
SS Bat 1	-	0.004125	-	-	-	-
SS Bat 2	-	-	-	-	-	-
SS Bat 3	-	-	-	-	-	-
Notes Due to technical malfunctions with the detector, SS Bat 3 only recorded eight nights' worth of data in July and missed a few nights in June. The detector was out of order from June 21 to July 24.						

Little brown myotis

The little brown myotis uses a wide variety of habitats, preferring to forage over open spaces (e.g., wetlands), and preferential to aquatic insects (COSEWIC, 2013). These bats may roost in a variety of structures, including tree bark, cliff crevices, foliage, and anthropogenic buildings (ECCC, 2018). Little brown myotis are short-distance migrators, moving from overwintering sites to summer roosting sites typically less than 550 km away (ECCC, 2018). Little brown myotis overwinter in hibernacula, typically in underground sites such as caves or abandoned mines.

The Mature Coniferous Forest ecotype in the PA would be considered possible roosting habitat, while Wetland and Open Water ecotypes serve as suitable foraging habitat. However, little brown myotis may use the airspace above and within all ecotypes in the PA.

Northern myotis

Northern myotis prefer to forage and roost in forested areas, feeding on moths and other insects (ECCC, 2018). As such, they were not observed in anthropogenic areas as often as the little brown myotis (ECCC, 2018). Northern myotis are thought to have similar migration patterns to the little brown myotis, often sharing hibernacula during the winter months (COSEWIC, 2012c). The Northern myotis typically forages and roosts in mature forested areas, such as the Mature Coniferous Forests found throughout the PA.

Overall, the number of bat detections in the PA was low, especially compared to data from some of the detectors deployed in the RAA (i.e., at lower elevations where it is less windy and more treed). While the detectors in the PA had average calls per night of 2.21, 0.05, and 2.87, detectors in the most productive places in the RAA had 25.02, 7.05, and 4.21 (and other detectors had rates similar to the PA). For additional information on bats see Appendix D2 for the Bats Baseline Study.

Mammals

No mammal SAR were observed in the PA, nor were any indicated in the AC CDC data. A marten hair snag survey was undertaken in accordance with NL WD's guidance document (Herdman, 2014), but no marten hair was recovered. On October 9, 2024, one stag caribou (*Rangifer tarandus*) was observed in the RAA north of the Come By Chance Industrial Site, on the opposite coast. Known natural herds of caribou do not exist along the Isthmus of Avalon, and historical data does not indicate that caribou are known for the area; however, sub-populations relocated from elsewhere in the 1990s likely spillover into the area as they move across the landscape (COSEWIC, 2014a). The closest introduction site is Random Island, but Bay De Verde and Sound Island may provide the RAA with vagrant or migrating caribou throughout the year. It is possible but thought to be unlikely that caribou would wander through the PA. For further information, refer to Appendix D4: Mammals Baseline Study.

Insects

A three-day survey was undertaken for insect SAR, concurrently with a portion of the rare plants survey in late August. Areas with flowering plants were observed for bumble bees and vegetation was searched for *Coccinella* spp. In addition, a small survey was undertaken near the helicopter hangar for the Project, within the LAA, to mimic the anthropogenically-influenced areas (e.g., roadsides) that will be created by the Project. No insect SAR were observed during field surveys, but the yellow-banded bumble bee is thought to be most likely for the area. This is due to the observations of *Bombus sandersoni* and/or *Bombus vagans bolsteri* during field studies, the habitat types present throughout the PA, and recent observations nearby. For further information, refer to Appendix D7: Rare Insects Baseline Study.

Lichens

Both dedicated and opportunistic rare lichen surveys were conducted throughout the PA. Targeted surveys were undertaken in September and October 2024 with additional surveys in June 2025, whereas opportunistic surveys were undertaken during other fieldwork throughout the year. Before undertaking dedicated surveys, habitat suitability mapping was conducted to outline areas of high probability for boreal felt lichen, vole ears lichen, and blue felt lichen. A total of 55 sites were searched within the PA. For each site, habitat suitability and other metrics were recorded. Surveys across the PA included all high-potential areas; however, no rare lichen thalli were observed. Where possible, wrinkled shingle lichen was incidentally searched for on white spruce (*Picea glauca*), but no thalli were observed. For further information, refer to Appendix D5: Rare Lichens Baseline Study.

3.2.4 Land and Resource Use

A secondary source study, Appendix R Land and Resource Use Baseline Study, was conducted to compile the existing LRUs within the PA, LAA, and RAA. This information was supplemented by a survey of land and resource users and comments received via engagement with stakeholders, Indigenous peoples, and the public in various forms, as detailed in Appendix R1.

3.2.4.1 Data Gaps

3.2.5 Heritage and Cultural Resources

- A HROA and a follow-up HRIA (Archaeological Investigation Permit No. 25.05) were completed in accordance with PAO requirements as summarized in Section 3.1.5. Details are available in Appendix F. As a result of the HRIA, the following management recommendations have been made: It is required that confirmed zones of high archaeological resource potential be avoided, if possible, in the design and development of the Project.

- If avoidance of the remaining portion of HPA-04 is impractical, it is required that planned Project infrastructure development areas that overlap this zone of high archaeological resource potential be subjected to the Archaeological Mitigation phase of an HRIA. This phase is designed to confirm or revoke the ascription of high archaeological resource potential made during the HROA and HRIA.

- If avoidance of HPA-12 is impractical, it is required that planned Project development areas that overlap this area be subjected to the Archaeological Monitoring phase of an HRIA, during construction activities. This phase is designed to monitor ground disturbance activities for signs of archaeological features or deposits. Should historic resources be encountered during monitoring, further mitigation may be required through engagement with the Client and the PAO.

- It is recommended that the detailed Contingency Plan (or Chance-Find Plan), located in Appendix F, outlining the protocols, should be followed by all Project personnel if any suspected historic resources or archaeological materials be encountered on the surface or are unearthed during any phase of the Project. It is also recommended that the Contingency Plan be provided to and discussed with all personnel working on the Project, particularly those involved in ground disturbing activities.

- As Project details emerge, any changes to the Project infrastructure layout within the PA beyond the area assessed in this report, must be subjected to an HROA, at minimum.

- Should archaeological deposits or human remains be encountered during any Project activities, all work in the associated area(s) must be halted and immediate contact made with the PAO (Jamie Brake, 709-729-2462).

3.2.6 Socio-economic Environment

A secondary source study, Appendix G: Socio-Economic Baseline Study, was conducted to gain an understanding of the existing socio-economic conditions of the PA, LAA, and RAA. A summary of the findings is presented there.

3.2.7 Human Health and Quality of Life

Aspects of the Project that may interact with the Human Health and Quality of Life VC are addressed in various sections above, including: Atmospheric Environment (air quality, light, noise, and vibration), LRU (domestic wood harvesting, viewscapes, and traditional, cultural, recreational, and Indigenous activities), Aquatic Environment (groundwater, surface water, fish, and fish habitat), and Terrestrial Environment (wildlife, birds, plants, and their habitats). To avoid repetition, these are not restated here.

Nortek Resource Solutions Inc. conducted a shadow flicker analysis to assess the extent and duration of flickering shadows cast by wind turbines. This analysis was based on developing a theoretical and realistic scenario that provides an understanding of the extent of shadow flicker because of the existing and proposed wind turbines. Full details of the study can be found in Appendix K – Shadow Flicker Analysis (Nortek).

GHD conducted an ice throw hazard analysis to evaluate the potential risk of ice falling or being thrown from wind turbines during cold weather operations. This analysis was based on the high-level, conservative approach recommended by Canada Renewable Energy Association's (CanREA) *Best Practices for Wind Farm Icing and Cold Climate Health & Safety* (CanREA, n.d.). Further information is available in Appendix L – Ice Throw Hazard Analysis (GHD).

3.2.8 Data Gaps

The proposed North Atlantic Project can be assessed with confidence, as there are no information gaps that would hinder the prediction of environmental effects. While some aspects of the Project design are still being finalized or subject to alternative design considerations, the assessment incorporates conservative assumptions alongside robust mitigation measures. This approach ensures that potential effects are not underestimated. Mitigation and monitoring measures will continue to be refined and updated as Project planning advances and additional details become available.

Land clearing and construction activities associated with the Project will modify existing land uses and lead to the alteration or loss of carbon sinks within the PA. While these effects have not been quantified, such analysis is not required under current provincial or federal GHG reporting frameworks. The Strategic Assessment of Climate Change (SACC) and its associated Draft Technical Guide (August 2021) identify carbon sink assessment as a recommended consideration; however, the SACC applies exclusively to federally designated projects and is not applicable to this Project.

No environmental baseline field studies have been completed to characterize local groundwater conditions within the LAA. However, a desktop review of publicly available information was completed to inform the assessment. Based on this review, groundwater was determined to be limited in extent and the absence of site-specific groundwater monitoring is not expected to limit the ability to predict environmental effects or develop appropriate mitigation measures.

Several information gaps have been identified for LRU. Based on publicly accessible sources, it is not possible to fully determine the precise locations where activities such as hunting, trapping, fishing, and domestic woodcutting occur within the PA, LAA, or RAA. As outlined in Appendix U4: Land and Resource Use Baseline Study, North Atlantic conducted a LRU survey and received limited, but valuable, responses. To supplement these findings, the Project has completed a more detailed study, including fieldwork, to better understand the occupancy and use of cabins as this information is not publicly available. The Project has committed throughout this process to continually engage with communities and address any concerns as they arise. No major socio-economic data gaps were identified in the baseline study that could compromise the effects assessment or advancement of the Project. There is, however, a paucity of information regarding the number and capacity of businesses in NL Eastern Region. A detailed overview of the number of businesses and the nature of their operations would help in understanding how the Project might affect them especially through Project procurement. Further, despite the diverse range of industrial and commercial services available, the current capacity of these businesses remains undocumented. Understanding the existing capabilities is important for identifying areas where support and development are needed. As Project planning proceeds, there will be a continuing process of identification and refinement of mitigation measures to address procurement needs and ensure opportunities are accessible to local businesses.

3.3 Predicted Future Condition of the Environment Without the Undertaking

This section describes the predicted future condition of the environment during the lifespan of the Project if it were not to proceed. This allows for distinguishing environmental change that would occur from processes unrelated to the Project. For the purposes of this analysis, it is assumed that the footprint of the Project would remain undeveloped should the Project not proceed.

As noted in Section 6.0 (Cumulative Effects), there are several ongoing and planned activities and undertakings that can reasonably be assumed to continue in the area have an effect on the environment. These include:

- Commercial traffic to and from major ports in Placentia Bay including Come By Chance, Whiffen Head, Argentia, Marystown, and Long Harbour along with the associated on-land industrial activity.
- Government services and infrastructure, including federal (i.e., DFO – Small Craft Harbours), provincial, and municipal (i.e., Town of Come By Chance and Town of Sunnyside) activities. These include water and sewer supply/maintenance, waste collection and disposal, roadway upkeep, building construction, and facilities maintenance.
- Industrial production at Bull Arm Fabrication (BAF) Site, the Braya Refinery, NARL Logistics Terminal, and IMTT Newfoundland Transhipment Terminal Ltd.
- Local tourism industry, including sites operated and maintained by Government, and private tourism accommodations (such as AirBnB).
- Inshore and nearshore fisheries including Icewater Seafoods Fish Plant and recreational fisheries in Arnolds Cove and Southern Harbour.

Atmospheric Environment

If the Project development does not proceed, air quality in the LAA would be relatively similar to the baseline conditions discussed in Section 3.1.1. The current air quality in the LAA is characterized by low background levels that regularly meeting NL AQS. Any future exceedances would likely result from unplanned events such as wildfire smoke.

Government initiatives and strategies, guided by specific reduction targets, aim to mitigate the effects of climate change. Due to these initiatives, if the Project does not move forward, it is expected that the current trajectory of decreasing GHG emissions will continue. The proposed Project is anticipated to contribute to global efforts to reduce carbon emissions by utilizing renewable energy sources, rather than fossil fuels, in the production of green hydrogen. Therefore, in the absence of the Project, fossil fuel usage globally would persist.

If the Project development does not proceed, condition of the acoustic environment in the LAA would remain consistent with the existing conditions as described in Section 3.1.1.

In the absence of the Project, climate change phenomena such as storm surges, sea level rise, and shifting precipitation patterns are expected to persist. Although the Project is designed to support global carbon reduction efforts, its absence would have a negligible effect on local climate conditions.

Aquatic Environment

If the Project development does not proceed, the aquatic environment (groundwater and surface water resources, and fish and fish habitat) in the LAA would be relatively similar to the existing environment as described in Section 3.1.2.

The primary source of current demand for industrial water is Braya's water use licence WUL-14-057. This source is actively supplied by water pumped into Inkster's Pond from Barrisway Pond and is also proposed to supply water to the Project operation. If the Project does not proceed, the demand would be slightly reduced.

In the absence of the development of the Project infrastructure such as linear corridors (i.e., roads and transmission lines) or wind turbine foundations on the Isthmus of Avalon, the natural flow of surface runoff, hydrology, and water quality would remain relatively unchanged. There would be no disturbance to aquatic habitat or species.

If the Project does not proceed, the predicted condition of the marine environment is expected to remain largely unchanged from that described in Section 3.1.2.

There would be no discharge of treated water from the hydrogen production, eliminating any associated effects on the marine environment. Existing projects and activities in the area currently interact with the marine habitat and biota, mainly from discharge and runoff into the marine environment. There are existing outfalls associated with the existing municipal and Braya water and sewer systems. Water quality conditions in the marine environment near the PA are expected to remain largely unchanged, with a continued low potential for negative effects in the absence of the Project.

Given the current industrial shipping activity in Placentia Bay and Trinity Bay, associated with the existing Port of Come By Chance and the Port of Bull Arm, the absence of the Project would result in a low to negligible difference. Without the Project, vessel traffic and movement (local, Canadian, and international) will have a minor, negligible reduction.

Similarly, there will be little difference between current and future effects on marine resource harvesting if the Project does not proceed, therefore, limiting the potential effects on local fish populations.

Terrestrial Environment

In the absence of the Project the terrestrial environment (avifauna and bats, wildlife habitat, wetlands, and vegetation) in the LAA would be little changed from existing conditions as described in Section 3.1.3. Terrestrial habitat will continue with minimal disruptive influences.

Protections currently in place under the **Species at Risk Act** (SARA Schedule 1) and the NL ESA would continue to apply, supporting the ongoing conservation of listed species. Additionally, areas identified as conservation priorities are expected to remain unaffected, with habitat quality remaining stable in the absence of the Project. However, for some species of conservation concern such as bats, the trajectory of causative agencies (viral infection) may lead to continued reductions in population numbers.

In addition, factors such as existing road traffic are expected to see modest increases with consequent increases in noise levels, artificial lighting and dust. The effect of these changes without the Project would be minor to negligible.

Land and Resource Use

The future condition of the environment related to land and resource use (LRU) is predicted to remain broadly consistent with its current state in the near term, as discussed in Section 3.1.4. The ongoing presence and availability of commercial resources, such as fisheries, forestry, and mineral assets, will continue to influence patterns of land and marine use. Sustainable management practices and regulated harvesting of species will help maintain environmental stability and resource availability over time.

As the proposed PA is designated for commercial and industrial use under existing land-use planning framework, the potential for future development remains high and it is likely that other forms of industrial or commercial land and resource use could be proposed or pursued in the area. Therefore, the region is likely to continue evolving in alignment with economic opportunities, regulatory approvals, and land-use policies.

Heritage and Cultural Resources

The distribution and abundance of heritage and cultural resources within the PA are expected to remain unchanged. These resources are generally fixed in location and limited in extent, meaning their presence is not influenced by the Project's absence. The only changes to the understanding or condition of these resources would occur if future development, either industrial or infrastructure-related, were to take place in the area.

A HROA was conducted as part of the Project's environmental assessment process (see Appendix F), in accordance with provincial requirements. It is unlikely that such an assessment would have been undertaken in the absence of the Project. Consequently, without the proposed development, the likelihood of identifying, documenting, and evaluating heritage and cultural resources within the PA would be substantially reduced.

Potential resources would therefore remain largely undocumented, and the heritage resource baseline would likely remain static.

Socio-Economic Environment

Population decline in the region is expected to continue, driven by an aging population and outward migration, as outlined in Section 3.1.6. This ongoing demographic shift would reduce demand for local infrastructure and services, potentially creating surplus capacity. However, a shrinking population and tax base would also result in reduced public and private investment in essential community services and infrastructure.

Key services likely to be affected include health care and social programs, education and training facilities, housing and accommodations, and fire and emergency services. The decline in economic activity would further exacerbate population loss, reinforcing a cycle of reduced service demand alongside diminished funding and investment capacity.

Without new economic drivers such as the proposed Project, regional communities may face growing challenges in supporting family life, recreation, culture, and long-term community resilience.

There is limited potential to diversify the economy of the area, hence it is predicted that economic dependence will continue to be placed on a relatively narrow array of industry sectors.

4.0 Environmental Effects

Environmental effects are the potential positive or negative interactions the Project may have with the surrounding environment inside the PA, LAA, or RAA. North Atlantic is taking a precautionary approach to the Project, ensuring that preventative measures are planned wherever a possible negative interaction is identified.

Environmental effects were assessed for each of the VCs, including the Atmospheric, Aquatic, Terrestrial, Socioeconomic environments, Land Resource Use, Heritage and Cultural Resources, and Human Health and Quality of Life. In addition, this section presents an overview of methods for conducting the effects assessment, a comprehensive analysis of any predicted effects of the proposed Project, a risk evaluation of accidents and malfunctions, a description of the effects over the expected temporal lifespan, and an overview of proposed mitigations. Mitigation measures were proposed to avoid, minimize, rehabilitate, or compensate for any significant impacts from the Project, and are discussed in Section 4.5.

A Cumulative Effects assessment was also conducted to evaluate the combined effects of the Project with other past, present or future projects in the RAA. This included all projects with an environmental footprint inside the RAA that were registered with NL EAD.

The approach and methods for the Effects Assessment are based on the current requirements and recommendations of NL DECC, including the following pieces of legislation and guidance documents:

- **NL Environmental Protection Act**, SNL 2002 cE-14.2;
- **NL Environmental Assessment Regulations**, 2003;
- "Environment Assessment: A Guide to the Process", 2025; and
- "Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects", 2023.

The effects assessment was comprised of the following components:

- A compilation of detailed information about the existing environment to establish baseline conditions;
- A spatial and temporal analysis of potential interactions with the existing environment;
- The selection of mitigation measures to avoid, minimize, or compensate (where appropriate) Project effects on the environment and communities;

- The development of contingency plans to address worst-case scenario, Project-related accidents and malfunctions;
- Establishment of plans for follow-up and monitoring programs to facilitate effects management and verify Project-related effects predictions; and
- A description of other projects in the RAA to identify possible interactions with the Project and potential cumulative effects.

The foundation for the analysis of residual and cumulative effects was established in Section 4, but the details are provided in Sections 5 and 6, respectively.

Sections 4 to 6 of this document describe the potential effects of the Project, and incorporate information from:

- Project Description (i.e., proposed Project components and activities);
- Applicable municipal, provincial, and federal regulations;
- Applicable policies and guidance documents;
- Environmental and socio-economic regulatory advice;
- Knowledge of the biophysical and socio-economic environments;
- Engagement with the public, Indigenous peoples, and stakeholders; and
- Experience with other development projects in NL.

4.1 Effects Assessment Methods

The purpose of the environmental effects assessment was to identify, predict, and reduce or avoid potential negative environmental interactions with the Project, and to predict the significance of residual negative effects. The following section comprises the various steps involved in environmental effects predictions, including the definition of the scope and boundaries, selection of VCs, establishment of baseline conditions, and identification of potential interactions with the Project. The effects were then predicted with consideration of mitigation measures, followed by the identification of, and determination of the significance of residual effects. The assessment also included methods for evaluating cumulative effects, accidents and malfunctions, and the effects of the environment on the Project.

4.1.1 Scope Definition

Defining the scope required establishing boundaries for the Project, incorporating temporal, spatial and administrative factors, and reflecting regulatory, policy, and economic requirements or restrictions. Scoping incorporated NL DECC guidelines, relevant literature, approaches used in similar projects, and consultations with key stakeholders such as the public, Indigenous peoples, and regulatory agencies. Assessment boundaries varied between VCs based on their specific characteristics and the extent of interaction with the Project.

Spatially, the Project used three tiers of assessment: the Project Area (PA), the Local Assessment Area (LAA), and the Regional Assessment Area (RAA). The PA encompassed the physical footprint of the undertaking and a spatial buffer to facilitate minor infrastructure adjustments during construction. The LAA and the RAA encompassed areas where indirect interactions could occur between the Project and environmental receptors, depending on activity, timing, and sensitivity. Boundaries were set to capture the furthest extent of potential influence from the Project. Administrative boundaries such as designated watersheds, public water supply areas, municipalities, and planning zones, were also considered.

The temporal boundaries represented the duration over which Project activities could interact with each VC. These boundaries applied to Project phases (Construction, O&M, Decommissioning and Rehabilitation) and to specific activities. Temporal boundaries varied by VC where adjustments were necessary. For this Project, the overall temporal boundaries spanned a period of 34 years: Construction (3 years), O&M (30 years), and Decommissioning and Rehabilitation (1 year).

4.1.2 Valued Component Selection

Concerns regarding the Project facilitated the selection of VCs, which are environmental, socio-economic, and cultural elements considered important to the public, Indigenous peoples, and regulators. In addition to the guidance from regulators, consultation and engagement activities identified specific concerns related to the Project. Section 8 summarizes engagement activities, which included meetings and correspondence with regulators, stakeholders, Indigenous and community organizations, and special interest groups. These concerns were subsequently organized by human and biophysical environments and used to help determine or confirm the VCs considered in the environmental effects prediction.

The assessment of each VC began with a definition and a brief overview of what was included (e.g., biological taxonomic groups or socio-economic interests), along with the rationale for its inclusion. KIs were identified for each VC, and measurable parameters were selected to describe the baseline status of the VCs to assess potential future changes in the KIs resulting from the Project. Methods to establish baseline conditions were summarized by VC in Section 4.2.

Table 4.1-1 lists the VCs and KIs considered in the effects assessment, which were based on:

- Conformance with *Environmental Assessment Guidance for Registration of Onshore Wind*

Energy Generation and Green Hydrogen Production Projects (Department of Environment and Climate Change, 2023), which considered:

- Technical aspects of wind energy and green hydrogen projects;
- Potential for presence and interaction with the Project and sensitivity to effects;
- Applicable municipal, provincial, and federal legislation such as SAR;
- Regulatory guidance from provincial and federal government agencies;
- Ecological and socio-economic importance to Indigenous peoples, communities and the public; and
- Similar projects that have occurred in the region or other jurisdictions.

Table 4.1-1 Valued Components and Key Indicators.

Valued Component	Key Indicator
Atmospheric Environment	Air Quality
	Greenhouse Gas (GHG) Emissions
	Light
	Sound Quality (Noise)
	Vibration
Aquatic Environment	Groundwater Resources
	Surface Water Resources
	Freshwater Fish and Fish Habitat
	Marine Fish and Fish Habitat
	Fisheries and Aquaculture
	Species at Risk (SAR)
	Habitats of Conservation Concern
	Marine Biosecurity
Terrestrial Environment	Flora
	Wetlands
	Fauna (Mammals)
	Avifauna
	Rare Lichens
	Bats
	SAR Insects
Land and Resource Use	Land Use Planning and Development Control
	Industrial and Commercial Land Use
	Tourism and Recreation
	Harvesting
	Indigenous Land Use
Heritage and Cultural Resources	Historic and Archaeological Resources
	Architectural Resources
	Paleontological Resources

Valued Component	Key Indicator
Socio-Economic Environment	Population Demographics
	Community Health and Wellbeing
	Infrastructure and Services
	Economy
	Employment
	Business
Human Health and Quality of Life	Air Quality[1]
	GHG[1]
	Light[1]
	Sound Quality (Noise)[1]
	Vibration[1]
	Shadow Flicker
	Ice Throw
	Tourism and Recreation[2]
	Indigenous Land Use[2]
Notes [1]Assessed in Atmospheric Environment [2]Assessed in Land and Resource Use	

4.1.3 Baseline Conditions

Baseline conditions were documented for each biophysical and socio-economic VC to characterize the existing environment, establish an understanding of the receiving environment, and provide sufficient context to examine the potential interaction between the Project and existing conditions in the PA, LAA and RAA. The review of existing baseline conditions also served to identify potential gaps important to the effects assessment, and hence the need for field data collection.

The review of existing conditions focused on information necessary to support effects assessment, the development of mitigation measures, and anticipated monitoring and follow-up programs. The various methods employed to collect baseline information for each VC were documented and described in individual reports, particularly those involving primary field data collection.

Existing environmental conditions were summarized for each VC within the effects assessment sections, with additional details provided in Section 3. The baseline studies that have been completed in support of the Project are appended, where available.

4.1.4 Results of Consultation and Engagement

The results of public consultation and engagement were considered in the effects assessment, including North Atlantic's commitments on mitigation, compliance, and effects monitoring programs. North Atlantic remains committed to ongoing engagement. Consultation with Indigenous peoples, stakeholders, communities and government agencies had been ongoing since 2022. Key issues and concerns raised during consultation and engagement related to Project activities were outlined for each VC, as relevant.

4.1.5 Project-Environment Interactions

Interactions between Project activities and the identified KIs were either direct or indirect. Direct interactions were based on a review of Project activities and existing biophysical and socio-economic conditions and characteristics. Indirect interactions typically required an active pathway that linked a Project activity with a KI.

As an example, a direct effect could have been the potential loss of a wetland due to clearing, grubbing and grading in preparation for construction. Clearing, grubbing and grading could also have decreased infiltration and therefore increased runoff, resulting in a potential indirect effect on surface water quality and quantity. Diminished surface water quality and quantity could have affected fish and fish habitat; this was an example of a KI acting as both the receptor of an effect and the pathway for an interaction.

To determine the potential direct and indirect interactions between Project activities and VCs, the EA team:

- Reviewed the anticipated components and activities required to construct, operate and close the Project;
- Identified potential accidents and malfunctions associated with Project activities in all phases; and
- Selected those KIs that could be directly or indirectly affected by Project activities through potential interactions.

Table 4.1-2 presents summary descriptions of the anticipated Project components and activities that could interact with elements of the environment. Identified interactions with the VCs and KIs are presented in Section 4.2. Full descriptions of Project components and activities appear in Section 2. Potential accidents and malfunctions are fully described and evaluated in Section 4.3.

Table 4.1-2 Summary of Project components and activities.

Phase, Component	Description
Construction	
Site Preparation	Clearing of vegetation, surface grubbing/grading and fill placement at work sites, building and structures sites, and laydown areas.
Roads	Construction of new access roads, widening and resurfacing of existing roads, and quarrying operations.
Staging and Laydown	Installation of temporary facilities including wind turbine staging areas, construction compounds and laydown areas.

Phase, Component	Description
Temporary Batch Plant	Construction and operation of a temporary concrete batch plant.
Equipment and Materials Transport	Road and marine transportation of construction vehicles, equipment and materials.
Wind Turbine Foundations	Installation of wind turbine foundations and crane pads including necessary blasting, excavation, and construction.
Electrical Infrastructure	Installation of electrical collector lines, substations and transmission infrastructure.
Wind Turbine Installation	Installation and assembly of wind turbine components including the tower, rotor blades, and nacelle. Anchoring the wind turbine to the foundation. Installation of meteorological evaluation tower.
Hydrogen Generation Plant	Construction and installation of the HGP including the building foundations and envelope, electrolyzers, and associated works to produce hydrogen. Includes construction of infrastructure necessary to supply water of adequate quality to the HGP, facilitate transfer of hydrogen to the HP, and to store hydrogen as well as process byproducts.
Hydrogenation Plant	Construction and installation of the HP including building foundations and envelope, and associated works to produce methylcyclohexane from toluene and hydrogen. Includes construction of infrastructure necessary to feed toluene from the storage tank to the plant, and to feed MCH from the plant to the storage tank.
Toluene and MCH Storage and Transfer	Conversion of North Atlantic's storage tanks to contain toluene and MCH including component retrofits, and associated construction works. Includes necessary component changes at NARL Logistics Terminal and construction of pipeline for facilitating transfer to and from marine vessels.
Flare Stacks	Installation of storage and process flare stacks to manage emissions.
Administration Buildings	Construction of administrative buildings and related infrastructure.
Temporary Workforce Accommodations	Potential installation of temporary workforce accommodations buildings and related infrastructure at Bull Arm Fabrication Site.
Employment and Expenditures	Direct and indirect spending on employment and goods/materials and services procurement.
Operation and Maintenance	
Wind Turbine Operation	Operation of wind turbine - and associated outputs including noise generation, vibration, shadow flicker, lighting, and ice throw.
Wind Turbine Maintenance	Preventative and unplanned maintenance of wind turbine components.
Electrical Infrastructure	Operation, preventative and unplanned maintenance of the electrical collector system, substations, and transmission system.
Venting and Flaring	Release of hydrogen or other gases either as flares or to air during regular maintenance.
Road Maintenance	Maintenance and use of access roads associated with wind turbines and electrical infrastructure.
Hydrogen Generation Plant	Operation, preventative and unplanned maintenance of hydrogen electrolyzers, water consumption, discharge; fuel/lubricant storage and transfer; temporary hydrogen storage; byproduct storage; hydrogen transfer to HGP.
Hydrogenation Plant	Operation, preventative and unplanned maintenance of plant components to produce MCH from toluene and hydrogen; transfer of toluene and MCH to and from storage.
Toluene and MCH Storage and Transfer	Storage of feedstock (toluene) and derivative (methylcyclohexane) products, transfer to and from marine vessels, and shipment.
Administration Buildings	O&M of administration buildings.
Employment and Expenditures	Direct and indirect spending on employment and goods/materials and services procurement.
Decommissioning and Rehabilitation	
Electrical Infrastructure	Disassembly and removal of electrical collector lines, substations, and transmission infrastructure.

Phase, Component	Description
Wind Turbines	Disassembly and removal of wind turbine infrastructure and meteorological evaluation towers.
Hydrogen Generation Plant	Disassembly and removal of HGP, water supply and treatment, hydrogen storage, byproduct storage, and transfer infrastructure.
Hydrogenation Plant	Disassembly and removal of HP, and toluene/MCH tank transfer infrastructure.
Toluene and MCH Storage and Transfer	Disassembly and removal of toluene/MCH storage and transfer infrastructure.
Administration Buildings	Disassembly and removal of O&M buildings and infrastructure.
Terrain Reclamation	Reclamation of disturbed areas.
Temporary Workforce Accommodations	Disassembly and removal of temporary workforce accommodations.
Employment and Expenditures	Direct and indirect spending on employment and goods/materials and services procurement
Accidents and Malfunctions	
Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials	Accidental spills and releases of hydrogen, toluene, MCH and other hazardous materials on land, in air or water.
Flaring /Venting of Hydrogen and Other Gases	Flaring or venting of hydrogen or other gases in the event of an emergency.
Traffic Incidents	Any Project-related vehicle collision or loss of control on land or in water with potential for injury to personnel, wildlife, and damage to infrastructure.
Fires and Explosions	Any incident involving a fire and/or explosion (other than from hydrogen).
Dislodging of a Wind Tower or Wind Turbine Blade	Unintended dislodging of a wind tower or wind turbine blade.
Ice Throw	Projection (ice throw) or drop (ice fall) of ice from wind turbine blades or tower structure.
Occupational Hazards and Human Injuries	Any event that presents a hazard or risk in which physical harm or damage may be inflicted upon a person.
Failure of Industrial Water Supply	Failure of industrial water supply to meet processing quality resulting in the shut-down of the electrolyzers until the issue can be rectified. Mechanisms of water supply failure may include unavailability of water or due to a spill, algal bloom, or water quality degradation (e.g., altered pH). Failure of water management infrastructure, such as pipeline leaks, dam breaks, and culvert failure, may result in the loss of process water supply or an unplanned release to the surrounding environment.
Wildlife Emergencies/Incidents	Any threatened or actual harm to Project personnel, or damage to Project infrastructure, resulting from interactions with wildlife.

4.1.6 Mitigation Measures

Along with compliance to regulations, a variety of standards, guidelines and mitigation measures were proposed to avoid, reduce, or compensate for potential adverse effects of Project-related activities. These ranged from standard industry best management practices for construction and operation, to policies and practices communicated through training programs, management plans, and/or engineering controls incorporated into the final Project design. Various mitigation measures were proactively incorporated into Project design to eliminate, reduce, and/or control the effects of Project-related activities on the environment. Project-specific mitigation and management measures are listed in Section 4.5 for ease of reference. The implementation of these mitigation measures was incorporated into the evaluation and rating of effects predictions.

4.1.7 Effects Predictions

The potential for an effect was determined based on the following tools and criteria:

- The location and duration of the interaction;
- The identification of any pathways between Project activities and the receiving environment;
- Results of predictive modelling and analyses;
- Existing literature on similar interactions and associated effects (including previous environmental assessments);
- Consultation with experts; and
- Results of monitoring exercises of similar projects.

To focus the assessment on key issues and substantive environmental effects, interactions with minimal or incidental potential effects were disregarded.

All predictions were accompanied by documentation of any scientific uncertainty related to the data and methods used to predict potential effects. All effects predictions were premised on the implementation of mitigation measures that have been proven effective in similar situations and are often mandatory or standard practice. Residual effects were those predicted to remain even after the implementation of proven mitigation measures or standard practices.

The characterization of residual effects included magnitude, geographic extent, duration, frequency and reversibility. Tables 4.1-3 (biophysical) and 4.1-4 (socio-economic) provide descriptions of effects characteristics and their contribution to determining the significance of an effect.

The assessment also incorporated the ecological and/or social context for each prediction, reflecting the importance of the subject attribute or feature to ecosystem health and function, as well as the influence of past and current human activities and associated disturbance.

Table 4.1-3 Residual biophysical effects assessment evaluation criteria.

Evaluation Criteria	Rating	Descriptor
Magnitude	1	Negligible – not detectable
	2	Low – within the range of natural variability and affects less than 10% of individuals/receptors in an affected area
	3	Moderate – affects 10 to 25% of individuals/receptors in an affected area
	4	High – affects between 25 and 50% of individuals/receptors in an affected area
	5	Very high – affects greater than 50% of individuals/receptors in an affected area
Frequency	1	Single event – residual effect occurs once
	2	Infrequent, irregular events – residual effects occur rarely but more than once
	3	Multiple irregular events – residual effects occur irregularly but more than once
	4	Multiple regular events – residual effects occur regularly
	5	Continuous – residual effects are continuous
Geographic Extent	1	Spatial extent of residual effect(s) is isolated to brownfield sites inside the PA
	2	Spatial extent of residual effect(s) is limited to the PA
	3	Spatial extent of residual effect(s) is limited to the local assessment area (LAA)
	4	Spatial extent of residual effect(s) is limited to the regional assessment area (RAA)
	5	Spatial extent of residual effect(s) is beyond the RAA
Duration	1	Effect lasts one day or less
	2	Effect lasts one to seven days
	3	Effect lasts one to four weeks
	4	Effect lasts one to 12 months
	5	Effect lasts more than one year
Reversibility	1	Highly reversible – likely to be reversed following end of Project phase or following Project closure
	2	N/A
	3	Partially reversible following end of Project phase or following Project closure
	4	N/A
	5	Irreversible – likely permanent following end of Project phase or following Project closure
Context	1	Brownfield site
	2	N/A
	3	Evidence of utilization but with natural features
	4	N/A
	5	Relatively pristine area

Table 4.1-4 Residual socio-economic effects assessment evaluation criteria.

Evaluation Criteria	Rating	Descriptor
Magnitude	1	Low – no perceptible impact on the integrity and/or quality of VC or its use by people
	2	N/A
	3	Moderate – integrity and/or quality of VC or its use by people is affected but not compromised
	4	N/A

Evaluation Criteria	Rating	Descriptor
	5	High – integrity and/or quality of VC or its use by people is compromised
Frequency	1	Single event – residual effect occurs once
	2	Infrequent, irregular events – residual effects occur rarely but more than once
	3	Multiple irregular events – residual effects occur irregularly but more than once
	4	Multiple regular events – residual effects occur regularly
	5	Continuous – residual effects are continuous
Geographic Extent	1	Limited to PA
	2	N/A
	3	Limited to LAA
	4	N/A
	5	Limited to RAA
Duration	1	Effect lasts one day or less
	2	Effect lasts one to seven days
	3	Effect lasts one to four weeks
	4	Effect lasts one to 12 months
	5	Effect lasts more than one year
Reversibility	1	Highly reversible – likely to be reversed following end of Project phase or closure
	2	N/A
	3	Partially reversible following end of Project phase or closure
	4	N/A
	5	Irreversible – likely permanent following end of Project phase or closure
Context	1	Low – not identified by regulators, Rights Holders or stakeholders as a Project-related issue
	2	N/A
	3	Medium – identified by regulators or stakeholders as an important issue to be addressed/resolved
	4	N/A
	5	High – has regulatory protection

The outcome of the effects assessment was the identification of interactions that result in significant negative residual effects. For each assessment, the determination was based on standards or thresholds assigned to each KI. Rationale for the threshold determination and the residual effects characterization has been provided in each VC section of Section 4.2.

Residual effects significance criteria were determined for each assessment based on such factors as:

- Review of applicable regulations, environmental standards, guidelines and/or objectives;
- Consultation with appropriate regulatory agencies;
- Information obtained in stakeholder or Rightsholder consultation;
- Available information on the status and characteristics of each VC; and
- Results from monitoring of other projects.

Significance criteria were defined quantitatively where possible, and qualitatively with supporting justifications where no standards existed. Significance criteria for each KI were defined in the corresponding VC section, and thresholds were based on the study team's expertise and experience.

A summary was prepared for each VC, in Section 5, to identify and describe remaining residual effects following compliance and mitigation, as presented in Tables 4.1-5 and 4.1-6. Section 5 also provides a description of any gaps or limitations that reduced the level of confidence in predictions.

Table 4.1-5 Summary of residual effects on Biophysical VC sample table.

Project Phase	KI	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction		P – Positive N – Negative	1 – Negligible 2 – Low 3 – Moderate 4 – High 5 – Very High	1 – Single 2 – Infrequent 3 - Multiple Irregular 4 – Multiple Regular 5 – Continuous	1 – Brownfield Site in PA 2 – PA 3 – LAA 4 – RAA 5 – Beyond RAA	1 – <1 day 2 – 1 to 7 days 3 – 1 to 4 weeks 4 – 1 to 12 months 5 – >1 year	1 – Highly Reversible 3 – Partially Reversible 5 – Irreversible	1 – Brownfield 3 – Evidence of Utilization 5 – Relatively Pristine
Operation and Maintenance								
Decommissioning and Rehabilitation								
Accidents and Malfunctions								

Table 4.1-6 Summary of residual effects on Socio-Economic VC sample table.

Project Phase	KI	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction		P – Positive N – Negative	1 – Low 3 – Moderate 5 – High	1 – Single 2 – Infrequent 3 - Multiple Irregular 4 – Multiple Regular 5 – Continuous	1 – PA 3 – LAA 5 – RAA	1 – <1 day 2 – 1 to 7 days 3 – 1 to 4 weeks 4 – 1 to 12 months 5 – >1 year	1 – Highly Reversible 3 – Partially Reversible 5 – Irreversible	1 – Low 3 – Medium 5 – High
Operation and Maintenance								
Decommissioning and Rehabilitation								
Accidents and Malfunctions								

4.1.8 Monitoring and Follow Up

Monitoring programs have been identified and are to be implemented both as good practice and in compliance with permits and approvals as required. Additionally, a program of environmental effects monitoring was identified to confirm predictions and assess the effectiveness of mitigation measures. Details on the specific monitoring required for each VC were based on the potential effects identified. Proposed monitoring and follow-up plans for the Project are described in Section 4.6, with select plans provided in the Appendices.

4.2 Predicted Environmental Effects of the Undertaking

This section evaluates potential environmental effects during construction, operations, decommissioning and rehabilitation, and examines the potential from accidents and malfunctions. It identifies areas of environmental sensitivity such as SAR habitats, wetlands, and culturally significant lands, and outlines mitigation strategies designed to avoid or reduce adverse effects. These strategies may include careful site selection, timing restrictions to protect migratory species, dust and noise control measures, water management plans, and post-construction monitoring. All measures were developed in accordance with federal and provincial environmental regulations and aim to ensure that North Atlantic advances NL's climate goals without compromising local ecological integrity or community well-being.

4.2.1 Atmospheric Environment

The atmospheric environment is an important component of environmental effects assessments for wind-to-hydrogen developments. There are five atmospheric considerations through which the Project could interact, including: air quality, noise, vibration, light, and greenhouse gases. Construction activities have the potential to generate dust and emissions from equipment, as well as vibrations from activities such as blasting and vehicular traffic, while operational interactions can include noise from wind turbines, compressors, or electrolyzers, as well as localized oxygen or thermal emissions.

4.2.1.1 Scope, Measurable Parameters, and Definition of Significant Effects

Five Key Indicators (KIs) were selected through which the Atmospheric Environment VC and the Project interact: air quality, GHGs, light, noise (sound quality), and vibration. Climate change is not directly considered a key indicator; however, GHG can be used as a proxy to illustrate potential interactions with climate change. Emitted GHGs trap and absorb heat, resulting in the greenhouse effect, which is the main driver of climate change.

In general, Project activities across all phases will generate emissions to the atmospheric environment. Such emissions may have adverse effects on vegetation, wildlife and wildlife habitat, human health and wellbeing, and visual aesthetic of the PA. Table 4.2.1-1 lists applicable measurable parameters of each KI, as well as the geographic scope covered in this assessment.

Table 4.2.1-1 Scope and Measurable Parameters of Key Indicators: Atmospheric Environment.

Key Indicator	Scope	Measurable Parameter(s)
Air Quality	RAA	Ambient ground-level concentrations of air contaminants (µg/m^3).
GHGs	RAA	Emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxygen (N_2O) in tonnes (t) of carbon dioxide equivalents (CO_2e) annually.
Light	LAA	Levels of light illuminance (lux).
Noise	LAA	Sound pressure levels measured in A-weighted decibels (dBA); change in percent highly annoyed (Δ %HA).
Vibration	PA	Proximity of sensitive receptors to Project-related sources of vibration (km).

The air quality assessment examined substances potentially emitted by the Project, specifically those subject to applicable air quality objectives and standards established by the NL DECC and/or ECCC. The predicted effects (i.e., ground-level concentrations of criteria air contaminants) were compared to the NL Air Quality Standards (NL AQS), as per Schedule A of the Air Pollution Control Regulations, 2022, as the compliance standard. Air contaminants concentrations considered in the assessment included: carbon monoxide (CO), sulphur dioxide (SO_2), nitrogen dioxides (NO_2), total suspended particulate (TSP), particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$). Other air contaminants such as hydrogen sulphide, asbestos, metals, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-p-dioxins (dioxins) and polychlorinated dibenzo furans, are also regulated provincially. However, none of the Project activities are expected to result in a release of these contaminants. Therefore, they were not considered further.

GHG emissions are quantified in tonnes (t) of carbon dioxide equivalent (CO_2e). The methodology for calculating CO_2e is outlined in Appendix H1. The GHG assessment accounted for emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) associated with Project activities. GHGs also include perfluorocarbons (PFC), hydrofluorocarbons (HFC), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). These gases are not expected to be released by the Project in appreciable or detectible quantities and were not considered further. Monitoring and reporting of GHGs will be conducted during the O&M Phase of the Project, in accordance with applicable provincial and federal GHG quantification and reporting requirements.

At present, there are no regulations in NL governing obtrusive light from industrial facilities. However, the Institution of Lighting Engineers (ILE) has published guidelines which have been referenced and applied in this assessment. Light levels, measured in lux, at the nearest receptors were considered accordingly in the effects assessment for this Project.

A study was completed to assess the potential effects of noise and vibration from the Project on the surrounding environment, specifically sensitive receptors (i.e., human receptors – seasonal and permanent dwellings) closest to the PA, representing the worst- case scenario for noise and vibration disturbance. The results, calculated as percent highly annoyed (%HA) as the compliance standard, were then compared to provincial guidelines as outlined in the *Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Product Projects* and Health Canada*'s Guidelines for Evaluating Human Health Impacts in Environmental Assessment: Noise* (January 2017). In the absence of provincial regulations or guidelines for exposure limits for vibration in NL, guidelines related to public nuisance from vibration developed by the American National Standards Institute (ANSI) and the Acoustical Society of America (ASA) through ANSI/ASA S.39-1983 were applied. The guidelines have been adopted by regulatory agencies such as the United States Federal Transit Administration (US FTA) and are often used in jurisdictions across Canada for assessing vibration. Predicted Project vibrations in mm/s root-mean-square (RMS) were compared to the ANSI and ASA guidelines for this Project.

The assessment criteria used to determine the effects of the Project on the Atmospheric Environment VC can be found in Table 4.1.3 of Section 4.1.7 above. For the Atmospheric Environment VC, the definition of a significant adverse residual effect was tailored according to each KI as follows:

- Air Quality – Project emissions of airborne contaminants are predicted to alter ambient air quality to the extent that the modelled concentrations, when combined with background levels, surpass applicable regulatory standards (i.e., high level of magnitude). Concern due to the predicted geographical extent (i.e., beyond the PA) and frequency (i.e., regularly or continuously) of the exceedances, as well as the proximity of sensitive receptors to Project infrastructure (i.e., contextual relevance), also influence the consideration of significance.

- GHGs – The Project GHG emissions are predicted to account for more than 25% of provincial emission totals (i.e., magnitude of emissions is high), and do not constitute measurable progress in the context of achieving established GHG reduction targets for 2030 and 2050. Additionally, the Project's contribution to global GHG emissions will be considered, including the anticipated reduction of downstream (Scope 3) emissions through the displacement of fossil fuels with green hydrogen produced by the Project.

- Light – Light emissions from the Project are predicted to surpass ILE guidelines for illuminance levels as compared to ambient light levels at sensitive receptors (i.e., the nearest residential receptors to Project infrastructure).

- Noise – Noise emissions from the Project are predicted to surpass the Health Canada guidelines for annoyance (i.e., the maximum change in percentage of the exposed population that would be annoyed (Δ%HA)), sleep disturbance (i.e., the indoor nighttime noise level limit at sensitive locations), or low frequency noise (i.e., the difference between A- and C-weighted sound pressure levels). An adverse residual effect was considered significant if the threshold of regular or continuous frequency was predicted to be exceeded beyond the PA at sensitive receptors (i.e., the nearest human receptors – seasonal and permanent dwellings – to Project infrastructure).

- Vibration – Project-related vibration levels are predicted to surpass nuisance guidelines established by the ANSI / ASA at sensitive receptors (i.e., the nearest human receptors – seasonal and permanent dwellings – to Project infrastructure).

4.2.1.2 Baseline Conditions

Sections 4.1.1 and 4.2.1 provide an overview of the current understanding of the baseline conditions of the five KIs – air quality, GHGs, light, noise, and vibration, with supporting documentation presented in:

- Appendix A – Atmospheric Environment Component Study, which includes desktop analyses and field studies to evaluate the existing air quality and noise conditions;

- Appendix H2 – Air Dispersion Modelling Study, which evaluates the impacts of pollutant emissions on air quality;

- Appendix I – Light Impact Assessment, which predicts the potential impacts of the proposed lighting installations on sensitive receptors; and

- Appendix J – Noise and Vibration Impact Study, which evaluates the potential noise and vibration impacts on sensitive receptors.

Air Quality

Baseline air quality conditions were evaluated using a combination of desktop analyses and field studies. The desktop assessment evaluated a variety of air contaminants including PM_{10}, $PM_{2.5}$, NO, NO_2, CO, SO_2, and O_3 within the RAA between 2020 and 2023. The study indicates that there is minimal regional variation in air quality as contaminant concentrations reported from the Mount Pearl NAPS station, located 130 km east of the PA, were largely comparable to measured concentrations in the vicinity of the PA. A supplemental baseline field survey was conducted at three locations assumed to be indicative of those across the broader RAA. Field study measured PM_{10}, TSP, metals, and NO_2 in an effort to provide a more comprehensive evaluation of air quality conditions in relation to potential emissions from the operations at Braya by supplementing their IMN ambient air quality monitoring stations. The results of the baseline study (Appendix A) revealed that the ambient air quality within the study area generally met established air quality standards.

Greenhouse Gas Emissions

Several facilities within the PA (i.e., Braya Refinery) and the RAA (i.e., Long Harbour Processing Plant, NARL Logistics Terminal and the Newfoundland Transshipment Terminal) contribute to GHG emissions through their operations. However, only the Braya Refinery and Long Harbour Processing Plant report GHG emissions to the NL DECC under the **Management of Greenhouse Gas Act, 2016**.

Light

A light assessment was conducted to analyze the proposed lighting installation for the Project. Findings from the assessment were compared with the guidelines published by the ILE in the document entitled, “Guidance Notes for the Reduction of Obtrusive Light”. According to the Environmental Zone Classification system developed by the ILE, the classification for rural areas, small villages, or relatively dark urban locations is "E2 Low district brightness areas". No field data was collected as part of this assessment. The areas surrounding the wind turbines are predominantly rocky and barren, offering minimal obstruction to light. In contrast, the HGP and HP PA is characterized by woodland, ponds, and wetlands. These features, along with topographic variation in the landscape, contribute to a substantial reduction in light transmission beyond the Project footprint.

Noise

Ambient noise levels were measured at six locations within the RAA in January, February, and August 2024. Noise levels were continuously collected over a period of two to six days at each location. The two locations in proximity to the Come By Chance Industrial Site (N2- Come by Chance and N5- Arnolds Cove) exhibited the highest levels of noise, characteristic of urban residential environments, while locations N1 (Rantem), N3 (Upshall), and N6 (Sunnyside) reported low ambient noise levels characteristic of a rural setting with minimal anthropogenic inclusions. The closest baseline noise monitoring station to the proposed Wind Farm is in Sunnyside. All other baseline noise monitoring stations are located to the south of the PA.

Vibration

Ambient vibration levels in the PA are generally low, with intermittent vibrations resulting from construction and industrial activities in the region, particularly from Braya operations. Further assessment of baseline vibration levels was not conducted due to the siting of Project infrastructure at distance from any potential sensitive receptors.

4.2.1.3 Project-Environment Interactions

Potential interactions with the identified KIs of the Atmospheric Environment VC are summarized in Table 4.2.1-2. As illustrated, there will be several interactions between the Project and KIs of the Atmospheric Environment VC.

Table 4.2.1-2 Potential Project interactions with atmospheric environment.

Project Component and Activity Description	Key Indicators: Atmospheric Environment				
	Air	GHG	Lig	Noi	Vib
Construction					
Site Preparation	X	X	X	X	X
Roads	X	X	X	X	X
Staging and Laydown	X	X	X	X	X
Temporary Batch Plant	X	X	X	X	X
Equipment and Materials Transport	X	X	X	X	X
Wind Turbine Foundations	X	X	X	X	X
Electrical Infrastructure	X	X	X	X	X
Wind Turbine Installation	X	X	X	X	X
Hydrogen Generation Plant	X	X	X	X	X
Hydrogenation Plant	X	X	X	X	X
Toluene and MCH Storage and Transfer	X	X	X	X	X
Flare Stacks	X	X	X	X	X
Administration Buildings	X	X	X	X	X
Temporary Workforce Accommodations	X	X	X	X	X
Employment and Expenditures					
Operation and Maintenance					
Wind Turbine Operation			X	X	X
Wind Turbine Maintenance			X	X	X
Electrical Infrastructure			X	X	
Venting and Flaring	X	X	X	X	
Road Maintenance	X	X	X	X	
Hydrogen Generation Plant	X	X	X	X	
Hydrogenation Plant	X	X	X	X	
Toluene and MCH Storage and Transfer	X	X	X	X	
Administration Buildings	X	X	X	X	
Employment and Expenditures					
Decommissioning and Rehabilitation					
Electrical Infrastructure	X	X	X	X	X
Wind Turbines	X	X	X	X	X
Hydrogen Generation Plant	X	X	X	X	X
Hydrogenation Plant	X	X	X	X	X
Toluene and MCH Storage and Transfer	X	X	X	X	X
Terrain Reclamation	X	X	X	X	X

Project Component and Activity Description	Key Indicators: Atmospheric Environment				
	Air	GHG	Lig	Noi	Vib
Temporary Workforce Accommodations	X	X	X	X	X
Administration Buildings	X	X	X	X	X
Employment and Expenditures					
Accidents and Malfunctions					
Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials	X	X			
Flaring /Venting of Hydrogen and Other Gases	X	X	X	X	X
Traffic Incidents	X	X	X	X	X
Fires and Explosions	X	X	X	X	X
Dislodging of a Wind Tower or Wind Turbine Blade				X	X
Ice Throw				X	X
Occupational Hazards and Human Injuries					
Failure of Industrial Water Supply					
Wildlife Emergencies/Incidents					

Notes
X: Potential interactions that might cause an effect.
Blanks indicate that interactions between the Project and the KI are not expected.

Air Quality

Throughout the Construction Phase, various activities will contribute to the release of air contaminants, primarily due to the use of fossil fuel-fired equipment (mobile and stationary). Additional emissions of air contaminants will be generated because of blasting, vehicular traffic on unpaved roads, wind erosion of exposed surfaces (e.g., stockpiles, laydown areas), material handling, and Project component transport. During the O&M Phase, airborne releases will arise from flaring systems (primary and backup), cooling towers, marine transport operations, and backup power generation.

Additional air emission activities during the Construction Phase are expected to generate fugitive dust, which can be carried by wind and dispersed over surrounding areas, potentially affecting nearby sensitive environments. These emissions may arise from nearly all construction-related activities including material handling and vehicle movement on unpaved surfaces. Their dispersion is influenced by several factors, such as wind speed and direction, surface dryness, and the absence of natural ground cover or vegetation. If not properly managed, fugitive dust can degrade local air quality, pose health risks to workers and nearby communities, and contribute to the deposition of particulate matter on ecologically sensitive areas. However, unlike emissions from the O&M Phase, those from the Construction Phase are temporary in nature. Additionally, mitigation measures are planned to minimize these interactions and are detailed in Section 4.5.1.

An Air Dispersion Modelling Study (Appendix H2) was completed to evaluate the geographic scope and magnitude of the potential air emissions by the Project during the O&M Phase, and to assess the potential effect on air quality based on relevant provincial regulations. The air dispersion modelling approach considered inputs such as emission rates, source locations, sensitive receptor locations, and results. Modelled concentrations for each air contaminant were combined with background concentrations and compared against NL AQS. Dispersion modelling used background concentrations developed in the Atmospheric Environment Baseline Study (Appendix A). A summary of the atmospheric dispersion modelling results is presented in Table 4.2.1-3. Atmospheric discharge rates (otherwise known as emission rates) used in the CALPUFF dispersion modelling system are provided in Table 4.2.1-4. Emission rates were conservatively estimated using the maximum expected values for all sources operating under normal conditions. These "worst-case" emissions were applied in combination with worst-case meteorological conditions throughout the entire modelling period to ensure that the maximum potential effect was captured. The same conservative emission assumptions were also applied in estimating annual average concentrations.

Results of the modelling indicated that no exceedances of regulatory air quality objectives (i.e., NL AQS) are predicted at and around identified sensitive receptors (i.e., cabins and residences). Isolated exceedances of select modelled parameters (PM_{10}, $PM_{2.5}$ and NO_2) are predicted to occur infrequently near the PA with limited to no public access.

A summary of air pollutant annual and daily atmospheric discharges estimates for the O&M Phase is provided in Table 4.2.1-5.

Table 4.2.1-3 Air dispersion modelling results summary.

Contaminant	CAS No.	Total Facility Emission Rate	Maximum Modelled GLC	Averaging Period	Percentile (1) (2)	Background Concentration (3) (4) (5)	Maximum Total GLC	Limit	Percentage of POI Limit
		(g s^{-1})	(µg m^{-3})		(nth)	(µg m^{-3})	(µg m^{-3})	(µg m^{-3})	
Carbon monoxide	630-08-0	1.41E+00	54.29	1-hr	Maximum	322.00	376.29	35,000	1.1%
		1.41E+00	34.01	8-hr	Maximum	253.00	287.01	15,000	1.9%
Nitrogen dioxide	10102-44-0	9.66E+00	529.59	1-hr	Maximum	30.08	559.67	400	139.9%
		9.66E+00	247.75	24-hr	Maximum	22.56	270.31	200	135.2%
		9.66E+00	22.17	Annual	Maximum	1.88	24.05	23	109.3%
Particulate matter <= 2.5 microns ($PM_{2.5}$)	-	2.60E+00	33.99	24-hr	Maximum	16.00	49.99	25	200.0%
		2.60E+00	1.72	Annual	Maximum	5.00	6.72	8.8	76.4%
Particulate matter <= 10 microns (PM_{10})	-	2.60E+00	33.99	24-hr	Maximum	28.00	61.99	50	124.0%
Total suspended particulate matter (TSP)	-	2.60E+00	33.99	24-hr	Maximum	33.57	67.57	120	56.3%
		2.60E+00	1.72	Annual	Maximum	12.45	14.18	60	23.6%
Sulphur dioxide	7446-09-5	3.05E-02	1.71	1-hr	Maximum	12.05	13.77	171	8.1%
		3.05E-02	1.47	3-hr	Maximum	0.79	2.25	600	<1%
		3.05E-02	0.82	24-hr	Maximum	5.76	6.58	300	2.2%
		3.05E-02	0.13	Annual	Maximum	0.79	0.91	11	9.1%

Notes

(1) For all averaging periods, the worst-case modelling result was considered without adjusting for any meteorological anomalies. Due to the unavailability of onsite source information, this approach, along with the use of conservative source assumptions, was employed to capture the maximum possible worst-case impact.

(2) For the Annual average periods, the modelling results are based on the worst-case result of each year within the 3-year modelling period.

(3) Based on continuous monitoring data from the Mount Pearl NAPS Station from January 1, 2020, to December 31, 2022

(4) Background concentrations are calculated as follows:

For hourly values, the maximum hourly concentration observed outside the Project fenceline

For 3-hour values, the 3-hour rolling average of 90th percentile hourly concentrations

For 24-hour values, the maximum 24-hour average

For annual values, the maximum annual average

(5) TSP is not monitored at the Mount Pearl NAPS Station. Background concentrations of TSP were estimated using the background concentrations of PM_{10} and the average ratio of PM_{10} to TSP observed during the field study (0.834).

Table 4.2.1-4 Atmospheric discharge rates: Project Operation.

Source	Maximum TSP Emission Rate	Maximum PM_{10} Emission Rate	Maximum $PM_{2.5}$ Emission Rate	Maximum SO_2 Emission Rate	Maximum NO_2 Emission Rate	Maximum CO Emission Rate
	($g\ s^{-1}$)	($g\ s^{-1}$)	($g\ s^{-1}$)	($g\ s^{-1}$)	($g\ s^{-1}$)	($g\ s^{-1}$)
Flare	0.087	0.087	0.087		0.055	0.422
Cooling Tower	0.384	0.384	0.384			
Tanker	0.517	0.517	0.517		0.881	
Tugboat	0.038	0.038	0.038		0.076	
Emergency Generator	0.100	0.100	0.100	0.094	1.422	0.306

Table 4.2.1-5 Estimated daily and annual emission rates by source.

Source ID	Equipment Name	CO Emission Rate (1) (2)		NO_2 Emission Rate (1) (2)		$PM_{2.5}$ Emission Rate (1) (2)		PM_{10} Emission Rate (1) (2)		TSP Emission Rate (1) (2)		SO_2 Emission Rate (1) (2)	
		($kg\ d^{-1}$)	($kg\ yr^{-1}$)	($kg\ d^{-1}$)	($kg\ yr^{-1}$)	($kg\ d^{-1}$)	($kg\ yr^{-1}$)	($kg\ d^{-1}$)	($kg\ yr^{-1}$)	($kg\ d^{-1}$)	($kg\ yr^{-1}$)	($kg\ d^{-1}$)	($kg\ yr^{-1}$)
SC-01	Emergency Generator (3)	26.466	110.277	122.860	511.918	8.636	35.985	8.636	35.985	8.636	35.985	8.079	33.664
FLR-01	LOHC Flare	36.429	13,296.633	4.795	1,750.008	7.526	2,746.863	7.526	2,746.863	7.526	2,746.863		
FLR-02	Braya Flare (3)	36.429	151.788	4.795	19.977	7.526	31.357	7.526	31.357	7.526	31.357		
CT-01	Cooling Tower Cell 1					33.164	12,104.764	33.164	12,104.764	33.164	12,104.764		
CT-02	Cooling Tower Cell 2					33.164	12,104.764	33.164	12,104.764	33.164	12,104.764		
CT-03	Cooling Tower Cell 3					33.164	12,104.764	33.164	12,104.764	33.164	12,104.764		
CT-04	Cooling Tower Cell 4					33.164	12,104.764	33.164	12,104.764	33.164	12,104.764		
CT-05	Cooling Tower Cell 5					33.164	12,104.764	33.164	12,104.764	33.164	12,104.764		

OGV-01	Ocean-going MCH tanker (4)	69.202	2,491.288	76.123	2,740.417	44.694	1,608.968	44.694	1,608.968	44.694	1,608.968	2.173	78.226
TUG-01	Tugboat 1 (4)	8.165	293.933	6.532	235.146	3.266	117.573	3.266	117.573	3.266	117.573	0.232	8.348
TUG-02	Tugboat 2 (4)	8.165	293.933	6.532	235.146	3.266	117.573	3.266	117.573	3.266	117.573	0.232	8.348
TOTAL	**Total**	**184.857**	**16,637.851**	**221.636**	**5,492.612**	**240.732**	**65,182.141**	**240.732**	**65,182.141**	**240.732**	**65,182.141**	**10.716**	**128.585**

Notes

(1) Based on the assumptions and calculation methodologies described in Appendix H2 - Air Dispersion Modelling Study.

(2) Daily emissions represent the daily maximum, while annual emissions represent the annual estimated under standard operating conditions.

(3) Based on a maximum annual operating time of 100 hours.

(4) Based on a maximum annual operating time of 864 hours, estimated using a given maximum movements of 18, and an estimate of 48 operating hours per movement.

The Construction and Decommissioning and Rehabilitation Phases were excluded from the air dispersion modelling due to the nature of activities in both Phases. Specifically, emission sources have significant temporal variation, with no permanent or long-term effects on air quality expected, and source parameters, including specific locations, are unknown. Airborne releases were also not estimated (quantified) for Accidents and Malfunctions based on the same logic. Project activities associated with Construction and Decommissioning and Rehabilitation Phases are anticipated to be lower than during Operation. Accidents and malfunctions (e.g., flaring, fire and explosion) have the potential to generate airborne releases, resulting in an effect on air quality but over a short duration and at levels lower than those generated during other Project phases.

Greenhouse Gas Emissions

Project activities during the Construction, O&M, and Decommissioning and Rehabilitation Phases will generate GHG emissions. The magnitude of Project related GHG emissions will be driven by fossil fuel consumption. During the Construction Phase, Scope 1 (direct) emissions will be released from blasting and fossil fuel consumption in mobile and stationary combustion equipment. Marine transport of supplies (e.g., nacelles, blades, towers) will generate Scope 3 (indirect) emissions during the Construction Phase. During the O&M Phase, Scope 1 (direct) emissions will be released from fossil fuel-powered mobile and stationary combustion equipment, as well as flaring at the HP. Indirect O&M emissions will arise from electricity consumption (Scope 2) and marine transport of MCH and toluene (Scope 3).

GHG emission estimates were developed for the Construction and O&M Phases using preliminary engineering details, publicly available emission factors, and good practice guidelines. Annual Construction and O&M Phase estimates are presented in Table 4.2.1-6. Calculation methodologies, inputs and assumptions are detailed in Appendix H1 (Emissions Inventory). O&M Phase emissions were calculated using inputs from the 30 ktpa production case except for emissions from flare stacks, which were calculated using inputs from the 60 ktpa LOHC production case. GHG emission estimates were not quantified for the Decommissioning and Rehabilitation Phase nor for unplanned events. It is assumed that GHG emissions during the Decommissioning and Rehabilitation Phase will not exceed GHG emission levels generated during the Construction Phase. Unplanned events (e.g., accidents, malfunctions) may generate GHG emissions, but at levels lower than those estimated during the Construction and O&M Phases.

GHG emissions estimated to be released during the Construction and O&M Phases are relatively low; emissions are not anticipated to result in measurable change to atmospheric levels of GHGs. During the O&M Phase, emissions are projected to account for less than 1% of provincial GHG emissions (Newfoundland and Labrador Department of Environment and Climate Change, 2023). GHG emission estimates for the O&M Phase are subject to change over the 30-year lifetime of the Project; the implementation of greener technologies (e.g., electric vehicles) may result in reduced GHG emissions.

Table 4.2.1-6 Annual GHG emissions estimate summary.

Phase	Source	Annual GHG Emissions (t CO_2e)			
		Scope 1 (Direct)	Scope 2 (Indirect)	Scope 3 (Other Indirect)	Total Scope 1 + Scope 2
Construction	Blasting	51			51
	Stationary Combustion	1,089			1,089
	Mobile Equipment	13,700			13,700
	Marine Transport of Supplies			83,341	0
	Total Annual Construction [1]	14,840	0	83,341	14,840
O&M	Mobile Equipment	98			98
	Flare Stacks	3,362			3,362
	Emergency Generator	19			19
	Marine Transport of Product			36,020	0
	Electricity Consumption [2]		5,465		5,465
	Total Annual Operation [3]	3,478	5,465	36,020	8,943

Notes
[1] Project construction scheduled to occur over a two-year period, marine transport of supplies to occur in a single calendar year.
[2] Accounts for firm and non-firm power requirements.
[3] Operational lifetime of the Project is 30 years.

Light

Light was evaluated as part of the Atmospheric Environment VC due to the potential effects of Project lighting on nighttime sky visibility, migrating wildlife, and overall nuisance to sensitive receptors. Artificial lighting will be required for safe and efficient operation during all Project Phases. During Construction and Decommissioning Phases, Project lighting will be temporary; limited to mobile equipment (e.g., heavy equipment, light duty vehicles, mobile floodlights) and will be minimized to only what is necessary for safety when activity in a particular location is complete. During the O&M Phase, permanent Project lighting will be installed on buildings, wind turbines, and access roads. Due to the industrial nature of the NARL Logistics Terminal and thus the location of the HGP and HP, the proposed Project will have a limited effect on the ambient light levels in this area. The Wind Farm is sited in a more natural largely undeveloped area, and therefore it is more susceptible to potential interactions with ambient light levels. Accidents and Malfunctions, including flaring, fire / explosion, and traffic accidents, also have the potential to temporarily alter ambient light levels in the vicinity of the PA.

Project lighting design has not been finalized; thus, a qualitative assessment (Appendix I) was conducted in consideration of regulations, codes and guidance set forth by the ILE and Transport Canada, as required (The Institution of Lighting Engineers, 2005; Standard 621 - Obstruction Marking and Lighting - Canadian Aviation Regulations (SOR/96-433), 2021). Final Project lighting design will consider such regulations, codes, and guidance to negate generation of Project-related obtrusive lighting. Following decommissioning, ambient light levels are anticipated to return to pre-Project conditions.

The Light Impact Assessment (Appendix I) evaluated influence of Project lighting on sensitive receptors (i.e., the nearest residential receptors to Project infrastructure). As a conservative measure, it is assumed that 100% of incident light will reach sensitive receptors. However, the combination of uneven terrain and surrounding vegetation will markedly attenuate light before it reaches these sensitive receptors, especially at the location of the HGP and HP, which is characterized by woodland, ponds, and wetlands. Additionally, there will be greater lighting associated with equipment and structural components within the HGP and HP area compared to the Wind Farm area.

Total illuminance (the amount of light that covers a surface) for the O&M Phase is provided in Table 4.2.1-7. Calculations of total illuminance were performed for a scenario where all equipment is operated at the same time and at the closest sensitive receptor, and for pre- and post-curfew conditions (The Institution of Lighting Engineers, 2005). Methodology used to assess lighting effects on sensitive receptors is further detailed in Appendix I.

Table 4.2.1-7 Illuminance at Receptors: Project O&M.

Period	Illuminance (lux)		ILE Guidance Limit (lux)
	HGP and HP	Wind Farm	
Pre-curfew (7:00 – 22:59)	2.22E-01	4.56E-01	5
Post-curfew (23:00 – 06:59)	2.22E-01	4.56E-01	1
Notes ILE = Institution of Lighting Engineers			

Pre- and post-curfew illuminance represent 9.11% and 45.55% of guidance limits, respectively. For context, the post-curfew limit of 1 lux is the accepted equivalent to moonlight. Considering this, predicted light effects for the duration of Project O&M will be negligible, in comparison to pre-existing conditions.

Noise

The Project will generate noise emissions during all Project phases. Construction noise, while temporary, will be generated during activities such as earthmoving, blasting, installation of electrical infrastructure (e.g., transmission line), and operation of mobile equipment. The Project will generate substantial noise emissions during the O&M Phase, primarily resulting from wind turbine operation; noise emissions from wind turbines generally increase with wind speed. HP and HGP infrastructure (e.g., compressors, generators, flares) will also generate noise emissions during Project operation. Operational noise-generating infrastructure may affect noise levels in the LAA, particularly at locations proximate to identified sensitive receptors. Noise generated during decommissioning and rehabilitation activities is anticipated to be less than that of other Project Phases and will be temporary. Ambient noise levels are anticipated to return to pre-Project conditions after decommissioning and rehabilitation activities are complete. Potential noise resulting from Accidents and Malfunctions will be temporary and localized to the location of the unplanned activity (i.e., traffic accident, fire or explosion).

A conservative approach was used to evaluate O&M Phase noise emissions in the Noise and Vibration Impact Study (Appendix J); it was assumed that the wind turbines will operate at the maximum wind speed at the Wind Farm, while it was assumed that all infrastructure at the HGP and HP will operate outdoors with enclosure reduction applied to select equipment. The percent highly annoyed (%HA) is a measurable parameter that was assessed in the study, as well as indoor nighttime noise and low frequency noise (LFN). The %HA is the percentage of the exposed population that would be annoyed by a particular day-night average sound pressure level (L_{dn}). LFN is noise with frequency content in the range of 16 to 200 hertz (Hz). The %HA was assessed for two Project construction scenarios: (1) wind turbine, HGP, and HP construction; and (2) transmission line, collector system and road construction. Additionally, %HA was assessed for Project O&M. Indoor nighttime noise and LFN were assessed for Project O&M only (i.e., Construction and Decommissioning and Rehabilitation were not considered). The study considered receptors with the greatest potential exposure to noise sources due to proximity and direct line of sight exposure. Receptor locations were selected in areas where people normally live, work, and take part in recreational activities; it did not consider the Project workforce. While many more receptor locations exist in the LAA, selected receptor locations are assumed to be representative of Project interactions. Results of the %HA assessment (Appendix J) are summarized in Table 4.2.1-8.

Table 4.2.1-8 Noise Impact Study Results: %HA Assessment.

Project Component	Baseline		Project Predicted L_{dn} (dBA)	Total (Baseline plus Project)		Δ %HA (Between Total and Baseline)
	L_{dn} (dBA)	%HA		L_{dn} (dBA)	%HA	
Construction Scenario 1 [1]	50 - 61	2.1 - 8.9	16 - 55	50 - 61	2.1 - 8.9	0.0 – 2.1
Construction Scenario 2 [2]			15 - 57	50 - 61	2.1 - 8.9	0.0 - 3.1
Operation and Maintenance			26 - 51	50 - 62	2.1 – 9.3	0.0 – 0.6

Notes
Δ %HA = change in %HA between total and baseline
L_{dn} data presented with the +10 dB correction for rural areas in accordance with Health Canada
[1] Construction of wind turbines, HGP and HP
[2] Construction of transmission line, collector system and road

Health Canada recommends that the maximum change in %HA due to Project activities be no more than 6.5% (Health Canada, 2017). Per Table 4.2.1-8, the change in %HA level is below 6.5% for all PORs. As such construction noise impacts are not anticipated during both Construction Scenario 1 (wind turbine, HGP and HP construction activities) and Construction Scenario 2 (transmission lines, collector system and road construction activities). During the O&M Phase, %HA at all receptors were predicted to comply with limits set forth by Health Canada. Therefore, provided that select operational equipment is tendered with low noise options or mitigated appropriately, predicted noise levels produced by worst-case activities during the Construction, and O&M Phases of the Project are predicted to be within the applicable limits.

In addition to the %HA assessment, an indoor nighttime noise assessment was conducted for the Project O&M Phase. As a conservative measure, 15 dBA was subtracted from outdoor Project noise at the plane of the dwelling window of receptors to obtain predicted indoor noise levels (Health Canada, 2017). The 15 dBA metric considers an outdoor-to-indoor transmission loss with windows at least partially open. Per Health Canada guidance, outdoor sound level targets for sleep disturbance are 45 and 57 dBA for partially open and fully closed windows, respectively. As a conservative measure, the sleep disturbance target was set to 45 dBA. The predicted indoor nighttime levels during Project O&M ranged from 4 to 30 dBA and are thus in compliance with the 45 dBA sleep disturbance target.

The Wind Farm was assessed for the potential to emit low frequency noise (LFN). To determine if a noise source is a likely to generate high LFN, the difference between the C weighted sound levels and the A weighted sound levels of the source are calculated and compared to a limit of 10 dB. If 10 dB is exceeded, then the source is generally considered to be an LFN source. Additionally, Health Canada suggests that if the energetic sum of the sound pressure levels within the 16 Hz, 31.5 Hz, and 63 Hz bands (unweighted, dBZ) exceed 70 dB, then mitigation measures should be explored to reduce these levels to within compliance. While the difference between A- and C-weighted noise levels calculated for the Wind Farm during the O&M Phase exceed 10 dB for the majority of PORs, the total LFN at each POR remains below 70 dB. As such, LFN is not anticipated to be an issue at surrounding receptors during Project O&M.

Vibration

The Project will generate vibrations during all Project Phases. Risk of vibration effects would be primarily occurring during the Construction Phase resulting from the operation of high vibration generating pieces of equipment. Vibration emissions during the construction period will frequently occur but will be transient due to the nature of activities and construction schedule. Furthermore, the minimum separation distance between the closest receptor to vibration intensive activities during construction activities is 84 m, which is outside the highest vibration zone of influence. It is anticipated that the O&M Phase will generate lower vibration levels at sensitive receptors compared to the Construction Phase. Since sources of vibration at the Wind Farm will be set back from dwellings by more than 1,000 m, Project interactions with baseline vibration levels are not anticipated. Similar to the O&M Phase, Project Decommissioning and Rehabilitation activities as well as Accidents and Malfunctions will result in lower risk of vibration effects than during construction. Due to established Project setbacks from dwellings and the transient nature of decommissioning activities and Accidents and Malfunctions, interactions with baseline vibration levels are unlikely. Following decommissioning, vibration levels are anticipated to return to pre-Project conditions.

4.2.2 Aquatic Environment

The aquatic environment is a key VC due to its ecological, cultural, and regulatory importance. It may also interact with the Project during all Phases and Unplanned Events. There are eight KIs through which the Aquatic Environment VC and the Project interact: Groundwater Resources, Surface Water Resources, Freshwater Fish and Fish Habitat, Marine Fish and Fish Habitat, Fisheries and Aquaculture, Species at Risk, Habitats of Conservation Concern, and Marine Biosecurity. Some aspects of the Aquatic Environment, such as surface water, provide a resource that can be utilized by the Project (along with existing usage). The Aquatic Environment also provides a pathway that links Project activities/elements to other environmental receptors. Aquatic resources such as fish and fish habitat interact with the Project and function as receptors. The PA is proximate to Placentia Bay, which is utilized by several species at risk and contains many biologically important habitats of conservation interest. Marine shipping associated with the Project may interact with the marine environment and has the potential to introduce aquatic invasive species (AIS).

4.2.2.1 Scope, Measurable Parameters, and Definition of Significant Effects

The Project will interact directly with freshwater and marine systems near Sunnyside and Come By Chance. These environments support sensitive species, including commercially and culturally important fish like Atlantic salmon and capelin. Any disturbance, such as sedimentation, flow alteration, or spills, could affect habitat quality and downstream users. Given the potential for harm during construction and operation, including erosion, water withdrawals, or spill risks at the jetty, robust environmental planning will be required. Avoidance, minimization, and mitigation measures such as erosion control, spill response systems, and environmental monitoring will be key to managing risks. Protecting aquatic resources is key to maintaining biodiversity and complying with legislation. Table 4.2.2-1 details applicable measurable parameters of each of the eight Aquatic Environment KIs, as well as the geographic scope covered in this assessment.

Studies determined that no critical habitats for freshwater or marine aquatic species, as defined by the SARA or NL ESA, and no Marine Protected Areas (MPAs), were identified in the RAA. However, several potential salmonid spawning habitats, six scheduled salmon rivers, and one Ecologically and Biologically Significant Area (EBSA) were identified in the RAA and encompassed the extent of the Habitats of Conservation Concern KI assessed.

Table 4.2.2-1 Scope and Measurable Parameters of Key Indicators: Aquatic Environment.

Key Indicator	Scope	Measurable Parameter(s)
Groundwater Resources	PA	Water quality (i.e., concentration of chemical parameters compared to applicable guidelines). Water quantity (i.e., alteration of baseflow (%),

Key Indicator	Scope	Measurable Parameter(s)
		change in well yield (L/min) for existing well users, change of groundwater level relative to existing conditions (m).
Surface Water Resources	LAA	Water quantity (i.e., changes in mean annual flow (m^3/s), runoff (mm), and water levels (m); water quality (i.e., changes in concentration of chemical parameters compared to applicable guidelines).
Freshwater Fish and Fish Habitat	LAA	Change in habitat quantity (i.e., area in m^2 or hectares); change in physical habitat quality (e.g., wetted width (m), depth (cm), water velocity (m/s), substrate classification, cover (%)); change in habitat water quality (e.g., water temperature (°C), pH; dissolved oxygen (DO -% saturation); salinity (ppt), conductivity (µS/cm), turbidity (FNU); nutrients, total metals, ammonia, total suspended solids (TSS), and alkalinity (mg/L); colour (TCU)); change in fish survival (e.g., abundance (numbers of fish), change in community structure (proportion of each species %), meristic characteristics of fish population); change in abundance and richness of benthic invertebrates.
Marine Fish and Fish Habitat	RAA	Change in marine physical habitat quality (i.e., temperature change reduction distance (m), salinity (ppt) in effluent receiving waters); change in marine water quality (i.e., pH, turbidity (FNU), TSS (mg/L), ammonia (mg/L), chlorophyll a (µg/L));
Fisheries and Aquaculture	RAA	Change in landed weight (kg) of commercially and recreationally important species such as snow crab, American lobster, sea scallops, Atlantic cod, and Atlantic herring; change in marine traffic volumes (vessels per day per km^2).
Species at Risk	RAA	Change of species designation under SARA, NL ESA, or IUCN Red List; change in presence/absence of American eel, Atlantic salmon, Atlantic Cod, American Plaice, Leatherback turtles (qualitative)
Habitats of Conservation Concern	RAA	Extent of loss or disturbance of habitats of conservation concern including salmonid spawning habitats, Scheduled Salmon Rivers, and the Placentia Bay Ecologically and Biologically Significant Area (EBSA) (i.e., area in km^2 or hectares).
Marine Biosecurity	RAA	Change in number of DFO data reports of AIS in RAA (number of individual records).

For the Aquatic Environment VC, a significant adverse residual effect was defined as one having a high magnitude, or a medium magnitude in combination with either a high frequency or a low level of confidence in the prediction. The definition of potential significant adverse residual effects was adjusted for select KIs as follows:

- Groundwater Resources – long-term or irreversible Project-related effect on public or industrial wellhead area through altered groundwater recharge zones, groundwater levels, groundwater yield quantities, and groundwater qualities beyond natural variability.
- Surface Water Resources - long-term or irreversible Project-related effect on watercourses or waterbodies through alerting surface water drainage pathways, standing water levels, mean annual flow, and surface water qualities beyond the range of natural variability. Impairment of public or industrial water supplies.

- Freshwater Fish and Fish Habitat – Project-related Harmful Alteration, Disruption or Destruction (HADD) of freshwater fish habitat or the death of freshwater fish, as defined by the **Fisheries Act**, that cannot be avoided, minimized, reversed through restoration or rehabilitation, or offset;
- Marine Environment regarding marine fish and fish habitat – Project-related HADD of marine fish habitat or the death of marine fish, as defined by the **Fisheries Act**, that cannot be avoided, minimized, reversed through restoration or rehabilitation, or offset;
- Fisheries and Aquaculture – A verified loss of net income from commercial fishing or aquaculture operations due to environmental effects caused by the Project, persisting for at least one fishing season; or the displacement of fishers as a result of long-term changes in marine traffic density.

4.2.2.2 Baseline Conditions

Baseline conditions for the Aquatic Environment have been characterized through desktop studies of scientific papers and reports, publicly available long-term datasets, and baseline field monitoring programs. Placentia Bay is a very well-studied region of Newfoundland, and there is a wealth of information on the aquatic environment to inform the effects assessment of the Marine Environment, and sufficient knowledge of the KIs on which to base effects predictions. A summary of findings is provided in Section 3.1.2, with supporting documentation in the following appendices:

- Appendix B1 – Aquatic Environment Baseline Study, which includes site-specific field surveys for freshwater and marine environments;
- Appendix B2 – Effluent Dispersion Modelling, which models the expected dispersion of Project effluent into the marine environment; and
- Appendix C – Surface Water Study, which combined desktop analyses of regional hydrology and field surveys of the local source water system.

Groundwater Resources

A desktop review of surficial and bedrock geology maps was conducted. Thin surficial rock and lithified bedrock were identified in the LAA. These conditions support a shallow and limited groundwater system. No registered public groundwater supply wells are present within the LAA. Groundwater quantities were assessed based on publicly available community well yield data, which indicated very low groundwater yield compared to surface water quantities (Section 3.1.2.2). As a result, groundwater contributions to the overall water resource system appear to be limited.

Surface Water Resources

Surface water resources within the LAA include Inkster's Pond Industrial Water Supply area, as well as watersheds near the proposed wind turbine placement area and transmission line. These surface water features include watershed areas, waterbodies, and watercourses, which may be influenced by site preparation, construction activities, and O&M of the HGP and HP.

A baseline field monitoring program was conducted to characterize water levels, flows, and seasonal dynamics within the Inkster's Pond Industrial Water Supply Area which currently supplies water to the facilities in the Project Area, including Inkster's Pond and several others which actively supply water via outlet control structures (i.e., Barrisway Pond and Willie Jarge Pond).

Field data obtained from May 2024 to May 2025 were supplemented by long-term regional climate and hydrometric records from the WSC. The comparison confirmed that the full hydrologic range was captured, including a 120-day low flow period and high flows associated with peak precipitation and snow melting events. The overall average unit flows during the baseline period ranged from 35.0 to 36.1 L/s/km², comparable to the long-term regional average of 37.2 L/s/km².

Freshwater Fish and Fish Habitat

Freshwater fish and fish habitat within the PA were characterized through baseline studies in 2024. Freshwater fish habitat and water quality was assessed at candidate road crossings and transmission line crossings for streams and waterbodies potentially affected by the Project. The fish communities at these locations were assessed and were dominated by brook trout, while Atlantic salmon, brown trout, threespine stickleback, and American eel were also occasionally present. Data were collected on streamflow conditions (depth and velocity, discharge) and benthic invertebrate communities for stream crossings, while plankton communities were assessed at waterbody crossing sites. Historical water quality data collected by NL DECC WRMD was accessed to supplement field data collection.

The Project Area freshwater habitats, primarily small streams, are characterized by common mesohabitat types such as pools, runs, and riffles, with dominant substrates including boulder and silt/clay, and smaller amounts of gravel crucial for spawning.

Marine Fish and Fish Habitat

Marine fish and fish habitat within the LAA was characterized through EEM studies conducted by Braya in 2023 and baseline studies conducted in 2024. Data on water and sediment quality, the benthic invertebrate community, and polycyclic aromatic hydrocarbon (PAH) concentrations in blue mussel tissue were available from the 2023 EEM studies. Conductivity/temperature and depth (CTD) profiling was completed at three marine stations in July, September and December 2024. Continuous recording of water temperatures at selected depths and subsequent profiling of the temperature regime from mid-July to early December 2024 was completed. Mean salinity was consistent across months with slight variation due to surface runoff. Mildly alkaline pH levels were consistent (8.02 to 8.11), and turbidity was low (0.33 to 0.62 FNU). Temperature profiling showed seasonal thermocline development in July and December typical of coastal environments, with water ranging from stratified (11.25°C to 16.35°C in mid-July) to relatively uniform (17.02°C to 17.71°C in late September).

Marine sediment primarily featured well-sorted coarse sand and cobble, contributing to low benthic invertebrate numbers, as well as low benthic species diversity. The 2023 EEM study reported an average abundance of 38 organisms and 2.8 taxa, predominantly polychaete worms, echinoderms, amphipods, oligochaetes, and nematodes. Drop camera surveys were conducted to assess marine habitats, including substrate, vegetation, and marine epifauna on the seafloor within the LAA. Drop camera surveys identified larger benthic macrofauna such as Cunner, Winter flounder, Sea Star, Hermit Crab, Crab, Sea Anemone, and Sea Urchin.

A modelling study was completed to assess dispersion of effluent from the Project if North Atlantic were to use the Braya outfall infrastructure. Temperature changes generally met the <1C° guideline at short distances, with the most challenging scenario (high-temperature effluent in summer without current) requiring 33.73 m for compliance. Salinity changes consistently remained within the 10% guideline, as effluent salinity was close to ambient levels. Due to the distance for temperature to be within compliance using Braya's outfall infrastructure, a second modelling study was completed to assess dispersion of effluent from the Project using a new outfall location, North of the jetty. Temperature changes generally met the <1C° guideline at short distances, with the most challenging scenario (high-temperature effluent in winter without current) requiring 5.22 m for compliance. Salinity changes consistently remained within the 10% guideline, as effluent salinity was close to ambient levels.

Fisheries and Aquaculture

Available information on commercial, recreational, and Indigenous fisheries that occur near or within the RAA were reviewed. There are negligible commercial freshwater fisheries within the RAA due to a moratorium on Atlantic salmon and declining American eel licenses. According to recent angling catch data from DFO, recreational fisheries are pursued in the RAA, targeting freshwater species like brook trout (the most common freshwater recreational catch), Atlantic salmon (in six scheduled rivers), rainbow smelt, and brown trout. Marine recreational groundfish fishing for Atlantic cod occurs annually from July until September.

An overview of commercial fishing activities within Placentia and Trinity Bay were conducted to assess potential interactions between the fishing industry and the Project. Commercial. fisheries data (landed weight and corresponding monetary value) for NAFO sub-division 3Psc were reviewed for species fished in Placentia Bay from 2018 to 2024, along with the concentration of fixed and mobile fishing gear, and interview data as collected by DFO and contained in a Community-Based Coastal Resource Inventory. For commercial marine fisheries in Placentia and Trinity Bay (NAFO 3Psc), snow crab, Atlantic cod, and American lobster were the top species by landed value from 2018 to 2024, with fixed gear being more commonly used than mobile gear. Indigenous fisheries, primarily by Miawpukek First Nation, involve both Food, Social, and Ceremonial (FSC) and commercial licenses for various species (e.g., snow crab, Atlantic salmon, American eel), however there is no evidence of substantial FSC activity within the RAA, likely due to distance.

Species at Risk

Two freshwater aquatic species, American eel and Atlantic salmon (South NL population), have been designated by COSEWIC, or under SARA and/or NL ESA, and are present in the RAA as both were captured in baseline studies in 2024. A total of 43 marine species (fish, mammals, and reptiles) of Special Conservation Concern (SCC) in Placentia Bay and the Avalon Peninsula were identified; however, only two marine finfish (Atlantic cod, American plaice) were expected to be found commonly in the RAA and LAA. The life histories and habitat requirements of these four species were assessed in the context of potential interactions with the Project.

Habitats of Conservation Concern

No critical habitats (as defined by SARA or NL ESA) for freshwater SAR or SCC were identified in the RAA. No discrete spawning habitats were documented during baseline studies. Placentia Bay is a designated Ecologically and Biologically Significant Area (EBSA) within the Placentia Bay-Grand Banks Large Ocean Management Area (PBGB LOMA) and this designation encompasses both the RAA and the LAA. No Marine Protected Areas (MPAs) or critical habitats, as defined under SARA and the **Newfoundland and Labrador Endangered Species Act** (NL ESA), were within the RAA or LAA. Sensitive marine habitats that occur within the RAA, but not within the LAA, include capelin spawning sites, eelgrass meadows, salt marshes, wetlands, and scallop beds.

Marine Biosecurity

The most severe biosecurity risk to Newfoundland ports are aquatic invasive species (AIS). During the Project Construction and O&M phases vessel traffic will be the main concern for AIS introduction and spread. Available information on AIS in Placentia Bay from 2006 to 2024 as provided by DFO were reviewed including nine reports of AIS in the RAA. Of these nine, six species were detected in Arnold’s Cove and/or Come By Chance Harbours, including: Coffin Box (*Membranipora membranacea*); European Green Crab (*Carcinus maenas*); Golden Star Tunicate (*Botryllus schlosseri*); Orange Ripple

Bryozoan (*Schizoporella japonica*); Oyster Thief (*Codium fragile ssp. fragile*); and Vase Tunicate (*Ciona intestinalis*). One species, the Ribbed Bryozoan (*Juxtacribrilina mutabilis*), was detected near the port of Bull Arm. Areas in NL that have higher levels of shipping and boating traffic than others, such as near the shipping lanes of Placentia Bay, are actively monitored for AIS by DFO.

4.2.2.3 Project-Environment Interactions

Potential interactions with the identified KIs of the Aquatic Environment VC are summarized in Table 4.2.2-2. In Section 5.2, a review of the significance criteria and determination of residual effects will be described.

Table 4.2.2-2 Potential Project Interactions with Aquatic Environment.

Project Component and Activity Description	Key Indicators: Aquatic Environment							
	Groundwater Resources	Surface Water Resources	Freshwater Fish and Fish	Marine Fish and Fish	Fisheries and Aquaculture	Species at Risk	Habitats of Conservation	Marine Biosecurity
Construction Phase								
Site Preparation	X	X	X	X				
Roads	X	X	X			X		
Staging and Laydown		X	X			X		
Temporary Batch Plant		X						
Equipment and Materials Transport		X		X	X	X	X	X
Wind Turbine Foundations		X	X			X		
Electrical Infrastructure		X	X			X		
Wind Turbine Installation		X	X			X		
Hydrogen Generation Plant	X	X		X	X			
Hydrogenation Plant	X	X		X	X			
Toluene and MCH Storage and Transfer		X	X	X	X	X	X	X
Flare Stacks				X				
Administration Buildings	X	X	X					
Temporary Workforce Accommodations		X	X					
Employment and Expenditures								
Operation and Maintenance								
Wind Turbine Operation								
Wind Turbine Maintenance		X	X					
Electrical Infrastructure								
Venting and Flaring				X				
Road Maintenance		X	X			X		
Hydrogen Generation Plant		X		X				
Hydrogenation Plant		X		X				

Project Component and Activity Description	Key Indicators: Aquatic Environment							
	Groundwater Resources	Surface Water Resources	Freshwater Fish and Fish	Marine Fish and Fish	Fisheries and Aquaculture	Species at Risk	Habitats of Conservation	Marine Biosecurity
Toluene and MCH Storage and Transfer				X	X	X	X	X
Administration Buildings								
Employment and Expenditures								
Decommissioning and Rehabilitation								
Electrical Infrastructure		X	X			X		
Wind Turbines		X	X			X		
Hydrogen Generation Plant	X	X		X				
Hydrogenation Plant	X	X		X				
Toluene and MCH Storage and Transfer		X						
Terrain Reclamation	X	X	X			X		
Temporary Workforce Accommodations		X						
Administration Buildings	X	X						
Employment and Expenditures								
Accidents and Malfunctions								
Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials	X	X	X	X	X	X	X	
Flaring /Venting of Hydrogen and Other Gases				X				
Traffic Incidents		X	X	X				
Fires and Explosions			X	X				
Dislodging of a Wind Tower or Wind Turbine Blade			X					
Ice Throw				X				
Occupational Hazards and Human Injuries								
Failure of Industrial Water Supply		X						
Wildlife Emergencies/Incidents								

NOTES
X: Potential interactions that might cause an effect.
Blanks indicate that interactions between the Project and the KI are not expected.

Groundwater Resources

Project-related interactions with groundwater are expected to be limited during all phases. During construction, localized ground disturbance from site preparation, excavation, and foundation installation may temporarily expose shallow subsurface materials, but substantial interaction with groundwater is not anticipated. This is due in part to the presence of shallow surficial rock and well-lithified, impermeable bedrock at the wind turbine placement sites, as confirmed by geotechnical studies (AllRock, 2025). During O&M, groundwater use is not required, and interactions will remain minimal. Similarly, groundwater interactions during decommissioning and rehabilitation are expected to resemble those during construction. The presence of extensive bogs and ponds in the region, along with baseline hydrology data, suggests poor groundwater drainage and minimal groundwater recharge, with water remaining at or near the surface. In the area near the North Atlantic Logistics Terminal, infrastructure is located close to existing industrial zones and the coast, where poor drainage and fault-controlled groundwater flow direct any potential runoff toward the sea or existing disturbed areas. Consequently, even in the event of accidental releases of hazardous materials, the risk of widespread groundwater contamination is low. Overall, groundwater resources are unlikely to be substantially affected by the Project.

Surface Water Resources

Surface water is likely to interact with the Project during all phases. Potential interactions include land disturbance near watercourses (potentially causing erosion and/or siltation/sedimentation), potential alteration of surface drainage patterns, surface water withdrawal during the Construction Phase, surface water withdrawal for hydrogen production at the HGP and HP, and a risk of accidental releases of contaminant.

During Construction, surface water interactions will result from land clearing, grading, excavation, road building, and water withdrawal activities. These actions may increase the extent of exposed soils and alter existing surface runoff pathways. Increased runoff and sediment mobilization may elevate TSS content in adjacent watercourses. Additionally, water from Lady Cove Pond will be extracted during construction, resulting in temporary downstream reductions in flow. However, the impact on water quantity is expected to be negligible, as the maximum projected monthly withdrawal represents 0.5% of the estimated average monthly water yield for Lady Cove Pond.

During O&M, the Project will withdraw water from Inkster's Pond to support production and emergency fire protection. These withdrawals will occur throughout the lifespan of the HGP and HP and may change surface water quantity downstream of the industrial water source. The changes, however, are expected to be small, as the proposed maximum water withdrawal rate (0.030 m^3/s) is just 11% of the average outflow at the Barrisway Pond diversion point.

Decommissioning activities are expected to temporarily interact with surface water resources similarly to during O&M. The removal of infrastructure may disturb stabilized soils and increase TSS concentrations.

Unplanned events during any Project Phase may result in surface water contamination. These include spills/releases or fires/explosions. An Emergency Response Plan (ERP) (Appendix M) was developed to minimize the likelihood and severity of these unplanned events.

Freshwater Fish and Fish Habitat

During the Construction Phase, freshwater fish and fish habitat can be affected by alterations to stream flow and habitat features, or by the creation of barriers to fish movement, removal of riparian vegetation, introduction of sediments and contaminants, and potentially direct injuries or mortalities from in-water work. Many of the interactions will be possible during the preparation of laydown areas, excavation for foundations, road construction, including water crossings, installation of collector systems, and transmission lines and substations. These activities can alter fish habitat quality from runoff and changes to water flow patterns, either by creating physical or velocity barriers to fish movement or restrictions to inflows/outflows along water courses, which may affect fish health and survival. Minor quantities of fish habitat may be lost because of the construction of water crossings for the road network associated with the Wind Farm. These locations also have the potential to result in an obstruction to fish passage if not properly designed and installed. Proper installation of culverts will be essential to maintain connectivity between downstream and upstream habitats to permit movement and migration of fish as required for their life history processes.

During O&M of the Wind Farm and transmission lines, runoff from access roads may affect fish habitat quality, fish production, health, and survival. Since the water supply for Project operation will be from an existing industrial water supply area, no new aquatic habitat interactions will be introduced.

The effects of Decommissioning and Rehabilitation activities on fish and fish habitat are anticipated to be similar to Construction; however, it is expected there will be no in-water work associated with this Project Phase as it assumed the existing road network and fish passage structures will remain in place.

Marine Fish and Fish Habitat

Marine fish and fish habitat may be affected by nearshore construction and operations activities. Project site preparation and civil works during construction will occur on land and a new, dedicated water outfall will be constructed North of the jetty. Operation of the HGP and associated infrastructure, and surface runoff from facilities, will result in the release of treated effluent into the marine environment near the plant site. Wastewater (e.g., surface water runoff, demineralization wastewater, sanitary discharge) will be directed to treatment systems that will operate in compliance with applicable regulatory approvals and discharge criteria. The new outfall will be constructed for the discharge of demineralization water from the HGP, while the existing outfall for Braya Refinery will be used to discharge the remaining effluents related to the Project.

Transportation of resources and equipment in the marine environment may affect habitat quality and interact with commercial/recreational fishing activities.

The minimal connection between the Project and the marine environment, combined with adherence to applicable regulatory standards, will result in few potential environmental effects during Construction, O&M and Decommissioning and Rehabiliation Phases. Unplanned events could result in deposition of contaminants or deleterious substances into the marine environment resulting in short term effects on fish and fish habitat.

Fisheries and Aquaculture

Potential effects of the Project on fishing grounds/aquaculture sites during construction are related to an increase in vessel traffic. These activities can limit access to fishing grounds and potentially introduce or spread AIS via transiting vessels. An increase in vessel activity has the potential to increase the risk of collisions or damage to fishing gear. The introduction of AIS through Project vessel activity could also disrupt local aquaculture operations (see Marine Biosecurity). Several AIS species (e.g., golden star tunicate, oyster thief, vase tunicate, and violet tunicate) are known to cause issues with marine-based shellfish aquaculture operations. AIS can cause damage important fish habitats that directly or indirectly support commercial fish species. There is, however, very limited commercial and recreational fishing occurring near the LAA and existing aquaculture operations are well removed from the LAA.

During O&M, marine infrastructure and vessel activity may result in temporary loss of access to fishing grounds. Changes in water quality during operation can also lead to changes in fishing grounds/aquaculture sites and productivity. Increases in noise and vibration from increased vessel traffic may cause auditory masking. As above, limited fishing activity occurs near the LAA and no aquaculture operations in Placentia Bay are close to or planned for the RAA, and the minimal increase to vessel traffic will limit interactions and potential effects during O&M.

Potential effects of the Project on fishing grounds/aquaculture sites during Decommissioning and Rehabilitation are like the Construction Phase and are related to an increase in vessel traffic. It is anticipated that after the Project lifespan, the marine infrastructure will remain in place for future use by other industries.

Species at Risk

Catadromous American eel and anadromous Atlantic salmon (South NL population) have been designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or under SARA and/or NL ESA, and both were captured in the PA in 2024. It is unclear if the salmon (juveniles) were from anadromous stock or were landlocked (i.e. ouananiche). Anadromous Atlantic salmon also occur in scheduled salmon rivers in the RAA, but not in the LAA or PA, and so scheduled rivers will not interact with or be affected by Project activities.

Most of the potential interactions with American eel and Atlantic salmon will occur during Project Construction owing to activities such as preparation of laydown areas, excavation for foundations, road construction, water crossings, installation of collector systems, transmission lines and substations. These activities can alter eel and salmon habitat quality because of runoff and water flow patterns that create physical or velocity barriers to movement. These interactions could in turn affect fish health and survival. Eel and salmon habitat could also be lost because of the installation of culverts. During O&M of the Wind Farm and transmission lines, eel and salmon habitat may be affected by runoff from access roads, which may in turn affect habitat quality, production, health and survival. Water supply for operation of the HGP and HP will be from the industrial water supply and will not affect eels/salmon and their habitats. The effects of Decommissioning and Rehabilitation activities on eel and salmon habitat are anticipated to be similar to Construction, however, it is expected there will be no in-water work associated with this Project Phase. With proper design and adherence to standard construction and maintenance measures, the potential level of interaction with eels/salmon and their habitats is predicted to be minimal.

Atlantic cod (Laurentian North Pop.) and American plaice (NL population) have a high probability of occurrence in the marine areas of the RAA and LAA. Other SARA listed species that have potential to occur in Placentia Bay include white shark, northern wolffish, spotted wolffish, Atlantic wolffish and banded killifish. Leatherback turtles and blue whales, two SARA listed species, are occasionally sighted in Placentia Bay. The potential for any of these species to occur in the RAA or LAA is extremely low. The Project will have limited aspects carried out in the marine environment other than transportation activities, and therefore, the potential level of interaction with marine species at risk is predicted to be minimal.

Habitats of Conservation Concern

No critical habitats (as defined by SARA or NL ESA) for freshwater species at risk or of conservation concern were identified in the RAA. Spawning habitats are important for reproduction and recruitment for salmonid populations; however, no discrete spawning habitats were documented during baseline studies in 2024.

The whole of Placentia Bay is designated as an Ecologically and Biologically Significant Area (EBSA) and this would include the RAA and LAA. Sensitive areas near the RAA and LAA include capelin spawning beaches, eelgrass beds, salt marshes, wetlands, and scallop beds. There are no Marine Protected Areas (MPAs) or critical habitats, as defined under SARA and the NL ESA, identified near the RAA or LAA. Marine habitats of conservation concern will not interact with or be affected by the Project.

Marine Biosecurity

Invasive species are a concern, both with respect to new introductions, as well as the possible spread of AIS species already present within Placentia Bay. There are extensive requirements in place in Canada

(**Fisheries Act** - Aquatic Invasive Species Regulations), as well as international protocols, to prevent introductions of invasive species through mechanisms such as ballast water exchange or hull fouling.

To reduce or eliminate the risk of AIS and pathogens being introduced into Canadian waters because of shipping, all ships are required to exchange ballast water in accordance with the *Ballast Water Control and Management Regulations* (Transport Canada 2006) and to follow international protocols (International Maritime Organization Code for Approval of Ballast Water Management System). The regulations require that ships transiting to Canadian ports exchange ballast water at sea in deep water away from coastal zones. The exchanged ballast water is then to be treated by a Ballast Water Treatment System (BWST) onboard the vessel during the remainder of the voyage. No interaction of ballast waters with the PA (e.g., introduction of invasive species) is anticipated.

Fouling is the unwanted growth of biological material such as barnacles and algae on the surface of a hull submersed in water. Hull fouling can increase the risk of invasive aquatic species and pathogens being introduced into Canadian waters. Vessels transiting to Come By Chance from international ports will be required to meet the IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships. This convention requires that vessels possess International Anti-fouling System Certification and that an anti-fouling system be in place on all vessels.

During Construction, the major supply route for equipment will be via marine traffic and originating at ports beyond Newfoundland and Labrador. Laden vessels will have a minimum of ballast water onboard. During O&M, hydrogen product will be shipped to European ports via charter vessels. When transiting to Come By Chance, it may be assumed that these vessels will carry ballast water and require exchange as per the IMO protocol. During the Decommissioning and Rehabiliation Phase it may be assumed that some equipment and Project structures will be shipped for sale or disposal using chartered vessels. It may be assumed that these vessels will be carrying ballast water during inbound voyages. It is unlikely that an unplanned event would act as a possible mechanism for invasive species introduction. During all shipping activities related to the Project, it is unlikely that vessels will transit to other Placentia Bay or Newfoundland ports.

4.2.3 Terrestrial Environment

The Terrestrial Environment is a key Valued Component (VC) due to its ecological, cultural, and regulatory significance. It may interact with the Project during all phases and in the event of unplanned incidents. There are seven Key Indicators (KIs) through which the Terrestrial Environment VC and the Project may interact: Flora (including Rare Plants), Wetlands, Fauna (Mammals), Avifauna, Rare Lichens, Bats, and SAR Insects.

The KIs above may all interact with the Project and existing land use activities in the region. The Project Area (PA) encompasses a wide variety of habitats used by a diverse suite of terrestrial flora and fauna, including Species at Risk, like the Red Crossbill and little brown myotis. The PA also contains wetlands and barrens that often have heightened potential for SAR and SCC flora.

4.2.3.1 Scope, Measurable Parameters, and Definition of Significant Effects

The Project will interact directly with terrestrial environments in the PA, surrounding Sunnyside and Come By Chance, and indirectly with those in the LAA and RAA. The forests, wetlands, barrens, and other land-based ecosystems support a variety of flora and fauna species and communities. Disturbances like vegetation clearing, machine noise, human presence, soil disturbance/compaction, erosion, or accidental spills could degrade habitat quality, fragment habitat, lower biodiversity, and diminish ecosystem services. Potential interactions with the identified KIs of the Terrestrial Environment VC are summarized in Table 4.2.3.1.

Table 4.2.3-1 Scope and Measurable Parameters of Key Indicators: Terrestrial Environment.

Key Indicator	Scope	Measurable Parameters
Flora	PA	Area of suitable habitat for common vegetation communities disturbed by the Project; amount of suitable SAR or SCC habitat disturbed (km^2).
Wetlands	PA	Area of wetlands disturbed (km^2).
Fauna (Mammals)	LAA	Area of habitat suitable for regionally common or abundant mammalian species lost or disturbed (km^2); area of habitat suitable for mammalian SAR and SCC disturbed (km^2); number of (direct and indirect) individual mortalities.
Avifauna	LAA	Area of habitat suitable for common resident avifauna species disturbed (km^2); area of habitat suitable for staging migratory avifauna species disturbed (km^2); area of habitat for avian SAR disturbed (km^2); number of individual mortalities from collisions with wind turbines.
Rare Lichens	PA	Area of habitat suitable for lichen SAR lost or disturbed (km^2).
Bats	LAA	Area of habitat suitable for resident bat SAR disturbed (km^2); area of habitat suitable for migratory bat SAR disturbed (km^2); number of individual mortalities from collisions with wind turbines.
SAR Insects	LAA	Area of habitat suitable for insect SAR disturbed (km^2).

The assessment criteria used to determine the effects of the Project on the Terrestrial Environment VC can be found in Table 4.1-3 of Section 4.1.7 above. For the Terrestrial Environment VC, a significant adverse residual effect was defined as one having a high magnitude, or a medium magnitude in combination with either a high frequency or a low level of confidence in the prediction. A significant adverse residual effect on SAR or Species of Conservation Concern (SCC) and their habitat was defined as one that threatens the long-term persistence, viability, or recovery of a species population in the PA, LAA, or RAA.

4.2.3.2 Baseline Conditions

Baseline conditions for the Terrestrial Environment have been characterized through desktop reviews of scientific literature, regional ecological reports, publicly available datasets like the AC CDC records, and field-based baseline studies. Ample data and information were available to inform the effects assessment of the Terrestrial Environment, including a strong knowledge base for the selected Key Indicators (KIs) to support predictive analysis of Project interactions.

A summary of baseline findings is provided in this section, with detailed supporting documentation located in the following appendices:

- Appendix D1 – Avifauna Baseline Study.
- Appendix D2 – Bats Baseline Study.
- Appendix D3 – Ecological Land Classification Baseline Study.
- Appendix D4 – Mammals Baseline Study.
- Appendix D5 – Rare Lichens Baseline Study.
- Appendix D6 – Rare Plants Baseline Study.
- Appendix D7 – Rare Insects Baseline Study.

Flora

Rare plants were chosen as a KI because they are important in NL to biodiversity, cultural heritage, and ecological stability. Their conservation is supported by both regulatory frameworks and local ecological knowledge, making their protection a priority in Project planning. Newfoundland hosts a variety of globally and regionally rare plant species, including boreal, subarctic, and coastal endemics. Rare plants often occur in sensitive ecosystems such as limestone barrens, peatlands, and coastal headlands, which are vulnerable to disturbance.

A desktop review of rare flora was conducted, including a data query with the Atlantic Canada Conservation Data Centre (AC CDC) to determine if any rare plants were known from the 5 km buffer around the PA. The AC CDC ranks plant species based on rarity (e.g., S1–S3), and these ranks are frequently used to flag conservation concerns during the EA process. Several S-ranked species were identified from the area in the data query and were considered during the planning of field surveys in the PA. Dedicated rare plant surveys were conducted in the PA in 2024. Several S-ranked species of S3 to S1 rankings were observed, including two S1 species. Appendix D6 describes the findings of that study in more detail.

Wetlands

Wetlands were delineated using ArcGIS through the development of the Ecological Land Classification. Several wetland types exist throughout the PA, LAA, and RAA, as discovered during field surveys for the ELC and other terrestrial components. A desktop review was also conducted to determine if there was existing information on wetlands in the region, and useful information was gleaned from the Forest Resource Inventory (FRI), maintained by the NL Department of Fisheries, Forestry and Agriculture (FFA). This GIS tool provided a foundation for the ELC, including the locations of most wetlands in the Project Area. However, a secondary desktop survey of the Project Area was necessary to more accurately delineate boundaries and identify wetlands that were not represented in the FRI.

Wetlands were assessed according to the Canadian Wetland Classification System (CWCS) (NWWG, 1997). Wetlands in NL are grouped by CWCS into the following: (i) bog; (ii) fen; (iii) swamp; (iv) marsh; and (v) shallow water wetlands (NWWG, 1997). This information was collected during ground truthing surveys but was not differentiated in the final ELC.

Wetlands within the Project Area accounted for 703 ha., or approximately 12% of the total PA. More information can be found in Appendix D3.

Fauna

Fauna, represented primarily by mammals in insular Newfoundland (since amphibians and reptiles on the Island are all non-native), were chosen as a KI due to their ecological roles, cultural relevance, and regulatory importance. Mammals are central to ecosystem functioning, and their health can reflect the broader state of the terrestrial and aquatic environment.

General mammal surveys undertaken within the PA resulted in the observation of 13 different mammal species. Dedicated muskrat surveys were conducted in the PA and around the Bull Arm site of the LAA in 2024. Several observations of muskrat sign were present within and around the wetlands of the PA and at Bull Arm

Dedicated surveys were also undertaken for Newfoundland marten (*Martes americana atrata*). All marten traps were placed in suitable mature coniferous forest within the PA. No marten hairs were obtained during the survey.

Moose were observed throughout the PA using various habitat types, with a high frequency of sign detected throughout. Canada lynx (*Lynx canadensis*) and Eastern coyote (*Canis latrans)* were regularly observed via tracks in the snow throughout the PA. Lynx was most often observed in the western portion of the PA during late fall and winter surveys. Coyote tracks were observed in the snow, and scent marking was observed throughout. River otter signs were observed in both the PA and RAA.

More specific information on the results of the mammal surveys can be found in Appendix D4.

Avifauna

A comprehensive desktop review was conducted to confirm the range and habitat use of the bird SAR that may occur in the PA. This entailed a literature review of relevant material, including scientific articles, grey literature, SAR registries, and anecdotal databases like iNaturalist. A review was also conducted of the SAR and Species of Conservation Concern (SCC) for the PA through an Atlantic Canada Conservation Data Centre (AC CDC) request.

A comprehensive suite of bird surveys was conducted in the RAA since 2023, and in the LAA and PA since 2024, and they continue through the breeding bird season of 2025. Surveys have been conducted throughout the year to include all seasons (winter, spring migration, breeding, and fall migration), and consisted of point counts, atlassing transects, raptor sky scans, seabird surveys, and waterfowl surveys.

The PA, LAA, and RAA encompass a diversity of habitat types, and the bird species reflect that landscape mosaic. Rocky barren, coniferous scrub, wetlands, and mature coniferous forest comprise much of the landscape in the PA, along with some shoreline and open water ponds and lakes and rivers. Subsequently, there are many different species of birds represented, including Anseriformes (waterfowl), Galliformes (gamebirds), Gaviiformes (loons), Accipitriformes (raptors), Charadriiformes (shorebirds), Columbiformes (doves), Gruiformes (rails), Strigiformes (owls), Caprimulgiformes (nightjars), Coraciiformes (kingfishers), Piciformes (woodpeckers), and Passeriformes (perching birds).

More specific information on the results of the bird surveys can be found in Appendix D1.

Lichens

A comprehensive desktop review was conducted to confirm the ranges of the lichen SAR that may occur in the PA. This entailed a literature review of relevant material, including scientific articles, grey literature, SAR registries, and anecdotal databases like iNaturalist. An Atlantic Canada Conservation Data Centre (AC CDC) data query was submitted to identify any historical records of SAR lichen. This request encompassed the entire PA with a 5 km buffer and included the LAA and part of the RAA. The AC CDC data request yielded two observations of boreal felt lichen in the RAA, both recorded in 2003, and distant from the PA.

The field survey was conducted opportunistically during other terrestrial field surveys and through lichen-specific surveys in suitable habitats. Lichen-specific surveys took place in September and October 2024. Surveys were conducted throughout the PA and the Local Assessment Area (LAA) and Regional Assessment Area (RAA). Dedicated surveys were conducted throughout the PA, while the surveys within the LAA and RAA were conducted opportunistically. No boreal felt lichen, vole ears lichen, or blue felt lichen thalli were observed despite intensive surveys in each high and moderate-ranked site identified.

More specific information on the results of the lichen surveys can be found in Appendix D5.

Bats

The AC CDC data request did not yield any results for bats. However, five bat SAR were targeted in this baseline study, as they were all possible for the PA, LAA, and RAA. These included resident bat species (native to NL and year-round inhabitants) - little brown myotis (*Myotis lucifugus*) and Northern myotis (*Myotis septentrionalis*), as well as migratory bat species (which may occur in NL during migration) - hoary bat (*Lasiurus cinereus*), Eastern red bat (*Lasiurus borealis*), and silver-haired bat (*Lasionycteris noctivagans*).

Extensive bat survey efforts have been ongoing for the Project since 2023 in the RAA and were subsequently expanded to the PA in 2024 and 2025 (and will be ongoing until November 2025). As with the avifauna, it was essential to incorporate efforts in the RAA for bats, given their aerial nature, large home ranges, and migratory life history strategies. Eight detectors were deployed in the RAA in 2023, resulting in 3,337 total bat detections. These data are important for providing a comparison between bat activity in the PA and the broader RAA.

The second phase of the Bats Baseline Study was conducted between April and November 2024. This included desktop research and field surveys aimed at determining the presence/absence of bat SAR in the PA. Three bat detectors were deployed in 2024. From May 8 to October 11, a total of 593 bat calls were recorded across all three detectors, representing relatively low numbers of bat detections from the primarily rocky barren Wind Farm area. In comparison, the eight detectors deployed in the more forested and lower-elevation portion of the RAA recorded a total of 8,918 detections. The relatively low number of detections in the PA, and particularly at the Wind Farm area, indicates that it may be of marginal to low quality to bats. Zero migratory bats were detected in the PA or RAA, and zero from the met tower detector (at 50 m height). Given the rocky nature of the Wind Farm area, and the consistently windy conditions (reducing insect abundance and making flying for bats difficult), it is unsurprising that the number of bat detections was low. Bat detections were much greater in in the RAA, and the habitats were much more suitable for insects and bats.

More specific information on the results of the bat surveys can be found in Appendix D2.

Species at Risk Insects

A comprehensive desktop review was conducted to confirm the ranges and habitat uses of the insect SAR that may occur in the PA. This entailed a literature review of relevant material, including scientific articles, grey literature, SAR registries, and anecdotal databases like iNaturalist. A review was also conducted of the SAR and SCC for the PA through an AC CDC request. There are four insect SAR possible for insular Newfoundland, all protected under provincial and/or federal legislation: the yellow-banded bumble bee (*Bombus terricola*), gypsy cuckoo bumble bee (*Bombus bohemicus*), Suckley's cuckoo bumble bee (*Bombus suckleyi*), and the transverse lady beetle (*Coccinella transversogutatta*). Each of these species was targeted in the Rare Insects Baseline Study.

The SAR insect survey was conducted between August and September 2024. This study included desktop research and field surveys designed to assess the presence/absence of insect SAR in the PA. These field studies did not yield any observations of the four insect SAR.

More specific information on the results of the insect surveys can be found in Appendix D7.

4.2.3.3 Project-Environment Interactions

Potential interactions with the identified KIs of the Terrestrial Environment VC are summarized in Table 4.2.3-2. As summarized, there will be a variety of interactions with the Project during all phases. In Section 5.3, a review of the significance criteria and determination of residual effects will be described.

Table 4.2.3-2 Potential Project interactions with Terrestrial Environment.

Project Component and Activity Description	Key Indicators: Terrestrial Environment						
	Flora	Wetlands	Fauna	Avifauna	Rare Lichens	Bats	SAR Insects
Construction							
Site Preparation	X	X	X	X	X	X	X
Roads	X	X	X	X	X	X	X
Staging and Laydown	X	X	X	X		X	
Temporary Batch Plant	X		X	X		X	
Equipment and Materials Transport			X	X			
Wind Turbine Foundations			X	X		X	
Electrical Infrastructure	X	X	X	X	X	X	X
Wind Turbine Installation			X	X		X	
Hydrogen Generation Plant				X			
Hydrogenation Plant				X			
Toluene and MCH Storage and Transfer				X			

Project Component and Activity Description	Key Indicators: Terrestrial Environment						
	Flora	Wetlands	Fauna	Avifauna	Rare Lichens	Bats	SAR Insects
Flare Stacks				X			
Administration Buildings	X		X	X		X	
Temporary Workforce Accommodations	X		X	X		X	
Employment and Expenditures							
Operation and Maintenance							
Wind Turbine Operation			X	X		X	
Wind Turbine Maintenance			X	X		X	
Electrical Infrastructure			X	X		X	X
Venting and Flaring				X		X	
Road Maintenance	X	X	X	X	X	X	X
Hydrogen Generation Plant		X		X			
Hydrogenation Plant				X			
Toluene and MCH Storage and Transfer				X			
Administration Buildings	X		X	X		X	
Employment and Expenditures							
Decommissioning and Rehabilitation							
Electrical Infrastructure	X	X	X	X	X	X	X
Wind Turbines			X	X		X	
Hydrogen Generation Plant				X			
Hydrogenation Plant				X			
Toluene and MCH Storage and Transfer				X			
Terrain Reclamation	X	X	X	X	X	X	X
Temporary Workforce Accommodations	X		X	X		X	
Administration Buildings	X		X	X		X	
Employment and Expenditures							
Accidents and Malfunctions							
Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials	X			X			
Flaring /Venting of Hydrogen and Other Gases				X		X	
Traffic Incidents			X	X			
Fires and Explosions	X	X	X	X	X	X	X
Dislodging of a Wind Tower or Wind Turbine Blade	X	X	X	X	X	X	X
Ice Throw			X	X			
Occupational Hazards and Human Injuries							
Failure of Industrial Water Supply		X					
Wildlife Emergencies/Incidents			X	X			

Notes
X: Potential interactions that might cause an effect.
Blanks indicate that interactions between the Project and the VC are not expected.

Avifauna

Wind energy developments can interact negatively with birds in the form of wind turbine collisions, habitat loss, and disturbance (Garvin et al., 2011), but perhaps less so compared to other forms of anthropogenic infrastructure like buildings and electrical infrastructure (Choi et al., 2020; Calvert et al., 2013; Erickson et al., 2014; Loss et al., 2014a; Loss et al., 2014b). In addition, the effects of disturbance from wind development are likely species-specific, since various studies have resulted in contradictory findings (Schöll & Nopp-Mayr, 2021). Nonetheless, a thorough literature review has been completed to assess the potential effects of wind turbines on the various bird groups present in the PA.

Passeriformes

Passeriformes (songbirds) represent the majority of bird fatalities at wind turbines, with a 2014 study estimating that between 134,000 to 230,000 small passerine fatalities occur annually at wind turbine sites in the United States and Canada (Bayne & Dale, 2011; Erickson et al., 2014). Collisions with tall anthropogenic structures such as communications towers, buildings, and electrical infrastructure account for millions of songbird fatalities each year (Erickson et al., 2014; Loss et al., 2014a; Loss et al., 2014b). Songbirds not only collide with blades but with the stationary towers of turbines (Choi et al., 2020). Songbird fatalities at wind sites generally peak during spring and fall migrations, with most fatalities occurring during the fall (Erickson et al., 2014; Lloyd et al., 2023).

A recent study concluded that forest-dwelling birds (including passerines) are affected more by changes to habitat quality than by the proximity of wind turbines (Rehling et al., 2023). Indeed, development has been shown to result in both direct and indirect impacts on the activity and behavioural patterns of forest-dwelling birds (Fontúrbel et al., 2021). However, certain factors associated with the presence of wind turbines (e.g., large rotor diameter) may still lead to a partial displacement effect (Rehling et al., 2023). Additionally, it is believed that the loss of wetland ecosystems is the primary factor in the population decline of wetland-dwelling birds (including passerines), and that habitat disturbance has a lesser effect (Quesnelle et al., 2013).

Some songbirds exhibit avoidance behaviour or altered territorial defense behaviour in the presence of wind turbine noise (Lehnardt et al., 2024; Zwart et al., 2015). In the study by Lehnardt et al. the number of songbirds observed in an area decreased by approximately 30% after wind turbine noise was introduced. However, reactions varied based on species and age, with some birds appearing to be unaffected. The most affected demographic were juvenile birds (Lehnardt et al., 2024). Studies on the various effects of wind energy on songbirds have led to contradictory results, likely because effects are species-specific (Marques et al., 2021; Schöll & Nopp-Mayr, 2021).

Raptors

Raptors reproduce at a slower rate than other types of birds. Their offspring, once hatched, may take years to reach maturity. Although raptors have naturally long lifespans that compensate for slow reproduction rates, untimely deaths interrupt this balance, leaving them particularly vulnerable to population decline. In addition, many raptors soar at high elevations to hunt prey and deter other raptors from entering their territory, which can potentially place them in the vicinity of spinning wind turbine blades (Schaub et al., 2024). Soaring heights, behaviours, physiology, and observed responses to wind turbines vary between raptor species and influence the level of effect on a given species (Garvin et al., 2011). Six species of raptor were observed in the PA: Bald Eagle (*Haliaeetus leucocephalus*), Sharp-shinned Hawk (*Accipiter striatus*), Northern Harrier (*Circus hudsonius*), Great-horned Owl (*Bubo virginianus*), Merlin (*Falco columbarius*), and Osprey (*Pandion haliaetus*). Where necessary, studies on the European counterparts of these birds (e.g., the Eurasian Goshawk in place of the American Goshawk) have been used to make inferences on the potential effects of wind energy on raptors found within the PA.

Numerous studies have found that Bald Eagle mortality rates are lower than that of other raptor species, such as the Golden Eagle (Pagel et al., 2013). One study posits that this can be attributed in part to physiological differences; a smaller blind spot and different foraging behaviours can lend Bald Eagles greater visibility when navigating the airspace around wind turbines (Fernández-Juricic et al., 2020). This in turn leads to a lower collision rate. Bald Eagles may be affected by wind turbines in other ways; for example, the construction of a wind farm was observed to alter breeding success in White-tailed Eagles (*Haliaeetus albicilla*) of the same genus, likely due to mortality and territory desertion or displacement (Dahl et al., 2012).

The Northern Harrier appears to demonstrate notable avoidance behaviour towards wind turbines, which can lead to long-term displacement (Shaffer et al., 2019). Consequently, Norther Harriers may have a relatively low mortality rate at wind turbine sites (Shaffer et al., 2019). A recent study on the Eurasian Goshawk (*Accipiter gentilis*) found that the construction of a wind farm and associated power infrastructure resulted in a decline in territory status and the number of breeding pairs present within 3 km of the disturbance (Husby, 2024). Similarly, a higher proportion of the Eurasian Eagle Owl (*Bubo bubo*) abandoned their territory (likely due to either mortality or displacement) within 5 km of a wind farm, with less territory desertion observed farther away (Husby & Pearson, 2022). A case study in southern Spain found that wind turbines were the second highest cause of non-natural mortality in Ospreys (García-Macía et al., 2024).

Many raptor species exhibit avoidance behaviour around wind turbines, and most are at least capable of detecting their presence (Estellés-Domingo & López-López, 2024). Wind farms located on mountain ridges may pose a particular threat to raptors due to their use of orographic lift and tendency to follow prevailing wind currents (Estellés-Domingo & López-López, 2024). In addition, raptors may be at increased risk during periods of high winds or low visibility, when their flight behaviour becomes riskier (Estellés-Domingo & López-López, 2024). In general, wind turbine disturbance can lead to effects such as territory desertion, re-locating nest sites, and a decrease in abundance (Estellés-Domingo & López-López, 2024). One long-term study found that while various raptors were displaced from their territory after the development of a wind farm, some species gradually returned to the site after several years (Dohm et al., 2019). The Sharp-shinned Hawk was among the species whose populations rebounded around seven to eight years after wind turbines had been constructed (Dohm et al., 2019). However, the Northern Harrier and American Kestrel (*Falco sparverius*) did not return to the area (Dohm et al., 2019). The authors theorize that, rather than wind turbine-collision mortality, habitat loss and disturbance is the main cause of raptor population decline near wind turbines. It is important to note that this study was limited to only one wind farm site and a few species, and that site-specific post-construction monitoring programs could be required to determine the response of raptors to a wind farm at another site.

Marine and Freshwater Birds

There is a paucity of literature surrounding the effects of onshore wind turbine development on waterbirds. One study conducted at a wind farm in Pennsylvania on the shores of Lake Erie observed low rates of bird mortality and no waterfowl mortality, although the survey was limited (Ross, 2013). Conversely, a study undertaken in grassland regions in North and South Dakota, U.S.A., found that the majority of wind turbine-related deaths in the area belonged to waterfowl from the family *Anatidae* (ducks) (Graff et al., 2016). The flying heights of many migratory waterbirds increases during migration, which in turn heightens their susceptibility to wind turbine collisions (Kamata et al., 2023). It is likely that waterbirds will be affected by wind turbine development in the same manner as other bird species, i.e., through habitat loss, disturbance, and collision mortality.

Flora and Lichens

The development of wind energy may negatively affect flora (plants). For example, a recent study concluded that the construction of wind farms may reduce species diversity, functional diversity, and productivity in grassland ecosystems (Zhao et al., 2025). Another study found that the diversity and abundance of rare plant species in proximity to wind turbines is reduced compared to naturalized areas nearby (Urziceanu et al., 2021a). Areas subjected to vegetation clearing were studied ten years after the installation of wind turbines and remained negatively affected (Urziceanu et al., 2021a). However, plant communities within undisturbed areas adjacent to the wind turbine sites appeared to be unaffected by the project (Urziceanu et al., 2021a). Project activities such as vegetation clearing and road development likely present a greater risk to floral communities than the operation of wind turbines themselves (Urziceanu et al., 2021b). The development of roads may result in the introduction of invasive species to a given area (Trombulak & Frissell, 2000). Invasive plant species in particular pose a serious threat to biodiversity (Weidlich et al., 2020). This highlights the importance of minimizing vegetation clearing to the extent possible, and replanting with native species in areas that have been cleared.

There is some evidence that air turbulence and vertical mixing from wind turbines affects local microclimates (e.g., temperature, moisture) and influences vegetation growth patterns (Kaffine, 2019). While this may positively benefit agricultural crop yields, the influence of these microclimatic changes on other plant species is poorly understood (Kaffine, 2019). Microclimatic effects may affect epiphytic lichens, which are particularly susceptible to changes within the atmospheric environment (Nimis et al., 2002; Pescott et al., 2015). Specifically, these lichens are highly sensitive to air pollution in the form of NOx and SO_2 (ECCC, 2022; Elsinger et al., 2007). Increased levels of air pollution may lead to the desiccation or mortality of these species (Cameron et al., 2013). Once lichen populations have been negatively affected, they demonstrate a weak capacity for restoration (Weldon & Grandin, 2021). Vegetation clearing will affect many forms of lichen, especially those growing on trees to be felled. However, no lichen SAR were observed during rare lichen surveys in the PA, and there exists only limited habitat suitability for these species throughout.

While the Project will inevitably affect local plant communities, mitigation measures aimed at minimizing vegetation clearing and revegetating disturbed areas will complement the resilience of local ecosystems and ensure that flora and lichens are protected to the extent practicable.

Fauna

It is likely that mammals will interact with some elements of the Project, as the construction and O&M of Project infrastructure will create disturbance and habitat fragmentation effects (Colman et al., 2013; Helldin et al., 2012; Schöll & Nopp-Mayr, 2021). The long-term effects of wind turbine development on mammals are not well-studied (Helldin et al., 2012; Schöll & Nopp-Mayr, 2021), but there is some literature available. It is often necessary to reference European findings due to the scarcity of North American studies. Many species and habitats across Europe are similar to those found in Canada, making inferences possible.

There is evidence that the presence of wind turbines has a negligible effect on small mammals such as rodents, shrews, and hamsters (Łopucki & Mróz, 2016; Łopucki & Perzanowski, 2018). However, one study found that common voles (*Microtus arvalis*) at wind turbine sites had increased corticosterone (stress chemical) levels (Łopucki et al., 2018). Notably, the same study found that the striped field mouse (*Apodemus agrarius*) did not exhibit any symptoms of increased stress (Łopucki et al., 2018). Finally, the noise and vibration from wind turbine operations is known to affect the anti-predator behaviour of the European ground squirrel (*Spermophilus beecheyi*) (Rabin et al., 2006).

Wind turbines do not have a measurable effect on the activity and habitat use of moose (*Alces alces*) (Berndt et al., 2021). Similarly, it was found that wind turbines do not have a conclusive effect on the behaviour on semi-domesticated reindeer (*Rangifer tarandus*) (Flydal et al., 2004). Colman et al. corroborate this research, as they theorize that access roads are the main cause of any observed avoidance behaviour (2013). In contrast to these studies, Skarin et al. posit that wind farms influence the calving site and home range selection of reindeer, as they will move away from the sight and sound of wind turbines if possible (2018). While responses to wind turbines differ between species, there is some evidence of a correlation between herbivorous mammals and wind turbine avoidance (Łopucki et al., 2017). This study found that while hare and deer avoided wind turbines, foxes behaved neutrally (Łopucki et al., 2017). This theory can be countered by the observations of Klich et al., who observed that wind farms have no effect on the European hare (*Lepus europaeus*) (2024). Of the various animals studied, including meso-carnivores like the red fox (*Vulpes vulpes*), most did not demonstrate avoidance of wind turbine areas (with the exception of deer and wild boar) (Klich et al., 2024).

Findings on this topic, while contradictory at times, reveal that the effects of wind energy development on terrestrial mammals is species-specific and is likely minimal.

Wetlands

Wetlands (i.e., bog, fen, marsh, swamp, and shallow water ecosystems) are found throughout the PA and represent approximately 12% of the total habitat (see Appendix D3: ELC). Wetland ecosystems are vital for habitat provision, groundwater recharging, erosion protection, and carbon sequestration, among other services. NL has an abundance of wetland ecosystems, although there is currently no wetland inventory system for the province.

Road construction can alter natural water flows throughout wetlands, and surface or subsurface flow alterations may result in the alternate destruction or creation of wetland habitats (Trombulak & Frissell, 2000). In addition, dust generation, erosion, and sedimentation from road construction can alter water quality (Trombulak & Frissell, 2000). Alterations to wetlands can affect overall ecosystem function, which in turn can affect the multitude of species that exist in these habitats (Webster et al., 2014; Mei et al., 2024). Certain species of flora and fauna are specifically adapted to use wetlands, and these species will be most vulnerable. For example, Quesnelle et al. (2013) studied the effects of habitat loss and alteration on wetland bird species, and found that habitat loss is the primary factor in population decline. Project infrastructure will be sited to avoid wetland areas wherever possible.

Species at Risk

Two bat SAR were observed in the PA. Thousands of bats collide with wind turbines each year across Canada and the U.S. (Allison et al., 2019). Bat mortalities may increase with the expansion of wind energy in North America (Zimmerling & Francis, 2016). The proximate cause of mortality is blunt force trauma from collision with wind turbine blades (Grodsky et al., 2011; O'Shea et al., 2016; Arnett et al., 2016). Another theory suggested barotrauma as also a cause of death (Baerwald et al., 2008; Brownlee & Whidden, 2011). However, this theory has been scrutinized in recent years, with some scientists remaining skeptical that the blades could generate enough pressure change to cause death by barotrauma (Rollins et al., 2012; Lawson et al., 2018; Lawson et al., 2020).

The phenomenon of high bat mortality at wind turbines has been the subject of intense study, but questions remain about the proximate causes for interaction (Guest et al., 2022). Several studies have shown that bats regularly forage for insects at wind turbines and may be killed during foraging activity (Foo et al., 2017; Horn et al., 2008; Rydell et al., 2010; Rydell et al., 2016). Bats are known to approach and forage near wind turbines on nights with low wind speeds (Arnett et al., 2008; Cryan et al., 2014; Wellig et al., 2018). In addition, some species of bats are susceptible to collisions because of their flight heights during migration, which can line up with the blade swept area of wind turbines.

Little brown myotis (*Myotis lucifugus*) accounts for approximately 13% of bat fatalities at wind turbines in Canada, and Northern myotis (*Myotis septentrionalis*) accounts for about 1% (Zimmerling & Francis, 2016). These bats, both found in the PA, are endangered by a deadly fungal disease known as WNS. This disease can eradicate up to 90% of bat populations in infected hibernacula (Cheng et al., 2021). While WNS is considered the most serious threat to *Myotis* bats, the development of wind turbines may compound this risk and further endanger bat populations on the island. *Myotis* bats are a regionally migrating species and are likely to be affected by wind turbines on a seasonal basis (ECCC, 2018). These bats make small migrations in groups to hibernacula and spring maternity roosts, and it has been observed that a small percentage of bats will move from one hibernaculum to another in the same winter season (sometimes over 100 km away) (COSEWIC, 2013). A recent study reported telemetry data indicating several large movement patterns of female little brown myotis, with one female travelling 375 km over four nights (Sunga et al., 2021). *Myotis* bats typically occupy the vertical stratum from the treetops to the ground, far below the blade swept area, and are not thought to be threatened by wind turbines to the same extent as migratory bats (COSEWIC, 2013). However, much remains unknown about their fall and spring movements to hibernacula, so they could be susceptible to turbine collisions (Roeleke et al., 2016).

Myotis bats may also experience displacement effects from wind turbines. European *Myotis* bats actively avoid the presence of wind turbines in forested areas, which in turn results in habitat loss and displacement (Gaultier et al., 2023). The avoidance distance has been found to increase accordingly with larger rotor diameter (Ellerbrok et al., 2022). The same displacement effect was observed by Scholz et al. (2025) who recommended a buffer zone be implemented between open water habitat and turbines.

The construction of wind turbines leads to habitat fragmentation and disturbance, which negatively affects avian species (Brawn et al., 2001; Fontúrbel et al., 2021). Even resident forest-dwelling birds that are at low risk of collisions with turbines may be affected by habitat disturbance (Fontúrbel et al., 2021). Habitat fragmentation and deforestation are known threats to Red Crossbill *percna* subspecies (*Loxia curvirostra percna*), a bird SAR observed in the PA (COSEWIC, 2016a). Roadways may also threaten this species due to the possibility of vehicle strikes (COSEWIC, 2016a). Red Crossbill *percna* are dependent on conifer forests as their main food source, which puts them in direct competition with the non-native red squirrel (*Tamiasciurus hudsonicus*), another limiting factor affecting their population. The PA is not heavily forested, but where forests do occur, they are predominately coniferous – Coniferous Scrub and Mature Coniferous Forest together comprise approximately 35% of the PA.

Similar to the Red Crossbill *percna*, the Evening Grosbeak (*Coccothraustes vespertinus*) is a forest-dwelling songbird that inhabits Newfoundland year-round. The Evening Grosbeak prefers mature mixedwood forests with fir and white spruce (*Picea glauca*), foraging largely on invertebrates (COSEWIC, 2016b) during the breeding season, and seeds in the winter. Their populations are thought to correlate with the occurrence of spruce budworm (*Choristoneura fumiferana*) (COSEWIC, 2016b). Evening Grosbeak may be affected by habitat disturbance and fragmentation, should development occur in or around the Mixedwood forests found in the PA. COSEWIC lists the loss of mature and old-growth forests, road collision mortality, and possibly the ingestion of sodium chloride at roadsides as the main factors threatening this species (2016b).

The third avian SAR observed is the Short-eared Owl (*Asio flammeus*). This nomadic owl is thought to breed in NL and overwinter in the U.S., although species-specific studies have been limited. Short-eared Owl typically breeds in open habitat (e.g., grasslands) of at least 50-100 ha, preying primarily on small mammals like voles and other rodents (COSEWIC, 2021). Habitat destruction/alteration and climate change are thought to be the greatest threats to Short-eared Owl populations (COSEWIC, 2021). Short-eared Owls in the PA may be affected by habitat disturbance and fragmentation in suitable habitat within certain portions of Rocky Barren, Wetland, and Developed/Disturbed Land ecotypes.

4.2.4 Land and Resource Use

Land and Resource Use (LRU) was selected as a VC because the Project has the potential to interact with other land and resource uses, or cause disruptions to other users, within or near the Project. Additionally, these interactions may result in regulatory or permitting requirements. To identify overlaps in LRU, potential disturbances to LRU and regulatory requirements, five categories of usage were examined - Land Use Planning and Development Control, Industrial and Commercial Land Use, Tourism and Recreation, Harvesting, and Indigenous Land Use.

4.2.4.1 Scope, Measurable Parameters, and Definition of Significant Effects

The spatial boundaries for the assessment of potential LRU effects include the PA, LAA and RAA as defined in Section 4.1.1. Table 4.2.4-1 lists the KIs applicable to the LRU VC, as well as geographic scope and applicable Measurable Parameters for each KI.

An overview of known information on contemporary Indigenous land use, included in Section 3.1.4.5 Indigenous Land and Resource Use, revealed Indigenous land use is absent from the PA and thus has been excluded from the assessment. An overview of known historical information is included in Section 3.1.5, Heritage and Cultural Resources.

Table 4.2.4-1 Scope and Measurable Parameters for Key Indicators: LRU.

Key Indicator	Scope	Measurable Parameter
Land Use Planning and Development Control	PA	• Qualitative description of property development plans and zoning requirements. • Qualitative description of activities affecting land use planning. • Extent of current land use sites overlapped by the Project. • Change / restriction or disruption of land use (ha).
Industrial and Commercial Land Use	PA	• Extent of current industrial and commercial sites. • Change or disruption affecting other users (ha).
Tourism and Recreation	RAA	• Presence/location of cabins. • Proximity and frequency of usage near Project features. • Extent of changes to viewscapes.
Harvesting	RAA	• Nature and level of use by area (e.g., hunting/trapping/angling, domestic wood harvesting). • Change/restriction or disruption of land use (ha). • Project proximity to harvesting sites (km). • Change in accessibility to domestic wood harvesting areas.
Indigenous Land Use	RAA	• Project proximity to contemporary land use areas (km).

The assessment criteria used to determine the effects of the Project on the LRU VC can be found in Table 4.1-4. For the LRU VC, a significant adverse residual effect is defined as having a high magnitude or a medium magnitude and characterized by a high level of frequency and a low level of confidence in the prediction.

4.2.4.2 Baseline Conditions

The Land and Resource Use Baseline Study in Appendix R is summarized in Section 3.1.4 and describes the existing knowledge of the five key indicators - Land Use Planning and Development Control, Industrial and Commercial Land Use, Tourism and Recreation, Harvesting, and Indigenous Land Use.

4.2.4.3 Consultation and Engagement Considerations

During public consultation, participants suggested the transmission line and access road could be combined in one corridor to reduce disturbance to the landscape and heritage trails and move Project infrastructure farther from Sunnyside and recreational users. North Atlantic has modified the Project design to accommodate this suggestion.

4.2.4.4 Project-Environment Interactions

Potential interactions with the identified KIs of the LRU VC are summarized below in Table 4.2.4-2.

Table 4.2.4-2 Potential Project interactions with Land and Resource Use.

Project Component and Activity Description	Land Use Planning and Development Control	Industrial and Commercial Land Use	Tourism and Recreation	Harvesting
Construction				
Site Preparation	X	X	X	X
Roads	X	X	X	X
Staging and Laydown	X	X	X	X
Temporary Batch Plant	X	X		X
Equipment and Materials Transport		X		X
Wind Turbine Foundations	X		X	X
Electrical Infrastructure	X	X	X	X
Wind Turbine Installation			X	X
Hydrogen Generation Plant				
Hydrogenation Plant				
Toluene and MCH Storage and Transfer		X	X	
Flare Stacks				
Administration Buildings	X	X		
Temporary Workforce Accommodations	X	X		
Employment and Expenditures				
Operation and Maintenance				
Wind Turbine Operation			X	X
Wind Turbine Maintenance			X	X
Electrical Infrastructure		X		X
Venting and Flaring				
Road Maintenance		X	X	X
Hydrogen Generation Plant				
Hydrogenation Plant				
Toluene and MCH Storage and Transfer				
Administration Buildings				

Employment and Expenditures				
Decommissioning and Rehabilitation				
Electrical Infrastructure	X	X	X	
Wind Turbine	X		X	
Administration Buildings		X		
Hydrogen Generation Plant		X		
Hydrogenation Plant		X		
Toluene and MCH Storage and Transfer		X		
Terrain Reclamation	X		X	
Temporary Workforce Accommodations				
Employment and Expenditures				
Accidents and Malfunctions				
Spills and Releases		X	X	X
Flaring or Venting Incident				
Fire or Explosion		X	X	
Traffic Incidents		X	X	
Wind Turbine Collapse			X	X
Ice Throw			X	X
Water Supply Failure		X	X	
Wildlife Incident			X	X
Occupational Hazard and Human Injury			X	

Land Use Planning and Development Control

The Project falls within the Municipal Boundaries / Planning Area Boundaries of the Town of Sunnyside and Town of Come By Chance. In Sunnyside, the Project, specifically the transmission line, interacts with five zoning designations including Rural, Public Utility, Town, TCH, and Environmental Protection. All interactions with zoning in Sunnyside are in zones that allow utilities as a permitted use. Therefore, there are no anticipated adverse interactions.

In the Town of Come By Chance, the Project also interacts with five zoning designations including Rural, Mixed Development, Watershed - Refinery, T'Railway Corridor, and Industrial General. Most interactions with zoning occur along the linear features connecting the Wind Farm to the HGP, and within the Industrial General and Watershed – Refinery zones. Within these zones, Industry/Utilities are permitted uses. The only zoning designation that does not allow for Industry/Utilities use is T’Railway Corridor. The Project can avoid such interactions, e.g. by crossing the T-Railway Corridor zone without installing transmission infrastructure within the T’Railway boundaries. Applicable precedents include existing crossings of the T’Railway by the TCH, several utility corridors and an ongoing application for Crown title in the LAA.

In general, the Project will be able to comply with all existing zoning requirements and restrictions during all Project Phases. Municipal planning requirements can be addressed through ongoing engagement with the two municipalities and the development of design changes to the Project, if required. Engaging with the NL Department of Tourism, Culture, Arts and Recreation (NL DTCAR) and the Newfoundland T’Railway Council as appropriate will also serve to identify potential land use conflicts and ensure compliance with regulations.

The PA intersects a protected road - Route 1 Trans-Canada Highway - Terra Nova National Park to Holyrood, which currently has no zoning plan. Roadways without a zoning plan are subject to applicable development regulations where they cross municipal zoning designations. Where a protected road has no zoning plan and is not encompassed by a municipal planning area, Section 6 of the Protected Road Zoning Regulation*s* applies. The Project transmission line is anticipated to cross the protected road within the municipal planning areas of Sunnyside and Come By Chance and thus will require approvals from the two municipalities.

The PA intersects Inkster’s Pond water supply. The NL Registry of Water Rights Data shows NARL Refining Inc. has a licence to use water for consumption from Inkster’s Pond at Come By Chance (NL DECC, 2025b). This licence has been transferred to Braya. The PA also intersects the Town of Sunnyside Center Cove River Protected Public Water Supply Area. Project infrastructure will be placed to avoid this protected area. Should it be required, an approval would be sought from NL DECC WRMD prior to undertaking any developments within the Protected Public Water Supply Area.

The PA intersects the buffer of an inactive waste disposal site in Sunnyside. This is a provincially defined area rather than a land use zone under municipal regulations. Development in the buffer of a waste disposal site or former waste disposal site does not require a permit but any development requires referral to NL DECC, Pollution Prevention Division and Digital Government and Service NL.

Several parcels of tenured land (e.g., grants, licences, leases, transfers, permissions) are intersected by the PA. While a large portion of the tenured land appears to be in favour of North Atlantic, several are held by other entities. Interactions with these tenured lands can be minimized by avoiding installation of Project infrastructure within their boundaries. If it cannot be avoided, North Atlantic will engage with the owners of these lands to seek agreement on access and utilization. Engagement may also be required with NL MAPA, Land Use Planning regarding Crown lands.

No interactions are anticipated between the Project and Infilling Limits or federal lands. Thus, no effects are expected on these land uses.

Project effects on Land Use Planning and Development Control will be addressed by permits from the appropriate authorities to proceed with construction, or engagement with those who have existing rights on tenured lands. Therefore, Project effects will occur prior to Construction and the Project will not interact with land use planning and development control during O&M or Accidents or Malfunctions. Some minor issues could arise during Decommissioning and Rehabilitation, should the status of land zoning have been altered by that time.

Industrial and Commercial Land Use

With a few exceptions, the lands in the PA (especially around the Sunnyside Wind Farm) are undeveloped. Some Project components are surrounded by the marine waters of Trinity Bay and Placentia Bay, which are both used for a variety of activities including commercial and industrial uses including the Sunnyside and Arnold’s Cove fishing harbours. As there are no marine commercial uses in the PA, there are no anticipated interactions.

Several potential wind energy projects are proposed in eastern Newfoundland. The PA intersects Wind Energy Land Reserves identified for Toqlukuti’k Wind and Hydrogen Ltd., along with those of North Atlantic’s Wind Hydrogen Hub. Engagement and coordination with Toqlukuti’k Wind and Hydrogen Ltd. is planned to address the limited area of the Project that overlaps with the Toqlukuti’k Wind and Hydrogen project. This dialogue will serve to avoid any potential conflict of infrastructure between the two projects. Engagement may also be required with NL IET, which oversees interests in wind and hydrogen development.

The PA intersects 11 Crown titles (i.e., leases, grants or permissions), which are sections of utility corridors. These titles are held by NLH and Labrador-Island Link Limited Partnership. Engagement with NLH and Labrador-Island Link Limited Partnership will address any potential land use conflicts and ensure that the Project and the utilities successfully access lands in the area.

The Project is located within two FMDs. The Project transmission line portion of the PA intersects small portions of two domestic harvest blocks but no commercial harvesting areas.

Road transport of wind turbine components has the potential to produce temporary traffic delays which may affect traffic to industrial and commercial operations in the PA. This interaction is anticipated to be minimal and temporary during shift changes and during movement of wind turbine components. A Traffic Management Plan has been developed to address means to reduce interactions and ensure the smooth flow of road traffic (Appendix E).

There are no mineral exploration licences or mining leases within the Project Area (PA), though the Duck Pond Mine Area is noted in the broader Regional Assessment Area (RAA). While 11 quarry permits exist across the Local and Regional Assessment Areas, none intersect the PA. Therefore, no interactions are anticipated between the Project and mining (i.e., mineral exploration licences or mining leases) and quarry lands. However, four mineral licences overlap the Wind Farm area. North Atlantic will continue to work with mineral rights holders in the area; licence holders have been contacted, and agreements will be arranged if needed to address any potential effects.

Any temporary disturbance to nearby properties will be limited to the Construction, and Decommissioning and Rehabilitation Phases. During the O&M Phase, levels of disturbance will be minimal. Given the existing zoning of the Project, which ensures compatible uses, there is minimal potential for Project activities to disrupt existing industrial and commercial resource uses.

Tourism and Recreation

Potential concerns could arise with tourism and recreation and the Project because of interactions with noise/vibration, ice throw and potential reduction in access and/or land quality.

Several cabins have been identified within the PA, LAA, and RAA. Due to the nature of noise during the Construction Phase and based on the review of noise effects in the Noise Impact Study, there will be interactions between cabins and noise from construction of wind turbines. Mitigation measures will be applied as appropriate to avoid or greatly reduce the effects of construction noise.

Another potential interaction is with ice throw from the wind turbine blades and nearby cabins during the O&M Phase of the Project. In the Ice Throw Assessment, it has been determined that there are potential interactions with ice throw and two potential cabins located near wind turbines 9 and 48. However, further engagement from North Atlantic confirmed that for the potential cabin area near wind turbine 9, there is no license to occupy or Crown land claim and the structure in the area has collapsed. There is a license to occupy for the cabin area near wind turbine 48, however North Atlantic has verbal confirmation that the owner does not intend to build in this location and there is no existing structure there. As such, the wind turbine locations that overlap with these potential cabin areas do not present any current or anticipated interaction.

Other potential tourism and recreation land uses include the T'Railway Provincial Park and the Come By Chance Estuary ('the Gut'), known for its birdwatching opportunities. Effects on these land uses would be temporary in nature and limited to the Construction Phase of the Project, when temporary reduced access to these areas could occur. The Project will also change the visual landscape of the PA, LAA and RAA following the construction of the wind turbines. This change to the visual landscape may alter the tourism and recreation use of the area.

Within the LAA and PAA, there are six trailheads – Otter Rub/War Path, Bordeaux Hiking Trail and Aurthur's Hill Trail in Arnold's Cove, Cleary Hiking Trail in Come By Chance and Truce Sound Coastal Trail and Centre Hill Trail in Sunnyside. As these trailheads do not interact with Project components, no direct interactions are anticipated.

There are no interactions between the Project and outfitting operations (e.g., camps, lodges, cabins and/or related facilities and services for sport angling/fishing, hunting or other recreational activities). Thus, no effects are expected on these land uses.

The disturbances noted above during the Construction and O&M Phases of the Project will be greatly reduced by the implementation of mitigation measures. Mitigation measures are discussed further below and in the Noise Impact Study (Appendix J) and the Ice Throw Assessment (Appendix L).

Harvesting

The Project overlaps with various harvesting areas, including hunting management areas (such as Black River, Bonavista Peninsula, and Bellevue), trapping zones, angling sites, small game management areas, and domestic wood harvest blocks located within the PA, LAA, and RAA. While these management areas encompass the broader assessment areas, they do not specifically cover high-use zones. Although recreational use of the wind turbine placement area appears low, the small survey sample limits confidence in this conclusion. Interactions with linear infrastructure, such as access roads and transmission line ROWs, are expected to be more frequent than for the wind turbine sites themselves because they cross through areas more frequently used by cabin owners and lead to domestic woodcutting zones via established ATV trails. Anticipated interactions during the Construction Phase are expected to be temporary and may limit access to some land uses; however, survey results suggest limited current use, with only two of eight respondents indicating engagement in harvesting activities, suggesting minimal effects overall.

The PA does not intersect any of the designated salmon rivers and as such, no effects are anticipated.

Project infrastructure will reduce the availability of quality land for domestic wood harvesting due to ongoing vegetation management within rights-of-way. This, along with clearing for infrastructure removal, may alter recreational and subsistence land use along transmission lines and roadways by affecting access to and availability of natural resources. However, disturbed areas will be restored and rehabilitated, as needed, to support the continued use of these areas for subsistence land-based activities.

Indigenous Land Use

There are no Indigenous land claims on the island; however, FSC licenses granted to members of the Miawpukek First Nation (MFN) cover a substantial marine area, including the coastal waters of Bay d'Espoir and the NAFO Division 3Ps. This area extends from Placentia Bay westward to Burgeo, providing MFN members access to a diverse range of marine resources. The FSC licenses support sustainable harvesting of fish, shellfish, trout, and seals, contributing to the community's economic and cultural well-being. Although there is an adjacent fishing license/enterprise to the PA, no information is available to determine if FSC fishing occurs in the Placentia Bay. It is anticipated that the Project will have little if any interaction, and hence no effect on this KI.

4.2.5 Heritage and Cultural Resources

Heritage and Cultural Resources are included as a VC because they are valued by society for the general and scientific information they can provide about past peoples, their societies, cultures, and lifeways, and the connections and interactions they may have had with other groups.

4.2.5.1 Scope, Measurable Parameters, and Definition of Significant Effects

The KIs presented in Table 4.2.5-1 for this VC include Historic and Archaeological Resources protected under the **Historic Resources Act** (1985). Historic resources refer to natural or human-made works that hold value due to their archaeological, prehistoric, historic, cultural, natural, scientific, or aesthetic significance. These may include sites, structures, or objects that provide insight into prehistoric or historic human activity.

Table 4.2.5-1 Scope and Measurable Parameters of Key Indicators: Heritage and Cultural Resources.

Key Indicator	Scope	Measurable Parameter(s)
Historic and Archaeological Resources	PA	A change in the number of registered archaeological sites identified within the PA; a change in the number of registered provincial cultural resource sites within the PA; the extent of overlap (km^2) or number of HPAs identified within the PA.
Architectural Resources	PA	A change in the number of registered heritage structures identified within the PA; a change in the number of Municipal Heritage sites identified within the PA.
Palaeontological Resources	PA	A change in the number of registered palaeontological sites identified within the PA.

Archaeological objects generally consist of materials such as stone tools, ceramics, glass, and metal artifacts, as well as structural remains (e.g., wooden or stone features) that are at least 50 years old and show evidence of human manufacture, use, or modification. This KI also includes human remains and burial, cultural, spiritual, and other heritage sites or artifacts from both the Pre-contact and Historic periods.

Another KI for this VC is Architectural Resources, which typically consist of buildings or structures of historical significance that have been recorded and registered with Heritage NL) through the NL DTCAR, or designated as Municipal Heritage Sites by the Town of Sunnyside.

The Heritage and Cultural Resources VC also encompass Palaeontological Resources (fossils) which refer to a construct, structure, or work of nature consisting of or representing evidence of prehistoric multicellular organisms, including palaeontological resources designated by regulation under the **Historic Resources Act** (1985).

A custom list of criteria was used to evaluate the effects of the Project on the Heritage and Cultural Resources VC. Some of the generic criteria presented in Table 4.1-4 have been modified for applicability to this VC, whereas other criteria are not applicable to the Heritage and Cultural Resources effects assessment, as noted in Table 4.2.5-2 below.

Table 4.2.5-2 Assessment criteria: Heritage and Cultural Resources.

Evaluation Criteria	Rating	Descriptor
Magnitude	1	Negligible – no perceptible effect on the integrity and/or quality of a Heritage and Cultural Resource.
	2	Low - disturbance of a Cultural and Heritage Resource is predicted; however, the integrity and/or quality of the resource can be fully preserved.
	3	Medium – some disturbance or loss occurs to a portion of a Cultural and Heritage Resource and its associated information that is of interest and concern to the associated community.
	4	N/A
	5	High – Complete disturbance or loss of a Cultural and Heritage Resource, with no retrieval of the resource and its associated information.

Evaluation Criteria	Rating	Descriptor
Frequency	Not applicable. An effect on Heritage and Cultural Resources occurs only once (i.e., disturbance results in the loss of context).	
Geographic Extent	Any extent is limited to specific Heritage and Cultural Resource site or HPA.	
Duration	Not applicable. Heritage and Cultural Resources are static and finite; therefore, residual effects are always permanent, with no return to pre-existing conditions.	
Reversibility	Not applicable. Any residual effect is not reversible.	
Historical or Cultural Context	1	Undisturbed - Area is relatively undisturbed or not adversely affected by human activity.
	2	N/A
	3	N/A
	4	N/A
	5	Disturbed – Area has been substantially previously disturbed by human development or human development is still present.

According to the **Historic Resources Act** (1985), a significant residual adverse effect on Heritage and Cultural Resources is defined as a residual Project-related change to the environment that results in the unauthorized disturbance or destruction of a Heritage and Cultural Resource that is determined by the Provincial Archaeology Office (PAO), to be historically, archaeologically, or culturally significant and that cannot be mitigated.

4.2.5.2 Baseline Conditions

A Historic Resources Overview Assessment (HROA) was prepared in accordance with the requirements of the PAO, as summarized in Section 3.1.5. The PAO serves as the central repository for all historic resource records in NL. As part of the assessment, the list of registered archaeological and palaeontological sites, provincial cultural resource sites, and registered heritage structures was reviewed.

One registered archaeological site was documented within the PA. There are no known or registered fossils in the PA (and the potential for them to be present is low due to the geological composition of the region); therefore, Palaeontological Resources were not assessed further. There are currently no provincially registered heritage structures or municipal heritage sites within the PA; therefore, Architectural Resources were not assessed further.

In addition, a desktop evaluation of the PA was conducted to assess the likelihood of encountering archaeological materials at previously un-surveyed locations. Areas with the highest likelihood were identified as HPAs, and the extent of their overlap with proposed infrastructure within the PA was evaluated. Twenty HPAs were identified within the PA during the HROA.

4.2.5.3 Consultation and Engagement Considerations

The Study Team complied with the Indigenous engagement requirements that are outlined in the Government of NL Aboriginal Consultation Policy on Land and Resource Development Decisions. On March 12, 2025, CRM Group contacted Miawpukek First Nation by email and requested any available information pertaining to traditional or historical Indigenous use of the Study Area (K. Cigolotti, personal communication, 12-Mar-25). As of completion of the HROA and HRIA reports, no response has been received.

4.2.5.4 Project-Environment Interactions

Historic or Archaeological sites and materials could be lost or disturbed by the Project. The Project Phase of most concern is Construction, when the greatest extent of physical disturbance to the landscape will occur. Activities such as site preparation, construction of roads, and establishment of wind turbine foundations all involve potentially disruptive aspects. During the O&M Phase, there will be few potential interactions due to the nature of Project activities. Decommissioning and Rehabilitation will mirror Construction regarding physical disturbance, albeit with far less potential for site disturbance. A limited number of Accidents and Malfunctions are candidates for interaction with Heritage and Cultural Resources. Potential interactions with identified KIs of the VC are listed in Table 4.2.5-3.

The HRIA resulted in the identification of one HPA (HPA-04) within the PA, in addition to a registered site ClAk-02 (HPA-12). Potential interactions with these sites could occur from access road, power line, or wind turbine construction and/or upgrading (see Figure 3.1.5-2). The other location ascribed high archaeological resource potential (HPA-05) is located near waterbodies and lies beyond the defined footprint of potential Project effects. If avoidance of the remaining portion of HPA-04 is impractical, it is required that planned Project development areas that overlap this area zones of high archaeological resource potential, be subjected to the Archaeological Mitigation phase of an HRIA.

Despite the lack of specific potential for archaeological sites surrounding the HPAs, the entire region contains ethnographic potential. Furthermore, despite the lack of identification of campsites or archaeological material during the HRIA field activities, the likelihood of discovery of archaeological resources throughout the course of the ground-disturbing activities is still possible. As such, a detailed Contingency Plan is included within Appendix F. This includes information on the identification of historic resources during construction and development, and protocols to follow in the rare instance of encountering historic resources during construction.

Table 4.2.5-3 Potential Project interactions with Heritage and Cultural Resources.

Project Component and Activity Description	Key Indicators: Heritage and Cultural Resources
	Historic and Archaeological Resources
Construction Phase	
Site Preparation	X
Roads	X
Staging and Laydown	X
Temporary Batch Plant	
Equipment and Materials Transport	

Project Component and Activity Description	Key Indicators: Heritage and Cultural Resources
	Historic and Archaeological Resources
Wind Turbine Foundations	X
Electrical Infrastructure	X
Wind Turbine Installation	
Hydrogen Generation Plant	X
Hydrogenation Plant	X
Toluene and MCH Storage and Transfer	
Flare Stacks	
Administration Buildings	
Temporary Workforce Accommodations	
Employment and Expenditures	
Operation and Maintenance	
Wind Turbine Operation	
Wind Turbine Maintenance	X
Electrical Infrastructure	X
Venting and Flaring	
Road Maintenance	X
Hydrogen Generation Plant	
Hydrogenation Plant	
Toluene and MCH Storage and Transfer	
Administration Buildings	
Employment and Expenditures	
Decommissioning and Rehabilitation	
Electrical Infrastructure	
Wind Turbines	
Hydrogen Generation Plant	
Hydrogenation Plant	
Toluene and MCH Storage and Transfer	
Terrain Reclamation	X
Temporary Workforce Accommodations	
Administration Buildings	
Employment and Expenditures	
Accidents and Malfunctions	
Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials	
Flaring /Venting of Hydrogen and Other Gases	
Traffic Incidents	
Fires and Explosions	
Dislodging of a Wind Tower or Wind Turbine Blade	
Ice Throw	
Occupational Hazards and Human Injuries	
Failure of Industrial Water Supply	
Wildlife Emergencies/Incidents	

4.2.6 Socio-economic Environment

This section includes the effects assessment for the socio-economic environment which includes two valued components (VCs) – Communities and Economy, Employment and Business. The Communities VC is included because community services and infrastructure and community health and wellbeing could be affected by the Construction, O&M and Decommissioning and Rehabilitation Phases of the Project. For the Economy, Employment and Business VC, economic conditions such as major industries, employment and business may be affected by the Construction, O&M and Decommissioning and Rehabilitation Phases of the Project.

The spatial boundaries for the assessment on Communities and Economy, Employment and Business effects include the PA, LAA and RAA as defined in Section 3.1.3.6.

The temporal boundaries for this assessment include three major Project Phases: Construction (29 months), O&M (nominally 30 years), and Decommissioning (one year). Temporal boundaries therefore extend from 2025 to 2058.

4.2.6.1 Scope, Measurable Parameters, and Definition of Significant Effects

The Communities VC includes three KIs - population demographics, community health and wellbeing and infrastructure and services, while the Economy, Employment and Business VC includes economy, employment and business as KIs. These KIs and applicable measurable parameters for each are listed below in Table 4.2-1.

Table 4.2.6-1 Scope and Measurable Parameters of Key Indicators: Socio-economic Environment.

Valued Component	Key Indicator	Scope	Measurable Parameter
Communities	Population Demographics	Socio-Economic RAA	• Population trends • Age • Diversity
	Community Health and Wellbeing	Socio-Economic RAA	• Health status • Education • Income • Food security
	Infrastructure and Services	Socio-Economic RAA	• Housing and accommodations • Health and social services • Education and training • Transportation • Municipal/Regional Infrastructure and Services • Utilities and communications • Prevention and emergency services • Recreation

Valued Component	Key Indicator	Scope	Measurable Parameter
Economy, Employment and Business	Economy	Socio-Economic RAA	• GDP • Tax revenue
	Employment	Socio-Economic RAA	• Labour supply • Employment equity and diversity
	Business	Socio-Economic RAA	• Business organizations • Industrial parks • Capacity and growth

A significant effect on the Communities VC is defined as an adverse residual Project-related effect to the socio-economic environment that results in either, or both, of the following:

- Long-term effects to community health and well-being, which cannot be managed through planned Project mitigation measures; or
- Long-term exceedance of available capacity, or a substantial decrease in quality of infrastructure or services, which cannot be managed through planned Project mitigation measures.

A significant effect on the Economy, Employment and Business VC is defined as an adverse residual Project-related effect to the socio-economic environment that results in:

- A measurable change distinguishable from current conditions, lasting beyond the life of the Project, and cannot be managed through planned Project mitigation measures.

Where a significant effect has been predicted, this evaluation then includes a determination of the likelihood associated with the predicted effect. "Likelihood" includes both the probability of occurrence as well as the scientific certainty of the predicted effect (e.g., where modelling was undertaken).

4.2.6.2 Baseline Conditions

The Socio-Economic Baseline study in Appendix G is summarized in Section 3.1.6 describes the existing knowledge of the six key indicators – Population Demographics, Community Health and Wellbeing, Infrastructure and Services, Economy, Employment, and Business.

4.2.6.3 Consultation and Engagement Considerations

During stakeholder engagement activities, including community consultations, no concerns have been identified with respect to socio-economic conditions.

4.2.6.4 Project-Environment Interactions

Potential interactions with the identified key indicators of the socio-economic environment KIs are summarized below in Table 4.2.6-2. For both VCs it is anticipated the potential effects of the Project would be similar regardless of the specific component of the Project. Thus, the Project components have been removed from the table below and the Project phase has been used instead. Further, accidents and malfunctions are unlikely to result in changes to either VC and are not reviewed further as part of this effect assessment.

Table 4.2.6-2 Potential Project Interactions with Socio-economic Environment.

Project Component and Activity Description	Key Indicators: Socio-economic Environment					
	Population Demographics	Community Health and Wellbeing	Infrastructure and Services	Economy	Employment	Business
Construction	X	X	X	X	X	X
Operation and Maintenance	X	X	X	X	X	X
Decommissioning and Rehabilitation	X	X	X	X	X	X
Accidents and Malfunctions						
Notes X: Potential interactions that might cause an effect. Blanks indicate that interactions between the Project and the VC are not expected						

Population Demographics

The Project may result in temporary or permanent increases in population, which vary by Construction, O&M and Decommissioning and Rehabilitation Phases of the Project. Population increases are generally considered to be positive in rural communities with population decline and ageing resulting in low or negative growth. Other than Come By Chance, all other locations in the LAA and RAA had small population increases in the last census. Although some services and infrastructure may be limited in these communities, capacity likely exists in those services available due to small populations. The Project may have a positive effect on the communities due to employment opportunities and the possibility of retaining and/or gaining new permanent residents. This may also result in a younger and more diverse population.

It is anticipated that the current population in the LAA will not be able to supply sufficient labour for the Project during the Construction Phase as approximately more than 1,200 full-time equivalents will be required over the course of the entire Construction Phase (Appendix Q, Workforce and Employment Plan). While there may be opportunities for permanent employment and some workers from the Construction Phase may gain employment with the Project during O&M, it is also likely that the 30-year operational period will attract other non-residents (depending on skill set) from the LAA and RAA to relocate for permanent work opportunities.

The Decommissioning and Rehabilitation Phase may require the support of a non-resident labour force in a manner similar to the Construction Phase. Following Decommissioning and Rehabilitation activities, permanent population may decline due to fewer temporary and permanent employment opportunities with the Project.

Community Health and Wellbeing

A Light Impact Assessment was undertaken for this Project. The assessment has determined that light levels at the identified sensitive receptors are below the limits recommended by the Institution of Lighting Engineers guidelines both before and after 11pm. Further, the closest receptors to the wind turbines, HGP and HP Plant are 371 m, 2,926 m and 1,448 m. respectively. However, further engagement from North Atlantic confirmed that for the potential cabin area near wind turbine 9, there is no license to occupy or Crown land claim and the structure in the area has collapsed. There is a license to occupy for the cabin area near wind turbine 48, however North Atlantic has verbal confirmation that the owner does not intend to build in this location and there is no existing structure there. As such, the wind turbine locations that overlap with these potential cabin areas do not present any current or anticipated interaction.

Several cabins have been identified within the LAA. Due to the nature of noise during the Construction Phase and based on the review of noise effects in the Noise Impact Study, there will be interactions between the cabins and the noise from construction of the wind turbines. Mitigation measures are recommended to be implemented as part of the Project to greatly reduce the effects of construction noise.

Another potential interaction is with ice throw from the wind turbine blades and nearby cabins during the O&M Phase. In the Ice Throw Assessment, it has been determined that there are potential interactions between ice throw and two cabins located near wind turbines 9 and 48. However, as mentioned above, no Crown land license to occupy or application exists near turbine 9. A license to occupy exists near turbine 48, but the owner has no plans to build. As such, the wind turbine locations that overlap with these potential cabin areas do not present risk for the foreseeable future.

Based on the results of modelling prepared for Section 4.1.2, the Project is not anticipated to result in adverse health effects due to dust, light, noise, vibrations or ice throw during the Construction, O&M or Decommissioning and Rehabilitation Phases. Installation and operation of the Wind Farm will result in a change to the viewscape, especially at Sunnyside. Based on community input, Project design changes have included moving the transmission line north to align with the access road away from Sunnyside and recreational areas. A 3D rendering of the PA is available here: https://experience.arcgis.com/experience/60fc2e3478ae491cbd3273f5c4834b7a

The Project will result in opportunities for employment, both short-term during Construction and long-term during O&M, which may require formal education or on-the job training. These opportunities may enhance the ability of workers to engage in employment that provides higher income and employment benefits, which could result in better quality of life for individuals and families. Higher education and secure income reduce poverty and related issues such as food insecurity.

Infrastructure and Services

Short-term and long-term population increases or decreases can be drivers of changes to the availability and capacity of infrastructure and services. The Project is expected to have both temporary and long term changes to population, which may affect the usage and capacity of infrastructure and services. The type and degree of changes depend on the number of individuals, Project phase and type of infrastructure or service.

Housing and accommodations can be affected by development projects if non-residents workers are left to find housing in communities or in hotels/short-term accommodations. While such arrangements are beneficial to those who own rental facilities, the presence of a non-residents workforce can result in increases in market rental housing prices for residents and incentivize conversion of housing for workers resulting in housing shortages for residents who live in market rental housing.

To avoid potential housing issues in the communities and given the short-term nature of construction work, it is possible that non-resident workers could take advantage of the temporary accommodation facilities at the Bull Arm Fabrication Site during the Construction Phase. While not all workers or Project-related personnel will use the worker accommodations, this mitigation measure would serve to reduce effects on housing. Any shortages or price increases in rental housing should stabilize during O&M as the non-resident construction workforce will no longer be present. It is anticipated that, due to the smaller number of O&M employees, any non-resident or visiting workers would not adversely affect rental housing.

The presence of a non-resident workforce could possibly contribute to shortages of health services. Recent studies show that in NL the availability of a regular health care provider is slightly lower that the Canadian average. A temporary increase of workers, especially during the Construction Phase, has the potential to affect access to health services either through routine appointments or due to injuries. This is offset by the fact that the three-year Construction Phase would be a short-term effect. Following Construction, demand for health services is likely to stabilize during O&M. Provision of health and safety resources for the Project can result in convenient access for workers and reduce potential incidents. Further, following Decommissioning and Rehabilitation, demand for services is likely to return to pre-Project conditions.

Workers may require education or trades training to gain employment with the Project. This could result in increased demand at colleges such as those in Clarenville and throughout the LAA. Public and private colleges and other educational institutions monitor changes and adjust programs based on needs and opportunities. Further, North Atlantic can work with educational institutions to address the needs of the Project by providing Project information and updates.

The Project has the potential to result in increased road traffic, especially at peak times such as shift changes. Daily worker transportation will be reduced by housing non-resident workers at an accommodation facility. North Atlantic has undertaken a Transportation Impact Study and Traffic Management Plan for the Project (Appendix E). The Traffic Management Plan outlines intended measures for Construction activities including traffic management, driver guidelines and traffic control measures. With these mitigation measures, it is anticipated that effects to the road network during Construction will be minimized.

The population is expected to increase temporarily during Construction. Thus, an increase in demand for services and infrastructure such as water and sewer could be anticipated. However, it is possible that non-resident workers could take advantage of the temporary accommodation facilities at the Bull Arm Fabrication Site which will have its own water and sewer services. This would result in minimal effect on water and sewer infrastructure during Construction.

During the Construction and Decommissioning and Rehabilitation Phases, it is anticipated that there will be a high volume of solid waste produced by the Project. As producers of industrial / commercial/institutional (ICI) waste engage management services in the private sector, it is not anticipated that there will be effects to any residential collection or waste management in the LAA. North Atlantic has prepared a Project-specific Waste Management Plan (Appendix N). North Atlantic currently has an Environmental Management Standard Operating Procedure which includes waste management practices. These practices include the waste management principles of reduction, reuse, recycling and recovery before disposal. As Robin Hood Bay Regional Waste Management Facility is the only one in the RAA that accepts ICI waste, North Atlantic will work with the operators of Robin Hood Bay to address waste diversion and disposal.

The Project will generate its own electricity supply but will need intermittent access to supplementary sources to improve reliability. Electricity in the RAA is provided by NLH and Newfoundland Power via a system dominated by hydroelectric generating facilities and supplemented by thermal generation (Holyrood). The Project will develop a new 138 kV transmission line from the Wind Farm to the HGP. Further, a separate grid feed will supply additional power to the HGP and HP substation from the Sunnyside substation owned by NLH.

The Project will require support services for potential emergencies during Construction and O&M. A 2015 review of fire protection services determined that of the five municipalities in the LAA, only the Towns of Arnold’s Cove and Clarenville had “Acceptable” offensive interior and defensive exterior ratings. The

Towns of Sunnyside, Come By Chance and Southern Harbour had either “Needs Improvement” or “Unacceptable” ratings. North Atlantic has prepared an Emergency Response Plan (Appendix M) and have an Emergency Response Team to manage emergencies such as fires. Further to this and given the locations of the HGP and HP in the Town of Come By Chance, North Atlantic will engage with the municipality to discuss increasing the capacity of the fire departments to manage potential emergencies.

The Project is not anticipated to affect recreation infrastructure and services in the LAA or RAA during the Construction and Decommissioning and Rehabilitation Phases. A potential increase in permanent population during O&M could result in demand for additional recreation infrastructure and services in the LAA, however capacity is likely available to accommodate any permanent population increase due to the Project. Following Decommissioning and Rehabilitation, utilization of infrastructure and associated services are likely to return to pre-Project levels.

Economy

It is anticipated that the Construction and O&M Phases of the Project will provide the most positive effects to the economy in the LAA and RAA. During the Construction Phase, there will be a large expenditure on procurement of construction contracts as well as goods and materials. This will result in a positive contribution to GDP and taxation.

During O&M, it is expected that there will also be a positive, but smaller, contribution to GDP and tax revenue. The Project will result in spending on goods and services to maintain O&M of the Project throughout its timeline.

The Decommissioning and Rehabilitation Phase of the Project is also projected to contribute to GDP and tax revenue but at levels below those experienced during Construction. Following closure, economic effects will be reduced due to fewer opportunities.

Employment

The Project will create new opportunities for employment in renewable energy and supporting sectors with an estimated 1,200 full-time positions during Construction Phase and approximately 62 full-time positions in the 30-year Operation Phase. North Atlantic will employ a combination of direct hires and contractors, with an emphasis on local hiring and diversity and inclusion in keeping with Government directives and company policies (Appendix Q, Workforce and Employment Plan). The Project may face labour challenges with the expected loss of 2.3% of construction workers in the province by 2033 (BuildForce Canada, 2024). Also, with the number of workers needed for the Project and the emphasis on diversity and inclusion, an employment opportunity will be presented to underrepresented workers such as women, Indigenous and immigrant workers.

With several large capital projects being developed in the province and increase employment in the non-residential construction sector from 2022 to 2023 (BuildForce Canada, 2024), it is an anticipated that the Project will attract both local and non-resident workers. Further, given the nature of wind farm and plant operation, many specialties will be required, which could also require specialised training.

The Decommissioning and Rehabilitation Phase of the Project may require the support of a resident and non-resident labour force but smaller than labour requirements for Construction.

Business

Within the LAA are numerous industrial and business services, as well as transportation, storage and logistics, safety and security, marine services, consulting and engineering services, construction, travel, accommodations and food services. With the expected increase in workers being drawn to the area and the need for business services, it is anticipated that businesses in the LAA will see an increase in opportunities. This is mainly expected during the Construction and O&M Phases of the Project. During the Project Decommissioning and Rehabilitation Phase, is anticipated that there will continue to be business investment, however, once the Project is complete the growth may cease. This is offset by the potential new capacity of these business due to the investment through the lifetime of the Project, which may provide new business opportunities.

4.2.7 Human Health and Quality of Life

This section considers the effect of the Project on the Human Health and Quality of Life VC, which may be affected by issues associated with Construction, O&M, and Decommissioning and Rehabilitation Phases of the Project. The interaction between the Human Health and Quality of Life VC and the Project occurs through eight key aspects: air quality, light, noise, vibration, shadow flicker, and ice throw, land and resource use, and tourism and recreation.

4.2.7.1 Scope, Measurable Parameters, and Definition of Significant Effects

Baseline conditions and Project interactions for key components such as air quality, light, noise, and vibration are discussed in the Atmospheric Environment section (4.2.1). Human Health and Quality of Life may be indirectly affected by other Project interactions, such as those discussed in the Land and Resource Use section (4.2.4), including land use planning and development control, industrial and commercial land use, and harvesting. Additionally, Project interactions with Indigenous land and resource use, detailed in Section 4.2.4, may also affect Human Health and Quality of Life.

Given the material presented in sections 4.2.1 and 4.2.4, this section addresses the remaining concerns - shadow flicker and ice throw. Table 4.2.7-1 lists relevant KIs for the Human Health and Quality of Life

VC, showing where each is addressed in other sections of the Registration. The geographic scopes for shadow flicker and ice throw were established in the respective studies resulting in specific peripheral distances for each.

Table 4.2.7-1 Scope and Measurable Parameters of Key Indicators: Human Health and Quality of Life.

Key Indicator	Scope	Measurable Parameter
Air Quality	See Section 4.2.1	
Greenhouse Gases		
Light		
Sound Quality		
Vibration		
Shadow Flicker	2,044 m radius from each wind turbine site	Shadow hours
Ice Throw	421.5 m from each wind turbine site.	Ice throw distance

4.2.7.2 Baseline Conditions

Section 3.1.1 (Atmospheric Environment) provides an overview of the current understanding of ambient light conditions in the RAA. Appendix K (Shadow Flicker Analysis) explains the concept of shadow flicker caused by wind turbines and Appendix L (Ice Throw Analysis) explains ice throw in detail.

Shadow Flicker

Shadow flicker occurs when the rotating blades of wind turbines cast moving shadows on nearby structures. This typically happens when the sun is low in the sky, during early morning or late afternoon, and the wind turbine is positioned between the sun and a receptor. The flickering effect can be disruptive to those receptors of shadow flicker living or working in affected areas.

Ice Throw

At a wind power facility, ice can form on various structures such as buildings, power lines, roads, walkways, stairs, wind turbine components (e.g., towers, nacelles, hubs, blades), weather masts, and other structures (Canadian Renewable Energy Association, 2020). Ice throw occurs when ice forms on the blades of wind turbines and is thrown off as the blades rotate. This ice can be propelled considerable distances, posing risks to nearby structures, vehicles, and individuals. Ice fall, on the other hand, occurs when ice fragments detach from the wind turbine while the blades are paused or idle. Both phenomena typically occur when temperatures rise rapidly from below freezing or fluctuate near 0°C. Additionally, ice throw may happen when wind turbines resume operation following a pause during an icing event.

4.2.7.3 Consultation and Engagement Considerations

Although no concerns were raised by the public regarding ice throw or shadow flicker, the Study Team was made aware of the presence of cabins and cabin areas that need to be considered in the ice throw and shadow flicker analysis. The results of this analysis are presented in the next section.

4.2.7.4 Project-Environment Interactions

Potential interactions with identified KIs of the Human Health and Quality of Life VC are summarized in Table 4.2.7-2. Wind turbine operation is the only interaction that may result in shadow flicker or ice throw.

Table 4.2.7-2 Potential Project Interactions with Human Health and Quality of Life.

Project Component and Activity Description	Key Indicators: Human Health and Quality of Life	
	Shadow Flicker	Ice Throw
Construction		
Site Preparation		
Roads		
Staging and Laydown		
Temporary Batch Plant		
Equipment and Materials Transport		
Wind Turbine Foundations		
Electrical Infrastructure		
Wind Turbine Installation		
Hydrogen Generation Plant		
Hydrogenation Plant		
Toluene and MCH Storage and Transfer		
Flare Stacks		
Administration Buildings		
Temporary Workforce Accommodations		
Employment and Expenditures		
Operation and Maintenance		
Wind Turbine Operation	X	X
Wind Turbine Maintenance		
Electrical Infrastructure		
Venting and Flaring		
Road Maintenance		
Hydrogen Generation Plant		
Hydrogenation Plant		
Toluene and MCH Storage and Transfer		
Administration Buildings		

Project Component and Activity Description	Key Indicators: Human Health and Quality of Life	
	Shadow Flicker	Ice Throw
Employment and Expenditures		
Decommissioning and Rehabilitation		
Electrical Infrastructure		
Wind Turbine		
Administration Buildings		
Hydrogen Generation Plant		
Hydrogenation Plant		
Toluene and MCH Storage and Transfer		
Administrative Buildings		
Terrain Reclamation		
Temporary Workforce Accommodations		
Employment and Expenditures		
Accidents and Malfunctions		
Spills and Releases		
Flaring or Venting Incident		
Fire or Explosion		
Traffic Incidents		
Wind Turbine Collapse		
Ice Throw		
Water Supply Failure		
Wildlife Incident		
Occupational Hazard and Human Injury		
Notes X: Potential interactions that might cause an effect. Blanks indicate that interactions between the Project and the VC are not expected		

Shadow Flicker

A shadow flicker analysis was completed by Nortek Resource Solutions Inc. in April 2025 (Appendix K), to establish the maximum shadow distance for the proposed wind turbines. The analysis developed both theoretical and realistic scenarios to understand the extent of shadow flicker that may be caused by the wind turbines.

According to the Nortek report, there are no federal or provincial regulations defining criteria or maximum limits for shadow flicker from wind projects. However, in NL, a generally accepted guideline suggests that developers must demonstrate that receptors will receive no more than 30 minutes of shadow flicker per day and/or no more than 30 hours of shadow flicker per year.

A theoretical case was modelled under highly unlikely conditions, including but not limited to, the sun shining fully 100% of the time when it is above the horizon and the wind turbine rotor being always perpendicular to the sun. Under these conditions, the maximum shadow distance was calculated to be 2,044 metres.

In contrast, a realistic case was modelled based on site-specific monthly sunshine probabilities, providing a more accurate approximation of real-world conditions. A total of 96 receptors were identified and modelled in this analysis (see Figure 4.2.7-1). These receptors were located through public consultation and satellite/aerial imagery to identify buildings considered as dwellings. Additionally, two pseudo-receptors (areas of interest without buildings [AE and BX]) were modelled based on public comments. According to the theoretical case models, four of these receptors (M, N, AE and BX) would experience shadow flicker. As receptors AE and BX are pseudo receptors, the only shadow impact on existing dwellings is expected at receptors M and N located on the north side of Deer Harbour. However, shadow flicker for these two receptors would not exceed 30 hours per year or 30 minutes per day in accordance with NL Regulation 18/24 (Newfoundland and Labrador Regulation 18/24, 2024).Although the realistic case scenario cannot specify the exact number of minutes of shadow flicker per year, it is expected that receptors will receive no more than five hours of shadow flicker per year.

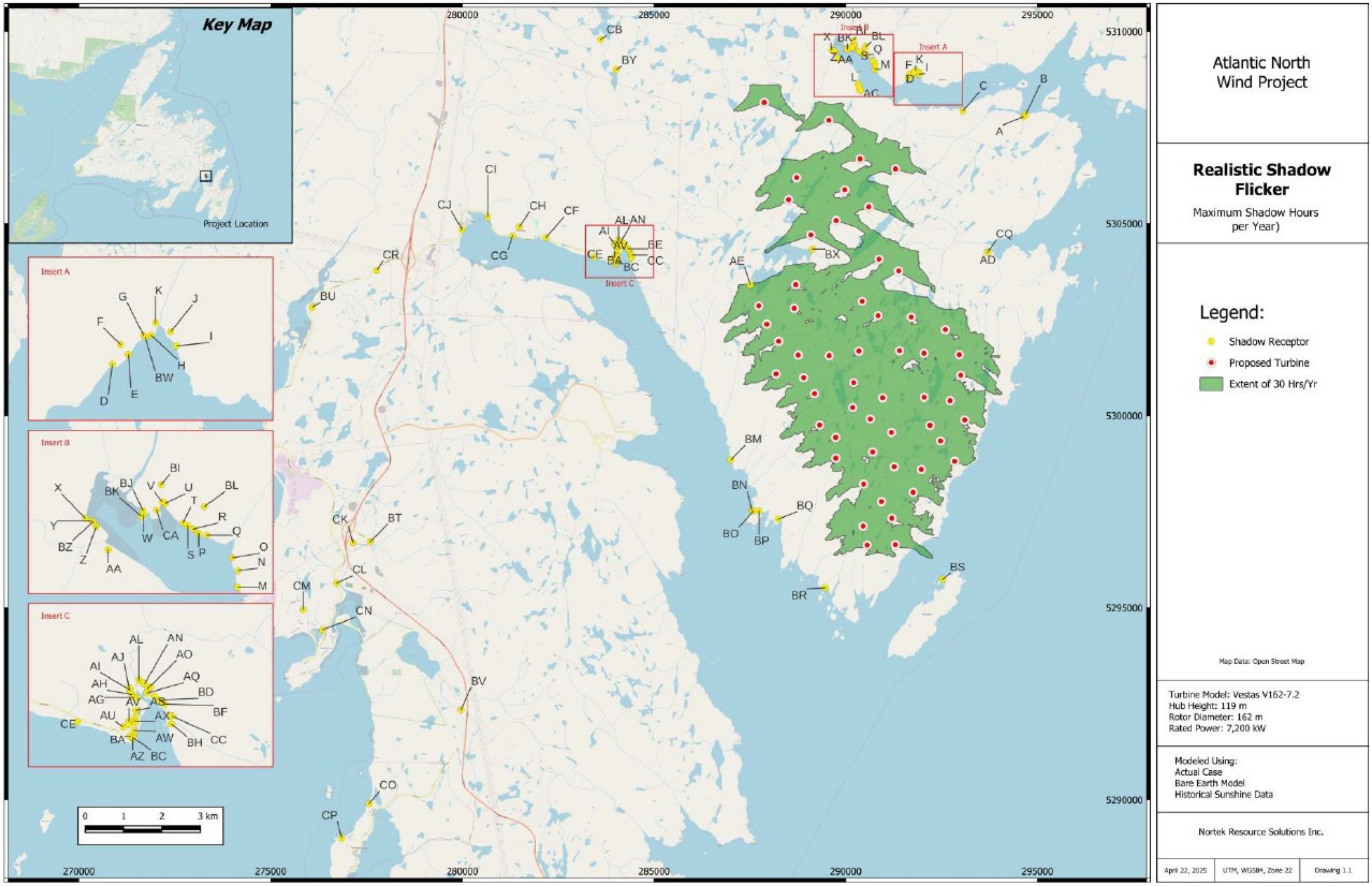


Figure 4.2.7-1 Shadow Flicker per Year Based on the Realistic Scenario for the Proposed North Atlantic Wind Farm (figure sourced from Nortek Resource Solutions Inc. Shadow Flicker Report (2025)).

Ice Throw

An Ice Throw Hazard Analysis (Appendix L) was conducted to assess ice throw and ice fall hazards to people, animals, and property within the maximum ice throw or ice fall zones.

Icing refers to any type of accumulation of ice or snow on a structure and occurs when water present in the air freezes after encountering a surface. Icing events are either meteorological or instrumental. Meteorological icing happens due to weather conditions. Instrumental ice, which is present and visible on a surface, can melt, sublimate, and shed (i.e., be thrown by a rotating blade) for days after meteorological icing. According to the Ice Throw Hazard Analysis, meteorological icing occurs 0.5 to 3% of the year (average of 1.8 to 11.0 days per year) and instrumental icing occurs 1 to 9% of the year (average of 3.7 to 32.9 days per year).

The Ice Throw Hazard Analysis was completed using the 55 wind turbine locations (see Appendix L), wind data provided by North Atlantic, and assuming the Vestas V162 6.8 wind turbine model (hub height of 119 m and rotor diameter of 162 m). The maximum ice throw distance for the planned wind turbines is 421.5 m.

The maximum ice fall distance, when the wind turbines are paused, depends on both the wind turbine characteristics (hub height and rotor diameter) and wind speeds. Table 4.2.7-3 includes the ice fall distance for various wind speeds while the wind turbines are paused. The likelihood of ice falling a distance greater than 333 m (the maximum ice fall distance) when the wind turbines are paused is considered extremely low to nil, as the likelihood of an ice fragment detaching at the same time as a gust of wind greater than 25 m/s is extremely low.

Table 4.2.7-3 Maximum Ice Fall Distance by Wind Speed.

Wind speed (m/s)	Maximum ice fall distance (m)
0	0
5	67
10	133
15	200
20	267
25	333

Ice throw and ice fall interactions may occur at various locations within the Wind Farm Area. A detailed list of receptors can be found in Appendix L. After decommissioning, ice throw and ice fall will cease, and conditions are expected to revert to their pre-Project state. This analysis does not consider the ice throw mitigation measures that will be implemented.

4.3 Accidents and Malfunctions

An accident is defined as an unplanned event, whereas a malfunction is defined as a failure to operate in the correct or intended manner. Accidents and malfunctions are unplanned events that may occur during all phases of the Project, with the risk of causing adverse environmental effects. An effective environmental management system reduces the probably of an accident or malfunction from occurring and limits the potential magnitude of any failure. North Atlantic has prepared an ERP to document the steps to be undertaken in prevention, preparedness and response to accidents and malfunctions. The ERP is provided in Appendix M. The following discussion identifies potential accidents and malfunctions associated with the Project, their potential effects and the measures that will be applied to reduce risk.

4.3.1 Emergency Preparedness

The North Atlantic ERP (Appendix M) for wind turbine and hydrogen / LOHC production operations details processes and guidelines for emergency response at both the Come By Chance and Sunnyside Facilities. The objectives of the ERP are:

- To preserve the health and safety of employees, contractors, response personnel and the public;
- To reduce adverse environmental effects;
- To reduce the risk of damage to property;
- To ensure that emergency response personnel are aware of the risks associated with the facility and its operations;
- To guide response personnel in deciding which measure to take in implementing them safely, quickly and efficiently;
- To minimize the amount of time and money required to resume normal operations;
- To inform citizens who may be affected by the event; and
- To communicate with the responsible authorities in the context of public safety.

A variety of Canadian codes and regulations will be adhered to regarding safe production and storage of hydrogen. These include, but may not be limited to:

- ASME (American Society of Mechanical Engineers) B31.3 Process Piping;
- ASME B31.12 Hydrogen Piping and Pipelines;
- ASME STPPT- 006 Design Guidelines for Hydrogen Piping and Pipelines;

- Hydrogen Technologies Code; and
- NFPA 55 Compressed Gases and Cryogenic Fluids Code.

Along with strict adherence to safety codes, the Project design has incorporated additional safety measures such as installation of stop valves, provision of continuous venting emissions monitoring, and a flaring facility.

In addition to risks associated with production, storage and transfer of hydrogen, toluene, and MCH, accidents and malfunctions associated with general industrial work may occur, such as spills and releases, fires, vehicle incidents, occupational hazards, equipment malfunctions, and human injuries. While preventative measures will reduce the likelihood of these accidents and malfunctions from occurring, the Project will maintain a comprehensive emergency response capability, including trained personnel, an inventory of response materials and full time access to medical care at the Braya Health Centre. Firefighting equipment, first aid kits, spill response materials, confined space rescue equipment, and high angle rescue equipment will all be readily available and maintained throughout the lifespan of the Project.

The ERP is considered a living document and will be updated to reflect changes to emergency response best practices and potential future revisions to Project design. The ERP will be made available to all North Atlantic personnel and Project visitors, if requested. Should the ERP be revised, the updated ERP will be circulated to all relevant and interested parties.

4.3.2 Incident Scenarios

Potential accidents and malfunctions identified are presented in Table 4.3.2-1, below. It is anticipated that the likelihood of a major accident or malfunction occurring is low, given proposed risk mitigation and management activities. Risk mitigation and management is an ongoing process, which allows for regular success assessments and refinement of practices. While the below accidents and malfunctions are considered to have the highest risk of occurring, additional scenarios beyond those presented may occur.

Table 4.3.2-1 Summary of Potential Accidents and Malfunctions.

Accident or Malfunction	Description of Scenario	Potential Adverse Effects
Accidental spills and releases of hydrogen, toluene, MCH and other hazardous materials	Hydrogen and/or toluene could be released during any phase following the introduction of chemicals to the Project in the Construction Phase. Release scenarios may arise due to ruptures, damage, or leaks to storage, transportation, or processing infrastructure. Risks associated with hydrogen and toluene will be	Hydrogen and toluene are both flammable, and a release of either introduces an increased risk of fire or explosion. Toluene is additionally toxic if inhaled in high enough concentrations. Depending on the volume, location, and material release, a

Accident or Malfunction	Description of Scenario	Potential Adverse Effects
	contained to the electrolysis plant facilities, in Come By Chance. Hazardous material spills and releases can occur at any point during the Project lifespan and are most commonly associated with the use of hydrocarbons (equipment maintenance, refuelling, heavy equipment operation). Releases of other hazardous materials may be associated with mishandling and improper storage procedures.	hazardous material release may contaminate terrestrial and aquatic environments, resulting in the potential consumption and intake of contaminants by wildlife. Common risks to human health resultant of spills include effects to respiratory health, and skin and eye damage.
Flaring/venting of hydrogen and other gases	Disposal of waste gasses and relief of pressurized systems through safe release flaring and venting will occur through the O&M Phase of the Project. Hydrogen will be vented in the event of an emergency and/or for maintenance.	Venting of pressurized gasses may result in the dispersion of odours, and potential reduction of local air quality.
Traffic incidents	Traffic incidents may occur during all Project phases which utilize vehicles and heavy equipment, with potential for injury to personnel, wildlife, and damage to infrastructure.	Traffic incident consequences are variable depending on vehicle and road conditions. High consequence results of a vehicle incident would include human and wildlife injury, and the introduction of hazardous material to the surrounding environment.
Fires and explosions (other than from hydrogen)	Fires and explosions may occur during all Project phases. Accidental ignition events may result from chemical mismanagement, vehicle and heavy equipment malfunctions, and the flaring or venting of gasses.	Accidental ignitions may threaten human and wildlife injuries or fatalities, and in the event a fire is not contained, may spread beyond the bounds of the PA.
Dislodging of a wind tower or wind turbine blade	Wind turbine failure may occur during all Project phases following initiation of wind turbine construction. The likelihood of incident is highest during Construction and Decommissioning and Rehabilitation Phases due to the introduction of hazards associated with heavy equipment usage.	The failure or dislodgement of wind turbine components could harm personnel, wildlife, and infrastructure within the hazard setback buffer.
Ice throw	Ice throw and ice fall may occur at the Project during any phase following the construction of wind turbines, given that environmental conditions for ice accumulations are met. Wind turbine blades and other components may be subject to meteorological conditions that result in, the accumulation of ice mass that can increase vibrations from blade imbalance, and alter blade aerodynamic properties resulting in reduced power conversion efficiency. Accumulated ice can break or melt off the blades and structure, resulting in ice throw or ice fall.	People, animals and property could be damaged from ice throw within the hazard zone. While the hazard potential includes serious injury and fatality, this has not been documented at any wind farms.

Accident or Malfunction	Description of Scenario	Potential Adverse Effects
Occupational hazards and human injuries	A variety of skills and work tasks are associated with the Project. Consequently, an array of occupational hazards will be present to personnel throughout all Project phases. A focus of project management will be on accident avoidance and prevention.	Workplace injuries can range from minor to severe and result in incapacitation over a range of timeframes.
Failure of industrial water supply	Failure of industrial water supply to meet processing quality resulting in the shut-down of the electrolyzers until the issue can be rectified. Mechanisms of water supply failure may include unavailability of water due to a spill, algal bloom, or water quality degradation (e.g., altered pH).	Adverse effects of an industrial water supply failure would likely be limited to the temporary shutdown of Project operations, with limited effects on the surrounding environment or personnel.
Wildlife emergencies/incidents	Wildlife interactions may increase throughout the lifespan of the Project as local wildlife become increasingly acclimatized to the Project presence. The Project is located within the habitat of a variety of animals, including several large mammal species.	Interactions between wildlife and Project personnel may lead to injury or death in extreme cases. Other effects include introduction of disease, and damage to Project infrastructure.

4.3.3 Risk and Risk Management

North Atlantic completed a Hazard Identification (HAZID) workshop in early 2025 to identify potential risks related to Project design. A Project hazard review was conducted for each failure scenario, which identified mitigation measures to reduce the associated risks.

The HAZID allowed for the identification and evaluation of both potential risks and mitigation measures prior to Project commencement. During the HAZID workshop, attendees examined proposed process systems, operational facilities, plan layouts, building locations, logistic hazards, and process equipment through the lens of structured risk criteria and subsequent risk ranking. The HAZID identification process allows for ensured regulatory compliance, and safety throughout the life of the Project. Results of the HAZID can be found in the HAZID Study Report (Appendix V1 and V2).

The following sections summarize the risk profile of the identified failure scenarios and presents a discussion of risk reduction measures.

4.3.3.1 Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials

Hydrogen has an elevated risk of ignition and combustibility compared to other fuels due to its flammability and minimal energy required to ignite. Therefore, it was assumed that in the event of a hydrogen release, a hydrogen fire will result. Hydrogen flames burn a pale blue which is difficult to detect by the unassisted eye during the daytime. Although hydrogen fires do not produce smoke themselves, burning of nearby combustible materials can result in smoke. Human health hazards related to hydrogen inhalation and contact may include dizziness or asphyxiation, respiratory system irritation, burns, and/or frostbite.

As with hydrogen, toluene and MCH are highly flammable. Toluene may be considered toxic if inhaled, ingested, or contacted with bare skin (Canadian Centre for Occupational Health and Safety [CCOHS], 2023). Health hazards related to vaporous toluene may include dizziness, headaches, anesthesia, and respiratory arrest. As a liquid, toluene can irritate eyes and cause drying of skin. If ingested, liquid toluene may cause coughing, gagging, distress, and increased risk of pulmonary edema. MCH has similar health hazards, with vapours being irritating to the eyes, mucous membrane, upper respiratory tract, and skin. MCH may have narcotic effects and can cause dermatitis.

Incidental spills and releases of hazardous material have varying effects, depending on the material released, the quantity, and the location of the release. For instance, diesel fuel and gasoline are toxic to aquatic life. A spill of either material proximal to a sensitive receiving environment could cause damage to fish communities and habitat. Personnel exposed to hydrocarbon releases may experience headaches, shortness of breath, dizziness, lung irritation, and a variety of other symptoms (D'Andrea & Reddy, 2014). In the absence of appropriate personal protective equipment (PPE), a release of cleaning agents could cause adverse effects to personnel's respiratory systems, cause skin or eye irritation, and corrode clothing.

Risk Reduction

The ERP details emergency shut-down procedures in the event of a hydrogen, toluene, or MCH fire. This includes measures to protect personnel, infrastructure, and the local environment. The Emergency Response Team (ERT) will be trained to respond to both material fires and chemical fires.

Flammable chemicals will be stored at a safe distance from any sources of heat or potential ignition. This will include rendering the areas adjacent to hydrogen, toluene, and MCH storage as smoking-free areas. Ultraviolet (UV), or infrared (IR) flame detectors will be installed along hydrogen transfer areas to assist with identifying potential chemical fires. Additionally, North Atlantic will install auto-isolating valves on any MCH and toluene storage tanks, so as to reduce the likelihood of a release occurring. Liquid toluene and MCH storage infrastructure will be designed to direct release drainage to a retention facility to prevent uncontrolled pooling and potential pool fires, allowing for further release response measures to be conducted in a controlled environment. Due to the proximity of the road network to the electrolysis plant facilities, the pressurized hydrogen equipment will have vehicle impact protection implemented to mitigate the risks of collisions. Hydrogen transfer pipelines located beneath roads will be manufactured with materials which can withstand the weight of vehicles, and hydrogen gas detection will be implemented in areas of under-road pipeline crossings, to detect the presence of hydrogen leaks or cracks in the pipeline prior to risk of ignition. To allow for regular inspection of pipeline conditions, underground pipelines will be placed in a culvert at intersections with roadways. During the MCH dehydrogenation process, a closed drain system will be installed for any hazardous or volatile materials, and any pumps which process hazardous or volatile materials will be equipped with double mechanical seals or tandem seals with barrier fluid systems.

Both input toluene and output MCH will be stored on the NARL Logistics Terminal. As a method of reducing the quantity of hazardous materials present at the Project, MCH product will be shipped monthly. Volumes of all stored hazardous materials will be minimized to the extent possible to lessen the likelihood and consequences of a hazardous release.

In the event of a liquid MCH/toluene spill, non-flammable absorbent material will be available on-site. This may include dry sand, earth, or vermiculite. Contaminated absorbent material will then be stored in chemical waste containers for further disposal.

All Project infrastructure related to hydrogen, toluene, and MCH will be inspected on a routine basis by plant personnel.

Storage and handling of hazardous materials will be based on best practices outlined in the applicable Material Safety Data Sheets (MSDS). The MSDS of all hazardous materials present on site will be readily available at the Project for personnel review as needed. Emergency washing facilities will be installed in working areas of the Project where risk of eye or skin exposure to harmful or corrosive material or other material that may burn or irritate is possible. Personnel who handle hazardous material will be provided with hazard-specific PPE, such as chemical-resistant gloves or respirators.

Preventative spill and release measures will be introduced to reduce the potential for a consequential hazardous material spill. These measures may include, but are not limited to:

- Mandatory health and safety orientation for all Project personnel and visitors prior to commencing work. Where applicable, training will be provided to personnel on storage and handling of task-specific hazardous materials.
- Designating areas of site maintenance, vehicle maintenance, and vehicle refuelling which are 30 m or more from sensitive environments (i.e., wetlands and watercourses).
- Ensuring spill response materials are readily available and regularly stocked in ‘spill kits’ placed strategically throughout the PA. Spill kits may include absorbent pads, spill booms and, bagged sand.
- Assigning designated storage areas for hazardous materials, with materials being stored in secondary containment where applicable.

- Enforcing a robust spill reporting and clean up protocol, which will include details regarding contaminated material disposal.

The ERP includes details on responding to spills and releases of varying volumes. Spills or releases to air, land, or water are addressed further in the ERP. While all employees will be trained on basic spill response procedures, an ERT will be trained in depth on responding to large spills which have potential to impair human, animal, and environmental health.

The installation of UV and IR flame detectors, coupled with auto-isolating valves on MCH and toluene tanks, will reduce the likelihood of a release to low probability. While the likelihood of a release will be reduced with the implementation of the above measures, the severity of consequence remains high.

The application of preventative and mitigation measures for the array of other hazardous materials as described in the ERP, provides assurance that both the likelihood of occurrence and subsequent consequences of a potential spill or release will be low.

4.3.3.2 Flaring/Venting of Hydrogen and other Gasses

Flaring and venting act as mitigation measures to avoid or reduce the consequences of other unplanned fire or explosive events. Therefore, the likelihood of flaring or venting occurring is directly tied to the probability of an unplanned event.

The risks associated with flaring and venting are variable depending on the material being dispensed. At low gaseous concentrations, there may be a resultant odour and a short-term reduction in air quality. Should the flare mechanism fail, there is potential for typically flared off gasses to be released as a toxic, flammable gas cloud. In the unplanned event of a toluene, MCH, or hydrogen vapour release, ignition of vapours could result in a vapour cloud explosion.

The composition of flared off-gasses is predicted to be composed of predominantly methane, MCH, and hydrogen, with lesser amounts of n-hexane, methyl cyclopentane, n-heptane, dimethyl cyclopentane, methyl cyclohexane, ethyl cyclopentance, and dimethyl cyclohexane. Venting of hydrogen and oxygen will occur at the HGP.

Risk Reduction

An ambient air quality station will be installed at the Project to continuously evaluate and monitor the air quality local to the Project. An AQM program will be implemented in conformance with the requirements of the NL DECC.

Venting outputs will be routed to safe locations, away from high personnel traffic areas, to allow for rapid dispersion and dilution.

Flare units will be equipped to manage unplanned events such as power outages and system failures. For flaring and venting to remain controlled, flare units will continuously measure emission volumes and concentrations. Flare locations will be selected at a safe distance from venting to avoid the possibility of high wind directing flare to vented gaseous releases. Both flaring and venting units will undergo routine inspections and maintenance.

The ERT and environmental coordinator will be notified of all flaring and venting activity, to allow for increased hazard monitoring, supplementing the flare unit emissions measurements. Should there be an uncontrolled release, neighbouring facilities and businesses will be alerted.

Since flaring and venting are associated with unplanned events, their likelihood of occurrence has conservatively been assessed as moderate. The consequence severity has been assessed as low, given the implementation of the above mitigation measures.

4.3.3.3 Traffic Incidents

The likelihood of a traffic accident occurring is directly related to the volume and speed of vehicles operating at the Project. While vehicles will be used during all phases of the Project, traffic is anticipated to be increased during the Construction and Decommissioning and Rehabilitation Phases. The public will be permitted to utilize new Wind Farm access roads, except for brief periods during all phases of the Project when there is an elevated risk to health and safety. These periods of public access restriction will be most common during the Construction Phase. Regarding terminal facility access, the access road to the facility is public, while the HGP and HP will be located within the limits of the NARL Logistics Terminal and Braya security area and will therefore have limited public access.

Activities which will require vehicle use include passenger vehicles transporting personnel and materials throughout the PA, heavy equipment movement, and transportation between the PA, various local ports, and substations.

Conditions which may additionally influence the likelihood of a traffic accident occurring include:

- Changing road conditions due to environmental factors (i.e., reduced visibility due to heavy precipitation or dust, ice coverage).
- Changing road conditions due to structural factors (i.e., frequency of road maintenance activities, loose gravel, potholes).
- Operator error (i.e., fatigue, new driver, inattention due to distractions).

- Mechanical failure (i.e., vehicle breakdown).

The consequences of a vehicle traffic accident may be amplified with increased speeds.

Risk Reduction

A Traffic Management Plan will be developed to ensure both reduced disruption to local commuters on public roads, and to reduce the likelihood of a traffic incident occurring. The below incident mitigation measures will be detailed further in the Traffic Management Plan:

North Atlantic will maintain reduced speed limits within the PA, with speed limits variable depending on terrain and infrastructure.

In areas of increased risk or reduced visibility, access will be restricted to personnel with permitted access.

A staffed office will be constructed at the intersection of the Wind Farm access road, with the access road being publicly accessible through the majority of the Project lifespan. During periods of increased risk (i.e., during windfarm construction), the access road may be closed to the public.

Structural roadway designs will enhance mitigation measures, with road widths accommodating multiple vehicle types depending on road usage, reduced road slope grades where possible. Following the construction of wind turbines, safety berms may be constructed in areas where there are increased risk vehicles leaving the roadway.

Vehicle Inspection Sheets will be completed by personnel prior to operating any Project vehicle to identify any maintenance or safety issues

Project vehicles will be maintained regularly and equipped to manage seasonal changes.

Transportation of large wind turbine components will be conducted in accordance with the NL **Highway Traffic Act**, which may include applying for an Overweight and Over Dimensional Special Permit. Transportation may be conducted during reduced traffic hours (i.e., overnight).

Project personnel who are involved in vehicular incidents and found to be at fault or in error will attend a Defensive Driving Course, and may not be permitted to operate a vehicle for a period of time.

Operations of all vehicles at the Project will align with the NL **Highway Traffic Act**.

The likelihood of a traffic accident occurring is variable depending on the volume and speed of vehicles operating at the Project. By implementing a stringent Traffic Management Plan and enforcing speed limits throughout the PA, the severity of a traffic incident at the PA can be reduced to having low consequences.

4.3.3.4 Fires and Explosions

A hydrogen release or toluene/MCH release would pose the highest potential for fire or explosion risk at the Project, and is discussed in Section 4.3.3.1, above. This section refers to accidental fires and explosions which are not resultant of a potential hydrogen, toluene, or MCH release. Accidental fires and explosions may also occur as a result of Project activities, during all phases of the Project.

Sources of fire due to Project activities may include hot work, dry conditions, improper cigarette disposal, overheated equipment and vehicles, and failure of fuel storage facilities. Fires originating from fuel storage facilities pose the greatest risk of explosion. Electrical fires may also ignite within the confines of wind turbines.

Risks associated with fires and explosions include effects on human and animal health and safety, destruction of vegetation and habitat, reduction of air quality, and/or damage to infrastructure. Should a fire not be contained, there is a risk of damage extending beyond the PA.

Risk Reduction

Project infrastructure will be constructed in alignment with the Newfoundland **Fire Protection Services Act** and the *National Fire Code of Canada* (Canadian Commission on Building and Fire Codes, 2020). The ERP will detail fire prevention, mitigation, and response measures. These measures may include, but are not limited to:

- Fire forecast risk monitoring;
- Posted disposal measures in highly visible areas for flammable materials, including cigarettes.
- Designated smoking areas;
- Installation of fire detection and protection systems in high-risk areas, such as fuel and hazardous material storage, and hydrogen transfer pipelines;
- Ongoing storage and maintenance of fire response equipment on site, including heavy equipment (e.g., fire trucks), fire extinguishers, and PPE;
- Site orientation to include fire prevention measures, and personnel roles and responsibilities during fire events; and
- Ongoing training of the ERT to ensure fire response capabilities are up to date.

A Jetty Regulations and Information booklet will be provided to the captains of all vessels upon arrival, which will include information related to fire prevention and response. Vessel captains will be required to sign for receipt and agreement with the information provided in the booklet.

All technicians working on wind turbines will carry an automated external defibrillator and self-rescue gear, including a safety harness and self-rescue rappelling device. All nacelles will be equipped with fire extinguishers and external ladders. Should nacelle exits be inaccessible due to fire presence, the safety harness and rappelling device will be used to rappel from the roof of the nacelle. Response to wind turbine fires is discussed further in the ERP.

The likelihood of a fire or explosion occurring is considered moderate due to the variety of potential ignition sources throughout the Project Construction and O&M Phases. With the implementation of thorough emergency preparedness and response procedures, the severity of a fire or explosion at the PA can be reduced to having low consequences.

4.3.3.5 Dislodging of a Wind Tower or Turbine Blade

The primary failure mechanisms of wind turbines can be broadly classified into mechanical, electrical, and environmental causes. Mechanical failures may include fatigue, erosion, and material defects to wind turbine components such as rotor blades, bearings, the gearbox, and the main shaft. Wind turbine electrical components include generators, converters, and control systems, all of which may experience failures resultant of insulation degradation, thermal stresses, and electrical transients. Environmental factors such as severe weather events, lightening strikes, extreme temperatures, humidity and corrosion may additionally contribute to potential wind turbine failure (Thomas, 2024).

Mechanical failures may lead to blade detachment and structural collapse. Continuous mechanical stress to wind turbine components may weaken critical connection points.

The potential for dislodgement of a wind turbine tower or blade is highest during the Construction and Decommissioning and Rehabilitation Phases, due to the introduction of hazards associated with using tower cranes and other heavy lifting equipment.

Risk Reduction

Prior to the Construction Phase commencing, meteorological towers were installed at the Project to collect baseline data regarding wind speed and direction, temperatures, and atmospheric pressure. The baseline weather data was coupled with baseline geotechnical surveys which identified areas of suitable wind turbine base installation. Suitable wind turbine base location was based on avoiding areas of increased erosion potential and slope instability.

Wind turbines were micro-sited based on hazard setback distances. Setback distances were determined based on the potential throw distance of wind turbine components in the unlikely event of dislodgement or collapse. Project personnel will be cautioned to reduce the amount of time spent within the hazard setback distance.

Routine inspections of wind turbine components allow for early identification of fatigue and erosion. Scheduled preventative maintenance, including the replacement of high-stress components, will be conducted on a regular basis. Detailed records of maintenance inspections and activities will be retained at the O&M Building.

Weather forecasts will be monitored on a regular basis, to determine if wind turbine operations should be reduced due to severe storm events. As a supplement to weather forecasts, wind levels will be monitored by use of the existing meteorological stations.

Should a wind turbine or wind turbine component experience a dislodgement or structural collapse, the wind turbine will be isolated and de-energized. Access to the damaged wind turbine will be restricted to exclusively authorized personnel. All appropriate stakeholders and local authorities will be notified of the incident. Depending on the severity of the incident, following wind turbine isolation and access restriction, repair or removal measures will commence. Given the significant size and weight of wind turbine components, repairs and removals will likely need to be conducted with the assistance of cranes.

Based on the low degree of wind tower and/or blade dislodgements occurring in the industry, the probability of a failure scenario occurring is considered low. The severity of the consequences to health and safety would be confined to the hazard setback distance around the wind turbine and is therefore also assessed as low.

4.3.3.6 Ice Throw

Ice throw is the phenomenon by which accumulated ice on wind turbine blades is projected from the wind turbine during operations. If ice detaches from the wind turbine while the blades are immobile, it is instead referred to as ice fall. Ice accretion is reliant on two principal factors occurring: air temperatures between the range of 3°C and -20°C, and the wind turbine being situated within a cloud or precipitation event (Canadian Renewable Energy Association (CanREA), 2020).

Ice fall is not limited to stationary wind turbines; any iced structure on the Wind Farm can also be a source of falling ice.

The highest severity hazards associated with ice throw and fall include:

- Serious injury or fatality to unprotected personnel within the vicinity of the ice throw zone during periods of rotor icing;
- Serious injury or fatality to wildlife within the vicinity of the ice throw zone during periods of rotor icing;
- Damage to property and infrastructure within the ice throw zone during periods of rotor icing, including damage to vehicles, equipment, electrical or other infrastructure, and buildings; and
- During icing periods, wind turbine operations will be paused, therefore disrupting the supply of electricity to the HGP. The formation of ice throw and assessment of potential throw distance is discussed further in the Ice Throw Hazard Analysis (Appendix L).

Risk Reduction

The risk of injury or fatality due to ice throw strikes will be reduced by application of the following mitigation measures:

- Issuance of ice watch notifications when ice fall conditions are present, notifying personnel to avoid areas where ice fall is a risk;
- Shutdown of wind turbines during rotor icing periods;
- Installation of ice protection devices, such as covered entrances to wind turbine base access points thereby enabling personnel to step from the protection of their vehicle directly to the protection of covered entrances; and
- Utilization of anti and de-icing technologies, such as heaters for wind turbine blades.

While the potential effect of ice throw on persons is at the highest consequence rating (serious injury or fatality), in the history of wind farm operations in cold climates, there has never been a single recorded incident of injury or fatality from a strike of falling or thrown ice. While the likelihood of occurrence is very low at the outer areas of the maximum ice throw zone, the area directly under a wind turbine, or any iced structure should be considered as medium (CanREA, 2020).

Given the climate in which the Project is located, the likelihood of ice throw occurring through the O&M Phase is moderate. Through implementation of CanREA guidance, coupled with the results of the Ice Throw Hazard Analysis (Appendix L), the consequence severity can be reduced from moderate to low.

4.3.3.7 Occupational Hazards and Human Injuries

Workers may be exposed to occupational hazards and injuries during all phases of the Project. In the NL construction industry, the highest reported injuries resulting in lost-time between 2017 and 2021 were sprains, strains, tears, fractures, back pain, and cuts and lacerations (WorkplaceNL, 2022).

Risk Reduction

All Project activities will be conducted in alignment with the duties of employers and employees outlined in the NL **Occupational Health and Safety Act**. Generally, this includes but is not limited to:

- Establishing an Occupational Health and Safety (OHS) program, which will be posted in a prominent location at the Project;
- Ensuring the workplace, necessary equipment, systems, and tools, are safe and do not risk the health of employees;
- Providing necessary training, instruction, and supervision;
- Ensuring that all employees are familiar with potential workplace health and safety hazards; and
- Employees taking reasonable care to protect their own health and safety, as well as the health and safety of those around them.

North Atlantic will implement additional measures, including:

- Mandatory health and safety orientation for all Project personnel and visitors prior to commencing work;
- Mandatory task-based PPE;
- Daily health and safety meetings (referred to as 'Tailgates') to identify potential health and safety risks; and
- Signage of safety and hazard awareness in high-traffic and high-risk areas.

During medical events, North Atlantic will have 24/7 access to the Braya Health Centre which is staffed during the day Monday through Friday with an industrial nurse. Should medical care be required during evenings and weekends, the Braya Medical Centre is further staffed by technicians with advanced first aid training.

Injuries may range from minor to severe (requiring medical intervention and time off work). With the implementation of the ERP and an OHS program, both the likelihood and severity of occupational hazards and injuries are anticipated to be low.

4.3.3.8 Failure of Industrial Water Supply

The electrolysis process of extracting hydrogen is reliant on the availability of freshwater. A failure or loss of the industrial water supply would result in the temporary shutdown of hydrogen production until the water supply can be restored. During shutdown, the source of the failure will be identified and corrected. The Project will not return to full operation until the failure has been rectified.

Should the water failure be resultant of a leak or infrastructure damage, there is potential that the failure would also have affected hydrogen conveyance infrastructure, therefore introducing the possibility for a simultaneous hydrogen release.

Failure of water management infrastructure, such as pipeline leaks, dam breaks, and culvert failure, may result in the loss of process water supply or an unplanned release to the surrounding environment. As above, depending on the volume of process water supply released, a temporary shutdown of hydrogen production would occur. As with an accidental spill, the consequence severity of an unplanned release of process water is dependent on the location and volume of the release. Should a high volume of water be released, localized flooding may occur, presenting a risk of infrastructure damage, erosion, and electrocution should electrical equipment be nearby.

Risk Reduction

A reserve of emergency fire response water will be stored separately from the electrolysis processing facility, therefore maintaining emergency response capability regardless of incidents occurring to process water supply.

Water supply is based on the existing Inkster's Pond Industrial Water Supply Area (licensed under WUL-14-057 for Braya). To date, there have not been reductions in supply availability within this water licence. However, North Atlantic will apply for a new water use licence from the NL DECC. Water storage and transportation infrastructure will be inspected regularly to detect and avoid potential failures. Daily monitoring will confirm the available quantity of process water. The ERP details response protocol in the event of flooding, which includes evacuation measures and direction regarding the management of electrical equipment and hazardous materials proximal to the release. Releases to air, land, or water are addressed in the Environmental Emergency Plan.

While the consequence severity of an industrial water failure would be high with respect to Project operations, the effects to human health and the surrounding environment would be minimal. The likelihood of an industrial water failure is considered low given the availability of water supply.

4.3.3.9 Wildlife Emergencies/Incidents

While wild animals typically avoid interaction with humans, they can become tolerant over long-term exposure and more readily approach humans and infrastructure. At the highest severity, risks associated with wildlife encounters can include attacks, transfer of disease, and damage to infrastructure. With the implementation of preventative and cautionary measures, the likelihood of wildlife interactions can be minimized.

Risk Reduction

Attraction of wildlife to the Project will be reduced by storing all edible garbage and food waste either indoors, or in secure waste disposal bins. Signage will be posted throughout the Project indicating appropriate waste disposal actions. While some animals may become comfortable enough around humans to 'beg' for food, personnel will be strictly forbidden from both approaching and feeding wildlife. Should large or potentially dangerous wildlife enter the PA, deterrents such as air horns, bear spray, and flashing lights will be readily available to encourage the wildlife to vacate the area. Should evidence of animal activity be identified (i.e., tracks, scat, claw marks, burrowing), the environmental coordinator will be notified and escalate the observation to the ERT as needed. All wildlife sightings and interactions will be documented.

In the event of an animal encounter, responsive actions will prioritize personnel safety. All efforts will be made to reduce effects to wildlife during deterrent measures, once personnel safety has been established.

Following the implementation of the above mitigation and response measures, the likelihood of a hazardous interaction with wildlife is considered low, while the consequences could range from low to moderate depending on the species.

4.4 Effects of the Environment on the Project

This section describes the effects of the environment on the Project throughout the Project's lifespan. This will help distinguish the effects from natural processes and the environment. The main environmental considerations that will be discussed are as follows:

- Weather and Climate Change;
- Algal Bloom;
- Geographical Hazards; and
- Forest Fires.

4.4.1 Weather and Climate Change

Harsh weather conditions and climate change can pose risks to Project infrastructure and equipment. These conditions include extreme snowfall, freezing rain, storms, and hurricanes. The baseline description of weather and climate change is detailed in Section 3.1.1. Further, weather and climactic conditions (e.g. average and extreme temperatures and wind speeds) are inputs to the Basis of Design of the Pre-FEED engineering design studies (Hatch, 2024 and Hatch 2025). Each interaction will be considered for each phase of the Project. All equipment sourced for the Project will be designed to operate at baseline weather conditions. For example, the wind turbine being considered for the Project has an operating temperature range between -20°C and 45°C (with provision for a -30°C minimum operating temperature based on inclusion of a cold weather operating package).

4.4.1.1 Temperature

Daily average temperatures in the PA (represented by Dunville / Argentia), as outlined in Section 3.1.1, ranged from -2.3 to 16.4 degrees Celsius (°C), with the lowest average temperatures occurring in February and the highest in August (Government of Canada, 2024a). It is expected with climate change that temperature increases (2.2 °C to 5.3 °C) will occur in Dunville / Argentia over the next century. The predicted increase in temperature will cause precipitation to trend towards rain rather than snow with fewer days below freezing, particularly in the spring and fall.

Although temperature changes alone are not likely to have severe effects on the Project, extreme weather hazards caused by temperature changes could affect the Project during the O&M Phase. These weather events include storms, significant weather events, and seasonal fluctuation (e.g., rapid freeze and thaw conditions in winter). Hotter and drier conditions can lead to droughts and wildfires. Fluctuating temperatures in the winter months can cause road washouts, leading to temporary limited access to Project facilities. As a result of ocean temperatures rise globally, there will be an increase frequency of storm events (e.g., hurricanes) and potential longer and stronger periods of landfall. Storms are further discussed below in section 4.4.1.3.

4.4.1.2 Precipitation

With climate change, there are projected increases in precipitation event intensity along the south coast of Newfoundland; the PA may see changes in precipitation intensity in the winter, spring, and fall. Projected changes in maximum 3-day, 5-day, and 10-day precipitation, as well as the 90th percentile of precipitation events, follow regional patterns like those described for mean precipitation intensity. Hazardous events typically occur over several days, during which time reservoirs, soil moisture capacity, and waterbodies reach capacity, eventually resulting in overflow and potential flooding. Given the nature of the topography in the PA and the local siting of Wind Farm, any potential overflow from local ponds will have minimal effect on the Project.

Flooding, erosion, and road washouts can be caused by extreme precipitation events along with consequential surface water runoff. This in turn, can cause roads to become unusable, limiting access to Project infrastructure. Consequently, this can cause delays in transportation of important materials for components, including, materials and supplies, products to market, and the workforce to and from the Project.

The low flow period within the PA generally occurs in summer to early fall, as outlined in the Surface Water Study (Appendix C). The study confirmed sufficient water availability for the Project with considerations for seasonal variability.

4.4.1.3 Snowfall, Freezing Rain, and Storms

The Project design considered winter weather including snowfall, freezing rain, and storms. Due to climate change, it is predicted that there will be fewer but heavier snowstorms and more frequent and heavier occurrences of rain during the winter season.

Accumulation of snowfall may strain utility systems (transmission lines, electricity grid connection) and structures, creating the risk of structural issues or failures. The loss of electrical power would disrupt production.

Freezing rain may result in the accumulation of ice on surfaces, increasing the risk of damage to utility systems, equipment and infrastructure. Accumulation of ice on wind turbines increases the risk of ice throw. Ice may build up on wind turbines during inactive periods. When the turbines become active, the potential for ice throw emerges, where chunks of accumulated ice may be thrown from the rotating blades.

Storms may result in flooding, damage to structures, and compromise the integrity of equipment. Storms may cause shipping delays in the receipt of materials for construction (i.e., wind turbine components, plant components). The occurrence of extreme winds necessitates a safeguard mechanism for wind turbines. A protective protocol engages the rotor to stop moving when the 10-minute average wind speeds surpass 25 m/s. The design of the wind turbine foundations (gravity and rock-anchored) will take into consideration the likelihood of high winds. As mitigation for the risk of ice throw, all Project wind turbines will be outfitted with de-icing technology and icing protocols will be implemented throughout operations of the Project.

In addition, snowfall, freezing rain and storms may also impair road conditions, creating unsafe driving conditions for workers, resulting in Project delays or temporary disruption to production.

4.4.1.4 Sea Level and Ice

Rising sea levels associated with climate change have the potential to result in adverse effects. Coastal sea levels in Come By Chance and Sunnyside are projected to rise, as outlined in Section 3.1.2, by 40 cm by 2049 and up to 90 cm by 2099. These projections are shaped by minimal crustal rebound in the region, which provides little offset to rising sea levels. As a result, areas such as Come By Chance and Sunnyside have a heightened vulnerability to the effects of sea-level rise, including more frequent and severe flooding, increased coastal erosion, and greater risks to infrastructure and ecosystems. Changes in water depth may disrupt or alter shipping routes which are vital for transportation. Coastal areas are susceptible to erosion and submersion of low-lying areas. Areas of the PA situated along shorelines become more exposed to the forces of waves and storm surges. Consequently, the heightened exposure increases the likelihood of erosion and flooding, bringing additional risks to the Project.

Alternatively, a reduction in sea ice increases the opportunities for shipping, tourism, resource exploration, and industrial activities, that may benefit the Project.

4.4.1.5 Wind

The maximum hourly wind speeds in Placentia Bay were recorded at 99 to 108 km/hr during the spring, 90 to 99 km/hr during the summer, 108 to 117 km/hr during the fall and 90 to 99 km/hr during the winter. The prevailing wind direction was westerly in the fall and winter and southwesterly in the spring and summer, although winds occur from all directions throughout the year.

Extreme wind conditions may cause damage to the wind turbines depending on the cut-in and cut-off speed. Wind thresholds are established to protect the wind turbine blades and the wind turbines themselves. Therefore, increased sustained winds above 90 km/hr will lead to the increased precautionary temporary shut down of wind turbines. Further, the Canadian Building Code and the associated maximum wind speed, will be utilized as the design conditions for a wind turbine structural components. In addition, extreme wind conditions can also cause damage to infrastructure. As climate changes and storms increase in frequency and intensity, spanning a couple days or more, this may lead to reduced energy production and supply to the HGP.

4.4.2 Algal Bloom

The Project proposes to utilize the existing Inkster's Pond Industrial Water Supply Area (licensed under WUL-14-057 for Braya). This pond may be susceptible to algal blooms which could degrade water quality and require additional treatment for the operation of the HGP. In addition, algal blooms may clog intake systems or filtration equipment, potentially leading to operational interruptions.

Regular inspection and maintenance will occur associated with the water intake structure at Inkster's Pond so that algal blooms can be detected and managed accordingly. Therefore, it is anticipated that algal blooms are not expected to have an environmental effect on the Project.

4.4.3 Geological Hazards

A review of topographic, surficial and bedrock mapping, and publicly available information was undertaken to understand the possible geological hazards within the PA. Further information regarding the surficial and bedrock geology of the LAA is provided in Section 3.1.3.3.6.

4.4.3.1 Terrain Stability

Based on the review of satellite imagery, there is no indication of any type of large-scale landslides, rockfalls or slope instability within the PA. The coastline sections of the PA may experience energetic erosional events from storm surges; however these conditions have little to minimal effects on the Project due to the location of infrastructure. The PA is mainly covered by vegetation and wetlands, which also assists in adding to the stability of the coastal edges and interior areas.

4.4.3.2 Seismic Activity

Seismic hazard relates to the probability of damaging ground motions caused by earthquakes occurring in an area. The Natural Resources Canada Earthquake Database is an interactive tool that allows users to search and filter seismic activity records based on customizable criteria (NRCan, 2025). According to the search results of the Earthquake Database, there was a total of 37 earthquakes documented within a 250 km radius of Come By Chance from 1985 to 2023: 26 earthquakes of magnitude 2.0 or greater and 11 earthquakes of magnitude 3.0 or higher. Although no seismic events have been reported within the PA (NRCan, 2025), the nearest recorded activity occurred in 2024, approximately 50 km from the PA and 9 km from Bay Roberts, with a magnitude of 2.2. Earthquakes are considered rare in NL (NLJPS, n.d.).

Unlike regions along tectonic plate boundaries, such as British Columbia where the rate and size of seismic activity is directly correlated with plate interaction, eastern Canada is part of the stable interior of the North American Plate. In intraplate regions such as the island of Newfoundland, seismic activity appears to be related to the regional stress fields, with the earthquakes concentrated in regions of crustal weakness (Natural Resources Canada, 2021). The Geological Survey of Canada prepares seismic hazard maps based on statistical analysis of previous earthquakes and information about tectonic and geological structures. The seismic hazard risk for the island of Newfoundland is low according to 2015 and 2020 seismic hazard maps of Canada, implying that the probability of major damage to buildings (which occur with seismic magnitudes greater then 3) within the region is less than 1% in 50 years (NRCan, 2021).

Based on the available data and seismic history of the region, the likelihood of a seismic event occurring in the PA that could damage or interrupt Project operations is low. This assessment reflects both the region's minimal seismic activity risk and the implementation of the nationally recognized design standards. Project infrastructure will be designed and constructed to withstand potential seismic events and as recommended by the National Building Code of Canada (National Research Council of Canada, 2015).

4.4.4 Forest Fires

Forest fires may result in delays in schedule, damage to Project infrastructure and loss in production during the O&M Phase. Electrical infrastructure including substations, transmission lines, and collector lines are vulnerable to damage, potentially resulting in power outages. Forest fires may also obstruct access roads and damage water crossings. In addition, forest fires may create health and safety risks to Project personnel from reduced visibility due to smoke and poor air quality.

As indicated in Section 3.1.1.2, projected changes to the maximum number of consecutive dry days as a result of climate change are minimal overall, with the exception of a significant decrease observed in the spring. The maximum number of consecutive dry days is projected to decrease by 13 over the next century during the spring season. This suggests a notable shift toward wetter conditions lowering the risk of forest fires. Project infrastructure will be designed and operated to reduce risk of damage from wildfire. Areas such as transmission rights-of-way and wind turbine pads will be maintained to ensure vegetation is controlled.

4.5 Mitigations

Mitigation measures to address the potential effects of the Project on each VC are outlined in the following sections. Measures included in monitoring and management plans, which support adaptive management, are also proposed, as described in Section 4.6. Other measures include project design mitigation (described according to VC throughout Section 4.5), standard environmental protection procedures and best management practices which North Atlantic has committed to uphold (Section 12), and contingency measures to manage potential accidents and malfunctions that could affect the environment (Section 4.3).

4.5.1 Atmospheric Environment

Standard mitigation and enhancement measures applicable to the Atmospheric Environment VC are provided by phase in Table 4.5-1. Project-specific plans (e.g., the Explosives and Blasting Management Plan) will also include mitigation measures that are applicable to this VC.

The Project as designed has incorporated mitigation measures to minimize potential effects on the atmospheric environment. Briefly, design considerations according to each KI include:

- A conservative setback distance of greater than 1,000 m was selected for siting wind turbines (i.e., minimum required distances between a wind turbine and dwellings) to reduce noise effects on nearby residents;
- Avoidance of conflicts with other land uses or users; and
- Operational equipment is selected with low noise options, where applicable.

Table 4.5-1 Atmospheric environment mitigation and enhancement measures.

Project Phase	Key Indicator	Interaction	Mitigation
Construction, Decommissioning and Rehabilitation	Air Quality	Project activities may result in air emissions which could temporarily diminish air quality.	• Where feasible, use mobile equipment with Tier 4 engines. • Maintain vehicles and equipment in good working order, ensuring that mufflers are functional. • Implement control measures such as road watering, application of approved chemical suppressants, or physical barriers, where appropriate, to reduce fugitive dust generation on exposed surfaces (e.g., unpaved roads, laydown areas, stockpiles), where applicable. • The blasting contractor will develop an Explosives and Blasting Management Plan, which will include design measures to reduce dust generation. • Implement and maintain speed limits and, where necessary, speed bumps to limit dust generation. • Idling will be limited to the extent practicable, and vehicles / equipment will be turned off when left for extended periods of time. • Stockpiles will be covered, where practicable, to reduce fugitive dust generation.
O&M	Air Quality	Project activities may result in air emissions which could temporarily diminish air quality.	• Where feasible, use mobile equipment with Tier 4 engines. • Maintain vehicles and equipment in good working order, ensuring that mufflers are functional. • Implement control measures such as road watering, application of approved chemical suppressants, or physical barriers, where appropriate, to reduce fugitive dust generation on exposed surfaces (e.g., unpaved roads, laydown areas, stockpiles). • Idling will be limited to the extent practicable, and vehicles / equipment will be

Project Phase	Key Indicator	Interaction	Mitigation
			turned off when left for extended periods of time. • Implement control measures such that emissions generated from flare stacks are reduced.
Construction, O&M, Decommissioning and Rehabilitation	GHGs	Project activities may increase atmospheric GHG levels.	• Where feasible, use mobile equipment with Tier 4 engines. • Maintain vehicles and equipment in good working order, ensuring that mufflers are functional. • Vehicles and equipment are to be turned off when left stationary for extended periods. The idling of engines will be avoided and / or minimized, wherever practicable.
Construction, Decommissioning and Rehabilitation	Light	Project lighting may contribute to increased ambient lighting levels and/or nuisance of sensitive receptors.	• Limit artificial lighting to what is necessary to maintain safety of site workers. • Where reasonable and feasible, construction should be carried out during standard daytime working hours. • Should nighttime work be required, lighting to be limited to what is necessary for safety and efficiency. • Use downward-facing lighting directed towards Project infrastructure, as practicable, to minimize disturbance to wildlife activity.
O&M	Light	Project lighting may contribute to increase ambient lighting levels and/or nuisance of sensitive receptors.	• Limit artificial lighting to what is necessary to maintain safety of site workers. • Install downward-facing lights on buildings, wind turbine bases and access roads. Where possible and permitted, equip downward-facing lighting with motion and heat sensors. • Set wind turbine and meteorological tower lighting levels to the minimum allowed by Transport Canada for aeronautical safety. • Use white or red strobe lights with the minimum allowable intensity and flashes per minute as required by Transport Canada.
Construction, Decommissioning and Rehabilitation	Noise	Project activities may contribute to increased noise levels.	• Develop and implement a Construction Noise and Vibration Monitoring Plan. • The blasting contractor will develop an Explosives and Blasting Management Plan, which will include design measures to reduce shock or instantaneous peak noise levels. • Incorporate blast design features (e.g., hole spacing, explosive charge weight, time delay) to meet required noise limits. • Where reasonable and feasible, construction should be carried out during standard daytime working hours. • Schedule high noise activities during normal working hours where feasible and

Project Phase	Key Indicator	Interaction	Mitigation
			practicable, and plan to complete such activities by 11:00 pm. • Where feasible and practicable, use low noise vehicle and equipment, and only the necessary sized and powered equipment for Project activities. • Shield sensitive receptors from noisy activities. • Enclose or shield stationary noise sources. • Maintain vehicles and equipment in good working order, ensuring that mufflers are functional.
O&M	Noise	Project activities may contribute to increased noise levels.	• Where feasible and practicable, schedule high noise activities during normal working hours, and plan to complete such activities by 11:00 pm. • Where feasible, use low noise vehicle and equipment, and only the necessary sized and powered equipment for Project activities. • Enclose or shield stationary noise sources. • Maintain vehicles and equipment in good working order, ensuring that mufflers are functional. • Maximize offset distance between the Wind Farm and nearby receptors and/or property lines, where practicable. • Maintain a minimum setback distance of greater than 1,000 m between the Wind Farm and sensitive receptors.
Construction, Decommissioning and Rehabilitation	Vibration	Project activities may increase vibration levels.	• When feasible and practicable, schedule activities during normal working hours, and plan to complete such activities by 11:00 pm. • Where feasible, use low noise vehicles and equipment, and only the necessary sized and powered equipment for Project activities.

4.5.2 Aquatic Environment

The Project design will incorporate mitigation measures to minimize potential effects on the aquatic environment, and these are provided by phase in Table 4.5-2. The following are generic mitigation measures that will be adopted for each KI and will be incorporated into the Project's Environmental Protection Plan (EPP):

- Wind turbines will be sited outside the nearby Center Cove River Protected Public Water Supply Area and its full drainage area, thereby avoiding public water supplies.

- Infrastructure will be sited on stable ground to minimize erosion and sedimentation risks, in accordance with a site geotechnical study (AllRock, 2025).
- A minimum buffer of 15 m will be established around the high-water mark of waterbodies to minimize ground and vegetation disturbance.
- Grubbed wood and stripped soil will be stored at least 50 m away from any watercourses, with erosion protection measures implemented until they are transported away for disposal.
- Required permits will be obtained for any work within 15 m of the high-water level. Work will occur during the low flow season where practical.
- Where watercourses must be temporarily diverted or isolated, clean water diversion, coffer dams, or similar will be used. Wastewater will be pumped to vegetated areas or settling basins for treatment.
- In-water works will be limited and aligned with DFO timing windows to protect sensitive fish life stages.
- Fish screens will be installed and regularly maintained at any instream water intakes to prevent fish entrainment.
- If fording is necessary, DFO’s Code of Practice for Temporary Fords will be followed.
- Culvert and bridge installation will follow provincial and federal standards, including DFO guidance on fish passage and sediment control.
- Watercourse crossings will be designed to maintain fish passage and convey high flows (e.g., 1:20-year event capacity).
- Heavy equipment will not operate directly in watercourses unless permitted to do instream work.
- Refueling and maintenance of equipment will occur a minimum of 30 m away from waterbodies.
- All equipment will be inspected for leaks and cleaned before use. Spill kits and fire extinguishers will be on site, and operators will be trained in their use.
- During instream works, turbidity monitoring and visual assessments will be conducted to monitor water quality. Post-construction, bank stability will be verified.
- Following construction or decommissioning, disturbed watercourses will be stabilized and restored as close as possible to natural conditions.
- Erosion and sediment control measures will be in place during and after watercourse crossing construction.
- The water withdrawal pipe or intake will be fitted with a screen to protect fish from impingement or entrainment. Measures will be taken to avoid pollution and to minimize disturbance of fish and fish habitat.

- Project construction and operation water consumption will not exceed the permitted annual volume specified in the Project's water use licences.
- Monitor fish populations for change in community structure, abundance/biomass, and growth.
- Monitor American eel and Atlantic salmon populations for change in abundance and biomass.
- Monitor fish habitat conditions.
- Ensure adherence to all applicable legislation and regulations governing the marine environment.
- Ensure compliance with DFO's **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada's Ballast Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships.
- Water quality at the marine outfall will be monitored to ensure compliance with applicable regulatory approvals and discharge criteria.
- A monitoring program will be undertaken to determine the presence and prevalence of aquatic invasive species.

Table 4.5-2 Aquatic Environment mitigation and enhancement measures.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
Construction	Groundwater Resources	• Possible entry of deleterious substances into the aquifers. • Possible alteration of groundwater flow patterns.	• Plan and schedule work over stable grounds. • Construct infrastructure foundations and temporary stockpiles over impermeable areas.
	Surface Water Resources	• Potential entry of deleterious substances into the surface water drainage system. This can result from clearing/grubbing vegetation, excavating/grading, installation of stream crossing structures, fording, and introduction of hydrocarbons (fuel, lubricants), solvents, and other deleterious substances, from construction equipment. • Potential changes in water quantity due to water withdrawal for construction. • Potential changes in drainage pattern due to clearing of areas for construction.	• Avoid public water supply areas and their watersheds to prevent changes in drinking water quality and quantity. • Schedule work during low flow period. • Construction diversion ditches to isolate work areas from watercourses. • Implement erosion control measures. • Maintain equipment in good working conditions to minimize leakage. • Monitor conditions before and after construction to ensure restoration of natural watercourses. • Monitor and document water withdrawal volumes during construction to ensure

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			compliance with authorized limits. • Fit the water intake with a screen to protect fish from impingement or entrainment. • Avoid pollution and minimize disturbance of fish and fish habitat.
	Freshwater Fish and Fish Habitat	• Potential change in fish habitat quantity from stream crossing structures or creation of barriers to movement and migration. • Potential change in fish habitat quality from runoff during road construction, installation of crossing structures, laydown areas, or fording. • Potential change in fish health and survival.	• Adhere to Environmental Protection Plan (EPP). • Adhere to DFO guidance documents, standard mitigation measures, and best management practices. • In-water work will be planned to respect DFO timing windows to protect fish in Newfoundland and Labrador. • If fording is required, follow DFO's temporary fording code of practice. • Ensure proper installation of road crossing structures. • Monitor fish populations for change in community structure, abundance/biomass, and growth.
	Marine Fish and Fish Habitat	• Transportation of resources and equipment may affect habitat quality. • Possible effects from release of heated effluent through the Braya Renewable's existing effluent disposal system	• Adhere to Environmental Protection Plan (EPP). • Adhere to DFO guidance documents, standard mitigation measures, and best management practices. • Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries. • Monitor effluent quality.
	Fisheries and Aquaculture	• Increase in transportation of resources and equipment may affect commercial and recreational fisheries. • Introduction of AIS may affect shellfish aquaculture. • Introduction of AIS could affect sensitive habitats supporting commercial fish species.	• Regular consultation with commercial and recreational fishers to ensure minimal disruption of fishing activity during shipping. • Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries. • Ensure compliance with DFO **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada Ballast

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships.
	Species at Risk	• Potential change in American eel and Atlantic salmon habitat quality from runoff during construction of roads. • Potential change in American eel and Atlantic salmon habitat health and survival.	• Adhere to Environmental Protection Plan (EPP). • Adhere to DFO guidance documents, standard mitigation measures, and best management practices. • In-water work will be planned to respect DFO timing windows to protect fish in Newfoundland and Labrador. • If fording is required, follow DFO's temporary ford code of practice. • Ensure proper installation of road crossing structures. • Monitor American eel and Atlantic salmon populations for change in abundance and biomass.
	Habitats of Conservation Concern	• Potential change in Habitats of Conservation Concern during Project Construction • Transportation of materials and equipment may affect habitats of conservation concern.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries.
	Marine Biosecurity	Introduction of aquatic invasive species from ballast water and hull fouling.	• Ensure compliance with DFO **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada's Ballast Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships.
Operation and Maintenance	Groundwater Resources	None.	• None.
	Surface Water Resources	Potential water quality impacts from ongoing vehicle use on access roads. Potential lowering of Willie Jarge and Barrisway Ponds water levels, and reduction of water quantity downstream due to water withdrawal.	• Maintain riparian vegetation buffers between watercourses and access roads. • Record actual water consumption for HGP and HP during Project operation to ensure extraction is within authorized limits. • Monitoring water quantity at the industrial water supply area to ensure adequate environmental flow.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
	Freshwater Fish and Fish Habitat	• Potential change in fish habitat quality from runoff during use of roads. • Potential change in fish health and survival.	• Site and access roads, including road crossing structures, will be maintained in good condition. • Monitor fish habitat quality. • Monitor fish populations for change in community structure, abundance/biomass, and growth.
	Marine Fish and Fish Habitat	• Transit of shipping vessels may affect habitat quality and cause auditory masking. • Potential water quality effects from effluent discharge.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries. • Ensure effluent and wastewater comply with applicable regulatory approvals and discharge criteria. • Develop a noise and vibration monitoring plan in consultation with FFA and local environmental non-governmental organizations.
	Fisheries and Aquaculture	• Vessel activity may result in temporary loss of access to fishing grounds. • Introduction of AIS may affect shellfish aquaculture. • Introduction of AIS may affect sensitive habitats supporting commercial fish species.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries. • Ensure compliance with DFO **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada Ballast Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships. • Implement an AIS monitoring plan.
	Species at Risk	• Potential change in American eel and Atlantic salmon habitat quality from runoff during use of roads. • Potential change in American eel and Atlantic salmon health and survival.	• Site and access roads will be maintained in good condition. • Monitor American eel and Atlantic salmon populations for change in abundance and biomass.
	Habitats of Conservation Concern	• Potential change in Habitats of Conservation Concern during Project Operations • Transportation of materials and equipment may affect habitats of conservation concern.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and DFO guidelines and regulations for fisheries.
	Marine Biosecurity	• Introduction of aquatic invasive species from ballast water and hull fouling.	• Ensure compliance with DFO **Fisheries Act** / Aquatic

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			Invasive Species Regulations, Transport Canada Ballast Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships. • Implement an AIS monitoring plan.
Decommissioning and Rehabilitation	Groundwater Resources	• Possible entry of deleterious substances into the aquifers. • Possible alteration of groundwater flow patterns.	• Conduct decommissioning work over stable grounds. • Dispose and store wastes over impermeable areas.
	Surface Water Resources	• Potential entry of deleterious substances into the surface water drainage system. This can result from removal of stream crossing structures, fording, rehabilitation works, and introduction of hydrocarbons (fuel, lubricants), solvents, and other deleterious substances due to equipment operations. • Potential changes in water quantity due to water withdrawal for decommission works. • Potential changes in drainage pattern during decommission works.	• Avoid public water supply areas and their watersheds to prevent changes in drinking water quality and quantity. • Schedule work during low flow period. • Construct diversion ditches to isolate work areas from watercourses. • Implement erosion control measures. • Maintain equipment in good working conditions to minimize leakage. • Monitor conditions before and after work to ensure restoration of natural watercourses.
	Freshwater Fish and Fish Habitat	• Potential change in fish habitat quality from runoff during use of roads. • Potential change in fish health and survival.	• Adhere to Environmental Protection Plan (EPP). • Adhere to DFO guidance documents, standard mitigation measures, and best management practices. • Limit any in-stream work.
	Marine Fish and Fish Habitat	• Transit of shipping vessels may affect habitat quality.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries.
	Fisheries and Aquaculture	• Transportation of materials and equipment may affect commercial and recreational fisheries. • Introduction of AIS may affect shellfish aquaculture. • Introduction of AIS may affect sensitive habitats supporting commercial species.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries. • Ensure compliance with DFO **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada Ballast Water Control and Management Regulations, and

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships. • Continue AIS monitoring until shipping activity associated with decommissioning ceases.
	Species at Risk	• Potential change in American eel and Atlantic salmon habitat quality from runoff during use of roads. • Potential change in American eel and Atlantic salmon health and survival.	• Site and access roads will be maintained in good condition. • Monitor American eel and Atlantic salmon populations for change in abundance and biomass.
	Habitats of Conservation Concern	• Transportation of materials and equipment may affect habitats of conservation concern.	• Ensure vessels comply with Transport Canada guidelines and regulations related to safety, environment, and fisheries.
	Marine Biosecurity	• Introduction of aquatic invasive species from ballast water and hull fouling	• Ensure compliance with DFO **Fisheries Act** / Aquatic Invasive Species Regulations, Transport Canada Ballast Water Control and Management Regulations, and IMO International Convention on the Control of Harmful Anti-fouling Systems on Ships. • Continue AIS monitoring until shipping activity associated with decommissioning ceases.
Unplanned Events	Groundwater Resources	• Spills/releases, fire, and/or explosions could affect groundwater quality.	• Ensure containment and rapid cleanup of spills/releases.
	Surface Water Resources	• Spills/releases, fire, and/or explosions could affect surface water quality.	• Ensure containment and rapid cleanup of spills/releases. • Identify and resolve water quality issues via real-time monitoring and alert system.
	Freshwater Fish and Fish Habitat	• Spills/releases, fire, and/or explosions could affect fish habitat and fish health and survival.	• Ensure containment and rapid cleanup of spills/releases.
	Marine Fish and Fish Habitat	• Spills/releases, fire, and/or explosions, and accidents on vessels could result in oil spills and introduction of harmful substances into the marine environment.	• Ensure containment and rapid cleanup of spills/releases. • Maintain inventory of oil spill response equipment.
	Fisheries and Aquaculture	• Spills/releases, fire, and/or explosions, and accidents on vessels could result in oil spills and introduction of harmful substances affecting commercial and recreational fisheries.	• Ensure containment and rapid cleanup of spills/releases. • Maintain inventory of oil spill response equipment. • Consider closure of fisheries if there is potential of contamination.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
	Species at Risk	• Spills/releases, fire, and/or explosions could affect American eel habitat and eel health and survival.	• Ensure containment and rapid cleanup of spills/releases.
	Habitats of Conservation Concern	• Spills/releases, fire, and/or explosions, and accidents on vessels could result in oil spills and introduction of harmful substances that could affect habitats of conservation concern.	• Ensure containment and rapid cleanup of spills/releases. • Maintain inventory of oil spill response equipment.
	Marine Biosecurity	• None.	• None.

4.5.3 Terrestrial Environment

Standard mitigation and enhancement measures that are applicable to the Terrestrial Environment VC are provided by Project phase in Table 4.5-3. Project-specific plans and studies (e.g., Noise Impact Study, Ice Throw Assessment) will also include mitigation measures that are applicable to this VC.

Table 4.5-3 Terrestrial Environment mitigation and enhancement measures.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
Construction	All	• Loss and fragmentation of wildlife habitat due to vegetation clearing. • Change in ecological community diversity as a result of loss of forest.	• Project footprint and disturbed areas will be minimized and limited to the space required to accommodate necessary infrastructure. Existing roads, trails, and disturbed areas will be used wherever feasible. • Clearing, grubbing, and topsoil overburden removal will be clearly identified in the field using flagging and survey stakes. • Vegetation removal will be limited to within the construction footprint area, and as little vegetation as possible will be removed.
	Avifauna	• Possible mortality of nesting birds. • Loss and/or degradation of nesting habitat. • Disturbance and/or displacement of nesting birds.	• Site clearing and grubbing will be conducted outside the temporal window of the bird breeding season where feasible. • If vegetation must be removed during the bird nesting season of April 1 to August 31, mitigations will be applied in accordance with the **Migratory Birds Convention Act**. • Pre-clearing surveys for active migratory bird nests will be carried out for work done during the breeding season, and buffer / set-back distances from active nests will be established. • A qualified Avian Biologist will be present during clearing activities to

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			supervise vegetation removal and carry out nest surveys. • A buffer zone shall be established around the active bird nest or confirmed bird nesting activity if one is discovered. The radius of the buffer will vary depending on the species, level of disturbance, and landscape context. The buffer will be developed in consultation with NL Wildlife Division. The nest is expected to be protected by the minimum buffer area of 10 m surrounding the nest from minor work such as vegetation clearing, building access roads, general heavy machinery use, and vehicle operation.
	Bats	• Loss and/or degradation of habitat. • Reduced habitat availability for bats • Disturbance and/or displacement of bats. • Disturbance to bat maternity roosts from anthropogenic activity.	• Project infrastructure will be micro-sited where possible to avoid high risk areas for bats, if any are identified during baseline studies. • During the bat roosting season, any trees proposed for removal and any suitable rock crevices or caves in areas proposed for blasting will be searched by a qualified Biologist for signs of maternity roosts. A buffer will be established around any active roosts found within the construction footprint site, in consultation with NL WD.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
	Fauna Avifauna Bats	• Loss and fragmentation of wildlife habitat due to sub-surface excavation activities. • Possible mortality and/or harm to terrestrial wildlife. • Disturbance to wildlife due to construction noise and vibration.	• Limit the affected area of blasting to minimize disturbance to wildlife while carrying out blasting operations in accordance with relevant Federal and Provincial guidelines and standards. • Time delay blasting cycles or blast mats will be used to control debris generated from blasting. • Blasting will only occur in areas that have been cleared of vegetation. • Prior to blasting, a qualified Biologist is to undertake an area search of the intended blasting area to determine whether wildlife is present on the day of blasting. • If wildlife is encountered in the blasting zone, deterrence measures are to be employed, up to implementation of a delay in blasting until the wildlife have vacated the area. • All blasting activities will be overseen by an Environmental Monitor. The designated monitor will check the site prior to and during blasting activities to ensure compliance with the Blasting Plan.
	Fauna Avifauna Bats	• Possible mortality, harm, and/or harassment to wildlife due to construction activities. • Disturbance to wildlife.	• An Environmental Monitor will be present during construction activities such as clearing vegetation, dewatering, and blasting to ensure adherence to environmental regulations.
	Fauna Avifauna Bats Insects Lichens	• Possible destruction and/or fragmentation of avian SAR habitat. • Change in mortality risk – harm, harassment, and/or killing of SAR.	• Staff will receive formal training on how to recognize SAR that may be present in the PA and the proper procedure to follow if SAR are encountered as per the EPP. • Construction work must stop immediately within 10 m of a SAR observation until a qualified Biologist can confirm the species has vacated the construction disturbance footprint. If the species is not present within the vicinity of the previous observation after a 24-hour period, work can resume. • SAR sightings will be reported to NL WD. • Upon discovery of a previously unknown SAR, work will be stopped until NL WD can be consulted.
	Flora Lichens	• Loss and fragmentation of rare plant or lichen habitat	• Project micro-siting, including the twinning of lines along existing linear corridors such as transmission lines and

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			roads, where practicable, will be done to reduce the volume of vegetation removal and limit damage associated with construction and maintenance activities. • Project infrastructure will be micro-sited to avoid rare plants or lichens where possible. • Before any clearing of suitable habitat types for rare lichen species, or habitat adjacent to such suitable habitat types, surveys should be conducted to identify any existing thalli. • Where boreal felt lichen exist within or adjacent to proposed construction sites, thalli will be translocated outside of the construction zone and beyond associated buffers. • Other rare lichen species like the blue felt lichen require a buffer as the crustose form of the species will not as easily survive transplanting. If observed, an appropriate buffer will be established for this species through consultation with NL WD.
	Wetlands	• Change in wetland and waterbody quantity and function due to Project construction.	• Maintain undisturbed buffer strips more than 30 m wide surrounding wetlands and waterbodies, except for where access roads are close to such crossings. • Permanent infrastructure will be sited outside of wetlands to the extent feasible. Otherwise, a Permit to Alter a Body of Water will be sought from NL DECC WRMD. • Store any stockpiled materials at least 30 m away from wetlands. • Site maintenance, vehicle maintenance, and fueling will be done in specified areas more than 30 m away from wetlands and waterbodies. Such locations will include drainage control features. • Where construction activities occur within 30 m of a wetland, install and maintain construction fencing to clearly define the construction footprint area to prevent damage to vegetation. • Erosion and sediment control measures will be implemented prior to and during construction near wetlands and waterbodies to prevent siltation and disturbance.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			• Maintain erosion and sediment control measures until re-vegetation of disturbed areas is complete. • Access road runoff will be diverted through drainage ditches into vegetated areas or through sediment barriers to prevent exposed soil or road materials from entering waterbodies or wetlands.
Operation and Maintenance	Fauna Avifauna Bats	• Disturbance to wildlife caused by noise and light from Project infrastructure, and possible avoidance of the area.	• Project lighting will be limited to that which is necessary for safe and efficient Project activity. • A wildlife-friendly lighting plan will be followed.
	Bats Avifauna	• Possible bird or bat mortality as a result of collision with wind turbines.	• North Atlantic will consult with NL WD and design and implement a science-based Bird and Bat Mitigation and Monitoring Plan. This plan will consider deterrents, optimized smart curtailment based on real data (which continues to be collected through 2025 and beyond), and thermal imaging/AI systems for real-time detection and mitigation for bats and raptors and SAR. • Continue to collect bat and bird data through pre-Construction, post-Construction and O&M phases to inform smart curtailment. • Based on the extensive bat dataset from 2023-2025, determine which turbines pose the greatest risk to bats. Discuss options for optimized smart curtailment of select turbines with NL WD. • A post-Construction mortality monitoring program (PCMP) will be established, and carcass searches will be conducted at all wind turbines between April and October for the first year (and beyond, if necessary). The mortality monitoring program will be developed in consultation with the NL WD. New mitigation measures will be implemented if high fatality rates are observed. • Install bird flight diverters in areas of relatively high risk of collision with infrastructure.
	Flora Lichens	• Disturbance to flora and rare lichen species from vegetation control measures implemented around transmission lines and substations	• Vegetation control measures will be implemented in accordance with industry standards and best practices (e.g., NL Hydro vegetation management program). • Herbicides will be applied in accordance with the federal **Pest Control Products**

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			Act, administered by the Pest Management Regulatory Agency, and the provincial **Environmental Protection Act** and its associated **Pesticide Control Regulations**. • If rare plant or lichen SAR are discovered within the vegetation clearing area, their presence will be reported to NL WD. Where appropriate, buffer zones will be established in consultation with NL WD. If an area containing SAR must be cleared, other mitigation measures (e.g., transplanting) will be considered, in accordance with guidance received from NL WD. • No herbicides will be used in the Centre Cove River PPWSA. Manual vegetation clearing efforts (e.g., tree trimming and brush clearing) will be undertaken in this area.
	Bats	• Reduced habitat availability for bats • Disturbance to bat maternity roosts from anthropogenic activity.	• Bat roosting surveys will be conducted on any structures within the PA and preventative measures will be implemented to ensure bats do not occupy buildings. Any bats detected within buildings will be left undisturbed until after the maternity season (in the case of maternity roosts) and Canadian Wildlife Health Cooperative guidelines will be followed.
Decommissioning and Rehabilitation	Flora Fauna Avifauna	• Loss and fragmentation of wildlife habitat due to vegetation clearing.	• Rehabilitation will be initiated within all temporary construction and decommissioning areas as appropriate to the type of habitat that was removed, i.e., replant forested areas using native stock.
Construction Operation and Maintenance Decommissioning and Rehabilitation	Fauna Avifauna Bats	• Possible wildlife interactions with personnel, equipment, and vehicles	• A Wildlife Response Protocol will be developed and implemented. • The work area will be kept clean and free from leftover foods which can attract wildlife. • Project personnel are to record and report all wildlife sightings and human-wildlife interactions and conflicts to the Environmental Coordinator. • Human-wildlife interactions will be reported to NL FFA.
	Fauna Avifauna Bats	• Mortality to wildlife as a result of vehicles using access roads.	• Establish Project speed limits that are protective of wildlife. • Post signage and monitor for adherence to the limits set. • Inform staff to be vigilant for wildlife while driving on site.

Project Phase	Key Indicator	Interaction	Mitigation / Enhancement
			• Roadkill will be removed from Project roads to reduce vehicular collision risk. • Include speed limit requirements in construction and operations wildlife trainings.
Accidents and Malfunctions	All	• Spills/releases, fire, and/or explosions could affect terrestrial KIs.	• Fire detection and protection systems will be installed in high-risk areas such as fuel and hazardous material storage. • Hazardous products will be stored according to industrial requirements and standards, and safely secured so that access is limited to authorized personnel. • All spills will be reported and cleaned up as soon as feasible, with contaminated soils removed from site for disposal at an approved/licensed location. • Firefighting equipment will be deployed to extinguish fires, if applicable. • The Emergency Response Plan and Hazardous Materials Training Plan, which specify the actions required both to prevent and respond to any release of chemicals to avoid water and soil contamination, will be adhered to.

4.5.4 Land and Resource Use

Standard mitigation and enhancement measures applicable to the LRU VC are provided by phase in Table 4.5-4. Project-specific plans (e.g., Domestic Wood Cutting Consultation Plan) will also include mitigation measures that are applicable to this VC.

Table 4.5-4 Land and Resource Use mitigation and enhancement measures.

Project Phase	Key Indicator	Interaction	Mitigation Measure
Construction	Land use planning and development control	• Project activities may be incompatible with designated land uses	• Apply for and obtain appropriate permits within the Municipal Planning Areas of Sunnyside and Come By Chance. • Avoid Protected Public Water Supply Areas where possible and if required apply for a Permit to Develop in a Protected Public Water Supply Area. • Apply for and obtain all other necessary permits required for the Project.

Project Phase	Key Indicator	Interaction	Mitigation Measure
	Industrial and commercial land use	• Temporary disturbance to nearby properties (e.g., noise, dust) • Periodic increased traffic delays	• Engagement with other land users to understand rights and interests and to avoid conflicts. • Engagement with provincial departments and agencies to understand and adhere to requirements. • Vehicles and equipment are to be maintained in good working order. • Dust suppression to be used as required. • Schedule transport of oversize loads outside of peak traffic hours. • Transportation of large wind turbine components to be conducted during reduced traffic hours (i.e., overnight).
	Tourism and recreation	• Project clearing may result in alteration of recreational land use near the Project due to changes in resource accessibility • Activities may reduce access to or quality of recreational land use • The Project may increase the noise levels at some cabin locations	• Engagement with other land users to understand rights and interests and to avoid conflict. • Engagement with provincial departments and agencies to understand and adhere to requirements. • Vehicles and equipment are to be maintained in good working order. • Dust suppression to be used as required. • Mitigation from Noise Study to be implemented. • Transportation of large wind turbine components to be conducted during reduced traffic hours (i.e., overnight).
	Harvesting	• Project clearing may result in alteration of harvesting due to changes in resource accessibility	• Engagement with local stakeholders. • Engagement with other land users to understand rights and interests and to avoid conflict. • Engagement with provincial departments and agencies to understand and adhere to requirements. • Route electrical infrastructure and access roads along existing rights-of-way wherever possible to reduce infrastructure footprint.
Operation and Maintenance	Harvesting	• Project infrastructure may result in alteration of	• Engagement with local stakeholders.

Project Phase	Key Indicator	Interaction	Mitigation Measure
		harvesting due to changes in resource accessibility	
Decommissioning and Rehabilitation	Industrial and commercial land use	• Temporary disturbance to nearby properties • Periodic increased traffic delays	• Engagement with local stakeholders. • Vehicles and equipment are to be maintained in good working order. • Dust suppression to be used as required. • Transportation of large wind turbine components to be conducted during reduced traffic hours (i.e., overnight).
	Tourism and recreation	• Temporary disturbance to nearby properties • Periodic increased traffic delays. • Project clearing for infrastructure removal may result in the alteration of recreational land use due to changes in resource accessibility • Closure activities may reduce access to or quality of tourism and recreation	• Engagement with local stakeholders. • Vehicles and equipment to be maintained in good working order. • Dust suppression to be used as required. • Transportation of large wind turbine components to be conducted during reduced traffic hours (i.e., overnight).
	Harvesting	• Project infrastructure may result in the alteration of harvesting land use due to changes in resource accessibility	• Engagement with local stakeholders.
Accidents and Malfunctions	Industrial and commercial land use	• Accidents and malfunctions may interact with the operations of other properties	• Assign designated storage areas for hazardous materials, with secondary containment where applicable. • Project vehicles will be maintained regularly and equipped to manage seasonal changes. • Transportation of large wind turbine components to be conducted during reduced traffic hours (i.e., overnight). • Installation of fire detection and protection systems in high-risk areas, such as fuel and hazardous material storage, and hydrogen transfer pipelines.
	Tourism and recreation	• Accidents and malfunctions may reduce access to or quality of tourism and recreation	
	Harvesting	• Accidents and malfunctions may reduce access to or quality of harvesting.	

4.5.5 Heritage and Cultural Resources

Standard mitigation measures that are applicable to the Heritage and Cultural Resources KIs are provided for all Project phases in Table 4.5-5 and discussed in detail in Appendix F. Based on the HRIA, the best approach is to avoid disturbance to a documented site. For potential sites of heritage and cultural importance, having a Contingency Plan in place for the discovery of a candidate site will mitigate disturbance.

Table 4.5-5 Heritage and Cultural Resources Mitigation and Enhancement Measures.

Project Phase	Key Indicator	Interaction	Mitigation Measure
All	Historic and Archaeological Resources	• Physical disturbance of the material or site causing a loss of integrity and/or quality.	• Avoidance of the two registered archaeological sites (ClAk-02 and ClAl-04) in or near the PA, and two identified HPAs (HPA-04 and HPA-12) situated within the PA. Note that HPA-12 encompasses ClAk-02. • Avoidance of any other structures or features eligible for registration with the PAO. • Completion of an Archaeological Mitigation Phase of the HRIA prior to conducting any Project activities that may alter or disturb any existing structural remains or terrain identified in the HRIA as having high potential for existing and/or as-of-yet undiscovered historic and archaeological resources.
	Architectural Resources	• Physical disturbance of the material or site causing a loss of integrity and/or quality.	• Avoidance of any structures or features eligible for registration with Heritage NL or as a Municipal Heritage Site.

As recommended in the HRIA, a detailed Contingency Plan would describe the measures and procedures to follow and the personnel to be contacted at the PAO if any suspected Historic and Archaeological Resources are encountered on the surface or are unearthed during any phase of the Project. The Contingency Plan would be provided to and discussed with all personnel working on the Project, particularly those involved in ground disturbing activities.

4.5.6 Socio-Economic Environment

Standard mitigation measures that are applicable to the socio-economic environment KIs are provided for all Project Phases in Table 4.5-6. Project-specific plans and studies (e.g., Workforce and Employment

Plan, Waste Management Plan, Transportation Impact Study and Traffic Management Plan) will also include mitigation measures that are applicable to these VCs.

Table 4.5-6 Socio-economic Environment mitigation and enhancement measures.

Project Phase	Valued Component	Key Indicator	Mitigation Measure
All	Communities	• Population Demographics	• Hire locally/regionally where possible. • Apply diversity, equity and inclusion policies.
		• Community Health and Wellbeing	• Institute workers' health and safety programs to comply with regulations and to promote the health, safety and wellbeing of workers. • Ensure contractor compliance with workers' health and safety regulations. • Hire locally/regionally where possible. • Enter into a Regional Community Benefits Program to ensure benefits to municipalities and to enhance local services.
		• Infrastructure and Services	• Potentially house non-resident workers in temporary accommodation facilities located at the Bull Arm Fabrication Site which have onsite potable water and sewage treatment. • Implement traffic management measures. • Develop and implement a waste management and waste reduction plan for the Project with special emphasis on waste during Construction and Decommissioning and Rehabilitation. • Work with regional waste management facilities and service providers to address waste management needs. • Work with educational institutions to address training needs.
	Economy, Employment and Business	• Economy	• Procure goods and services provincially as much as possible to the extent that they are available.
		• Employment	• Implement commitments from the Workforce and Employment Plan.
		• Business	• Procure goods and services locally, regionally and provincially as much as possible to the extent that they are available.

4.5.7 Human Health and Quality of Life

Standard mitigation and enhancement measures applicable to the Human Health and Quality of Life VC are provided by phase in Table 4.5-7. Project-specific plans (e.g., the Traffic Management Plan) will also include mitigation measures that are applicable to this VC.

Table 4.5-7 Human Health and Quality of Life Mitigation and Enhancement Measures.

Project Phase	Key Indicator	Interaction	Mitigation Measure
Operation and Maintenance	Shadow Flicker	• Project activities may generate shadow flicker during the daytime under particular conditions, causing visual nuisance.	• No specific mitigation measures are planned to address shadow flicker since exceedances of the 30 shadow hours per year threshold are not anticipated. • Stakeholder engagement will continue throughout the Project.
Operation and Maintenance	Ice Throw	• Project activities may result in ice throw and ice fall hazard, posing a risk of injury to people and animals or property damage.	• North Atlantic to further investigate ice throw mitigation technologies and consider implementation if required (heated blades, low friction coatings). • Ice protection devices (either mobile units deployed as needed, or permanent installations at each wind turbine) will be further investigated and considered for implementation to provide an entryway for workers to leave their vehicle and enter the wind turbine base while being protected from the risk of falling ice. • Add public education and warning signage that explain hazards to prevent members of the public from entering maximum ice throw areas during periods of rotor icing. • Educate and train employees in potential risks in accordance with best practices and guidelines. • North Atlantic to further develop Project site plan and if required, critical equipment at the substation can be protected with casing/ caging or moved to mitigate consequence of ice throw.

Shadow flicker

The shadow flicker analysis revealed that the effects on receptors will be minimal, with expected shadow flicker not exceeding 30 hours per year or 30 minutes per day. Consequently, at this time no specific mitigation measures are planned to address shadow flicker.

Stakeholders will continue to be engaged throughout the Project to identify any issues and ensure their well-being is considered. Regular updates and consultations will be conducted to maintain open communication and address any concerns.

Ice throw

Planned roads for O&M access are within the ice throw zones of all 55 wind turbines, posing potential risks to motorists on access roads. Transmission lines are within the ice throw zones of wind turbines HAT-05, DNV-04, and DNV-05, risking damage and power outages. Collector lines and substations are similarly at risk, with limited mitigation measures available.

The following risk mitigation measures will be employed to address the risks associated with ice throw:

- Anti-icing or de-icing technologies will be further investigated and considered for implementation if required to reduce the anticipated rotor icing periods and mitigate the likelihood of ice throw.
- Ice protection devices (either mobile units deployed as needed, or permanent installations at each wind turbine) will be further investigated and considered for implementation to provide an entryway for workers to leave their vehicle and enter the wind turbine base while being protected from the risk of falling ice.
- After further development of the Project site plan and if required, critical equipment at the substation can be protected with casing/ caging or moved to mitigate consequence of ice throw.
- PPE and training will be provided to workers, in accordance with CanREA Best Practices recommendations. Workers will be trained about the risks of ice throw, and made aware of active rotor icing events, and will have adequate PPE.

4.6 Plans & Environmental Management

North Atlantic recognizes that safety is a fundamental element of everyday operations and is committed to preventing the accidental loss of any of its resources, both human and physical. Employees, Supervisors, and Contractors are responsible for the company's overall safety initiatives.

Accordingly, North Atlantic will do everything that is practical and reasonable to provide their employees and contractors with a safe working environment by continuing to meet and/or exceed OHS and related regulatory requirements. This shall be achieved through the development and implementation of comprehensive policies and procedures, education in hazard and incident reduction, mandatory training and orientation for employees and contractors, and a commitment to review and continuously improve the corporate safety management system.

The cooperation from all employees is vital to the success of the safety management system. Safety must be an integrated part of every job.

North Atlantic is devoted to developing a system of responsibility, measuring key performance indicators, providing its employees and contractors with sound leadership, and leading by example. These are the cornerstones of developing a sustainable safety culture.

4.6.1 Environmental Policy

North Atlantic is committed to the protection and preservation of the environment through regulatory compliance and the continuous review of site operations. Recognizing that all management and employees have a role to play in achieving environmental protection, the company has formulated the following guiding principles:

- All operations will comply with government legislation, corporate policy and applicable industry standards concerning the protection of the environment and the public;
- Ensure that environment issues associated with the business are identified, evaluated and mitigated during project planning, implementation and operations;
- Ensure the operations allow for the efficient use of energy and other resources;
- Identify and minimize environmental hazards;
- Communicate this policy to ensure all employees understand and implement these guiding principles in their daily work;
- To report to the relevant authority all occurrences, including spillage or discharge that may have an adverse effect on the environment; and
- Having available at all times, sufficient stocks of equipment and materials to mitigate the effects of any spillage or discharge of any environmentally damaging substances.

4.6.2 HSE Management System

A Health, Safety, & Environmental Management System (HSEMS) is a set of processes and procedures that help an organization manage its health, safety and environmental risks. It can be used to identify, assess, control, and monitor health, safety, and environmental risks. A HSEMS can be designed to meet specific needs and should consider the size, type, and the nature of the Project component. Good and effective management principles provide a sound basis for improving health, safety, and environmental performance.

A few key characteristics make up a good HSEMS. A well-run system will have clear policies and procedures in place and a commitment from management to follow these procedures. Employees should also be regularly trained on how to safely perform their jobs and effectively communicate between workers and management on health, safety, and environmental concerns. Finally, a good HSEMS will have ongoing monitoring and evaluation to ensure that it works as intended. An effective HSEMS is intended to achieve the following benefits through its implementation:

- Minimize the risks of workplace incidents and injuries;
- Comply with relevant health and safety laws and regulations;
- Improve employee morale and motivation;
- Enhance the company's image and reputation;
- Reduce workers' compensation costs;
- Avoided or reduced negative environmental effects;
- Pro-active rather than re-active environmental and community management planning and control;
- Improved operational structure and efficiency with regards to environment management;
- Achieve a level of environmental performance that goes beyond compliance with applicable laws;
- Effective management of environmental risks; and
- Efficient use of resources.

By putting together, a comprehensive HSEMS, North Atlantic can create a safer workplace for everyone. It is an investment that will pay off in the long run, both in terms of preventing accidents and injuries and in terms of compliance with health, safety, and environmental legislation.

Implementation of the North Atlantic HSEMS enables the company to develop and implement a Health, Safety, and Environmental (HSE) policy and objectives which consider legal requirements, and application of risk management practices and continuous improvement processes. Continuous improvement is at the core of HSEMS by virtue of the plan/do/check/act (PDCA) cycle. The success of the system depends on commitment from all levels and functions of the organization, and especially from senior management.

Figure 4.6-1 show the steps use the PDCA process and how it is used to devise a structure for use in developing a safety management system. By having a specific process, a structure is provided from which a map can be developed for the organization to follow. In addition, the PDCA provides a dynamic format that reflects how the process is not static and is in continual movement and renewal.

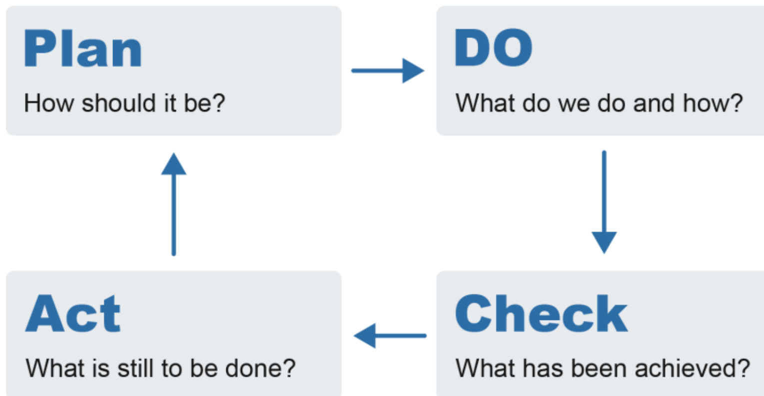


Figure 4.6-1 The four phases in the Plan-Do-Check-Act cycle.

The four phases in the Plan-Do-Check-Act cycle involve:

- **Plan:** Establish the objectives and processes necessary to deliver results in accordance with the organization's HSE policy.
- **Do:** Implement the plan.
- **Check:** Monitor and measure the process against the OHS Policy, objectives, and legal requirements, and report results.
- **Act:** Act to continually improve performance.

4.6.2.1 Roles and Responsibilities

President/General Manager

- Overall responsibility and accountability for health & safety performance at the workplace;
- Responsible for showing leadership on health & safety within the organization;
- Develop a strong, positive health and safety culture throughout the company and communicate it to all managers;
- Proactively promoting health and safety as part of the organization's culture & values;
- Monitoring to ensure the organization's standards are being met and achieving the right results;
- Ensure that the HSEMS is reviewed on a regular basis, maintained, and meets legislative requirements;

- Ensure that adequate resources are provided to meet the organization's HSE objectives;
- Include HSE activities & initiatives in the overall business plan; and
- Review annually the North Atlantic HSE and Right to Work (RTW) Policies.

Manager/Supervisor

- Know and apply the North Atlantic HSEMS;
- Ensure the health and safety of employees under their supervision;
- Hold employees accountable for their individual safety;
- Ensure employees use PPE or any other devices or apparel & are provided with instructions on its care & use;
- Maintain a healthy and safe workplace, systems, equipment, and tools;
- Ensure training, instruction and supervision is provided to employees;
- Advise and train workers of the hazards they may face on the job;
- Instruct employees in HSE Safe Operating Procedures, Programs, Safe Work Practices / Procedures;
- Identify, report, and correct unsafe conditions and workplace hazards to the HSE Specialist;
- Report all incidents, safety issues, concerns, &/or recommendations to the HSE Specialist;
- Participate in incident investigations as required;
- Participate in workplace inspections;
- Co-operate with the OHS Committee / Workplace Health and Safety Regulations (WHSR); and
- Co-operate with regulatory government departments/agencies.

Health, Safety & Environment (HSE) Specialist

- Responsible for the development and implementation of the HSEMS;
- Review the HSEMS in its entirety at least every 3 years;
- Ensure that the HSEMS is maintained and compliant with legislative requirements;
- Ensure that new employees are provided with timely orientation;
- Ensure employees are made aware of and understand the contents of this manual and accompanying Safe Operating Procedures, Programs and Safe Work Practices/Procedures;

- Ensure adequate availability of health and safety information, instruction, materials, and assistance to all employees;
- Ensure that a WHMIS inventory is on site and maintained;
- Review all correspondence and records and take appropriate action where applicable;
- Ensure the formation of OHS Committee's &/or WHSR at applicable worksites and co-operate with them;
- Promote safety and take a proactive approach to hazard identification and mitigation;
- Notify the President, General Manager & Deputy Minister Service NL of a serious workplace injury;
- Co-operate with regulatory government departments/agencies;
- Participate in incident investigations as required;
- Participate in workplace inspections;
- Co-operate with the OHS Committee /WHSR; and
- Co-operate with regulatory government departments/agencies.

Employee

- Protect their own health and safety and the safety of others;
- Participate in workplace inspections;
- Follow instructions and training that was provided;
- Report hazardous conditions to one's supervisor/manager;
- Work in compliance with the OHS Act/Regulations & North Atlantic HSEMS;
- Properly use and maintain PPE and other devices or apparel required under the OHS Act; and
- Co-operate with the employer, manager/ supervisor, co- workers, OHS Committee/WHSR and anyone exercising a duty imposed under the legislation.

OHS Committee / WHSR

- OHS Committee / WHSR will communicate serious issues/concerns by employees to management;
- Participate in workplace inspections;
- Receive OHS concerns, issues or complaints and make recommendations;

- Establish and promote health and safety;
- Maintain record of activities; and
- Co-operate with regulatory government department/agencies.

Contractor

- Abide by the NL OHS Act/ Regulations, North Atlantic's HSEMS as well as site safety requirements; and
- Provide North Atlantic proof of Insurance, Letter of Good Standing from Workplace NL, Newfoundland and Labrador Construction Safety Association (NLCSA) Certificate of Recognition (COR) (if required), OHS Policy or any other requirement as per contractual agreements.

4.6.2.2 Planning

For the Project, North Atlantic is taking a structured approach to environmental planning by developing targeted management plans for key environmental aspects. A Hazard Identification process will be conducted to assess risks associated with upcoming Construction, O&M, and Decommissioning Phases and to meet legal and regulatory requirements identified through the Project Registration process. Clear objectives and targets are being set to monitor the effectiveness of these plans.

By incorporating HSE practices early, the Project has proactively built mitigation measures into project design. These include:

- Meeting water quality standards with appropriate treatment;
- Considering climate change, such as rising marine levels, in site selection;
- Using low-emission equipment during construction;
- Implementing a Diversity, Equity and Inclusion Plan for workforce development; and
- Designing energy-efficient buildings.

4.6.2.3 Management Plans

To address the commitments identified in the HSE Policy, North Atlantic has identified 15 elements to guide the HSE Management System. Each element consists of a Standard Operating Procedure (SOP), with supporting HSE programs and Safe Work Practices (SWP) and/or HSE forms as required.

The following is a list of the 15 HSE Elements with reference document numbers:

- Element # 1 SOP-HSE-001 Leadership and Administration.
- Element # 2 SOP-HSE-002 OH & S Committee.
- Element # 3 SOP-HSE-003 Hazard Recognition, Evaluation & Control.
- Element # 4 SOP-HSE-004 PPE Management.
- Element # 5 SOP-HSE-005 Training and Education.
- Element # 6 SOP-HSE-006 HSE Information & Communication Management.
- Element # 7 SOP-HSE-007 Incident Management.
- Element # 8 SOP-HSE-008 HSE Inspection Management.
- Element # 9 SOP-HSE-009 Emergency Preparedness & Security.
- Element # 10 SOP-HSE-010 Environmental Management.
- Element # 11 SOP-HSE-011 Disability Management.
- Element # 12 SOP-HSE-012 Contractor Management.
- Element # 13 SOP-HSE-013 HSE Regulatory Management.
- Element # 14 SOP-HSE-014 Measurement and Analysis.
- Element # 15 SOP-HSE-015 HSE Program Management.

In addition to the North Atlantic HSE elements, Table 4.6.2-1 provides a summary of the required plans as described in the Environmental Assessment Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects (EAR-GWH). These plans will be implemented in all Project Phases including Construction, O&M, Decommissioning and Rehabilitation, and ultimate closure.

Table 4.6.2-1 Summary of Plans Required for North Atlantic Wind to Hydrogen Project.

Location	Plan Title	Components	Notes
Ch. 9	Environmental Protection Plan	a. Purpose b. Scope and Objectives c. North Atlantic HSE Policies d. Regulatory Requirements e. Roles and Responsibilities f. Training g. General Environmental Protection Procedures	Section 9 provides an annotated table of contents for the Project Construction EPP. Future iterations (O&M Phase, Decommissioning and Rehabilitation Phase) will be tailored to reflect the relevant site activities and their associated protection procedures.

Location	Plan Title	Components	Notes
		h. Resource Specific Protection Procedures i. Environmental Mitigation Measures j. Contingency and Monitoring Plan k. Compliance Monitoring and Reporting l. Contact List	
App. E	Transportation Impact Study and Traffic Management Plan	a. Transportation Impact Study • Road Infrastructure • Existing Traffic • Wind Farm Access Road Design Considerations • Construction, O&M, and Decommissioning and Rehabilitation Phase Traffic b. Traffic Management Plan • Oversized and Overweight Materials, Equipment and Vehicles • Diver Education • Driver Conditions • Traffic Control Measures • Monitoring and Reporting	The Transportation Impact Study includes the review of the location of the proposed Wind Farm access road, the geometric configuration of the proposed intersection wit the TCH and a sight line analysis in accordance with the request by DoTI. The TMP discusses management of oversized and overweight vehicles, outlines strategies to manage construction-related travel and disruptions to traffic flow during the Project's implementation.
App. M	Emergency Response/Contingency Plan	a. Site Information b. Risk Assessment and Incident Classification c. Incident Command System d. Emergency Communication e. Emergency Response Plan f. Training and Testing	This ERP provides processes and guidelines for emergencies involving hazardous materials that can occur with equipment in-service, in storage or during transportation for all employees of the Project. The primary purpose of the response plan is to implement a structured program for the prevention of, preparation for, response to and recovery from an environmental emergency or danger to human life or health at the CBC and Sunnyside Facilities.
App. N	Waste Management Plan	a. Document Control b. Project Description c. Reference Documentation d. Roles and Responsibilities e. Waste Management f. Training	Provides the processes and guidelines to be followed by all employees of North Atlantic to ensure the proper storage, handling and disposal of waste material. identifies requirements and actions for the management of waste generated by the Project and applies to all components of the Project, including onshore wind

Location	Plan Title	Components	Notes
			energy generation, hydrogen production, dehydrogenation processing, derivative storage, and exporting.
App. O	Hazardous Materials Response and Training Plan	a. Objective b. Responsibilities c. Training Requirements d. Training Records e. Proof of Competency f. Refresher and supplemental training	Provides the appropriate information and tools for consistency in its application while retaining appropriate site-specific practices. This training plan covers the mandatory practices that assure adequate training and qualification of personnel whose job duties impact and influence hazardous material response and handling. The program includes initial, and refresher training and qualification.
App. P	Public Participation Plan	a. Scope and Objectives b. Roles and Responsibilities c. Engagement Strategy d. Communication and Engagement Tools e. Inquiry and Complaints Resolution Protocol f. Engagement During Project Phases g. Indigenous Engagement h. Emergency Response i. Monitoring and Reporting j. Evaluation and Updating	Describes the plan to facilitate engagement and consultation with stakeholder and Indigenous peoples during the Construction, O&M and Decommissioning and Rehabilitation Phases. The plan details show and when public and key stakeholders' participation will occur.
App. Q	Workforce and Employment Plan	a. Introduction and Labour Force b. Scope c. Workforce Requirements and Forecast d. Commitments to Benefits and Diversity, Equity, and Inclusion e. Recruitment and Retention f. Training and Development g. Stakeholder Engagement h. Monitoring and Reporting	The Workforce and Employment Plan outlines workforce requirements, recruitment, training and development, and retention strategies as well as reporting requirements for the Project.
App. T	Domestic Woodcutting Consultation Plan	a. Purpose and Objectives b. Existing Conditions c. Environmental Effects and Mitigation Measures d. Consultation Strategy	This plan ensures the appropriate stakeholders are identified and engaged in a meaningful manner throughout all phases of the Project, by outlining the planned consultation methods and activities with domestic wood harvesters and other related stakeholders in the PA.

Location	Plan Title	Components	Notes
To be developed as needed to support regulatory permitting.	Environmental effects follow up and monitoring programs (EEMPs)	a. Species at Risk Impact Monitoring and Mitigation Plan b. Post Construction Monitoring Plan	Mitigation, monitoring, and adaptive management frameworks for the SAR and species of concern, as it relates to the Project. Aims to meet the requirements for the issuance of a Section 19 permit under the NL ESA.

4.6.2.4 Plan Implementation

The implementation of each management plan will be supported by structured training, orientation, and engagement activities to ensure personnel clearly understand their assigned responsibilities. Staff will be introduced to the North Atlantic HSE Management System through formal briefings and practical workshops, which will also cover monitoring protocols and documentation requirements.

Continuous improvement will be driven by the application of the PDCA methodology—a well-established, iterative framework for enhancing operational performance. Within this model, the “Check” phase plays a critical role by evaluating the effectiveness of management strategies through performance measurement against defined environmental objectives and targets. These targets are developed with full awareness of applicable regulatory standards. Where feasible, internal performance thresholds are set conservatively, providing a buffer that allows for early corrective action and proactive compliance management.

In the event of an incident or performance deviation, such as a material spill, a structured review process will be initiated to identify root causes, document lessons learned, and highlight opportunities for improvement. The findings from this review will guide the development of corrective actions aimed at reducing the likelihood of recurrence and reinforcing system resilience.

4.6.2.5 Management Reviews and Assurance

The performance of the HSE Program is reviewed and communicated through regular HSE reports to keep management informed of the company’s HSE performance. The following data identifies some of the HSE inputs and outputs which will assist the HSE Specialist in ensuring the HSE program is communicated, maintained, and continuously improved.

Inputs:

- Monthly OHS inspection data;
- HSE training; and
- Incident data.

Outputs:

- Number of inspections conducted;
- Number of orientation/training sessions conducted;
- Number of incidents: Lost Time Injury (LTI) / Restricted Work Case (RWC) / Medical Aid (MA) / First Aide (FA); and
- Spills / environmental incident trends.

5.0 Residual Effects

This Registration has presented an assessment of the environmental effects of the proposed Project on the biophysical and socio-economic environments. VCs were selected by incorporating guidance from NL DECC during early consultations, analyzing feedback from public engagement sessions, and by considering the details of the Project description in the context of environmental interactions. A set of KIs were allocated to each VC using information compiled from scientific literature, government reports, baseline field surveys, and from engagement with Indigenous peoples, stakeholders, and the public.

The following sections list the VCs and their associated KIs and provide a summary of the rationale of each effects assessment. In some cases, KIs were found to lack any potential interaction with the Project and consequently were omitted from the residual effects assessment (e.g., Paleontological Resources was not assessed for the PA because none were identified during surveys). Air quality, light, noise, and vibration were part of both the Human Health and Quality of Life VC and the Atmospheric Environment VC. The effects assessment of these KIs was presented once, under Atmospheric Environment VC.

Residual effects are those which cannot be avoided or mitigated, or that remain after the application of environmental control technologies and best management practices (as described in Section 4.5). Residual effects were discussed by Project phase and were characterized as being positive or negative. Monitoring will be conducted to verify predictions and promote ongoing improvement in environmental management, especially for interactions involving SAR.

5.1 Atmospheric Environment

The evaluation of the Project's potential effects on air quality, GHG emissions, noise, vibration, and light throughout all phases was informed by projected emission levels, the scope of proposed activities, best practices, and applicable mitigation measures. GHG emission estimates were developed for the Construction and O&M Phases, as presented in Appendix H1. Atmospheric dispersion modelling was conducted for the O&M Phase to develop release estimates, as presented in Appendix H2. Additionally, effects assessments were developed for noise, vibration, and light during the Construction and O&M Phases, as presented in Appendix J (Noise and Vibration) and I (Light). The mitigation measures described in Section 4.5.1 were chosen in consideration of the identified environmental effects pathways and consist of proven, industry-standard approaches designed to effectively reduce air contaminant and GHG emissions, mitigate noise and vibration, and manage light emissions. Following compliance, regulatory measures, and mitigation, residual effects were evaluated using the criteria in Table 4.1-3. A summary of the assessment for the Atmospheric Environment VC is provided in Table 5.1-1.

Table 5.1-1 Potential environmental effects of the Project on Atmospheric Environment.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Air Quality	N	3	3	4	5	1	1, 3
	GHGs	N	2	3	5	5	5	1, 3
	Light	N	2	2	3	5	1	1, 3
	Noise	N	2	3	3	5	1	1, 3
	Vibration	N	2	2	3	5	1	1, 3
Operation and Maintenance	Air Quality	N	3	5	4	5	1	1, 3
	GHGs	N	2	5	5	5	5	1, 3
	Light	N	2	5	3	5	1	1, 3
	Noise	N	2	5	3	5	1	1, 3
	Vibration	N	2	5	3	5	1	1, 3
Decommissioning and Rehabilitation	Air Quality	N	3	3	4	5	1	1, 3
	GHGs	N	2	3	5	5	5	1, 3
	Light	N	2	2	3	5	1	1, 3
	Noise	N	2	3	3	5	1	1, 3
	Vibration	N	2	2	3	5	1	1, 3
Accidents and Malfunctions	Air Quality	N	2	2	3	2	1	1, 3
	GHGs	N	2	2	4	2	5	1, 3
	Light	N	1	2	3	1	1	1, 3
	Noise	N	1	2	3	1	1	1, 3
	Vibration	N	1	2	3	1	1	1, 3

Notes
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Negligible, 2 – Low, 3 – Moderate, 4 – High, 5 – Very High
Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous
Geographic Extent: 1 – Brownfield Site in PA, 2 – PA, 3 – LAA, 4 – RAA, 5 – Beyond RAA
Duration: 1 – <1 day, 2 – 1 to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year
Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible,
Context: 1 – Brownfield, 3 – Evidence of Utilization, 5 – Relatively Pristine
N/A – not applicable, no residual effects anticipated on this KI.

Construction

During the Construction Phase, emissions of air contaminants, GHGs, noise, and vibration are expected to occur with low to moderate magnitude and on a regular basis, caused by the operation of stationary and mobile equipment, blasting, and other construction-related activities (e.g., site works, excavations, material handling). Air contaminants will be primarily generated by the combustion of fossil fuels in mobile and stationary equipment, with additional contributions from fugitive dust during site preparation. Emissions of GHGs during the Construction Phase will arise from direct (e.g., fuel combustion, blasting) and indirect (e.g., electricity consumption, marine transport) sources. Noise and vibration emissions will arise from equipment used to construct the Wind Farm, HP, HGP, and associated infrastructure. The effects on air quality, noise, and vibration during the Construction Phase will be negative, as construction activities will result in elevated ambient air contaminant concentrations, as well as noise and vibration levels relative to baseline conditions. Given the North Atlantic commitments to implement mitigations described in Section 4.5.1, the risks of exceeding air quality, noise, or vibration criteria frequently are low. Following completion of construction, ambient air quality, noise, and vibration levels are expected to return to baseline. GHG emissions from the Project, emitted from direct or indirect sources, will contribute very little to overall global GHG emissions.

Light emissions are expected to be of negligible to low magnitude, occurring intermittently during nighttime construction activities, primarily from mobile equipment. These effects, while negative, will be temporary and geographically limited to the active construction zones.

Considering that construction-related effects will occur in both brownfield and relatively undisturbed areas, the context criterion for the assessment was conservatively characterized as 'evidence of utilization,' reflecting a balanced representation of the overall Project area.

Operation and Maintenance

During the O&M Phase, emissions of air contaminants will be of moderate magnitude and occur continuously, associated with flaring, cooling tower operation, and ocean vessels for the transportation of MCH and toluene. Direct GHG emissions will arise from flaring, emergency generator use, and mobile equipment during the O&M Phase. Indirect GHG emissions (i.e., those that occur outside of the PA) will arise from electricity consumption and marine transportation of MCH and toluene. GHG emissions during the O&M Phase will be of low magnitude and occur continuously. Noise and vibration emissions will be of low magnitude and occur continuously, associated with operation of the HP, HGP, and Wind Farm. During the O&M, lighting will be continuous to ensure safe and efficient Project operation. Lighting sources during the O&M Phase include navigation lights on wind turbines and nighttime safety lighting around Project buildings, roadways and parking areas. The geographic extent of light emissions will be limited to the immediate vicinity of the PA and are expected to persist for the duration of the O&M Phase.

Decommissioning and Rehabilitation

During the Decommissioning and Rehabilitation Phase, emissions of air contaminants, GHGs, light, noise, and vibration are not anticipated to exceed the magnitude of Construction Phase emissions. These emissions will arise from similar sources, including the use of stationary and mobile equipment and from mobile lighting. The frequency and duration of effects are expected to be short-term and intermittent, with geographic effects localized to the decommissioning work areas. These effects have been assessed qualitatively, given their limited scope and anticipated lower intensity.

Accidents and Malfunctions

Accidents and malfunctions by nature are infrequent, irregular types of events, however such events can affect the Atmospheric Environment VC via accidental spills and releases of hazardous substances (e.g., toluene, MCH), flaring and venting during upset scenarios, fires and explosions, and dislodging of a wind tower or wind turbine blade. Accidental spills and releases of volatile hazardous substances can alter ambient levels of air contaminants and increase the risk of fire or explosion. Similar effects will arise for flaring and venting during upset scenarios. Fires and explosions can elevate ambient levels of air contaminants, GHGs, noise, vibration, and light. Additionally, ambient noise and vibration levels will be affected should a wind tower or wind turbine blade become dislodged. Accident and malfunction scenarios are expected to be transient and confined to the PA. While effects could extend beyond the PA, this is unlikely given that the Project will operate in accordance with environmental protection measures outlined in Project-specific plans and procedures. Given the significance criteria defined in Section 4.2.1.1, no Project phase was determined likely to result in significant residual effects to any KI of the Atmospheric Environment VC, as summarized in Table 5.1-2.

Table 5.1-2 Significance of potential residual environmental effects of the Project on Atmospheric Environment.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Air Quality	NS	3
	GHGs	NS	3
	Light	NS	3
	Noise	NS	3
	Vibration	NS	3
Operation and Maintenance	Air Quality	NS	3
	GHGs	NS	3
	Light	NS	3
	Noise	NS	3
	Vibration	NS	3

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Decommissioning and Rehabilitation	Air Quality	NS	3
	GHGs	NS	3
	Light	NS	3
	Noise	NS	3
	Vibration	NS	3
Accidents and Malfunctions	Air Quality	NS	3
	GHGs	NS	3
	Light	NS	3
	Noise	NS	3
	Vibration	NS	3

Notes
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

5.2 Aquatic Environment

The evaluation of the potential effects on groundwater resources, surface water resources, freshwater fish and fish habitat, marine fish and fish habitat, fisheries and aquaculture, aquatic SAR, aquatic habitats of conservation concern, and marine biosecurity were informed by the potential for interactions between planned activities and watercourses or waterbodies, proposed water consumption, interactions from wastewater release, interactions with aquatic species and habitats, recognized best practices, and the compatibility of mitigation measures. Baseline freshwater and marine fish and fish habitats were characterized with desktop reviews and field surveys (Appendix B1). Project wastewater effects on the marine fish and fish habitat were predicted in two scenarios by dispersion modelling of effluents (Appendix B2 & B3) with a preference of option 2 (Appendix B3). Surface water resources were evaluated by combining regional desktop data with site-specific survey results (Appendix C). The mitigation measures described in Section 4.5.2 were proposed according to the identified environmental effect pathways and consist of proven, industry-standard approaches that effectively reduce Project effects on water quantity, water quality, and productive aquatic habitat functionalities. Following compliance, regulatory measures, and mitigation, the residual effects of the Project were assessed based on the criteria set out in Table 4.1-3. An assessment of the residual environmental effects of the Project on the Aquatic Environment VC is summarized in Table 5.2-1 below.

Table 5.2-1 Potential environmental effects of the Project on Aquatic Environment.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Groundwater Resources	N	1	2	3	2	1	3,5
	Surface Water Resources	N	2	4	3	5	1	3,5
	Freshwater Fish and Fish Habitat	N	2	2	4	4	3	3,5
	Marine Fish and Fish Habitat	N	1	1	2	2	3	3,5
	Fisheries and Aquaculture	N	1	1	3	2	1	3,5
	Species at Risk	N	2	2	4	4	3	3,5
	Habitats of Conservation Concern	N	1	2	4	3	1	3,5
	Marine Biosecurity	N	2	1	5	5	3	3
Operation and Maintenance	Groundwater Resources	N	1	5	3	5	1	1,3
	Surface Water Resources	N	2	5	3	5	1	1,3
	Freshwater Fish and Fish Habitat	N	2	1	2	2	1	3,5
	Marine Fish and Fish Habitat	N	1	1	2	1	1	3,5
	Fisheries and Aquaculture	N	1	2	2	1	1	3,5
	Species at Risk	N	1	1	2	2	1	3,5
	Habitats of Conservation Concern	N	1	2	4	3	1	3,5
	Marine Biosecurity	N	2	1	5	5	3	3
Decommissioning and Rehabilitation	Groundwater Resources	N	1	1	3	2	1	3
	Surface Water Resources	N	2	2	3	2	1	3
	Freshwater Fish and Fish Habitat	N	2	2	2	4	3	3,5
	Marine Fish and Fish Habitat	N	1	1	2	2	3	3,5
	Fisheries and Aquaculture	N	1	1	3	2	1	3.5
	Species at Risk	N	2	2	2	4	3	3,5
	Habitats of Conservation Concern	N	1	2	4	3	1	3,5
	Marine Biosecurity	N	2	1	5	5	3	3
Accidents and Malfunctions	Groundwater Resources	N	1	2	3	1	1	3
	Surface Water Resources	N	1	2	3	1	1	3
	Freshwater Fish and Fish Habitat	N	2	1	4	1	1	3,5
	Marine Fish and Fish Habitat	N	2	1	3	1	1	3,5

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
	Fisheries and Aquaculture	N	1	1	3	1	1	3,5
	Species at Risk	N	2	2	2	4	3	3,5
	Habitats of Conservation Concern	N	1	2	4	3	1	3,5
	Marine Biosecurity	N	2	1	5	3	1	3

Notes
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Negligible, 2 – Low, 3 – Moderate, 4 – High, 5 – Very High
Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous
Geographic Extent: 1 – Brownfield Site in PA, 2 – PA, 3 – LAA, 4 – RAA, 5 – Beyond RAA
Duration: 1 – <1 day, 2 – 1 to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year
Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible,
Context: 1 – Brownfield, 3 – Evidence of Utilization, 5 – Relatively Pristine
N/A – not applicable, no residual effects anticipated on this KI.

Construction

During the Construction Phase, residual effects are expected on different aspects of the Aquatic Environment, including water resources KIs, freshwater environment KIs, and marine KIs. These deleterious effects will be of low magnitude. Effects on groundwater resources during the Construction Phase are expected to be negligible. The PA, and particularly the Wind Farm, have limited groundwater potential compared to surface water yields. Construction activities will be performed on geotechnically stable grounds with negligible permeability, thus reducing any interaction with groundwater resources.

Effects on the surface water resources and freshwater KIs are expected to be low given the implementation of appropriate mitigations. Much of the Construction Phase activities will be conducted on dry land and at distance from watercourses and waterbodies. The installation of water-crossing structures and diversion ditches will alter watercourses at localized sections and may temporarily increase the addition of TSS. Water withdrawal will occur regularly for approximately two years at Lady Cove Pond; however, the resulting reduction in average downstream flow is expected to be negligible. Some habitat associated with culverts will be altered, but proper installation will ensure connectivity between upstream and downstream habitats. These interactions will occur primarily at the Wind Farm and across the road and transmission line network. Proper maintenance of riparian habitats will help ensure that water quality parameters such as dissolved oxygen and water temperature are maintained.

Temporary increases in marine traffic are expected during the Construction Phase. This should not cause any noticeable effects on marine fish and fish habitat, and any possible effects on local marine fisheries will be mitigated through planning and communications. Increased marine traffic during Construction could increase the likelihood of marine AIS introduction, but this will be mitigated through adherence to government and international regulations and protocols.

No significant residual effect on the Aquatic Environment VC is expected during this Project phase.

Operation and Maintenance

Residual effects during the O&M Phase are expected to be low. O&M of this Project may cause negative interactions with the Aquatic Environment, but these changes are expected to be limited in magnitude and geographic extent. Given the limited size and bedrock geology of the Wind Farm, residual effects with Groundwater Resources and Surface Water Resources should be minimal.

Residual effects on Groundwater Resources, Surface Water Resources, and Freshwater Fish and Fish Habitat are expected to be low during O&M. Infrequent and localized interactions will happen due to transportation and maintenance activities over roads and at water crossings. These effects on water quality and aquatic habitats are expected to be low and temporary.

Year-round water withdrawal will be necessary to support the HGP and HP. This withdrawal will utilize the existing Inkster's Pond industrial water supply. The effect will be low in magnitude as the proposed Project maximum water withdrawal rate (0.030 m^3/s) is only 11% of the average outflow at the Barrisway Pond diversion point. Any effect will be limited in geographic extent, as it will only affect waterbodies and watercourses downstream of Willie Jarge and Barrisway Ponds.

The effects of Project operation on marine fish and fish habitat, marine fisheries, and marine AIS introductions will be centered on the NARL Logistics Terminal and are expected to remain low. Interactions will occur due to discharge of wastewater into the marine environment, utilizing a new discharge point north of the jetty, and in addition, there will be potential residual effects from the overseas shipment of MCH. The Project will produce approximately 2,400 m^3 MCH daily (Hatch, 2025) for 30 ktpa, or approximately 15,000 bbl/d, resulting in monthly shipments of MCH. This low level of activity will limit the likelihood of marine AIS introductions, which will also be mitigated through adherence to government and international regulations and protocols.

Decommissioning and Rehabilitation

Residual effects on the Aquatic Environment VC will also occur during the Decommissioning and Rehabilitation Phase. These interactions will be similar to, but less than those of the Construction Phase with a smaller magnitude and shorter duration. Disassembly and removal of infrastructure may expose and loosen the soil, which may result in increased erosion and TSS loads after precipitation events. The frequency and duration of effects will be short-term with effects localized to the PA. No in-water work is expected during this Project phase, as the existing road network and fish passage structures will remain in place.

There will be temporary increases in marine traffic during the Decommissioning and Rehabilitation Phase due to the transportation of Project elements and infrastructure from the PA. This will not cause any noticeable effects on Marine Fish and Fish Habitat. Increased marine traffic during Decommissioning and Rehabilitation could increase the likelihood of marine AIS introductions but this would be for a very short temporal window, so it is relatively unlikely.

Accidents and Malfunctions

Accidents and Malfunctions may affect the Aquatic Environment VC through spills or leakages of deleterious substances, failures of water management infrastructure, and emergency water replenishments for fire suppression. Accidental spills or leakages of harmful substances can worsen water quality and impair productive fish habitat functionalities. Similar effects can happen due to failures of water management infrastructures, which include breakage of water retention structures, leakage of pipelines, shutdown of pumps, and bank breach or spill at wastewater retention ponds. A robust monitoring program and environment protection measures will ensure early detection and containment of any spilled substances, minimizing any potential adverse effects. In the event of fires, deficits of the fire water tank will be replenished by water from Inkster's Pond. Sufficient water will always be kept in reserve and no noticeable adverse effect on water resources is expected. Accidental events such as oil spills and/or transportation of the LOHC during marine transportation will be mitigated by having the necessary containment and clean-up equipment available on site for immediate deployment. NARL Logistics and Braya have all the necessary containment and clean-up equipment on site as required for operation of the refinery and oil spill response plans for Placentia Bay are in place and have been refined during many simulations.

Given the significance criteria defined in Section 4.2.2.1, the Project was deemed unlikely to result in significant residual effects on the Aquatic Environment VC for all KIs during all phases, as summarized in Table 5.2-2.

Table 5.2-2 Significance of potential residual environmental effects of the Project on Aquatic Environment.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Groundwater Resources	NS	3
	Surface Water Resources	NS	3
	Freshwater Fish and Fish Habitat	NS	3
	Marine Fish and Fish Habitat	NS	3
	Fisheries and Aquaculture	NS	3
	Species at Risk	NS	3
	Habitats of Conservation Concern	NS	3
	Marine Biosecurity	NS	3
Operation and Maintenance	Groundwater Resources	NS	3
	Surface Water Resources	NS	3
	Freshwater Fish and Fish Habitat	NS	3
	Marine Fish and Fish Habitat	NS	3
	Fisheries and Aquaculture	NS	3
	Species at Risk	NS	3
	Habitats of Conservation Concern	NS	3
	Marine Biosecurity	NS	3
Decommissioning and Rehabilitation	Groundwater Resources	NS	3
	Surface Water Resources	NS	3
	Freshwater Fish and Fish Habitat	NS	3
	Marine Fish and Fish Habitat	NS	3
	Fisheries and Aquaculture	NS	3
	Species at Risk	NS	3
	Habitats of Conservation Concern	NS	3
	Marine Biosecurity	NS	3
	Groundwater Resources	NS	3

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Accidents and Malfunctions	Surface Water Resources	NS	3
	Freshwater Fish and Fish Habitat	NS	3
	Marine Fish and Fish Habitat	NS	3
	Fisheries and Aquaculture	NS	3
	Species at Risk	NS	3
	Habitats of Conservation Concern	NS	3
	Marine Biosecurity	NS	3
Notes Level of Significance: S – significant, NS – not significant, P – positive Level of Confidence: 1 – low, 2 – medium, 3 – high N/A – not applicable, no residual effects anticipated on this KI.			

5.3 Terrestrial Environment

The evaluation of the potential residual effects on flora, wetlands, fauna, avifauna, rare lichens, bats, and SAR insects was informed by the Project footprint and activities, ecological literature, appropriate mitigation measures, and a comprehensive suite of terrestrial baseline studies. The field program was conducted to assess KIs in the PA, and for birds and bats in the LAA and RAA. The results of those baseline studies are presented in Appendices D1 through D7. After allowance for compliance with regulations and identified mitigation measures, the residual effects of the Project on the Terrestrial Environment VC were assessed using the criteria provided in Table 4.1-3. The residual effects assessment is summarized in Table 5.3-1 below.

The mitigation measures described in Section 4.5.3 were chosen in consideration of the identified environmental effects pathways and consist of proven, industry-standard approaches designed to effectively reduce or eliminate risks to Terrestrial KIs where possible. Given the significance criteria defined in Section 4.2.3.1, no Project phase was determined likely to result in significant residual effects to any KI of the Terrestrial Environment VC, as summarized in Table 5.3-2.

Table 5.3-1 Potential residual effects of the Project on the Terrestrial Environment VC.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Flora	N	3	4	1	5	3	1, 3
	Wetlands	N	2	2	2	3	3	3
	Fauna (Mammals)	N	2	3	3	1	1	1, 3
	Avifauna	N	2	3	3	4	3	1, 3
	Rare Lichens	N	2	3	2	3	3	1, 3
	Bats	N	2	3	2	3	3	1, 3
	SAR Insects	N	2	3	2	3	3	1, 3
Operation and Maintenance	Flora	N	2	3	1	5	3	1, 3
	Wetlands	N	2	2	2	3	3	3
	Fauna (Mammals)	N	2	2	3	1	1	1, 3
	Avifauna	N	2	2	2	2	3	1, 3
	Rare Lichens	N	2	2	2	1	3	1, 3
	Bats	N	2	2	2	1	3	1, 3
	SAR Insects	N	2	2	2	1	3	1, 3
Decommissioning and Rehabilitation	Flora	N	3	4	1	5	3	1, 3
	Wetlands	N	2	2	2	3	3	3
	Fauna (Mammals)	N	2	3	3	1	1	1, 3
	Avifauna	N	2	3	3	4	3	1, 3
	Rare Lichens	N	2	3	2	3	3	1, 3
	Bats	N	2	3	2	3	3	1, 3
	SAR Insects	N	2	3	2	3	3	1, 3
Accidents and Malfunctions	Flora	N	2	2	1	4	3	1, 3
	Wetlands	N	2	2	2	3	3	3
	Fauna (Mammals)	N	2	2	3	1	5	1, 3
	Avifauna	N	2	2	2	1	5	1, 3
	Rare Lichens	N	2	1	2	1	3	1, 3
	Bats	N	2	1	2	1	3	1, 3
	SAR Insects	N	2	1	2	1	3	1, 3

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Notes Nature of Effect: P – Positive, N – Negative Magnitude: 1 – Negligible, 2 – Low, 3 – Moderate, 4 – High, 5 – Very High Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous Geographic Extent: 1 – Brownfield Site in PA, 2 – PA, 3 – LAA, 4 – RAA, 5 – Beyond RAA Duration: 1 – <1 day, 2 – 1 to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible, Context: 1 – Brownfield, 3 – Evidence of Utilization, 5 – Relatively Pristine N/A – not applicable, no residual effects anticipated on this KI.								

Table 5.3-2 Significance of potential residual environmental effects of the Project on Terrestrial Environment.

Project Phase	Key Indicator	Significance of Residual Environmental Effects: Level of Significance	Significance of Residual Environmental Effects: Level of Confidence
Construction	Flora	NS	3
	Wetlands	NS	3
	Fauna (Mammals)	NS	3
	Avifauna	NS	3
	Rare Lichens	NS	3
	Bats	NS	3
	SAR Insects	NS	3
Operation and Maintenance	Flora	NS	3
	Wetlands	NS	3
	Fauna (Mammals)	NS	3
	Avifauna	NS	3
	Rare Lichens	NS	3
	Bats	NS	3
	SAR Insects	NS	3
Decommissioning and Rehabilitation	Flora	NS	3
	Wetlands	NS	3
	Fauna (Mammals)	NS	3
	Avifauna	NS	3
	Rare Lichens	NS	3
	Bats	NS	3
	SAR Insects	NS	3
Accidents and Malfunctions	Flora	NS	3
	Wetlands	NS	3
	Fauna (Mammals)	NS	3
	Avifauna	NS	3
	Rare Lichens	NS	3
	Bats	NS	3
	SAR Insects	NS	3

Notes
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

Construction

Many of the activities undertaken throughout the Construction Phase of the Project will interact directly and indirectly with terrestrial KIs. Vegetation clearing, access road construction, blasting, and other construction activities will result in habitat alteration for flora, Species at Risk, avifauna, and mammals. In addition, wildlife species may be disturbed or displaced due to temporary increases in noise, vibration, artificial lighting, and human presence. The implementation of mitigation measures outlined in Section 4.5.3 will ensure that negative interactions are infrequent and of low magnitude.

Vegetation clearing, wind turbine transportation and installation, electrical infrastructure construction, HGP and HP construction, and other activities associated with the construction of the Project infrastructure are anticipated to have a temporary negative effect on Flora, particularly at the Wind Farm area and the Linear Corridor. The geographic extent of the interactions will be largely limited to the PA in the form of habitat alteration or fragmentation, and the induction of avoidance behaviours due to noise and disturbance. Project infrastructure will be micro-sited to avoid any contentious locations such as rare plant species habitat. Since no lichen SAR were recorded within the PA, it is expected that the effects on SAR lichens due to Project construction will be of limited magnitude and geographic extent. SAR or SCC rare plants will be buffered after consultation with NL WD. Overall, it is not anticipated that the Project will have a significant effect on the Flora KI.

Much of the PA is comprised of rocky barren, and coniferous scrub habitat, with Wetlands occupying approximately 12% of the total land coverage (see Appendix D3: ELC). North Atlantic understands the ecological importance of wetlands and will establish a minimum 30-meter avoidance buffer. Where construction must interact with a wetland, a Permit to Alter a Body of Water will be sought from WRMD. Construction fencing and erosion control will also be implemented to ensure that the effects of the construction are limited in magnitude.

Fauna may be disturbed or displaced by construction activities such as vegetation clearing, machinery noise, blasting, human presence, and vehicle traffic. The construction of the Linear Corridor and Wind Farm will inevitably fragment natural wildlife habitat. However, Project construction will be limited temporally and geographically, with much of the Wind Farm to be constructed atop isolated rocky barrens with relatively limited species diversity and abundance. Residual effects of the Construction Phase will include habitat fragmentation for a relatively small number of species, and increased hunting or poaching pressure due to the construction of the access roads into the Wind Farm area and between wind turbines. Given the mitigation measures to which North Atlantic is committed (e.g., lower speed limits to limit collisions with wildlife), the residual effects of the Project Construction Phase on the Fauna KI are not anticipated to be significant.

The Construction Phase could cause residual effects for the Avifauna KI, particularly if activities are undertaken during nesting season (mid-April to mid-August), which could cause direct mortality, stress or avoidance behaviour, nest abandonment, or habitat fragmentation. Relevant regulatory measures will be adhered to, including the **Migratory Birds Convention Act** and associated Migratory Bird Regulations, which protect many nesting bird species from harm. Others are protected under the

Provincial **Wildlife Act**. Construction will be limited temporally and geographically and is not expected to have a significant residual effect on the Avifauna KI.

Construction activities may interact with the Bats KI. Noise, lights, machinery, and human presence will be ephemeral and unlikely to result in any residual effects. Habitat alteration may occur as linear infrastructure is constructed and cannot be mitigated. However, linear corridors often provide foraging opportunities for bats. In the proposed Wind Farm area, most of the habitat is of low suitability for bats, reducing the possibility of Project-bat interactions during the Construction Phase. In addition, North Atlantic has committed to various bat-specific mitigation measures to ensure the protection of this KI during Project construction (*see* Table 4.5-3)). Given these commitments, it is anticipated that the magnitude of effects on bats will be low and that any residual effects will not be significant.

The Construction Phase will likely have minimal to negligible residual effects on the two possible SAR Insects - the yellow-banded bumble bee (*Bombus terricola*) and transverse lady beetle (*Coccinella transversoguttata*). Dedicated surveys were conducted in appropriate habitats throughout the PA, and no SAR insects were observed. If SAR insects are observed in the future, they will be reported to NL WD, and appropriate mitigation measures will be established for their protection.

It is not anticipated that the Construction Phase will have any significant residual effects on the Terrestrial Environment VC.

<u>Operation and Maintenance</u>

During the O&M Phase, residual effects will be limited in geographic scope and magnitude.

The Linear Corridor (i.e., access road and transmission line) will continue to be a source of habitat fragmentation for some KIs, but given the minimal width of the corridor, the effects will be minimal. Disturbance from human presence and vehicles will be much less after the Construction Phase, but public access will increase, causing some additional, but minimal avoidance behaviour for some KIs.

While wind turbines and transmission/collector line infrastructure pose a risk to volant species (avifauna, bats, certain insects), the mitigations that North Atlantic has committed to will ensure that these effects are reduced or eliminated where feasible. The HGP and HP, located on a developed brownfield site in the PA, are not anticipated to have any significant residual effects on terrestrial KIs. Other disturbances associated with the O&M Phase such as increased light pollution and noise from Project infrastructure and the operation of wind turbines have been accounted for in the mitigation measures that North Atlantic has committed to for the Project. Although residual effects are anticipated to be insignificant, some minimal negative effects will persist for the duration of the O&M Phase.

While Project infrastructure, such as access roads, wind turbines, and hydrogen facilities, are in operation, flora will be prevented from growing underneath. However, on and around much of the proposed Wind Farm site, vegetation is sparse among stretches of bare rock or stones. Underneath transmission/collector lines, herbicides may be used to prevent large woody growth. Federal and provincial regulations will be adhered to, and herbicide use will follow industry best practices. The magnitude and geographic extent of the residual effects on flora are expected to be low, although the duration of these effects will last for the entirety of the O&M Phase. The Project O&M Phase is not expected to have any significant adverse effects on flora or rare lichens.

Some wetlands may be altered by the presence of Project infrastructure. However, wetlands can function properly with some disturbance, given that appropriate mitigation measures are in place. North Atlantic, having committed to robust mitigation measures for wetlands throughout the O&M Phase of the Project, will effectively reduce any potential negative effects on wetlands to a low magnitude and limited geographic extent. It is anticipated that wetlands, where they interact with the Project, will maintain their functionality and will not experience significant adverse effects.

Wildlife habitat will be fragmented by the construction of Project infrastructure; however, the total area of habitat rendered uninhabitable will be low and geographically limited. Most wind turbines will be sited atop rocky barrens at high elevations, representing areas infrequently used by terrestrial mammals. Mitigation measures designed for the protection of wildlife will remain in place throughout the O&M Phase. Terrestrial mammals will be able to traverse the linear corridors and roads but may exhibit some avoidance behaviour of the Wind Farm area, at least in the short term. However, residual negative effects on mammals are not anticipated to be significant.

Various infrastructure associated with the O&M Phase of the Project presents a risk of harm or mortality to avifauna. This includes tall anthropogenic structures that present collision hazards, such as electrical transmission/collection infrastructure and wind turbines. The Wind Farm site would be considered of marginal to low habitat suitability for many species, given the scarcity of vegetation, high winds, and the blade swept area won’t interact with most birds given its vertical height. However, some groups, such as raptors (e.g., Bald Eagle), migratory waterfowl and passerines will inevitably be at risk of collisions. North Atlantic has committed to several mitigation measures to ensure that any effects on the Avifauna KI during Project construction are minimized. Optimized smart curtailment, possibly including a real-time camera-based detection system (such as IdentiFlight or DTBird) may be installed to detect birds and enable temporary shutdown of high-risk turbines. These systems can also help detect and identify sensitive species like SAR, facilitating informed curtailment and idling selected turbines through North Atlantic’s SCADA network. Selection of any systems will be conducted in consultation with NL WD and the Canadian Wildlife Service (CWS).

Birds may also experience habitat fragmentation or disturbance due to the presence of Project infrastructure throughout the PA. However, the Project footprint will be reduced to the minimum amount of land possible, and much of the proposed Wind Farm infrastructure will be located in habitats with relatively less abundance and biodiversity (e.g., rocky barrens). While there will be negative residual effects on avifauna, the mitigation measures to which North Atlantic has committed will help ensure that interactions are of a low magnitude and limited geographic scope.

Wind turbine operation is known to pose risks to bats, particularly migratory species, through collisions with moving wind turbine blades during the active season (May through October). Migratory bats, which may migrate at the height of the blade swept area, are the most vulnerable group according to scientific literature. The two bat species observed in the PA, the little brown myotis and Northern myotis, are resident species that are not expected to regularly fly or forage into the vertical stratum of the blade swept area of the wind turbines. In any case, North Atlantic has committed to a suite of mitigation measures to ensure that bat species utilizing the Wind Farm area are protected during the O&M Phase. These mitigations will be finalized through consultations with NL WD and CWS and will likely be based on optimized smart curtailment, combined with acoustically triggered curtailment (like the SMART system, developed by Wildlife Acoustics). Such a system can help minimize bat fatalities while maintaining energy production; it can communicate with SCADA to pause turbine operations based on user-determined bat-call variables. North Atlantic is continuing bat monitoring through 2025 and beyond so that any curtailment options will be informed by robust data. With scientifically backed mitigations in place, and given the very low amount of bat use of the Wind Farm area, negative effects on bats will be of low magnitude and geographic extent, and not significant.

No insect SAR are known for the PA. If SAR are observed, they will be reported to NL WD and appropriate mitigation measures established for their protection. In some instances, the presence of Project infrastructure may result in the creation of suitable habitat for SAR insects – for example, the yellow-banded bumble bee is known to forage at anthropogenically disturbed roadsides and meadows. The Project O&M Phase is not anticipated to have a significant adverse effect on this KI.

Decommissioning and Rehabilitation

The effects of the Decommissioning and Rehabilitation Phase are similar to but reduced in comparison with the magnitude of the Construction Phase. Disturbance to terrestrial KIs is likely due to increased noise, vibration, and human presence. However, the intention of this phase is to restore the terrestrial environment back to its natural state. The effects will be limited temporally and geographically, and rehabilitation efforts should have a positive lasting effect on terrestrial KIs.

Fauna, avifauna, bats, and insects, while affected by Decommissioning and Rehabilitation activities, may eventually return to the habitat use patterns that existed before Project construction. Flora and lichen species, as well as wetland habitats, may reestablish a natural presence in the once-disturbed areas. In addition, North Atlantic remains committed to undertaking mitigation measures during this phase. Negative effects will be limited temporally and geographically and are not expected to be significant.

Accidents and Malfunctions

Accidents and malfunctions are expected to be infrequent and irregular, given that North Atlantic has committed to constructing and maintaining the Project according to industry standards and engineering best practices. Accidents and malfunctions include accidental spills and releases of hazardous substances, fires and explosions, and dislodging of a wind tower or wind turbine blade. In the unlikely instance that such events occur, terrestrial KIs may be negatively affected. Each of these events may cause disturbance, harm, or mortality to flora, fauna, avifauna, bats, lichens, or insects. They may cause damage to wetland habitats if they occur on or near these areas. Accident and malfunction scenarios are expected to be transient and confined to the PA. While effects could extend beyond the PA, the Project will operate in accordance with environmental protection measures outlined in Project-specific plans and procedures.

Given the significance criteria defined in Section 4.2.3.1, no Project phase was determined likely to result in significant residual effects to any KI of the terrestrial environment VC, as summarized in Table 5.1-3.

5.4 Land and Resource Use

Following consideration of compliance with regulations and implementation of identified mitigation measures, the residual effects of the Project on the LRU VC were assessed using the criteria provided in Table 4.1-3.

The evaluation of potential effects on land use planning and development control, industrial and commercial land use, tourism and recreation, and harvesting throughout all Project phases was informed by a sound understanding of the existing environment, the scope of proposed activities, recognized best practices, and planned mitigation measures.

A Land and Resource Use study (Appendix R) was conducted to characterize the baseline environment. To complement the study, a land and resource survey was developed and distributed; however, participation was low, limiting the utility of the collected information. Appendix T comprises a Domestic Woodcutting Consultation Plan describing planned consultation methods and interactions with domestic wood harvesters and other stakeholders using resources in the PA over the lifespan of the Project. The plan was prepared to identify and address any concerns and develop appropriate mitigation measures. The mitigation measures described in Section 4.5.4 were chosen to address possible incompatibilities in designated land use, limit disturbance to nearby properties and recreational land use, and address potential changes in resource accessibility. Using the criteria from Table 4.1-3, a summary assessment of residual environmental effects of the Project on the LRU VC is presented in Table 5.4-1. As Indigenous land use is not known to intersect with the RAA, LAA, or PA potential interactions with the Project are not anticipated as an effect. As presented in Table 5.4-2, no Project phase was determined likely to result in significant adverse residual effects to any KI of the LRU VC.

Construction

North Atlantic will avoid Protected Public Water Supply Areas where possible through detailed Project design. If required, the company will apply for a Permit to Develop in a Protected Public Water Supply Area. As a result, the Project is not anticipated to result in negative effects on the land use planning and development control KI from the Construction Phase. Temporary disturbance (e.g., noise, dust) to users of nearby properties and periodic traffic delays may occur during construction resulting in infrequent negative effects of moderate magnitude. Project construction activities may result in reduced access to, or quality of, recreational land and resource use and may increase noise levels at some cabin locations resulting in infrequent negative effects of moderate magnitude for the tourism and recreation KI. Land clearing for the Project may alter harvesting due to changes in resource accessibility resulting in infrequent negative effects of moderate magnitude for the harvesting KI

Operation and Maintenance

North Atlantic will comply with all existing zoning requirements and restrictions prior to Project development. As a result, the Project is not anticipated to result in adverse effects associated with the land use planning and development control KI in the O&M Phase. Land cleared for the Project may result in alteration of harvesting due to changes in resource accessibility, causing infrequent negative effects of moderate magnitude for the harvesting KI.

Table 5.4-1 Potential environmental effects of the Project on Land and Resource Use.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Land use planning and development control	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Industrial and commercial land use	N	3	2	1	3	1	1
	Tourism and recreation	N	3	2	5	3	1	3
	Harvesting	N	3	2	5	3	1	1
	Indigenous Land Use	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation and Maintenance	Land use planning and development control	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Industrial and commercial land use	N	1	1	1	1	1	1
	Tourism and recreation	N	3	2	5	1	1	1
	Harvesting	N	1	2	5	1	1	1
	Indigenous Land Use	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Decommissioning and Rehabilitation	Land use planning and development control	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Industrial and commercial land use	N	3	2	1	1	1	1
	Tourism and recreation	N	3	2	5	2	1	1
	Harvesting	N	1	2	5	2	1	1
	Indigenous Land Use	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Accidents and Malfunctions	Land use planning and development control	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Industrial and commercial land use	N	3	1	1	1	3	1
	Tourism and recreation	N	3	1	1	1	3	1
	Harvesting	N	3	1	1	1	3	1
	Indigenous Land Use	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Low, 3 – Moderate, 5 – High
Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Geographic Extent: 1 – PA, 3 – LAA, 5 – RAA Duration: 1 – <1 day, 2 – 1 to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible, Context: 1 – Low, 3 – Medium, 5 – High N/A – not applicable, no residual effects anticipated on this KI.								

Table 5.4-2 Significance of potential residual environmental effects of the Project on Land and Resource Use.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Land use planning and development control	NS	3
	Industrial and commercial land use	NS	3
	Tourism and recreation	NS	2
	Harvesting	NS	2
	Indigenous Land Use	N/A	N/A
Operation and Maintenance	Land use planning and development control	N/A	N/A
	Industrial and commercial land use	NS	3
	Tourism and recreation	NS	2
	Harvesting	NS	2
	Indigenous Land Use	N/A	N/A
Decommissioning and Rehabilitation	Land use planning and development control	N/A	N/A
	Industrial and commercial land use	NS	3
	Tourism and recreation	NS	2
	Harvesting	NS	2
	Indigenous Land Use	N/A	N/A
Accidents and Malfunctions	Land use planning and development control	N/A	N/A
	Industrial and commercial land use	NS	3
	Tourism and recreation	NS	2
	Harvesting	NS	2
	Indigenous Land Use	N/A	N/A

NOTES
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

Decommissioning and Rehabilitation

North Atlantic will be able to comply with all existing zoning requirements and restrictions prior to Project development and during all Project phases. As a result, no adverse effects associated with the land use planning and development control KI are anticipated to result from the Decommissioning and Rehabilitation Phase of the Project. Temporary disturbance (e.g., noise, dust) to nearby properties and periodic increased traffic delays may occur during the Decommissioning and Rehabilitation Phase resulting in infrequent negative effects of moderate magnitude for the industrial and commercial land use KI. Decommissioning and Rehabilitation activities may result in reduced access to, or quality of, recreational land use and may increase noise levels at some cabin locations causing infrequent negative effects of moderate magnitude for the tourism and recreation KI. Dismantling of Project infrastructure may result in alteration of harvesting due to changes in resource accessibility causing infrequent low magnitude negative effects.

Accidents and Malfunctions

North Atlantic will be able to comply with all existing zoning requirements and restrictions during all Project phases. As a result, no negative effects associated with land use planning and development control KI are anticipated to interact with the Accidents and Malfunctions Phase of the Project. Accidents and malfunctions may interact with the operations of other properties or sites, reduce access to, or quality of, tourism and recreation features and harvesting areas resulting in a moderate magnitude adverse effect of infrequent nature.

5.5 Heritage and Cultural Resources

The residual effects of the Project on the Heritage and Cultural Resources VC were assessed based on the criteria set out in Table 4.2.5-2 and results are summarized in Table 5.5-1 below.

Given the significance criteria defined above in Section 4.2.5.1, no Project phase was determined to result in significant negative residual effects to any KI of the Heritage and Cultural Resources VC, as summarized in Table 5.5-2. This prediction is based on the implementation of the measures identified in the HRIA and summarized as:

- Avoidance of the two registered archaeological sites (ClAk-02 and ClAl-04) in or near the PA, and two identified HPAs (HPA-04 and HPA-12) situated within the PA will be avoided, and any other structures or features potentially worthy of registration with the PAO, Heritage NL, or as a Municipal Heritage Site. Note that HPA-12 encompasses ClAk-02.
- Completion of an Archaeological Mitigation phase prior to conducting any Project activities that may alter or disturb any existing structural remains or terrain identified in the HRIA as having high potential for existing and/or as-of-yet undiscovered historic and archaeological resources.
- Following of the Contingency Plan outlined in Appendix F that describes the measures and procedures to follow and the personnel to be contacted at the PAO if any suspected Historic and Archaeological Resources are encountered on the surface or are unearthed during any phase of the Project.

Table 5.5-1 Potential environmental effects of the Project on Heritage and Cultural Resources.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria	
			Magnitude	Historical or Cultural Context
Construction	Historic and Archaeological Resources	N	2	1
Operation and Maintenance	Historic and Archaeological Resources	N	1	1
Decommissioning and Rehabilitation	Historic and Archaeological Resources	N	1	1
Accidents and Malfunctions	Historic and Archaeological Resources	N	2	1

NOTES
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Negligible, 2 – Low, 3 – Medium, 5 –High
Historical or Cultural Context: 1 – Undisturbed, 5 – Disturbed
N/A – not applicable, no residual effects anticipated on this KI.

Table 5.5-2 Significance of potential residual environmental effects of the Project on Heritage and Cultural Resources.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Historic and Archaeological Resources	NS	3
Operation and Maintenance	Historic and Archaeological Resources	NS	3
Decommissioning and Rehabilitation	Historic and Archaeological Resources	NS	3
Accidents and Malfunctions	Historic and Archaeological Resources	NS	3

NOTES
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

5.6 Socio-Economic Environment

The residual effects of the Project on the Socio-economic Environment VC were assessed based on the criteria established in Table 4.1-4. The results are summarized in Table 5.6-1 below.

The evaluation of potential effects on population demographics, community health and wellbeing, infrastructure and services, economy, employment and business throughout all phases was informed by the scope of proposed activities, recognized best practices, and planned mitigation measures. A traffic impact assessment prepared for the Construction Phase of the Project is presented in Appendix E. The baseline socio-economic environment was characterized in a desktop review and provided in Appendix G. A Workforce and Employment Plan was developed to outline preliminary workforce requirements, recruitment, training and development, and retention strategies as well as reporting requirements for the Project and is presented in Appendix Q. A Waste Management Plan (Appendix N) was developed for the Project with special emphasis on waste during Construction and Decommissioning and Rehabilitation.

The mitigation measures described in Section 4.5.6 were chosen in consideration of identified environmental effects and consist of proven, industry-standard approaches designed to support population growth, promote the health, safety and wellbeing of workers and the public, mitigate strain on public infrastructure and services, and provide local economic, employment and business opportunities. Following compliance, regulatory measures, and mitigation, residual effects were evaluated using the criteria in Table 4.1-4. A summary of the assessment for the Socio-economic VC is provided in Table 5.6-1.

Given the significance criteria defined in Section 4.2.6.1, no Project phase was determined likely to result in significant residual effects to any KI of the socio-economic VC, as summarized in Table 5.6-2.

<u>Construction</u>

During the Construction Phase, a temporary increase in population is expected as it is anticipated that the current population will not be able to supply sufficient labour for the Project. Population increases are generally considered positive in rural communities with population decline and ageing as well as low growth. Based on the results of modelling prepared for Section 4.1.2, the Project is not anticipated to result in adverse effects due to dust, light, noise, vibrations or ice throw during Construction. The Project will result in opportunities for short-term employment during Construction which may enhance the ability of workers to engage in employment that provides higher income and employment benefits creating a positive effect on Community Health and Wellbeing. An increase in demand for services and infrastructure such as water, sewer, housing, health care, and roads will result in a temporary negative effect of low magnitude especially with the potential mitigation to use temporary worker accommodations facilities at the Bull Arm Fabrication Site which has water and sewer infrastructure on site. These effects would be short term and expected to stabilize during the O&M Phase. The effects on economy, employment and businesses will be positive due to employment opportunities and procurement of materials, goods and services for the Project.

Table 5.6-1 Potential environmental effects of the Project on Socio-economic Environment.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Population Demographics	P	3	1	1	5	1	1
	Community Health and Wellbeing	P	3	5	1	5	5	5
	Infrastructure and Services	N	1	5	5	5	5	5
	Economy	P	5	5	5	5	1	1
	Employment	P	5	5	5	5	1	5
	Business	P	3	5	3	5	1	1
Operation and Maintenance	Population Demographics	P	1	5	1	5	1	1
	Community Health and Wellbeing	P	1	5	1	5	5	5
	Infrastructure and Services	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Economy	P	1	5	5	5	1	1
	Employment	P	1	5	5	5	1	5
	Business	P	1	5	3	5	1	1
Decommissioning and Rehabilitation	Population Demographics	N	1	5	1	5	1	1
	Community Health and Wellbeing	N	1	5	1	5	5	5
	Infrastructure and Services	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Economy	N	1	5	5	5	1	1
	Employment	N	1	5	5	5	1	5
	Business	N	1	5	3	5	1	1
Accidents and Malfunctions	Population Demographics	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Community Health and Wellbeing	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Infrastructure and Services	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Economy	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
	Employment	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Business	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Low, 3 – Moderate, 5 – High
Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous
Geographic Extent: 1 – PA, 3 – LAA, 5 – RAA
Duration: 1 – <1 day, 2 – 1-to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year
Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible,
Context: 1 – Low, 3 – Medium, 5 – High
N/A – not applicable, no residual effects anticipated on this KI.

Table 5.6-2 Significance of potential residual environmental effects of the Project on Socio-economic Environment.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Population Demographics	NS	2
	Community Health and Wellbeing	NS	2
	Infrastructure and Services	NS	2
	Economy	NS	2
	Employment	NS	2
	Business	NS	2
Operation and Maintenance	Population Demographics	NS	2
	Community Health and Wellbeing	NS	2
	Infrastructure and Services	NS	2
	Economy	NS	2
	Employment	NS	2
	Business	NS	2
Decommissioning and Rehabilitation	Population Demographics	NS	2
	Community Health and Wellbeing	NS	2
	Infrastructure and Services	NS	2
	Economy	NS	2
	Employment	NS	2
	Business	NS	2
Accidents and Malfunctions	Population Demographics	N/A	N/A
	Community Health and Wellbeing	N/A	N/A
	Infrastructure and Services	N/A	N/A
	Economy	N/A	N/A
	Employment	N/A	N/A
	Business	N/A	N/A

NOTES
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

Operation and Maintenance

It is likely that the O&M Phase of the Project will attract non-residents (depending on skill set) from outside the PA to relocate for permanent work opportunities, which may increase the permanent population and is considered a positive effect of low magnitude. Based on the results of modelling prepared for Section 4.1.2, the Project is not anticipated to result in adverse health effects due to dust, light, noise, vibrations or ice throw during O&M. The Project will result in opportunities for long-term employment during O&M which may enhance the ability of workers to engage in employment that provides higher income and employment benefits creating a positive effect on Community Health and Wellbeing. It is anticipated that, due to the smaller number of O&M employees, there would not be an adverse effect on infrastructure and services. During O&M, it is expected that there will also be a positive, but smaller, contribution to GDP and tax revenue. The effects on economy, employment and businesses will be positive due to increased opportunities for procurement of materials, goods and services to support the O&M of the Project.

Decommissioning and Rehabilitation

The Decommissioning and Rehabilitation Phase may require the support of a non-resident labour force similar to but smaller than the Construction Phase. Following Decommissioning and Rehabilitation activities, permanent population may decline due to fewer temporary and permanent employment opportunities with the Project and is therefore determined to have a negative effect of low magnitude. Based on the results of modelling prepared for Section 4.1.2, the Project is not anticipated to result in adverse health effects due to dust, light, noise, vibrations or ice throw during Decommissioning and Rehabilitation. The loss of opportunities for long-term employment after Project closure may result in a small negative effect on Community Health and Wellbeing. It is anticipated that, due to the smaller number of jobs lost after Project closure there would not be an adverse effect on infrastructure and services. The effects on the economy, employment and businesses will be negative but of a low magnitude due to the decreased opportunities for procurement of materials, goods and services to support the Project.

Accidents and Malfunctions

Accidents and malfunctions are expected to be infrequent and irregular, given that North Atlantic has committed to constructing and maintaining the Project according to industry standards and engineering best practices. Accidents and malfunctions may include accidental spills and releases of hazardous substances, fires and explosions, and dislodging of a wind tower or wind turbine blade. In the unlikely instance that such events occur, any effects will be contained within the PA and unlikely to result in interactions with the socio-economic environment. While effects could extend beyond the PA, the Project will operate in accordance with environmental protection measures outlined in Project-specific plans and procedures to ensure the safety of the population and communities.

5.7 Human Health and Quality of Life

The evaluation of the potential effects on human health and quality of life throughout all Project phases was informed by assessments of shadow flicker (Appendix K) and ice throw (Appendix L). Both metrics used to assess human health and quality of life impacts are only applicable to the Wind Farm during the O&M Phase. Human Health and Quality of Life may be indirectly affected by other Project interactions, such as those discussed in Section 5.4 (Land and Resource Use) including land use planning and development control, industrial and commercial land use, and harvesting.

Mitigation measures described in Section 4.5.7 were chosen in consideration of identified environmental effects pathways and consist of proven, industry-standard approaches designed to effectively mitigate shadow flicker and ice throw. Following consideration of compliance with standards and regulations as well as implementation of mitigation measures, the residual effects of the Project were assessed based on the criteria established in Table 4.1-3. The residual environmental effects of the Project on the Human Health and Quality of Life VC are summarized in Table 5.7-1.

Operation and Maintenance

Shadow flicker and ice throw will be of low magnitude and occur infrequently, persisting for the duration of the O&M Phase. The geographic extent of shadow flicker and ice throw will be limited to the PA. While it is possible that shadow flicker could adversely affect Human Health and Quality of Life during the O&M Phase, results from the Shadow Flicker Assessment (Appendix K) indicate that shadow flicker will not exceed the recommended 30-shadow hours per year at any of the 96 modelled receptors. While ice throw may adversely affect Human Health and Quality of Life, the risk is restricted to Project personnel required to access the Wind Farm during the O&M Phase. Mitigative measures outlined in Section 4.5.7 will be implemented to protect Project personnel from falling or thrown ice fragment, thus the risks of ice throw affecting Human Health and Quality of Life are low.

Given the significance criteria defined in Section 4.2.7.1, no Project phase was determined likely to result in significant adverse residual effects to any KI of the Human Health and Quality of Life VC, as summarized in Table 5.7-2.

Table 5.7-1 Potential environmental effects of the Project on Human Health and Quality of Life.

Project Phase	Key Indicator	Nature of Effect	Effect Criteria					
			Magnitude	Frequency	Geographic Extent	Duration	Reversibility	Context
Construction	Shadow Flicker	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ice Throw	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Operation and Maintenance	Shadow Flicker	N	1	2	3	5	1	3
	Ice Throw	N	1	2	3	5	1	3
Decommissioning and Rehabilitation	Shadow Flicker	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ice Throw	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Accidents and Malfunctions	Shadow Flicker	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Ice Throw	N/A	N/A	N/A	N/A	N/A	N/A	N/A

NOTES
Nature of Effect: P – Positive, N – Negative
Magnitude: 1 – Negligible, 2 – Low, 3 – Moderate, 4 – High, 5 – Very High
Frequency: 1 – Single, 2 – Infrequent, 3 - Multiple Irregular, 4 – Multiple Regular, 5 – Continuous
Geographic Extent: 1 – Brownfield Site in PA, 2 – PA, 3 – LAA , 4 – RAA, 5 – Beyond RAA
Duration: 1 – <1 day, 2 – 1 to 7 days, 3 – 1 to 4 weeks, 4 – 1 to 12 months, 5 – >1 year
Reversibility: 1 – Highly Reversible, 3 – Partially Reversible, 5 – Irreversible,
Context: 1 – Brownfield, 3 – Evidence of Utilization, 5 – Relatively Pristine
N/A – not applicable, no residual effects anticipated on this KI.

Table 5.7-2 Significance of potential residual environmental effects of the Project on Human Health and Quality of Life.

Project Phase	Key Indicator	Significance of Residual Environmental Effects	
		Level of Significance	Level of Confidence
Construction	Shadow Flicker	N/A	N/A
	Ice Throw	N/A	N/A
Operation and Maintenance	Shadow Flicker	NS	3
	Ice Throw	NS	3
Decommissioning and Rehabilitation	Shadow Flicker	N/A	N/A
	Ice Throw	N/A	N/A
Accidents and Malfunctions	Shadow Flicker	N/A	N/A
	Ice Throw	N/A	N/A

NOTES
Level of Significance: S – significant, NS – not significant, P – positive
Level of Confidence: 1 – low, 2 – medium, 3 – high
N/A – not applicable, no residual effects anticipated on this KI.

5.8 Summary of Significant Residual Effects

This Registration presents information about the proposed Project and describes the existing biophysical and socio-economic environment to a level of detail that enabled a thorough assessment of environmental effects. Therefore, North Atlantic is confident in stating that the overall conclusion of its assessment is that there will be no significant residual adverse environmental effects from the Project.

6.0 Cumulative Effects

Cumulative effects assessment encompasses the combined effects of past, on-going and planned undertakings. Identifying and describing "planned" undertakings is key to this analysis. For the purposes of this cumulative effects assessment, reasonably foreseeable developments were selected based on undertakings that have been registered with relevant government agencies under EA processes. Note, within-Project cumulative effects have been considered and incorporated into the main Effects Assessment prepared for VCs and associated KIs (see Section 4.0).

6.1 Methods

All ongoing activities and projects described in Section 6.2 were included in the scope of the cumulative effects assessment. In addition, "planned undertakings" were identified through a review of project registrations listed on the websites of the Impact Assessment Agency of Canada and NL DECC EAD as of May 01, 2025.

The following criteria were considered for a candidate project or activity to be included in the cumulative effects assessment:

- The undertaking is likely to have an adverse residual environmental effect.
- Potential adverse effects from the undertaking overlap spatially and/or temporally with those of the Project.

The spatial boundary for the cumulative effects assessment is illustrated in Figure 6.1-1. The exception is Employment, Economy and Business, which has a larger study area to reflect labour requirements

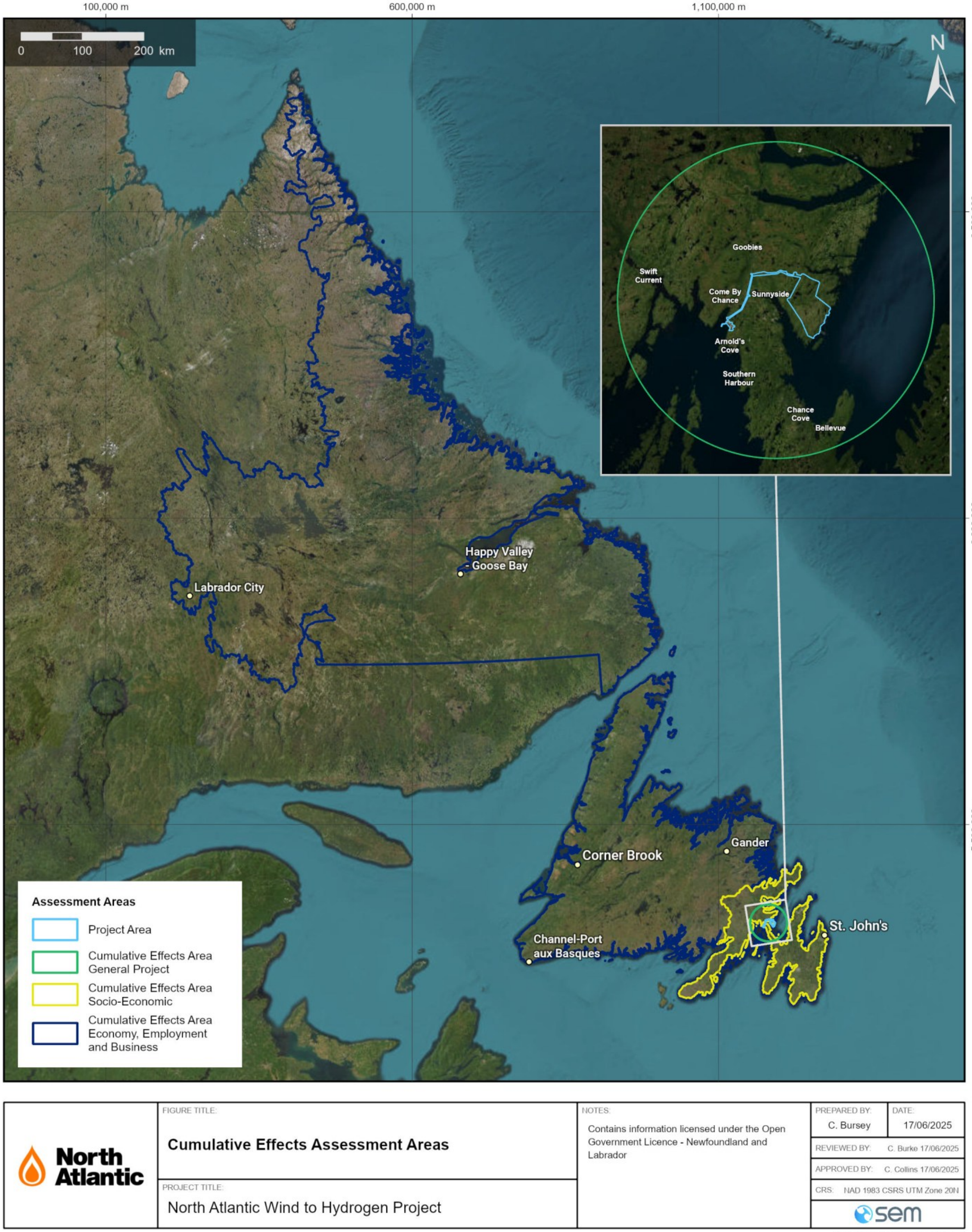


Figure 6.1-1 Cumulative effects assessment area (green circle).

Section 4.1 provides a description of methods and steps used to make cumulative effects predictions. The method is relatively high-level given the variety of information available on selected undertakings. Additionally, the effects predictions focus on proposed Project KIs (i.e., the most likely sources of cumulative effects).

6.2 Project Descriptions

The selection of past, present, ongoing, and anticipated undertakings and activities are listed in Table 6.2-1 and Table 6.2-2. The selection process included a conservative approach, so if a project was in question, it was included. As per standard practice, only projects registered with NL DECC EAD are subject to inclusion in a cumulative effects assessment. Toqlukuti'k Wind and Hydrogen Project and Arnold's Cove Industrial Park would have been considered for the cumulative effects assessment but have not been registered for environmental assessment at the time of the registration of the Project.

Table 6.2-1 Past and ongoing undertakings selected for Cumulative Effects Assessment.

Theme	Project name or Activity	Description	Status
Industrial development	Bull Arm Fabrication (BAF) Site, Bull Arm	Initially built to fabricate the gravity-based structure for the Hibernia Offshore Oil Project, currently leases all or portions of the facility to industrial tenants and provides construction, maintenance, inspection, fabrication, load-out, assembly, manufacturing, and supply servicing for large scale projects, including major portions of offshore oil installations (e.g., Hibernia, Terra Nova, White Rose and Hebron).	Intermittent operation - currently without a major capital project
	Braya Renewable Fuels, Come By Chance	A renewable bio-diesel generation facility with plans to expand into the green hydrogen industry in partnership with ABO Wind. In January 2025 (due to lower than anticipated margins), announced a temporary shut-down without identifying a reopening date (VOCM News, 2025).	Temporary shut-down
	NARL Logistics Terminal, Come By Chance	Provides storage and distribution services to North Atlantic (NARL Marketing LP) for vehicular, marine vessel and aircraft fuels.	Operational
	Canadian Maritime Agency Ltd	A locally based marine agency servicing foreign or domestic vessels entering Canadian waters, on behalf of NARL Logistics Terminal, charters and vessel owners.	Operational
	International-Matex Tank Terminals (IMTT) Newfoundland Transshipment Terminal Ltd. Whiffen Head (Arnold's Cove and Come By Chance)	Serves the offshore oil industry by transferring oil for shipment to market.	Operational
Government services and infrastructure	Non-specific	Includes federal, provincial and municipal (Town of Come By Chance, Town of Sunnyside, Town of Arnold's Cove, Town of Southern Harbour) activities including water and sewer supply/maintenance, roadway upkeep, building construction and facilities maintenance. Also includes provincial government services and infrastructure providing health care, education and training, and social services. Further information on government services and infrastructure can be found in Appendix G Socio-Economic Baseline Study, Sections 3.1.2 and 3.1.3.	Operational

Theme	Project name or Activity	Description	Status
Marine infrastructure	Icewater Seafoods Fish Plant, Arnold's Cove	Groundfish processing facility.	Operational
	Arnold's Cove Marina	Recreational boat marinas used by residents and visitors.	Operational
	Southern Harbour Marina		Operational

Table 6.2-2 Planned undertakings selected for Cumulative Effects Assessment.

Theme	Project name or Activity	Description	Status
Wind energy	EverWind Fuels Burin Peninsula Green Fuels Project	A proposed 10 GW onshore wind project with three wind farms of up to 1,500 turbines combined; three solar farms with a total capacity of 2.5 GW; and a 5.5 GW hydrogen/ammonia production plant (NLECC, 2025). All proposed project components are on the Burin Peninsula south of Swift Current.	Project is registered for environmental assessment and EIS Guidelines have been issued.
Marine infrastructure	Fisheries and Oceans Canada (DFO)-Small Craft Harbours (SCH), Arnold's Cove	Boat launch reconstruction – removal of existing infrastructure and construction of new boat launch for commercial users, in existing footprint (IAA 2025).	Released from impact assessment February 1, 2024
	DFO-SCH, Arnold's Cove	Floating dock installation – installation of a new floating dock (anchored with concrete anchor blocks) at an existing system of floating docks for recreational boating (IAA 2025).	Released from impact assessment March 7, 2024
	DFO-SCH, Arnold's Cove	Finger pier reconstruction – demolition and reconstruction of a finger pier for commercial users in existing footprint and dredging for installation of a rock mattress beneath the new structure (IAA 2025).	Pending Federal Authority notice of determination

6.3 Cumulative Effects Assessment

As detailed in Section 6.2, each identified contributor to cumulative effects has been evaluated for potential temporal and spatial overlap within the Project's assessment boundaries. Table 6.3-1 presents an overview of interactions that could potentially contribute to cumulative effects by VC. Where N/A is identified in the Table 6.3-1, this indicates that there is neither a temporal nor spatial interaction from these project's activities that could contribute to cumulative effects along with the Project.

Table 6.3-1 Potential interactions from other projects contributing to cumulative effects.

Theme	Valued Components							
	Atmospheric	Aquatic	Terrestrial	Land and Resource Use	Heritage and Culture Resources	Communities	Economy, Employment, Business	Human Health and Quality of Life
Past and present activities from other projects								
Industrial development	Plant and vehicle operations	Marine traffic	Vehicle operations Land use	Land use Water use	Land disturbance	Demand for services and facilities	Employment and procurement	Employment and income
Government services	Vehicle operations	Sewage discharge	Vehicle operations	Land use	Land disturbance	Demand for services and facilities	Employment and procurement	Employment and income
Marine infrastructure	Vehicle and commercial / recreational boat operations	Marine traffic	N/A	N/A	Cultural identity	Demand for services and facilities	Employment and procurement	Employment and income
Planned activities from other projects								
Wind energy	Construction Plant and vehicle operations	N/A	Vehicle operations Land use	Land use Water use	Land disturbance	Increased demand for services and facilities	Employment and procurement Potential competition for skilled labour	Employment and income
Marine infrastructure	Construction in marine environment Vehicle and boat operations	Disturbance to aquatic life Marine traffic	N/A	N/A	Cultural Identity	N/A	Employment and procurement	N/A
N/A = not applicable – no interaction identified/predicted								

6.4 Cumulative Effects Predictions

This section discusses the notable cumulative effects predictions of the Project, in accordance with the **Newfoundland and Labrador Environmental Protection Act** and its associated Environmental Assessment Regulations. Cumulative effects were assessed by considering the incremental contribution of the Project in combination with the residual environmental effects of past, present, and future projects (those registered with the Province) within the RAA.

EverWind Fuels is proposing to construct and operate the Burin Peninsula Green Fuels Project, a large-scale initiative with onshore wind and solar farms and a hydrogen/ammonia production plant. It is reasonable to assume that EverWind Fuel's activities will interact with the 'Economy, Employment, and Business' VC, as all three components will have requirements for large construction labour forces and procurement contracts. The Burin Peninsula Green Fuels Project is in the EA process. Should the project proceed, construction is anticipated to begin in Q2 of 2026. The Construction Phase could overlap with the Construction Phase of the Project, which is anticipated to occur from 2026 to 2029 (EverWind Fuels, n.d.). To date, no offtake agreements have been announced for EverWind Fuels' project on the Burin peninsula, nor for the project in Point Tupper, NS.

On a province-wide scale, the available labour has the capacity to meet anticipated demands of the Project in combination with other planned projects. For selected trades, additional training resource needs may be identified. These will be addressed in consultation with training institutions as required.

Marine infrastructure projects (i.e., boat launch reconstruction, finger pier reconstruction, floating dock installation) in Arnold's Cove are currently in the application for approval phase with DFO and is expected to begin construction in 2026 (DFO, 2025). Depending on schedule, there is potential for temporal overlap between these initiatives and the Project, and each could impact the workforce and thus the Economy, Employment, and Business VC due to the requirement for similar supporting services for construction. Additionally, an increase in vehicular traffic in Arnold's Cove is anticipated as industrial activities in the area expand, which may impact the atmospheric VC through effects on air quality and greenhouse gas generation or communities through increased traffic. The aquatic VC may also be affected due to potential disturbances to aquatic life from construction activities in the marine environment.

Although (as shown in Table 6.2-1), there are potential interactions from other projects that may contribute to cumulative effects along with residual effects of the Project, they are temporary in nature (i.e., not expected to be long term) and within a small geographic area. Thus, the prediction of cumulative effects on the VCs are considered to have no significant residual cumulative effects.

In summary, it is projected that the effects of the Project at all stages will result in minimal overlap with interactions from other undertakings and activities. Consequently, the cumulative environmental effects of the Project on VCs, in conjunction with effects from other planned or ongoing undertakings, are anticipated to be "not significant".

7.0 Assessment Summary and Conclusions

This Registration includes all the elements for a comprehensive environmental assessment, according to (1) the Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects, (2) Environmental Assessment: A Guide to the Process, and (3) the Environmental Assessment Regulations (2003) under the **Environmental Protection Act**.

For this Undertaking, predictions were developed for:

- The future condition of the environment in the absence of the Project;
- The predicted environmental effects of all phases of the Project, including the effects of Accidents and Malfunctions;
- The effects of the environment on the Project; and
- The cumulative effects of the Project when combined with the effects of past, present, and planned projects/activities.

The Project comprises three interconnected components; a Wind Farm situated on Crown Land Reserve in the Sunnyside Area, an HGP and HP both located within the existing Come By Chance Industrial Site including the NARL Logistics Terminal and Braya Refinery. Temporal, spatial and administrative boundaries were established for the Project, terminology was standardized, and the assessment methodology was developed in consultation with appropriate agencies.

Effects predictions for the Project were derived from empirical results. In all cases, conservative assumptions were made, especially where Project details (e.g., final designed wind turbine and transmission structure micro-siting, lighting design) are yet to be determined, or where alternatives were still under consideration.

The future condition of the environment in the absence of the Project would be a presumed continuation of the status quo for the area. The Crown Land Reserve would remain in its mosaic condition of several ecotypes of forest, wetland and scrub, and anthropogenic use would be primarily limited to a handful of recreational cabin owners. Meanwhile, the Come By Chance Industrial Site and surrounding area would continue to be dominated by industrial anthropogenic use. However, accompanying the status quo would be the forgone benefits of the Project to the region associated with positive socio-economic effects on the economy, employment, business, and community health.

The effects of the environment on the Project will be predominantly attributed to climate change predictions for increased variability in storms and storm surges, precipitation, and temperature. These phenomena have been considered in Project design. Meteorological monitoring stations will characterize and model local climate phenomena throughout the Project life.

Several other projects could contribute to cumulative environmental effects for the PA, LAA, and RAA, and it is projected that the effects of the Project at all stages will result in limited overlap with interactions from other undertakings and activities. Consequently, the cumulative environmental effects of the Project on VCs, in conjunction with effects from other planned or ongoing undertakings, are anticipated to be "not significant".

7.1 Assessment Summaries

The following text is intended to provide an overview summary of the results from the detailed assessment presented in Sections 4.0 and 5.0. Refer to Section 4.0 for detailed explanations of the interactions by Project phases and activities, descriptions of effects predictions (by KI), and details on mitigation and monitoring measures. The rationale for each of the effects predictions appear in Section 5.0.

7.1.1 Atmospheric Environment

This VC comprises GHGs, air quality, light, noise, and vibration. Modelling was conducted to provide quantitative predictions for each. Interactions were identified for all Project phases, including Accidents and Malfunctions. An Energy and Emissions Study (Appendix H1) was conducted to provide emission rates and dispersion for the Construction and O&M Phases. An Air Dispersion Modelling Study (Appendix H2) was conducted to evaluate the geographic scope and magnitude of the potential air emissions by the Project during the O&M Phase, and to assess the potential effect on the air quality based on relevant provincial regulations. A Light Impact Assessment (Appendix I) was conducted to evaluate influence of Project lighting on sensitive receptors. A Noise and Vibration Impact Study (Appendix J) was completed to evaluate the potential noise and vibration effects on sensitive receptors. Conservative assumptions were employed throughout all studies.

GHG emissions were a high priority for the Atmospheric Environment. Results from modelling indicated that atmospheric levels of GHGs during Construction and O&M will not be measurably changed because of the Project. GHG emission estimates were not quantified for the Decommissioning and Rehabilitation Phase nor for Accidents and Malfunctions. It is assumed that GHG emissions during the Decommissioning and Rehabilitation Phase will not exceed GHG emission levels generated during the Construction Phase. Accidents and Malfunctions may generate GHG emissions, however, at levels lower than those estimated during the Construction and O&M Phases. GHG emissions from the Project, emitted from direct or indirect sources, will contribute very little to overall global GHG emissions, and, assuming the green hydrogen that is produced is utilized to displace conventional hydrogen fuels, a net reduction in global GHG emissions can be expected.

Results of the air dispersion modelling indicated that no exceedances of regulatory air quality objectives are predicted at and around identified sensitive receptors. Isolated exceedances of select modelled parameters occurred infrequently inside the PA where limited to no public access is granted.

The extent to which artificial lighting and sound will affect receptors (including nearby residents) was modelled. Given the Project location, there will be limited potential for interactions between receptors and Project lighting. Modelling results indicated that predicted light effects for the duration of Project O&M will be negligible, in comparison to pre-existing conditions, and are in full compliance with applicable guidelines. Noise modelling was conducted using conservative methods (i.e., the largest wind turbines possible for the Project were modelled, even though their likelihood of being employed is low). Construction noise was predicted to have a minimal to negligible effect on nearby receptors. During O&M, noise levels will also remain within guidance levels.

The Project will generate vibrations during all Project phases. Risk of vibration effects would be primarily occurring during the Construction Phase resulting from the operation of high vibration generating pieces of equipment. It is anticipated that the O&M Phase will generate lower vibration levels at sensitive receptors compared to the Construction Phase. Since sources of vibration at the Wind Farm will be set back from dwellings by at least 1,000 m, Project interactions with baseline vibration levels are not anticipated. Like the O&M Phase, the Project Decommissioning and Rehabilitation Phase (and Accidents and Malfunctions) will result in less risk of vibration effects than Construction. Due to established Project setbacks from dwellings and the transient nature of decommissioning and rehabilitation activities and Accidents and Malfunctions, interactions with baseline vibration levels are unlikely. Following Decommissioning and Rehabilitation, vibration levels are anticipated to return to pre-Project conditions.

7.1.2 Aquatic Environment

The Aquatic Environment encompasses both freshwater and marine environments, with the freshwater environment likely experiencing more interaction with the Project given that the only marine interactions would be through the shipping of product and the outfall of wastewater.

Surface water will be required for the electrolysis process in the HGP and will interact with construction activities. Therefore, both surface water quantity and quality were considered for the assessment. The assessment was based on regulatory standards and guidance to protect water quality, including for outfalls and discharges. Much of the Construction Phase activities will be conducted on dry land and not in proximity to watercourses and waterbodies, however the installation of water-crossing structures and diversion ditches will alter watercourses at localized sections associated with access road and transmission line civil works. By applying proven mitigation measures (e.g., stormwater controls, adherence to pre-construction approvals and DFO guidance), there will be minimal and ephemeral effects on water quality. Additionally, water requirements for construction are expected to be limited in geographic extent and negligible in magnitude.

During O&M, continuous water withdrawal will be necessary to support the HGP and HP. This withdrawal will utilize the existing Inkster's Pond industrial water supply, and examination of hydrological cycles confirmed the capacity of the selected watershed to provide the required quantity of water without compromising other uses.

Demineralization water from the HGP will be directed to a new outfall location North of the jetty. Surface water runoff will be directed to the existing wastewater treatment plant for Braya and will be discharged through its marine outfall. Interactions with marine fish and fish habitats could also result from surface runoff during Construction (although that interaction is unlikely to be significant). Effluent dispersion modelling predicted that temperature and salinity changes will meet regulatory criteria. The discharge will be strictly regulated under environmental approvals to ensure compliance with safety and environmental standards.

Groundwater in the PA is not planned to be utilized to meet Project requirements and there will be few aspects of the Project that will interact with groundwater. The potential effects of the Project on groundwater are considered minimal.

Local fisheries and aquaculture operations in the RAA will not be measurably affected by Project construction or the monthly product shipments during O&M. The Fish Food and Allied Workers (FFAW) has been consulted and was not concerned with the level of marine interaction of this Project.

Several freshwater and marine SAR were identified as present or potentially present in the RAA. However, there were no interactions identified that would affect these species or the areas containing habitats of conservation concern.

Aquatic invasive species can be present in ballast water or attached to vessel hulls. Several such species are currently present in Placentia Bay, and DFO has taken measures to limit their spread. All appropriate precautions will be taken during vessel operations to prevent the introductions or spread of invasive species.

7.1.3 Terrestrial Environment

The major biophysical interactions resulting from the Project will be with the Terrestrial Environment. Extensive field surveys were conducted on several KIs to support the effects assessment. First, an ELC was conducted to serve as the foundation for assessing habitats for KIs and for stratifying field surveys by habitat type. Interactions with flora and fauna could then be assessed according to the habitats present within the PA (or LAA, if necessary).

For the brownfield portion of the PA (i.e., NARL Logistics Terminal) the anthropogenically altered landscape limits the potential for many terrestrial species, especially those that are habitat specialists of forested landscapes. Most of the species using the area would be limited to habitat generalists (that are rarely of any conservation concern) or those that specialize in disturbed or open habitats. A greater number of interactions are possible in the Wind Farm portion of the PA due to the more forested nature of the area, and the mosaic of different species compositions and age structures provides niches for a diversity of species to use the area. Bird species surveyed were comprised of a typical suite of resident and migratory species. Generally, during the temporal window of the Construction Phase, there will be avoidance behaviours exhibited by many species of birds and mammals. Road, transmission line, and wind turbine foundation construction will fragment habitats for some species, but mitigation measures (e.g., using existing roads and disturbed areas) will help reduce the potential for negative effects.

While many of the interactions with the Terrestrial Environment VC will occur during the Construction Phase of the Project, the O&M Phase will also involve ongoing interactions. Specifically, avifauna (birds) and bats are important receptors that will continue to interact with the Project during O&M. These species are susceptible to effects from wind energy development, primarily through collisions with wind turbines and electrical infrastructure, as well as habitat loss, fragmentation, and disturbance during all Project phases. Several SAR birds (e.g., Red Crossbill *percna*, Evening Grosbeak) and bats (e.g., little brown myotis, Northern myotis, and migratory species like hoary bat, Eastern red bat, silver-haired bat) have been identified as present or possible in the PA or LAA, heightening the need for protective measures. Additional survey time was allocated, and is ongoing in 2025, to ensure all SAR using the PA will have a higher probability of detection. A suite of proposed mitigation and monitoring measures were developed through consultations with regulatory agencies and reference to scientific literature. Proactive infrastructure siting (e.g., most wind turbines are sited on rocky barrens at high elevations with a naturally lower biodiversity and harsher environment for birds and bats), and work restrictions during sensitive timing windows (e.g., breeding season), and commitments to reduce mortalities through deterrents and adaptive smart curtailment are anticipated to reduce adverse effects. The Project will also include robust post-construction monitoring and adaptive management measures, such that the overall assessment concluded that there will be no significant residual effects on avifauna and bats (after the implementation of mitigation measures).

Some areas of vegetated land will be altered, lost, or fragmented due to the development of Project infrastructure such as roads, transmission lines, and wind turbine foundations. Micro-siting of infrastructure to avoid rare plants or lichens will be completed where possible.

Wetlands, primarily represented by many bogs and fens (and complexes of each), are abundant throughout the PA. Planning the road routes and wind turbine locations to avoid and minimize effects on wetlands will serve to minimize any direct wetland loss. During the Construction Phase, special precautions and mitigation measures will be implemented, including maintaining undisturbed buffers (e.g., 30 m wide), installing construction fencing, and applying erosion and sediment control measures, to minimize interactions and prevent siltation and disturbance.

7.1.4 Land and Resource Use

The Land and Resource Use VC was identified as a key focus because the Project has the potential to interact with existing land uses and resource activities within or near its footprint, and these could necessitate specific regulatory approvals and permits. The assessment considered several KIs - Land Use Planning and Development Control, Industrial and Commercial Land Use, Tourism and Recreation, Harvesting, and Indigenous Land Use. Recreational and subsistence activities are common amongst residents, as hunting, fishing, and foraging are widely popular activities in the region. Recreational fisheries for species such as brook trout, Atlantic salmon, rainbow smelt, and brown trout are common in the RAA, as well as trapping (e.g., fox, coyote, beaver, mink, lynx, wolf), and hunting (e.g., moose, black bear, small game, waterfowl, snipe, murres), and domestic wood harvesting.

Throughout all Project phases—including Construction, O&M, and Decommissioning—interactions with Land and Resource Use were anticipated. During the Construction Phase, activities such as site preparation and road building may lead to temporary disturbances such as noise, dust, and traffic delays, potentially affecting recreational users and nearby properties. Notable potential interactions with the Project include overlaps between the PA and a section of the T'Railway Provincial Park, two domestic harvest blocks in Sunnyside, and a handful of cabins located at Gull Pond and Lady Cove Pond. Linear infrastructure (access roads and transmission lines) associated with the Project is expected to have more frequent interactions with recreational and subsistence users than the wind turbine sites themselves. This is because these corridors cross areas used by cabin owners and accessed as domestic woodcutting zones via established ATV trails.

The Project has the potential to interact with mineral land tenure; however, the location of properties is such that no direct conflicts occur. Although Indigenous land claims were reviewed, no claims intersect with the PA, RAA, or LAA, and therefore, no interactions with Indigenous land use are anticipated. While marine fishing activities in adjacent waters was also considered, the likelihood of any measurable interaction is very low.

The Project incorporated design-in mitigation measures to address potential adverse effects such as twinning linear infrastructure along existing corridors to reduce the extent of disturbance. The Project electrical transmission lines will be required to cross the T'Railway corridor; however, none of the associated infrastructure will need to be constructed directly within the T'Railway property, thus avoiding direct physical disruption of the park's functional space. Other portions of the transmission line right-of-way were relocated based on stakeholder feedback to align with access roads, which further helps to manage interactions with recreational amenities. North Atlantic is committed to avoiding Protected Public Water Supply Areas (PPWSAs) where possible, and if necessary, will secure required permits for any development within these areas. Furthermore, North Atlantic has committed to continuing engagement with local stakeholders, including domestic wood harvesters and cabin owners, to understand their rights and interests. To address concerns about increased access to remote cabin areas and potential crime, North Atlantic plans to have a staffed office at the Trans-Canada Highway intersection and will install multiple onsite cameras, with a willingness to install a gate if requested by the community. Gate installation potential will be addressed through planned community engagement.

Given the application of comprehensive mitigation and environmental protection measures, the assessment concluded that there will be no significant residual adverse environmental effects on the Land and Resource Use VC. The Project is designed to comply with all existing zoning requirements, and while temporary effects from the Construction and Decommissioning and Rehabilitation Phases are acknowledged, they are assessed as moderate in magnitude and infrequent. Interactions during the O&M Phase are expected to be minimal.

7.1.5 Heritage and Cultural Resources

The Heritage and Cultural Resources VC encompassed natural or human-made works that hold value due to their archaeological, prehistoric, historic, cultural, natural, scientific, or aesthetic significance. The PA overlaps with one registered archaeological site as well as one area identified as having high archaeological resource potential where precautions will need to be taken. The Sunnyside Hills registered archaeological site (ClAk-02), and a portion of HPA-04 are within the PA. The next nearest registered archaeological site to the PA is the Bay Bulls Arm Telegraph Station (ClAl-04), located approximately 110 m east of the proposed transmission line ROW.

The location identified within the PA as having high archaeological resource potential includes an area near an unnamed watercourse. All other terrain within the PA was rated as having low archaeological potential. The HRIA also recorded the presence of two ethnographic locations within the PA which were recorded for the PAO and do not require any avoidance or mitigation measures There are no known or registered fossils in the PA, and the potential for their presence was considered low due to the region's geological composition. Similarly, there are no provincially registered heritage structures or municipal heritage sites within the PA.

The primary concern for heritage and cultural resources is physical disturbance or loss during the Construction Phase due to activities such as site preparation, road construction, and foundation installation. While there is potential for interaction, the North Atlantic approach to mitigation emphasizes avoidance of documented sites and structures eligible for registration. The two registered archaeological sites (CIAk-02 and CIAl-04), in or near the PA, and the two HPAs (HPA-04 and HPA-12) situated within the PA will be avoided. Note that HPA-12 encompasses CIAk-02. An Archaeological Mitigation phase will be completed prior to conducting any Project activities that may alter or disturb any existing structural remains or terrain identified in the HRIA as having high potential for existing and/or as-of-yet undiscovered historic and archaeological resources. The Contingency Plan will be followed, which outlines the measures and procedures to follow if any suspected Historic and Archaeological Resources are encountered on the surface or are unearthed during any phase of the Project. It is anticipated that, with these measures, there will be no significant adverse residual effects on Heritage and Cultural Resources.

7.1.6 Socio-Economic Environment

The Socio-Economic Environment VC was assessed in terms of Community interactions as well as Economy, Employment and Business. Community population demographics considered population growth, as well as changes in age structure and diversity. Community health and well-being was examined with respect to education, income, housing, food security, health and social services, as well as diversity, equity and inclusion. The description of community infrastructure and services included water and sewer, waste management, transportation, utilities, communications, emergency and prevention services, and recreation. The local economy, employment and business were examined in terms of GDP, tax revenue, labour supply, employment equity and diversity, other economic sectors, and capacity and growth.

During the Construction Phase a temporary increase in population is expected, as the local workforce may not be sufficient to meet the Project's labor needs. This increase is generally seen as a positive effect for rural communities experiencing population decline and aging. The Project is also anticipated to create employment opportunities, both short-term during the Construction Phase and long-term during O&M, which could lead to higher income and improved quality of life for individuals and families. Temporary increased demand on services like water, sewer, housing, healthcare, and roads is anticipated due the population influx during Construction. However, the option to house non-resident workers in an accommodation facility at the Bull Arm Fabrication Site with its own water and sewer services would minimize the impact on municipal infrastructure. Due to the smaller number of O&M employees, there is not anticipated to be an adverse effect on infrastructure and services.

A higher volume of solid waste is expected, but as industrial waste is handled by the private sector, there is no anticipated effect on residential collection or waste management in the LAA. North Atlantic will prepare a Project-specific Waste Management Plan. Temporary traffic delays may occur due to the transport of large wind turbine components, which will be managed through a Traffic Management Plan, with transportation potentially occurring during reduced traffic hours. Positive effects to the provincial and local economy are expected through large expenditures on construction contracts, goods, and materials, contributing positively to GDP and taxation. The Project is expected to generate an estimated 1,200 full-time positions during the Construction Phase, with an emphasis on local hiring and diversity and inclusion. A decrease in employment following Project closure is anticipated, and utilization of infrastructure and associated services are likely to return to pre-Project levels. An increased volume of solid waste is expected during Decommissioning and Rehabilitation Phase and will be managed similar to the Construction Phase. North Atlantic will develop a Project Decommissioning and Rehabilitation Plan to ensure site restoration.

The Project will result in a change to the visual landscape, especially around Sunnyside, due to the presence of wind turbines. North Atlantic acknowledges the visual alteration as a direct effect of the Project and has used public engagement to inform design modifications to minimize its effect where possible.

During O&M, the Project will require electricity services, including a new 138 kV transmission line connecting the Wind Farm to the HGP and a separate grid feed from the existing Sunnyside substation. The requirement for electrical services from the NLH grid during the O&M Phase (up to 120 MW, with 7 MW being firm power), is designed to leverage surplus grid capacity when available, while minimizing strain on the island grid.

North Atlantic has prepared an Emergency Response Plan and will have an Emergency Response Team to manage incidents such as fires, and engagement with area municipalities is planned to discuss how best to increase the capacity of nearby fire departments. Interactions between the Project and the Socio-Economic VCs from Accidents and Malfunctions are not expected to result in changes.

North Atlantic has committed to various community engagement and partnership initiatives to build partnerships with local municipalities, to maximize local benefits. and support community amenities and services. Measures include local/regional hiring, diversity and inclusion policies, workers' health and safety programs, traffic management, and waste reduction plans. With these measures, the Project is predicted to have no significant adverse residual effects on the Socio-Economic Environment VC throughout its lifespan. Overall, the effects on the local communities and regional economy, employment, and business will be positive, given the size and duration of the Project.

7.1.7 Human Health and Quality of Life

Many of the interactions with the potential to affect human health and quality of life were considered under other VCs. Atmospheric Environment included assessments of Air Quality, GHG Emissions, Light, Noise, and Vibration. The results of modelling concluded there will be no significant adverse residual effects from these interactions. Tourism and Recreation Resource Use, and Indigenous Land Use were considered under the Land and Resource Use VC, and it was concluded that there will be no significant adverse residual effects.

Shadow flicker and ice throw from wind turbine blades during O&M were considered in the Human Health and Quality of Life VC. Shadow flicker occurs when sunlight passes through the moving blades and creates an effect of pulsating light and shadow. It is most pronounced when the sun is low on the horizon, typically during sunrise and sunset, and when a wind turbine is positioned directly between the sun and a receptor. The intensity of shadow flicker decreases with increasing distance from the wind turbines, meaning it is most apparent to receptors closest to the wind turbines. Modelling identified four receptors which would experience shadow flicker; however, these receptors are expected to receive no more than five hours of shadow flicker per year, which is far below the current guidelines of 30 hours per year. As such, there will be no significant residual adverse environmental effects from shadow flicker.

Ice throw can occur during changes in air temperature such that accumulated ice on the wind turbine blades is projected from the wind turbine during operations as the blades rotate. A related phenomenon, ice fall, occurs when ice fragments detach from the wind turbine while the blades are paused or idle. Modelling produced estimates of ice throw distances under extreme conditions and indicated that Project roads are within the ice throw zones of all wind turbines. Similarly, transmission lines and substations are potentially at risk of damage from ice throw. With the implementation of CanREA guidance, adherence to recommended setback distances from dwellings, and measures to prevent ice accumulation (e.g., all wind turbines will be equipped with winter weather and de-icing features), the Project is not anticipated to result in significant adverse health effects due to ice throw during any Project phase.

7.2 Assessment Conclusions

This Registration provides details about the proposed Project and outlines the current biophysical and socio-economic conditions with enough detail and analyses to support a comprehensive evaluation of potential environmental effects. Based on this assessment, North Atlantic is confident in concluding that the Project will not result in any significant residual adverse environmental effects, as presented below in Table 7.2-1.

Key considerations were concerning SAR (i.e., the collision of SAR birds and bats with wind turbine blades), the potential effects of catastrophic Accidents and Malfunctions (e.g., uncontrolled release of process products – hydrogen, toluene, or MCH), surface water use, treatment and discharge of effluent, and potential changes to access and quality of land use. The Project also presents benefits in terms of its contribution to global decarbonization efforts by displacing fossil fuels with green hydrogen, but also to the province of Newfoundland and Labrador with the expected generation of significant employment opportunities, positive contribution to the GDP, and tax revenue.

A core principle of the assessment was the conservative approach consistently applied to effects predictions, aiming to avoid any underestimation of potential adverse effects. Integration of site-specific conditions and engineering design, such as leveraging the existing Come By Chance Industrial Site brownfield infrastructure for the HGP and HP, were key to minimizing adverse effects. Overall, the Construction Phase of the Project is anticipated to involve the most numerous and widespread interactions with the environment, over a proposed 29-month period concluding by 2029. During this time a suite of standard mitigation measures will help avoid interactions, minimize effects, or both. While the O&M and Decommissioning and Rehabilitation Phases will also have interactions, they are generally expected to be of lesser magnitude or similar to those during the Construction Phase, but typically less extensive or temporary. Nevertheless, some will require monitoring and adaptive measures (particularly to address concerns with SAR). A hierarchy of mitigations will be employed: first, to avoid unwanted interactions with the environment during planning; second, to reduce their magnitude, duration, or extent if unavoidable; third, to restore disturbed areas to their original condition; and finally, to consider compensation as a last resort. This commitment is reflected in various Project-specific plans and best management practices. Accidents and Malfunctions are unlikely to result in interactions that produce significant negative residual effects.

The Wind Farm area is largely in an area of low habitat quality for bats; however, population estimates are not well established for the island, due to a relatively scarce amount of historical data and research. The locations of routes for migratory species remain unknown; nor is it certain that routes are even established in Newfoundland. Although plenty of literature exists from other jurisdictions on responses of bats to mitigation measures, there has been no local research conducted in Newfoundland. North Atlantic is committed to establishing mitigation for bat collisions through consultations with NL WD. North Atlantic is proposing the use of optimized smart curtailment to minimize effects on bats, and the implementation of state-of-the-art technology such as thermal cameras and AI. Smart curtailment incorporates real time data and predictive models to mitigate collisions by adjusting turbine operations as necessary (i.e., triggering higher cut-in speeds only when bat activity is detected), and mitigates against the unnecessary energy losses that accompany blanket curtailment. Optimized smart curtailment incorporates AI models and machine learning with site specific information on species, topography, and turbine locations, allowing for maximum energy output while minimizing risk of collisions.

Table 7.2-1 Index of effects assessment conclusions by Valued Components and Key Indicators.

Valued Component	Key Indicator	Residual Effect
Atmospheric Environment	Air Quality	Not Significant
	Greenhouse Gas (GHG) Emissions	Not Significant
	Light	Not Significant
	Noise	Not Significant
	Vibration	Not Significant
Aquatic Environment	Surface Water Resources	Not Significant
	Ground Water Resources	Not Significant
	Freshwater Fish and Fish Habitat	Not Significant
	Marine Fish and Fish Habitat	Not Significant

Valued Component	Key Indicator	Residual Effect
	Fisheries and Aquaculture	Not Significant
	Species at Risk	Not Significant
	Habitats of Conservation Concern	Not Significant
	Marine Biosecurity	Not Significant
Terrestrial Environment	Flora	Not Significant
	Wetlands	Not Significant
	Fauna (Mammals)	Not Significant
	Avifauna	Not Significant
	Lichens	Not Significant
	Bats	Not Significant
	Insects	Not Significant
Land and Resource Use	Land Use Planning and Development Control	Not Significant
	Industrial and Commercial Land Use	Not Significant
	Tourism and Recreation	Not Significant
	Harvesting	Not Significant
	Indigenous Land Use	N/A
Heritage and Cultural Resources	Historic and Archaeological Resources	Not Significant
	Paleontological Resources	N/A
	Architectural Resources	N/A
Socio-Economic Environment	Population Demographics	Not Significant (Positive)
	Community Health and Wellbeing	Not Significant
	Infrastructure and Services	Not Significant
	Economy	Not Significant (Positive)
	Employment	Not Significant (Positive)
	Business	Not Significant (Positive)
Human Health and Quality of Life	Air Quality[1]	Not Significant
	Light[1]	Not Significant
	Noise[1]	Not Significant
	Vibration[1]	Not Significant
	Shadow Flicker	Not Significant
	Ice Throw	Not Significant
	Recreational and Subsistence Resource Use[2]	Not Significant
	Indigenous Land Use[2]	N/A

NOTES
N/A = not applicable
[1]Assessed under Atmospheric Environment.
[2]Assessed under Land and Resource Use.

Effects predictions for the Project were derived from empirical results. In all cases, conservative assumptions were made, especially where Project details (e.g., final designed wind turbine and transmission structure micro-siting, lighting design) are yet to be determined, or where alternatives were still under consideration.

In conclusion, the assessment of potential environmental effects across various categories reveals that the Project is unlikely to result in significant adverse effects on Atmospheric, Aquatic, or Terrestrial environments, Land and Resource Use, Heritage and Cultural Resources, the Socio-economic Environment, or on Human Health and Quality of Life. All KPIs, such as air quality, water resources, wildlife habitats, land use, heritage, and community well-being, were found to have an insignificant impact. In addition, the Project’s effects on human health, including factors such as noise, vibration, and air quality, are also expected to be negligible.

Overall, the proposed Project demonstrates a minimal environmental footprint, suggesting that it will be manageable and sustainable in terms of both ecological integrity and socio-economic benefits.

8.0 Stakeholder and Indigenous Consultation

Consultation is a key component of the North Atlantic approach to project planning and development. North Atlantic understands that the success of a project goes beyond regulatory requirements; it is about building meaningful, collaborative relationships that ensure concerns are addressed, ideas are shared, and benefits are felt in local communities. The North Atlantic group of companies has been working with local communities for more than 30 years to enhance local economic development through information sharing, deliberative dialogue, and the development of collaborative processes. This is particularly true in the communities surrounding the PA where North Atlantic currently operates. Throughout community consultations, residents evoked their own experiences with North Atlantic as a local employer, member of the business community, investor, and community supporter; demonstrating their own investment in the company and its long-term success.

North Atlantic's consultation approach focuses on early and active community engagement, ensuring community values are part of the project planning process. Understanding that different stakeholders have diverse interests and objectives with respect to the Project, North Atlantic appreciates the need for a multifaceted engagement approach.

North Atlantic's consultation approach focused on four main objectives:

- Provide timely information to Project stakeholders.
- Receive and respond to stakeholder feedback, questions, and concerns.
- Collect local knowledge for incorporation into project planning.
- Learn how communities may be potentially affected by the Project.

Based on this approach and long-established foundation of trust and open communication, North Atlantic believes that by continuing to work collaboratively with communities the Project will be a successful and environmentally sustainable project for the province.

Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects recommends that public and Indigenous consultation is undertaken to address any concerns prior to registering the undertaking, and to consider identifying and contacting local community representatives, government representatives (municipal, provincial, and federal), Indigenous peoples, and other stakeholders who may have an interest in the proposed undertaking. Consultation and associated issues scoping activities for the Project that involved government departments and agencies, stakeholder and Indigenous peoples, and the public are summarized in this section.

8.1 Key Stakeholder and Indigenous Groups

Prior to commencing consultation activities, key stakeholder and Indigenous peoples were identified through North Atlantic's established relationships, desktop research, and consultation with local groups and organizations. The list of key stakeholder and Indigenous groups is presented in Table 8.1-1. As the Project advances through the subsequent phases, the list will evolve as new groups and organizations express an interest.

Table 8.1-1 Key stakeholder and Indigenous groups.

Category	Organization/Group
Government agencies and departments	NL Department of Environment and Climate Change NL Department of Industry, Energy and Technology NL Department of Tourism, Culture, Arts and Recreation NL Department of Fisheries, Forestry and Agriculture NL Department of Justice and Public Safety NL Department of Immigration, Population Growth and Skills Environment and Climate Change Canada Fisheries and Oceans Canada Transport Canada
Indigenous Groups	Qalipu First Nation Band Miawpukek First Nation
Municipalities and Local Service Districts	Sunnyside Come By Chance Arnold's Cove Southern Harbour Chance Cove
Industry	Energy NL econext NL Hydro Professional Engineers and Geoscientists Newfoundland and Labrador (PEGNL)
Business	Arnold's Cove and Area Chamber of Commerce Advance St. John's Community Business Development Bank (CBDC) Local business owners
Unions and Labour	Trades NL United Steel Workers (USW) Carpenters and Millwrights Union Construction Labour Relations Association
Fishery	Fish Food and Allied Workers (FFAW) Atlantic Groundfish Council NL Aquaculture Industry Association Ocean Choice International
Arts and Education	Memorial University of Newfoundland (MUN) Marine Institute College of the North Atlantic Tricentia Academy
Environment and Non-Government Organization (NGO)	Salmonoid Association of Eastern Newfoundland Nature Newfoundland and Labrador Canadian Parks and Wilderness Society (CPAWS) – Newfoundland and Labrador Chapter

Category	Organization/Group
Tourism and Recreation	Centre Hill Trail Newfoundland and Labrador Outfitters Association Hospitality NL

8.2 Government & Regulatory Consultation

As part of the Project planning process, North Atlantic has engaged with all identified provincial and federal government stakeholders to share information and request feedback. Consultation with government departments and agencies has included discussions and ongoing information sharing through meetings, email, and telephone conversations. The results of these consultations have been considered in Project planning and incorporated into the Registration.

Table 8.2-1 provides a list of all government department and agencies consulted for the Project.

Table 8.2-1 Summary of regulatory consultation.

Date	Department/Agency	Method	Purpose and Focus
22-07-2024	DFO	Email	Request for a meeting.
31-07-2024	DFO	Meeting	Introductory meeting and Project overview.
16-08-2024	DFO	Email	Email to share information to provide further understanding of the PA selection process associated with the Project. Requested review and further discussion on the program.
24-09-2024	NL DECC – Environmental Assessment Division	Meeting	Introductory meeting and Project overview.
24-09-2024	NL DECC – Environmental Assessment Division	Email	Follow-up email to share Project plan, meeting notes and presentation.
11-10-2024	Department of Industry, Energy and Technology – Renewable Energy Division	Phone call	Request for information regarding Crown land permits.
16-10-2024	NL DECC - Pollution Prevention Division	Email	Request to meet.
16-10-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Request to meet.
16-10-2024	NL DECC – Water Resources Management Division	Email	Request to meet.
16-10-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Request to meet.
21-10-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office (PAO)	Email	Contacted PAO regarding a potential archaeological site in the area.

Date	Department/Agency	Method	Purpose and Focus
29-10-2024	NL DECC - Pollution Prevention Division	Meeting	Meeting to discuss Project overview, progress, timeline, study details with respect to Pollutant Release and water use.
04-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Offering schedule options for a meeting.
05-11-2024	NL DECC – Water Resources Management Division	Email	Follow-up request to meet with schedule options for the meeting.
05-11-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Offering schedule options for a meeting.
05-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Offering schedule options for a meeting.
08-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Meeting	Introductory meeting. Discussion regarding Project scope and requirements
08-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Requesting details regarding the potential overlap between the transmission line and the potential UNESCO site.
08-11-2024	Department of Justice and Public Safety – Fire Services Division	Email	Offering dates to schedule a meeting with Fire Services Division.
19-11-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Meeting	Introductory meeting and Project overview.
20-11-2024	Department of Industry, Energy and Technology	Email	Request for information on Mineral Licenses within a Wind Energy Land Reserve, and contact info for mineral claims holders.
20-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Sharing meeting minutes.
20-11-2024	NL DECC – Pollution Prevention Division	Email	Sharing meeting minutes.
21-11-2024	Department of Industry, Energy, and Technology	Phone call	Follow up call to the email to IET regarding mineral license holder outreach.
22-11-2024	NL DECC – Water Resources Management Division	Meeting	Introductory meeting and Project overview.
27-11-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Sharing meeting minutes and request for follow up meeting to discuss Aquatic survey methodology.
28-11-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Archeologist advising that there are fossils in the Chance Cove area, but they are outside the PA.
02-12-2024	NL DECC - Pollution Prevention Division	Email	Sharing Pop-up Office hours.
04-12-2024	Department of Justice and Public Safety – Fire Services Division	Meeting	Introductory meeting and Project overview.

Date	Department/Agency	Method	Purpose and Focus
05-12-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Sent meeting request.
12-12-2024	NL DECC – Water Resources Management Division	Email	Sharing meeting minutes, presentation, and details of the proposed water crossings.
12-12-2024	NL DECC – Environmental Assessment Division	Meeting	Monthly Project Update Meeting.
12-12-2024	Department of Justice and Public Safety – Fire Services Division	Email	Sharing meeting minutes.
13-12-2024	Fisheries Forestry and Agriculture – Wildlife Division	Meeting	Discussion regarding Aquatic baseline program scope and methodology.
17-12-2024	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Request for a listing of all the registered archaeological and ethnographic sites situated within the Regional Assessment Area.
18-12-2024	NL DECC – Environmental Assessment Division	Email	Sharing meeting minutes.
18-12-2024	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Request for input on recreational fishing and land and resource use survey.
06-01-2025	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	Email	Requesting locations of currently known historical sites to determine if there are any potential interactions with PA.
07-01-2025	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Request for input on creel survey.
08-01-2025	NL DECC - Climate Change Branch and Department of Health and Community Services	Email	Request to meet.
08-01-2025	Department of Tourism, Culture, Arts and Recreation – Tourism Product Development Division	Email	Request to meet.
09-01-2025	ECCC – Canadian Wildlife Service	Email	Request to meet and provided agenda.
13-01-2025	Department of Transportation and Infrastructure	Email	Request to meet.
13-01-2025	Transport Canada	Email	Request to meet.
13-01-2025	Department of Indigenous Affairs and Reconciliation	Email	Invitation to Community Sessions.
13-01-2025	Department of Finance	Email	Invitation to Community Sessions.
13-01-2025	Department of Immigration, Population Growth and Skills	Email	Invitation to Community Sessions.
13-01-2025	Department of Transportation and Infrastructure	Email	Invitation to Community Sessions.
13-01-2025	Department of Digital Government and Service NL	Email	Invitation to Community Sessions.

Date	Department/Agency	Method	Purpose and Focus
13-01-2025	NL DECC	Email	Invitation to Community Sessions.
13-01-2025	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Invitation to Community Sessions.
13-01-2025	Department of Health and Community Services	Email	Invitation to Community Sessions.
13-01-2025	Department of Industry, Energy and Technology	Email	Invitation to Community Sessions.
13-01-2025	Department of Justice and Public Safety	Email	Invitation to Community Sessions.
13-01-2025	Department of Municipal and Provincial Affairs	Email	Invitation to Community Sessions.
13-01-2025	Department of Tourism, Culture, Arts and Recreation	Email	Invitation to Community Sessions.
13-01-2025	Department of Energy and Natural Resources	Email	Invitation to Community Sessions.
13-01-2025	Office of the Member of House of Assembly (MHA) - Placentia West - Bellevue District	Email	Invitation to Community Sessions.
13-01-2025	Office of the MHA - Terra Nova District	Email	Invitation to Community Sessions.
13-01-2025	Department of Industry, Energy and Technology	Email	Invitation to Community Sessions.
13-01-2025	Department of Industry, Energy and Technology	Email	Invitation to Community Sessions.
14-01-2025	ECCC – Canadian Wildlife Service	Email	Offering schedule options for a meeting.
17-01-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	Sharing meeting minutes.
20-01-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	Sharing revised meeting minutes.
21-01-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	Sharing Creel Survey for Review.
21-01-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	SEM provided details of correspondence with DFO for review of methods by Wildlife Division.
27-01-2025	NL DECC – Environmental Assessment Division	Meeting	Monthly Project update meeting.
28-01-2025	NL DECC – Wildlife Division	Email	Follow-up with regulator who was unable to attend November meeting.
28-01-2025	NL DECC – Environmental Assessment Division	Email	Sharing meeting minutes.
30-01-2025	Department of Municipal and Provincial Affairs	Email	Request to meet.
30-01-2025	ECCC – Canadian Wildlife Service	Email	Invitation for meeting and provided draft of Project survey plan.
31-01-2025	NL DECC - Climate Change Branch and	Meeting	Introductory meeting and Project overview.

Date	Department/Agency	Method	Purpose and Focus
	Department of Health and Community Services		
05-02-2025	NL DECC – Climate Change Branch	Email	Provided overview of the Management of Greenhouse Gas Act.
07-02-2025	Department of Transportation and Infrastructure	Meeting	Introductory meeting and Project overview.
10-02-2025	Transport Canada	Meeting	Introductory meeting and Project overview.
10-02-2025	DFO – Canadian Coast Guard	Email	Submitting information for an assessment of wind turbine siting.
11-02-2025	ECCC – Meteorological Service of Canada	Email	Submitting information for an assessment of wind turbine siting.
12-02-2025	NL DECC - Climate Change Branch and Department of Health and Community Services	Email	Sharing meeting minutes.
12-02-2025	DFO – Canadian Coast Guard	Email	Provided assessment that they do not anticipate any interference issues.
14-02-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	Correspondence requesting historical forestry information.
17-02-2025	Transport Canada	Email	Sharing meeting minutes.
17-02-2025	Department of Transportation and Infrastructure	Email	Sharing meeting minutes.
17-02-2025	Department of Tourism, Culture, Arts and Recreation – Tourism Product Development Division	Meeting	Introductory meeting and Project overview.
18-02-2025	Department of Municipal and Provincial Affairs	Email	Follow-up request to meet.
18-02-2025	NL DECC	Email	Request to meet.
18-02-2025	Department of Immigration, Population Growth and Skills	Email	Request to meet.
18-02-2025	Department of Industry, Energy, and Technology – Mineral Lands Division	Email	Request to meet.
18-02-2025	Department of Fisheries, Forestry and Agriculture – Aquaculture Division	Email	Request to meet.
18-02-2025	Department of Fisheries, Forestry and Agriculture – Land Management Division	Email	Request to meet.
21-02-2025	Department of Health and Community Services	Email	Methodology recommendations provided for noise baseline studies.
21-02-2025	ECCC – Meteorological Service of Canada	Email	Provided assessment that they do not anticipate any interference issues.
24-02-2025	Department of Fisheries, Forestry and Agriculture	Email	Request to go over license agreement to access digital data in the area North

Date	Department/Agency	Method	Purpose and Focus
			and Northeast of Sunnyside of the island.
24-02-2025	NL DECC – Environmental Assessment Division	Email	Monthly Project update meeting.
25-02-2025	Transport Canada	Email	Confirmed that the Project does not trigger conditions necessitating federal Impact Assessment based on proposed marine transportation components.
25-02-2025	NL DECC – Environmental Assessment Division	Email	Clarification on the industry standards for Shadow Flicker.
25-02-2025	NL DECC – Policy Planning and Natural Areas Division	Email	Correction on industry standard of allowed shadow flicker exposure per day/per year (based on Germany).
24-02-2025	NL DECC – Environmental Assessment Division	Email	Sharing meeting minutes.
26-02-2025	ECCC – Canadian Wildlife Service	Meeting	Introductory meeting and Project overview.
26-02-2025	Department of Fisheries, Forestry and Agriculture – Aquaculture Division	Email	Provided assessment that they do not anticipate any interference issues.
27-02-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	SEM followed up on Wildlife Division's review of Aquatic survey methods.
28-02-2025	Department of Tourism, Culture, Arts and Recreation – Tourism Product Development Division	Email	Sharing meeting minutes and presentation.
03-03-2025	Department of Transportation and Infrastructure	Email	Request for the Department to provide an update on outstanding action items.
03-03-2025	Fisheries Forestry and Agriculture – Wildlife Division	Email	Wildlife Division replied to request for review of Aquatic survey methods – pending review by their fish ecologist.
04-03-2025	Department of Transportation and Infrastructure	Email	The Department shared link to their Highway Access Management Policy.
04-03-2025	Department of Fisheries, Forestry and Agriculture – Wildlife Division	Email	Request to meet to discuss bat curtailment.
06-03-2025	NL DECC – Canadian Wildlife Service	Email	Sharing meeting minutes and presentation.
06-03-2025	NL DECC – Policy Planning and Natural Areas Division	Email	Sharing meeting minutes and presentation.
06-03-2025	Department of Tourism, Culture, Arts and Recreation	Email	Request for information from the Department for Historic Resources Overview Assessment.
10-03-2025	NL DECC - Policy Planning and Natural Areas Division	Email	Sharing updated meeting minutes.
10-03-2025	Fisheries Forestry and Agriculture – Wildlife Division	Meeting	Meeting to discuss bat curtailment.

Date	Department/Agency	Method	Purpose and Focus
11-03-2025	Department of Tourism, Culture, Arts and Recreation - Tourism Product Development Division	Email	Department provided contact info for local communities & businesses.
12-03-2025	Department of Immigration, Population Growth and Skills	Meeting	Introductory meeting and Project overview.
21-03-2025	Department of Indigenous Affairs and Reconciliation	Email	Request to meet.
26-03-2025	Department of Immigration, Population Growth and Skills	Email	Sharing meeting minutes and presentation. Provided regulator with the Projects economic impact evaluation.
02-04-2025	Department of Fisheries, Forestry and Agriculture – Land Management Division	Email	Follow-up request to meet.
04-04-2025	NL DECC – Environmental Assessment Division	Meeting	Monthly Project Update Meeting.
07-04-2025	Various Departments – PPD, Fire Services, Service NL	Email	Request for review of the Emergency Response Plan.
08-04-2025	NL DECC – Environmental Assessment Division	Email	Sharing meeting minutes.
15-04-2025	Department of Fisheries, Forestry and Agriculture – Land Management Division	Email	Informed that the Crown Lands reserves are being administered by IET and provided contact information for Robert Hodder, Director of Renewable Energy Projects.
15-04-2025	Department of Industry, Energy and Technology	Call	Robert Hodder called to discuss the meeting invite. Informed that they have been engaging with North Atlantic regarding this Project monthly. Mr. Hodder advised he will reach out if he requires additional meetings.
11-04-2025	Department of Municipal and Provincial Affairs – Local Governance and Planning	Email	Scheduled meeting.
14-04-2025	Various Departments – PPD, Fire Services, Service NL	Email	Follow up on status of the request for review - Emergency Response Plan.
23-04-2025	Department of Municipal and Provincial Affairs – Local Governance and Planning	Meeting	Introductory meeting and Project overview.
24-04-2025	Department of Municipal and Provincial Affairs – Local Governance and Planning	Email	Sharing meeting minutes and presentation.
25-04-2025	NL DECC – Environmental Assessment Division	Email	Sharing monthly meeting agenda.
28-04-2025	Various Departments – PPD, Fire Services, Service NL	Email	Responses received from Service NL and PPD for incorporation. Final reminder for comments sent to regulators.

Date	Department/Agency	Method	Purpose and Focus
29-04-2025	NL DECC – Environmental Assessment Division	Email	Sharing meeting minutes.
02-05-2025	Department of Indigenous Affairs and Reconciliation	Email	Scheduled meeting.
05-05-2025	Various Departments – PPD, Fire Services, Service NL	Email	Responses received from Fire Services Division. Feedback period for incorporation in the EA registration document closed.
09-05-2025	Department of Indigenous Affairs and Reconciliation	Email	Introductory meeting and Project overview.
14-05-2025	Department of Indigenous Affairs and Reconciliation	Meeting	Introductory meeting and Project overview.
22-05-2025	Department of Indigenous Affairs and Reconciliation	Email	Sharing meeting minutes and presentation.

8.3 Public and Stakeholder Consultation

A variety of consultation and communication methods have been used to engage with stakeholders and the public during the Registration planning process. The methods used were designed to proactively engage in respectful two-way information sharing with a focus on gathering local knowledge and perspectives on potential effects (both adverse and positive), respond to questions and concerns, and bridge the gap between technical and non-technical audiences.

A list of the consultation and communication methods used to share information and encourage participation, and feedback is presented in Table 8.3-1.

Table 8.3-1 Consultation and communication methods.

Method	Description
Project website	A Project website, www.greenenergyhub.ca, was launched in 2024. Information is regularly updated to ensure the website is accurate and up to date. Website content includes: • Project overview. • Project map identifying land allocation. • Estimated Project timeline and schedule. • Public Event details. • Frequently Asked Questions. • Supplier registration form. • Email subscription form. • Newsletter archive. • Contact information.
FAQ Document	A Project fact sheet with frequently asked questions and answers is hosted on the website and printed for distribution at public information sessions. This document is updated based on questions received during public engagement.
Email address	A dedicated email, greenenergy@northatlantic.ca, has been promoted as a key communication method to contact the North Atlantic team with questions,

	comments, and feedback. Communications received and responses provided are recorded in Project consultation records.
Email distribution list	A Project email distribution list is regularly updated and includes key stakeholders, government personnel, and members of the public that requested to be added to the list.
Project Newsletter	A Project newsletter was created to share timely information with stakeholders. A sign-up form is available on the website and shared at all public events. The newsletters include information regarding: • Recent Project progress. • Upcoming public events. • Upcoming office hours. • Team bios. • Contact information. Newsletters are sent to addresses on the email distribution list and are archived on the Project website for public reference. The newsletter is distributed to 295 subscribers.
Community pop-up office	A series of community pop-up office hours provided an opportunity for residents to speak directly to team members to receive information and provide feedback.
Open houses	A series of open houses hosted in local communities provided stakeholders and the public an opportunity to meet the North Atlantic Team and subject matter experts, learn about the Project, ask questions, and provide feedback.
Community social	A community luncheon in Sunnyside offered a casual 'meet and greet' for residents and the North Atlantic team.
Career events	Participation in MUN's Fueling Tomorrow: The Future of Renewable Energy in NL conference and career fair offered graduating students the opportunity to learn more about potential careers with North Atlantic. Partnership with Energy NL and Marine Institute offered Tricentia Academy grade 10-12 students the opportunity to learn more about the industry and potential careers in energy.
Key stakeholder meetings	Numerous face-to-face and virtual meetings were hosted to provide up-to-date information to key stakeholders. PowerPoint presentations were used to aid discussions.
Survey	An online Land and Resource Use Survey was developed to capture local knowledge regarding public use of the PA.
3D Digital Model	A 3D interactive digital model was created to show the change in viewscape from any location in the PA.
Social media	Social media was used to share information regarding upcoming public information sessions, pop-up office hours, and Project updates. North Atlantic's social media channels are: • X (previously known as Twitter). • Facebook. • Instagram. • LinkedIn. Additionally, advisories for public information sessions were shared with municipalities for their distribution.
Press releases	Press releases have been issued to inform the media of Public Information Sessions and other Project updates.
Public Service Announcements (PSA)	PSAs were used to inform residents of upcoming activities. They were shared through all social media channels and with municipalities.

8.3.1 Public Information Sessions

Eleven public information events have been hosted to encourage public participation in Project and Registration planning; this included a series of community pop-up office hours and open houses in communities surrounding the PA. A description of these events and how the public was notified is provided below. Questions and concerns that were identified during the public information sessions are included in Section 8.9. Copies of information and materials distributed through these sessions are included in Appendix U.

8.3.1.1 Pop-up Community Office

A pop-up office was setup to introduce the Project and team members and establish a point of contact for the area communities. Six office days were hosted at the Bull Arm Information Centre, a central location for surrounding communities, see Table 8.3-2. The office was managed by the North Atlantic Communication and Engagement Manager with support from other team members. The office featured:

- Project Storyboards.
- Project video.
- Project map for public mark up to document local knowledge.
- Take-home information booklet.

Table 8.3-2 Summary of community pop-up office.

Community pop-up Office	Date	Time	Number of Participants
Bull Arm Information Centre	December 3, 2024	1-5pm	20
	December 4, 2024	1-5pm, 7-9pm	7
	December 5, 2024	9am-12pm	5
	December 17, 2024	1-5pm	7
	December 18, 2024	1-5pm, 7-9pm	10
	December 19, 2024	9am-12pm	8

Public Open Houses

Four public open houses were held in area communities during the afternoon and evening of January 28 and 29, 2025, see Table 8.3-3. The open houses were designed as a drop-in event where participants could visit at a time convenient to them and spend as much time as they wanted discussing elements of the Project. The room was set up as an information circuit with topic-specific poster boards arranged around the room to encourage conversations regarding each element of the Project. A map table was in the center of the room where participants were asked to add local knowledge to paper maps. Subject matter experts were available at each station. Welcome and feedback stations were located adjacent to the entrance and exit, as well as a refreshment table. The open house team consisted of six North Atlantic staff, as well as representatives from environmental consultant SEM and engineering consultant Hatch.

The event consisted of five topic-specific stations with poster board displays. All information presented was combined into a take-away booklet. The topic specific stations included:

- Project overview.
- Wind Farm and related infrastructure.
- Hydrogen generation and hydrogenation plants.
- Environmental assessment process and baseline studies.
- Feedback and Land and Resource Use survey.

Table 8.3-3 Summary of public open houses.

Open House Location	Date	Time	Number of Participants
Southern Harbour	January 28, 2025	1-4 pm	13
Come By Chance	January 28, 2025	6-9 pm	9
Arnold's Cove	January 29, 2025	1-4 pm	12
Sunnyside	January 29, 2025	6-9 pm	17

8.3.1.2 Community Social

North Atlantic hosted a community lunch in Sunnyside on April 5, 2025, from 1 to 4 pm, at the Sunnyside Wellness Centre. The community luncheon offered a casual 'meet and greet' for residents and the North Atlantic team. An information circuit was set up, similar to the open houses. A total of 35 residents dropped by to meet the Team, review Project information, and have a light lunch.

8.3.1.3 Public Notification

To ensure broad community awareness and encourage participation, North Atlantic shared information regarding all public events a minimum of three weeks in advance via multiple avenues:

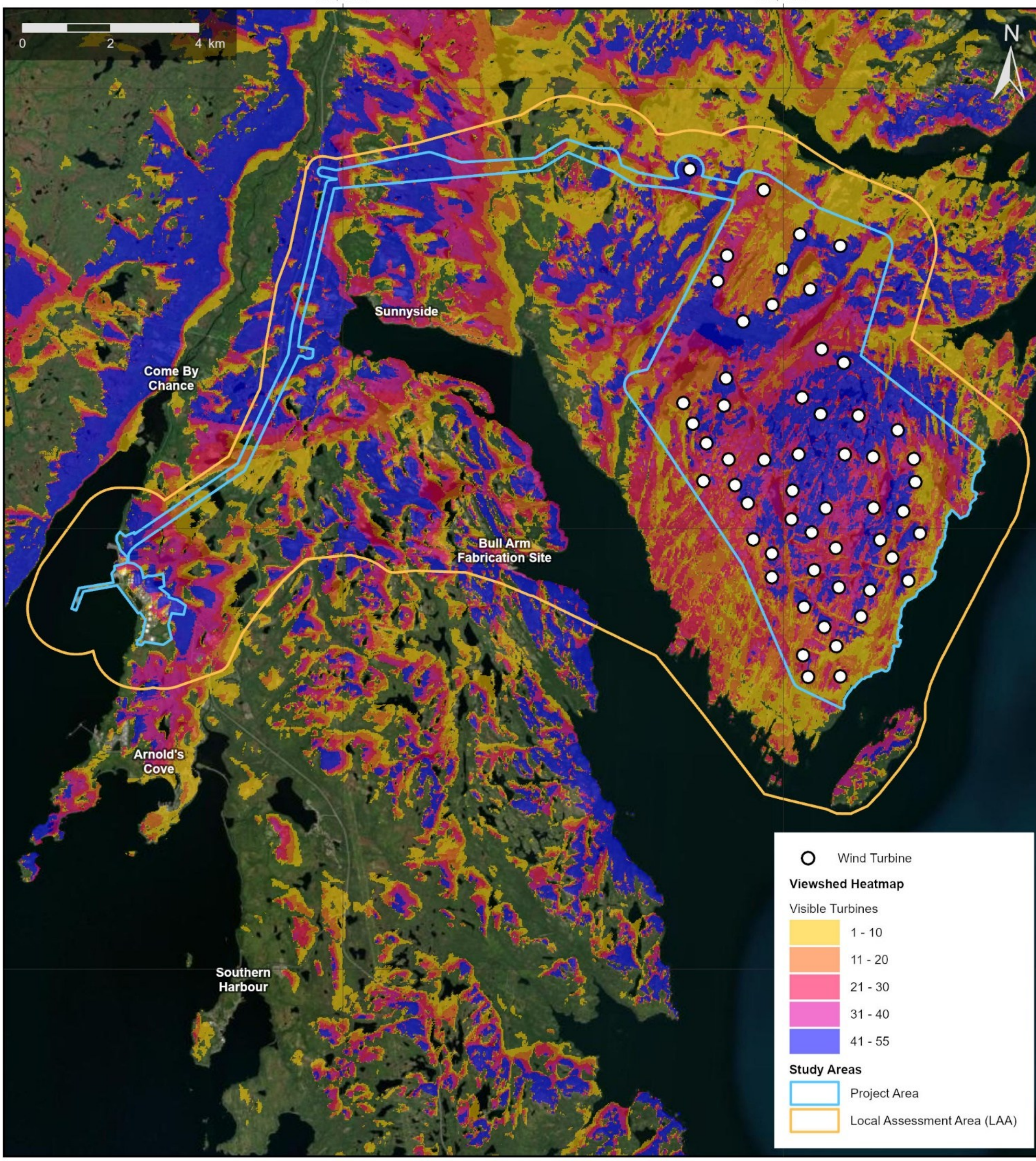
- Posters in public locations;
- Social media posts;
- Town websites;
- Email distribution list;
- Newsletter;
- Press releases to media; and
- Personalized invitations sent to members of Indigenous communities, key stakeholders, municipalities, and government departments.

8.3.1.4 Public Service Announcements

North Atlantic issued Public Service Announcements on local radio stations from April 4 to April 7, 2025, to advise the public about upcoming work associated with the installation of a MET in Sunnyside.

8.3.1.6 Digital Model and Viewshed

North Atlantic developed a 3D interactive digital model for public events. The model recreated views of the Wind Farm from any point in the Project study area. Residents were able to enter their home address, or other location, to see what the windfarm would look like from that particular vantage point. The model also allowed for a virtual view of Project components including the windfarm, access road, substation, and transmission line. Residents commented that the model was very effective in visualizing changes. The model can be found at: https://experience.arcgis.com/experience/60fc2e3478ae491cbd3273f5c4834b7a . A 2D viewshed of the wind turbines has also been developed and presented in Figure 8.3.2-1.



North Atlantic	FIGURE TITLE: Turbine Viewsheds	NOTES: Viewshed model created from the Geodesic Viewshed tool where Observer Height = 1.5m and maximum visible Turbine Blade Height = 200m. DEM Provided by Government of NL GIS and Mapping division.	PREPARED BY: J. Crocker	DATE: 09/07/2025
	PROJECT TITLE: North Atlantic Wind to Hydrogen Project		REVIEWED BY: C. Bursey 09/07/2025	
			APPROVED BY: C. Collins 09/07/2025	
			CRS: WGS 1984 UTM Zone 22N	
			sem	

SEM MAP ID: 016-015-GIS-666-Rev0

Figure 8.3.2-1 Turbine viewsheds.

8.4 Land and Resource Use Study

North Atlantic created an online Land and Resource Use survey to gather information from local resource users. Online and paper copies of the survey were available at the public information sessions held in January and April 2025; participants were encouraged to complete the survey. In March 2025, the survey was included in the Project newsletter and recipients were encouraged to complete the survey. The survey was also provided to the FFAW and Hospitality NL for distribution. By April 30, 2025, 16 completed surveys were received. The survey and responses are presented in Appendix R-1.

8.5 Stakeholder Working Group

For more than twenty years, North Atlantic has engaged a local Stakeholder Working Group to update them on activities related to the company's ongoing business, and to provide a forum that can address issues of concern. The Stakeholder Working Group is led by representatives from the NARL Logistics Terminal because of the long-standing relationship with local stakeholders. The group includes community representatives, local industries, unions and the Arnold's Cove Area Chamber of Commerce. The group was engaged early in Project planning, since the representatives have a high level of interest in the Project. There have been several meetings with the group over the past three years, specific to the Project. North Atlantic plans to continue to meet with the working group throughout all Phases of the Project, at least once every six months or more frequently, as needed.

There exists a continuous and open channel of communication between the mayors of the local communities and representatives from the NARL Logistics Terminal. Community leaders frequently reach out directly to Terminal personnel whenever they have question about the Project.

8.6 Public and Stakeholder Consultation Summary

A summary of public and stakeholder consultation activities to date (May 2025) is provided in Table 8.6-1. The listing of 90 interactions illustrates the depth and breadth of engagement with interested parties. A summary of the issues and concerns addressed through this consultation program is presented in Section 8.9.

Table 8.6-1 Summary of public and stakeholder consultation.

Date	Stakeholder Group	Method	Purpose and Focus
26-07-2022	Town of Arnold's Cove	Meeting	Project overview; letters of support were offered
26-07-2022	Town of Southern Harbour	Meeting	Project overview; letters of support were offered

Date	Stakeholder Group	Method	Purpose and Focus
26-07-2022	Town of Sunnyside	Meeting	Project overview; letters of support were offered
28-07-2022	Town of Come By Chance	Meeting	Project overview; letters of support were offered
05-08-2022	Arnold's Cove Area Chamber of Commerce	Meeting	Project overview; letters of support were offered
21-09-2022	Office of the MHA	Meeting	Project overview; letters of support were offered
29-09-2022	Stakeholder Working Group	Meeting	Stakeholders updated on progress of Project
29-09-2022	Stakeholder Working Group	Meeting	Meeting to provide overview of Project
07-12-2022	Stakeholder Working Group	Meeting	Stakeholders updated on progress of Project
08-12-2022	Stakeholder Working Group	Meeting	Stakeholders updated on progress of Project
17-01-2023	Stakeholder Working Group	Email	Stakeholders updated on progress of Project
20-02-2023	Stakeholder Working Group	Meeting	Introduction to the Hy2gen team and discussion of potential partnerships between Hy2Gen and North Atlantic
11-05-2023	Stakeholder Working Group	Email	A series of emails initiating consultation with the Stakeholder Working Group
04-07-2023	Stakeholder Working Group	Meeting	Update on Center of Excellence and Met Tower
04-07-2023	Stakeholder Working Group	Meeting	Stakeholders updated on progress of Project
01-08-2023	Town of Come By Chance, Town of Sunnyside	Meeting	Discussion of Project details and local impacts
01-08-2023	Arnold’s Cove Area Chamber of Commerce, Town of Southern Harbour	Meeting	Discussion of Project details and local impacts
15-09-2023	Stakeholder Working Group	Meeting	Discussion of Crown lands bid
15-09-2023	Stakeholder Working Group	Meeting	Discussion of Crown lands bid
19-02-2024	Stakeholder Working Group	Meeting	Stakeholders updated on progress of Project
07-07-2024	Stakeholder Working Group	Email	Update on Crown lands bid
23-07-2024	Office of the MHA	Phone call	Notification that a Crown land recommendation letter would be provided to North Atlantic from the MHA
23-07-2024	Town of Come By Chance, Town of Sunnyside, Office of	Meeting	Meeting to discuss the Crown land bid announcements

Date	Stakeholder Group	Method	Purpose and Focus
	the MHA, Arnold's Cove Area Chamber of Commerce		
04-10-2024	Trades NL	Meeting	Meeting to provide Project update
10-10-2024	Town of Arnold's Cove	Email	Correspondence addressing questions regarding employment opportunities
10-10-2024	Town of Come By Chance	Email	Correspondence addressing questions regarding employment opportunities
10-10-2024	Town of Sunnyside	Email	Correspondence addressing questions regarding employment opportunities
11-10-2024	Town of Southern Harbour	Email	Invitation to networking reception
11-10-2024	Town of Arnold's Cove	Email	Invitation to networking reception
11-10-2024	Town of Sunnyside	Email	Invitation to networking reception
11-10-2024	Town of Come By Chance	Email	Invitation to networking reception
15-10-2024	Arnold's Cove Area Chamber of Commerce	Email	Invitation to networking reception
24-10-2024	MUN	Email	Invitation to several events
30-10-2024	econext/MUN	Conference	Presented at annual conference
04-11-2024	MUN	Meeting	Discussions about MUN and Marine Institute's potential roles and involvement
05-11-2024	Key stakeholder distribution list	Email	Invitation to Green Energy Hub launch event
22-11-2024	Office of the MHA, Arnold's Cove Area Chamber of Commerce, Stakeholder working group, Key Project stakeholders	Email	Update on public engagement activities
25-11-2024	Town of Arnold's Cove, Southern Harbour, Come By Chance, Salvation Army Food Bank	Email	Offering donation to owns or community recreation activities
29-11-2024	FFAW	Email	Correspondence to initiate introduction and set-up meeting
29-11-2024	Arnold's Cove Area Chamber of Commerce	Email	Request to meet
02-12-2024	Iron City Services	Email	Response to request to deliver a presentation on services
02-12-2024	Midshore Construction Limited	Email	Response to request to be added to supplier list
04-12-2024	FFAW	Email	Sharing pop-up office hours

Date	Stakeholder Group	Method	Purpose and Focus
11-12-2024	econext, MUN	Email	Correspondence to share materials presented at conference
13-12-2024	FFAW	Email	Correspondence to arranging meeting with fish harvesters
13-12-2024	Ocean Choice International Inc.	Email	Correspondence to share link to Green Energy Hub website
13-12-2024	Town of Sunnyside	Email	Sharing pop-up office hours and request to meet
16-12-2024	Trades NL	Meeting (In-person)	Briefing on construction needs
18-12-2024	Trades NL	Email	Sharing copy of presentation
18-12-2024	Local cabin owners	Meeting (In-person)	Discussion on Project and location of wind turbines
19-12-2024	Town of Arnold's Cove, Southern Harbour, Come By Chance, MHA, Arnold's Cove and Area Chamber of Commerce.	Luncheon	Christmas Luncheon at the Arnold's Cove Inn
06-01-2025	Town of Chance Cove	Email	Request to meet
06-01-2025	NLCA	Email	Correspondence offering Project briefing
06-01-2025	Ocean Super Cluster	Email	Correspondence offering Project briefing
06-01-2025	Energy NL	Email	Correspondence offering Project briefing
06-01-2025	Nature Newfoundland and Labrador	Email	Correspondence offering Project briefing
06-01-2025	Canadian Parks and Wilderness Society (CPAWS) – Newfoundland and Labrador Chapter	Email	Correspondence offering Project briefing
06-01-2025	Cabin owners	Meeting	Meeting to review PA and address questions and concerns
08-01-2025	Town of Chance Cove	Email	Correspondence to provide Project information
08-01-2025	Newfoundland Aquaculture Industry Association (NAIA)	Email	Correspondence offering Project briefing
09-01-2025	Newfoundland and Labrador Construction Association (NLCA)	Email	Correspondence to set a date for Project briefing
13-01-2025	Key Stakeholder distribution list	Email	Invitation to public open house
14-01-2025	Canadian Manufacturers & Exporters (CME)	Email	Correspondence offering Project briefing

Date	Stakeholder Group	Method	Purpose and Focus
14-01-2025	PEGNL	Email	Correspondence offering Project briefing
14-01-2025	North Star Associates Inc.	Email	Supplier briefing
15-01-2025	Groundfish Council	Virtual meeting	Discussion about vessel traffic and risks
20-01-2025	Town of Sunnyside	Email	Invitation to public open house
20-01-2025	Construction Labour Relations Association of NL	Meeting	Meeting to provide Project introduction
21-01-2025	FFAW	Email	Correspondence to arranging meeting
30-01-2025	J. Picco Barnett	Email	Correspondence to respond to local questions regarding noise
31-01-2025	Greig Seafood	Virtual meeting	Discussion on spills
31-01-2025	NL Outfitters	Virtual meeting	Discussion on disruption for hunters in the area
05-02-2025	econext	Meeting (In-person)	Presentation & discussion on Project
05-02-2025	Construction Labour Relations Association	Virtual meeting	Discussion on support of Project
05-02-2025	Atlantic Canada Regional Council, Carpenters and Millwrights	Virtual meeting	Discussion on labour model & offering of letter of support
17-02-2025	Legendary Coasts	Email	Correspondence offering Project briefing
17-02-2025	Hospitality NL	Email	Correspondence offering Project briefing
19-02-2025	Community Business Development Corporation (CBDC)	Virtual meeting	Discussion on using local suppliers & employment/training
20-02-2025	Town of Sunnyside	Meeting (In-person)	Presentation & discussion about Project
20-02-2025	Community Business Development Corporation	Meeting	Project update presentation to all NL CBDC directors
21-02-2025	Community Business Development Corporation	Email	Meeting follow-up with presentation used during the meeting
25-02-2025	Advantage St. John's	Virtual meeting	Presentation & discussion about Project
26-02-2025	Arnold's Cove Area Chamber of Commerce	Email	Correspondence with the Chamber to provide information for their strategic plan
27-02-2025	Energy NL	Meeting	Meeting to provide Project update. Follow-up email to share presentation
05-03-2025	FFAW	Virtual meeting	Presentation on Project; Discussed risk of spills, vessel traffic, runoff etc.

Date	Stakeholder Group	Method	Purpose and Focus
06-03-2025	Hospitality Newfoundland and Labrador	Virtual meeting	Presentation on Project
03-04-2025	Town of Chance Cove	Meeting (In-person)	Presentation & discussion on Project; Discussed PA/size, timeline, LOHC process and water use
08-04-2025	Professional Engineers and Geoscientists	Meeting (In-person)	Presentation & discussion of Project
09-04-2025	The Salmonid Association of Eastern NL	Email	Project overview and highlights of salmon baseline studies.
27-05-2025	Student of Tricentia Academy	In-person Event	Careers in Energy Day

8.7 Indigenous Consultation

North Atlantic respects the asserted and established Aboriginal and Treaty Rights of Indigenous peoples in Newfoundland and Labrador as protected by section 35 of the **Constitution Act**, 1982, and acknowledges that its activities may have potential effects on these rights. Consistent with this commitment, North Atlantic has provided Indigenous peoples with opportunities to learn about the Project and to provide input regarding potential effects of the Project on Indigenous rights and interests. North Atlantic will continue to provide timely, relevant, and accessible information to Indigenous peoples throughout each phase of the Project.

Miawpukek First Nation

Miawpukek Mi'kamawey Mawi'omi, also known as Miawpukek First Nation (MFN), is a First Nations Reserve on the south coast of Taqamkuk (Newfoundland) (MFN, 2024). The Reserve is approximately 130 km west of the PA. Miawpukek was historically used by Mi'kmaq as a semi-permanent camping site, and became a permanent community around 1822 (MFN, 2024). The Miawpukek Reserve was officially designated as Samiajij Miawpukek Indian Reserve in 1987 under the Federal Indian Act (MFN, 2024). There are about 3,060 members of the MFN, living both on and off the Reserve (MFN, 2024).

North Atlantic initially approached Miawpukek in October 2024 to establish a relationship and process for ongoing consultation. In June 2025, Chief Benoit visited and toured the NARL Logistics Terminal for a presentation on the Project and later toured the proposed Wind Farm area by helicopter.

Qalipu First Nation

Qalipu Mi'kmaq First Nation (QFN) was established as an Indigenous Band under the **Federal Indian Act** in 2011, and consists of approximately 24,000 members (HNL, 2024). While QFN does not manage reserve lands and has no official land base, its members reside within 66 communities across the island

(HNL, 2024). QFN maintains a central administrative office in Corner Brook and satellite offices in Glenwood, Grand-Falls Windsor, St. George's, and Stephenville (HNL, 2024).

North Atlantic initially approached Qalipu in October 2023, to establish a relationship and process for ongoing consultation.

Indigenous Consultation Summary

To date, consultation has been in the form of meetings and information exchanges as described in Table 8.7-1. Lines of communication have been established with both organizations and ongoing liaison will ensure that issues of concern are addressed promptly.

Table 8.7-1 Summary of Indigenous consultation.

Date	Indigenous Group	Method	Purpose and Focus
12-10-2023	Qalipu First Nation	Meeting	Exchange of organizational overview presentations
18-10-2024	Miawpukek First Nation	Email	Invitation to Green Energy Hub Launch Event
18-10-2024	Qalipu First Nation	Email	Invitation to Green Energy Hub Launch Event
21-10-2024	Miawpukek First Nation	Email	Invitation for a virtual discussion
21-10-2024	Qalipu First Nation	Email	Invitation for a virtual discussion
22-10-2024	Miawpukek First Nation	Email	Invitation to post-launch event dinner
23-10-2024	Qalipu First Nation	Email	Invitation to post-launch event dinner
13-11-2024	Miawpukek First Nation	Email	Follow-up on invitation to upcoming engagement events
19-11-2024	Qalipu First Nation	Phone call	Invitation to tour the facilities
22-11-2024	Qalipu First Nation	Email	Follow-up email with invitation to tour the facilities
13-01-2025	Miawpukek First Nation	Email	Invitation to Community Information Sessions
13-01-2025	Qalipu First Nation	Email	Invitation to Community Information Sessions
27-02-2025	Qalipu First Nation	Email	Inviting C. Pender and Chief Brake for facility tour
10-03-2025	Miawpukek First Nation	Email	Scheduling tentative tour of facilities for Chief Benoit
12-03-2025	Miawpukek First Nation	Email	Request for information from MFN regarding traditional or historical Indigenous use of the Project Study Area

Date	Indigenous Group	Method	Purpose and Focus
15-04-2025	Qalipu First Nation	Email	Follow-up email to Chief Brake offering an introduction to the Project and tour of North Atlantic's facilities.
15-04-2025	Qalipu First Nation	Email	Response from QFN acknowledging the invitation and advising that they will follow-up with a date and time that works for them.
15-04-2025	Miawpukek First Nation	Email	Follow-up email to Chief Benoit offering an introduction to the Project and tour of North Atlantic's facilities.
16-04-2025	Miawpukek First Nation	Email	Response from MFN offering to meet on June 18, 2025.
18-06-2025	Miawpukek First Nation	Meeting (In-Person)	Site visit and tour by Chief Benoit.

8.8 Ongoing Engagement

North Atlantic is committed to ongoing engagement throughout all phases of Project planning and development. Beyond the Registration, North Atlantic will actively work with communities to provide timely Project updates, address concerns, and incorporate feedback. North Atlantic is committed to ensuring that the Project not only succeeds but does so in a way that is collaborative, inclusive, and respectful of communities.

The North Atlantic Public Participation Plan for the Construction, O&M, and eventual Decommissioning and Rehabilitation Phases of the Project is presented in Appendix P. The purpose of the plan is to ensure that interested and affected parties, including local communities, are engaged in a meaningful way during all phases of the Project. The plan describes the communication and outreach approaches that will be used to ensure that productive and meaningful public engagement is ongoing throughout all Project phases.

8.9 Questions and Concerns

Stakeholder and Indigenous questions and concerns raised during consultation have been collected and inventoried throughout the Project planning process. A summary of the questions and concerns identified to date, and responses provided, are listed in Table 8.9-1. The table is categorized by theme and notes the section of the Registration that addresses the topic.

Table 8.9-1 Summary of questions and concerns and responses.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
Registration	Recommend including detailed outline of the rational site/survey methods in the Registration.	FFAW	Appendix B1 – Section 3.2 Study Sites and Aquatic Baseline Evaluations has a description of all the sites that were evaluated and selected and what criteria was used. Table B1.1 in the appendices includes specifics on each water crossing.
	Recommend having specific details on the process of sub-selection of waterbodies and watercourses.	DFO	Appendix B1 – Section 3.2 Study Sites and Aquatic Baseline Evaluations has a description on how the selection process for streams occurred. From desktop to site evaluations and their criteria.
	Recommend that all waterbodies and watercourses (permanent and intermittent) that may be directly or indirectly affected by the proposed work be identified and listed.	DFO	A total of 49 freshwater habitats were identified with an interaction with the Project components, including 20 watercourse crossings associated with the access roads, 4 waterbodies associated with the access roads and 25 watercourse crossings associated with transmission lines. Details are provided in Appendix B1.
	Recommend all listed watercourse crossing locations should be classified and from this a subset percentage of representative streams should be selected for field investigations.	DFO	Of the 49 freshwater habitats, 20 were assessed in the field and 29 were assessed through desktop analysis. Details are provided in Appendix B1. Rationale for the selection of these sites was presented to both federal and provincial regulators, DFO and NL FFA. Details are provided in Appendix B1.
	Baseline characterization will be required for a subset of waterbodies and watercourse crossings for which there is potential or confirmed fish habitat.	DFO	Field baseline studies were conducted for a subset of waterbodies and watercourse crossings. Details are provided in Appendix B1.
	Timing of Registration submission.	Cabin owners/ Public Information Sessions	Expect to submit in July 2025.
	Availability of baseline studies	Cabin owners	Baseline studies will be included in the Registration.
Project Planning	Upgrades to the existing jetty near the NARL Logistics Terminal?	NL DECC	Some piping will require upgrading but no other upgrades to the jetty are planned. Details are provided in Section 2.
	Effluent discharge location	NL DECC	Two options have been evaluated and modelled as a potential effluent discharge location. These locations are presented in Section 2.3.1.4 and 2.4.2.4, and on Figure 2.3.1.4-1.
	Volatility of LOHC	NL DECC	LOHC properties and hazards are outlined in the ERP (Appendix M). Toluene and MCH are considered volatile organic compounds (VOC). Toluene and MCH have a vapour pressure lower than gasoline. Loss of LOHC

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
			to the environment will increase the risk of fire or explosion. As engineering design progresses, North Atlantic will complete Dispersion modelling and update applicable plans, including the Emergency Response Plan (Appendix M) and Hazardous Materials Training Plan (Appendix O).
	Status of dehydrogenation plants at the off-taker side	NL DECC	Pre-FEED stage ongoing at the time of Registration submission.
	Relationship with Braya	NL DECC	Silverpeak has a minority share (<20%) in Braya Renewable Fuels. North Atlantic does not operate any facilities owned by Braya. NARL Logistics provides terminal services to Braya only. Additional details are presented in Section 1.1.
	Exceedances associated with combined effluent with Braya	NL DECC	Two options have been evaluated and modelled as a potential effluent discharge location. These locations are presented in Section 2.3.1.4 and 2.4.2.4, and on Figure 2.3.1.4-1.
	Additional investments in the Terminal	Stakeholder meeting	Terminal upgrades for this Project will include the conversion of 4 existing crude tanks, as well as upgrades to some piping and loading arms on the jetty for the purpose of handling MCH and Toluene.
	Backup power options	NL DECC	Compared to constructing on-site batteries, supplementing the system with NLH grid power is preferred. Details are presented in Section 2.4.2.1.
	Connection to the grid for backup power	Stakeholder Meeting	North Atlantic has submitted an Interconnection request to NLH for a total of 120 MW to support the Project during wind intermittency.
	Project timeline	Public information session	Construction schedule is anticipated from Q4 2026 to Q2 2029 and is presented in Table 2.3.4-2.
	Requirement for Sulfur pile removal for hydrogen facility	NL DECC	North Atlantic is in currently in negotiations to begin the process of having the piles removed.
	Confusion distinguishing between different Projects in the area.	Public information session	Refer to Section 2.1 and Figure 2.1.1-1 for clarity.
	Reason for selection of Project	Public Information Session	It allows us to use existing infrastructure at Come By Chance and government-allocated land from the Wind Energy Call for Bids. It is also driven by hydrogen market demand, Provincial climate commitments, and strong local wind resources (see Section 2.2).
	Possibility of underwater transmission line	Public Information Session	It is cost prohibitive to do an underwater transmission line, as well as an issue for maintenance during operation for underwater transmission.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	Land requirements for transmission line	NL DECC	Regulatory requirements and Project permits, approvals, licences, and authorisations that may be required are outlined in Section 2.5.
	Comparison of published satellite wind data to what has been measured at the MET	Stakeholder Meeting	99.2% agreement has been observed on energy yield.
	Number of water crossings anticipated from the development of Project infrastructure	NL DECC	A total of 49 freshwater habitats were identified with an interaction with the Project components, including 20 watercourse crossings associated with the access roads, 4 waterbodies associated with the access roads and 25 watercourse crossings associated with transmission lines. Details provided in Appendix B1.
	Potential for multiple plants	Stakeholder Meeting	There is the possibility of multiple plants, for Wind and for Hydrogen. North Atlantic has been looking to partner with businesses that have the expertise in the Wind and Hydrogen industry.
	Size and location of the substation	Town of Chance Cove	Provided map. Project Description details provided in Section 2.3.
	Plan for selling power to the grid	Town of Chance Cove	The Project does not include a plan to sell power to the grid
	Access to the parcel of land to the North for future developments	Cabin owner group	There has been no engineering performed on the parcel to the North. It is the third priority for development. Should it be developed, a new EA and additional consultation will be undertaken.
	Access road snow clearing	Cabin owner group	The access road will be cleared such that a 4x4 can utilize it (Section 2.3.5.1).
	Requirement for water use license separate from Braya	NL DECC	The Project intends to use Lady Cove Pond for construction water requirements, and the existing Inkster's Pond industrial water supply for operation water requirements. Two new water use licenses will be applied for dedicated Project usage, per consultation with NL DECC WRMD. Project Description details provided in Section 2.3.
	Amount of water required for both the hydrogen process and cooling	NL DECC	947,000 m^3 annually or 0.030 m^3/s for maximum Project production capacity. Details are presented in Appendix C.
Terrestrial Environment	Amount of clear cutting required for each wind turbine?	Cabin owner group	Each wind turbine will have a 110 m x 110 m footprint. Project Description details provided in Section 2.3.
Atmospheric Environment	Effect of a loss of LOHC to the environment	NL DECC	Loss of LOHC to the environment will increase the risk of fire or explosion. Additionally, toluene is toxic if inhaled in high enough concentrations. Exposure to toluene may impact respiratory health, and cause irritation to eyes and skin (Table 4.3-1, Chapter 4).

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
Aquatic Environment	Effects on the salmon river in Come By Chance	Public information session	There will be no project interaction with the Come by Chance River. Details provided in Appendix B1.
	Presence of schedule salmon rivers in the PA	FFAW	There are no scheduled Atlantic salmon rivers within the LAA or PA while some of the Deer Harbour River watershed is within the PA. Details provided in Appendix B1.
	Requirement for scheduled salmon rivers should be ground surveyed and fully characterized.	DFO	A total of 49 freshwater habitats were identified with an interaction with the Project components and 20 were studied in field baseline surveys. Details provided in Appendix B1.
	Inclusion of water chemistry studies in the Registration	Cabin owner group	Water chemistry studies were included in the aquatic baseline studies. Details provided in Appendix B1.
	Surveys for collector line crossings	DFO	Collector lines for the Project will run parallel to access roads, therefore will impact the same waterbody and watercourse crossing locations as the access roads. Details provided in Appendix B1.
	Rational for how and why the two water bodies were selected for further field work	DFO	Rationale for the selection of sites was presented to both federal and provincial regulators, DFO and NL FFA. Details provided in Appendix B1.
	Timing and duration of surveys per year and number of years of data collection	DFO	Fish and fish habitat field surveys were conducted during the summer and fall of 2024 on the Sunnyside Peninsula and isthmus region. Details provided in Appendix B1.
Marine Environment and Shipping	Requested a review of the Physical Activities Regulations: SOR/2019-285 to ensure the Project does not trigger any of the conditions necessitating federal assessment based on any marine transportation components.	Transport Canada	Following a review of the regulations, we can confirm that none of the conditions triggering a federal assessment will be met.
	Timing of vessel traffic related to the Project	FFAW	Likely not until 2027. The Construction Phase schedule is presented in Section 2.3.
	Concern regarding increased traffic in Placentia Bay	Public information session	Recently there has been a downward trend of vessels docking at the Port of Come By Chance over a10-year period. For this Project, LOHC vessels, and possibly tugboats if required, will be shipping product from the NA Logistics Terminal 12 to 15 times a year. Logistics considerations are outlined in Section 2.4.3.
	Concern regarding effluent going in the ocean	Public information session/FFAW	Effluent from HGP will be discharged to a new outfall location north of the jetty and will meet all effluent quality requirements. Description provided in Section 2.3.1.4 and 2.4.2.4.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	Concern regarding the quantity of water released into the ocean	FFAW	Approx. 50K liters/hour
	Concern regarding the impact freshwater release into the ocean will have on lobsters	FFAW	Effluent will be discharged to a new outfall location north of the jetty and will meet all effluent quality requirements. Description provided in Section 2.3.1.4 and 2.4.2.4.
	Concern regarding increased vessel traffic for Construction Phase and delivery of equipment	Public information session	There will be increased vessel traffic during the Construction Phase at the Port of Come By Chance and also potentially at the Port of Bull Arm. Construction details are presented in Section 2.3.4.
	Concern regarding a spill of Liquid Organic Hydrogen Carrier (LOHC). How is it different than an ammonia spill?	FFAW	In the event of spill or release of LOHC, North Atlantic has full spill response capabilities for water and land. LOHC has similar properties to petroleum hydrocarbons and a spill would be treated similar to an oil spill. Accidents and Malfunctions are presented in Section 4.3.
	Concern regarding a spill during transit	Groundfish Council	The NARL Logistics Terminal has full spill response capabilities for water and land. Accidents and Malfunctions are presented in Section 4.3.
	Concern regarding a spill of Toluene and Methylcyclohexane (MCH)	Greig Seafood	The NARL Logistics Terminal has full spill response capabilities for water and land. Accidents and Malfunctions are presented in Section 4.3.
Land and Resource Use	Concerned regarding impact to hunting ground in Bellevue peninsula area.	Public information session	The Project does not include development around Bellevue. Any future development would require an additional environmental assessment and consultation. More information on land and resource use near the Project is included in Section 3.2.4.
	Concern about the impact on trapping (beaver and mink) in the barrens area to the east of the Project.	Public Information Session	The Project intersects Beaver Fur Zones 2 and 3 (Trap Lines 46, 30, 33, and 42; see Appendix R), but wetlands and waterbodies will be avoided where possible or buffered by at least 30 m (Section 2.3.4.9), negating any likely interaction with traplines.
Species at Risk	Have there been eagle sightings/nesting in the area? Will eagles be studied?	Public information sessions	Bald Eagle is not an SAR, but it was observed during both the 2023 and 2024 field surveys within the PA and RAA, with one nest documented in 2024 during seabird surveys along the coast. Raptor-specific surveys, including sky scans and aerial helicopter surveys, were conducted throughout the study to identify eagle activity and potential nesting sites, with a focus on suitable elevated terrain and cliff edges. The results of these surveys can be found in Appendix D1.
	Incorporation of species at risk (SAR) into the Project	NL DECC	SAR studies have been conducted throughout the Project Area, and several SAR have been observed. The results of

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
			these surveys can be found in Appendix B1 and D1-D7. As the Project moves forward, mitigation strategies for each SAR will be derived through consultations with the NL WD, CWS, and DFO; many mitigations were proposed in Section 4.5. North Atlantic has also begun a Species at Risk Mitigation and Monitoring Plan to supplement this environmental assessment.
Socio-economic Environment	Estimated number of jobs during construction and maintenance	Public Information Session	The planned construction period is from late 2026 to early 2029 with an estimated number of full-time positions between 98 and 1,179 in any quarter with peak construction employment in the first quarter of 2028. It is estimated that approximately 62 long-term full-time jobs will be available in O&M. North Atlantic is pleased that this development will bring a new industry to the area with job opportunities for the local population. More information on employment and procurement is included in Section 3.1.6.6, Section 3.2.6.1 and Appendix Q.
	Request for supplier development opportunities	Advantage St. John's	Supplier development opportunities will be available in the next phase of the Project. More information on employment and procurement is included in Section 3.1.6.6, Section 3.2.6.1 and Appendix Q.
	Where will the engineering work be done?	PEGNL	Engineering work is currently being done in NL and North Atlantic plans to keep as much work as possible in the province. More information on employment and procurement is included Section 3.1.6.6 and Section 3.2.6.1.
	Request for information regarding temporary and permanent jobs and training for local people.	Public information session	The planned construction period is from late 2026 to early 2029 with an estimated number of full-time positions between 98 and 1,179 in any quarter with peak construction employment in the first quarter of 2028. It is estimated that approximately 62 long-term full-time jobs will be available in O&M. More information on employment and procurement is included in Section 3.1.6.6 and Section 3.2.6.1.
	Concern that the Project will negatively impact the area and will not provide local benefits.	Public Information Session	Construction is anticipated to generate between 98 and 1,179 full-time positions (peak construction employment) and approximately 62 full-time jobs in O&M for 30 years. Procurement will also generate employment through suppliers. More information on employment and procurement is included in Section 3.1.6.6 and Section 3.2.6.1.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	Concern regarding the impact on Centre Hill as a tourist/heritage destination.	Public Information Session	The transmission line right-of-way was moved to the north, in parallel to the access road to be further from Sunnyside and recreational and tourism amenities such as Centre Hill Trail and cabins. More information on Project design and planning is included in Section 2.3. Information on the effects of the Project on land and resource use is included in Section 4.2.4.
	What role could North Atlantic play in developing hydrogen markets locally?	econext	North Atlantic currently plans to export green hydrogen. At this point no local market exists. More information on Project plans is included in Section 2.3.
Communities	Recommendation to speak to Deer Harbour cabin owners because the wind turbines will be visible from that area.	Public information session	North Atlantic is engaging with communities including Sunnyside and stakeholders such as cabin associations in areas affected by the Project. More information on community engagement is included in Section 8 and Appendix P.
	Town would like to see the community benefit from the Project	Town of Sunnyside	North Atlantic is committed to building a partnership with the Town of Sunnyside to maximize local benefits. More information on community engagement is included in Section 8 and Appendix P.
	Recommended engagement with local municipalities, recreational groups in the area and community members, including Local Service Districts.	NL DECC	North Atlantic is engaging with communities and stakeholders (e.g., cabin associations) in areas affected by the Project. More information on community engagement is included in Section 8 and Appendix P.
	Request for support for community trails.	Public Information Session	North Atlantic is committed to building partnerships with communities and stakeholders to maximize local benefits. More information on community engagement is included in Section 8 and Appendix P.
	Request to use community assets such as the Community Centre for a Project office.	Town of Sunnyside	North Atlantic is committed to building partnerships with communities and stakeholders to maximize local benefits. More information on community engagement is included in Section 8 and Appendix P.
	The Chance Cove trail is a heavily used trail and important to the region.	Department of Tourism, Culture, Arts and Recreation	The Project does not include development around Chance Cove. Any future development would require an additional environmental assessment and consultation. More information on land and resource use near the Project is included in Section 3.4.6.
	The Town of Come By Chance is assessing new drinking water sources. This will need to be taken into consideration by the Project.	NL DECC	North Atlantic is committed to building a partnership with the Town of Come By Chance to understand their concerns and to minimize the effects of the Project. More information on drinking water sources near the Project is included in Section 3.4.6.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	Concern regarding where the transmission line crosses over the trail to Center Hill. The trail is accessed by both tourists and All-Terrain Vehicles (ATVs).	NL DECC	After evaluation of the area based on stakeholder feedback, the transmission line right-of-way was relocated to align with the access road. More information on trails near the Project is included in Section 3.4.6.
	Concern by cabin owners that the new access road will increase ill-intentioned access to the otherwise remote area. Some people, however, were interested in the benefits of the increased access.	NL DECC	A staffed office will be located at the intersection of the Trans-Canada Highway (TCH) and multiple cameras will be installed on-site for safety and security. North Atlantic is open to installing a gate if that is desirable to the community. More information on Project design and planning is included in Section 2.3.
	Recommendation to combine the access road and transmission line to minimize environmental impact?	Cabin owner group	After evaluation of the area based on stakeholder feedback, the transmission line right-of-way was relocated to align with the access road. More information on Project design and planning is included in Section 2.3.
	Concern regarding increased access to cabin area and potential for increased crime.	Cabin owner group	A staffed office will be located at the intersection of the Trans-Canada Highway (TCH) and multiple cameras will be installed on-site for safety and security. North Atlantic is open to installing a gate if that is desirable to the community. More information on Project design and planning is included in Section 2.3.
	Concern with impact on watershed, specifically runoff from construction work and Wind Farm infrastructure	Town of Sunnyside	Spill containment will be a part of the assessment and incorporated into construction plans and mitigations (Section 4.5).
	Will cabin owners be compensated for the value of their cabin?	Cabin owner group	North Atlantic does not anticipate any negative impact on cabins outside the PA. The Project will bring benefits such as employment and business opportunities to the area. North Atlantic will continue to engage residents, including cabin owners, to monitor the effects of the Project and mitigate any issues. More information on community engagement is included in Section 8 and Appendix P.
	Concern with helicopters over homes for the MET installation.	Town of Sunnyside	Public Service Announcements, as committed to within the Public Participation Plan (Appendix P), will be issued to notify residents of helicopter work around the community.
Human Health	Concern regarding visual and noise impact of wind turbines, specifically if the Project expands closer to the community.	Public information session	For noise impact, noise from the wind turbines, HGP and HP has been assessed against 'percent-highly-annoyed' (%HA), as per Health Canada guidance documentation. It is a tool used to assess project related

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
			noise levels against the existing baseline noise levels. Noise from the wind turbines, based on manufacturer supplied data, achieves compliance with this method, with consideration also to internal noise and low frequency noise. More information is available in Appendix J. A 3D rendering of the PA was developed and is accessible here: https://experience.arcgis.com/experience/60fc2e3478ae491cbd3273f5c4834b7a
	Inclusion of interference noise in the evaluation	Cabin owner group	For noise impact, noise from the wind turbines, HGP and HP has been assessed against 'percent-highly-annoyed' (%HA), as per Health Canada guidance documentation. It is a tool used to assess project related noise levels against the existing baseline noise levels. Noise from the wind turbines, based on manufacturer supplied data, achieves compliance with this method, with consideration also to internal noise and low frequency noise. More information is available in Appendix J.
	Request for North Atlantic to generate a graph that demonstrates the sound profile in the surrounding communities	Public information session	The day-night noise levels from the Project are provided graphically as noise level contours in Figure J-8.1-1
	Noise baseline studies should be designed to ensure that the measured levels are representative of the local area. If noise is measured only at one time of the year, then it will be important to explain why this season is representative, and why noise levels in other seasons would not be significantly different from those that were measured during the study.	Department of Health and Community Services	A baseline noise monitoring campaign was undertaken to quantify the prevailing baseline noise levels at noise sensitive receptors. A total of six monitoring locations were selected to collect a representative sweep of noise levels for all sensitive receptors in the vicinity of the project. Whilst it is generally observed that there can be minor seasonal variations in baseline noise levels (when comparing summer to winter for example), the degree of variation can depend on a number of factors such as wildlife, human activity, change in noise propagation (for example snow in winter absorbing noise) however the variations are typically minor. It is likely that the undertaking of an additional monitoring campaign would result in similar baseline noise levels. As a result, the criteria would also be similar, such that the overall conclusions of the report would likely remain the same. More information is available in Appendix J.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	Important to show where the baseline noise levels were measured, and whether the locations represent nearby receptors.	Department of Health and Community Services	Baseline noise monitoring locations are provided in Figure J-3.0-1. Baseline noise monitoring data is provided in Appendix J-1. The representativeness of the locations is discussed in the above response.
	Recommendation for the baseline study to provide sample calculations and references to any guidance documents used in the assessment.	Department of Health and Community Services	The baseline study was conducted in accordance with ISO 1996-2:2007 ("Acoustics –Description, measurement and assessment of environmental noise – Part 2L Determination of environmental noise levels"), as recommended by Health Canada (Health Canada 2017). Full details of the monitoring methodology are provided in Section 3.0 of the Appendix J noise report.
Historic Resources	There is a known Historic Resources site along the proposed transmission line that may be of concern. Recommend a desktop study to assess the next steps.	Department of Tourism, Culture, Arts and Recreation – Provincial Archaeology Office	An HROA and HRIA were completed with details available in Section 3.1.5 and Appendix F. The two registered archaeological sites and the two HPAs situated within or near the PA will be avoided. Note that one HPA encompasses one of the archeological sites. An Archaeological Mitigation phase will be completed prior to conducting any Project activities that may alter or disturb any existing structural remains or terrain identified in the HRIA as having high. The Contingency Plan will be followed, which outlines the measures and procedures to follow if any suspected Historic and Archaeological Resources are encountered.
	Archeological sites along the coast inside Bull Arm, Stock Cove, and Frenchman's cove.	Public Information Session	An HROA and HRIA were completed with details available in Section 3.1.5 and Appendix F. The two registered archaeological sites and the two HPAs situated within or near the PA will be avoided. Note that one HPA encompasses one of the archeological sites.
	Remains of the first trans-Atlantic cable station are still in Sunnyside.	Public Information Session	An HROA and HRIA were completed with details available in Section 3.1.5 and Appendix F. The two registered archaeological sites and the two HPAs situated within or near the PA will be avoided. Note that one HPA encompasses one of the archeological sites.
Cumulative Effects	Concern regarding cumulative effects of all the Projects in the area.	Public information session	The region has long been developed as an industrial area. It is not unexpected that the community would have concerns about additional development. Currently, no other industrial projects registered for environmental assessment (e.g., Burin Peninsula Green Fuels Project) overlap with the components of this Project. Several marine infrastructure projects planned for Arnold's Cove do not overlap with the components of this project. If construction for

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
			any of the projects proceed simultaneously with this Project, there may be competition for labour. More information on cumulative effects is included in Section 6.3.
	Concern regarding the size and location of the wind developments proposed by other proponents.	Public Information Session	A second wind energy project has been proposed in the Isthmus area but is not yet defined or registered for environmental assessment. More information on cumulative effects is included in Section 6.3.
Emergency Response	Will the Spill Response Plan be upgraded to reflect the facility upgrades? Will the upgrade be separate from Braya?	NL DECC	North Atlantic has an updated ERP (Appendix M). The ERP provides procedures with respect to Spill Response, in addition to those outlined in the existing Spill Response Emergency Plan and Environmental Emergency Plan for the NARL Logistics Terminal. Existing operations at the NARL Logistics Terminal and Braya Refinery are not included in the scope of the document. The existing plans will either be revised or a new document made to support the new materials on site.
	Concern regarding the proximity of the hydrogen storage to the tank farm, considering its flammability.	NL DECC	It should be noted that the Project is not planning to have pressurized hydrogen storage. A Hazard Recognition and Risk Assessment was completed and incorporated into the ERP (Appendix M). The ERP provides response procedures with respect to hydrogen release, protection and suppression. Personnel who work around hydrogen will be trained in the characteristics of hydrogen releases and fires. Fire protection systems in greenfield hydrogen production and handling areas will be designed in accordance with relevant codes and standards in order to mitigate and/or eliminate risk associated with hydrogen gas release. North Atlantic will model hydrogen release scenarios during FEED studies. The results of these studies will inform Project design changes as required to mitigate risks to public safety.
	North Atlantic's emergency response capabilities for hydrogen.	Public information session	The ERP (Appendix M) provides response procedures with respect to hydrogen release, protection and suppression. Personnel who work around hydrogen will be trained in the characteristics of hydrogen releases and fires. Fire protection systems in greenfield hydrogen production and handling areas will be designed in accordance with relevant codes and standards in order to mitigate and/or eliminate risk associated with hydrogen gas release.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
Transportation	Concern regarding existing road infrastructure for the size and weight of Project materials.	Department of Transportation and Infrastructure	Weight capacity of the existing infrastructure is discussed in Appendix E.
	Concern regarding proximity of new access road to the weigh scales.	Department of Transportation and Infrastructure	The proposed intersection is at a suitable distance from the weight scales as per the guideline requirements. This is discussed in Appendix E.
	Concern regarding traffic volume increase in the area.	Department of Transportation and Infrastructure	Construction is not expected to generate large traffic volumes, and the trips will not result in capacity issues. Additional information is available in Appendix E.
	Concern regarding sightline for new access road and TCH intersection.	Department of Transportation and Infrastructure	The intersection could be designed as a right-in/right-out intersection with an acceleration lane leading to a merge onto the TCH. The design of the intersection will be completed to comply with appropriate design standards. Additional information is available in Appendix E.
	Concern regarding gravel access road and the potential for an apron to prevent gravel onto the highway.	Department of Transportation and Infrastructure	North Atlantic will work to develop a solution to mitigate gravel making its way onto the highway through final design activities for the access road.
Construction	Concern regarding loss of access to cabins via the access road during construction	Cabin owner group	Roads will remain accessible. There may be brief periods where access may need to be controlled if the roads are combined (Appendix E).
	Location of the concrete batch area	Cabin owner group	It will be located inside the Wind Farm footprint (Section 2.3.3).
Operation and Maintenance	Lifespan of wind turbines	Cabin owner group	Wind turbines have a 30-year life (Executive Summary, ES3.2).
	Production schedule	Cabin owner group	Construction is expected to begin in the Spring of 2026 and will occur over three summers. First production is expected in 2029. Project development schedule is discussed in Section 2.3.4.8.
Decommissioning	Responsibility for site remediation	Cabin owner group	Government is drafting a policy to ensure complete removal of equipment and site remediation. A decommissioning plan will be developed and submitted to government for approval.
	Cost of decommissioning	Cabin owner group	Cost of decommissioning will be built into the economic model. Government will determine the exact mechanism of ensuring the financial capability exists to decommission.
	Life expectancy of the Project	FFAW	30-year operational life (Executive Summary, ES3.2).
Regulatory Process	Concern regarding the wind energy process established by government and that government is not doing	Public information session	Concern noted and shared with regulator.

Topic	Questions / Comments / Concerns	Source	Registration Reference and Response
	what's in the best interest of the province.		
	Concern regarding government's real intentions with wind energy.	Public information sessions	Concern noted and shared with regulator.
	It was apparent that the large parcels of land awarded to other proponents is hurting all projects and causing confusion and fear. Reduction of these large parcels as proponents further develop their Project, could help reduce opposition to wind development. Consider sharing this information with GNL to form their understanding and adherence to the timelines they have given proponents.	Public information session	Concern noted and shared with regulator.
	Does North Atlantic own the land?	Stakeholder meeting	The exclusive rights to development were provided under a reservation granted to North Atlantic by the Government of NL, with the same conditions that applied to other successful wind proponents. In addition, regulatory requirements and Project permits, approvals, licences, and authorisations that may be required are outlined in Section 2.5 and will be obtained as the Project progresses.
	Was a permit provided for the test well process?	Cabin owner group	No, this was an oversight, and we are committed to doing better in the future.

9.0 Environmental Protection Plan

The North Atlantic HSE Manual outlines responsibilities, procedures, and information pertaining to health, safety and environmental protection that applies to all management, supervisors, and employees within all divisions of the company. The Environmental Protection Plan (EPP) will act as a Project-specific supplement to the HSE Manual. The EPP represents a proactive approach to Project development in response to the pressing issues of climate change, biodiversity loss, and resource depletion. Grounded in scientific rigor and guided by a commitment to environmental and social responsibility, the EPP will be customized to fit the distinct periods of Project progression from the Construction Phase, throughout the O&M Phase, and eventually during the Decommissioning and Rehabilitation Phase. Each version of the plan will lay out the hierarchy of responsibility and reporting so that individual roles and documentation procedures are clearly understood. Environmental procedures are organized for field utilization (i.e., activity or resource-specific) and worded to avoid ambiguity or excessive jargon.

Table 9.0-1 provides an annotated table of contents for the Project Construction EPP. Future iterations (O&M Phase, Decommissioning and Rehabilitation Phase) will be tailored to reflect the relevant PA activities and their associated protection procedures.

Table 9.0-1 Annotated table of contents of Construction EPP for the Project.

Section	Description
Cover Page(s)	Includes: the title (Environmental Protection Plan); document identification number; corporate owner of the document; Project phase; affected facility or location; effective date and revision date of the plan; and corporate approval signature.
Revision History	Provides a record of document revisions and updates, indicating locations and brief descriptions of changes.
Contents	Provides a listing of sections, figures, tables, and appendices of the EPP.
1. Purpose	Introduces the EPP in the context of the North Atlantic HSE Manual. Brief description of the Project location and overview of the applicable Project phase, anticipated Project Area activities, and schedule/timing.
1.1. Scope of the EPP	Identifies the subject matter addressed and the relationship to other plans within North Atlantic's HSE Manual. The potential for overlap/redundancy is described and how this is addressed/resolved. The relationship of the plan to employees, contractors and other entities is briefly explained.
1.2. Objectives of the EPP	Describes the objectives of the EPP and how it will be used. This includes long-term goals, as well as interim objectives and achievable targets.
2. Reference Documents	Presents a list of references consulted in the creation of the EPP, including applicable North Atlantic's HSE Manual. Includes references to the appropriate Acts, regulations, and by-laws.

Section	Description
3. Definitions	Presents a list of commonly appearing acronyms, key concepts, and terminology paired with their definitions.
4. Regulatory Requirements	Lists the environmental approvals, authorizations and permits applicable to PA activities. Where approvals have been obtained, dates of expiration and required compliance reports are listed.
5. Roles and Responsibilities	Identifies personnel responsibilities and reporting relationships for environmental monitoring, incident response, reporting, performance evaluation, and approval.
6. Training	Identifies required training by task and role. Environmental orientation requirements for Project employees, site visitors, material and service contractors are described. The method of training records maintenance will be identified.
7. Environmental Protection Procedures	Provides descriptions of environmental concerns and sensitivities associated with each subject activity for the applicable Project phase. This is followed by a detailed description of each applicable environmental protection procedure. Information on mitigation measures will be incorporated into each description. At a minimum, procedures included in the Construction EPP will address: • Surveying; • Vegetation management and buffer zones; • Equipment laydowns and storage areas; • Grubbing, overburden and aggregate management; • Excavating, backfilling, and grading pertaining to road development, electrical works, and building construction; • Geotechnical work and borehole drilling; • Blasting; • Foundation works including concrete generation, handling, and placement; • Erosion and sediment control; • Watercourse crossing installation (i.e., culverts); • Fording; • Infilling; • Dewatering; • Vehicle traffic control and site access; • Marine traffic; • Equipment use and maintenance including light vehicles, heavy mobile equipment, mobile cranes, pumps, generators, and ancillaries; • Storage, transportation, and management of fuel and other hazardous materials; • Solid waste management and recycling; • Sewage handling, treatment, and sanitary wastewater disposal; • Stormwater management; • Lighting; and • Air emissions, noise and dust control.

<table>
<tr><th>Section</th><th>Description</th></tr>
<tr><td>8. Resource Specific Protection Procedures</td><td>Identifies potential environmental concerns applicable to the Project for resources of concern. These are paired with protection procedures for working in or near each sensitive habitat/resource, including:
• Critical habitat and/or highly suitable habitat for Species at Risk (SAR) and Species of Conservation Concern (SCC);
• Breeding bird habitat (including species protected by the Migratory Birds Convention Act (MBCA) and others, e.g. owls and raptors);
• Streams, waterbodies and wetlands;
• Coastal environments and fish habitat;
  ▪ Freshwater fish habitat;
  ▪ Marine mammal habitat; and
  ▪ Migration pathways.
This section also provides activity planning guidance to avoid certain seasons or sensitive areas by establishing buffer zones including:
• Streams, waterbodies and wetlands;
• Fish spawning periods;
• Bird nesting periods;
• Bird migration periods;
• Lichen habitat;
• Rare plants habitat;
• Highly important areas of cultural, recreational, or agricultural significance;
• Protected Public Water Drinking Supply Area(s) (PPWSA);
• Areas of high archaeological potential and historic sites;
• Public roadways; and
• Residential areas.
Finally, the section includes resource-specific procedures to be applied in all areas and at all times of year, including:
• Water use management;
• Birds and bats management such as collision and electrocution prevention;
• Wildlife management;
• Aquatic invasive species prevention; and
• Progressive rehabilitation and revegetation.</td></tr>
<tr><td>9. Environmental Mitigation Measures</td><td>Each Project activity/environmental concern will be categorized in a table with each respective mitigation measure. Applicability to specific Project phases and areas will be indicated. Reference will be made to the following section regarding monitoring and reporting. Person(s) responsible for implementing mitigation measures will be identified.</td></tr>
</table>

Section	Description
10. Contingency and Monitoring Plans	Outlines contingency and monitoring plans for Accidents and Malfunctions that could occur during the applicable Project phase. These may include, but are not limited to: • Spill Response; • Extreme Weather; • Construction Water Quality Monitoring Exceedance; • Water Management Infrastructure Failure; • Wildlife Encounters; • Wildlife Mortalities; • Discovery of Historic Resources; and • Discovery of Human Remains. Resource-specific monitoring plans such as the Species at Risk IMMP and Post-Construction Monitoring Plan will be developed under separate covers and appended to the EPP. Potential for overlap with the separate Emergency Response Plan (ERP), such as in the case of fire/explosions or spills, will be addressed and guidance will be provided as to which has priority.
11. Compliance Monitoring and Reporting	Describes documentation and reporting protocols, including site inspections and compliance monitoring requirements. Identifies personnel responsible for conducting monitoring, schedule for monitoring, types of activities to be monitored, locations and parameters to be monitored, overview of information recorded to track mitigation effectiveness, and procedures for correcting incidents of non-compliance. Internal and external reporting procedures are identified, with specific reference to reporting and compliance conditions associated with active permits/approvals, and report deadlines.
12. Contact List	Lists key Project personnel and regulatory agencies including telephone and email contact information.
Appendices	Contains all referenced documents required to accompany the EPP, including the EPP distribution list, site inspection/monitoring/sampling forms, incident and reporting forms, and plans developed under separate covers.

10.0 References

Section 1

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Section 7

No works were cited in Section 7.

Section 8

No works were cited in Section 8.

Section 9

No works were cited in Section 9.

11.0 Personnel

The names and qualifications of all key professionals responsible for preparing the Registration and supporting documentation have been provided below in Table 11.0-1 and Table 11.0-2.

Table 11.0-1 Key professionals involved in preparing the registration document (Proponent).

Name	Credentials	Role	Years of Experience	Company
Aditya Vasaikar	B.E.	Wind Project Engineer	9	North Atlantic
Ashish Dixit	B.E., PMP	Director - Wind Farm Development	16	North Atlantic
Criselda Sy	B.Sc., MBA	Associate	10	Silverpeak
Denise Riggs	B.A., MBA	Director of Human Resources	22	North Atlantic
Jamie Beach	IFSAC FFIII, CFSL, CRM	CEO	27	North Atlantic (NARL Logistics)
Jeff Murphy	B.Sc., P.Eng.	VP, Capital Projects	22	North Atlantic
Jenna Broders	B.E., M.Eng.	Junior Project / Process Engineer	1	North Atlantic
Lilian Alves	B.A., MBA	VP	15	Silverpeak
Mark Duggan	B.A., B.Ed. MBA	Communications and Engagement	35	North Atlantic
Natasha Noseworthy	BBA	Executive Assistant	5	North Atlantic
Peter Miles	B.A.	VP, Business Development	19	North Atlantic
Rhonda Hiscock	B.Sc., M.Sc.	Compliance and Business Development Manager	28	North Atlantic (NARL Logistics)
Santosh Raikar	B.Sc., M.Sc.	Managing Partner and Head of Renewables	25	Silverpeak
Ted Lomond	B.A., MBA, MPhil,	President & CEO	35	North Atlantic

Table 11.0-2 Key professionals involved in preparing the registration document (Consultants).

Name	Credentials	Role	Years of Experience	Company (see *Notes)
Amy Copeland	B.Sc.Eng., P.Eng.	Project Manager	25+	SEM
April Tucker	B.A.	Technical Author/Editor	4	SEM
Bevin Ledrew	B.Sc., M.Sc.	Senior Editor	50+	SEM
Brendan Meaney	B.Sc.	Biologist	5	SEM
Brigitte Masella	B.Adm., M.E.S.	Environment and Socio-Economic Assessment Support	30+	GHD
Brittany Connolly	B.Sc. (Hons), A.Dipl.	Document Manager / Environmental Scientist	10	SEM
Callie Andrews	B.Sc., M.Sc.	GHD Project Director	17	GHD
Chris Hearn	B.Sc.	Terrestrial Lead	12	SEM
Christina Burke	Dipl. Geomatics / Survey Engineering, B. Tech.	Geomatics Lead	7	SEM
Crystal Kehoe	B.Sc.	Document Control Lead	20	SEM
Emma Wells	B.Sc., M.Sc.	Aquatic Biologist	5	SEM
Heather Murphy	B.Sc.	Aquatics Lead	15	SEM
Jared Pardy	BASc., MESc., EIT	Aquatic Biologist	8	SEM
Jennifer Blundon	B.Sc.	Regulatory Liaison	5	SEM
John Crocker	GIS Application Specialist Dipl.	Geomatics Specialist	4	SEM
Kathryn Dawe	B.Sc. (Hons), M.Sc.	Atmospheric Lead	10	SEM
Kelsey Menard	B.Sc. (Hons), M.Sc.	Environmental Chemist	8	SEM
Kirk Schmidt	B.Sc.F, M.Sc.F.	Shadow Flicker Specialist	17	Nortek Resource Solutions Inc.
Kyle Cigolotti	B.A.	Support Historic Resources	13	CRM
Matthew Griffin	P.Eng.	Light Impact Assessment Lead	17	GHD
Mike Masschaele	BES, LEL	Noise and Vibration Lead	18	GHD
Morgan Walsh	B.Sc., P.Eng.	Assistant Project Manager	9	SEM
Nancy Griffiths	BDEP, MCIP	Socio-Economic Lead	30	GHD
Nicole Button	B.A.	Engagement and Consultation Support	18	SEM
Pooya Shariaty	Ph.D., P.Eng.	Emissions Inventory and Air Dispersion Modelling Lead	13	GHD
Rachel Holub	B.Sc. (Hons), M.Sc.	Aquatic Biologist	4	SEM
Robert Shears	M.A., R.P.A, C.A.H.P.	Principal Investigator Historic Resources	17	CRM
Rosanne Williams	B.Sc., B. Bus. Admin.	Stakeholder Relations Lead	20	SEM

Name	Credentials	Role	Years of Experience	Company (see *Notes)
Shannon Hildebrandt	M.Sc., P.Eng.	Ice Throw Hazard Analysis Lead	9	GHD
Shanshan Liu	B.Sc., M.Sc.	Environmental Scientist - Effluent Dispersion Modelling	17	Independent Consultant
Siham Bendenia	M.Res.	GHD Project Manager	15	GHD
Steve Gullage	B.Sc., M.Sc.	Biophysical Lead	20+	SEM
Tyler Brenton	M.Sc., P.Eng.	Hydrology Lead	7	SEM
Vanessa Skelton	P.Eng.	Transportation Study Lead	30	GHD
Zihe Zhao	M.Sc.	Water Resources Author and Data Analyst	7	SEM

*Notes
Sikumiut Environmental Management Limited (SEM)
GHD Group Limited (GHD)
Cultural Resource Management Group Limited (CRM)

12.0 Commitments

North Atlantic is dedicated to supporting the global transition to renewable energy in a way that upholds environmental integrity. Central to this commitment is a proactive approach to understanding and managing project effects. By engaging meaningfully with a wide range of stakeholders, including Indigenous peoples, local communities, environmental groups, landowners, regulators and resource agencies, North Atlantic endeavours to improve its performance through collaboration and transparency at every stage.

The Project places a strong emphasis on avoiding and reducing negative environmental effects, both in the development of its projects and in the day-to-day operations of its facilities. Through thorough assessment, forward-thinking planning, and the implementation of effective avoidance and mitigation strategies, North Atlantic works to reduce its footprint and protect surrounding ecosystems.

Compliance with applicable environmental laws and regulations serves as a foundation, but North Atlantic goes further by adopting best practices from across the industry.

12.1 Statement of Diversity, Equity, and Inclusion Commitments

North Atlantic is dedicated to fostering a diverse, equitable, and inclusive workplace where all individuals feel valued and respected, regardless of their background, gender, or identity. Creating an environment that empowers underrepresented groups contributes to a more engaged workforce and leads to stronger organizational outcomes. Recognizing that meaningful progress requires sustained effort, North Atlantic approaches diversity, equity, and inclusion as a continuous journey.

To support this commitment, North Atlantic will:

- **Establish a Diversity Committee**: Establishing and maintaining a Diversity Committee comprised of management/executive level employees and a number of employee representatives of marginalized groups. The committee will oversee diversity, equity and inclusion efforts at all levels, and ensure that diversity and inclusion is integrated into all initiatives and aspects of North Atlantic.

- **Allocate Resources**: Dedicating adequate resources (in budget and staffing) to meet North Atlantic's diversity, equity and inclusion goals.

- **Provide Training**: Encouraging diversity, equity and inclusion education/training on discrimination and harassment, systemic discrimination, unconscionable bias, stereotyping, marginalization, differential treatment, and the impact on performance perceptions.

- **Ensure Human Resources Expertise**: Ensuring Human Resources employees have sufficient training and expertise in human rights legislation and diversity, equity and inclusion strategies. If there is no internal staff at North Atlantic who meet such requirements, an external expert may be retained to assist with achieving North Atlantic's diversity and inclusion goals.

- **Embed DEI Throughout the Organization:** Striving to ensure diversity is represented in all areas of North Atlantic including policies, procedures and practices. Through these efforts, North Atlantic aims to cultivate a work environment that not only reflects the diverse communities it operates in but also drives meaningful and lasting change within the renewable energy sector.

12.2 Environmental Effects Mitigation, Monitoring, and Follow-up Commitments

Table 12.2-1 below provides a comprehensive list of all commitments made regarding environmental effects mitigation, monitoring, and follow-up for the Project. Each commitment is cross-referenced to the relevant section of the registration document where it is discussed, in accordance with the *Guidance for Registration of Onshore Wind Energy Generation and Green Hydrogen Production Projects.*

Table 12.2-1 Environmental Effects Mitigation (Mi), Monitoring (Mo) and Follow-up (F) Commitments Index.

Type			Registration Section	Commitment
Mi	Mo	F		
		✓	1.3 (Project Benefits)	Benefits and opportunities arising from Project development and operation will be distributed locally and throughout the province.
		✓	1.3 (Project Benefits)	The Project will help pioneer wind energy development in NL, and at this time, is on track to be one of the first wind installations since the moratorium was lifted.
✓			1.3 (Project Benefits)	North Atlantic will avoid or minimize potential negative environmental effects throughout all Project phases.
		✓	1.3 (Project Benefits)	North Atlantic will support new skills and new jobs for the evolving landscape of green energy in NL. North Atlantic commits to prioritizing the provision of opportunities for local hires and suppliers.
✓			1.3 (Project Benefits)	The Project will utilize some of the existing infrastructure within the NARL Logistics Terminal (i.e., tanks and Jetty), eliminating emissions associated with new builds and/or demolition.
		✓	1.3 (Project Benefits); 3.2.8 (Data Gaps); 4.5.7 (Mitigations - Human Health and Quality of Life); 8.8 (Ongoing Engagement)	North Atlantic is committed to continuing frequent engagement with communities adjacent to the proposed Project.
		✓	2.1.2 (Project Land and Property Ownership)	North Atlantic proposes to connect to the Inkster's Pond industrial water supply and will obtain their own Water Use License for the Project operation.
✓			2.2 (Rationale for the Undertaking)	North Atlantic will produce green hydrogen that will enable substantial reductions in carbon dioxide (CO2) emissions.
		✓	2.2 (Rationale for the Undertaking)	North Atlantic will support workforce development by fostering new skills and creating jobs in NL's evolving green energy sector.
✓			2.3.1 (Hydrogen Generation Plant)	Any process water not converted into hydrogen will undergo treatment and be managed in full compliance with environmental regulations before being discharged.
		✓	2.3.1.3 (Water Requirements and Supply)	The water supply system will also supply a fire water storage tank. The firefighting water supply will be designed to provide two hours of fire water storage, in accordance with National Fire Protection Association (NFPA) standards and engineering best practices.

Type			Registration Section	Commitment
Mi	Mo	F		
✓			2.3.1.4 (Wastewater)	The sewerage rate and sanitary sewer design will be determined based on the estimated sewerage flows and design criteria in compliance with the Government of NL Guidelines for the Design, Construction and Operation of Water and Sewerage Systems.
		✓	2.3.1.4 (Wastewater)	The Environmental Control Water & Sewage Regulations, 2003 will also be consulted to determine the allowable discharge to sanitary sewers and receiving environments.
		✓	2.3.2.2 (Toluene)	The current pan-style internal floating roofs will be removed and replaced with modern Sandborn floating roofs to improve operational efficiency and minimise vapour emissions. Mechanical infrastructure upgrades will made to enhance safety and environmental protection. New tank floors will be installed, incorporating a leak detection system and a sacrificial anode cathodic protection system to prevent corrosion and protect against potential environmental impacts. A new bottom-course nozzle will be added to each tank to maximise hydraulic efficiency, complete with a manual valve and a low point suction pipe extending to the tank's center. The berm containment area will be cleared and graded. Drainage slopes will be re-established to ensure a dry tank floor.
✓			2.3.2.4 (Water Supply) & 2.3.2.8 (Utility Systems)	Process-cooling water will circulate in a closed-loop system, therefore reducing the intake of water.
		✓	2.3.2.7 (Port Infrastructure); 2.3.4 (Construction Activities)	Detailed engineering evaluations will be undertaken to ensure compliance with safety standards and optimise performance for LOHC storage.
		✓	2.3.2.7 (Port Infrastructure)	Two existing terminal loading arms currently designed for crude oil service, will transfer the MCH and toluene from the toluene/MCH pipeline to and from the ships. The loading arms will be upgraded with replacement of the wetted seals (i.e., the part of the arm that directly contacts the MCH/toluene) to accommodate the new type of cargo (MCH/toluene instead of petroleum products) (CIMA Canada Inc., 2025). New wetted seals will also help prevent leaks, vapor emissions, or contamination, and would have better chemical resistance and performance.
✓			2.3.4 (Construction Activities); 4.2.4 (Land and Resource Use)	Should the temporary accommodations be located at the Bull Arm Fabrication Site be utilized during the construction phase of the Project, daily workforce transportation to the site will be managed by shuttle services, minimising local housing pressure.
		✓	2.3.4 (Construction Activities)	All work will comply with provincial and federal permitting requirements, including electrical codes, process safety standards, and emissions regulations.

Type			Registration Section	Commitment
Mi	Mo	F		
		✓	2.3.4 (Construction Activities)	There will be rigorous adherence to occupational health and safety regulations, including confined space work, high-voltage systems, and chemical handling.
✓			2.3.4 (Construction Activities)	Environmental controls will be implemented, including erosion control, dust suppression, and spill prevention measures during all phases of construction.
✓			2.3.4.2 (Linear Infrastructure)	The linear infrastructure routing will be optimised to minimise environmental effects and land use conflict and will parallel existing utility corridors and roads where possible.
		✓	2.3.4.2 (Linear Infrastructure)	Land surveying and geotechnical investigations will be completed to finalise the alignment of the corridor, assess terrain conditions, and identify environmentally sensitive areas.
✓			2.3.4.2 (Linear Infrastructure)	During all construction activities associated with the linear corridor, BMPs will be followed, including silt fencing when interacting with streams, avoidance of critical wildlife breeding seasons, and habitat restoration, if necessary.
		✓	2.3.4.2 (Linear Infrastructure)	Electrical systems will be tested for functionality, load capacity, and safety prior to operation.
✓			2.3.4.5 (Upgrades to Jetty and Tank Farm)	Given MCHs and Toluene's flammable nature, enhanced fire suppression systems, gas detection sensors, emergency venting, and spill containment infrastructure will be installed. Fire suppression systems will be incorporated for high-risk areas.
✓			2.3.4.5 (Upgrades to Jetty and Tank Farm)	Mitigation systems for potential marine spills, air emissions control, and stormwater management will be integrated to ensure regulatory compliance and environmental stewardship of the surrounding bay and coastline.
✓			2.3.4.9 (Regulatory and Environmental Considerations during Construction)	Where practicable, significant Construction Phase activities that may disturb nesting or breeding wildlife will be scheduled to avoid key breeding seasons. Buffer zones will be established around nests, wetlands, waterbodies, and habitat for Species at Risk (SAR) or Species of Conservation Concern (SCC), in consultation with the Newfoundland and Labrador Wildlife Division (NLWD). When avoidance of the breeding season is not feasible, pre-clearing surveys will be conducted to identify birds, rare plants, and potential bat roosting trees.
		✓	2.3.4.9 (Regulatory and Environmental Considerations during Construction)	A water use licence will be applied for through NL DECC at Lady Cove Pond for construction-related water use. The water intake will be fitted with a screen to protect fish from impingement or entrainment. Measures will be taken to avoid pollution and to minimize disturbance of fish and fish habitat.

Type			Registration Section	Commitment
Mi	Mo	F		
✓		✓	2.3.4.9 (Regulatory and Environmental Considerations during Construction); 5.3 (Residual Effects - Terrestrial Environment)	Wetlands were mapped as part of the Ecological Land Classification (ELC) and will be avoided wherever possible (or buffered by 30 meters as per the Lands Act). Where construction must interact with a wetland, a Permit to Alter a Body of Water will be sought from the Water Resources Management Division of the Department of Environment and Climate Change. Construction fencing and erosion control will also be implemented to ensure that the effects of the Project construction are limited in magnitude.
		✓	2.3.4.9 (Regulatory and Environmental Considerations during Construction)	Culverts, bridges, and erosion control will be used for stream crossings. When avoidance is impossible, North Atlantic will seek Ministerial approval for a Permit for Alterations to a Body of Water. Compensation/offsetting may be required by DFO if the waterbody is fish-bearing.
✓			2.3.4.9 (Regulatory and Environmental Considerations during Construction)	North Atlantic will ensure that the workdays during Construction are kept to reasonable hours to limit the disturbance to local communities and wildlife in areas with sensitive receptors. If dust becomes an issue during construction, appropriate measures will be taken, e.g. through wetting roads.
✓			2.3.4.9 (Regulatory and Environmental Considerations during Construction)	North Atlantic will ensure that erosion and sediment controls are in place during Construction Phase, will restrict clearing to the extent possible, and will utilise matting and fencing to protect sensitive areas.
✓			2.3.4.9 (Regulatory and Environmental Considerations during Construction)	North Atlantic commits to safe handling and storage of fuels, lubricants, oils, and other chemicals, in addition to construction waste. A Waste Management Plan has been provided in Appendix N.
		✓	2.3.4.9 (Regulatory and Environmental Considerations during Construction)	Throughout all the stages of the Construction Phase, North Atlantic will ensure the use of the Mitigation Hierarchy (1. Avoidance, 2. Minimisation, 3. Restoration, 4. Compensation).
		✓	2.3.4.9 (Regulatory and Environmental Considerations during Construction); 4.2.4 (Land and Resource Use)	Portions of the PA including the access road to the Wind Farm and transmission line route overlap with the Centre Cove River Protected Public Water Supply Area (SA-0878) for a linear distance of approximately 1 km. Ministerial approval will be sought for these small overlaps.

Type			Registration Section	Commitment
Mi	Mo	F		
✓	✓		2.3.4.9 (Regulatory and Environmental Considerations during Construction)	Any SAR or SCC occurrences or habitat known from previous studies, data queries, or original surveys will be avoided during the Construction Phase, either spatially, temporally (to avoid breeding season, usually) or both. BMPs will be followed, according to Provincial and federal legislation regarding SAR and SCC, and consultations will be undertaken with the NL WD and the Canadian Wildlife Service prior to any activities that may interact with SAR or SCC or their habitats.
✓			2.3.4.10 (Quarry Sites)	To minimise the potential effects of a new quarry on local communities (and the associated traffic), North Atlantic will seek to site the quarry within 10 km of the Wind Farm. This proximity to the Wind Farm will also minimise transportation time and reduce fuel use and emissions.
✓			2.3.4.10 (Quarry Sites)	Preference will be given to reopening inactive quarries or expanding existing quarries, as this option would have less environmental effect, would likely already be permitted, and the geology of the sites would already be well established.
		✓	2.3.4.10 (Quarry Sites)	The selected quarry site will comply with the Newfoundland and Labrador **Quarry Materials Act** and Environmental Assessment Regulations if the disturbed area exceeds certain thresholds (>5 hectares).
		✓	2.3.4.10 (Quarry Sites)	The quarry must be clear of environmental and regulatory obstacles. Avoidance of SAR or SCC habitats, waterbodies/wetlands, or other constraints will be mandatory for North Atlantic.
		✓	2.3.4.10 (Quarry Sites)	Once a quarry site has been selected, North Atlantic will apply for a quarry permit with the Mineral Lands Division of the Department of Industry, Energy, and Technology (NL DIET).
✓			2.3.4.13 (Transport, storage, and use of all hazardous construction materials)	For hazardous construction materials, fuels, and lubricants (e.g., diesel fuel, hydraulic fluids, oils/greases, solvents/cleaners, paints/adhesives, batteries, etc.) storage will be in clearly labeled, sealed containers within spill-contained areas. Storage areas will be located away from waterbodies, watercourses, and/or environmentally sensitive areas. Fuel tanks will be double-walled and stored within secondary containment units.
		✓	2.3.4.13 (Transport, storage, and use of all hazardous construction materials)	Transportation of any hazardous materials will comply with the Canadian Transportation of Dangerous Goods Regulations, and vehicles and drivers will be certified for this type of transport.

Type			Registration Section	Commitment
Mi	Mo	F		
		✓	2.3.4.13 (Transport, storage, and use of all hazardous construction materials)	Anyone working on the Project who will be involved in transport, storage, or use of hazardous materials will receive WHMIS training.
✓	✓		2.3.4.13 (Transport, storage, and use of all hazardous construction materials)	Spill kits and containment booms will always be mandatory on site, and regular inspections and maintenance of machinery will be conducted to minimise the chance of leaks.
		✓	2.3.4.14 (Solid and Liquid Waste Generation)	Spent catalysts or LOHC degradation products, must be managed through approved hazardous waste handlers.
		✓	2.3.5.1 (Operation and Maintenance Activities [O&M])	The wind turbines on the Wind Farm will require both routine and predictive maintenance to ensure maximum uptime, output, and safety. These maintenance practices will include routine mechanical maintenance, electrical maintenance, and year-round road maintenance to ensure reliable access to site.
✓			2.3.5.1 (Wind Farm O&M Activities)	Proper handling of fuels, lubricants, and hazardous materials, along with detailed maintenance planning and spill mitigation, is key to ensuring the long-term viability and regulatory compliance of the wind energy component of the Project.
✓			2.3.5.1 (Wind Farm O&M Activities)	Storage of the fuels, fluids, and potentially hazardous materials for the O&M Phase (Table 2.3.5-1) will follow the NFPA fire codes and any applicable environmental regulations.
✓	✓		2.3.5.1 (Wind Farm O&M Activities)	Spill containment trays, bundled pallets (i.e., a heavy-duty platform with a built-in secondary containment basin underneath to catch and contain leaks or spills from the containers stored on top and prevent those substances from contaminating soil or water), and automatic shutoff valves will be available on site at all times, and workers will be trained in spill response procedures.
	✓	✓	2.3.5.1 (Wind Farm O&M Activities)	The Project will comply with the following legislative pieces and standards: the NL EPA, OHS Regulations, CSA and IEC standards for wind turbine maintenance and materials handling, and spill reporting obligations under provincial and federal law.

Type			Registration Section	Commitment
Mi	Mo	F		
	✓	✓	2.3.5.2 (Hydrogen Generation Plant O&M Activities)	Given the sensitivity of PEM systems to operational conditions, O&M activities are designed to support continuous performance monitoring, preventative upkeep, and rapid response to faults. These will include weekly system checks on water and hydrogen purity, membrane voltage degradation, and stack pressure balance. Quarterly inspections will be required for water pumps, valves, dryers, heat exchangers, sensors, and flow meters. Every seven to ten years the membrane (i.e., the thin material that keeps the gases apart and conducts ions) and stack (i.e., multiple electrolysis cells stacked together to increase hydrogen production capacity) will require replacement.
	✓		2.3.5.2 (Hydrogen Generation Plant O&M Activities)	Safety and compliance activities for the HGP during the O&M Phase will include routine leak tests with hydrogen detectors, ventilation checks, and annual operator training on hydrogen safety and emergency procedures.
		✓	2.3.5.2 (Hydrogen Generation Plant O&M Activities)	Hydrogen drying units, gas analysers, and pressurisation equipment will need to be calibrated regularly to maintain safe and efficient operation.
	✓		2.3.5.2 (Hydrogen Generation Plant O&M Activities)	Safety-critical equipment such as pressure relief valves, flame arrestors, and hydrogen detectors will require regular testing and functional verification under the standards of the Canadian Standards Association (CSA) and International Electrotechnical Commission (IEC).
	✓		2.3.5.2 (Hydrogen Generation Plant O&M Activities)	The electrolyzer cooling system will require continuous monitoring for flow rate, heat exchanger fouling, and potential leaks.
		✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	The reactor will use a catalyst which will lose activity over time due to coking, fouling, or sintering, and will need to be changed out on a regular cycle. In addition, regular sampling and performance testing will be required.
		✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	Hydrogenation Plant temperature control is critical, and heat exchanger efficiency will be maintained through regular descaling and pressure testing. Thermocouples will also be verified on a regular schedule.

Type			Registration Section	Commitment
Mi	Mo	F		
	✓	✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	Each time toluene is hydrogenated to form methylcyclohexane and later dehydrogenated, the chemical undergoes exposure to high heat, catalysts, and hydrogen gas. Over many cycles, side reactions can occur, producing byproducts or impurities (e.g., polyaromatics, resins, or acidic compounds) which can affect reaction efficiency, catalyst life, and hydrogen purity. A rigorous monitoring program will be implemented to test for boiling point drift, as boiling point is a strong indicator of chemical integrity. Samples will be analysed using gas chromatography or distillation tests to ensure the compound is within spec. In addition, periodic chemical analysis will be conducted to identify buildup of contaminants and will subsequently be removed. Routine rheological testing will also be conducted to test viscosity and flow properties, which can affect the kinetics of the reaction and heat transfer. Viscosity increase often points to polymerisation or heavy residue formation. Some degradation of the toluene is inevitable over many cycles, so a fraction may have to be reconditioned or replaced.
	✓	✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	Pumps, transfer lines, and storage tanks will be maintained under CSA and the American Petroleum Institute (API) codes for hydrocarbon systems. Inspection of secondary containment (i.e., a system designed to contain the liquid if the primary container fails) and leak detection systems will be conducted on a regular schedule.
	✓	✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	Scheduled maintenance will be required for instrument air compressors, nitrogen purge systems, and the HGP flare stack. Electronics and transformers at the HGP will require infrared scanning, oil sampling, and partial discharge checks. Control systems will require software updates, redundancy testing, and cybersecurity audits. Fire protection systems, including gas suppression, foam systems, and firewater pumps, will undergo weekly and monthly inspections per National Fire Protection Association (NFPA) standards.
		✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	The O&M Phase will involve regular handling and disposal of treated water, discharged under a permit with regular effluent testing.
	✓	✓	2.3.5.3 (Hydrogenation Plant O&M Activities)	Environmental monitoring programs will include groundwater and surface water sampling, air quality monitoring at the Come By Chance industrial site, inspections of secondary containment, and reporting of any reportable releases to the province.

Type			Registration Section	Commitment
Mi	Mo	F		
	✓	✓	2.3.5.4 (Regulatory Framework for Incremental Development)	North Atlantic will provide sufficient monitoring data demonstrating that all emissions, discharges, and operational impacts are within regulated limits and that mitigation measures are performing as predicted. This data will include regular monitoring reports (e.g., volatile organic compounds levels, noise, effluent, groundwater, Species at Risk, birds and bats), transparent records on LOHC integrity, spills, emissions, and analysis of efficacy of mitigations.
		✓	2.3.5.4 (Regulatory Framework for Incremental Development)	North Atlantic is committed to following all necessary regulatory requirements if the time comes where production increases can be considered.
	✓	✓	2.3.5.5 (O&M Activities for the Substations and along the Transmission Lines)	Substations near the HGP and HP must be regularly inspected, tested, and maintained. Transmission ROWs must be kept clear, structurally sound, and environmentally compliant. Hazardous materials must be well-managed and documented. Activities will be logged and monitored via SCADA and reported as part of the project's environmental and safety compliance framework.
✓	✓		2.3.5.5 (O&M Activities for the Substations and along the Transmission Lines)	Any clearing of the transmission line rights of way will be attempted outside of the breeding season for birds if possible. Otherwise, nest surveys will be conducted prior to clearing, and any nests will be avoided until the young have fledged. Any herbicides to be used in vegetation management will adhere to the NL Pesticides Control Regulations.
		✓	2.3.5.5 (O&M Activities for the Substations and along the Transmission Lines)	O&M activities at the substations and along the transmission lines will be compliant with the Canadian Electrical Code (CEC), the Occupational Health and Safety Regulations, the Environmental Protection Act, and the NFPA fire codes and Transportation of Dangerous Goods regulations.
	✓		2.3.5.6 (O&M Activities for the Transport of Hydrogen)	There will be a variety of O&M activities associated with the storage of MCH and toluene in the four existing storage tanks, and the transfer of MCH and toluene to the jetty for shipping. These activities will involve routine monitoring, preventative maintenance, safety systems, and logistics coordination to ensure the reliable, safe, and efficient handling of the LOHC.
✓	✓		2.3.5.6 (O&M Activities for the Transport of Hydrogen)	Several inspections will be necessary to ensure the safe transfer of the product from the storage tanks to the loading arm and the ship. In addition, confirmation of containment booms and spill kits will be a routine task.
✓	✓		2.3.5.6 (O&M Activities for the Transport of Hydrogen)	Emergency procedures and communication protocols will be reviewed by North Atlantic employees working at the Terminal and the shipping personnel. Forecasts for weather and tide

Type			Registration Section	Commitment
Mi	Mo	F		
				conditions will be checked prior to loading. Drip trays and secondary containment vessels will be positioned beneath connections. Inspections for spills will be conducted around tanks, the pump, the loading arm, and the vessel.
✓	✓		2.3.5.6 (O&M Activities for the Transport of Hydrogen)	Inspections of fire detection and suppression equipment will occur regularly to ensure that equipment is in working order. Daily logs will provide documentation of activities and compliance, in addition to the regular documentation regarding maintenance schedules, inspection records, and certification of O&M personnel.
		✓	2.3.5.7 (Emissions and Energy Use)	While total (i.e., baseline plus Project) day-night sound levels (Ldn) will deviate from baseline levels, values of Ldn will continue to be in compliance with limits set forth by Health Canada.
✓			2.3.5.7 (Emissions and Energy Use); 3.2.1.2 (Atmospheric Environment -Light); 4.2.1 (Atmospheric Environment)	Project infrastructure will be setback from sensitive areas such that vibration [and light] effects will not be experienced by sensitive receptors (i.e., more than 1000m from dwellings).
		✓	2.3.5.7 (Emissions and Energy Use); 3.2.1.2 (Atmospheric Environment -Light); Appendix I (Light Impact Assessment)	Permanent lighting at the HP and HGP will be installed on infrastructure for safety purposes. Wind turbines in the Wind Farm will be equipped with navigation light fixtures, as necessary, to satisfy requirements of the Transport Canada Standard 621 – Obstruction Marking and Lighting.
✓			2.3.5.7 (Emissions and Energy Use)	Vents at the HP and HGP will be designed such that releases occur at a safe location.
✓			2.3.6 (Decommissioning and Rehabilitation)	Rehabilitation measures will be implemented progressively as opportunities arise throughout the lifetime of the Project.
		✓	2.3.6 (Decommissioning and Rehabilitation)	North Atlantic will continue to seek solutions and improve the decommissioning and rehabilitation strategy as the Project progresses, considering best available technologies.
✓		✓	2.3.6 (Decommissioning and Rehabilitation)	North Atlantic does not intend to bury or incinerate any wind turbine blades on site and commits to exploring options for repurposing or recycling wind turbine components upon decommissioning.
✓		✓	2.3.6 (Decommissioning and Rehabilitation)	Recyclable materials and components suitable for repurposing will be salvaged wherever possible. Buildings not designated for redevelopment or other uses beyond the end of Project life will be demolished, building foundations will be removed, and the sites will be cleaned and graded.

Type			Registration Section	Commitment
Mi	**Mo**	**F**		
✓			2.3.6 (Decommissioning and Rehabilitation)	Powerlines and inactive conductors will be removed in a safe manner in accordance with approvals. Decommissioned electrical infrastructure will be considered for reuse or recycling wherever possible (such as wood or metals) or transported to an appropriate facility for disposal.
✓			2.3.6 (Decommissioning and Rehabilitation)	Above-ground concrete footings will be removed and managed with other demolition concrete.
		✓	2.4.3 (Logistics Considerations)	Environmental and community concerns will also be assessed with the aim to reduce disruption during transport operations.
		✓	2.5 (Regulatory Framework)	To minimise potential adverse environmental effects and enhance positive outcomes, principles of sustainability and environmental and social responsibility are integrated into North Atlantic's internal resource management plans. These plans are embedded within North Atlantic's organisational and approval framework. As outlined in Section 4.6, several such plans will be developed and implemented throughout the Project.
✓			3.2.2.5 (Freshwater Sensitive Time Periods and Working Windows)	Most instream work will be conducted between May 31 and September 1 and mitigation measures (e.g., such as a fish relocation plan), may need to be implemented during this period to minimize interference with fish migration and rearing.
		✓	3.2.2.7 (Physical Oceanography)	Stormwater inputs were not incorporated into the dispersion model presented in Appendix B3 for the HGP area. A stormwater assessment for this location will be completed in the next phase of detailed design.
		✓	3.2.2.8 (Marine Navigation and Ship Traffic)	To ensure effective communication between marine vessels and shore bases, communication systems will be required in accordance with the *Canadian Coast Guard's Marine Communications and Traffic Services (CCG-MCTS).*
✓	✓		3.2.2.9 (Marine Biosecurity); 5.2 (Residual Effects - Aquatic Environment)	To mitigate the potential spread of AIS. North Atlantic will adhere to recommended best practices and guidelines. Shipping vessels will be inspected for biofouling by AIS such as Vase tunicate and European green crab.
		✓	3.2.8 (Data Gaps)	North Atlantic will complete detailed aquatic surveys for crossings identified during the final design phase.

Type: Mi	Type: Mo	Type: F	Registration Section	Commitment
	✓		4.2.1 (Atmospheric Environment)	Monitoring and reporting of GHGs will be conducted during the O&M Phase of the Project, in accordance with applicable provincial and federal GHG quantification and reporting requirements.
✓			4.2.1 (Atmospheric Environment)	Artificial lighting will be required for safe and efficient operation during all Project Phases (i.e., Construction, O&M, Decommissioning and Rehabilitation). During Construction and Decommissioning Phases, Project lighting will be temporary; limited to mobile equipment (e.g., heavy equipment, light duty vehicles, mobile floodlights) and will be minimized to only what is necessary for safety when activity in a particular location is complete.
✓			4.2.1 (Atmospheric Environment)	All infrastructure at the HGP and HP will operate outdoors with enclosure reduction applied to select equipment.
✓	✓		4.2.2 (Aquatic Environment)	Given the potential for harm during construction and operation, including erosion, water withdrawals, or MCH/toluene spill risks at the jetty, robust environmental planning will be required. Avoidance, minimization, and mitigation measures such as erosion control, spill response systems, and environmental monitoring will be key to managing risks.
✓		✓	4.2.4 (Land and Resource Use)	The Project transmission line is anticipated to cross the protected road with the municipal planning areas of Sunnyside and Come By Chance and will require approvals from the Towns of Come By Chance and Sunnyside.
		✓	4.2.4 (Land and Resource Use)	North Atlantic will continue to work with mineral rights holders in the area; licence holders have been contacted, and agreements will be arranged if needed to address any potential effects.
✓		✓	4.2.6 (Socio-economic Environment)	North Atlantic will employ a combination of direct hires and contractors, with an emphasis on local hiring and diversity and inclusion in keeping with Government directives and company policies (Appendix Q, Workforce and Employment Plan).
		✓	4.3.3.1 (Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials)	The Emergency Response Team (ERT) will be trained to respond to both material fires and chemical fires.
		✓	4.3.3.1 (Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials)	North Atlantic will install auto-isolating valves on any MCH and toluene storage tanks, as to reduce the likelihood of a release occurring.

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	✓	✓	4.3.3.1 (Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials)	Hydrogen transfer pipelines located beneath roads will be manufactured with materials which can withstand the weight of vehicles, and hydrogen gas detection will be implemented in areas of under road pipeline crossings, to detect the presence of hydrogen leaks or cracks in the pipeline prior to risk of ignition. To allow for regular inspection of pipeline conditions, underground pipelines will be placed in a culvert at intersections with roadways.
		✓	4.3.3.1 (Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials)	In the event of a liquid MCH/toluene spill, non-flammable absorbent material will be available at the Project. This may include dry sand, earth, or vermiculite. Contaminated absorbent material will then be stored in chemical waste containers for further disposal.
		✓	4.3.3.1 (Accidental Spills and Releases of Hydrogen or Toluene, and Other Hazardous Materials)	Preventative spill and release measures will be introduced to reduce the potential for a consequential hazardous material spill.
		✓	4.3.3.3 (Traffic Incidents)	The public will be permitted to utilize new Wind Farm access roads, with the exception of brief periods during all phases of the Project when there is an increased risk to health and safety, such as during transportation of large wind turbine components.
✓		✓	4.3.3.3 (Traffic Incidents)	North Atlantic will maintain reduced speed limits within the PA, with speed limits variable depending on terrain and infrastructure.
		✓	4.3.3.3 (Traffic Incidents)	Transportation of large wind turbine components will be conducted in accordance with the **Newfoundland Highway Traffic Act**, which may include applying for an Overweight and Over Dimensional Special Permit. Transportation may be conducted during reduced traffic hours (i.e., overnight).
	✓	✓	4.3.3.5 (Dislodging of a Wind Tower or Wind Turbine Blade)	Scheduled preventative maintenance, including the replacement of high-stress components, will be conducted on a regular basis. Detailed records of maintenance inspections and activities will be retained at the PA.
	✓		4.3.3.5 (Dislodging of a Wind Tower or Wind Turbine Blade)	Weather forecasts will be monitored on a regular basis, to determine if wind turbine operations should be reduced due to severe storm events. As a supplement to weather forecasts, wind levels will be monitored by use of the existing meteorological stations.

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		✓	4.3.3.7 (Occupational Hazards and Human Injuries)	All Project activities will be conducted in alignment with the duties of employers and employees outlined in the **Newfoundland Occupational Health and Safety Act**. North Atlantic will implement additional measures, including Mandatory health and safety orientation for all Project personnel and visitors prior to commencing work; Mandatory task-based PPE; Daily health and safety meetings (referred to as 'Tailgates') to identify potential health and safety risks; Signage of safety and hazard awareness in high-traffic and high-risk areas.
		✓	4.3.3.7 (Occupational Hazards and Human Injuries)	During medical events, North Atlantic will have 24/7 access to the Braya Health Centre which is staffed during the day Monday through Friday with an industrial nurse. Should medical care be required during evenings and weekends, the Braya Medical Centre is further staffed by technicians with advanced first aid training.
✓		✓	4.3.3.8 (Failure of Industrial Water Supply)	A reserve of emergency fire response water will be stored separately from the electrolysis processing facility, therefore maintaining emergency response capability regardless of incidents occurring to process water supply.
		✓	4.4.2 (Algal Bloom)	Regular inspection and maintenance will occur associated with the water intake structure at Inkster's Pond, therefore algal blooms can be detected and managed accordingly.
✓			4.4.3 (Geological Hazards)	Project infrastructure will be designed and constructed to withstand potential seismic events and as recommended by the National Building Code of Canada (National Research Council of Canada, 2015).
✓			4.4.4 (Forest Fires)	Project infrastructure will be designed and operated to reduce risk of damage from wildfire (e.g., transmission rights-of-way, wind turbine pads etc. will be maintained to ensure vegetation is maintained).
✓	✓	✓	4.5 (Mitigations)	Mitigation measures will be implemented to address the Project's potential impacts on each valued component (VC), including the standard environmental protection procedures and best management practices that North Atlantic has committed to.
		✓	4.6 (Plans and Environmental Management)	North Atlantic recognizes that safety is a fundamental element of everyday operations and is committed to preventing the accidental loss of any of its resources, both human and physical. Employees, Supervisors, and Contractors are responsible for the company's overall safety initiatives.

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		✓	4.6 (Plans and Environmental Management)	North Atlantic will do everything that is practical and reasonable to provide their employees and contractors with a safe working environment by continuing to meet and/or exceed OHS and Environment regulatory requirements. This shall be achieved through the development and implementation of comprehensive policies and procedures, education in hazard and incident reduction, mandatory training and orientation for employees and contractors, and a commitment to review and continuously improve their safety management system.
	✓	✓	4.6 (Plans and Environmental Management)	North Atlantic is devoted to developing a system of responsibility, measuring key performance indicators, providing its employees and contractors with sound leadership, and leading by example. These are the cornerstones of developing a sustainable safety culture.
		✓	4.6.1 (Environmental Policy)	North Atlantic is committed to the protection and preservation of the environment through regulatory and the continuous review of their operations.
			5.0 (Residual Effects)	Monitoring will be conducted to verify predictions and promote ongoing improvement in environmental management, especially for interactions involving SAR.
		✓	5.2 (Residual Effects - Aquatic Environment)	Some habitat associated with culverts will be altered, but proper installation will ensure connectivity between upstream and downstream habitats.
✓			5.3 (Residual Effects - Terrestrial Environment)	Project infrastructure will be micro-sited to avoid any contentious locations like those of rare plant species.
✓			5.3 (Residual Effects - Terrestrial Environment)	Relevant regulatory measures will be adhered to, including the **Migratory Birds Convention Act** and associated Migratory Bird Regulations, which protect many nesting bird species from harm. Others are protected under the Provincial **Wildlife Act**.
		✓	5.5 (Residual Effects - Heritage and Cultural Resources)	The two registered archaeological sites and the two HPAs situated within or near the PA will be avoided. Note that one HPA encompasses one of the archeological sites. An Archaeological Mitigation phase will be completed prior to conducting any Project activities that may alter or disturb any existing structural remains or terrain identified in the HRIA as having high. The Contingency Plan (Appendix F) will be followed, which outlines the measures and procedures to follow if any suspected Historic and Archaeological Resources are encountered.

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		✓	8.9 Questions and Concerns	As engineering design progresses, North Atlantic will complete Dispersion modelling and update applicable plans, including the Emergency Response Plan (Appendix M) and Hazardous Materials Training Plan (Appendix O).
		✓	8.9 Questions and Concerns	North Atlantic will work to develop a solution to mitigate gravel making its way onto the highway through final design activities for the access road.
		✓	9.0 (Environmental Protection Plan)	Table 9.0-1 provides an annotated table of contents for the Project Construction EPP. Future iterations (O&M Phase, Decommissioning and Rehabilitation Phase) will be tailored to reflect the relevant PA activities and their associated protection procedures.
✓			Appendix B1 (Aquatic Environment Component Study)	Access roads will range in width from 5 to 20 m and be designed to avoid or reduce negative environmental effects (i.e., maintaining local drainage patterns and reducing width of disturbance).
		✓	Appendix E (Transportation Impact Study and Traffic Management Plan)	Culverts along the travel path of oversized and overweight vehicles will be identified and then inspected by a qualified inspector. If any culvert is found to be structurally inadequate to support the anticipated loads, appropriate reinforcement measures will be implemented.
		✓	Appendix E (Transportation Impact Study and Traffic Management Plan)	The measures intended to minimize effects on the road network during all phases of the Project include obtaining required permits and approvals from relevant authorities, conducting route assessments, and reinforcing critical infrastructure.
✓		✓	Appendix E (Transportation Impact Study and Traffic Management Plan)	PA access and wind turbine delivery will be scheduled to avoid or reduce effects on the TCH. Activities with major effect on the road network will be completed in the off-peak periods to avoid conflict with the peak vehicular demand.
✓		✓	Appendix E (Transportation Impact Study and Traffic Management Plan)	Following the removal of infrastructure, the Wind Farm area will be rehabilitated and restored, and the Wind Farm access road may be dismantled.
	✓	✓	Appendix H2 (Air Dispersion Modelling Study)	The Air Dispersion Modelling Study present preliminary descriptions of the main features of the Project based on the wind and hydrogen Pre-FEED report. More extensive and detailed information will become available as studies and detailed design proceed.

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		✓	Appendix J (Noise and Vibration Impact Study)	Blasting is expected to be limited to daytime hours and will follow BMPs outlined in guidance documents such as the Blasters Handbook (ISEE, 2016) and the Environmental Code of Practice for Metal Mines (ECCC, 2009) and as such was not assessed at this stage of design. These guidance documents provide detailed information on designing and carrying out blasting to reduce sound emissions, and these will be consulted during blasting design.
	✓		Appendix J (Noise and Vibration Impact Study)	Compliance monitoring, where required by permitting or regulations, will be conducted to confirm that mitigation measures are properly implemented. Should an unexpected deterioration of the environment be observed as part of follow-up and/or monitoring, intervention mechanisms may include the application of noise mitigation measures to address it.
		✓	Appendix M (Emergency Response Plan)	The ERP will be incorporated into and utilized with existing safety documentation, and applies to all other personnel, individuals and organizations that may be involved in emergency measures on site, including the NARL Logistics Terminal and Braya.
		✓	Appendix N (Waste Management Plan)	North Atlantic is committed to environmentally responsible operations and will adhere to the Waste Management Plan (Appendix N). Waste generation is minimized through responsible environmental management, proper planning, employee training, and preventative maintenance. All records related to the Waste Management Plan will be maintained electronically for a minimum of seven years. The Waste Management Plan will be reviewed annually, at a minimum, and updated where necessary. Waste generated during the Construction and, O&M Phases of the Project, will be collected, transported and disposed of in accordance with the WMP and the existing NARL Logistics WMP.
		✓	Appendix O (Hazardous Material Training Plan)	The Hazardous Materials Response Team will adhere to guidelines in the Hazardous Material Training Plan.
✓		✓	Appendix P (Public Participation Plan)	Develop a local Benefits Plan, including a Gender Equity, Diversity and Inclusion Plan (GEDP), in consultation with stakeholders.

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		✓	Appendix P (Public Participation Plan)	Host public information sessions, including topic specific sessions on labour and employment requirements and business opportunities.
	✓	✓	Appendix P (Public Participation Plan)	Establish a Community Liaison Committee with participation from diverse stakeholders to ensure a wide range of expertise and perspectives are engaged.
	✓	✓	Appendix P (Public Participation Plan)	Continue to distribute a quarterly newsletter with the aim to educate the public on various aspects of the Project, and to highlight progress, schedule of upcoming activities, environmental monitoring, etc.
		✓	Appendix P (Public Participation Plan)	Open a Project office in the community to enhance public engagement and help increase community ownership and support.
✓		✓	Appendix P (Public Participation Plan)	Work with stakeholders to implement the Benefits Plan and Gender Equity, Diversity, and Inclusion Plan.
✓		✓	Appendix P (Public Participation Plan)	Develop a construction awareness campaign to provide advance notice to communities, motorists, and marine vessel operators regarding the commencement of work related to the access road and transmission line, site clearing, blasting operations, helicopter activity, delivery of oversized equipment via TCH and local roads, marine traffic, etc.
		✓	Appendix P (Public Participation Plan)	Offer Plant and PA tours to local government, service organizations, industry partners, schools and other interested parties.
		✓	Appendix P (Public Participation Plan)	Host public meetings and presentations on the development of a Decommissioning and Rehabilitation Plan.
		✓	Appendix P (Public Participation Plan)	North Atlantic will seek opportunities to continue working with Indigenous peoples to share knowledge and environmental data, create employment and contracting opportunities, and explore ways in which Indigenous peoples can directly benefit from the Project.

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		✓	Appendix P (Public Participation Plan)	North Atlantic will conduct regular public awareness campaigns to educate the community about emergency procedures, communication channels, and the importance of staying informed.
	✓	✓	Appendix P (Public Participation Plan)	North Atlantic will also establish a feedback mechanism to gather input from community and industry stakeholders, allowing for continuous improvement of the communication strategy.
		✓	Appendix P (Public Participation Plan)	A formal inquires and complaints resolution process will be developed in consultation with the Community Liaison Committee and shared with the public via the Project website.
		✓	Appendix Q (Workforce and Employment Plan)	North Atlantic will employ a combination of direct hires and contractors, with a strong emphasis on local hiring and diversity and inclusion.
		✓	Appendix Q (Workforce and Employment Plan)	Competitive compensation packages will be offered to attract and retain qualified talent.
		✓	Appendix Q (Workforce and Employment Plan)	The Project will support apprenticeships and provide necessary training to ensure all employees are well-prepared for their roles.
	✓	✓	Appendix Q (Workforce and Employment Plan)	Reporting on workforce statistics will be conducted quarterly as per government requirements.
✓		✓	Appendix Q (Workforce and Employment Plan)	Prior to construction, a Benefits Agreement and Gender Equity, Diversity and Inclusion (GEDI) Plan will be established to meet the requirements of regulators and to ensure the Project delivers meaningful employment and economic opportunities for residents (local, regional and provincial) and under-represented groups.
		✓	Appendix T (Domestic Woodcutting Consultation Plan)	To ensure that concerns related to domestic woodcutting are addressed transparently and fairly, the Project will implement a tiered resolution process: Community Liaison Committee Engagement; Project Review and Response; Appeals and Arbitration.

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		✓	Appendix T (Domestic Woodcutting Consultation Plan)	Project planning will consider opportunities to maintain or improve access to domestic cutting areas, particularly where infrastructure development overlaps with traditional harvest routes.
✓		✓	Appendix T (Domestic Woodcutting Consultation Plan)	Subject to safety and operational constraints, the Project will prioritize making cleared timber available to local residents, particularly in known domestic cutting areas. This will be done in consultation with the NLFFA and local stakeholders.
	✓	✓	Appendix T (Domestic Woodcutting Consultation Plan)	The Project will maintain ongoing communication with local wood harvesters and the surrounding community. Stakeholders in affected areas will be consulted regularly to identify concerns, minimize disruption, and optimize access to resources.
✓			Appendix T (Domestic Woodcutting Consultation Plan)	The Project will prioritize micro-siting along existing linear corridors (e.g., transmission lines, roads) where practicable, in order to reduce vegetation removal and minimize effects on domestic woodcutting areas.
✓		✓	Appendix T (Domestic Woodcutting Consultation Plan)	Information regarding Project woodcutting activities and other related information (i.e., construction of access, use of access for wide loads, buffer zones around defined construction and operation activities) will be distributed to woodcutting permit holders and interested stakeholders via email. This will be an optional email list, in which stakeholders may request to be added to the list. In addition, PSA's will be used to target the broader community.