NS-NB Reliability Intertie

Environmental Assessment Registration Document

October 26, 2023

Nova Scotia Power Incorporated

Nova Scotia POWER An Emera Company

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Executive Summary

Nova Scotia Power Inc. (NSPI) is proposing to construct a new 345 kilovolt (kV) transmission line twinning an existing line to the New Brunswick border ("the Project"). L8006 will traverse approximately 96 kilometres (km) from Onslow, Nova Scotia, to the New Brunswick border. The route will parallel L8001, an existing 345 kV transmission line, and this new transmission line will be strung on separate steel towers located in a parallel corridor. This section of new transmission line Right-of-Way (RoW) corridor in Nova Scotia will be 96 km long and 38.1 metres (m) wide and is part of a longer line called the NS-NB Reliability Intertie. **Figure E1** below shows the existing line and corridor. This line will extend from the provincial border to Memramcook, New Brunswick (NB) and then Salisbury, NB; those segments will fall under NB permitting. The construction of this transmission line will be an important regional link and will help NSPI meet provincial renewable energy targets, balance wind generation, and strengthen grid connectivity.

The proposed route of this new L8006 is shown in **Figure E1** below. This line has been contemplated for more than a decade and in Nova Scotia approximately 90% of the needed RoW easement has already been acquired. NSPI is responsible for obtaining environmental approval and for construction of the portion of the line residing in Nova Scotia, while New Brunswick Power has similar responsibilities for the New Brunswick portion of the line.

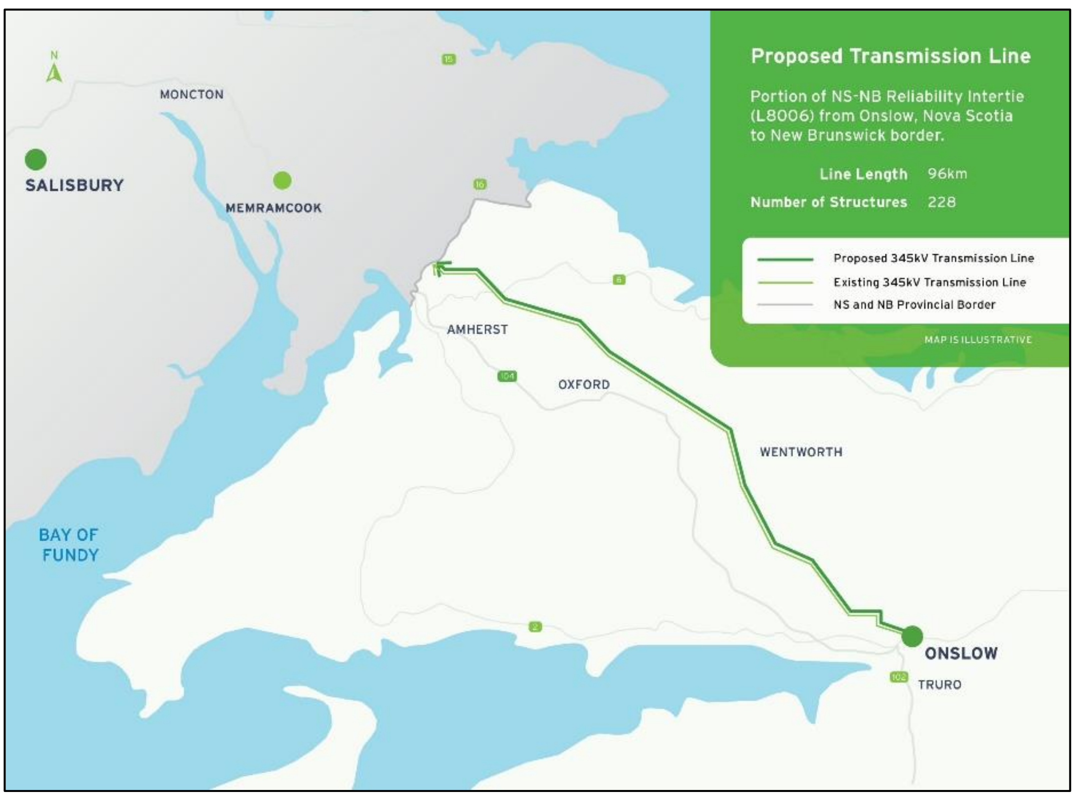

Figure E1 Proposed Route of L8006

The Project is considered a Class 1 undertaking under the Nova Scotia Environmental Assessment Regulations and requires a registered Environmental Assessment as identified under Schedule A of the Regulations. The Environmental Assessment and the registration document have been completed according to the methodologies and requirements outlined in the "*Proponent's Guide to Environmental Assessment*" (NSECC 2001, updated 2017) and accepted best practices for conducting Environmental Assessments, including significant engagement with the Mi'kmaq and stakeholders. The goal for completing the environmental assessment is to identify potential Valued Components (VCs), determine what effects the Project may have on each VC and develop mitigation techniques that will eliminate, reduce, or control any adverse environmental effects. Various environmental studies and considerations are required to support the Environmental Assessment.

LIST OF ACRONYMS AND ABBREVIATIONS

AC	alternating current
AFE	Acadian Forest Ecozone
AM	Amplitude-modulated
Amps	amperes
AOI	Area of Interest
ASF	Atlantic Salmon Federation
asl	above sea level
ATV	all-terrain vehicle
BP	before present
CEA	cumulative effects assessment
CEAA	*Canadian Environmental Assessment Act*
CEPA	*Canadian Environmental Protection Act*
CER	Clean Energy Regulations
CESCC	Canadian Endangered Species Conservation Council
CIWA	Chignecto Isthmus Wilderness Area
CLWA	Chase Lake Wilderness Area
CNWA	*Canadian Navigable Waters Act*
CO	carbon monoxide
CO_2	carbon dioxide
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CSA	Canadian Standards Association
CWS	Canadian Wildlife Service
dB	decibels
dBA	decibels adjusted
DC	direct current
DFO	Fisheries and Oceans Canada
DO	dissolved oxygen
DU	designable units
EA	Environmental Assessment
EBSA	Ecologically and Biologically Significant Area
ECBC	Enterprise Cape Breton Corporation
ECCC	Environment & Climate Change Canada
ECEI	Eastern Clean Energy Initiative
Emera	Emera Inc.
EMF	electromagnetic field
EMP	Environmental Management Plan
EMS	Environmental Management System
EPP	Environmental Protection Plan
EPR	Environmental Preview Report
EPRI	Electrical Power Research Institute
EPSGA	*Environmental Goals and Sustainable Prosperity Act*
ERP	Emergency Response Plan
ESC	erosion and sediment control

FAT	Factory Acceptance Test
FM	Frequency-modulated
FTE	full time equivalent
GHG	greenhouse gas
GPR	ground potential rise
GPS	Global Position System
ha	hectare
HSSMP	Health, Safety and Security Management Plan
HVAC	high voltage alternating current
HVDC	high voltage direct current
Hz	Hertz
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IBP	International Biological Program
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ISQG	Interim Sediment Quality Guidelines
KMKNO	Kwilmu'kw Maw-klusuaqn Negotiation Office
km	kilometre(s)
kt	kilotonnes
kV	kilovolts
LAA	Local Assessment Area
LiDAR	Light Detection and Ranging
m	metre
MBCA	*Migratory Birds Convention Act*
MBS	Migratory Bird Sanctuary
MEKS	Mi'kmaq Ecological Knowledge Study
MGS	Membertou Geomatics Solutions
MHz	megahertz
MW	megawatt
NB	New Brunswick
NCNS	Native Council of Nova Scotia
NERC	North America Electric Reliability Corporation
NGO	non-governmental organization
NIR	National Inventory Report
NOx	nitrogen oxides
NRCan	Natural Resources Canada
NS	Nova Scotia
NSDNRR	Nova Scotia Department of Natural Resources & Renewables
NS ESA	Nova Scotia *Endangered Species Act*
NSEA	Nova Scotia *Environment Act*
NSECC	Nova Scotia Environment & Climate Change
NSCCTH	Nova Scotia Communities, Culture, Tourism and Heritage
NSMNH	Nova Scotia Museum of Natural History
NSOLA	Nova Scotia Office of L'nu Affairs
NSPI	Nova Scotia Power Inc.
NSRR	Nova Scotia Resources and Renewables

NWA	National Wildlife Area
O_3	ground level ozone
PDA	Project Development Area
PID	parcel identification number
PM	particulate matter
PWGSC	Public Works and Government Services Canada
RA	Responsible Authorities
RES	Renewable Energy Standards
RoW	Right-of-Way
SACC	Strategic Assessment of Climate Change
SANS	Snowmobile Association of Nova Scotia
SAR	species at risk
SARA	*Species at Risk Act*
SDS	safety data sheets
SDSS	Sustainable Development and Strategic Science
SF_6	sulphur hexafluoride
StaBNR	Staples Brook Nature Reserve
SteBNR	Steepbank Brook Nature Reserve
SO_2	sulphur dioxide
SO_x	suphur oxides
SOCC	species of conservation concern
SOCI	species of conservation interest
SSEPP	Site Specific Environmental Protection Plan
TC	Transport Canada
t CO_2e	tonnes of carbon dioxide equivalent
TSS	total suspended solids
L8001	Existing 345 kV transmission line
L8006	Proposed 345 kV transmission line
UINR	Unama'ki Institute of Natural Resources
µT	microtelsa
µV/m	microvolts per metre
VC	valued component
V/m	volts per metre
WAP	watercourse alteration permit
WAPA	*Wilderness Areas Protection Act*
WESP-AC	Wetland Ecosystem Services Protocol for Atlantic Canada
WHO	World Health Organization
WHMIS	Workplace Hazardous Materials Information System
WSS	Wetlands of Special Significance
WVWA	Wentworth Valley Wilderness Area
XLPE	cross-linked polyethylene

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1 Introduction

Nova Scotia Power Inc. (NSPI), a wholly owned subsidiary of Emera Inc., is proposing to construct and operate a new 345 kV reliability transmission line in coordination with New Brunswick Power. This new transmission line will enhance the reliability of the NSPI grid while enabling the integration of a significant amount of renewable generation onto NSPI's system. The transmission line will also facilitate greater access to the North American electric grid. L8006 will traverse approximately 96 km from Onslow, Nova Scotia, to the New Brunswick border (the "Project"). The route will parallel L8001, an existing 345 kV transmission line, and this new transmission line will be strung on separate steel structures located in a parallel corridor. This section of new transmission line Right-of-Way (RoW) corridor in Nova Scotia will be 96 km long and 38.1 m wide and is part of a longer line called the NS-NB Reliability Intertie Project.

The location of the Project is shown in **Figure 1.1.**

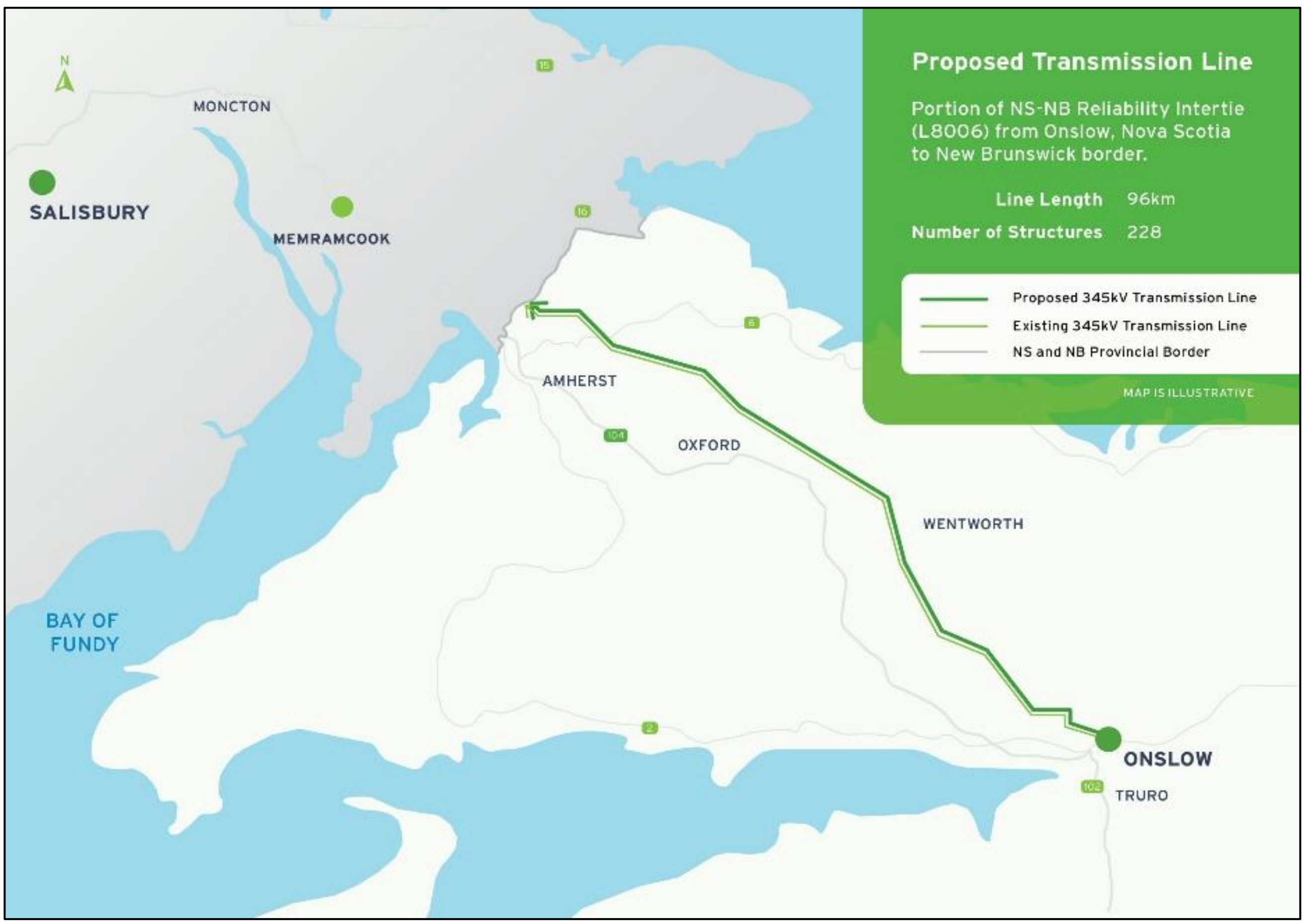

Figure 1.1 Project Location

This document is intended to fulfill the environmental assessment (EA) requirements for the construction and operation of the NS-NB Reliability Intertie through the Class 1 Undertaking under the *Nova Scotia Environment Act* (NSEA). An environmental assessment is designed specifically for application at the conceptual and design phases of Project planning. It requires careful consideration of avoiding or minimizing potential environmental challenges as part of Project design. This requires the planning process to be sufficiently advanced to identify and avoid, when possible, such challenges while still leaving sufficient flexibility in design to mitigate remaining foreseeable problems. This approach promotes a seamless transition from the environmental assessment to the balance of the regulatory approval processes (e.g., permitting), wherein precise mitigation measures and monitoring activities specific to certain environmental effects are required prior to the NS-NB Reliability Intertie coming into service.

The NS-NB Reliability Intertie presented in this environmental assessment report is based on both the conceptual and functional engineering designs completed for the Project. Flexibility is built into the EA process by establishing a *Study Area* around the proposed route. This approach allows flexibility for Project planning changes, such as the siting of structures within the RoW, to meet the requirements of the EA and subsequent permitting processes. NSPI believes this hierarchical approach between assessment and permitting, coupled with monitoring activities and the other commitments made in this report, provide an appropriate level of environmental protection and management.

In this EA, NSPI has been both rigorous and cautious with respect to the use of scientific information in defining and assessing environmental risks. Where there is some scientific uncertainty regarding residual effects following mitigation measures, commitments have been made for follow-up activities and monitoring programs to verify conclusions or adapt as appropriate.

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1.1 Overview of the Project

1.1.1 Context of the Project for Electrical Transmission

NSPI is connected to the North American Bulk Electric System through both the Maritime Link to Newfoundland and Labrador and the NS-NB 345 kV transmission interconnection (L8001) through New Brunswick. As requirements for environmental and emissions compliance have increased, NSPI has added a significant amount of renewable energy to the power grid in the past decade. As these new sources of generation come online, maintaining electric grid system stability has become a key planning component. A second interconnection transmission line to New Brunswick provides that system stability and has been a utility planning consideration in both the 2014 and 2020 Integrated Resource Plans (IRP).

IRP Finding 2a in NSPI's 2020 IRP[1] identified Regional Integration as a central component across all future planning scenarios evaluated within the exercise.

Regional Integration as outlined in NSPI's 2020 IRP:

- The NS-NB Reliability Intertie: a 345 kV Alternating Current (AC) line from Onslow, NS to the New Brunswick border, which continues on through Memramcook, NB to Salisbury, NB.

The NS-NB Reliability Intertie was found to be the least cost option to both strengthen the connection to the North American electrical grid and enable greater renewable generation integration on NSPI's system while reducing system synchronized inertia requirements. The AC component, required for enhancing reliability and system stability to NS, is independent of any future initiatives.

Line L8006, the NS-NB Reliability Intertie, is a 96 km, 345 kV transmission line from Onslow, Nova Scotia to the New Brunswick border in parallel with the existing 345 kV transmission line L8001. The transmission line will continue on from the New Brunswick border, through Memramcook, NB to Salisbury, NB. The portions of the transmission line in New Brunswick will fall under their jurisdiction and respective environmental regulations. Please refer to **Figure 1.2** for a map of the proposed RoW of the New Brunswick portion of the Project.

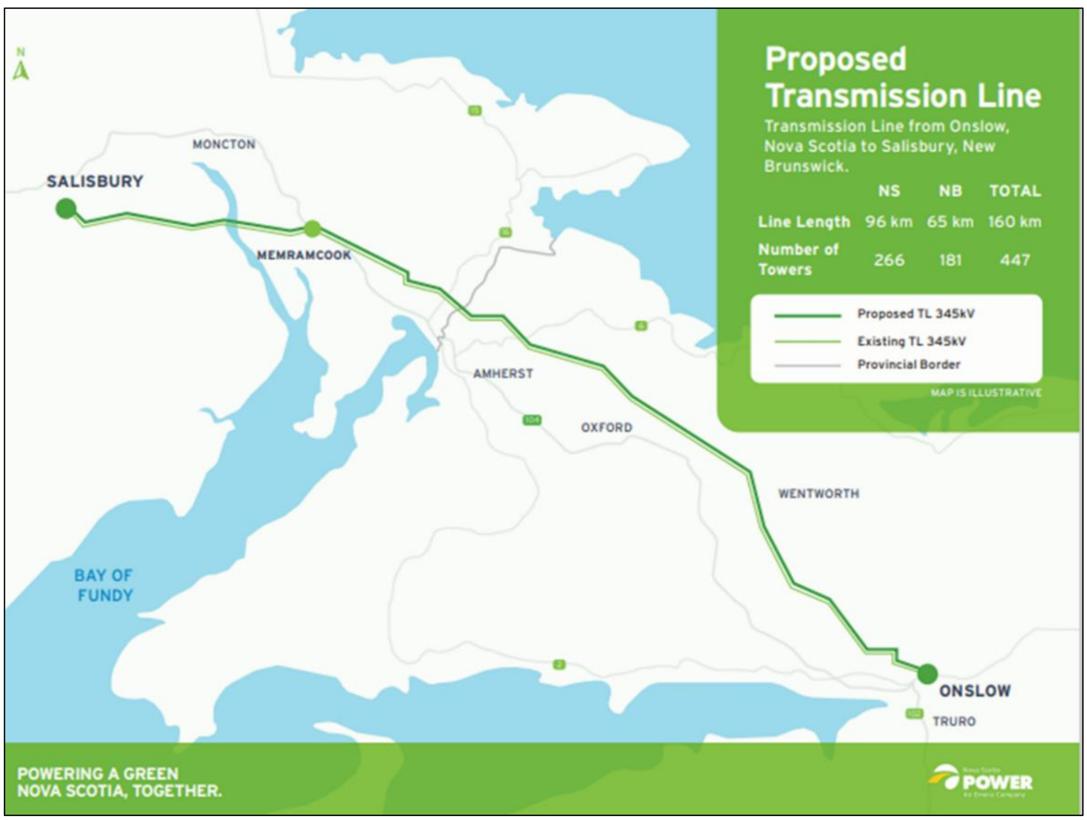

Figure 1.2 Nova Scotia and New Brunswick Portions of the NS-NB Reliability Intertie

[1] NSPI 2020 Integrated Resource Plan, November 27, 2020, page 105.

1.1.2 Context of the Project

In early March 2019, the federal government, alongside Atlantic provincial governments and regional utilities, began to develop a roadmap for how the Atlantic region could work together to achieve a clean energy future.

The result of the collaboration between the groups was the *Clean Power Roadmap for Atlantic Canada* released by Natural Resources Canada in March, 2022[2]. Key findings of the report include:

- As the Atlantic Provinces move to net zero, electricity demand is expected to increase across the region due to population growth and electrification of the transportation system and other sectors.
- New clean energy generation will be needed to replace coal-fired, and eventually other fossil-fuel based generation in the region.
- A transmission loop would provide system benefits and help bring clean hydro power from Quebec and Labrador to New Brunswick, PEI, and Nova Scotia.

Prior to the *Clean Power Roadmap*, the Maritime Link Project was the first major step towards regional integration. The project was commissioned in 2018 and connects Newfoundland and Nova Scotia via a 500 kV Direct Current transmission line allowing electricity to flow from the Muskrat Falls hydroelectric project in Labrador via the island of Newfoundland to Nova Scotia.

The following document assesses only the NS-NB Reliability Intertie as a proposed 345 kV HVAC line from Onslow, NS to the New Brunswick border.

1.2 Proponent Information

1.2.1 About NSPI

Nova Scotia Power Inc. is a vertically integrated utility and the primary electricity supplier to Nova Scotians. NSPI has approximately $6.1 billion in assets and provides electricity generation, transmission, and distribution services to approximately 536,000 customers.

NSPI's current generation mix includes wind, biomass, hydro, solid fuel (coal), natural gas and oil which can generate up to 2,453 megawatts (MW) of electricity at a given time. NSPI also contracts for additional renewable energy from Independent Power Producers and imports renewable energy across the Maritime Link and the New Brunswick intertie (L8001). NSPI's transmission system consists of over 5,000 km of transmission lines and 28,000 km of distribution and facilities across a service territory of 55,284 square kilometres.

To address the effects of climate change, governments around the world have begun to move towards reducing global Greenhouse Gas (GHG) emissions in an effort to mitigate the most serious effects of the changing climate and adapt to the inevitable changes in climate to come.

Under the current Nova Scotian Renewable Energy Regulations, NSPI has a mandated target to achieve 40 percent of its energy generated from renewable sources each year from 2020-2029. In addition, in late 2021, the Nova Scotia government enacted the *Environmental Goals and Climate Change Reduction Act* which introduced a

[2] Natural Resources Canada and NS Department of Intergovernmental Affairs, Clean Power Roadmap for Atlantic Canada.

goal to phase out coal-fired generation by 2030 and achieve a goal of 80% of its energy generated from renewable sources. In August 2023, the Federal government published draft *Clean Energy Regulations* (CER) with a path to a net-zero electricity grid by 2035. These CER are part of broad emissions reductions with a milestone in 2030 (40 to 45% reduction below 2005 levels) and net-zero emissions 2050.

As carbon emission regulations tighten, NSPI is taking significant steps to transform its generation asset mix to clean energy. Key to this transformation is the reinforcement of NSPI's transmission system with the addition of a second interconnection transmission line with New Brunswick. The NS-NB Reliability Intertie will enable system stability as new renewable energy sources are added to the grid and allow for the additional import of renewable energy onto the system.

1.2.2 NSPI Corporate Management and Policies

NSPI is a wholly owned subsidiary of Emera Inc. Emera Inc. which has seven electric and natural gas utilities in Canada, the United States and the Caribbean with approximately 2.5 million customers, 7,100 employees and $34 billion in total assets. The majority of Emera's subsidiaries are regulated utilities.

NSPI is governed by a board of directors which consists of nine members, seven of whom are independent with Scott Balfour, President and Chief Executive Office of Emera, acting as board chair. Members of the executive leadership team share responsibility for the financial, operational, regulatory and information technology oversight of the company. NSPI is subject to both the Emera Code of Conduct, which sets expectations for appropriate business conduct, and the Affiliate Code of Conduct which guides fair dealing with affiliates.

NSPI is subject to regulation under the *Public Utilities Act of Nova Scotia* and provides the Nova Scotia Utility and Review Board (UARB) with supervisory powers for NSPI's operations, expenditures, and rate setting processes. NSPI is regulated under a cost-of-service model, which allows for the recovery by the company of prudently incurred costs of providing electricity services to Nova Scotians and a reasonable return to its investors.

As NSPI is a fully integrated utility, it is subject to all environmental and safety-related laws and regulations set by both the Government of Canada and the Province of Nova Scotia. NSPI works diligently to comply with all environmental and emissions related standards and participates fully and transparently with all government and regulatory bodies in ensuring best practices are being employed to monitor and achieve all targets and comply with all applicable legislation. Within NSPI, the team tasked with leading the transition to cleaner energy sources is called the Eastern Clean Energy Initiative (ECEI).

1.2.3 Environmental Planning and Management at NSPI

1.2.3.1 Environmental Management System

Emera and NSPI employ an organizational approach to environmental management through their Environmental Management System (EMS). The goal of the EMS is to ensure environmental considerations are a part of daily activities at the company. The intended outcomes of NSPI's EMS include the enhancement of environmental performance, fulfillment of all compliance obligations and the attainment of all environmental objectives. NSPI employees, consultants and contractors are responsible for the application and execution of EMS activities within the context of maintaining and improving the electrical power system.

Effective governance is key to NSPI's EMS with the executive leadership team and the board of directors for both Emera and NSPI accountable for monitoring annual performance targets, changes to business practices due to new compliance obligations, summaries of environmental incidents, the results of both internal and external audits, and stakeholder inquiries.

1.2.3.2 NSPI Environmental Policy

Along with the corporate EMS system, NSPI has an Environmental Policy which demonstrates how NSPI shares in the desires of our customers, shareholders, employees, and others, to enjoy the benefits of a sound economy and a healthy and sustainable environment. Through implementing this policy, NSPI is committed to meeting business objectives in a manner that is respectful and protective of the environment, and in full compliance with legal requirements and Company policy.

In delivering on this commitment, NSPI:

- Considers pollution prevention its first option, in preference to control or clean-up;
- Makes environment an integral part of decision making, as it pursues both environmental performance and value to shareholders;
- Verifies, and uses appropriate opportunities to continually improve its environmental performance and management system;
- Uses the Environmental Policy as the framework for setting and reviewing environmental objectives and targets;
- Works with employees and customers to promote the most efficient use of our products and services;
- Provides energy to customers in a manner that uses resources as efficiently as possible;
- Works with government in the development of technically sound and financially responsible environmental laws and regulations; and,
- Communicates with all stakeholders on environmental performance in a proactive and open manner.

All NSPI employees are required to fulfill the safety and environmental responsibility and requirements of their jobs at all times.

1.2.3.3 Project Environmental Management Plan

The NS-NB Reliability Intertie Project-specific Environmental Management Plan (EMP) will be developed under the umbrella of the robust EMS in place at NSPI and overseen corporately by the Emera EMS. The EMP will encompass all environmental regulatory requirements and commitments made during the EA process which include the formal conditions of the EA processes, as well as subsequent requirements of provincial and/or municipal permitting (Authorizations, Approvals, Permits, Certificates, etc.).

The EMP also encompasses commitments made in this EA Report, which include applicable compliance standards and/or industry best management practices. The EMP will focus on the construction phase of the Project. As the Project progresses through Commissioning to the Operations and Maintenance phase, the applicable aspects of the EMP will be incorporated directly into the EMS. This is consistent with other operations and maintenance activities across Emera companies.

The environmental assessment is designed to be applied during the design and planning phases of project scheduling. Mitigation through project design is a key aspect of environmental assessment. The goal for the NS-NB Reliability Intertie is to determine where project components will be located, and how they will be constructed, by balancing the following: engineering design requirements, (e.g., relevant CSA standards and National Standards of Canada such as CAN/CSA-C22.3 NO. 1-2020 - Overhead Design Systems and CAN/CSA-C22.3 NO. 60826-2019 – Design Criteria of Overhead Transmission Lines), topography; constructability considerations, (e.g., access, transportation of materials); environmental protection, (e.g., avoidance of sensitive features), mitigation; traditional use of lands and resources by Indigenous persons; and the project schedule.

Specific environmental requirements and mitigation practices are identified in this assessment and will be refined in subsequent environmental regulatory permitting processes and are applicable through the construction phase of the Project. The EMP will continue to evolve through the life of the Project as new requirements emerge from various permitting and other processes. All permits, authorizations, approvals, and certificates associated with the construction will be tracked and monitored.

1.2.3.4 Project Environmental Protection Plan

An important component of the EMP is the Environmental Protection Plan (EPP). The EPP clearly sets out specific plans for implementation of protection procedures and mitigation measures associated with Project construction activities. It is the primary mechanism for ensuring that mitigation is implemented, as determined through the EA process to avoid or mitigate potential adverse environmental effects that might otherwise occur from construction activities, and as required by applicable agencies through permitting processes. The Project EPP will be developed in consideration of the broad spatial (96 km) and temporal (three years of construction plus follow-up studies) boundaries for Project construction activities, to ensure effective and efficient implementation and compliance with regulatory and other requirements set out in the EMP.

The EPP is a plan for all Project personnel, including contractors, and describes the responsibilities, expectations and methods for environmental protection associated with Project activities. The EPP will incorporate:

- means to comply with requirements of relevant legislation;
- environmental protection measures identified as part of the Environmental Assessment; and subsequent Project permitting;
- environmental commitments made as part of the Environmental Assessment.

NSPI Environmental Monitors will check and monitor the Project RoW and activities throughout construction to identify where proactive measures are needed and report any EPP-related deficiencies. In addition to Environmental Monitors, NSPI will provide capacity funding for Indigenous Monitors.

1.3 Purpose and Need for Undertaking

1.3.1 Purpose and Need for the Project

The need for this second transmission line to NB is supported by results of a comprehensive study (RECSI – Atlantic Region) carried out in 2018 wherein it acknowledged that a second 345 kV NS-NB Reliability Intertie was identified as a high potential transmission element to facilitate the use of more renewable energy in the region. The existing AC interface with NB comprises one 345 kV line and two 138 kV lines. This interface has been utilized for years for a variety of services including economic energy import and export, balancing services, and reserve sharing. However, due to capacity constraints on this interface, the ability to import firm energy and capacity from the broader North American grid is currently very limited. A second Reliability Intertie comprises development of a new 345 kV AC line between Onslow, NS and Salisbury, NB. This transmission option was an available resource in all key IRP scenarios. During the Pre-IRP Phase, NSPI engaged Power System Consultants (PSC) to conduct a system stability study to assess the ability to integrate additional inverter-based generation on the NSPI system, particularly expanded wind capacity. This study identified the loss of the existing 345 kV line to NB as a significant contingency for NSPI, and determined that the addition of a second 345 kV line would bring security and operating flexibility to the system and could enable the integration of an additional 400 MW of variable inverter-based generation. This type of Regional Integration is an economic component of the lowest cost plans under each load scenario of the IRP.

In 2010, after reviewing the limitations of NSPI's transmission capacity to import and export power, the NSUARB approved NSPI's request for funding to secure the RoW needed to twin the NS-NB Reliability Intertie. *"The Board understands the purpose of the project is to provide an easement for a second 345 kV transmission line that will parallel the existing 345 kV transmission line inter-tie now in place with New Brunswick. The Board also understands that this project is being undertaken in order that the route of the line will be established and complementary studies for environmental permits and detailed line design can be advanced. The Board agrees that this Project is necessary and a key first step in the planning for strengthening the transmission inter-tie with New Brunswick." (UARB letter July 21st, 2010).*

1.3.2 Alternative Means of Carrying out the Project

This section summarizes key alternative means of carrying out the Project. The examination of the alternative means of carrying out the Project involves the following steps:

- identification of potential alternative means to carry out the Project;
- identification of the alternatives which are technically and economically feasible;
- determination of potential environmental effects associated with feasible alternatives; and
- description of the rationale for selecting the preferred alternative.

Several alternative means of carrying out the Project were considered throughout the early phases of Project planning with respect to the following Project components:

- transmission corridor routing;
- transmission technology - HVAC and/or HVDC;
- overhead or buried transmission cables

Only Project alternatives which meet applicable safety standards are presented in this report. Criteria were developed to assess the alternative means, including economic and technical feasibility, as well as environmental and socio-economic considerations. Any alternative not considered economically or technically feasible, was not evaluated for environmental and socioeconomic considerations. **Table 1.1** presents a summary of the assessment of alternative means for undertaking the Project.

Table 1.1 Alternative Means

Alternative Means	Technical Feasibility	Economic Feasibility	Environmental and/or Socio-economic Considerations	Selected Means
Alternate transmission line routes	Routes to the SW and NE are technically feasible.	Alternate routes are higher cost options, as without a shared corridor with the existing transmission line they require 33% wider RoW corridors and new access routes.	Alternate routes would have a greater impact on the landscape because of the wider RoW corridor and new access routes.	A parallel route was selected, twinning the existing line is the least-cost and lowest impact option.
Selection of transmission technology	HVDC lines are not required for the length of this line.	NSP system planning studies has confirmed 345 kV lines a standard in Nova Scotia. HVAC integrates with the substation at Onslow, no converter station is required.	No converter station is required for HVAC, this reduces the Project footprint.	A 345 kV HVAC transmission line was selected.
Overhead or Buried Transmission	Overhead is standard in NS and considered feasible. Buried is considered feasible although the geology of the terrain in NS is technically challenging.	Overhead is common practice and considered feasible. Buried is considered not feasible, due to the prohibitive cost of burying the lines for 96 km in NS and difficulty continuing through NB.	No further assessment required as this alternative is not economically feasible.	Overhead is the selected means.
Parallel Circuit or Upgraded Single Circuit	A single circuit is technically possible but does not meet NERC reliability requirements.	No further assessment required as this alternative is not technically feasible.		

1.4 Regulatory Framework

A provincial regulatory approval under the NSEA is required for the NS-NB Reliability Intertie to proceed. Environmental legislation and other regulatory approvals that are applicable to the Project are described below.

1.4.1 Federal

The *Canadian Impact Assessment Act* (2019) does not have explicit triggers for this proposed Project. Section 9(1) indicates that the Minister may, on request or on his or her own initiative, by order, designate a physical activity that is not prescribed by regulations made under paragraph 109(b) if, in his or her opinion, either the carrying out of that physical activity may cause adverse effects within federal jurisdiction or adverse direct or incidental effects, or public concerns related to those effects warrant the designation. There are factors to consider, and such a decision is not taken lightly. In section 9(2), before making the order, the Minister may also consider adverse impacts that a physical activity may have on the rights of the Indigenous peoples of Canada.

There is also provision for a Designation in the *Canadian Energy Regulator Act* but this can only be triggered by an Order from the Governor in Council. Extensive discussions with the federal government representatives did not reveal triggers of the federal process. However, the provision of federal funding for the Project requires the federal government to ensure that the impact assessment process followed is rigorous and includes elements deemed important by the federal government including fulsome engagement processes with Indigenous peoples and the public.

1.4.2 Provincial

The Nova Scotia provincial EA requirements are set out in the NSEA, under the Environmental Assessment Regulations. Schedule A of the Regulations designates specific undertakings for the EA, and the Environmental Assessment Branch of Nova Scotia Environment & Climate Change (NSECC) is responsible for administering the EA process. Accordingly, the Project has been designated as a Class 1 undertaking since it involves, “a modification, extension, abandonment, demolition, or rehabilitation of an undertaking listed in Schedule A which was established either before or after March 17, 1995. Schedule “A” of the Environmental Assessment Regulations lists those undertakings which are required to register for environmental assessment. The proposed transmission line Project will consist of “a corridor for 1 or more electric power transmission lines that have a cumulative voltage rating equal to or greater than 345 kVA.”

1.4.3 Confirmation of the Impact Assessment Process

To ensure the use of the appropriate IA Process, Nova Scotia Power and New Brunswick Power met first with their respective provincial agencies, then jointly with the two utilities and the two provincial agencies and, finally with all four parties plus IAAC. After thorough consultation, there was acceptance that each utility would have their portion of the line assessed by its respective provincial agency, and the federal government would participate in those processes as appropriate via Technical Review Committees.

1.5 Sustainability

1.5.1 Context for Sustainability

The proposed NS-NB Reliability Intertie is a central part of NSPI’s strategy to improve the electricity reliability of Nova Scotia’s electricity grid. The proposed transmission line will enable the transformation of NSPI’s emission profile and will improve the social, economic, and environmental sustainability of NSPI’s delivery of electricity. NSPI has had a main 345 kV transmission connection to New Brunswick for four decades that has served both NSPI and NB Power well in balancing both systems and in meeting spinning reserve and other system requirements. NSPI is now embarking on a major transformation of its generation portfolio and electricity transmission system. Government regulations require the closure of all coal fired generation by 2030, representing more than 50% of NSPI’s generation capacity. At the same time, it is expected that the electrification of other sectors (transportation, homes, etc.) will lead to an increase in the demand for electricity.

To replace coal fired generation and meet emerging requirements for electricity, there will be the need for several new projects such as natural gas generation, wind, solar, energy storage, imports, and other contributors. However, many of these new sources are not dispatchable (i.e., not always available) and will require new transmission to assist in maintaining grid reliability. The proposed NS-NB Reliability Intertie will connect to other 345 kV transmission infrastructure that, in the event of increased future electricity demand or the loss of electricity transmission elsewhere in the region, could be used to meet ongoing or temporary electricity needs. This ability to transmit energy will provide opportunities for the decommissioning of Nova Scotia's coal plants and increase our ability to transmit electricity generated from renewable and/or low-carbon emitting sources - an important step in the regional approach to reducing greenhouse gas emissions and mitigating anthropogenically induced climate change.

The new transmission line will assist in meeting the North American Electric Reliability Corporation's (NERC) requirements that govern NSPI's connection to the eastern North American electricity grid (the applicable NERC standard is CIP-013). This Project will also provide a degree of redundancy, should the existing 345 kV line have an issue. Ultimately, the NS-NB Reliability Intertie will assist in in-province reliability, overall sustainability of the grid, and will also play a role in the NERC compliance.

1.5.2 Project-Specific Sustainability Measures

While the Project as whole is an enabler of significant reductions in NSPI's carbon footprint, there are also Project-specific measures that reflect a commitment to sustainability in various forms – be it social, economic, and environmental sustainability. Please note that the goals and activities associated with sustainability measures will be regularly revisited throughout the life of the Project to provide relevant and appropriate value for present and future generations.

Socio-economic Sustainability Measures

Socio-economic sustainability measures associated with the Project relate to our engagement and interaction with the Mi'kmaq, general public, landowners, and the local economy, with the goal of creating a net positive socio-economic impact. As it pertains to the Project's Mi'kmaw engagement, a collaboration agreement is under discussion with the Mi'kmaq to ensure full participation in the Project, including economic benefits. As outlined in Section 4, engagement with the Mi'kmaq began early in addition to undertaking a Mi'kmaq Ecological Knowledge Study (MEKS) (Section 13). While not identifying any major concerns, the MEKS outlined important traditional use areas within the Project boundary, allowing the Project design team to identify, and address where possible, barriers and specific concerns.

The Project's robust public engagement strategy has thus far included communication with landowners, the general public, and special interest groups and will continue throughout all Project phases. To date, NSPI has conducted meetings with stakeholders covering interests ranging from environmental, agricultural, wildlife-related, property-specific, etc., and has held four Open Houses along the line route (see Section 5 for more information on public engagement). This engagement has also provided information to local residents and businesses on employment, contracts, or other avenues of participation. As such, we aim to source Project materials and skilled workers locally and responsibly, to the extent practical. Care will also be taken for workers staying along the route to support local businesses and minimize disruption to local tourism. As discussed in greater detail in Section 14, one of the main economic activities along the NS-NB Reliability Intertie route is blueberry harvesting, with the operations of one of the largest wild blueberry processing operations in the world, Oxford Frozen Foods. NSPI has met with blueberry growers and processors to identify optimal structure placement to minimize impacts on crops, considering both the environmental and socio-economic sustainability of their operations.

Environmental Sustainability Measures

By its very nature, the Project embodies environmental sustainability, aligning itself with NSPI's commitment to transition Nova Scotia to a more secure and smarter electrical grid, while decarbonizing our system and accessing clean energy. In addition, the line's design includes several environmental benefits, as discussed in more detail below. Notably, paralleling the existing transmission line is a more sustainable approach than developing a new, stand-alone RoW, and will reduce the amount of new land required. Further, the width of the new RoW will be 38 m instead of the normal 50 m requirement, an approximate 30% reduction in width. This limits the creation of a new separate corridor, reducing habitat fragmentation and the amount of biota that the Project might interact with. This will be an important feature in protecting wildlife habitat, especially mainland moose. Where possible, existing access routes to the current RoW will be used, again reducing the amount of new area required and creating efficiencies during construction, and operation and maintenance.

Environmental sustainability measures have also been considered as part of line design and structure locations, so as to minimize impacts to important features (wetlands, archaeological sites, etc.). Where wetlands cannot be avoided, a wetland compensation program will be carried out to result in no net loss of wetland habitat. Streams and rivers will be avoided or crossed with temporary bridges. Project infrastructure and components have also been selected in consideration of changing climate variables such as temperature, wind speed, precipitation, and ice loading. Infrastructure used will reduce the potential for property damage and economic and personal hardship that occurs during the loss of electricity transmission as a result of extreme weather. As such, the new line's conductor will be larger, and the structures will be slightly higher and more robust to they can withstand weather events anticipated over the life span of the infrastructure. This will improve reliability, providing situational redundancy. Finally, provisions will be included in the Project's procurement contracts to require the most environmentally sustainable methods and measures, albeit within the practical limitations of the Project.

2 Project Description

2.1 Background

Central to Nova Scotia's energy transition away from coal-fired generation is the requirement for additional transmission system support. This can be achieved with the addition of a second transmission line with New Brunswick Power. With this upgrade, additional renewable generation can be added to NSPI's system while maintaining transmission system stability.

The scope of work for the NS-NB Reliability Intertie Project includes the addition of a second 345 kV transmission line from 67N-Onslow Substation to New Brunswick and multiple system upgrades to address system contingency and stability. The NS-NB Reliability Intertie will parallel the existing L8001 reducing environmental impacts by minimizing Right of Way requirements.

The Project will include the following components:

- Addition of new 345 kV transmission line from Nova Scotia (67N-Onslow) to New Brunswick.
- Substation modifications at 67N-Onslow to accommodate the new line termination. These modifications include a pad expansion, the addition of electrical equipment, and associated protection and control equipment.

2.2 Project Location

The Project spans Colchester and Cumberland counties, adjacent to the existing route of line L8001, from the Onslow substation to the NS-NB Border. The NS portion of the route is 96 km long, the corridor is 38.1 m wide, and is comprised of approximately 228 tower structures. **Figure 2.1** identifies the Nova Scotia portion of the transmission line. Please note that the number of tower structures in Nova Scotia is subject to change once a final detailed design has been completed.

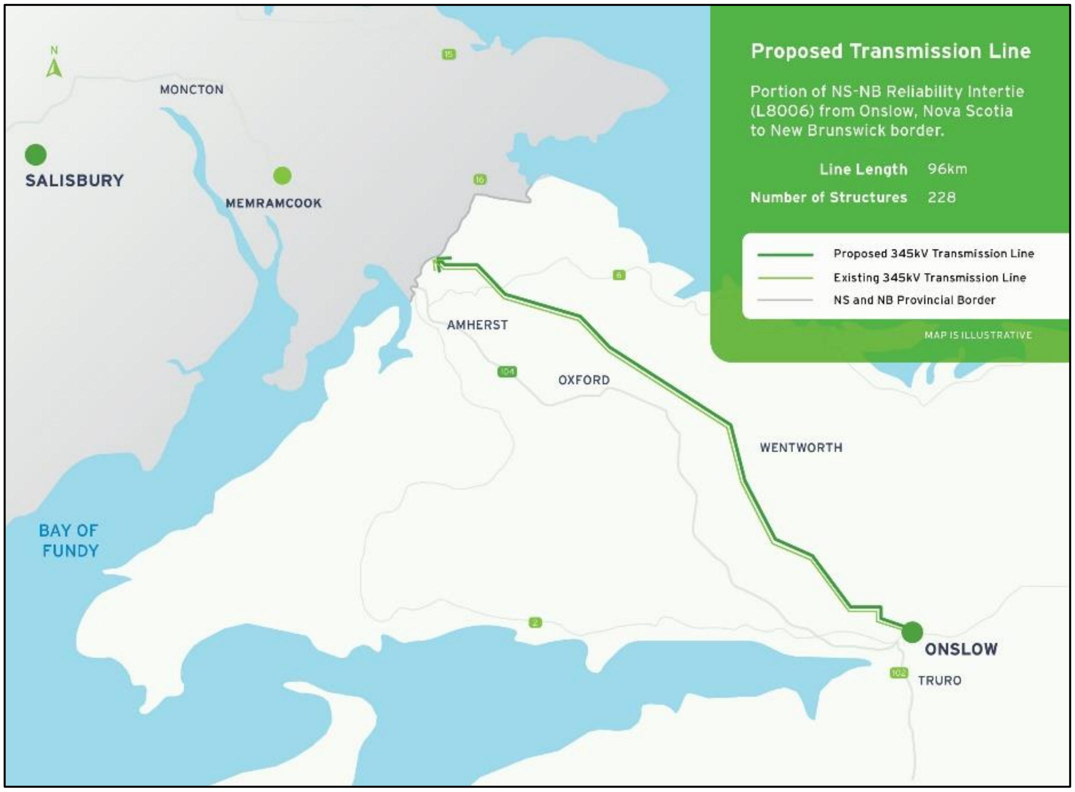

Figure 2.1 Nova Scotia Portion of the NS-NB Reliability Intertie

The proposed L8006 transmission line begins at the 67N Substation in Onslow, Nova Scotia, a community outside of the Town of Truro, and runs through the counties Colchester and Cumberland, adjacent to the Town of Oxford and the Town of Amherst to the New Brunswick / Nova Scotia border. The 67N-Onslow Substation civic address is 133 Old Tatamagouche Road, Onslow Mountain, NS. The following Project location description is divided into three sections based on geography, but the L8006 is continuous[3].

67N Onslow Substation – Belmont – Folly Mountain (24 km)

Beginning at the 67N-Onslow substation, the proposed L8006 line is located to the north immediately adjacent to the existing L8001 line. The two transmission line RoW corridors are proposed to be continuous to avoid creating a second larger new RoW corridor for L8006. The route begins within the lowlands between Cobequid Bay and Onslow Mountain, and travels near Belmont in Colchester County. This area is characterized by farmland and flatlands to gently rolling hilling. Streams in this area tend to be braided and silted. Alder thickets and wetlands are common.

The route crosses over the Chignaois River (L8001-019-020) and several small streams including Staples Brook (L8001-023-024) and Lightbody Brook (L8001-025-026) before making several turns on the way northwest (NW) to East Folly Mountain and the Debert River (L8001-039). It should be noted that these streams are small but run

[3] L8006 Transmission Line Project-Colchester & Cumberland Co., NS. MEKS. Membertou Geomatics Solutions. February 2023.

larger after heavy rains, when they overflow their banks into broad floodplains. Lowlands extend north to approximately EL. 75 m along river and brook cuts in the upper elevated Cobequid Slopes, reaching EL. 150 m at the foothills of the Debert River and Folly River (L8001-062). The Minas Lowlands are covered mostly in black spruce and pine on poorly drained sites and hemlock, red spruce, yellow birch, beech and sugar maple on well-drained sites and steep slopes. The route climbs to Folly Mountain and a CN rail line crossing at L8001-062-063 and crosses Highway #4 at L8001-064-065.

Higgins Mountain – Westchester Station - Greenville Station – Jersey (25 km)

The second section of the line begins at the crossing of Highway #4 at L8001-065. North of the Minas Lowlands and climbing in elevation are the Cobequid Slopes that represent an approximate 5 km narrow, east-west band of sloped topography between 75 m and 125 m elevation. The route continues NW from Folly Mountain and turns NNW at L8001-072. The Cobequid Slopes proximity to the Bay of Fundy and south exposure have a moderate climate that supports a habitat of Acadian mixed forest. Red spruce forest covers the middle to lower slopes and sugar maple, yellow birch and beech cover upper slopes and hill crests. There are very few wetlands on the well-drained tills and sloped topography of the Cobequid Slopes. Further northwest along the Study Area and steeply climbing from approximate 125 m to 300 m elevation are the Cobequid Hills with high points of over EL. 350 m through the Cobequid Hills. The elevated plateau topography has ancient drainage cuts with existing flows south to Cobequid Bay and north cuts with present-day flows to the Northumberland Strait.

The L8006 line passes through the Cobequid Hills centered at East Folly Mountain, through Folly Mountain, Cobequid Mountain and Higgins Mountain. A band of Volcanic Bedrock running east-west, the Fountain Lake Formation forms the Wentworth Valley east wall at the north end of notch between Higgins Brook and Wentworth Valley at approximately Miller Court Road. A nearly straight section of line runs NNW and is accessed by the Higgins Mountain Road for Structures L8001-072-103. The line crosses over from Colchester to Cumberland County at L8001-077 to 078. A second CN rail crossing occurs at L8001-103-104. Continuing along the Higgins Mountain Plateau, Colluvial Deposits are found along step valley walls and the bedrock has thin till cover on the hill tops. Forest cover consists of Acadian hardwood sugar maple, yellow birch, beech from crests to lower slopes and white ash and ironwood on more humus rich soils. Softwood stands are found on level terrain, mixed forest within the ravines. The upper elevation forests are subject to ice and wind damage. There are few wetlands within the Cobequid Hills due to rapid surface drainage with lager wetland supporting habitat. The West Branch Wallace River is crossed between L8001-112-113. The line turns NW again at L8001-120 between Greenville Station and Jersey. This section of line ends at Structure L8001-133 with a second crossing of Highway #4 (L8001-133-134).

Hansford – Kolbec – Mansfield – Truemanville – Tantramar Marshes (47 km)

The third section of the line begins at the crossing of Highway #4 at L8001-134. As elevations drop along the north edge of the Cobequid Hills, the Cumberland Hills form a hilly topography sloping north from approximate EL. 125 m to 75 m elevation near Greenville Station. The L8006 line runs NW through Hansford, West Hansford and alongside Oxford and Little River. There is also a patch of Cumberland Hills just north of Oxford. The Cumberland Hills is mostly covered in Acadian mixed forest with hardwoods on upper slopes and softwoods on level and lower slopes. Upper elevations are subject to ice and wind damage.

There is known habitat for Mainland Moose within the Cumberland Hills ecodistrict. River Phillip is crossed between Oxford and Kolbec at L8001-165-166. The L8006 line runs NW from Oxford to just north of Amherst via Mansfield and Truemanville. There are no turns from L8001-120-176. The line takes a slight turn NNW at L8001-177, turns westerly at L8001-195, NW at L8001-222 and then crosses Highway #6 at L8001 226-227. The line continues NW and crosses Route 366 at L8001-237-238 before it turns due west at L8001-242. A large marsh is crossed at L8001-239-240. Notably, a 2.6 km section of line including structures L8001-240-246 is within the Chignecto Isthmus Wilderness Area and the section of line from L8001-240-243 is within the North Tyndal Well Field Protected Watershed Area.

The L8006 route exits these protected areas into a wetland complex and crosses a marshy fen called Warm Run at L8001-246-247. The lowlands are an approximate 25 km wide topography sloping north from the 75 m contour to the Northumberland Strait. The coastline resembles a drowned landscape of low sandstone cliffs and fine tills slipping below the Strait waters and leaving flooded river estuaries and extensive salt marshes. As the line approaches the border with New Brunswick, the Cumberland Marshes are encountered at MacLellens Brook with flat topography of dykes, floodplains, and agriculture land no more than 25m in elevation. Known as the Tantramar Marshes, the extensive salt marshes and freshwater lakes are drained by the Missaguash River and La Planche River into the Cumberland basin.

The extensive salt marshes, freshwater lakes and tidal flats supports habitat for year-round and migrating waterfowl and has a climate of cooler temperatures and strong winds. The line turns to the NW at L8001-255 and is joined by a parallel section of L6536 (a 138 kV transmission line). It continues to the NS-NB border as the Missagaush River at L8001-259-260. This section of line ends at Structure L8001-260 and completes the NSPI proposed route of transmission line L8006.

The NB Power transmission line (L3224) continues across Highway 16 near Point de Bute, traveling northwest to the next substation 410N Memramcook and on to Salisbury. **Figure 2.2** shows the full transmission line from Onslow connecting into Salisbury, New Brunswick. Please note that the number of tower structures in New Brunswick is subject to change once a final detailed design has been completed.

Figure 2.2 Full Transmission Line from Onslow, NS to Salisbury, NB

2.3 Siting Considerations

2.3.1 Transmission Line Route

When building new transmission lines, NSPI adheres to best management practices for route planning. The primary objective is to minimize new footprint requirements by paralleling existing linear corridors and to reduce the overall length of the line by maintaining the straightest alignment possible. A shared corridor is substantially narrower than two separate corridors, reducing tree clearing, environmental impacts and habitat fragmentation that would result from multiple separate transmission corridors.

The secondary objective is to minimize interactions with known environmental constraints (See Appendix A). Aerial photographs, GIS based mapping, and biological databases are referenced to reduce the potential for the crossing of wetlands, watercourses, known archaeological sites, and environmentally significant areas, among other constraints. The above practices incorporate industry recognized engineering and design principles. Particular attention is paid to the type and number of structures to reduce the overall environmental footprint.

Terrain constraints such as accessibility, slope, and crossing windows (i.e., highway and road crossings), as well as climate related impacts to infrastructure are also considered when selecting the route. Finally, route selection is conducted in consideration of existing land use. Where possible, the route is located to minimize the proximity to buildings and residences, to follow roadways and property lines where possible, and to avoid bisecting properties to the extent possible.

NSPI determined that the most environmentally, socially, and economically feasible route for the Project was to parallel the existing transmission line from Onslow to the NB/NS border. While the "parallel alignment" would also require vegetation clearing and widening of the existing RoW, most Project effects would be in the context of previous disturbance. In other words, the effect is already occurring, and the presence of an additional transmission line would marginally add to these effects. As a result, the proposed route reduces the amount of new RoW through comparatively undeveloped green spaces, and minimizes interactions with population centres and residential properties, as much as possible. Because of the benefits of paralleling existing lines, especially in the context of limited land for alternative alignment options within the Chignecto Isthmus, it was determined that the need for an alternative route analysis was not required. Deviation from the existing transmission line corridor around the Chignecto Isthmus Wilderness Area would require 10 to 30 kilometres of additional transmission line depending on the route. Rerouting would require a 30% wider stand-alone corridor with multiple turns and a new access road network, resulting in reduced connectivity between the protected area and the surrounding lands.

Access Considerations include the following key items:

- Use existing corridor where possible by sharing twinned RoW.
- Utilize existing access routes, minimize new construction.
- Minimize footprint and maintain landscape connectivity, as per the NSECC A Proponent's Guide to Environmental Assessment: "*EA of these undertakings, as described in this document, is used to promote good project planning and therefore minimize impacts that developments cause to the environment.*" (Section 1.5).
- Connect to substations in Onslow and Memramcook using existing space on north side of each substation.
- Keep to the northeast side of the existing line L8001.
- Since 2014, approximately 86% of the RoW easement in NS has been acquired.

2.3.2 Land Ownership and Number of Landowners Affected by the Project

The proposed easement corridor crosses land in 269 parcel identification numbers (PIDs). Of these, 14 PIDs are registered to the provincial government, 204 are owned by individuals or private entities, and 51 PIDs are roads, rivers, cemeteries, or have defective title. To view the full list of PIDs, please see Appendix B. The process of securing land easements for properties that cross the transmission line began over a decade ago, and to date 90% of individual private landowner easements have already been secured.

2.3.3 Upgrades to the Existing Terminal Location

One existing terminal station or substation will be expanded and upgraded to accommodate the proposed L8006 transmission line. It is located east of the Old Tatamagouche Road, off the Laybolt Road in Onslow, approximately 3 km north of Truro and 700 m from Highway 104, at civic address 133 Old Tatamagouche Road, Onslow Mountain, NS. The 67N-Onslow substation was constructed in the late 1970s and is surrounded by a wooded area and cleared transmission corridors. This substation is a central hub connecting a number of transmission lines across the province. The nearest residences are located approximately 250 m away along the Old Tatamagouche Road. To allow room within the substation for the L8006 transmission upgrades (including breakers and switches), the pad will be expanded northward 80 m by 175 m wide (**Figure 2.3**). No new land rights need to be obtained for this pad expansion.

Figure 2.3 67N Onslow Expansion

2.4 Description of Project Components and Infrastructure

2.4.1 Components and Infrastructure

For the new 345 kV Transmission Line L8006 from Onslow to the NS/NB Border, the transmission tower structures will consist of approximately 228 steel lattice tangent and angle / dead-end structures. The choice of both tower structure and transmission line is based on prescribed National Standards of Canada (e.g., CAN/CSA-C22.3 No. 1-10 - Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission as set by the CSA and issued under the Canadian Electrical Code, Part III), in addition to functional and engineering considerations which include: climate considerations, transmission line characteristics (i.e. conductor sag limits, wind and ice loading requirements, etc.), topography, terrain, insulation requirements, electrical clearances, transmission corridor width requirements, structural design requirements, acceptable performance of similar structures in the area, and foundation and anchor design requirements.

Transmission towers planned for the NS-NB Reliability Intertie will be comprised of a variety of design tower types for specific uses, consisting of two main types:

- Tangent towers: also referred to as suspension towers, are galvanized lattice steel structures that hold the suspended conductor in place and are used on areas of the transmission path that are straight runs or low angles. Tangent structures keep the conductor suspended when forces are symmetrical (equal and opposite). Guy wires anchored into the ground are used to provide lateral structural support. Guyed-V (**Figure 2.4**) or Guyed Portal (**Figure 2.5**) structure types may be used for this transmission line.
- Self-supporting structures: serve multiple functions and are galvanized lattice steel structures. These structures are built to withstand asymmetrical loading, which can occur during planned maintenance or as a result of weather-related forces on a structure. They are also called angle structures or “dead-ends” and are used in areas of the transmission path with high angles which causes bends in the line when the span is longer than normal such as when crossing environmentally sensitive areas (**Figure 2.6**).

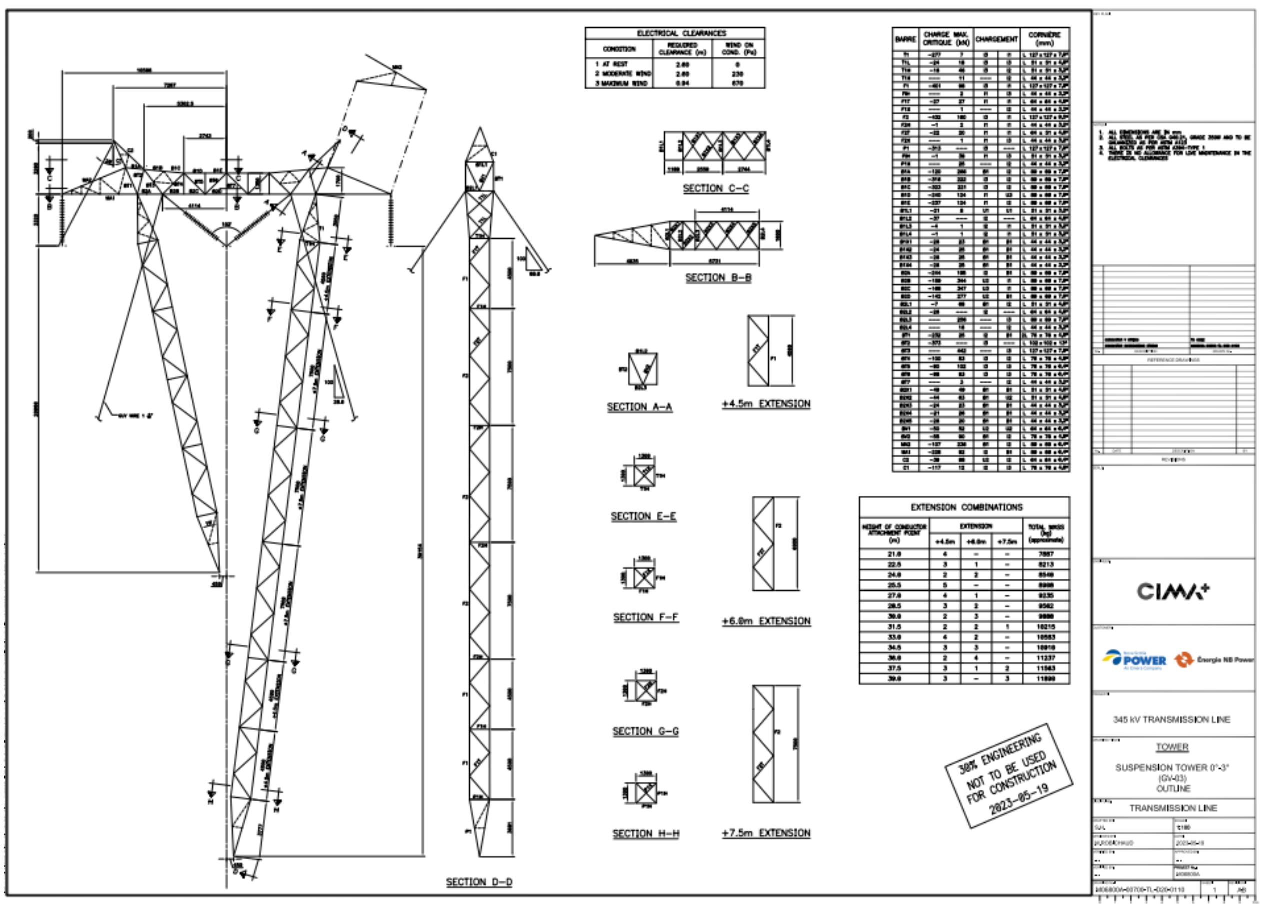

Figure 2.4 Example of a Guyed V Tangent Steel Lattice Tower Design

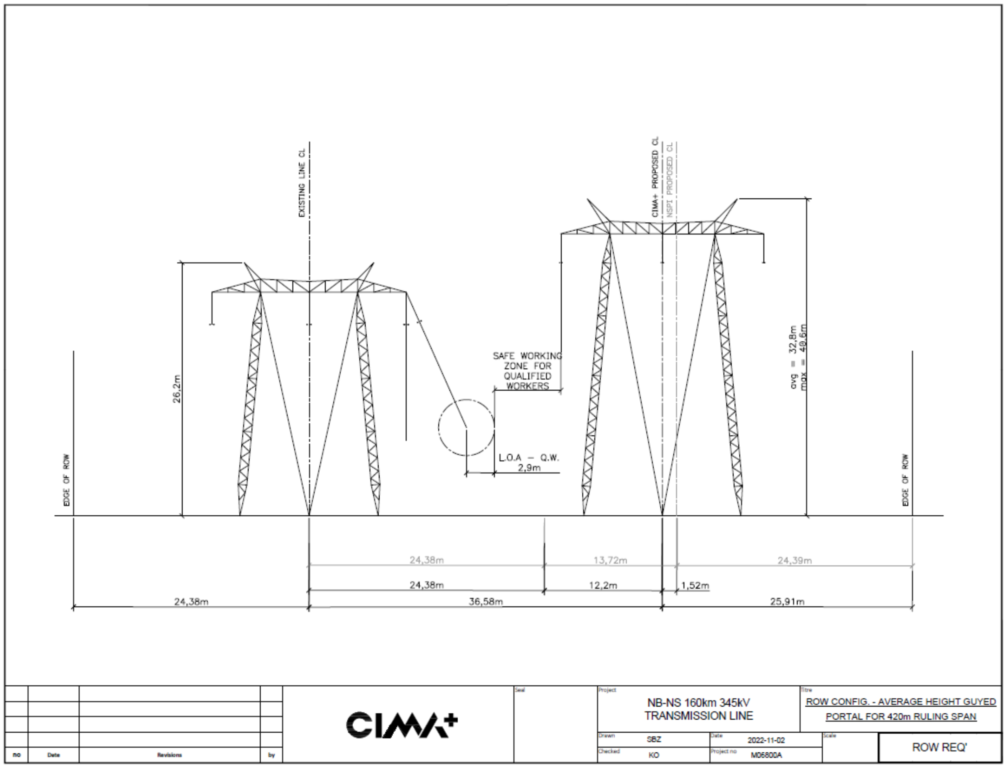

Figure 2.5 Example of a Guyed Portal Tangent Steel Lattice Tower Design

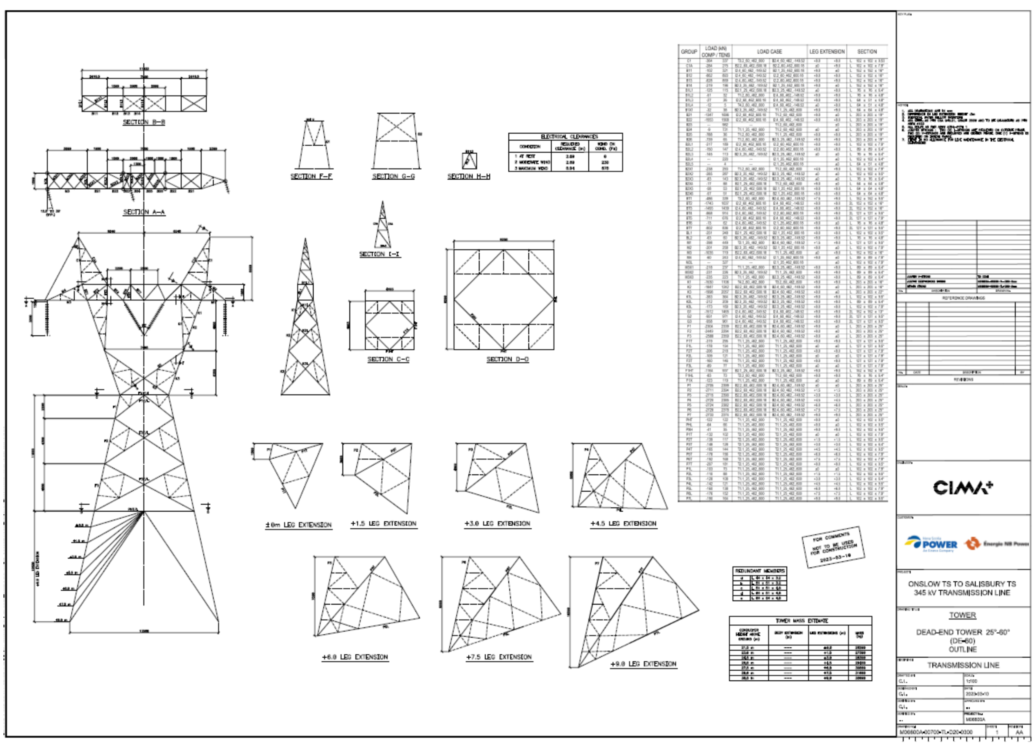

Figure 2.6 Example of an Angle/Dead-end Steel Lattice Tower Design

2.4.2 Expansion of Existing Terminal

The expanded 67N-Onslow substation pad will accommodate new 345 kV line terminals and protective equipment.

2.5 Project Phases and Activities

General Activities

The use of provincial roads during the construction and operation phases of the Project will be in compliance with the "Nova Scotia Temporary Workplace Traffic Control Manual (2009)". All required permits and approvals will be obtained prior to construction.

Potential site services required prior to and during construction include:

- Staging and storage facilities;
- Temporary offices;
- Temporary sanitary facilities;
- Utilities and communications; and,
- Garbage collection and off-site disposal.

Activities that are weather dependent (e.g., steel delivery and erection) will be scheduled to occur during optimal time frames to minimize the potential for delay. For example, the delivery of the tower steel will occur outside of the spring weight restrictions, which are pursuant to Subsection 20(1), Section 371 of the Revised Status of Nova Scotia, *The Public Highways Act* and published by the Nova Scotia Transportation and Infrastructural Renewal (http://novascotia.ca/tran/trucking/springweight.asp). The timing and duration can change annually based on weather conditions, as such delivery will be scheduled between May and December and the spring restrictions will be reviewed prior to transport if it is occurring close to typical spring closure months.

General activities required for construction of the Project are:

- Vegetation clearing and site preparation
- Expansion of the 67N-Onslow substation
- Possible upgrades to access
- Lay down and storage area(s)
- Foundation or grillage construction
- Tower assembly
- Tower erection
- Stringing of conductor
- Clean-up and remediation

During the Operation & Maintenance phase there will be:

- Periodic inspection & maintenance
- Vegetation management

Clearing and construction activities will be carried out in accordance with all applicable provincial and federal regulations and requirements and following the NSPI Environmental Protection Plan (EPP) for clearing and construction of the line and the NSPI *Contractor Environmental Requirements Handbook*.

2.5.1 Pre-Construction Planning

The following plans will be developed prior to construction and include best practices, commitments and regulatory requirements identified through the EA process:

- EPP including an Erosion and Sediment Control Plan
- Access Plan

The following activities are undertaken prior to construction:

- Land surveys and confirmation/acquisition of required easements
- Geotechnical investigations

2.5.2 RoW Clearing and Site Preparation

In order to prepare for construction several activities must be completed, including:

- Placement of erosion and sedimentation control measures
- Installation of any temporary bridges, stream crossings or other mitigation controls
- Clearing of trees and grubbing areas for construction
- Preparation of marshalling yards and laydown areas
- Preparation of conductor pull sites

Required vegetation clearing will occur outside of the bird nesting season, unless an approved mitigation plan has been agreed to by NSECC, Nova Scotia Department of Natural Resources & Renewables (NSDNRR) and Canadian Wildlife Service (CWS).

The majority of clearing will be carried out via machine. However, in areas of increased environmental sensitivity such as wetlands, or along steep slopes where clearing by machine is unsafe, the areas will be assessed by the contractor as well as the NSPI and appropriate mitigation measures will be applied. If necessary, these areas will be cleared by hand. Areas with adequate clearance between vegetation and conductor may be left uncut.

2.5.3 Excavation and Structure Assembly

Tower Foundations

A geotechnical assessment has been completed at selected tower foundation locations to determine the design requirements, to establish bedrock and overburden depth, and to complete bedrock/soil material sampling. General activities during foundation construction may include:

- Installation of erosion and sedimentation control measures
- Removal of overburden / rock breaking
- Blasting of bedrock (to be determined)
- Excavation of soils
- Pouring and curing of concrete
- Placement of competent soils for grading purposes
- Compaction of soils

Any wash water from the cleaning of the concrete trucks will be disposed of on-site using standard industry practices and following environmental regulations/guidelines for the protection of watercourses and wetlands.

All soil removed during the excavation phase will be stored according to provincial regulations and best practice guidelines. Soil needed for backfilling after the foundation has been laid may be stored temporarily adjacent to the excavations until needed. Remaining excavated material may be used on site or removed and managed accordingly as spoils. Prior to excavation activities, erosion and sedimentation control measures will be deployed and assessed on a regular basis. All control measures will be maintained to ensure protection of watercourses and wetlands.

Tower Assembly and Erection

It is anticipated that tower structures will be assembled on site where possible. In some cases, tower structures may be assembled off site at laydown areas, delivered by helicopter and then erected through the use of cranes or a helicopter.

Crane and landing pads will be required; however, it is anticipated that existing laydown areas will be used. Should additional earthworks be required for the landing and crane pads, any material removed will be stored or disposed of in accordance with regulations and best practices. Any material stored on site will be accompanied with appropriate erosion and sedimentation control measures or reused.

2.5.4 Conductor Stringing

Stringing is anticipated to occur through the use of ropes and tensioners and possibly a helicopter. A designated landing pad, most likely an existing laydown area, will be used on site. Pull sites will be identified as part of the contractor’s stringing plan. These will be temporary areas used for stringing during construction, they will not be needed for operations.

2.5.5 Expansion of Onslow Terminal

67N-Onslow will require five new 345 kV Breakers, L8006 Line Terminals and terminal structures. The pad will be expanded in area 80 m by 175 m to accommodate this new substation equipment.

2.5.6 Inspections and Energization

The commissioning phase of the Project will consist of the following:

- Mechanical inspection including Factory Acceptance Test (FAT) of towers and conductor prior to delivery and installation.
- Quality control tests, as applicable, including a climbed inspection carried out by the contractor and NSPI. All rock anchors shall be tested to 80% of the guaranteed ultimate tensile strength. Applicable concrete slump tests will be performed to confirm consistency of concrete.
- The lines will be energized with acceptance, signoff, and handover of the lines to the NSPI Energy Control Center (ECC).

2.5.7 Clean up and Remediation

Once construction of all phases has been completed, all temporary works will be removed. Excess soil and gravel will be used on site as required or disposed of at an appropriate facility. All areas will be appropriately graded and erodible soils will be stabilized. Once stabilized, temporary erosion and sedimentation controls are removed. Attention will be paid during site reinstatement to ensure areas will promote wildlife return to the area.

2.6 Operation and Maintenance

Various Environmental Protection Procedures are required to ensure that RoW practices used by NSPI and those working on behalf of NSPI address all relevant acts and regulations, meet environmental due diligence requirements, and meet all company commitments to government, the public, and landowners.

NSPI document *ENV-014 Environmental Protection and ROW Management* outlines the environmental planning and activities required for maintenance and management of transmission and distribution lines throughout the province. The document in conjunction with various NSPI Environmental Services “Technical Specification Procedures” address the identified Valued Components (VCs) as well as:

- The required environmental planning associated with construction and maintenance activities for NSPI’s Transmission infrastructure including:
    - Environmental protection measures associated with watercourses and temporary bridging
    - Environmental protection measures and strategies associated with wetlands
    - Erosion and sedimentation control procedures and techniques
    - Working around fresh, salt, and navigable water

During the life span of the Project (estimated to be 75 years before significant maintenance), line inspections which are carried out on a set schedule, will be required. Much of the line inspection work may be completed from the air by helicopter (or by drones in some cases) with ground inspections completed once every 3-5 years. Ground inspections can be completed by travelling the RoW with an ATV or on foot if necessary to avoid sensitive wetland areas and/or watercourses. Operational maintenance, as identified through the inspections program and vegetation management activities, will be required as needed to ensure the safe and reliable operation of the line and reliable delivery of electricity. Efforts are made with the NSPI vegetation management program to leave all compatible vegetation which does not pose a risk to the line.

During the operational phase, VCs may be monitored, as required by NSECC. The VCs to be monitored will be specified within the EA Approval and plans will be developed per the terms and conditions.

2.6.1 Inspections – Transmission Standard Practices

A transmission system must be maintained to ensure reliability of the system and maximize equipment sustainability over the asset life. Maintenance generally conforms to manufacturer equipment specifications, industry best management practices and standard operating procedures. Inspection of all aspects of a transmission system is a key component of a maintenance program. Scheduled Inspections of transmission infrastructure is undertaken using a combination of ATVs and/or snowmobiles, foot patrols, and aerial surveys.

2.6.2 Vegetation Management-Forestry Standard Practices

Vegetation management is an important part of an overall maintenance program since it contributes to the reliability of the system by maintaining the corridor. The corridor is cleared as part of initial construction to prevent high-canopy vegetation from becoming established and interfering with the sagging conductors. The initial clearing of high-canopy vegetation is followed on a cyclical basis by controlling the height of naturally occurring re-growth throughout the life of the asset. Vegetation management is performed typically on a cyclical basis every 3 to 5 years; however, the timing depends on site-specific conditions and will vary across the transmission line. Industry reliability best practices involve vegetation management as follows:

- removal of incompatible tree and shrub species that may impede the reliable operation of the transmission system;
- procedures for removal and control of vegetation will range from cutting to selective use of approved herbicides;
- herbicides will be applied by certified applicators, in accordance with integrated vegetation management practices, applicable regulations and permits;
- work near wetlands and watercourses will adhere to the conditions of relevant permits;
- compliance with the *Fisheries Act* which states that "…no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water."
- the frequency of vegetation management will depend on the type of vegetation and the productivity of particular areas; and
- vegetation management will comply with industry practices and applicable regulations.

2.7 Decommissioning

It is anticipated that a capital maintenance program will periodically repair this L8006 line to extend its 75-year design life. In the eventuality that it is ever decommissioned, NSPI will provide minimum one year notice to NSECC and determine a timeline for removal of all infrastructure and site remediation.

2.8 Project Schedule

General Project Schedule (pending approvals):

- Vegetation clearing, access upgrades and site preparation; Fall 2024 - 2026
- Expansion of the 67N-Onslow substation; 2025-2027
- Foundation construction; 2025-2026
- Tower assembly and erection; 2026-2027
- Stringing of conductor; 2026-2027
- Line commissioned and in-service; end of 2027
- Clean-up and remediation 2027-2028

2.9 Anticipated Company Permits

See **Table 2.1** below for a list of anticipated permitting required by NSPI. It does not include permits required by NSPI's contractors.

Table 2.1 Anticipated Permits

Jurisdiction	Granting Body	Title	Status	Details
Company Supplied Permits				
Federal	Transport Canada - Navigable Waters	Navigable Waters	Pending Line Design	• Survey of high-water mark needed for distance to conductor with maximum sag to determine clearance
Federal	Transport Canada – NAVCanada: Canadian Aviation Regulations	Tower Marking and Lighting	Pending Line Design	• Consideration for line near Debert Flight Center (44 Spitfire Road, Debert)
Commercial	CN Rail	Utility Crossing / Encroachment	Pending Line Design	• Survey for top-of-rail elevation and stamped engineered drawings
Provincial	Dept. Natural Resources and Renewables – Crown Lands	Overhead Wires over Submerged Crown Lands	Pending Line Design	• Survey of high-water mark needed for distance to conductor with maximum sag to determine clearance
Provincial	Dept. Natural Resources and Renewables – Crown Lands	Temporary Land Rights	Pending access planning	• Crown Land interests for temporary RoW and Access Trails off RoW
Provincial	Dept. Natural Resources and Renewables – Wildlife Division	Species at Risk Permitting	Determine during EA process	Possible species at risk (SAR) within Project footprint include: • Mainland moose • Olive-sided flycatcher • Eastern wood peewee • Eastern white cedar • Wood turtle, snapping turtle • 14 vascular plant species at 39 sites (incl. frosted glass whiskers & Eastern waterfan). Determine buffer zones & SMP application with NRR.
Provincial	Department of Environment and Climate Change	North Tyndal Protected Water Area Designation and Regulations	Pending review of structure locations (line design), Access Plan, Approved Forestry Mgmt Plan, ESCP	• Three spans of line intersect area • Construction of power lines is a regulated but not prohibited activity within Zone III. • See restrictions for Forestry and Equipment (6) Easements (10), Erosion Controls (13) • Regulations - Environment - North Tyndal Protected Water Area (novascotia.ca)
Provincial	Department of Environment and Climate Change	Wilderness Area – Permit to Construct	Pending easement confirmation and EA decision	• Six spans of line intersect area • Permit needed for construction within the Chignecto Isthmus Wilderness Area
Provincial	Department of Environment and Climate Change	Wetland Alteration Approval	Pending review of structure locations (line design)	• For structure foundation in wetlands • Requires Functional Wetland Assessments during growing season by Strum

3 Overview of Environmental Setting

This Section provides an overview of existing physical, biological, and socioeconomic conditions relevant to the Project assessment. Further detail is provided for existing conditions for each valued component (VC) in Sections 7 through 14.

3.1 Physical Setting

3.1.1 Bedrock and Surficial Geology

The Project Development Area (PDA) extends through several terrestrial regions. Beginning in the greater terrestrial region known as the Carboniferous Lowlands – Rolling Upland – St. Marys Fault Block, the PDA progresses into the Avalon Uplands – Hardwood Plateau – Cobequid Hills before entering the Carboniferous Lowlands – Hills and Valleys – Cumberland Hills, and Coastal Plain – Northumberland Plain – Northumberland Strait, ending within the greater terrestrial region of the Coastal Plain – Tantramar Marshes.

The east end of the PDA, the St. Marys Fault Block consists of a band of Horton rocks laying in a downfaulted block between two parallel faults (Davis & Browne 1996:134). The tills within this region are derived from the grey sandstone of the Horton bedrock. The soils commonly found within this region are Halifax soils, a well-drained brown sandy loam, Shulie soils, a brown gravelly silty loam to sandy loam, Springhill soils, a brown sandy loam, and Millbrook soils, a very dark greyish brown gravelly clay loam.

Throughout the PDA are several geologic regions. The Cobequid Hills represent a series of hills created by a steep-sided, elongated fault block, which forms a highland on the north side of the Minas Basin (Davis & Browne 1996:26). These highlands are composed of granites and volcanic deposits that have been crushed, folded and faulted. The Cumberland Hills represent a hilly terrain underlain by sandstone and sandstone conglomerate bedrock. The Northumberland Strait region is a coast plain underlain by fine red sandstone, thrown into broad folds. Low ridges and valleys determine the outline of the coast in this region, with ridges running out to the sea as headlands, and valleys forming inlets and harbours along the coast. The sandstones and shale that underlie the region produce glacial tills of sandy loam and sandy clay loam.

The west of the PDA terminates within the Tantramar Marshes region. These marshes occupy an area at the head of the Cumberland Basin, where the natural flat terrain meets the sediment-rich waters of the Bay of Fundy. Three soils are common within this region: Acadia series, which exhibit little horizon development and are made up entirely of red-brown or grey silty clay loams; peat, which is formed in low-lying areas and consists mostly of moss or sedge peat; and finally, Masstown series soils, which consist of a mottled brown sandy loam to loam.

Colchester and Cumberland Counties have the potential for karst topography, however according to Nova Scotia's Karst Risk Map, there is a relatively low risk of encountering karst topography throughout the PDA.

3.1.2 Topography and Drainage

Moving east to west, the PDA begins at Onslow within Minas Lowlands of lowland shores surrounding Cobequid Bay and extend approximately 8 km north inland to Onslow Mountain. The Minas Lowlands extend further north to approximately the 75 m contour along river and brook cuts in the upper elevated Cobequid Slopes, reaching 150 m at the foothills of the Debert River and Folly River. The northern extent of the Minas Lowlands is crossed by the PDA westward from North River to just north of Belmont and northward to Staples Brook and west through Totem Brook and East Mines. Further northwest along the PDA and steeply climbing from approximate 125 m to 300 m elevation are the Cobequid Hills with high points of over 350 m elevation. The elevated plateau topography has ancient drainage cuts with existing flows south to Cobequid Bay and north cuts with present-day flows to the Northumberland Strait. The PDA passes through the Cobequid Hills centered at East Folly Mountain, through Folly Mountain, Cobequid Mountain, and Higgins Mountain. In addition to the colluvial deposits along step valley walls, the bedrock has thin till cover on the hill tops. As the PDA approaches the border with New Brunswick, the Cumberland Marshes are encountered at MacLellens Brook with flat topography of dykes, floodplains, and agriculture land no more than 25 m in elevation.

3.2 Biophysical Setting

3.2.1 Atmospheric Environment

The proposed transmission line is in the Northern air zone of the province, with one air quality monitoring station in the town of Pictou. There are several National Pollutant Release Inventory (NPRI) reporting industries in the Northern air zone, including a tire manufacturing plant, a coal-fired power plant, and a pulp and paper plant that shut down in 2020 (NSECC 2023a). The overall management level for the Northern air zone is “yellow”, recommending that management plan actions be taken to prevent air quality from deteriorating.

The existing acoustic environment is characterized predominantly by vehicle traffic along nearby highways and secondary roads, noise from recreational activities (e.g., boating, camping, all-terrain vehicles), natural sounds (e.g., wildlife, wind) and other various activities/developments, with no industrial sources of noise along the route.

There are no substantive existing sources of ground vibration near the Project; therefore, the existing level of ground vibration in the PDA is assumed to be negligible.

3.2.2 Wildlife, Vegetation, Habitat and SOCI

Terrestrial habitat in the PDA appears to be largely forested with softwood, hardwood, and mixed-wood forests covering approximately 67% of the PDA, combined. The remaining habitat is a combination of agricultural lands, industrial and urban developments, clearcuts, and wetlands. Habitat in the PDA is likely somewhat degraded by the adjacent, previously existing, infrastructure including transmission lines, roads, and substations. The Local Assessment Area (LAA) appears to be similar in composition to the PDA and contains approximately 50 m of disturbed land along the length of the PDA. Land disturbance is due to previous vegetation clearing and the presence of the existing transmission line infrastructure.

There are several protected wilderness areas and nature reserves within the PDA, including the Chignecto Isthmus Wilderness Area, the Wentworth Valley Wilderness Area, Chase Lake Wilderness Area, Steepbank Brook Nature Reserve, and Staples Brook Nature Reserve. Also within the PDA are several deer wintering areas, migratory bird areas, species at risk areas, species of concern areas, and “other habitat” areas related to locations of Bald Eagle (*Haliaeetus leucocephalus*) and identified talus habitat.

The LAA has potential to support 22 federal (federal *Species at Risk Act;* SARA) and provincial (Nova Scotia *Endangered Species Act;* NS ESA) listed species at risk (SAR; two invertebrates, two herpetofauna, one mammal, 14 birds, two vascular plants and one non-vascular plant) and an additional 156 species of conservation concern (SOCC; 21 invertebrates, one herpetofauna, 55 birds, 75 vascular plants, and four non-vascular plants). Given the already disturbed state of the LAA and the proximity of the Project to existing infrastructure, not all SAR/SOCC (collectively called species of conservation interest; SOCI) are expected to interact with the Project.

3.2.3 Wetlands and Water Resources

Wetlands within the proposed PDA are primarily composed of treed swamps found commonly throughout the province. Characteristic vegetative species included a dense herbaceous cover of cinnamon fern (*Osmundastrum cinnamomeum*), sensitive fern (*Onoclea sensibilis*), three-seeded sedge (*Carex trisperma*), bunchberry (*Cornus canadensis*) and starflower (*Lysimachia borealis*), with a layer of sphagnum moss (*Sphagnum spp*.) covering the ground. Shrub species typically included regenerating tree species, mountain holly (*Ilex mucronata*), wild raisin (*Viburnum cassinoides*), and speckled alder (*Alnus incana*). A dense tree canopy was typical, and included balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), red maple (*Acer rubrum*), and yellow birch (*Betula alleghaniensis*).

Surface water quality in Nova Scotia is generally good (NSECC 2023b). However, surface waters can be affected by several naturally occurring and human-made substances, such as silt, acids, nutrients, metals, mercury, petroleum products, chlorides from road salt, and coliform bacteria (NSECC 2007).

The PDA crosses the North Tyndal Wellfield Protected Water Area, a protected water area and primary drinking water supply for the Town of Amherst. A total of 238 groundwater wells were identified within 500 m of the PDA. Groundwater quality in Nova Scotia is generally good, with some exceptions. Naturally occurring elevated water quality parameters in Nova Scotia include arsenic, chloride, hardness, iron, manganese, radionuclides, radon, sulphate, and uranium (NSECC 2023c).

3.2.4 Fish, Fish Habitat and Aquatic Environments

The desktop assessment identified 92 watercourse crossings along the proposed transmission line. Field surveys determined that 48 of these watercourses are permanent, 27 are intermittent (i.e., irregular flow within defined channels) and 17 are ephemeral (i.e., seasonal flow with poor channelization; Strum 2020).

Seven aquatic SAR/SOCC may inhabit watercourses near the Project: American eel (*Anguilla rostrata;* COSEWIC 2012), Inner Bay of Fundy (iBoF) and Gaspe-Southern Gulf of St. Lawrence (GSGSL) Atlantic salmon (*Salmo salar;* COSEWIC 2010), brook trout (*Salvelinus fontinalis;* Strum 2020), brook floater (*Alasmidonta varicosa*; COSEWIC 2009), eastern lampmussel (*Lampsilis radiata*), creeper (*Strophitus undulatus*) and tidewater mucket (*Leptodea ochracea*; Strum 2020).

3.3 Socioeconomic Setting

3.3.1 Infrastructure and Services

The Colchester East Hants Health Centre and the Cumberland Regional Health Care Centre are the two hospitals closest to the PDA, located in Truro and Amherst, respectively.

Main towns along the PDA include Amherst, Oxford, Debert, and Onslow. The Amherst Fire Department has both full-time and volunteer firefighters, while the Oxford, Debert, and Onslow Fire Departments are all volunteer based.

3.3.2 Labour and Economy

The PDA crosses both Colchester and Cumberland counties. Retail trade and health and social services employ the greatest number of residents in Colchester and Cumberland counties, respectively. Other industries of significance in the Project area include manufacturing, public administration, and educational services.

Industry near the PDA includes retail distribution centres and general industrial retail, as well as agriculture and food processing.

3.3.3 Land and Resource Use

The PDA crosses predominantly rural portions of Colchester and Cumberland counties. The most common land uses along the PDA include agriculture and recreation.

Agriculture is the predominant land use in the PDA, with Colchester and Cumberland counties accounting for one third of the farms in Nova Scotia. The area is home to several blueberry farms in addition to forestry activities on both private and Crown land along and adjacent to the transmission line.

Recreational land use includes fishing and hunting activities, motorized (e.g., all-terrain vehicle and snowmobile) and non-motorized (e.g., hiking) activities, skiing, and cottage/cabin use. Protected wilderness areas near the PDA also provide opportunity for recreational activities.

3.4 Managed and Protected Areas

There are several managed and protected areas within 5 km of the PDA. These are listed in **Table 3.1**, along with the VC Section in which they are discussed.

Table 3.1 Managed and Protected Areas within 5 km of the PDA

Area	VC Section
Chignecto Isthmus Wilderness Area	Section 9: Wildlife, Vegetation and Habitat; Section 14: Socioeconomic Environment
Wentworth Valley Wilderness Area	Section 9: Wildlife, Vegetation and Habitat; Section14: Socioeconomic Environment
Chase Lake Wilderness Area	Section 9: Wildlife, Vegetation and Habitat; Section14: Socioeconomic Environment
Steepbank Brook Nature Reserve	Section 9: Wildlife, Vegetation and Habitat; Section14: Socioeconomic Environment
Staples Brook Nature Reserve	Section 9: Wildlife, Vegetation and Habitat; Section14: Socioeconomic Environment
North Tyndal Protected Water Area	Section 10: Water Resources; Section14: Socioeconomic Environment
Wentworth Provincial Park	Section14: Socioeconomic Environment
Trans-Canada Trail	Section14: Socioeconomic Environment

3.5 References

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2009. COSEWIC assessment and status report on the Brook Floater *Alasmidonta varicosa* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vii + 79 pp.

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4 Indigenous Engagement

4.1 Objectives

NSPI places a priority on fostering positive long-term relationships with the Nova Scotia Mi'kmaq and is committed to meaningful and productive collaboration on the NS-NB Reliability Intertie Project along with all other projects undertaken by the Company. As a project team, we acknowledge that this proposed Project will be constructed in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq people. We recognize that our relationship is based on a series of Peace and Friendship treaties between the Mi'kmaw Nation and the Crown and we are all treaty people.

Beginning in 2021, NSPI has been engaging with the Mi'kmaq related to the NS-NB Reliability Intertie Project. Details of these engagement methods can be found in Section 4.4 below. NSPI and the Project team will continue to engage with the Mi'kmaq for the duration of the Project, while promoting opportunities for mutual benefit and contributing to the growth of this relationship for future projects.

4.2 Mi'kmaw Communities

There are thirteen Mi'kmaw communities in Nova Scotia all of which are legal entities with democratically elected governments. The Assembly of Nova Scotia Mi'kmaq Chiefs is currently comprised of eleven Mi'kmaw Chiefs. Membertou and Sipekne'katik First Nation are not currently members of the Assembly. Kwilmu'kw Maw-klusuaqn (KMK) operates as the secretariate to the Assembly and represents ten Mi'kmaw communities for the purposes of crown consultation. KMK does not represent Sipekne'katik, Membertou, or Millbrook First Nation for the purposes of Crown consultation.

[4]

Figure 4.1 Mi'kmaw Communities in NS

[4] NS Office of L'nu Affairs. Map of First Nations in Nova Scotia. [Map of First Nations in Nova Scotia | Government of Nova Scotia]

Millbrook First Nation is the nearest Mi'kmaw community to the Project area, located south of Truro and referenced as Millbrook No. 27. Franklin Manor No, 22 Reserve is located west of the River Herbert and south of Amherst, approximately half distance to Parrsboro and is jointly administrated by Paqtnkek and Pictou Landing First Nations.

4.3 Engagement with the Mi'kmaq

Effective Mi'kmaw engagement is fundamental to Project success and as such, the ECEI team understands the importance of respectfully and regularly engaging Mi'kmaw communities and organizations on the Project. We are fully committed to fulfilling and exceeding the regulatory requirements as set out in the *Proponents Guide for Engaging the Mi'kmaq* developed by the Office of L'nu Affairs (2012). The guide outlines the Province's duty to consult with the Mi'kmaq on issues related to Indigenous Treaty Rights as well as the ability to delegate engagement and procedural elements of consultation to project developers where appropriate, as they are experts on their respective projects.

NSPI has an ongoing and comprehensive relationship with the Nova Scotia Mi'kmaq including the Assembly of Nova Scotia Mi'kmaw Chiefs, their secretariat KMK, and the 13 Mi'kmaw communities in Nova Scotia. NSPI has an MOU with the Assembly of Nova Scotia Mi'kmaw Chiefs (Assembly) with the objective to work together to cultivate a relationship of mutual respect, understanding and collaboration to work with the Mi'kmaq to build long-term, sustainable economic development. There is a multi-year capacity funding agreement in place that provides funding for three FTE at KMK; an NSPI Early Engagement Coordinator, an NSPI Community Liaison and an archaeologist. There are also quarterly meetings between NSPI leadership and Co-Chairs of the Assembly and KMK and monthly Project update meetings between NSPI and KMK staff. KMK leads consultation on behalf of 10 of the Mi'kmaw communities in Nova Scotia.

Three Mi'kmaw communities conduct consultation on their own behalf including Sipekne'katik, Millbrook and Membertou. NSPI has carried out separate notifications and engagement with these communities as outlined in section 4.3.1.

In this stage of the NS-NB Reliability Intertie Project, NSPI has begun implementing a Mi'kmaw engagement plan for the Project and Mi'kmaw engagement to date and plans for ongoing engagement are outlined in sections 4.3.1 and 4.3.2 below. The Province has initiated consultation with the Mi'kmaq and has recently formally delegated procedural aspects to NSPI.

4.3.1 Mi'kmaw Engagement Completed to Date

As recommended by Nova Scotia's Office of L'nu Affairs, the Project team has engaged with Mi'kmaw communities as well and the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO). Given the Project footprint extends from Onslow to the New Brunswick border, the nearest Mi'kmaw communities include Millbrook First Nation, Pictou Landing First Nation, and Sipekne'katik First Nation. Paqtnkek and Pictou Landing First Nation also share administration of Franklin Manor Reserve in Cumberland County. NSPI directly reached out to Millbrook, Sipekne'katik, and Membertou to provide updates about the Project and planning activities and offer meetings to discuss impacts, concerns, and opportunities. KMK has reached out to Paqtnkek and Pictou Landing First Nation on behalf of NSPI.

NSPI has also been engaging by having regular meetings with the KMK to build a Collaboration Agreement for this Project. This Agreement includes elements such as capacity funding, commitment to maximizing Mi'kmaw employment and business procurement opportunities through the Mi'kmaq First Program, environmental and archaeological monitoring and capacity for the Mi'kmaq to participate throughout the EA and construction process. NSPI also has monthly meetings with the KMK to provide information on various Projects in the planning stage (e.g., Project scope, archaeology, environmental studies).

Communication and engagement with Mi'kmaw communities is tracked by the Manager, Mi'kmaq Relations, at NSPI and by the stakeholder engagement leads on the Project team.

Table 4.1 below outlines the Mi'kmaw engagement completed to date on the Project.

Table 4.1 Mi'kmaw Engagement Completed to Date on NS-NB Reliability Intertie Project

Mi'kmaw organization or community	Activity	Date	Notes	Feedback
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	**Monthly NSPI/KMK Capital Project Update Meetings**	**July 13, 2021 - present**	Since July 2021 NSPI has had regular meetings with KMK staff to update on NSPI Capital Projects. NSPI has regularly updated KMK about planning activities for the NS-NB Reliability Intertie.	Shovel testing for geotechnical test pits within HPAs of interest.
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	**One Window Meeting**	**Dec 15, 2021; March 14, 2023**	NSPI holds One Window meetings to discuss anticipated capital projects with KMK. NS-NB Reliability Intertie was discussed at the last two One Window Meetings.	At Dec 15, 2021 meeting, KMK stated that ARD is reviewing the ARIA and in particular the area close to the Debert Paleo-Indian Site. At March 14, 2023, meeting Collaboration Agreement revisions were discussed.
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	**NS-NB Reliability Intertie Collaboration Agreement**	**July 21, 2021 - August 15, 2023**	Since July 2021 NSPI and KMK have been regularly meeting to discuss and develop a Collaboration Agreement for the NS-NB Reliability Intertie.	This agreement has been finalized but has yet to be executed (as of September 1st, 2023).
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	**ARIA**	**Nov 19, 2021**	Email to share Archaeological Resource Impact Assessment (ARIA).	
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO)	**Site Visit**	**Feb 3 & Feb 6, 2023**	KMK conducted site visits during geotechnical work near High Potential Areas of archeological interest indicated in ARIA.	KMK staff monitored the shovel tests and had no concerns.

Table 4.1 Mi'kmaw Engagement Completed to Date on NS-NB Reliability Intertie Project

Mi’kmaw organization or community	Activity	Date	Notes	Feedback
Kwilmu’kw Maw-klusuaqn Negotiation Office (KMKNO)	**MEKS**	**March 2023**	MEKS was sent to the KMKNO for review in March 2023.	Review completed in 2023, feedback sent to Membertou Geomatics.
Kwilmu’kw Maw-klusuaqn Negotiation Office (KMKNO)	**Site Visit**	**August 17, 2023**	KMK conducted a visit to observe follow up shovel testing in High Potential Areas of archeological interest indicated in the ARIA.	Took place August 17 2023
Kwilmu’kw Maw-klusuaqn Negotiation Office (KMKNO)	**ARIA**	**August 18, 2023**	Email to share Archaeological Resource Impact Assessment (ARIA) for 67N Onslow substation expansion and Shovel Testing Report for geotechnical work.	
Millbrook First Nation	**Letter of Engagement**	**Sept 27, 2021**	Initial letter sent to Millbrook First Nation to define Project scope and invite engagement.	
Millbrook First Nation	**Meeting**	**Jan 30, 2023**	Meeting with Gerald Gloade, Consultation Lead with Millbrook. Presented slides about Project planning including ARIA, MEKS, and Geotech.	
Millbrook First Nation	**ARIA**	**Feb 9, 2023**	Email to Gerald Gloade at Millbrook to share Archaeological Resource Impact Assessment.	Received confirmation that ARIA will be reviewed shortly.
Millbrook First Nation	**MEKS**	**May 31, 2023**	Emailed MEKS to Millbrook and requested meeting to discuss findings.	No response or feedback to date.
Millbrook First Nation	**Community meeting request**	**June 8, 2023**	NSP sent email to Millbrook to ask for community meeting.	Confirmation of email receipt, no community meeting planned to date.
Millbrook First Nation	**Supplier Information Session**	**July 5, 2023**	Session in Millbrook organized by KMKNO for developers to promote their respective Project employment opportunities.	Well attended by developers but no Mi’kmaw community members attended the event.
Sipekne’katik First Nation	**Letter of Engagement**	**Sept 27, 2021**	Initial letter sent to Sipekne’katik First Nation to define Project scope and invite engagement.	

Table 4.1 Mi'kmaw Engagement Completed to Date on NS-NB Reliability Intertie Project

Mi'kmaw organization or community	Activity	Date	Notes	Feedback
Sipekne'katik First Nation	**Meeting**	**June 28, 2022**	NSPI met with Sipekne'katik to discuss Sipekne'katik engagement and consultation process.	Sipekne'ketik did not want to discuss transmission line until province agrees to follow Sipekne'katik consultation process.
Sipekne'katik First Nation	**Meeting**	**July-August 2023 (postponed)**	NSPI to meet with Sipekne'katik to deliver a Project update and discuss community employment opportunities.	Looking for new date
Paqtnkek First Nation	**Offer to Engage**	**July 14, 2022**	KMK confirmed by email that letter was sent to Paqtnkek and PLFN to introduce the NS-NB Reliability Intertie and ask if the communities would like to set up a meeting to discuss further.	
Paqtnkek First Nation	**Offer to Engage**	**June 7, 2023**	KMK sent letter inviting engagement with Paqtnkek and Pictou Landing First Nation Chiefs	No response to date.
Pictou Landing First Nation	**Offer to Engage**	**July 14, 2022**	KMK confirmed by email that letter was sent to Paqtnkek and PLFN to introduce the NS-NB Reliability Intertie and ask if the communities would like to set up a meeting to discuss further.	
Pictou Landing First Nation	**Offer to Engage**	**June 7, 2023**	KMK sent letter inviting engagement with Paqtnkek and Pictou Landing First Nation Chiefs	Chief Andrea Paul asked if there were any concerns raised regarding the Project. NSPI shared that no major concerns had been brought forward so far and that MEKS and ARIA and Moose Assessment have helped indicate how to reduce potential impact. NSPI sent map of proposed transmission line to Chief Andrea and she expressed no immediate concerns.

Table 4.1 Mi'kmaw Engagement Completed to Date on NS-NB Reliability Intertie Project

Mi'kmaw organization or community	Activity	Date	Notes	Feedback
Membertou First Nation	**Letter of Engagement**	**March 24, 2023**	Initial letter sent to Membertou to define Project scope and invite engagement.	No response to date.
Office of L'nu Affairs	**Meeting**	**August 10, 2023**	Virtual meeting held to discuss Project details and the NS government's plans to engage in formal consultation with the Mi'kmaq on the Project.	Requested Project description, map, supporting studies of interest and record of engagement to date.
Office of L'nu Affairs	**Delegation Letter**	**September 20, 2023**	Proponent Engagement and Delegation of Procedural Aspects of Aboriginal Consultation on the NS-NB Reliability Intertie Project	-
Office of L'nu Affairs & KMKNO	**Meeting**	**September 21, 2023**	Virtual meeting for early consultation	Reviewed Project description, map, supporting studies of interest and record of engagement to date.

4.3.2 Ongoing Mi'kmaw Engagement

Recognizing that engagement completed to date is a first step in the Project's relationship with the Mi'kmaq, NSPI anticipates continuing Mi'kmaw engagement throughout planning and construction activities. The goal of future engagement is to continue building relationships and consistently ensure any concerns or questions are addressed.

Future engagement activities will include:

- Regular Project updates and benefits discussions with KMKNO
- Reporting requirements with the Office of L'nu Affairs
- Regular update meetings with Mi'kmaw communities
- Mi'kmaw community open houses as well as public open houses to which Mi'kmaw communities will be invited

In addition to the activities stated above, a Collaboration Agreement has been drafted but not yet signed between NSPI and the KMKNO. The goals of the Collaboration Agreement are to:

- Foster collaboration between NSPI and the KMKNO's member communities throughout the life of the Project.
- Develop an engagement approach and methodology for communicating Project activities.

- Provide support for Mi'kmaw participation and capacity building throughout the Project.
- Provide student bursaries as well as opportunities for Mi'kmaw employment, training, and procurement.
- Explore and identify future Assembly of Nova Scotia Mi'kmaw Chiefs-NSPI partnerships and opportunities.

Specifically, the Collaboration Agreement provide opportunities for employment, training, and procurement consistent with the *Mi'kmaq First Program*, to increase Mi'kmaq employment and Mi'kmaq business procurement by way of accountability between contractors/subcontractors and the Collaboration Agreement's Implementation Committee. Contractors must report on their achievements (e.g., hosting community info sessions, number of Mi'kmaq hired, Mi'kmaq supply contracts, etc.) and any challenges faced in order to develop strategies to ensure success. Ultimately, the commitments made under the *Mi'kmaq First Program* will build capacity and economic development of Mi'kmaw individuals and businesses so that when this Project ends, skills can be transferrable and assist in future employment opportunities.

4.4 Effects of the Undertaking on the Mi'kmaq of Nova Scotia

As a result of the Project there is potential for effects and impacts on the Mi'kmaq of Nova Scotia. It is the duty as a Project team to gain a clear understanding of such impacts identified in Project studies such as the MEKS as well as from feedback provided by Mi'kmaw communities and organizations.

NSPI will work closely with Mi'kmaw communities and organizations to develop mitigation and avoidance measures where needed. NSPI will report on the details of any proposed mitigation or avoidance measures of potential adverse impacts and any feedback received on mitigation or avoidance measures from Mi'kmaw communities.

See **Table 4.2** below for responses to issues of concerns raised by the Mi'kmaq to date.

Table 4.2 NSPI Responses to Issues or Concerns Raised by the Mi’kmaq

Issue or Concern	Response to Issue or Concern	EA Report Reference
Need for Capacity Funding Agreement	NSPI entered into discussion to reach a Collaborative Agreement that will include funding for Mi’kmaw capacity to participate in Project	Section 4.3.1 Section 4.3.2
Request for Community Liaison dedicated to the Project and maximizing Mi’kmaw employment and procurement.	Current draft Collaboration Agreement contemplates Mi’kmaw Implementation Coordinator dedicated to the Project and maximizing Mi’kmaw employment and procurement.	Section 4.3.1 Section 4.3.2
Request for NSPI to adopt “Mi’kmaq First Program” language in agreements with main Project contractors.	Current draft Collaboration Agreement outlines the use of “Mi’kmaq First Program” language in its agreements with Project contractors in order to increase business and employment opportunities for Mi’kmaw companies and individuals.	Section 4.3.1 Section 4.3.2
Request for Mi’kmaw training program associated with NS-NB Reliability Intertie agreement.	Current draft Collaboration Agreement contemplates funding for Mi’kmaw training.	Section 4.3.1 Section 4.3.2
Concern about potential impact to archaeology.	NSPI contracted Archaeological Resource Impact Assessment of Project area and is sharing results with the Mi’kmaq.	Section 12
Concern about where artifacts that are found during sub-surface testing will be stored after Project completion.	NSPI responded that the artifacts are kept by CCTH unless there is agreement with Mi'kmaw for safe keeping with Mi'kmaw. NSPI is not involved in this decision. NSPI did send letter to province to state the Mi'kmaw are rightful owners of Mi'kmaw artifacts.	Section 12
Request for sub-surface testing if impact to High Potential Areas	NSPI commits to sub-surface testing if impacting High Potential Areas. NSPI has had sub-surface testing completed before Geotech testing in HPAs. KMK completed site visits during Geotech testing in HPAs.	Section 12
Request for archaeological studies from the previous line that was developed in the area.	NSPI confirmed the previous line was built in late 80's and there was no EA or archaeological studies.	
Concern about area surrounding Debert Paleo site.	NSPI is committed to avoiding the Debert Paleo site with the proposed transmission line RoW and associated access where possible. Any High Potential Areas identified on the transmission line RoW or new access will be shovel tested where subsurface disturbance cannot be avoided.	Section 12
Request for Mi’kmaw Ecological Knowledge Study to be completed for Project.	NSPI contracted Membertou Geomatics to complete a MEKS.	Section 13

5 Public Participation

5.1 Approach and Framework

Throughout the different phases of the NS-NB Reliability Intertie Project, the NSPI Project team aims to be the first and best source of information for stakeholders and community members. Building trust and meaningful relationships within the surrounding communities is key for the success of NSPI projects.

NSPI aims to engage stakeholders in advance of and throughout the Project by providing information, opportunities for discussion, consultation for feedback, and continued proactive tactics throughout the development and implementation of the Project.

NSPI objectives throughout the engagement process are:

- Be the first and best source of information about the Project.
- Remain top of mind for stakeholders when questions arise.
- Provide an active dedicated point of contact for inquiries.
- Anticipate and de-risk potential stakeholder escalations.
- Earn stakeholder support for the Project.
- Follow IAP2[5] best practices and core values.

5.1.1 Stakeholder Mapping

The following stakeholder groups have been identified as part of the Project's engagement strategy and have been/will be engaged throughout the life of the Project.

- Government (municipal, provincial and federal representatives)
- Nearby residents and landowners
- Community groups (recreationists, ATVers/snowmobilers, fire departments)
- Local businesses
- Environmental groups
- Special interest and advocacy groups
- NSPI employees
- Media

To view a more detailed list, please see Appendix D.

5.1.2 Level of Engagement by Stakeholder Group

The desired level of participation will depend on the priority of the stakeholder and how much NSPI needs, and they want, to be involved. The Stakeholder Engagement team will follow the International Association of Public Participation (IAP2) best practices and guidelines throughout the projects. **Table 5.1** below outlines the Levels of Stakeholder Participation as specified by IAP2; however, as a Project team, NSPI adopts the terminology of "engagement" rather than "consultation" as the latter is typically used in the context of Government's duty to

[5] IAP2 is an international association of members who seek to promote and improve the practice of public participation in relation to individuals, governments, institutions, and other entities that affect the public interest in nations throughout the world. [IAP2 Canada / AIP2 Canada - History of IAP2]

consult with Indigenous peoples on matters of rights and title. NSPI does not engage in formal consultation and therefore, this term is replaced by engagement in reference to both Mi'kmaw and public engagement in this EA document. This change in terminology and definition of engagement is reflected in **Table 5.1** below.

Table 5.1 Levels of Stakeholder Participation

Desired level of participation		
Inform	Provide balanced and objective information to assist in understanding the problems, alternatives, opportunities, and/or solutions	
Consult	Obtain public feedback on analysis, alternatives, and/or decisions	**Engage:** For this Project's purpose, engagement includes IAP2's definition of *consultation* and *involvement* by both soliciting stakeholder feedback and working to ensure concerns are addressed. Engagement is a precursor to deeper forms of collaboration and empowerment which can only occur once trusting relationships have been established.
Involve	Work directly with the public to ensure concerns and aspirations are understood	
Collaborate	Partner in decision making including the development of alternatives and identification of preferred solutions	
Empower	Place final decision-making in the hands of the public	

Source for first two columns of table: IAP2 International Federation 2015

5.1.3 Methods of Engagement

In order to effectively engage with stakeholders, various forms of engagement have been, and will continue to be used throughout Project development. Methods of engagement associated with respective stakeholders are outlined in **Table 5.2** as well as the level of participation NSPI anticipates for each stakeholder grouping. The levels of participation are based on the modified Project-specific levels identified in **Table 5.1** above, these include – *Inform, Engage, Collaborate, and Empower.*

Table 5.2 Stakeholder Engagement Tactics

Stakeholder Group	Level of participation	Engagement Methods
All levels of Government	Inform, Engage, and Collaborate	• Direct communication with Stakeholder Lead • Meetings and updates • Personal invite to Open House
Nearby residents and landowners	Inform, Engage, Collaborate	• One-on-one meeting at the site • Invitation to Open House • Opt-in mailing list
Local community	Inform and Engage	• Open houses • Meetings with influential groups • Informational handouts • Website • Opt-in mailing list
Local businesses	Inform and Engage	• Open houses • Meetings with influential businesses and groups • Supplier Information Sessions • Informational handouts • Website • Opt-in mailing list
Environmental and Special Interest groups	Inform and Engage	• One-on-one meetings • Lunch & learn sessions • Open houses • Informational handouts • Website • Opt-in mailing list
NSPI employees	Inform	• Project shared on both external and internal websites • Newsletter article at a Project milestone • Personal targeted invitations to Open House events • Pop-Up Open House at offices
Media	Inform	• Promotion of open houses with social media ads • Provide media release at a Project milestone

5.2 Results of Public Participation Program to Date

5.2.1 Stakeholder Engagement Completed

Table 5.3 below outlines a fulsome summary of the stakeholder engagement completed to date on the NS-NB Reliability Intertie. These activities were led by the Project's Stakeholder Engagement Lead, Environmental Manager, and various other team members as required.

Table 5.3 Stakeholder Engagement Completed to Date

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
All government jurisdictions identified along the proposed route: • Municipality of Colchester • Municipality of Cumberland • Town of Amherst • Town of Oxford • Town of Truro • MLA Truro - Bible Hill - Millbrook - Salmon River • MLA Colchester North • MLA Colchester Musquodoboit Valley • MLA Cumberland North • MLA Cumberland South • MP Cumberland – Colchester	Letters sent by email and follow up phone calls made.	**June 2022** Letters sent to CAO, Mayors, MLA, and MPs supplying a high-level introduction of the potential Project and a request to meet and review. Letters were followed up with a phone call to confirm receipt and prompt the meeting request.
Elected Official outside Project area but identified stakeholder - MP Halifax	Letter sent by email and follow up phone call made.	**June 2022** Sent letter supplying a high-level introduction of the potential Project and a request to meet and review. The letter was followed up with a phone call to confirm receipt and prompt the meeting request.
Town of Truro - Warden and CAO	In person meeting	**June 27, 2022** Project team members delivered a meeting including slides to illustrate the Project. Discussion shared content about the location of the proposed Project, opportunity for employment and economic benefits, and Project timelines. Commitment made to provide updates as Project develops.
MP Halifax	In person meeting	**July 27, 2022** Hosted the MP and policy advisor to review the Project and receive feedback. Project team members shared slides and discussion about the transition to renewables, steps planned to meet renewables targets, and the projects which are part of that target. The MP asked about learnings from Smart Grid Atlantic project and how NSPI's current work plays into plans. Discussion also centered around modern technologies, infrastructure modernization, and barriers. Follow-up included a Project report and commitment to deliver an update with a tour of the NSPI Control Centre.

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
MLA Truro	In person meeting	**August 11, 2022** Supplied information to new MLA for Truro and their Constituency Assistant about government relations support and delivered high-level information about NS-NB Reliability Intertie Project. The MLA asked about the location and timelines of the potential Project and commitment was made to provide updates as Project evolves.
Landowner	In person meeting	**December 7, 2022** During the geotechnical fieldwork kick-off meeting, a property was identified with high visibility nearby. NSPI provided property owner with information on geotechnical activities and contact information for any questions or feedback.
ATV & snowmobile trail users in Higgins Mountain area	Calls and emails	**January 17, 2023** Dangerous conditions reported from field activity during harsh weather, freezing rain, and ice buildup on transmission lines in the area. Alert given to exercise caution provided to leadership of the trail user groups and safety message provided by email for distribution to membership.
ATVANS Executive Director	In person meeting	**February 7, 2023** The Executive Director reached out to the Project's Stakeholder Lead after learning of recently shared safety message and offered support for efficient distribution of messaging for future needs. The Executive Director was given a high-level Project update and suggested opportunities for future engagement with ATVANS were provided.
Cumberland Municipality – Mayor, CAO and staff	Virtual meeting	**March 6, 2023** Project team members met with the Mayor, CAO and staff to share Project information and receive feedback. Questions were raised about construction materials and understanding of the RoW and its widening. Feedback emphasized the importance of making efforts to keep Powerline Technician jobs in Nova Scotia, concern about the Chignecto Isthmus, and consideration about climate modeling in Project planning. Commitment made to keep the Mayor updated as the Project develops and to supply invitation to Open Houses.
Colchester Municipality – Mayor, CAO	Phone call & follow up email	**March 7, 2023** An offer of a meeting was made to the Colchester Mayor and CAO and was not accepted at this time. A follow up call indicated limited scheduling availability; however, a Project update slide deck was sent via email. Efforts will continue to be made to host an in-person meeting with the Colchester Mayor and CAO in the near future.

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
MLA Colchester North	Virtual meeting	**March 7, 2023** MLA Colchester North was provided with a high-level summary of the Project. Questions from the MLA were focused on the Project's location, the status of required lands, and timelines for the Project. The MLA also asked how this Project was related to the Atlantic Loop project, if it was part of enabling it, and the cost of this Project and the Atlantic Loop.
MLA Cumberland North	In person meeting	**March 30, 2023** MLA requested rescheduling due to Legislative requirements.
Town of Oxford - Mayor, CAO and Committee of the Whole	In person presentation	**April 3, 2023** Project team members presented the Project to the Committee of the Whole for the Town of Oxford during their regularly scheduled Council meeting - the presentation was live streamed on social media. Council members asked about ongoing maintenance of the existing and new transmission equipment.
MP Halifax	In person tour and discussion	**April 11, 2023** Meeting and tour held at the NSPI Control Centre as requested by the MP. Project leadership provided information about potential projects within our clean energy transition, the proposed NS-NB Reliability Intertie, and how they relate to the Control Centre. The MP requested continued updates.
Nova Scotia Blueberry Growers Association - Executive Director	In person meeting	**April 17, 2023** Project team members presented Project facts to the Executive Director of the Nova Scotia Blueberry Growers Association. During the discussion, team members learned important considerations related to grower activity and reviewed the next steps to collaborate and engage membership. Commitment made to share information as the Project evolves including messaging for association membership.
MLA Cumberland North	Virtual meeting	**April 18, 2023** Project team members presented an overview of the Project to the MLA. The MLA asked questions about land easement status, the plan for engagement with landowners, and Project timelines. The MLA expressed concern about the Chignecto Isthmus, its vulnerability and the proximity to the Project. The team committed to investigate engagement around the Isthmus and to keep the MLA updated as the Project evolves including an invitation to Open Houses.
ATV Association of NS AGM	In person presentation	**April 22, 2023** Project team members attended the Nova Scotia ATV Association Annual General Meeting and delivered a formal presentation on the Project at a tradeshow booth. Interactions included showing plans and reviewing maps of group trails within the Project area as well as

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
		engagement with elected officials. Members asked how to gain permission to travel on the right-of-way lands near the transmission line equipment; NSPI advised members that NSPI does not own the land and has easements only for the work of installing, servicing and maintaining equipment.
Snowmobile Association of Nova Scotia executive team	In person meeting	**May 1, 2023** Snowmobile Association of NS and Project team members visited the club house of this association to present the Project and its impact on snowmobilers. Group leadership shared input regarding how the area is used and the trails most important to their membership. Opportunity for follow up engagement with full membership to be provided within seasonal timing and as Project evolves.
Off Road Riders Association	Lunch & learn session	**May 18, 2023** The Project team shared Project information and a discussion centered on land and easements used for the transmission lines, considerations for respectful travel in the area, safety, and Project timelines. The association expressed that they would value any bridges built as part of construction to be left in place, that trails be left clear as much as possible, or at least cleared when the work in the area is completed, and that any trail clearing that can be done when heavy equipment is on site would be a tremendous help as Hurricane Fiona damage has been very impactful. The association provided an invitation to one of their upcoming events as an opportunity to further engage with membership. They also expressed a desire to collaborate on shared access roads.
NS Environmental Network	Lunch & learn session	**May 30, 2023** The Project team hosted members of the Network at NSPI to share Project information and the group asked about the capacity of the line, ice loading and wind shear of the proposed line, and steps taken regarding impacts to birds. The Executive Director offered to deliver a memo to membership advising that NSPI would be requesting meetings to provide additional Project information.
Clean Nova Scotia	In person meeting	**June 5, 2023** Project team members met with the Executive Director of Clean Nova Scotia and staff of the organization. Discussion was centered around policy, rate design, low-income support within the clean energy transition, and untapped behavioral choices such as time variable pricing to support the work. A commitment was made to keep the group updated as the Project evolves.

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
Higgins Mountain Wind group	Virtual meeting	**June 12, 2023** Project team members met with representatives from Elemental Energy to review consideration around the projects working in close proximity. A commitment was made to engage and review steps to minimize impact in clearing access roads and shared intention to minimize environmental impacts.
Protect Wentworth Valley Association	Virtual Meeting	**June 15, 2023** Project team members presented a Project overview to six members of the Protect Wentworth Valley Association. The group expressed community mistrust regarding previous Environmental Assessments being filed and the lack of transparency and fact in the reports. They asked for details of NSPI's approach to this EA filing and requested information on tower heights and setbacks, vegetation management strategy, and the interconnection point with the Higgins Mountain Wind Project. The group also asked if blasting would occur, hours of operation, and if water testing would be supplied before and during the Project. Follow up provided information around the tower height and invitation to Open Houses; additional follow up will provide answers to the group's remaining questions.
Ecology Action Centre	Virtual Meeting	**June 19, 2023** Project team members met with representatives from the Ecology Action Centre and delivered an overview of the Project. Questions focused on NSPI's environmental assessment filing requirements, wildlife habitat considerations, and wilderness areas. Review of details provided in the IRP were flagged as well as requirements for adapting to climate change. Commitment made to keep the EAC updated as plans evolve.
Sierra Club	In person meeting	**June 21, 2023** Project team members met with representatives from the Sierra Club and information was shared about the Project and renewable energy policy. Concerns were flagged around herbicide spraying in vegetation management, how the Project will be funded, what sources of electricity the line is connecting to, and the calculation methodology for line emissions. The Sierra Club identified additional environmental and special interest groups that NSPI should engage with. Further consideration around how stakeholders are referenced in the writing of the Environmental Assessment was highlighted including respectful representation and meaningful engagement.
ClimAtlantic	Virtual meeting	**June 22, 2023** Project team members met with the Executive Director, shared Project information, and discussion centered on the clean energy transition and targets. Commitment made to keep the group updated as plans evolve.

Community/Stakeholder Group	Engagement Type	Details (Date, Summary)
Oxford Frozen Foods	In person meeting	**June 23, 2023** Project team members met with Oxford Frozen Foods staff and shared Project information. Oxford Frozen Foods identified areas where they have blueberry growers and explained potential impacts the line may have, as well as opportunities for avoidance, mitigation, and possible compensation. Follow up meeting to be scheduled when GIS files for tower locations are available.
Ducks Unlimited	In person meeting	**June 26, 2023** Project team members met with the Ducks Unlimited regional representative to explain the Project and considerations around wetlands and other topics of interest. Review of recent work around towers and access roads was shared; opportunity to collaborate on future work considerations identified. A follow-up discussion will be held in the coming months as Project plans evolve.
NSPI Community Open Houses	In person events	**July 5, 6, 12, 13, 2023** Project team members hosted Open Houses in Amherst, Oxford, Wentworth and Onslow. Locations were selected based on proximity to the Project area as well as venues which would be convenient and draw good attendance. See section 5.2.6 for more information on the open houses.
NB Power Open Houses	In person	**July 11, 19, 2023** Project team members attended Open Houses hosted by NB Power in Tantramar, NB on July 11^{th} and in Salisbury, NB on July 19^{th}. NSPI provided informational materials on the Nova Scotia portion of the NS-NB Reliability Intertie at the July 11^{th} session only, and one-on-one discussions were held with NB guests who visited the NSPI display area.
Engaged Stakeholders	Email	**August 28, 2023** Email of Project update sent to all stakeholder engaged to date. Update included status, estimate of EA filing, and offer to meet to review and receive feedback. Follow up calls and emails sent to those who have not yet engaged with the Project team, extending an additional offer to meet.
Millen Farms	In Person	**August 30, 2023** Project team members met with business owners to provide Project information and receive feedback. Areas of concern were reviewed, and mitigation options reviewed. A follow-up meeting will be held to review specifics and dedicated contact support established.

5.2.2 Issues Tracking and Follow-up

The following **Table 5.4** thematically summarizes the issues, questions, and concerns that have been raised during meetings, open-houses, and other forms of communications with various stakeholders on the Project. Responses to these issues as well as reference information to such issues in the EA area are also outlined within the table.

Table 5.4 Summary of Issues/Concerns and Responses

Issue or Concern	Response to Issue or Concern	EA Report Reference
Environmental Impact		
Vegetation management and the use of herbicides in the area	Tree contacts are the leading cause of power outages in Nova Scotia, so vegetation management is necessary to maintain system reliability. Safety and environmental concerns are a top priority related to herbicide application. In NSPI rights of way, when appropriate NSPI uses a combination of methods including periodic cutting and selective herbicide application applied from the ground, as it effectively prevents regrowth of trees while promoting the growth of lower-growing plants like grasses, bushes, shrubs, and ferns. When applying herbicides along rights of way, NSPI meets or exceeds protection for people and the environment as required in the NSPI Pesticide Application Permit issued by NSECC, including public notification via local publications and on-the-ground signage. NSPI does work with landowners to understand and address any concerns raised.	Section 2.6.2 Section 9
Birds strikes with power lines	NSPI takes care to protect birds in their habitats when our work takes us into their environment. The use of bird flight deflectors in areas at risk for bird strikes is part of our Project planning.	Section 9
Abandoned infrastructure	The infrastructure NSPI installs is deemed required at the time of its installation. When needs change, equipment may no longer be in service but may prove necessary for future use. The decision to remove infrastructure is weighed against the potential for future need, the impact it makes, as well as the cost of the removal.	Sections 2.5.7, 2.7,
Abandoned materials	After a Project has been completed, NSPI's goal is to leave the area NSPI worked in as close as possible to its original condition. This includes complete removal of any construction debris and leftover materials that were not used in an infrastructure build. This policy extends to the work carried out by NSPI contractors.	Sections 2.5.7, 2.7,
Chignecto Isthmus vulnerability and its effect on Project	The Chignecto Isthmus has been identified as an area of concern related to potential flooding in low-lying land near railway and roads. The Project area is located over 6 kms from the main areas of concern. The equipment NSPI is planning to install is	Section 15

Table 5.4 Summary of Issues/Concerns and Responses

Issue or Concern	Response to Issue or Concern	EA Report Reference
	designed in consideration of low lying and wet areas. The overall protection of the Isthmus is a responsibility of the federal and provincial governments.	
Lack of climate change consideration in Project planning	As a regulated utility NSPI complies with government climate targets. NSPI’s energy transition has the best interest of Nova Scotians in mind balancing costs, energy availability, reliability, feasibility, and the future. Part of this includes building infrastructure which is stronger and made to withstand the climate conditions in the coming years, including increasing temperatures, extreme weather events, flooding, fires, etc.	Section 15
Health and Safety		
Existing and increased EMFs from the transmission line and its impact on health	Power lines, transformer boxes and electrical substations are sources of EMFs; however, as one moves away from power lines, one’s level of exposure rapidly decreases (by the square of the distance). When you are in your home, the electric fields from transformer boxes and high voltage power lines are often weaker than the fields from household electrical appliances. The potential health effects of extremely low EMF exposure have been studied extensively. While some people are concerned that long term exposure may cause cancer, the scientific evidence does not support such claims (Health Canada, 2022). Transmission lines are built to industry standards and those of Electricity Canada’s (formerly the Canadian Electrical Association) requirement. Ultimately, the proposed line will be built to ensure that the EMF measurement outside of the Right-of Way is below the limits acceptable by Health Canada.	Section 7
The ability to safely travel paths and access roads during clearing and construction	Safety is the top priority in all NSPI’s work, including this Project. A robust Safety Plan will be developed, which includes plans, observations, reporting and continued evaluation. All of this also includes the access routes for the Project.	Section 2
The Project activities’ effects on waterways, the water table, and personal wells	No residual effects from Project activities are anticipated with the use of best practices during construction and site remediation.	Section 8 Section 10 Section 11
Safety associated with heavy debris in trails and access roads because of Hurricane Fiona	Hurricane Fiona caused widespread damage particularly in terms of downed trees. Clearing the trails and access roads which are part of our Project Area will be undertaken during an early stage of construction. Trails and access roads outside of the Project Area are not within the Project scope.	Section 2

Table 5.4 Summary of Issues/Concerns and Responses

Issue or Concern	Response to Issue or Concern	EA Report Reference
Light and noise impacts during Project construction if site work extends into early morning or late evening	Work for this Project is planned around daylight hours to limit light pollution created by the Project activities. In the Spring and Summer, NSPI plans 12-hour days including travel time. The start and end time will be focused on the maximum amount of daylight. During the Fall and Winter when there are less daylight hours, work hours may be reduced to 10 hours per day. Project work, especially construction of access roads and preparation of tower foundations, will produce localized and short-duration noise associated truck and equipment operation. Work in any one area will be limited to a few days at a time, before the activity moves to the next structure. Noise bylaws will be followed and in some cases noise control measures may be put in place. Residents will be kept informed of the schedule of activities near or on their properties that may produce sound or light pollution.	Section 7
Wildlife Concerns		
Concern that mainland moose habitat will be disrupted, in addition to the existing impacts from neighboring wind farms & development	No residual effects from Project activities are anticipated with the use of best practices during construction and site remediation. Measures to limit disruption during sensitive periods for moose will be considered as needed.	Section 9 Section 17
Concern over blasting and the disruption it will cause to land and wildlife	Blasting is not expected as part of this Project. In the event it is required NSPI will consider the impact it may have and take steps to protect the land and wildlife.	Section 9
Landowners' horses rubbing against structures and receiving injury	In areas where there is expected traffic from trail users, NSPI installs guy wire covers which act to identify wires with safety in mind. These covers also provide some barrier from the wire and its abrasive quality.	n/a
Reliability		
Ability to maintain new equipment in addition to existing equipment	Providing safe and reliable service to customers is central to NSPI work; this includes inspection and maintenance of infrastructure. The NS-NB Reliability Intertie will consist of new equipment with a 75-year design life. After commissioning, this line will be operated and maintained by NSPI and NSPI contractors.	Section 2
Economic Opportunities		
Providing work for Power Line Technician graduates at home here in Nova Scotia	Power Line Technicians or PLTs are a very important part of our work, and NSPI is proud to have this training offered locally by NSCC at its Cumberland Campus. All hiring of NSPI Powerline Technicians will be posted on the NSPI jobs portal: https://www.nspower.ca/about-us/careers. Ultimately, NSPI anticipates that the Project will provide employment to skilled people from the local area and beyond,	Section 14

Table 5.4 Summary of Issues/Concerns and Responses

Issue or Concern	Response to Issue or Concern	EA Report Reference
	and that most of these jobs will occur during the construction phase, with a smaller requirement for ongoing operation and maintenance staff.	
Lands and Rights		
Concern over property devaluation and compensation for those with properties within proximity of the transmission line or those under easement agreement	Landowners from whom NSPI acquires rights are compensated on the same basis as is used in expropriation proceedings. This basis is defined in statute and case law and, as far as compensation can, is intended to put the landowner in an equal position to that which existed before rights were acquired for the Project.	n/a
Clarity of land use permission around transmission line	Land subject to rights acquired by the Project can be used by the owners as they wish so long as they do not infringe the rights granted to the Project.	n/a
Clarity of land use permission within easement arrangement	Land subject to rights acquired by the Project can be used by the owners as they wish so long as they do not infringe the rights granted to the Project.	n/a
Compensation for property damaged by NSPI and its contractors during Project work	NSPI plans its work carefully to avoid or minimize damage to any property; however, in the event NSPI does cause damage NSPI will work with the property owner to repair their property to their satisfaction or provide appropriate compensation.	n/a
Respectful work around customers' property	It is NSPI'sr objective to be respectful in all our work, and NSPI requires the same standards of all its contractors. To this end NSPI will give early and continued updates about the Project, notify customers when the work will directly affect them, restrict the hours during which we work, and set the standards for how business is conducted.	Section 5
Potential for long-term damage to crops	If there is any damage to crops there will be consultation and discussion with owners to determine the proper amount and basis of compensation for loss of crops or any damage to the productive qualities of the land.	Section 14
Vegetation management delivery without accuracy (spraying where not supposed to)	All pesticide applicators are trained and must hold an applicator certification from NSECC, as required in the Pesticide Application Permit under the *Environment Act*. Pesticides are only applied where allowed by the Pesticide Application Permit and landowners. This permit and NSPI's Vegetation Management Operating Procedures have setbacks for wetlands, watercourses, wells, residential areas, designated and non-designated watersheds, and agricultural areas.	Section 2.6.2 Section 9

Table 5.4 Summary of Issues/Concerns and Responses

Issue or Concern	Response to Issue or Concern	EA Report Reference
Concern over recreational trails being left messy as a result of Project work	NSPI will leave access trails as good or better than they were pre-construction; construction-related damage (e.g., rutting) will be repaired and construction-related debris will be removed. Some brushing will be required for trails that have grown in or do not meet the size required for the Project. Vegetation is typically cut into smaller sections and left on the RoW to decompose.	Section 5.2.1 Section 14
Fair compensation to agricultural growers in the right-of way	If there is any damage to crops there will be consultation and discussion with owners to determine the proper amount and basis of compensation for loss of crops or any damage to the productive qualities of the land.	Section 14
Renewables		
Calculation methodology used on emissions reporting	NSPI strives to be a transparent environmental leader and publicly shares its GHG emissions data. The methodology used to calculate NSPI reporting is based on emissions measured from the stack and reported to both the Provincial and Federal governments. NSPI follows government approved methodology for collection and reporting of emissions data.	n/a
Lack of focus on building more renewable generation	NSPI is committed to ensuring that its long-term strategy is aligned with significant government policy and market changes while supporting decarbonization. This includes more wind and solar, battery storage technology, and connecting to clean energy sources for our generation mix.	Section 1
General		
Visibility of workers in communities and people not aware of why they are there	NSPI has been implementing a robust stakeholder engagement plan which includes sharing Project information in a phased approach, as it becomes available. This includes the early sharing of information on site work to as many local residents as possible through a variety of engagement activities and continuing to provide a dedicated contact for the Project.	Section 5
Transparency in supplying Project information to the public	Within the NSPI stakeholder engagement strategy, NSPI has identified and engaged with a diverse group of stakeholders. A core principle of this work is to be the first and best source of information and to build trust by being transparent. As the Project evolves, updates and continued engagement activities are planned.	Section 5

5.2.3 Summary of Meetings with Local Elected Officials

Over the past several months, NSPI has engaged with local elected officials of all levels – municipal, provincial, and federal. Given the geographic scope of the Project, several elected officials have been engaged thus far and more detail regarding meetings with elected officials can be found in **Table 5.5**.

Municipal elected officials from the Municipality of Colchester, Municipality of Cumberland, Town of Amherst, Town of Oxford, and the Town of Truro represent the local communities along the NS-NB Reliability Intertie - its residents, landowner, industry, and business interests. They have a mandate to promote the local economy and development opportunities and as stakeholders, are interested in employment opportunities, support for local businesses and socio-economic impacts. NSPI has engaged several municipal representatives in one-on-one meetings, presentations to Council, and invitations to and attendance at the Project Open Houses held in July 2023.

Similarly, MLAs and MPs have been and will continue to be engaged and informed on the Project, primarily via email communication and one-on-one meetings. Overall, feedback from municipal, provincial, and federal officials has been positive, offering constructive feedback and thoughtful inquiries. NSPI has expressed to all elected officials its commitment to continue to inform and engage them as the Project progresses.

5.2.4 Summary of Meeting with Environmental Stakeholders & Special Interest Groups

A breadth of environmental stakeholders and special interest groups have been engaged on the Project, ranging from local environmental groups, wildlife groups, recreationists (e.g., snowmobilers, ATVers, hunters, and others), and farmers (e.g., blueberry farmers, woodlot owners). These stakeholders all use areas and sites along or adjacent to the proposed NS-NB Reliability Intertie and have Project questions and concerns. NSPI believes that it is important that they understand the Project and are easily able to voice their issues and concerns. As such, initial meetings have been held with several groups with the intent to remain in dialogue throughout the life of the Project. In some cases, representatives from these groups attended the Project Open Houses in July 2023, and/or follow-up meetings have taken place or are planned for the near future. Please see **Table 5.3** for more detail on the engagement to date with these groups.

5.2.5 Summary of Meetings with Landowners along the Transmission Line RoW

Landowners have an interest in the potential effects and benefits of the Project on the biophysical and socio-economic environment. Landowners whose property is crossed by the transmission line route have a specific interest in how the Project may directly affect them and their land. To date, landowners have been engaged in a variety of forms: one-on-one discussions, invitations to and attendance at open houses, as well as direct email and phone conversations. Further, many of the one-to-one landowner discussions were delivered as part of NSPI early Project planning work and notification of potential visibility of contractor crews working in the area. NSPI is committed to continue to engage with landowners and mitigate impacts as the Project progresses.

5.2.6 Summary of Open Houses

The Project team hosted four Open Houses in communities along the NS-NB Reliability Intertie:

- Open House 1, hosted on July 5th, 2023 at the Royal Canadian Legion in Oxford
- Open House 2, hosted on July 6th, 2023 at the Business Innovation Centre in Amherst
- Open House 3, hosted on July 12th, 2023 at the Wentworth Recreation Centre in Wentworth
- Open House 4, hosted on July 13th, 2023 at the Lower Onslow Community Centre in Onslow

These events were heavily promoted for three weeks in advance of the events. The promotion included approximately 8,800 invitation postcards mailed to residents of the communities in the area of the Project. The invitation was also emailed to all stakeholders previously engaged within stakeholder strategy work and included a poster, social media post, and encouragement that it be shared within their own channels.

Additional promotion included creating a Facebook Event geotargeted to the Project area, which was posted on NSPI social media channels. This was also shared with local vendors NSPI has worked with in the Project area as well as nearby NSPI depots and employees. Please see Appendix E for examples of the Open House promotional materials. Personal invitations were also shared through meetings with elected officials and special interest groups.

The open house format was informal and designed to encourage attendees to walk throughout the room and view poster boards with information about the Project. All attendees were greeted, and the majority spoke directly with the Project team and subject matter experts in attendance. Attendees were provided various ways to provide feedback and ask questions including an exit survey to complete at the event or privately at home.

Participants and speakers from the Project team included:

- Dan Thompson, Environment Manager
- Mary Black, Stakeholder Lead
- Kumar Kandaswamy, Project Manager
- Balraj Bilkhu, Engineering Lead
- Duncan Morum, Manager of Capital Lands & Rights
- Terry Toner, Environmental Consultant
- Mary-Frances Lynch, Consultant

The information presented at the open houses included:

- Project purpose and NSPI strategy
- Project details, timeline, and an artist's rendering of a tower design option
- Map books illustrating transmission line location
- Samples of materials used tower construction
- Support for NSPI general business and service-related inquiries

- Community engagement commitment and how to get involved
- Samples of community feedback received to date
- An exit survey including an at-home submission option

Please see Appendix F to access the full poster board content.

Attendees were prompted to engage with team members in private one-on-one conversation and review of materials; many wanted to examine map books and learn the proximity of the Project in relation to their own property. An artist rendering of what the potential line will look like in relation to the existing line was a useful tool within these conversations.

Landowners in areas crossed by the proposed line shared their views on the Project. This feedback is very helpful and will help NSPI create the ways to work with all owners and stakeholders as the Project advances. The majority of the stakeholders NSPI met were not owners of land crossed by the Project's easement corridor.

There was an excellent turnout from the elected officials for the Town of Amherst and Municipality Cumberland including members of their Business Development teams who wish to work closely with the Project team and review future opportunities within the Project.

Table 5.5 below outlines the number of participants and inquiries that arose from our in-person open houses. For specific stakeholder comments and questions, please see **Table 5.4**: Summary of Issues or Concerns.

Table 5.5 NS-NB Reliability Intertie Open Houses

Open House # and Date	Location	Number of Attendees	General Comments
Open House 1 - July 5, 2023	Oxford Legion, 74 Jackson Street, Oxford, NS	10	An elected official, landowners, residents, and local business attended.
Open House 2 – July 6, 2023	Business Innovation Centre, 5 Ratchford Street, Amherst, NS	22	Well-attended by people with a variety of backgrounds and interests including a robust turnout from elected officials. Other attendees included landowners, community members, job seekers, and business owners.
Open House 3 – July 12, 2023	Wentworth Community Centre, 13752 Highway 4, Wentworth, NS	13	Community members and area landowners visited to learn more about the Project. Guests expressed interest in the Project in relation to wind farm development in the community.
Open House 4 – July 13, 2023	Lower Onslow Community Centre. 12391 Highway 2, Lower Onslow	14	Guests included curious community members and landowners wishing to investigate how their property would be affected.

5.3 Continued Engagement

As a Project team, NSPI understands that community engagement is ongoing throughout all Project phases, and as such, NSPI is committed to following through on a robust engagement plan. This may include, but is not limited to the following engagement activities:

- Additional open houses in local communities along the transmission line
- Regular meetings / follow ups with special interest and community groups
- Continued one-on-one meetings with landowners along the transmission line RoW
- Regular meetings with elected officials
- Engagement with local fire departments
- Project site tours at various Project stages
- Creation of local business directory to be provided to Project contractors
- Supplier Information Sessions to communicate business opportunities and benefits

5.4 Complaint Resolution Process

NSPI is committed to fully engaging with the local community to ensure that Project concerns and complaints are heard and addressed. NSPI understands that building trust and meaningful relationships with stakeholders is essential, and that a clear and transparent complaint resolution process plays an important role in maintaining this trust.

During the development and construction of the NS-NB Reliability Intertie, all inquiries and complaints should be sent to Mary Black, Stakeholder Lead for the Project, at questions@nspower.ca.

Once the Project is operational, inquiries and complaints should be directed through NSPI's Customer Care Centre, open Monday to Friday 8 a.m. – 6 p.m. Any operational inquiries or complaints sent through NSPI's Customer Care Centre should identify that they relate to the NS-NB Reliability Intertie to ensure that they are directed to the appropriate operations Project team member.

Email: home@nspower.ca
Toll Free: 1-800-428-6230, 1-800-565-6051 (TTY/Hearing Impaired)
Fax: 902-428-6108 (Fax)

6 Environmental Assessment Methodology

6.1 Scope of the Assessment

The scope of the Project to be assessed includes the construction and operation and maintenance phases, and incorporates the following key considerations:

- Identifying the activities and components of the Project
- Predicting and evaluating potential changes to the environment and the likely effects on identified valued environmental components (VCs)
- Proposing measures to mitigate adverse environmental effects
- Determining remaining residual effects and whether residual adverse effects are significant after the implementation of mitigation measures
- Development of follow-up and monitoring programs, where applicable, to verify both the accuracy of the effects assessment and effectiveness of mitigation measures

For the purpose of this assessment, the scope of the Project includes the major activities (see Section 2.5) described below:

Construction

- Site preparation and clearing (includes upgrades to access and development of laydown/storage areas)
- Excavation and structure assembly
- Conductor stringing
- Expansion of Onslow terminal
- Inspections, energization and testing
- Clean-up and remediation

Operation and Maintenance

- Presence of conductor and towers
- Inspection and maintenance
- Vegetation management

The EA registration document begins with the description of the Project and the existing environment, which informs the identification of VCs, which are the elements of the environment that could be affected by the Project and are of importance or interest to regulators, Indigenous communities, and other potentially affected members of the public or interested parties. Potential Project interactions with VCs are then identified, along with mitigation measures to avoid or reduce adverse effects, and the residual effects (those remaining after mitigation has been applied) are characterized. The residual Project-related environmental effects are characterized using specific criteria such as direction, magnitude, geographic extent, duration, timing, frequency, reversibility, and ecological and socioeconomic context.

6.2 Selection of Valued Ecosystem Components

The methodological framework used in this EA has been developed to meet the requirements of the NSEA and related Regulations. This framework is based on a structured approach that:

- Focuses on issues of greatest concern
- Considers the issues raised by the Mi'kmaq
- Considers the issues raised by the public and stakeholders
- Integrates engineering design and programs for mitigation and follow-up into a comprehensive environmental planning process
-

The EA focuses on specific VCs, which are specific components of the biophysical and human environments that, if altered by the Project, may be of concern to regulatory agencies, Indigenous communities, stakeholders, resource managers, scientists, and/or the general public.

It is noted that "environment" is defined to include not only biological systems but also human, social, and economic conditions that are affected by changes in the biological environment. As such, VCs can relate to ecological, social, cultural, or economic systems that comprise the environment as a whole.

Special focus component studies and considerations were completed for the following VCs:

- Atmospheric Environment
- Wetlands
- Wildlife, Vegetation, and Habitat (SOCI)
- Water Resources
- Aquatic Environment
- Archeological and Heritage Resources
- Use of Land and Resources for Traditional Purposes by the Mi'kmaq
- Socioeconomic Environment
- Effects of the Environment on the Project
-

Based on the VCs listed in Section 6.2, **Table 6.1** presents the VCs assessed in this report, the potential interactions between the Project and the environment, and scoping considerations for each VC.

Table 6.1 Selection of Valued Environmental Components

	Potential Environmental Interactions	Scoping Considerations
Atmospheric Environment	• Change in air quality • Change in GHG emissions • Change in sound quality	Activities will result in release of air contaminant emissions (particularly dust during construction) and may have the potential to affect human and ecological health. Air quality is regulated by the Province of Nova Scotia under the *Environment Act*. The Province of Nova Scotia has set GHG reduction targets as part of its Climate Change Plan for Clean Growth. Sound pressure levels and vibration at nearby receptors may increase temporarily during construction which may cause annoyance.
Wetlands	• Change in wetland area or type	Activities or components have the potential to directly or indirectly affect wetlands. Wetlands are valued features of the environment, defined by the *Nova Scotia Environment Act* and protected by the Nova Scotia Wetland Conservation Policy. The focus of concern is on the protection of species biodiversity, unique species assemblages, forest habitats, wetlands, and uncommon habitats.
Wildlife, Vegetation, and Habitat	• Change in wildlife habitat • Change in wildlife mortality risk • Change in vegetation communities	Activities or components have the potential to directly or indirectly affect vegetation communities and wildlife and wildlife habitat including species at risk (SAR) or species of conservation concern (SOCC). Protection of species biodiversity for wildlife is administered through the federal *Species at Risk Act*, *Nova Scotia Wildlife Act*, and *Endangered Species Act*.
Water Resources	• Potential change in surface water flow regime • Potential change in surface water quality/quantity • Potential change in groundwater quality/quantity	Activities and components could potentially interact with surface water to result in adverse environmental effects on water quality and quantity. Surface water is an important component to the ecosystem and is integrally linked to several other VCs. Groundwater is important in the hydrologic cycle and provides an important ecological function (e.g., surface water discharge). Water resources in Nova Scotia are protected by the *Water Resources Protection Act*.

Table 6.1 Selection of Valued Environmental Components

	Potential Environmental Interactions	Scoping Considerations
Aquatic Environment	• Change in fish population • Change in fish habitat	Activities or components of the Project have the potential to result in a change in fish populations (i.e., mortality), including SAR and SOCC, and a change in fish habitat (e.g., loss of fish habitat). Serious harm, defined as any work, undertaking or activity that results in the death of fish, or a permanent alteration or destruction of fish habitat to fish that are part of a commercial, recreational, or Indigenous fishery or fish to support such a fishery, is regulated under the *Fisheries Act*.
Archaeological and Heritage Resources	• Change in heritage resources	Heritage resources are those resources, both human-made and naturally occurring, related to activities from the past that remain to inform present and future societies of that past. Heritage resources are afforded protection under the provincial *Heritage Property Act*. Heritage resources are relatively permanent, although highly tenuous, features of the environment. Heritage resources are non-renewable and susceptible to loss or damage as a result of ground-disturbing activities.
Use of Land and Resources for Traditional Purposes by the Mi'kmaq	• Change in availability of land and resources for traditional purposes by the Mi'kmaq	The Project may result in changes to availability of land and resources for traditional purposes by the Mi'kmaq as detailed in the MEKS.
Socioeconomic Environment	• Socioeconomic environment: change in land and resource use • Socioeconomic environment: change in economy	The socioeconomic environment may be adversely affected by the loss of access or loss of area available for recreational use; incompatibility with applicable land use plans and/or economic development plans; Project demand for labour; Project expenditures; and demand on housing and temporary accommodations. It should be noted there can be positive socioeconomic environmental effects, particularly with respect to change in economic conditions.
Effects of the Environment on the Project[1]	• Change in the integrity of Project infrastructure	The Project may be adversely affected by climate-related events such as changes in extreme temperatures, winds, precipitation, and ice-loading.
NOTE: [1] Effects of the Environment on the Project is not a VC; however, it is included here for continuity in the assessment of potential interactions between the Project and the environment. General: note that some of the environmental studies refer to L8005. The transmission line number has since been updated to L8006		

As part of the engagement process for this assessment (Sections 4 and 5), opportunities have been provided for public participation within the local community by presenting information on the Project and obtaining and responding to feedback to better understand local interests and concerns. Engagement with

Indigenous groups has also been carried out in order to gather feedback and develop collaborations on the Project.

Throughout the planning of the Project, NSPI has developed management strategies to reduce the magnitude of potential adverse effects. This EA registration employs a precautionary, conservative approach. Conservative assumptions were generally applied to overstate, rather than understate, potential adverse effects. Aspects of the Project have been examined and planned in a careful and precautionary manner to avoid significant adverse environmental effects.

6.3 Environmental Assessment Methods

The Project-related environmental effects are assessed using a standard framework for each VC.

The assessment includes descriptions of how an environmental effect will occur (pathways), the mitigation and environmental protection measures proposed to reduce or eliminate the environmental effect, and the characterization of the residual environmental effects (i.e., the environmental effects that remain after planned mitigation has been applied) of the Project.

Cumulative environmental effects consider the residual environmental effects of the Project with the residual environmental effects of other physical activities for projects or activities that have been or will be carried out. If there is an identified potential for adverse residual environmental effects of the Project to interact cumulatively with the residual environmental effects of other past, present, or reasonably foreseeable future projects or physical activities, these cumulative environmental effects are also described.

The applicable phases of the Project are described in this EA registration, as are accidents, malfunctions, and unplanned events. The evaluation also considers the effects of the environment on the Project. The significance of residual Project-related environmental effects is then determined. Follow-up measures that are proposed to verify the environmental effects predictions or the effectiveness of mitigation are identified as appropriate.

6.3.1 Spatial and Temporal Boundaries

6.3.1.1 Spatial Boundaries

The Project Development Area (PDA) is the immediate area of physical disturbance associated with construction and operation and maintenance of the Project. The PDA encompasses the Project footprint and includes the 38.1 m wide right-of-way (RoW) for the transmission line. The PDA also includes the upgrade of the existing terminal at Onslow. The modifications of the Onslow terminal will require an expansion area approximately 80 m x 175 m to the north of the existing terminal. For construction, it is anticipated that various temporary facilities will be required including the temporary installation of bridging and matting for watercourse and wetland crossings, temporary marshalling yards, temporary access roads/trails, and where required, any improvements to existing access roads/trails. The PDA is illustrated in **Figure 2.1**.

The local assessment area (LAA) encompasses the maximum area within which Project effects can be predicted or measured with a reasonable degree of accuracy and confidence. This varies for each VC based on a variety of factors and is described in each VC section (Sections 7 to 14).

6.3.1.2 Temporal Boundaries

Temporal boundaries for the EA address the potential effects during the Project's construction, and operation and maintenance over relevant timescales. These temporal boundaries are used in the assessment of residual effects and are also considered applicable for the assessment of cumulative effects.

The temporal boundaries for the Project consist of the following phases:

- Construction Phase: The construction phase of the Project is currently planned to run from Q3 2024 through Q4 2027, pending EA approval and receipt of other required permits and approvals. Early civil works including access and staging will take place in the fall and winter of 2024-2025. Clearing of the RoW will also take place within this timeframe in order to complete this work outside of the sensitive time for migratory birds. Excavation activities associated with the installation of the structure are planned for the spring of 2025 and will continue to the summer of 2027. Works for the upgrades to the Onslow terminal are planned to be initiated in the fall of 2024 and will continue until the summer of 2027. Conductor stringing and energization of the transmission line will take place in the fall of 2027; clean-up and revegetation of the RoW will also take place in this timeframe.
- Operation and Maintenance Phase: There are various activities required to monitor and maintain the transmission line throughout its life. Some of these activities are scheduled at regular intervals, while others are implemented when conditions warrant or following an inspection or patrol that identifies that maintenance or a repair is necessary. The RoW will be patrolled on a regular basis (aerial patrols every year, and on-ground patrols every three years). Additional patrols will be considered before or following major storm events. Due to the robust design of this transmission line, maintenance and repairs activities are not anticipated for approximately 20 years, although this will be guided by the results of the various patrols of the infrastructure. The needs for vegetation management will be evaluated during the various patrols, but in general is anticipated to begin within two to four years following the completion of construction.

6.3.2 Gender-based Analysis Plus

Gender-based analysis plus (GBA+) refers to the assessment of how projects may have different positive or negative impacts on diverse groups of people or communities. Thus the '+' refers to the fact that there may be a number of identity factors to consider in addition to gender. Groups that are more vulnerable to a project's adverse effects may include, for example, populations close to the project site, women, Indigenous peoples, and young or elderly populations (IAAC 2022).

To consider GBA+, relevant baseline socioeconomic conditions of sub-populations of interest need to be described in the baseline conditions presented in Section 14 (Socioeconomic VC). Where disproportionate residual effects are likely to be experienced by population subgroups, both the effect experienced by the general population, as well as that experienced by the differentially affected sub-population, has been described in Section 14, under 14.4.5 Gender-based Analysis Plus Effects.

6.3.3 Description and Assessment of Potential Effects

The Project's potential effects are assessed in the context of the existing conditions for each VC.

For each potential effect, specific Project activities that may interact with the VC and result in an environmental effect (i.e., a measurable change that may affect the VC) are identified and described.

Mitigation measures that will eliminate, reduce, or control potential environmental effects are identified and described for each VC. Standard mitigation practices that are technically and economically feasible were considered for each VC, as well as VC-specific measures.

Following the analysis of environmental effects pathways and mitigation measures, the residual environmental effects (i.e., the environmental effects that remain after mitigation has been applied) are described. Characterizations of residual environmental effects include:

- **Direction**: The long-term trend of the residual effect
- **Magnitude**: The amount of change in measurable parameters of the VC relative to existing conditions
- **Geographic Extent**: The geographic area in which a residual effect occurs
- **Duration**: The period of time required until the measurable parameter or the VC returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived
- **Timing**: Considers when the residual environmental effect is expected to occur; timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant
- **Frequency**: Identifies how often the residual effect occurs and how often during the Project or in a specific phase
- **Reversibility**: Describes whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases
- **Ecological/Socioeconomic Context**: Existing condition and trends in the area where residual effects occur

Quantitative measures are developed, where appropriate and practicable, to characterize residual effects. When not appropriate or practicable, qualitive descriptions are considered. Residual environmental effects are those that remain following consideration of mitigation measures. Within each VC section, a summary of the specific characterization of residual environmental effects is provided in tabular form. An example summary table is provided below in **Table 6.2**.

Table 6.2 Example of Summary of Residual Effects Table

Residual Effect		Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Residual Effect 1	C*	A*	L*	PDA*	ST*	N/A*	S*	R*	D*
Residual Effect 2	C*	A*	L*	PDA*	ST*	N/A*	S*	R*	D*
Residual Effect 3	C*	A*	L*	PDA*	ST*	N/A*	S*	R*	D*

KEY
See (*Table number varies by VC*) for detailed definitions

Project Phase
C: Construction
O: Operation and Maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project Development Area
LAA: Local Assessment Area

Duration:
ST: Short term
MT: Medium term
LT: Long term

Timing:
N/A: Not Applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

* Examples only

6.3.3.1 Determination of Significance of Effects

For each environmental effect, threshold criteria or standards beyond which a residual environment effect is considered significant are identified. The thresholds are defined in consideration of regulatory standards, objectives, or guidelines as applicable to the VC. Where thresholds are not set by guidelines or regulations, a threshold is developed using the measurable parameters established for the VC. The thresholds define the limits of a change in a measurable parameter or state of the VC beyond which it would be considered significant, based on resource management objectives, community standards, scientific literature, or ecological processes. Quantitative thresholds are preferred; however, qualitative thresholds for significance may be used where quantitative thresholds are not practicable.

A determination of significance of Project residual environmental effects is made using thresholds of significance as defined for the VC. Generally, the determination of significance depends in part on the magnitude, geographic extent, duration, timing, frequency, and/or reversibility of residual effects.

If an environmental effect is determined to be significant, there is further consideration of the likelihood of occurrence of that significant environmental effect.

6.3.4 Cumulative Environmental Effects

The residual environmental effects of the Project that may interact cumulatively with the residual environmental effects of other projects or physical activities that have been or will be carried out are identified in this section, and the resulting cumulative environmental effects are assessed.

An assessment of cumulative environmental effects is warranted if:

- The Project is assessed as having residual environmental effects on one or more VCs, whether those residual environmental effects are significant or not; and
- The residual environmental effects of the Project on the VCs could act cumulatively with the residual environmental effects of other past, present, or reasonably foreseeable future projects or activities.

6.3.5 Effects of the Environment on the Project

Potential effects of the environment on the Project (e.g., climate change effects) are identified, significance thresholds are determined, existing conditions are described, potential effects analyzed, mitigation measures described, and residual effects characterized.

6.3.6 Accidents, Malfunctions, and Unplanned Events

The potential for, and consequence of, the effects of accidents or malfunctions to occur over the life of the Project are described in this EA registration. The assessment provides a range of potential accident or malfunction event scenarios across all phases of the Project (i.e., construction, and operation and maintenance).

6.3.7 Follow-up and Monitoring

Follow-up plans and associated monitoring of specific residual effects will be determined in each VC, as applicable.

6.4 References

IAAC (Impact Assessment Agency of Canada). 2022. Guidance: Gender-based Analysis Plus in Impact Assessment. Available online at: https://www.canada.ca/en/impact-assessment-agency/services/policy-guidance/practitioners-guide-impact-assessment-act/gender-based-analysis.html

7 Assessment of Environmental Effects of the Atmospheric Environment

7.1 Rationale for Selection as a Valued Component

The atmospheric environment has been selected as a VC because the Project may result in releases to the atmosphere that may cause impacts to health of flora and fauna in the region. As a valued component, the assessment of impacts on the atmospheric environment includes studies of air quality, greenhouse gases (GHGs), sound quality, and electrical phenomena including electromagnetic fields (EMFs) and corona, as described below.

Air quality is defined as the composition of the ambient air, including presence and quantity of air contaminants, that may have adverse effects on vegetation, wildlife, or human health. The concentrations of air contaminants in the ambient air can be compared to air quality criteria, objectives, and / or standards, which are established to protect the environment and human health. Air quality is highly correlated with local sources of air contaminants, such as industrial facilities or heavy vehicle traffic, with secondary influences from long range transport of air contaminants from distant sources into a region.

The release of GHGs, on a global scale, increases the worldwide concentrations of GHGs in the atmosphere, and this contributes to climate change (IPCC 2014). Project-based releases of GHGs, mainly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), are typically used as an indicator of the potential environmental interactions with climate change. The Project's GHG emissions are compared to provincial and national emissions and reduction targets for context. The GHG assessment considers emissions of GHGs expressed in the form of tonnes of carbon dioxide equivalent (t CO_2e). CO_2e is the unit of measurement used to express the global warming potential of various GHGs in terms of the amount of carbon dioxide it would emit to the atmosphere (Brander 2023). CO_2e is used to compare emissions from different GHGs based on how severely they contribute to global warming.

Sound quality in the context of this assessment is characterized by the sound pressure levels in the outdoor environment, in the vicinity of the Project. Sound quality is characterized more specifically by the type, frequency, and duration of sound. Sound pressure levels are measured in decibels (dB). For environmental assessments where the effect of sound on humans is the focus, an A-weighted dB scale (dBA) is used to report sound pressure levels as it most closely mirrors the frequency perception of the human ear.

The operation of a transmission line produces a flow of electrical current through the conductor (i.e., through the wire making up the transmission line). Where the line is operated with voltages greater than 345 kV, which this Project is not, electrical current may in some cases flow on the surface of the conductor. These electrical currents produce electric fields and magnetic fields. At higher voltages, other effects may occur such as corona effects, audible noise, radio, television, and GPS interference, and potentially ozone. Electromagnetic fields (EMF) are defined as invisible waves that travel through space and time and exert force on charged particles (Government of Canada 2022). These fields are typically found near electrical equipment and wires with flowing electrical current. These include outdoor power lines, and transmission lines (Government of Canada 2022). The corona effect refers to the phenomenon of electrical discharges and ionization of surrounding air molecules occurring around high-voltage systems, such as power lines or transformers, and can occur on transmission lines with voltages higher than 345 kV (Photonis 2022). Under specific conditions, this can produce a glow of blue light, and audible crackles and humming sounds from the electric fields surrounding the conductors (VELCO 2023).

In this assessment for the 345 kV NS-NB Reliability Intertie, the potential changes to the atmospheric environment from the Project, including changes to air quality, GHGs, noise, EMF, and corona are considered. The scope of the assessment is based on applicable regulations and policies, professional judgment of the study team, and knowledge of potential interactions of Project activities with the surrounding environment.

7.2 Scope of Assessment for Atmospheric Environment

7.2.1 Regulatory Context

Air Quality

The Nova Scotia Air Quality Regulations under the *Environment Act* regulate air quality in the province. The Regulation and Act provide measures to regulate the release of air contaminants to the atmosphere from "sources", provides testing and monitoring provisions, and establishes permissible ground-level concentrations of specified air contaminants in the ambient air, among other requirements. Nova Scotia monitors provincial air quality at seven stations throughout the province. Measured parameters include:

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

At the federal level, the main guidance for managing air quality contaminants is the Air Quality Management System (AQMS) (CCME 2019), developed by the Canadian Council of Ministers of the Environment (CCME). It outlines the Air Zone Management Framework (AZMF), which offers guidance on actions to be taken at the air zone level to achieve the federal Canadian Ambient Air Quality Standards (CAAQS). The AZMF consists of four management levels that determine the nature of actions to be taken when concentrations of specific air contaminants approach or exceed the CAAQS. It emphasizes the importance of intergovernmental collaboration, stakeholder engagement, and the use of air zones and airsheds to manage local air quality. The AZMF highlights and emphasizes the significance of continuous improvement and maintaining clean areas to reduce emissions and prevent air quality deterioration (CCME 2019). The CAAQS (CCME 2022), were developed by the CCME in 2013 and contain limits for air contaminants. The provincial NS limits and the CAAQS in terms of permissible ground level concentrations are presented in **Table 7.1** and **Table 7.2**, respectively.

Table 7.1 Summary of Permissible Ground Level Concentrations in Nova Scotia

Air Contaminant	Averaging Period	Maximum Permissible Ground Level Concentration	
		$\mu g/m^3$	pphm
Carbon Monoxide (CO)	1 hour	34,600	3,000
	8 hours	12,700	1,100
Hydrogen Sulphide (H_2S)	1 hour	42	3
	24 hours	8	0.6
Nitrogen Dioxide (NO_2)	1 hour	400	21
	annual	100	5
Ozone (O_3)	1 hour	160	8.2
Sulphur Dioxide (SO_2)	1 hour	900	34
	24 hours	300	11
	annual	60	2
Total Suspended Particulate (TSP)	24 hours	120	-
	annual	70*	-

Note:
* Geometric mean
$\mu g/m^3$ micrograms per cubic meter
pphm parts per hundred million
Source: Nova Scotia Air Quality Regulations (2020)

Table 7.2 Canadian Ambient Air Quality Standards for Ground Level Concentrations

Air Contaminant	Units	1 hour	8 hours	24 hours	1 year
Ozone (O_3)	$\mu g/m^3$	-	122	-	-
Nitrogen dioxide (NO_2)	$\mu g/m^3$	113	-	-	32
Sulphur dioxide (SO_2)	$\mu g/m^3$	183	-	-	13.1
Fine particulate matter ($PM_{2.5}$)	$\mu g/m^3$	-	-	27	8.8

Note:
$\mu g/m^3$ micrograms per cubic meter
The CAAQS includes standards for 2015, 2020 and 2025; the 2020 standards are listed above.
Source: CCME (2022)

GHG Emissions

The government of Nova Scotia requires facilities and fuel suppliers in the province to verify and report GHG emissions under the Quantification, Reporting and Verification Regulations (QRV Regulation) under the following circumstances:

- A facility emitter releases more than 50,000 t CO2e per calendar year.
- A natural gas distributor who distributes natural gas for combustion within Nova Scotia, and the combusted natural gas would release 10,000 t CO2e or more in the calendar year.
- A petroleum product supplier who imports more than 200 L total of automotive gasoline, diesels, light fuel oils, heavy fuel oils, or propane, subject to the definitions in Table 2 of Schedule 2 of the QRV Regulation.
- An electricity importer who imports electricity into Nova Scotia, where the amount of greenhouse gas that is emitted from the generation of the electricity is 10,000 t CO_2e or more. (Province of Nova Scotia 2018)

Federally, industrial facilities that emit more than 10,000 t CO_2e per year are required to quantify and report GHG emissions to Environment and Climate Change Canada's (ECCC) Greenhouse Gas Reporting Program (GHGRP) (ECCC 2019).

Sound Quality

The province of Nova Scotia has used the Guideline for Environmental Noise Measurement and Assessment (NSECC 1990) to help manage industrial noise in the environment. The guideline is currently under review and a new draft was published in 2022. This guideline includes noise criteria for different periods of the day (day, evening, and night) and geographic area classifications (rural, urban, and industrial). The new draft of the guideline defines the permissible sound levels for compliance to be the maximum equivalent sound level (LAeq1 hour)) (average cumulative A-weighted sound level over a 1-hour period) and mean impulse noise (LLM) allowed over a compliance period in the ambient environment (NSECC 2022). These values are interpreted to represent hourly averages measured at the property boundary of receptors (i.e., noise-sensitive locations such as residential properties) (NSECC 2022). The Nova Scotia permissible sound levels are presented in **Table 7.3**.

Table 7.3 Nova Scotia Draft Noise Guidelines - Permissible Sound Levels

	$LAeq_{(1\ hour)}$ dBA (including $L_{LM(x\text{-}hrs)}$ dBAI)		
	Day (7:00 – 19:00)	**Evening (19:00 – 23:00)**	**Night (23:00 – 7:00)**
Rural	50	45	40
Urban Residential	55	50	45
Industrial	65	60	55

Notes:
$LAeq_{(1\ hour)}$ A-weighted sound level over a 1-hour period.
dBA Sound pressure level filtered through the A-weighted filter.
dBAI Peak sound pressure level for impulse noise filtered through the A-weighted filter.
L_{LM} Logarithmic mean impulse sound level.
Source: NSECC (2022)

Electrical Effects

Most of the interest regarding possible health effects from electrical phenomena is related to magnetic fields. When the term EMF level is used, it is usually referring to the presence of electromagnetic fields and magnetic field strength. There are currently no Canadian regulations limiting EMF emissions, nor are there Canadian guidelines for EMF exposure (Canadian Electricity Association 2018). Health Canada does not consider EMF guidelines necessary because scientific evidence is not strong enough to conclude that exposures cause health problems to the general public (Health Canada 2012). No quantitative guidelines are established for the corona effect, or any other electrical effects associated with the operation of the proposed 345 kV transmission line.

7.2.2 Spatial Boundaries

The assessment of potential environmental interactions between the Project and the atmospheric environment is focused on the Project Development Area (PDA) and a Local Assessment Area (LAA).

The PDA for the Project is defined as the immediate area of physical disturbance associated with construction and operation and maintenance of the Project. The PDA encompasses the Project footprint and includes the 96 km, 38.1 m wide right-of-way (RoW) for the transmission line. The PDA also includes the upgraded existing terminal at 67N-Onslow. The Onslow substation will be expanded northward from its current location with an expansion area of 80 metres by 175 metres wide. For construction, it is anticipated that various temporary facilities will be required including the temporary installation of bridging and matting for watercourse and wetland crossings, temporary marshalling yards, temporary access roads/trails, and where required, improvements to existing access roads/trails. The PDA is illustrated in **Figure 2.1**.

The LAA for the atmospheric environment is defined as the area within which the environmental effects of the Project can be reliably measured or predicted and can be thought of as the theoretical “zone of influence” of the Project on the atmospheric environment. Considering a potential change in the atmospheric environment, the LAA for air quality and sound quality is defined as the immediate area within 1 kilometer (km) on either side of the PDA. This would include 1 km on either side of the RoW, and 1 km around the substation terminal being upgraded in Onslow. The RoW will cross 269 properties where there is the potential for interactions. Based on previous assessments, it is known that the construction and operation of a transmission line has a low potential to generate air contaminants that would be noticeable past the LAA. Air contaminant and noise from the Project beyond this distance are expected to be indistinguishable from background levels. For GHGs, no LAA is applicable, as climate change is a global effect.

7.3 Existing Conditions for the Atmospheric Environment

7.3.1 Approach and Methods

A desktop review of provincial and federal regulations and existing air quality reports were used to provide baseline data to characterize the existing atmospheric environment in northwestern Nova Scotia. No field surveys or baseline monitoring for the atmospheric environment were conducted during the assessment process for this Project. The data is expected to represent the atmospheric environment within the PDA due to similar geographic terrain, weather conditions, and sparse land use.

The provincial government collects air quality data from seven monitoring stations located throughout Nova Scotia, and air quality monitoring reports are released annually by the Nova Scotia Department of Environment and Climate Change (NSECC). NSECC releases an Air Zone Report which contains data for each of the four air zones in Nova Scotia. Stantec used the information in NSECC's most recent air quality report for the year 2021 (NSECC 2023) to inform this assessment. Provincial and national GHG emissions are reported by ECCC in annual National Inventory Reports (NIR) to the United Nations Framework Convention on Climate Change. The latest NIR was published in 2023 for the year 2021 and was used as the source of Nova Scotia's and Canada's existing GHG emissions (ECCC 2023). Sources of information used as guidance to quantify the existing conditions for sound quality include noise guidelines published by the NSECC (NSECC 2022), Health Canada (Health Canada 2017), and by the Alberta Energy Regulator (AER; AER 2023).

7.3.2 Description of Existing Conditions

The following section describes the existing conditions for air quality, GHG emissions, sound quality, and electrical effects.

Air Quality

Following the guidelines of the AZMF, the province of Nova Scotia is divided into four air zones, which each have common terrain, meteorology, and other factors that interact with air pollutant emissions to influence the ambient air quality in the particular air zone (NSECC 2023). The NSECC's Air Quality Unit (AQU) collects data at monitoring stations in each air zone, that is used to make management decisions for air quality in each air zone (NSECC 2023). The NSECC publishes yearly Nova Scotia Air Zone Reports, with the most recent being for data collected in 2021. The proposed transmission line is located in the Northern air zone of the province, with one air quality monitoring station in the town of Pictou. The CAAQS targets were achieved for all parameters in all four of Nova Scotia's air zones for data collected between 2016 and 2021 (NSECC 2023). The provincial AQU uses the management zone framework developed by the CCME with the intention of improving Nova Scotia's air quality beyond the targets set in the CAAQS. Each air quality parameter in each air zone is assigned a management level (green, yellow, orange, or red).

The Northern air zone is geographically characterized by the Cobequid Mountain Range, which stretches across the air zone from west to east. To the north of the Cobequid Mountains lies the Maritime Lowlands ecoregion, which is known for having the lowest levels of precipitation among the Maritimes provinces (NSECC 2023). There are several National Pollutant Release Inventory (NPRI) reporters in the Northern Air Zone. These include a tire manufacturing plant, a coal-fired power plant, and a pulp and paper plant that shut down in 2020 (NSECC 2023).

The monitoring station for the Northern air zone is located in the town of Pictou. The Pictou air quality monitoring station is located approximately 60 km from the eastern end of the Project, where the substation will be upgraded in Onslow. There were no exceedances of the provincial air quality monitoring objectives between 2016 and 2021, which is the most recently available published data (NSECC 2023). Results from the Pictou air quality monitoring station are summarized in **Table 7.4**.

Table 7.4 Air Quality Results from the Pictou Monitoring Station for 2016-2021

Reporting Year	Ozone (O_3) 8-hour (ppb)	$PM_{2.5}$ 24-hour ($\mu g/m^3$)	$PM_{2.5}$ annual ($\mu g/m^3$)	Sulphur Dioxide (SO_2) 1-hour (ppb)	Sulphur Dioxide (SO_2) Annual (ppb)	Nitrogen Dioxide (NO_2) 1-hour (ppb)	Nitrogen Dioxide (NO_2) Annual (ppb)
CAAQS 2020	62	27	8.8	70	5	60	17
2016	45	18	6.6	-	-	-	-
2017	46	14	5.7	-	-	-	-
2018	48	10	5.1	-	-	-	-
2019	50	10	5.2	-	-	-	-
2020	51	10	5.0	28	0.5	12	1
2021	51	10	5.0	26	0.4	11	1

Notes
$\mu g/m^3$ micrograms per cubic meter
ppb parts per billion
\- parameter was not recorded for this year
Source: NSECC 2023

Concentrations of $PM_{2.5}$ have been declining since 2016 at the Pictou monitoring station, while ground level Ozone (O_3) has been increasingly steadily over the previous six years. Ozone is now given a management level of Yellow (actions for preventing air quality deterioration) for the northern air zone. Sulphur Dioxide (SO_2) and Nitrogen Dioxide (NO_2) data have been recorded at the Pictou monitoring station since 2020. The overall management level for the Northern air zone is yellow recommending that management plan actions be taken to prevent air quality from deteriorating. The PDA is located a considerable distance away from industrial sources in the Northern air zone, which are the cause of the yellow air zone management level. The area of the proposed transmission line is free of industrial sources and it is anticipated that air quality would generally be improved from most of the Northern air zone.

GHG Emissions

The quantity of GHG emissions released to the atmosphere in Canada in 2021 (the most recently published data from Canada's National Inventory Reports) was 670,000 kilotonnes of CO_2 equivalent (kt CO_2e), of which 15,000 kt CO_2e were released in Nova Scotia (ECCC 2023). Therefore, Nova Scotia's GHG emissions represent approximately 2.4% of Canada's emissions in 2021. Canada's contribution to total global GHG emissions (31.5 gigatonnes [Gt] CO_2e) in 2020 was 2.1% (IEA 2021). Canada's GHG emissions have been trending down in recent years (725,000 in 2018, 724,000 in 2019, 659,000 in 2020), having a slight rise from 2020; but overall, GHGs are down 10% since 2005 (ECCC 2023). Nova Scotia GHG emissions have been steady the past few years (16,000 in 2018 and 2019, 15,000 in 2020), but are down 36% overall since 2005 (ECCC 2023).

Sound Quality

The revised draft of the Guidelines for Environmental Noise Management and Assessment classifies all urban population centers in Nova Scotia as either large, medium, or small, when determining the maximum permissible noise levels in the area. The PDA will pass by three areas along the RoW that are designated as small population centers, Amherst, Springhill, and Truro. The rest of the PDA would fall under the rural category. The substation upgrade and expansion in Onslow is located within 5 km from the town of Truro, which has a population of 13,000 as of 2021 (Statistics Canada 2023). The transmission line within the RoW will pass by Springhill, with a population of 2,700 as of 2021, about 20 km to the northeast (Statistics Canada 2023). Finally, the transmission line passes the town of Amherst, with a 2021 population of 9,400, 5 km to the northeast, right before crossing the New Brunswick border (Statistics Canada 2023).The existing acoustic environment is characterized predominantly by vehicle traffic along nearby highways and secondary roads, noise from residential activities (e.g., boating, camping, all-terrain vehicles, snowmobiles), natural sounds (e.g., wildlife, wind) and other various activities/developments, with no industrial sources of noise within the LAA.

The existing sound pressure levels in the Project area can be estimated based on methodology published by the Alberta Energy Regulator with the contributing factors of population density and traffic patterns (AER 2023). According to the AER directive, the average ambient sound level for areas with comparable population densities as the three small urban population centers and distances from heavily travelled roads is estimated to be approximately 48 dB_A at night, and 58 dB_A during the day (AER 2023). The average ambient sound level for the rural areas along the remainder of the RoW are estimated to be approximately 40 dB_A at night, and 50 dB_A during the day. For reference, a sound pressure level of 50 dB_A is comparable to a quiet suburb or conversations at home; a sound pressure level of 60 dB_A is comparable to sound levels in a restaurant or office setting. Sound quality is not expected to be a substantive issue for Project activities and no background sound pressure level monitoring was conducted as part of this assessment.

There are no substantive existing sources of ground vibration near the Project; therefore, the existing level of ground vibration in the area of review is assumed to be negligible.

Electrical Effects

Corona Effects

Corona phenomena may occur when the 60-Hertz (Hz) electric fields at the surface of powerline conductors are large enough to cause local ionization of the air. If there is sufficient corona activity, audible noise and radio/television interference can be noticeable within a hundred metres of the transmission line, and small amounts of ozone and nitrous oxide can be released. The effects considered in this section are most pronounced directly underneath the line conductors and decrease quickly with distance from the transmission line.

For lines with a voltage greater than or equal to (≥) 345 kV, any irregularities on the conductor surface (e.g., nicks, water droplets, or debris) may create points where the electric field is intensified sufficiently to produce a corona. In foul weather, raindrops or snowflakes accumulating on the conductor surface will also act as points for corona inception. Corona activity is therefore more likely to occur near transmission lines at higher altitudes and is most pronounced during foul weather on lines with a voltage ≥ 345 kV.

Electromagnetic Fields (EMFs)

Every time an appliance or electrical device is plugged into an outlet, even if it's not turned on, an electric field is formed (Health Canada 2012). Magnetic fields are formed once the device is turned on, and there is an electric current flowing through the device (Health Canada 2012). Together, the electric and magnetic fields combine and radiate outwards like a wave, which is known as an EMF (Government of Canada 2022). Electricity transmission through overhead power lines, transformer boxes and electrical substations are known to generate EMFs. The EMFs produced by the transmission and use of electricity are considered to be of "extremely low frequency" (ELF), which is quantified as any frequency below 300 hertz (Health Canada 2012). Transmission lines typically utilize ELF alternating current (AC) fields, that produce frequencies of 60 Hz, which are similar to those produced by many household appliances (ATCO 2023).

Power frequency electric and magnetic fields that are ELF are present everywhere that electricity flows. Although they are often referred to together as EMF, electric fields and magnetic fields are distinct components of electricity. Electric fields around transmission lines are produced by electrical charges on the energized conductor. Electric field strength is directly proportional to the line's voltage; that is, increased voltage produces a stronger electric field. Magnetic fields result from the flow of current through wires or electrical devices and increase in strength as the current increases. Both electric fields and magnetic fields are strongest at the source, and the level of exposure rapidly decreases with increase in distance from a source (Government of Canada 2022).

The potential health effects of extremely low frequency EMFs have been studied extensively, and the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has issued exposure guidelines to ELF EMFs (Government of Canada 2022). Health Canada reviewed current EMF information and concluded that there is inadequate evidence correlating EMF and risk to human health for the frequencies associated with electrical transmission lines (Government of Canada 2022). Health Canada concluded that Canadians do not need to take precautions to protect themselves from EMF exposure, as the exposure levels in Canadian homes, schools, and offices are well below the guidelines set forth by the ICNIRP (Government of Canada 2022).

A summary of conclusions to date from research conducted on the possible human health effects of EMFs since the 1970s are as follows:

- Health Canada's (2004) It's Your Health Fact Sheet on EMF states: "Research has shown that EMFs from electrical devices and power lines can cause weak electric currents to flow through the human body. However, these currents are much smaller than those produced naturally by your brain, nerves and heart, and are not associated with any known health risks." Health Canada concludes that, "In summary, when all of the studies are evaluated together, the evidence suggesting that EMFs may contribute to an increased risk of cancer is very weak."

- Based on a 10-year review of scientific research on effects from exposure to electromagnetic fields, the World Health Organization's (WHO 2016) International EMF Project states: "In the area of biological effects and medical applications of non-ionizing radiation approximately 25,000 articles have been published over the past 30 years. Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the World Health Organization concluded that current evidence does not confirm the existence of any health consequences from exposure to low level EMFs. However, some gaps in knowledge about biological effects exist and need further research."
- The Federal-Provincial-Territorial Radiation Protection Committee (FPTRPC), organized under the Health Canada Radiation Protection Bureau (2005), issued a Position Statement in January 2005 stating that adverse health effects from exposure to power frequency EMFs at levels normally encountered in homes, schools and offices have not been established.
- The FPTRPC (2008) also issued a Response Statement to Public Concerns in November 2008 regarding EMFs from Electrical Power Transmission and Distribution Lines which concluded "In summary, it is the opinion of the FPTRPC that there is insufficient scientific evidence showing exposure to EMFs from power lines can cause adverse health effects such as cancer."
- A 1999 report by the United States National Institute of Environmental Health Sciences following a seven-year EMF research program concluded: "The United States National Institute of Environmental Health Sciences believes that the probability that EMF exposure is truly a health hazard is currently small. The weak epidemiological associations and lack of any laboratory support for these associations provide only marginal scientific support that exposure to this agent is causing any degree of harm." (NIEHS 1999)
- The World Health Organization International Agency for Research on Cancer (IARC) has classified power frequency EMF as a 2B carcinogen—a possible carcinogen based on unanswered questions of the statistical association between magnetic field exposure and childhood leukemia (IARC 2002). The IARC (2002) found no consistent evidence that childhood EMF exposures are associated with other types of cancers or that adult EMF exposures are associated with increased risk of any kind of cancer. Other 2B possible carcinogens include coffee, pickled vegetables, and gasoline engine exhaust.

Audible Noise

The corona caused by large electric fields at the surface of a transmission line conductor is accompanied by an audible snapping sound. If there is sufficient corona activity on a high voltage line, many small snaps from corona sources along a conductor may be sufficient, in combination, to produce discernable audible noise or crackle at the edge of the RoW. At higher voltages (345 kV and above) and higher conductor-surface gradients, corona activity is more likely and audible noise more frequent, particularly in foul weather, and is therefore considered in the design of the transmission line.

Sound intensity is measured in dB referenced to a pressure of 20 micropascals, which is approximately the pressure threshold of human hearing at 1 kHz. The sound intensity of typical human speech is approximately 60 dBA, and background levels of noise in rural and urban environments are about 30 to 40 dBA. Specific identifiable noises such as birdcalls, neighborhood activity, and traffic can produce audible noise levels of 50 to 60 dBA.

The audible noise levels at the RoW edge for the existing transmission line and the proposed new line, under fair weather, are expected to be as follows in **Table 7.5**.

Table 7.5 Audible Noise Levels at RoW Edge for Existing and Proposed 345 kV Transmission Lines

Location	Audible Noise (dBA)
New 345 kV line (L3224-L3226) Side - RoW Edge	52.6 dBA
Existing 345 kV intertie (L3006-L3025) Side – RoW Edge	54.2 dBA[1]
Notes: [1] RoW width used in calculation assumed to be 300 ft.; however, the NSPI RoW for the parallel interties is slightly narrower (285 ft in NS vs 300 ft in NB), as such, the noise would be expected to be slightly higher than modelled. (CIMA+ 2023)	

The Electrical Power Research Institute (EPRI) establishes a limit of 55 dBA for audible noise from a transmission line, measured at one m above ground at the edge of the RoW. This limit is applied in transmission line design by other Canadian utility companies such as Hydro-Quebec and Hydro One. The results of the CIMA+ study show that audible noise is below the established limit of 55 dBA for the entire length of the RoW (CIMA+ 2023).

Radio and Television Interference

Radio noise can produce interference to an amplitude-modulated (AM) signal such as a commercial AM radio audio signal or the video portion of a TV station. Frequency modulated (FM) radio stations and the audio portion of a TV station (which is also frequency modulated) are generally not affected by electromagnetic noise from a transmission line.

The maximum calculated radio interference level was found to be just over 30 $dB_{\mu}V/m$ which is well below the specified limit for a 345 kV line of 56 $dB_{\mu}V/m$ at a lateral distance of 15 m from the outer most phase conductor under fair weather conditions (dry conductor) specified in the CAN/CSA-CISPR 16-1-1-10 – Specification. (CIMA+ 2023)

Ozone and Other Gaseous Products

Corona discharge can produce small quantities of ozone (O_3) and nitrous oxides (NO_x). Ozone and No_x produced by corona activity on this line would contribute very little, if at all, to people's overall exposure to these two products. Several investigators have attempted to measure ozone at ground level adjacent to transmission lines with voltages up to 765 kV (EPRI, 1987). No ground level ozone attributable to the transmission line was detected. Therefore, no increased levels of ozone or nitrous oxides attributable to corona are expected to result from the proposed 345 kV line and will not be considered further in this assessment.

CIMA+ was contracted by NB Power to conduct a study on electromagnetic interference and electrical effects including the corona effect and EMFs. Estimates of audible noise, radio interference, and television interference were calculated across the RoW for the existing 345-kV transmission line; and the proposed new 345-kV transmission line in New Brunswick.

The line design in Nova Scotia is identical and there are no anticipated Project-related environmental effects from electrical effects, including EMFs and corona, based on the conclusions of research conducted on these phenomena by Health Canada and the ICNIRP. As such, electrical effects will not be considered further in the following sections of this assessment. If additional mitigation is warranted, it will be developed and implemented during the planning, design, and operation phases of the Project.

Based on the EMF study done in NB (CIMA+ 2023), the new 345 kV transmission intertie in Nova Scotia will not be a significant source of ozone or nitrogen oxides and therefore these are not likely to affect the air quality along the projected path. Since the L8006 RoW for the intertie is slightly narrower in Nova Scotia than the RoW assessed for the New Brunswick project, the electrical effects at edge of the Nova Scotia RoW will be incrementally higher but are rated not significant.

7.4 Effects Assessment

7.4.1 Assessment Criteria

7.4.1.1 Residual Effects Characterization

The definitions for the characterization of residual environmental effects on the atmospheric environment are presented below in **Table 7.6**. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not feasible.

Table 7.6 Characterization of Residual Effects on Atmospheric Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to atmospheric environment relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to atmospheric environment relative to baseline
Magnitude	The amount of change in measurable parameters of the VC relative to existing conditions	**Negligible –** no measurable change from baseline conditions. **Low –** air quality is slightly affected but is well within the objectives, guidelines or standards; relatively small changes are expected to provincial and national GHG emissions (10,000 t CO_2e or less per year); sound quality is slightly affected but comparable to background sound pressure levels. **Moderate –** air quality is affected to values that are near, but below, the objectives, guidelines or standards; notable changes are expected to provincial and national GHG emissions (10,000 to

Table 7.6 Characterization of Residual Effects on Atmospheric Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		100,000 t CO_2e per year); notable changes are expected in sound pressure levels from background sound pressure levels. **High –** air quality is degraded to values that may exceed the objectives, guidelines or standards; material changes are expected to provincial and national GHG emissions (over 100,000 t CO_2e per year); material changes are expected in sound pressure levels from measured background sound pressure levels.
Geographic Extent	The geographic area in which a residual effect occurs	**PDA –** residual effects are restricted to the PDA **LAA –** residual effects extend into the LAA **Global –** residual effects regarding GHGs extend globally
Duration	The period of time required until the measurable parameter or the VC returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived	**Short term** – residual effect extends for less than 1 year **Medium term** – residual effect extends through the construction phase **Long term** – residual effect extends through the operation phase **Permanent –** recovery to baseline conditions unlikely
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant	**Not Applicable –** Effect does not occur during critical life stage or timing does not affect the VC **Applicable –** Effect occurs during a critical life stage
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event** **Multiple irregular event –** occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously

Table 7.6 Characterization of Residual Effects on Atmospheric Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Describes whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and rehabilitation **Irreversible –** the residual effect is unlikely to be reversed
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	**Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

7.4.1.2 Significance Definition

A significant adverse residual effect on the atmospheric environment is defined as follows:

For a change in air quality, the maximum Project-related ground level air contaminant emissions plus the background levels lead to frequent exceedance of the respective ambient air quality objective, guideline, or standard. Frequent is defined as once per week for one-hour objectives, and once per month for 24-hour objectives.

For a change in GHG emissions, provincial and federal policies and regulations do not identify specific thresholds or standards that could be used to determine significance when assessing the residual effects of a single Project's GHG emissions. Project emissions will be ranked as low (10,000 t CO_2e or less per year), moderate (10,000 to 100,000 t CO_2e per year) or high (over 100,000 t CO_2e per year) as presented in the magnitude definition in **Table 7.6**. The significance of Project GHG emission totals will be determined at the provincial and national jurisdictional boundaries by comparing Project GHG emission totals to provincial and national GHG emission totals.

For a change in sound quality, noise from Project construction and operation plus the background sounds pressure levels may cause frequent and medium- or long-term annoyance to the nearest residences or may result in sleep disturbance. Health Canada's guidance document on assessing human health impacts from noise defines sleep disturbance from noise as any of the following conditions, difficulty falling asleep, awakening, curtailed sleep duration, alterations of sleep stages or depth, and increased body movements during sleep (Health Canada 2017). The percent highly annoyed (%HA) is an aggregate indicator of assorted noise effects and the negative effects they present to a community, which may not be noticeable when considered as separate events. Increases in %HA is used as an indicator of the adverse health effects on humans caused by exposure to long term construction noise and Project operational noise (Health Canada 2017).

7.4.2 Potential Project Interactions with the Atmospheric Environment

Activities and components could potentially interact with the atmospheric environment and result in adverse environmental effects on the atmospheric environment. In consideration of these potential interactions, the assessment of Project-related environmental effects on the atmospheric environment is therefore focused on the potential environmental effects listed in **Table 7.7**. These potential environmental effects will be assessed in consideration of specific measurable parameters, also listed in **Table 7.7**.

Table 7.7 Potential Environmental Effects, Effect Pathways, and Measurable Parameters for the Atmospheric Environment

Potential Environmental Effect	Effect Pathway	Measurable Parameters
Change in Air Quality	• Project-related emissions of air contaminants, GHGs, and sound	• Ambient concentrations of air contaminants and particulate matter in units of µg/m^3
Change in GHG Emissions	• Project-related emissions of GHGs	• GHG emissions in t CO_2e
Change in Sound Quality	• Project-related emissions of sound	• Sound pressure levels in dBA

Table 7.8 identifies the physical activities that may interact with the VC and result in an environmental effect. These interactions are discussed in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 7.8 Potential Interactions Between Physical Activities and Atmospheric Environment

Project Activities	Change in Air Quality	Change in GHG Emissions	Change in Sound Quality
Construction			
Site Preparation and Clearing	✓	✓	✓
Excavation and Structure Assembly	✓	✓	✓
Conductor Stringing	✓	✓	✓
Expansion of Onslow Terminal	✓	✓	✓
Inspections and Energization	✓	✓	✓
Clean-Up and Revegetation	✓	✓	✓
Employment and Expenditure	-	-	-
Operation and Maintenance			
Presence of Conductors and Towers	-	-	-
Inspections and Maintenance	✓	✓	✓
Vegetation Management	✓	✓	✓
Notes: ✓= Potential interaction – = No interaction			

Most potential effects to the atmospheric environment as a result of Project activities will occur during the initial construction phase. In the operations and maintenance phase, ground inspections will be carried out every three to five years, by ATVs or on foot, while additional air inspections will be carried out by helicopter. The administrative changes in employment and expenditure are not expected to interact with the atmospheric environment during the Project.

7.4.2.1 Potential Effects to the Atmospheric Environment During Construction

Without mitigation, the construction of the Project components has the potential to interact with the atmospheric environment in the following ways:

- Air contaminants and greenhouse gases may be generated from the combustion of fossil fuels (e.g., diesel and/or gasoline) by heavy mobile equipment and vehicles travelling to and from the Project site.
- Fine particulate matter (dust) may be generated by excavation and earth moving activities, loading, and dumping of materials (e.g., rock or earth).
- Dust may be generated from construction equipment and vehicles moving along unpaved surfaces, and exposed soil along the RoW during construction activities.
- Noise (unwanted sound) may result from the construction process itself, from the use of heavy mobile equipment and vehicles (e.g., engines, back-up beepers, banging of equipment), from the delivery of materials and potentially noise from blasting.

7.4.2.2 Potential Effects to the Atmospheric Environment During Operation and Maintenance

Without mitigation, the operation and maintenance of the Project has the potential to interact with the atmospheric environment in the following ways:

- Minor GHG emissions as a result of the use of SF_6 circuit breakers in the Onslow Terminal.
- Air contaminants (Particulate matter (TSP, PM_{10}, $PM_{2.5}$), fugitive dust, sulphur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), ground level ozone (O_3)) and GHG emissions (e.g., CO_2, CH_4, and N_2O) may be generated from the combustion of fuels (e.g., diesel and/or gasoline) from heavy mobile equipment used for periodic maintenance activities.
- Noise from mobile equipment (e.g., engines, back-up beepers, banging of equipment,) will be limited during operation, though transformers in switching stations may result in localized emissions of noise.
- Vegetation maintenance will be conducted as needed to limit disturbances to operation from extreme weather events. Noise from manual saws and mechanical equipment will be present during vegetation management.

7.4.3 Mitigation for the Atmospheric Environment

The following mitigation measures specific to the atmospheric environment have been identified for this Project.

Mitigation for Fugitive Dust and Exhaust Emissions

Mitigation measures will include standard, proven measures for air quality and dust management, outlined in the NSP Contractor Environmental Requirements (NSP 2023) which will be incorporated into a Project Specific Environmental Protection Plan (EPP) that defines measures to mitigate the creation of fugitive dust and exhaust emissions. General mitigation measures include:

- Conduct grading and site preparation in phases to minimize disturbed soil areas until just prior to construction or further preparatory activities.
- Haul routes will be managed to reduce hauling distance, engine idling, and dust.
- Speed limits will be followed on Project-controlled gravel roads to reduce construction-related fugitive road dust.
- By design, most of the RoW will be left in a vegetated state and/or with forest floor and duff layer intact, with groundbreaking generally occurring only at the structure locations, minimizing potential for dust emissions.
- Stabilize exposed soil surfaces by sloping or using vegetation, stone, soil, or geotextiles to prevent dust.
- Cease dust-generating activities during dry periods with high winds or use of dust suppressant (water application) as needed.
- Water (with water) aggregate and soil stockpiles to control dust.
- Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.
- Where appropriate, wash down vehicles and equipment using hoses and water to remove accumulated mud/dirt (in a manner that run-off water does not enter watercourse or wetland and is free of fuels, oils and lubricants).

- Project personnel must adhere to all safety protocols and wear appropriate personal protective equipment in the event of significant fugitive events.

General mitigation measures for exhaust emissions include:

- Equipment must meet all applicable provincial and air quality regulations and emission standards.
- Equipment is to be fueled using low-sulphur diesel.
- Maintain engines and exhaust systems according to manufacturer's specifications.
- Remove from service malfunctioning equipment and/or equipment generating excess amounts of smoke, odor, or noise until repairs can be made.
- Restrict the idling of equipment where practical.
- Haul distances to disposal sites will be reduced where possible.

Mitigation for GHGs

The GHG emissions will be mitigated through regular equipment inspection and maintenance and restriction of engine idling. Given that Project-related GHG emissions are anticipated to be temporary, localized, and minor in nature, they are considered unlikely to result in a measurable change in GHGs. SF_6 Emissions will be document and reported to ECCC as required.

Mitigation for Noise

- Noise control measures (e.g., sound barriers, shrouds, enclosures at the substation) will be used where warranted.
- Landowner will be kept apprised of Project activities.
- Noise-generating construction activities will comply with the requirements of existing by-laws (where applicable).
- In areas close to homes and businesses, construction activities will be limited to daytime hours (typically between the hours of 7:00 a.m. to 7:00 p.m.) as feasible to limit nuisance noise to nearby residences at night.
- NSPI staff will monitor noise qualitatively within the RoW and implement appropriate mitigation and responses defined in the EPP in the event that they receive noise complaints from nearby receptors.
- The need for additional noise mitigation will be considered through construction planning and lower noise generating alternatives will be considered where available.
- Should blasting be necessary for rock excavation, it will be conducted in accordance with provincial legislation and subject terms and conditions of applicable permits.
- Landowners will be notified of any blasting activities through a communication plan, to be developed as part of the EPP.
- All blasts are to be conducted and monitored by certified professionals.
- Where blasting is planned within 500 m of residences, activities will comply with the requirements of existing by-laws (where applicable).

7.4.4 Characterization for Residual Project Environmental Interactions for the Atmospheric Environment

7.4.4.1 Construction

The quantities of air contaminants released by the Project are expected to be low and not expected to cause downwind concentrations to exceed provincial or federal air quality objectives or standards during construction. Combustion gases and GHGs are expected to be released from the operation of construction equipment, including forestry equipment, trucks, bulldozers, graders, excavators, backhoes, cranes, and other heavy equipment, and from machinery and large trucks travelling to and from site. However, construction along each portion of the RoW will be short in duration (e.g., two weeks for individual structure assembly). The upgrades required for the Onslow terminal will require forest clearing and grading activities, and a slightly longer construction period in a localized area. Repair and maintenance activities will be performed on equipment, machinery and trucks as required to maintain normal operation and associated quantities of air contaminants being released into the atmospheric environment.

Fugitive dust emissions are expected to be generated from earth moving activities, loading, and dumping of materials, and exposed soil along the RoW and access roads during construction activities. Except for the structure locations, most of the forest floor and duff layers on the RoW will be maintained during and after construction, reducing the potential for dust emissions.

The particulate matter in ambient air may contain soil materials, pollen, salt, spores and tire particles. There are two forms of particulate matter (PM) which can pose a concern for human health; PM with a diameter of 10 microns or less (PM_{10}) and PM with a diameter of 2.5 microns or less ($PM_{2.5}$). People with underlying lung and heart disease, children, and the elderly are the most susceptible to exposure to particulate matter, including dust. Fugitive dust may also affect environmental quality through deposition onto vegetation and waterways.

Standard dust control and mitigation practices will be used to control dust levels, in particular on unpaved access roads, during construction. These include the use of approved dust suppressants such as water on unpaved areas frequented by heavy equipment to limit dust emissions, especially during windy and dry conditions.

The construction of the Project also has the potential to interact with the atmospheric environment by the release of GHG emissions (e.g., CO_2, CH_4, and N_2O) generated from the combustion of fossil fuels. Idling of vehicle engines, equipment and machinery will be maintained to the levels required for the safe and normal operation of equipment, and transportation routes will be managed to reduce the release of unnecessary combustion gases and GHG emissions. Construction activities will result in an increase in truck and equipment tailpipe exhaust, primarily PM, NO_x, SO_2 and CO. These emissions are mostly associated with the Project sites themselves and access roads into the line and not expected to affect local residents or communities.

The NS-NB Reliability Intertie Project is part of an overall plan to reduce greenhouse gases. In Nova Scotia, this will be achieved primarily by stopping coal-fired generation by 2030 to be replaced with a combination of measures including, but not limited to, additional wind and solar generation, full integration of the energy from the Maritime Link, use of grid-scale batteries, additional, low-capacity factor natural gas and possible imports (electricity) via New Brunswick from potential sources in Quebec, New England and New Brunswick. Key to this portfolio will be the addition of this second 345 kV reliability transmission line between Onslow and Salisbury.

The operation of the transmission line will not contribute in a substantive way to GHG emissions, rather it will facilitate the overall reduction of GHGs for NSPI and will assist in NSPI meeting the 2030 renewables target and the expected 2035 Net Zero GHG emissions advocated by the federal government. This will result in lower GHG emissions by 2030.

The federal and Nova Scotia provincial government each have methodologies for calculating project GHG emissions. The main component in those approaches is the calculation of actual production emissions, with additional methods for estimating construction phase GHG emissions.

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

- Use of heavy equipment (excavators, dozers, cranes)
- Use of light-duty vehicles and equipment (pick-up trucks, generators)
- Land clearing, including the removal of cut foliage and trees
- Cement Production for foundations

Emissions from mobile vehicles and off-road equipment were estimated using diesel and gasoline combustion emission factors from the ECCC National Inventory Report (NIR) (ECCC 2023) and the estimated fuel usages. The estimated fuel usages were provided by the NSPI and were estimated based on the level of construction effort anticipated for the Project. The GHG releases were estimated from fuel combustion in mobile vehicles and equipment for the full construction phase (three years) are presented in **Table 7.9**.

Carbon stock emissions from land clearing of the forests (removal of foliage and trees) were estimated following the method outlined in the Strategic Assessment of Climate Change (SACC) Technical Guide (ECCC 2021) and related IPCC methodologies (IPCC 2019), using the area of land cleared, and information related to the forest. The area cleared is approximately 365 hectares, estimated from 96 km for the transmission line with 38 m RoW . The cut biomass will be removed from the site, and not burned. The total GHG emissions from land use changes during the construction period are estimated to be 51,163 tonnes CO_2e, as presented in **Table 7.9**.

Table 7.9 Summary of Estimated Construction GHG Emissions

Activity	Units	CO_2	CH_4	N_2O	Total (CO_2e)
Mobile Combustion – Gasoline	tonnes	2,653	5.84	0.074	2,836
Mobile Combustion – Diesel	tonnes	16,436	0.45	1.39	16,817
Land Clearing – Carbon Stock Change	tonnes	51,163	-	-	51,163
Total GHG Emissions	tonnes	70,252	6.29	1.47	70,816

Collectively the GHG emissions represents less than 100,000 tonnes CO_2e over the length of the construction period.

The magnitude of the residual effect on air quality is expected to be low due to exhaust emissions, including GHG emissions, from Project equipment and vehicles during construction. The GHG emissions from construction activities will be negligible in comparison to the annually reported GHG emissions in Nova Scotia.

Construction activities can cause undesirable increases in sound quality for nearby receptors. Use of large equipment and vehicles during construction will emit sound that will occur inside the PDA and adjacent areas. Interactions between the Project and sound quality are expected to occur during construction, during a relatively short time frame near each property (two years' total construction, moving along the RoW). Clearing along the RoW will be completed by mulchers mounted on the end of excavators, with feller bunchers and skidders used when necessary for areas with larger trees. Clearing activities will progress along the RoW between half a kilometre to a kilometre a day, limiting the amount of time that the sound level would be elevated for individual receptors. Structure installation will be completed within a week at each individual structure location.

Noise will generally be associated with the operation of construction and forest clearing equipment, including engines and safety back-up beepers. Typical sound pressure levels of some commonly used construction equipment are presented in **Table 7.10** below.

Table 7.10 Typical Sound Pressure Levels of Construction Equipment

Construction Equipment	Sound Pressure Level (dB_A) at 15 Metres Away from the Construction Equipment
Auger Drill Rig	85
Backhoe	80
Blasting	94
Chain Saw	85
Concrete Mixer Truck	85
Crane	85
Dozer	85
Drill Rig Truck	84
Dump Truck	84
Excavator	85
Flat Bed Truck	84
Grader	85
Pickup Truck	55
Tractor	84
Helicopter	87 dB @ 152 m above ground
Source: United States Department of Transportation (USDOT) 2006	

Construction noise is typically intermittent, fluctuates during active construction, and will generally be confined to the LAA and restricted to daytime hours to lessen the disturbance to nearby residences. In the event that blasting is required, blasting activities will be carefully controlled by qualified personnel and the extent of blasting activity will be localized and short term. Residents will be notified in advance of any blasting activity through the communication plan established in the EPP.

The PDA crosses 269 properties, with other residences in the adjacent area to the PDA that may also experience an increase in noise during daytime hours in the construction phase of the Project. Residences surrounding the Onslow terminal may experience longer durations of increased noise from construction during the upgrades of these facilities. The Onslow substation is located in a predominantly rural area, with residences nearby on Old Tatamagouche Road, with the closest being approximately 250 m through a wooded area from the terminal site.

A screening level noise calculation was completed for the nearest residences to the terminal upgrades required in Onslow. The noise levels at the nearest receptors were estimated using sound pressure levels (as shown in **Table 7.9**) for construction equipment located 15 m away, as well as background sound levels for areas with similar population densities as per the AER directive. It is generally assumed that no more than three pieces of construction equipment would operate near a residence at a given time and would not operate for more than 12 hours in a workday. The nearest receptors to the Onslow terminal upgrades are approximately 250 m away and can be expected to experience elevated sound pressure levels of 66.1 dBA during construction, and an equivalent continuous sound level over a 24-hour period of 63.1 dBA. These projected levels are above the industrial area permissible sound levels from the Nova Scotia draft noise guidelines; however, the noise from construction is expected to vary, occur sporadically, and generally be confined to daytime hours. The Nova Scotia draft guidelines restrict industrial areas such as the Onslow substation terminal to cause overnight sound pressure levels at receptors in residential areas to exceed the permissible sound pressure levels for the residential area type, which in this case would be urban residential. Health Canada's noise guideline has mitigation measures for short-term construction noise exposure that is less than 1 year, that can be applied in the event that noise complaints are received and there are increases in the %HA.

In some cases, helicopters may be used to transport the components of the new transmission towers to the site. The average sound pressure level of a helicopter flying at 152 m (500 feet) above ground is 87 dBA, according to the Helicopter Association International, while it drops to 79 dBA at 305 m (1,000 feet) above ground level (Price 2023). Using the noise calculation method described above, receptors within 100 m of the RoW may experience elevated sound pressure levels of 90.6 dBA during the time a helicopter is present. The presence of a helicopter at each point along the RoW will be relatively short-term in duration. If they are the selected construction method, helicopters would deliver components for foundation and tower construction within a period of two weeks for each foundation and tower. Helicopters may also be selected to complete conductor stringing, which would also have a timeline of zero to two weeks.

Due to the linear progression of construction activities for the transmission lines along the RoW, it is anticipated that nearby residences or other sensitive receptors will be exposed to potentially increased noise levels for less than a week at a given time, apart from those surrounding the Onslow terminal being upgraded, who will be exposed for a longer period. To reduce overall noise during construction, equipment will be in good working order, and will undergo preventative maintenance, such as inspection to confirm that mufflers are functioning properly. Increases in noise will be during daytime hours; existing nighttime sound pressure levels in the vicinity of nearby receptors are not expected to be affected, as clearing and construction activities will only take place during workday hours when near homes and businesses. If delays in the Project schedule require work hours to be extended past daytime hours, then the planned changes to schedule and Project activities will be communicated to all residences within 500 m, along with contact information if they wish to submit a noise complaint. NSPI staff will monitor noise qualitatively within the RoW and implement appropriate mitigation if they receive noise complaints from nearby receptors (e.g., reduced hours of noise producing activities in those areas). Therefore, with mitigation measures employed, changes in sound quality during construction are expected to be moderate in magnitude, and low in frequency beyond the PDA.

7.4.4.2 Operation and Maintenance

During operation and maintenance, limited and infrequent activity would occur along the RoW, and activity at the existing substations will be the same as the operation currently in place. No substantial emissions of air contaminants, GHGs or noise are expected to occur during operation and maintenance of the transmission line or the expanded terminals. Operation and maintenance activities that could release air contaminants, GHGs or noise would include the use of manual saws (e.g., chainsaws, brush saws and axes) and mechanical equipment (e.g., hydro-axes, excavators with mulching head and bush hogs) for vegetation management, the use of heavy equipment for structure and/or line replacement, or the use of trucks and hoists for repairs to grid stations. Detailed helicopter patrols of the RoW planned for Project Inspection will cause elevated noise levels, similar to those described during construction. The post-construction patrol will be completed for the transmission line in one day, with a second day only necessary if the first inspection identifies areas needing corrective action. During normal operation of the transmission line, there will be no other equipment on the RoW. Vegetation maintenance activities will be scheduled as necessary based on inspections of vegetation growth along the RoW. These activities are likely to be temporary and short-term events at each location. Areas within the PDA with excessive growth of vegetation could be scheduled for longer periods of time, but the typical timeline of these events would be between one and two days along each point of the RoW. The level of noise in the LAA during operation is expected to be comparable to the existing level of noise in the LAA (as described in Section 7.3.2).

7.4.4.3 Summary

Effects on the atmospheric environment, including local air quality, GHGs, the acoustic environment (noise), and EMFs are not expected to be substantive. The magnitude of effects will be negligible to moderate and reversible upon cessation of the activities. A summary of the residual environmental effects on the atmospheric environment during Project construction and operation and maintenance is provided in **Table 7.11.**

It is important to note that the NS-NB Reliability Intertie Project is part of an overall plan to reduce greenhouse gases primarily by facilitating the cessation of coal-fired generation in Nova Scotia by 2030. Key to this effort will be the addition of this second 345 kV reliability transmission line between Onslow and Salisbury.

Table 7.11 Project Residual Effects on Atmospheric Environment

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in Air Quality	C	A	L	LAA	MT	N/A	IR	R	D
	O	A	L	LAA	LT	N/A	IR	R	D
Change in GHG Emissions	C	A	M	G	MT	N/A	IR	I	D
	O	A	L	G	LT	N/A	IR	I	D
Change in Sound Quality	C	A	M	LAA	MT	N/A	IR	R	D
	O	A	L	LAA	LT	N/A	IR	R	D

KEY

See Table 7.6 for detailed definitions

Project Phase:
C: Construction
O: Operation and maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project development area
LAA: Local assessment area
G: Global

Duration:
ST: Short term
MT: Medium term
LT: Long term

Timing:
N/A: Not applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

7.5 Determination of Significance

With the implementation of mitigation and environmental protection measures as described in this assessment, it is not anticipated that the residual adverse environmental effects of the Project on the atmospheric environment will result in exceedances of air quality objectives, guidelines or standards The Project will contribute a very small fraction of GHG in relation to provincial and national GHG emissions. Exceedances of the regulatory thresholds for noise may occur during construction; however, the noise is expected to fluctuate, be intermittent, and will generally be confined to the LAA during daytime hours. The residual environmental effects on the atmospheric environment are therefore predicted to be not significant for the Project.

7.6 Follow-up and Monitoring

A dedicated follow-up and monitoring plan for the atmospheric environment is not warranted because the potential effects are not expected to be a serious concern. The Project EPP will include the means to respond to and address complaints regarding noise or dust, should they be received during construction. Follow up would occur to investigate the nature of the noise issue and monitoring may be deployed to verify whether the Project activities or noise could be causing undue exposure or annoyance, and if so, how to best address them.

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8 Assessment of Environmental Effects on Wetlands

8.1 Rationale for Selection as a Valued Component

The Nova Scotia Environment and Climate Change (NSECC) policy document *Nova Scotia Wetland Conservation Policy* (NSECC 2019)(the Policy) states that wetlands provide or support a wide range of important ecological, social, and economic functions and services in our watersheds that are beneficial to Nova Scotians. Individual wetlands will typically only provide a subset of these functions and services. These include, but are not limited to:

- Maintaining watershed health by moderating flood waters, slowing runoff rates, and minimizing erosion and sedimentation of adjacent lakes and streams
- Protecting human and ecosystem health by removing organic waste and bacteria and filtering excess nutrients, contaminants and silt from surface and ground water
- Buffering the impact of storm water runoff and maintaining natural drainage regimes
- Storing and sequestering carbon from the atmosphere, potentially moderating climate effects
- Contributing to the water balance and drinking water supply by storing and releasing surface water and recharging groundwater reservoirs
- Conserving biodiversity by providing important habitats for fish, wildlife, and plants, including rare or endangered species
- Producing abundant and diverse plant communities that may be released, after decomposing, as essential nutrients to support fisheries and food webs in nearby rivers, estuaries and coastal waters
- Offering opportunities for recreational, scientific, aesthetic, spiritual, and cultural pursuits
- Supporting natural food (e.g., wild rice, cranberries) and peat production
- Supporting medicinal and ceremonial plants important to the Mi’kmaq of Nova Scotia

Based on the 2004 inventory, Nova Scotia’s 5.5 million hectares of land is comprised of 360,462 hectares (6.6% of total land area) of freshwater wetlands and 17,060 hectares (0.3% of total land area) of salt marsh (NSECC n.d.). Information in this section relies on data presented in the report *Wetland, Watercourse, Rare Species, And Habitat Assessment: L8001 and L8006 Transmission Lines, Amherst to Onslow, Nova Scotia* (Strum 2020). This report details the methods and results of a desktop review and field delineation of wetlands, among other surveys, for the existing L8001 and proposed L8006 (hereafter referred to as “L8006” per current nomenclature) transmission lines, and is included as Appendix C.

8.2 Scope of Assessment for Wetlands

8.2.1 Regulatory Context

Wetlands in Nova Scotia are protected by the Nova Scotia *Environment Act*, 1994-95, where “wetland” is defined as:

> *“…land commonly referred to as a marsh, swamp, fen or bog that either periodically or permanently has a water table at, near or above the land's surface or that is saturated with water, and sustains aquatic processes as indicated by the presence of poorly-drained soils, hydrophytic vegetation and biological activities adapted to wet conditions.”*

The Wetland Policy provides context to the legislation, regulations and operational policies designed to protect and guide management of wetlands in Nova Scotia. Most importantly, the Policy establishes a specific goal of no loss of Wetlands of Special Significance (WSS) and no net loss in area and function for other wetlands (NSECC 2019). As indicated in the Policy, WSS include:

- All salt marshes
- Wetlands that are within or partially within a designated Ramsar site per the Ramsar Convention
- Provincial Wildlife Management Areas (Crown and Provincial lands only), Provincial Parks, Nature Reserves, Wilderness Areas or lands owned or legally protected by non-government charitable conservation land trusts
- Intact or restored wetlands that are project sites under the North American Waterfowl Management Plan and secured for conservation through the Nova Scotia Eastern Habitat Joint Venture
- Wetlands known to support at-risk species as designated under the *Species at Risk Act,* 2002 or the Nova Scotia *Endangered Species Act,* 1998
- Wetlands in designated protected water areas as described within Section 106 of the *Environment Act*, 1994-95

Any project with the potential to alter wetland habitat (either directly and/or indirectly) requires approval through the Wetland Alteration Approval or Environmental Assessment process, each under the *Environment Act, 1994-95*. If alterations to a wetland (or wetland complex) are less than two hectares, a Wetland Alteration Approval must be obtained. If alterations exceed two hectares, an Environmental Assessment application is required in addition to the Wetland Alteration Approval. Under the *Nova Scotia Wetland Conservation Policy, 2019*, the following are exempt from the approval process:

- Wetlands on federal lands
- Wetlands less than 100 m^2 in total area
- Wetlands constructed specifically for wastewater or stormwater treatment
- Wetlands created by humans on upland habitats not for the purpose of fulfilling compensation requirements under Wetland Alteration Approvals (e.g., excavated ponds)
- Wetlands designated as “Marshlands” under the *Agricultural Marshland Conservation Act, 2000* as agricultural land
- Wetlands within agricultural drainage ditches
- Wetlands that develop as the unintended result of urban, commercial, industrial or agricultural construction projects completed less than 20 years before the current calendar year

Wetland conservation in Nova Scotia is achieved by considering the mitigative sequence for decision-making (avoidance, minimization, compensation). The sequence aids proponents during the planning and design stage to produce proposals that will be acceptable to NSECC. The first step in the sequence (and the priority) is “avoidance”. This option involves avoiding alteration to the wetland, forcing the consideration of alternative options for an activity that may result in less of an adverse impact to the wetland. If no other alternative option exists, “minimization” is recommended, meaning that any unavoidable impacts to the wetland be managed in such a way that adverse impacts are reduced. This can be accomplished through specific techniques, materials, and/or site choice. “Compensation” requires compensatory mitigation for residual adverse impacts on wetland function or loss of wetland area, through restoration, enhancement, creation and/or expansion of a wetland ecosystem. A functional assessment of wetlands is required to determine the impacts on wetland function. The amount of compensation necessary is determined by NSECC and ranges from 1 ha to 4 ha for every 1 ha of wetland altered, depending on the compensation approach. For new right-of-way, NSPI will avoid alterations to WSS, and the NSECC Wetland Policy recognizes “necessary public function” necessary alterations as long as avoidance was demonstrated.

Federal wetland conservation is directed by *The Federal Policy on Wetland Conservation* (Government of Canada 1991) which sets a conservation goal of no net loss of wetland function on a national scale. This policy is applied to federal land or federal programs in areas where wetland loss has reached critical levels.

8.2.2 Species and Risk and Species of Conservation Interest

See Section 9 for a discussion of wildlife, vegetation, and habitat; including Species at Risk and Species of Conservation Interest.

8.2.3 Spatial Boundaries

The assessment of potential environmental interactions between the Project and wetlands is focused on the Project Development Area (PDA), and Local Assessment Area (LAA).

The PDA for the Project is defined as the area directly impacted by the Project footprint. This is limited to the expected area of physical disturbance associated with the construction, operation and maintenance phases of the Project.

The LAA for wetlands is defined as the area within which the environmental impacts of the Project on wetlands can be measured or predicted with a high degree of confidence. The LAA for this VC is defined as the PDA plus a 500 m buffer on either side of the Right of Way (RoW) centre line.

8.3 Existing Conditions for Wetlands

8.3.1 Methods

Strum (2020) conducted a background information review of mapped wetlands and potential wetland habitat using a variety of databases and resources as outlined in Appendix C.

In-field, wetland boundaries were walked and flagged with flagging tape between August 21 and September 15, 2020. Wetland boundaries, data points, and watercourse/drainage flow paths were recorded using a GPS receiver capable of sub 5 m accuracy. Soil pits, vegetation surveys, and assessments of hydrology were completed to confirm the presence/absence of wetland habitat following the methodology outlined in the *US Army Corp of Engineers Wetland Delineation Manual* (Environmental Laboratory 1987).

Areas were considered wetlands where the following three criteria were met:

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

8.3.2 Description of Existing Conditions

Wetland delineation by Strum Consulting identified 230 areas of wetland habitat totaling 49.5 ha within the L8006 and L8001 transmission line RoWs (Drawing A6-1 to A6-30, Appendix C; Strum 2020). In most cases, wetlands identified within the existing L8001 RoW consisted of shrub swamp and cattail marshes, indicative of wetlands formed or modified in anthropogenically altered environments (see Appendix C, Table E1). These wetlands were often dominated by herbaceous species such as broadleaf cattail (*Typha latifolia*), tawny cottongrass (*Eriophorum virginicum*), woolgrass (*Scirpus cyperinus*), cinnamon fern (*Osmundastrum cinnamomeum*), Canada goldenrod (*Solidago canadensis*), and tall white aster (*Doellingeria umbellata*). Dominant shrub species included white meadowsweet (*Spiraea alba*), speckled alder (*Alnus incana*), red maple (*Acer rubrum*), gray birch (*Betula populifolia*), and lambkill (*Kalmia angustifolia*).

Wetlands within the proposed L8006 RoW were primarily composed of treed swamps found commonly throughout the province. Characteristic vegetative species included a dense herbaceous cover of cinnamon fern, sensitive fern (*Onoclea sensibilis*), three-seeded sedge (*Carex trisperma*), bunchberry (*Cornus canadensis*) and starflower (*Lysimachia borealis*), with a layer of sphagnum moss covering the ground. Shrub species typically included regenerating tree species, mountain holly (*Ilex mucronata*), wild raisin (*Viburnum cassinoides*), and speckled alder. A dense tree canopy was typical, and included balsam fir (*Abies balsamea*), black spruce (*Picea mariana*), red maple, and yellow birch (*Betula alleghaniensis*). Detailed descriptions of wetlands can be found in Appendix C, Table E1.

Of the 49.5 ha of wetlands within the PDA, the most dominant wetland type was shrub swamp, which accounts for 47% of wetland area. Treed swamp is the next most common wetland type, making up 24% of wetland area within the PDA. Wetland complexes containing more than one wetland type make up 27% of wetland area within the PDA. Less common wetland types include marsh, fen, and bogs which together account for only 2% of wetland area within the PDA. Wetlands frequently consisted of a treed or shrub swamp in the L8006 RoW before transitioning to a shrub swamp or marsh in the L8001 RoW, likely due to disturbance in the existing transmission line corridor. Many of the wetlands consisted of shallow histosol substrate in basin or sloping landforms. Due to the dry conditions during delineation, common hydrologic indicators including a high-water table (< 30 cm), surface water, or surface saturation were not present in several wetlands.

Approximately 12.7% (49.5 ha) of the PDA was delineated as wetland habitat following fieldwork carried out by Strum. Comparatively, mapped wetlands only indicated that 7.4% (714.2 ha) of the LAA was wetlands, suggesting that mapped wetlands do not adequately account for the actual wetland area. Extrapolating the delineated wetland data out to cover the LAA, a more accurate estimate of total wetland area in the LAA is likely 1225.7 ha (12.7 % of the LAA). Recognizing the importance of wetlands as a landscape feature performing many biological, hydrological, social/cultural, and economic functions, Project design and planning has focused on avoiding wetlands to the extent feasible.

8.4 Effects Assessment

8.4.1 Assessment Criteria

8.4.1.1 Residual Effects Characterization

This section describes the criteria used to assess environmental effects on wetland habitats. Residual environmental effects are assessed and characterized using criteria defined in **Table 8.1**, including direction, magnitude, geographic extent, timing, frequency, duration, reversibility, and ecological or and socioeconomic context. The assessment also evaluates the significance of residual effects using threshold criteria or standards beyond which a residual environmental effect is considered significant. The definition of a significant effect is provided in Section 8.4.1.2 below. Section 8.4.2 identifies the environmental effects to be assessed for wetlands, including effect pathways and measurable parameters, as well as an identification of potential Project interactions.

Table 8.1 Characterization of Residual Effects on Wetlands

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to wetlands relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to wetlands relative to baseline
Magnitude	The amount of change in measurable parameters relative to existing conditions	**Negligible –** no measurable change from baseline conditions **Low –** a measurable change in wetlands but unlikely to affect sustainability of wetlands within the LAA, and no loss of wetland function **Moderate –** a measurable change affecting the sustainability of wetlands in the LAA. Loss of wetland function limited to the LAA **High –** a measurable change affecting the sustainability of wetlands beyond the LAA
Geographic Extent	The geographic area in which a residual effect occurs	**PDA** – residual effects are restricted to the PDA **LAA** – residual effects extend into the LAA
Duration	The period of time required until the measurable parameter or the wetland returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived	**Short term** – residual effect extends for less than 1 year **Medium term** – residual effect extends through the construction phase (12 years) **Long term** – residual effect extends through the operation phase **Permanent** – recovery to baseline conditions unlikely

Table 8.1 Characterization of Residual Effects on Wetlands

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant	**Not applicable** – effect does not occur during critical life stage or timing does not affect the wetland **Applicable** – effect occurs during a time when critical functions may be more impacted
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event** – the residual effect occurs once **Irregular event** – the residual effect occurs at no set schedule **Regular event** – the residual effect occurs at regular intervals **Continuous –** the residual effect occurs continuously
Reversibility	Describes whether a measurable parameter can return to its existing condition after the Project activity ceases	**Reversible** – the residual effect is likely to be reversed after activity completion and rehabilitation **Irreversible** – the residual effect is unlikely to be reversed
Ecological and Socioeconomic Context	Existing conditions and trends in the area where residual effects occur	**Undisturbed** – area is relatively undisturbed or not adversely affected by human activity **Disturbed** – area has been substantially previously disturbed by human development or human development is still present

NOTE:
[1] If alterations to a wetland (or wetland complex) are less than two hectares, a Wetland Alteration Approval under the *Environment Act, 1994-95* must be obtained. If alterations exceed two hectares, an Environmental Assessment application under the same act is required in addition to the Wetland Alteration Approval.

8.4.1.2 Significance Definition

A significant adverse residual effect on wetlands is defined as one that, following the application of avoidance and mitigation measures, results in an unauthorized net loss of wetland function after consideration of provincially required compensation for unavoidable wetland loss.

8.4.2 Potential Project Interactions with Wetlands

Activities and components of the Project could potentially interact with wetlands to result in adverse environmental effects. In consideration of these potential interactions, the assessment of Project-related environmental effects on wetlands is therefore focused on the potential environmental effects listed in **Table 8.2**. These potential environmental effects will be assessed in consideration of specific measurable parameters, also listed in **Table 8.2**.

Table 8.2 Potential Environmental Effects and Measurable Parameters for the Aquatic Environment

Potential Environmental Effect	Effect Pathways	Measurable Parameter
Change in wetland function	• Loss of wetland habitat through removal of features • Changes to vegetation communities, hydrology, surface water regimes, species composition, soil characteristics, etc. as a result of activities such as grubbing, rutting, and excavation.	• Measure of total area of wetland by type and comparison to baseline conditions • Water quality, including but not limited to total suspended solids (TSS) (mg/L); dissolved oxygen (DO) (mg/L); water temperature (°C); pH • Vegetation and wildlife species abundance • Vegetation community characterization

Table 8.3 identifies the physical activities that may interact with wetlands and result in an environmental effect. These interactions are discussed in detail in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 8.3 Potential Interactions Between Physical Activities and Wetlands

Physical Activities	Change in Wetland Function
Construction	
Site Preparation and Clearing	✓
Excavation and Structure Assembly	✓
Conductor Stringing	-
Expansion of Onslow Terminal	✓
Inspections and Energization	-
Clean-Up and Revegetation	✓
Employment and Expenditure	-
Operation and Maintenance	
Presence of Conductors and Towers	-
Inspections and Maintenance	-
Vegetation Management	✓
Notes: ✓ = Potential interaction – = No interaction	

Most potential effects to wetlands as a result of Project activities will occur during the construction phase (i.e., site preparation and clearing, excavation and structure assembly, expansion of terminals, and clean-up and revegetation), though ongoing vegetation management during the operation and maintenance phase could also affect wetlands. The remainder of Project activities are not expected to interact with wetlands. Many planned Project activities will be limited in their footprint to existing infrastructure or will occur on roads established during site preparation and clearing. These activities include conductor stringing, inspections and energization, and employment and expenditure during the construction phase and inspections during the operation and maintenance phase. The presence of conductors and towers is not expected to interact with wetlands post-construction.

8.4.3 Mitigation for Wetlands

Interactions between Project activities and wetlands will be managed in consideration of the environmental effects pathways. Mitigation measures will include standard, proven measures for sediment and erosion control and other procedures, outlined in the NSPI *Contractor Environmental Requirements* (NSPI 2023) which will be incorporated into the Project-specific EPP. Employees and contractors working on the Project will be trained on the EPP prior to commencing work. Clearing and construction activities will be carried out in accordance with applicable provincial and federal regulations and requirements and following the EPP for clearing and construction of the line.

Response procedures related to the temporary control of a release of deleterious substances are addressed in Section 17 Accidents and will be outlined in an Emergency Response Plan that will be part of the EPP, including spill prevention measures, erosion prevention and sediment control failure, hazardous material spills, and waste management.

Guidance on wetland mitigation and conservation will follow the *Nova Scotia Wetland Conservation Policy* (NSPI 2019). Wetland avoidance is the primary objective in wetland habitat conservation and is achieved through mitigation by design. A wetlands delineation survey by Strum Consulting (2020a) along the entire PDA was used as an input into the route design to minimize siting infrastructure within wetlands. The following general mitigation measures will be applied:

- To the extent feasible, access for the purpose of construction will use existing roads (public roads, resource roads, trails) and existing cleared transmission corridor. It is preferred that construction equipment and materials advance linearly along the cleared transmission corridor, minimizing the extent of disturbance. In situations where wetlands traverse the entire transmission corridor width, access will deviate around the wetland, where feasible, or temporary mitigation such as swamp mats, corduroy trails, or brush mats will be used to cross the wetland. Since the mats distribute the load weight over a much larger area, disturbance is expected to be temporary in nature and quickly rehabilitated to original conditions. Mats will be removed at the end of the construction. Consider using low ground-pressure equipment in sensitive areas when retrieving mats.
- Alteration as a result of excavating and backfilling tower foundations is expected to be permanent. Mitigation by design allows for the lengthening of distance between towers and positioning towers laterally to avoid wetlands.

- Natural vegetated buffers or engineered sedimentation controls will be used if construction activities are required within 30 m of a wetland.
- Final structure locations and access routing will consider the locations of known high concentrations of waterfowl and SAR, to the extent feasible.
- Hydrologic function of the wetlands will be maintained.
- Runoff from construction activities and access routes will be directed away from wetlands.
- Where wetlands cannot be avoided, crossings will be restricted to a single location and ideally at a narrow section of the wetland.
- Wetland crossings will be located in areas which exhibit a stable soil type and where grades approaching the crossings are not too steep.
- Any wetland alterations that cannot be avoided by route design, access routing, and mitigations will be assessed through functional assessments using the Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC) method. NSPI will apply for wetland offsetting through the NSECC permitting process and offsetting measures will be put in place where applicable.
- Where possible, refueling in the field will not occur within 30 m of wetlands and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors (e.g., absorbent pads located below nozzles and spill response kits fully stocked and located at the refueling location).
- Temporary storage of waste materials on-site will be located at least 30 m from wetlands and water supply areas (including known groundwater wells).
- Herbicide applications, if required for vegetation management, will be used in accordance with government regulations and permit requirements. Application will not occur within 30 m of a wetland.
- Changes to the Project PDA in undeveloped locations are to be subject to wetland (or rare species) survey.

8.4.4 Characterization for Residual Project Environmental Interactions with Wetlands

8.4.4.1 Residual Effects on Wetlands During Construction

Following the implementation of mitigation measures described above, residual effects relating to change in wetland function during the construction phase are summarized in **Table 8.3** and characterized by the following:

- Direction is adverse: there is potential for a direct loss and alteration of wetland area. Vegetation clearing and other construction activities will be avoided where feasible in wetlands; however, impacts are possible both within infrastructure footprints and the RoW.
- Magnitude is moderate: While a measurable change in wetland function is likely within the PDA, it is considered unlikely to affect sustainability of wetlands within the LAA. Treed wetlands along the RoW will undergo conversion to different wetland types such as tall shrub swamps, which will result in a change to some wetland functions but is unlikely to result in complete functional loss.
- Geographic Extent is the LAA: Direct residual effects (i.e., removal) of wetlands are not expected to occur beyond the PDA. However, construction could potentially alter wetland function in the LAA due to hydrological and hydrogeological impacts from alteration to local catchment areas, surface and ground water characteristics, and through the cumulative impacts of vegetation disturbance in

the RoW, however; these effects are expected to be limited by targeted mitigation as described above.
- Duration is both medium-term and permanent: wetland loss and alteration is anticipated to be permanent within infrastructure footprints and temporary in construction areas throughout the RoW.
- Timing is not applicable: Construction timing is not anticipated to affect the residual effects to wetlands.
- Frequency is single event: construction of towers in wetlands is anticipated to be a one-time event.
- Change is both irreversible and reversible: lost wetlands are not expected to return to their initial state within infrastructure footprints but may be restored in temporary construction areas.
- Ecological and socioeconomic context is disturbed: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.
- Wetland alterations that cannot be avoided by route design, access routing, and mitigations will be assessed through functional assessments using the WESP-AC method. NSPI will apply for wetland offsetting through the NSECC permitting process where applicable. The goal of this process is "no net loss" of wetland function on a provincial scale. An Access Plan will be developed for the Project, including specific actions and planning for the crossing of wetlands.

8.4.4.2 Residual Effects on Wetlands During Operations and Maintenance

Following the implementation of mitigation measures described above, residual effects relating to change in wetland function during the operation and maintenance phase are summarized in **Table 8.3** and characterized by the following:

- Direction is adverse: There is limited potential for loss or alteration of wetlands once construction is completed, however effects would be anticipated to be adverse in nature.
- Magnitude is negligible: a measurable change in wetlands is not expected.
- Geographic Extent is the PDA: residual effects are not expected to occur beyond the PDA once construction is complete.
- Duration is permanent: wetland loss is anticipated to be permanent in infrastructure footprints.
- Timing is not applicable.
- Frequency is regular event: indirect effects would result from vegetation management, which is anticipated at regular intervals.
- Change is irreversible: lost wetlands are not expected to return to their initial state, especially in tower footprints. No change in overall wetland function is expected during operation.
- Ecological and socioeconomic context is disturbed: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.
- Project activities expected to affect wetlands during operation and maintenance of the Project are limited to vegetation management in the RoW. Much of the change is expected to occur during the construction phase, as outlined above, and thus the resulting residual effects expected during the operation and maintenance phase of the Project are negligible. Herbicide application, where required, will follow appropriate set back distances from water features, and will be applied in a manner consistent with the EPP, permits issued by regulators, and provincial law.

8.4.5 Summary

A summary of the residual environmental effects, following the application of mitigation measures described in Section 8.4.4, is provided in **Table 8.4**.

Table 8.4 Project Residual Effects on Wetlands

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in Wetland Function	C	A	M	LAA	MT/P	N/A	S	I/R	D
	O	A	N	PDA	P	N/A	R	I	D

KEY
See Table 8.1 for detailed definitions

Project Phase
C: Construction
O: Operation and maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project development area
LAA: Local assessment area

Duration:
ST: Short term
MT: Medium term
LT: Long term
P: Permanent

Timing:
N/A: Not Applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological / Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

8.5 Determination of Significance

With the implementation of mitigation and environmental protection measures as described in this assessment, as well as the compensation for loss of wetlands, it is anticipated that the residual adverse environmental effects of the Project on wetlands will be not significant. Following mitigation and compensation, the Project is not expected to result in significant loss or change to wetland function. While treed wetlands along the RoW will undergo conversion to different wetland types such as tall shrub swamps, which will result in a change to some wetland functions, it is unlikely to result in complete functional loss. In conclusion, the residual environmental effects of the Project on wetlands during all phases of the Project are rated not significant.

8.6 Follow-up and Monitoring

NSPI is required to apply for a wetland alteration permit from NSECC where avoidance is not possible. It is anticipated the permit terms and conditions will be included in the Project EPP and related activities will be monitored for compliance. Wetland offsetting projects will be funded as part of this wetland alteration permit.

8.7 References

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Vicksburg, MS: US Army Corps of Engineers.

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9 Assessment of Environmental Effects on Wildlife, Vegetation and Habitat

9.1 Rationale for Selection as a Valued Component

The Wildlife, Vegetation, and Habitat VC includes wildlife species that live at least part of their life cycle in Nova Scotia, and the vegetation and habitat types that make up the PDA and LAA.

Wildlife, vegetation, and habitat were included as a VC due to their environmental, cultural, and social importance, and for the potential for the Project to interact with wildlife, vegetation, and habitat in the PDA and LAA. Wildlife, vegetation, and habitat are important components of the environment as they provide ecological, aesthetic, recreational, economic, and cultural value to stakeholders, the public, Indigenous communities, local businesses, and government agencies and contribute to biodiversity. This VC focuses on terrestrial wildlife, including birds, mammals, and herptiles, terrestrial vegetation, and terrestrial habitats. Wetland vegetation and habitats are addressed in Section 8. Aquatic wildlife, vegetation, and habitats are addressed in Section 11.

Information contained in this section relies substantially on desktop reviews, in-field surveys and reporting conducted by Strum Consulting from 2020 and 2023. Original reports are included as Appendices G, C, H, I, and J. (Strum 2020a; 2020b; 2021; 2022; 2023).

9.2 Scope of Assessment for Wildlife, Vegetation and Habitat

9.2.1 Regulatory Context

9.2.1.1 Federal

Migratory Birds Convention Act

The *Migratory Birds Convention Act* (MBCA) provides protection for migratory birds on federal, provincial, and private lands. Most migratory species that are native or naturally occurring in Canada are protected; species and species groups are further defined in Section 2 of the Act. These protections include a prohibition on depositing harmful substances in areas frequented by migratory birds, and a prohibition on disturbing, destroying, taking, or possessing migratory birds, their nests, and eggs.

Recent changes to the MBCA have updated and clarified the long-standing Migratory Bird Regulations with regards to the protections afforded to the nests of migratory bird species. The new regulations, known as the *Migratory Bird Regulations, 2022*, establish a list of species (Schedule 1) that continue to have year-round protection for their nests, unless the nests are determined to be abandoned. It also establishes the protocol and waiting period for determining a Schedule 1 species' nest to be abandoned. All species protected under the MBCA continue to have their nests protected when they contain a live bird or a viable egg, but the protection does not continue outside the nesting period except for the species for which the waiting period applies.

Species at Risk Act

The federal SARA provides protection for SAR in Canada that are listed on Schedule 1 of SARA (Government of Canada 2023). The legislation provides a framework to facilitate recovery of species listed as Threatened, Endangered, or Extirpated and to prevent species listed as Special Concern from becoming Threatened or Endangered. SARA provides protection for both SAR and their critical habitat or residences by prohibiting: 1) the killing, harming, or harassing of Endangered or Threatened SAR (sections 32 and 36); 2) the destruction of critical habitat of an Endangered or Threatened SAR (sections 58, 60, and 61); and 3) damage or destruction of residence of SAR (section 33 of SARA). On private land, these prohibitions apply only to listed aquatic species and listed migratory birds that are also listed in the *Migratory Birds Convention Act, 1994*. In some circumstances the prohibitions could also be applied, through an order, to other species listed as endangered, threatened, or extirpated in Schedule 1 of SARA when found on private land if provincial / territorial legislation or voluntary measures do not adequately protect the species and its residence. Public consultation would first be sought in accordance with normal federal government regulatory procedure (Government of Canada n.d.).

On private land, SARA requires that the critical habitat of aquatic species be protected within six months after it has been identified in a finalized SARA recovery strategy or action plan. SARA contains a prohibition against destroying any part of critical habitat, but also provides other options for protection. Critical habitat of these species must be protected by one of the following methods: the application of the SARA prohibition by ministerial order; other legal means under SARA such as a conservation agreement; or by other federal legislation (Government of Canada n.d.).

Residence descriptions, where defined, may afford additional protections to migratory birds that are not afforded under the *Migratory Bird Regulations*.

9.2.1.2 Provincial

Nova Scotia Wildlife Act

The Nova Scotia *Wildlife Act* is an act to provide for the protection, management and conservation of wildlife and wildlife habitat. The *Wildlife Act* defines wildlife as vertebrates that, in their natural habitat, are usually wild by nature and includes (i) domestic organisms that are physically similar to their wild counterparts, (ii) exotic wildlife, (iii) hybrid descendants of wildlife or of wildlife and a domestic organism, (iv) the eggs, sperm or embryos of wildlife, and (v) any other organism designated as wildlife by the Governor in Council in accordance with this Act and the regulations.

Nova Scotia Endangered Species Act

The Nova Scotia *Endangered Species Act* (NS ESA) provides protection, designation, recovery, and conservation for species at risk and their habitats to prevent extirpation or extinction because of human activity. The NS ESA defines species as a plant, animal, or other organism, and includes one or more populations of a species, and the eggs, larvae or other forms of developmental life of a species and any part of an individual of a species but does not include a domesticated species.

Nova Scotia Wilderness Areas Protection Act

The Nova Scotia *Wilderness Areas Protection Act* (WAPA) allows for the establishment, management, protection, and use of wilderness areas in Nova Scotia. The goals of the WAPA include maintaining and restoring natural processes and biodiversity, protecting landscapes and ecosystems, and protecting unique, valuable, and rare natural features and phenomena.

9.2.1.3 Species of Conservation Interest

For the purposes of this EA registration, Species of Conservation Interest (SOCI) refers to both Species at Risk (SAR) and Species of Conservation Concern (SOCC). SAR include those listed as Extirpated, Endangered, Threatened, or Special Concern by the federal SARA, NS ESA, or by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC assesses and designates the status of species and recommends this designation for legal protection under SARA.

SOCC are those species that do not meet the above definition of SAR, but are considered rare in Nova Scotia, or the long-term sustainability of their populations has been evaluated as tenuous. SOCC are defined here as non-SAR species ranked S1 (Critically Imperiled), S2 (Imperiled), or S3 (Vulnerable) in Nova Scotia by the Atlantic Canada Conservation Data Centre (AC CDC; AC CDC 2023) with the potential to occur in the LAA. SOCC are included as SOCI in this VC as a precautionary measure, reflecting observations and trends in their provincial population status, and are often important indicators of ecosystem health and regional biodiversity.

9.2.2 Spatial Boundaries

The assessment of potential environmental interactions between the Project and the wildlife, vegetation, and habitat is focused on a PDA and a LAA.

The PDA for the Project is defined as the area directly impacted by the Project footprint. This is limited to the expected area of physical disturbance associated with the construction and operation and maintenance phases of the Project.

The LAA for this VC is the extended area that Project related disturbances can impact wildlife, vegetation, and habitat and be measured or predicted with a reasonable degree of accuracy and confidence. The LAA is largely dictated by noise penetrating wildlife habitats and is defined as a 500 m buffer on either side of the PDA. This buffer includes the existing RoW for L8001. Noise disruption has been shown to be greatest near construction and diminishes as distance increases. (e.g., Benitez-Lopez et al. 2010, Shannon et al. 2016). Similarly, edge effects are thought to extend up to 300 m in forested landscapes for some species but are typically most pronounced closer to the edge (e.g., Batáry and Báldi 2004).

9.3 Existing Conditions for Wildlife, Vegetation and Habitat

9.3.1 Methods

Existing conditions for wildlife, vegetation, and habitat were identified through a combination of desktop review and field surveys to better understand the occurrence and distribution of wildlife, vegetation, and habitat types within the PDA and LAA, including for SOCI. This section provides a brief overview of the methods used to collect baseline data.

9.3.1.1 Desktop Review

Background information was obtained from several sources, including federal, provincial, and not-for-profit publications, reports, and data sources. As presented in Strum 2020a; 2020b; 2021; 2022; 2023, below is an overview of key resources used during the background review to assist in establishing the existing conditions for wildlife in the PDA and LAA.

- Topographic mapping and orthographic aerial imagery were used to help identify habitat and provide an overall indication of site topography.
- Important Bird Areas (IBA) Canada and eBird databases contain information about important bird habitats and historical bird sightings.
- Nova Scotia Resources and Renewables (NSNRR) wetland inventory (NSNRR 2018a).
- NSNRR Significant Species and Habitats Database (NSNRR 2018b).
- SARA Public Registry is a database containing the status of species assessed and listed under the SARA and by COSEWIC, and associated documentation including assessment and status reports, recovery strategies, and management strategies (Government of Canada 2023).
- NS *Endangered Species Act* contains a current list of the status of species assessed by the province and listed under NS ESA (Government of Nova Scotia 2023).
- NSNRR Moose Observation Database (NSNRR 2018b).
- Nova Scotia Department of Lands and Forests Forestry Inventory Mapping (NSDLF 2020)
- NSNRR Wetland Inventory Database (NSNRR 2018c)
- The AC CDC maintains a database for biodiversity in Atlantic Canada, including SOCI observation data (AC CDC 2023).

9.3.1.2 Field Studies

Field studies were undertaken to help establish the existing conditions within the LAA. Incidental detections of wildlife and wildlife signs were recorded during field studies (Strum 2020a; 2020b; 2021; 2022; 2023). Field studies undertaken are outlined in the subsections below.

Avian

Two types of avian surveys were conducted. Detailed methodologies and figures can be found in the Strum Avian Assessment Report (Strum 2020a; Appendix G). The following is a high-level summary of the methodologies used.

Habitat Use Surveys

Two sections of the Project were identified as being high priority for birds and bird habitat due to their proximity to important bird habitat features. The first area is an 8 km section beginning at the New Brunswick border and ending just north of Amherst, NS (the Amherst Section). The second is a 5 km section beginning near Crows Mills Road (Belmont, NS) and ending at the Onslow Substation in Upper Onslow, NS (the Onslow Section). Mapping is available in Appendix G (Strum 2020a).

Habitat use surveys were completed during the breeding season. Surveys for the Amherst Section were completed on June 23, June 24, July 16, and July 17, 2020, and for the Onslow Section on June 19 and July 13, 2020 (Strum 2020a). All surveys were completed within four hours of sunrise when bird activity is highest. Biologists walked transects varying between 300 m and 600 m in length and recorded visual and auditory observations. Breeding bird evidence was also recorded.

Migration Infrastructure Interaction Surveys

Infrastructure interaction surveys were completed at both the Amherst and Onslow sections during the spring and fall migration seasons of 2020 (Strum 2020a). Surveys were conducted from vantage points where large sections of the proposed transmission line were visible and where large-scale bird movements were likely to occur. Surveys consisted of morning (fewer than four hours post-sunrise) and evening watches (fewer than four hours pre-dusk). Data were collected regarding the location, species and number of individuals, flight direction and height, interaction with existing powerlines, and environmental conditions. Surveys were completed on the following dates for both sites (unless noted):

- Spring Migration: May 7 (evening), May 8 (morning), May 20 (evening), May 21 (morning), June 4 (morning; Onslow Section only), June 5 (morning and evening; Amherst Section only), and June 6 (evening; Onslow Section only).
- Fall Migration: August 23 (evening), August 24 (morning), September 10 (evening), September 11 (morning), September 24 (evening), September 25 (morning), October 6 (evening), October 7 (morning), October 21 (evening), and October 22 (morning).

Flora

Field surveys for rare plants were completed concurrently with wetland delineation between August 21 and September 15, 2020 (Strum 2020b, Appendix C; see Section 8 for further information about wetlands), and again between July 8 and July 23, 2021 (Strum 2021, Appendix H). The study area (PDA and the existing cleared RoW for Transmission Line L8001) was walked in a random meander technique where terrain allowed, with focus on unique and rare habitat which may be more likely to support rare species. The location of identified rare plants were recorded using ArcGIS application Survey123 and a GPS receiver with an accuracy of sub 5 m. Species identification was completed with the aid of Roland's Flora of Nova Scotia (Roland and Zinck 1998), with additional resources, consulted if necessary.

Old Growth Forest

Forest stands identified during the desktop review as being high-potential for old-growth forest were assessed for old-growth conditions within 100 m of the proposed RoW (Strum 2023; Appendix J). At each stand, Strum biologists performed rapid assessments (Strum 2023) for old-growth conditions. When the rapid assessments were deemed inconclusive or indicated potential for old-growth, Part 1 of the old-growth scoring procedure, as defined by NSNRR (2022), was employed. At each plot, a tree core was retrieved and analyzed with a microscope to determine average stand age.

Mainland Moose

Strum (2022) reviewed the mainland moose observation dataset (NSNRR 2018 in Strum 2022), which shows higher concentrations of observations in the Northwestern portion of the study area near the Amherst Marsh, between Highway 366 and the New Brunswick border. This area is part of the Chignecto Isthmus, which connects Nova Scotia to New Brunswick. The area has been a focus of conservation efforts, with the goal of establishing a corridor for Nova Scotia's mainland moose population to move freely across the Isthmus into New Brunswick, and vice versa. This area is also of conservation interest due to the high concentration of wetlands and other surface water features that may provide mainland moose with adequate summer browse (aquatic vegetation is a primary part of the diet during the summer months) and thermal refuge from the heat. The extent to which these features provide overwintering habitat for mainland moose in the area is unknown, but the abundant water features could be a source of surface water for moose during the winter. A similarly high concentration of mainland moose observations has been recorded in the area of Higgins Mountain, adjacent to Folly Lake. Strum has also made several direct observations of mainland moose and recorded moose sign on Higgins Mountain during fieldwork for another project in July and August of 2020 (Strum 2022). This area, particularly the Dicks Meadow wetland complex, appears to be an important habitat feature for mainland moose during the summer. Aside from these two concentration areas, observations of mainland moose have been made near the study area along the entirety of the RoW in low concentrations (NSNRR 2018 in Strum 2022).

Southwest of Highway 366, towards the Onslow terminus of the Project, the PDA crosses several dozen watercourse and river valleys that may attract mainland moose seasonally, either as a source of liquid water in winter, or for foraging on shrub growth during spring and summer. Areas of open marsh and surface waterbodies that would be suitable for thermal refuge during the summer are scant along the RoW, with the exception of the Amherst Marsh area (Strum 2022).

No habitat features specific to mainland moose, such as moose wintering areas, were identified within or near the Study Area (Strum 2022).

A mainland moose (moose) assessment (Strum 2022; Appendix I) was completed to collect information on the distribution and habitat use of moose within 1 km of the RoW (the Moose Study Area) to inform mitigation and management for these animals throughout Project development. A combination of winter snow tracking surveys and spring pellet group inventory survey transects within a 1 km buffer of the Project were completed to determine the proximity of moose to the Project site, potential areas of high usage, and areas to avoid when siting equipment or planning access trails. This 1 km buffer is in accordance with recent guidance released by NSDNRR (NSDNRR 2021).

Snow Tracking Surveys

Snow tracking surveys included a total of 20 transects ranging in length from 1,005 m to 7,000 m and totaling 30.1 km (Appendix I). Transects were distributed within the Moose Study Area along the RoW and were dispersed to represent the habitat diversity present along the RoW. Transects were selected to assess specific habitat features, usually near a location where moose had been previously observed (NSDRR 2018b). Efforts were made to include sections of the existing L8001 transmission line corridor in the transect routes to assess if moose move along it.

Snow tracking transects were surveyed by a team of biologists and were completed in February and March 2022 within four days of a snowfall of 10 cm or more, provided no periods of high wind or rainfall occurred between the snowfall event and the survey. Two metres on either side of each transect were surveyed by biologists walking on foot and using a handheld GPS to navigate along the transect. Observations of animal signs, including tracks, pellets/scat, rubs, and direct observations were recorded and georeferenced. When suspected moose activity was observed, detailed notes and photos were recorded. Notes relating to habitat, weather, and animal activity were also recorded.

Spring Pellet Group Inventory

Pellet group inventory surveys consisted of 13 transects ranging in length from 1,000 m to 1,669 m, totaling 16 km. Transects were distributed within the Moose Study Area along the RoW, and were dispersed to represent the habitat diversity present along the RoW. Transects were selected to assess specific habitat features, usually near a location where moose were observed previously. Efforts were made to include sections of the existing L8001 transmission line corridor in the transect routes (Strum 2022).

Pellet group transects were surveyed by a team of biologists in April 2022, after snow had melted in the Moose Study Area, and before green up. Two metres on either side of each transect were surveyed by biologists walking on foot and using a handheld GPS to navigate along the transect. Observations of animal signs, including tracks, pellets/scat, rubs, and direct observations were recorded and georeferenced. Additional notes relating to habitat, weather, and animal activity were recorded.

Incidental Observations and Other Wildlife

Incidental observations, including SOCI, were noted concurrently with all field studies. Observations included direct sightings as well as indirect evidence such as pellets, tracks, and other signs. The location, type, species, and date of observation were recorded.

9.3.2 Desktop Results

9.3.2.1 Habitat and Protected Area

Habitat Types

Terrestrial habitat in the PDA appears to be largely forested with softwood, hardwood, and mixed-wood forests covering approximately 67% combined. The remaining habitat is a combination of agricultural lands, industrial and urban developments, clearcuts, and wetlands (**Table 9.1**; adapted from Strum 2020b. Habitat in the PDA is likely somewhat degraded by the adjacent, previously existing, infrastructure including transmission lines, roads, and substations. The LAA appears to be similar in composition to the PDA and contains approximately 50 m of highly disturbed land along the length of the PDA. Land disturbance is due to previous vegetation clearing and the presence of the existing transmission line (L8001) infrastructure.

Table 9.1 Habitat Types Found in the PDA

Habitat Type	LAA (ha)	LAA (%)	PDA (ha)	PDA (%)
Anthropogenic	**614.35**	**6.40**	**21.48**	**5.51**
Agriculture	436.80	4.55	18.22	4.67
Urban/Non-vegetated	177.55	1.85	3.26	0.84
Forests and Upland	**8255.10**	**85.97**	**310.24**	**79.52**
Hardwood Establishment	32.73	0.34	1.55	0.40
Young-immature Hardwood	164.31	1.71	4.62	1.18
Mature-overmature Hardwood	573.58	5.97	24.92	6.39
Mixedwood Establishment	615.60	6.41	32.82	8.41
Young-immature Mixedwood	484.44	5.04	13.22	3.39
Mature-overmature Mixedwood	1404.36	14.62	44.49	11.41
Softwood Establishment	1741.41	18.13	52.94	13.57
Young-immature Softwood	821.80	8.56	32.58	8.35
Unknown Forest - Regeneration	398.76	4.15	21.94	5.62
Unknown Forest	125.12	1.30	5.88	1.51
Vegetated - Other	309.92	3.23	13.43	3.44
Vegetated - Utility Corridor	357.25	3.72	27.20	6.97
Non-Forest miscellaneous	2.78	0.03	0.00	0.00
Wetlands	**733.18**	**7.64**	**58.42**	**14.97**
Mapped Wetlands	573.96[1]	5.98	7.96[2]	2.04
Delineated Wetlands	140.24	1.46	49.51	12.69
Waterbody	18.98	0.20	0.95	0.24
Total	**9602.63**	**100.00**	**390.13**	**100.00**

Notes:
[1]Data collected from a combination of NSDNR Forestry Mapping and NSE Wetland Inventory
[2]Mapped wetland determined to be upland habitat during delineations. Included in Wetlands for this table, but not included in future wetland area calculations. Mapped wetlands determined to be wetland are included in the Delineated Wetlands layer.

Protected Areas

The desktop review also identified several protected and ecologically sensitive areas within 5 km of the PDA. The following areas were identified and considered with regard to impacts of the Project.

Chignecto Isthmus Wilderness Area

The Chignecto Isthmus Wilderness Area (CIWA) is approximately 3,750 ha, located where Nova Scotia meets New Brunswick. The CIWA sits on the Chignecto Isthmus which forms an important land bridge between the two provinces and consists largely of a fen-bog complex. The CIWA is home to a variety of plants and animals, including SOCI. First protected in 2008, the protected land nearly quadrupled with expansion in 2017. The Project would pass through the CIWA for approximately 2.6 km, twinning the existing NSPI RoW through the CIWA. The original L8001 and the easement for the proposed L8006 were established before the expansion of the wilderness area.

Wentworth Valley Wilderness Area

The Wentworth Valley Wilderness Area (WVWA) is approximately 2,019 ha, located in the Cobequid Mountains at the Wentworth Valley. The WVWA is mainly forested and contains the highest point in mainland Nova Scotia (unnamed peak). The WVWA provides quality habitat for mainland moose and forms part of the headwaters for the Wallace River, which supports an Atlantic salmon run. The Project would pass more than 3.5 km west of the WVWA and will not interact directly with the WVWA.

Chase Lake Wilderness Area

The Chase Lake Wilderness Area (CLWA) covers 873 ha of old forest near Chase Lake, west of Oxford. The CLWA is home to a large nesting colony of Great Blue Herons. The Project will pass more than 3 km east of the CLWA and should not impact the CLWA.

Steepbank Brook Nature Reserve

The Steepbank Brook Nature Reserve (SteBNR) is a small nature reserve covering 202 ha of forest next to Steepbank Brook. The forest is low lying and poorly drained, and the SteBNR contains eastern white cedar (*Thuja occidentalis)*, a SOCI. SteBNR is located approximately 4.5 km southwest of the Project and should not be impacted.

Staples Brook Nature Reserve

The Staples Brook Nature Reserve (StaBNR) is a proposed nature reserve that is protected under an interim order while cabinet approval is secured. It covers 1,066 ha near Debert and is approximately 700 m east of the Project. While this falls outside the LAA, and thus impacts are not expected, this area falls within the 1,000 m area of interest for moose and is further considered in that context.

Ecologically Sensitive Areas

Several ecologically sensitive areas were identified within 5 km of the Project (NSNRR 2018b). An overview of these areas is provided below.

Three areas classified as 'Deer Wintering

Three areas known to be used for over-wintering habitat for white-tailed deer (*Odocoileus virginianus*) were identified near the Project. The areas are located near Atkinson (CU287), Greenville Station (CU274), and East Folly Mountain (CO176). The Project is planned to pass through CO176, and CU274, and will pass approximately 4 km to the east of CU287. These areas are used by deer for shelter during the winter months when there is significant snow cover.

Two areas that are classified as 'Migratory Bird'

Two unclassified areas of waterfowl habitat near the East Amherst and Missaguash marshes were identified as sensitive habitat for Migratory Birds. These areas (CU27; CU28) represent part of the low-lying wetland complex on the Chignecto Isthmus. These wetlands will be impacted directly by the Project and are addressed in Section 9.

Eight areas classified as 'Other Habitat'

Eight areas identified as 'other habitat' are related to locations of Bald Eagle (*Haliaeetus leucocephalus*) and identified as talus habitat near NW Folly Lake and Smith Brook-Wentworth Valley, and the River Philip estuary. There are two known Bald Eagle nests on the existing transmission line L8001.

Four Areas Classified as 'Species at Risk':

Four areas were identified as sensitive habitat for wood turtle (*Glyptemys insculpta*). Standard watercourse mitigation will be in place to limit possible interaction with wood turtle. Turtle awareness training is done by NSPI for contractors likely to work within wood turtle buffers, and consultants are hired to conduct wood turtle surveys in areas where construction may be carried out inside these buffer zones. More information concerning this is available in Section 11.

Three Areas Classified as 'Species of Concern'

Related to karst topography in the Black Lake area and the delicate lamp mussel (*Lampsilis ochracea)*. More discussion of these areas and the impact of the Project can be found in Section 11.

9.3.2.2 Species of Conservation Interest

Records indicate the LAA has potential to support 22 federally (SARA) and provincially (NS ESA) listed SAR (two invertebrates, two herpetofauna, one mammal, 14 birds, two vascular plants and one non-vascular plant) and an additional 156 SOCI (21 invertebrates, one herpetofauna, 55 birds, 75 vascular plants and four non-vascular plants; (Strum 2020b; Table 1, Appendix C). SOCI listed include species historically observed within 5 km of the Project (Strum 2020b). However, given the already disturbed state of the LAA and the proximity of the Project to existing infrastructure, not all SOCI are expected to interact with the Project. Species further discussed are limited to SAR observed during field studies, or those not targeted in field studies but with a high likelihood of interaction with the Project given the habitat types in the LAA. These species are discussed in greater detail in Section 9.3.3.

9.3.3 Field Studies Results

9.3.3.1 Avian

The following sections contain a high-level summary of the data presented in Appendix G (Strum 2020a). The detailed results of the Avian Field Program, including species counts and information about locations of observations, are presented in Appendix G (Strum 2020a).

Habitat Use Surveys

Amherst Section

A total of 1,247 individuals of 47 bird species were detected during the habitat use surveys in the Amherst Section. Of these, the following six SOCI were observed: American Kestrel, Boreal Chickadee, Eastern Wood-Pewee, Canada Jay, and Olive-sided Flycatcher. Eastern Wood-Pewee and Olive-sided Flycatcher are SAR and are described further in Section 9.3.3.

Onslow Section

A total of 573 individuals of 41 bird species were detected during the habitat use surveys in the Onslow Section. Of these, the following six SOCI were observed: American Kestrel, Eastern Wood-Pewee, Olive-sided Flycatcher, Red-breasted Nuthatch, Ruby-crowned Kinglet, and Swainson's Thrush. Eastern Wood-Pewee and Olive-sided Flycatcher are SAR and are described in Section 9.3.3.

Migration Infrastructure Interaction Surveys

Amherst Section

Within the Amherst Section, a total of 85 individuals of 13 bird species (unidentified ducks were grouped into one species for the purpose of this count; 'duck spp.') were detected during the spring migration surveys, and a total of 1,139 individuals of 21 species (including 'duck spp.') were observed during the fall migration studies. No SOCI were observed during these surveys.

Onslow Section

Within the Onslow Section, a total of 37 individuals of 10 bird species (including 'duck spp.') were detected during the spring migration surveys, and a total of 431 individuals of 9 species were observed during the fall migration studies. No SOCI were observed during these surveys.

9.3.3.2 Flora

Plant and Lichen SOCI

The following is a high-level summary of the flora observed, and a categorization of the vegetative communities in the PDA. Detailed reports on flora, including maps and observation locations, can be found in Appendix H (Strum 2021).

Four plant SOCI were observed during the 2020 field program and seven additional SOCI were observed during the 2021 field program. **Table 9.2** summarizes the plant SOCI observed in the field. The species identified were located throughout the RoW, with many located closer to disturbed areas along the existing L8001 RoW and along wetland margins. Of these species, three are lichens and eight were vascular plants. The most observed SOCI was blood milkwort (S3). Acadian jellyskin lichen were ranked S3S4 when fieldwork was completed, and thus were classified by Strum (2020b; 2021) as SOCI. Acadian jellyskin lichen has subsequently been reclassified as S4 (ACCDC 2023) and thus no longer meets the definition of SOCI. Records appear in Appendix H (Strum 2021) but are not further considered in this section.

Three vegetation species observed are SAR and are discussed further in section 9.3.3. These include eastern white cedar, frosted glass whiskers (*Sclerophora peronella*), and eastern waterfan (*Peltigera hydrothyria*). In total, 14 rare vascular plant and lichen species were observed in the field at 39 locations.

Table 9.2 Plant SOCI Observed During the Field Program

Scientific Name	Common Name	COSEWIC	SARA	NS ESA	S-Rank	Survey Year
Agalinis neascotia	Nova Scotia Agalinis				S3S4	2020
Agalinis purpurea	Purple False Foxglove				S3	2021
Eriophorum gracile	Slender cottongrass				S3	2020
Peltigera hydrothyria	Eastern Waterfan	TH	TH	TH	S1	2021
Plantago rugelii	Rugel's Plantain				S3	2021
Platanthera grandifolia	Large Purple Fringed Orchid				S3	2020, 2021
Platanthera macrophylla	Large Round-leaved Orchid				S2	2021
Polygala sanguinea	Blood Milkwort				S3	2021
Sclerophora peronella	Frosted Glass Whiskers	SC	SC		S3S4	2020
Stereocaulon spp.	Foam Lichen				S3	2021
Thuja occidentalis	Eastern White Cedar			VU	S2S3	2021

Notes:
Species classified under SARA, NS ESA, or COSEWIC have the following rankings:
Endangered = EN
Threatened = TH
Vulnerable = VU
Special Concern = SC
Not at Risk = NAR
Species ranked as Critically Imperiled (S1), Imperiled (S2), or Vulnerable (S3) by the Atlantic Canada Conservation Data Centre (AC CDC 2023) and recorded within 5 km of the Project by desktop data source, where:
S1: Critically Imperiled – Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences). May be especially vulnerable to extirpation.
S2: Imperiled – Imperiled in the province because of rarity due to very restricted range, very few populations (6 to 20 occurrences or few remaining individuals). May be vulnerable to extirpation due to rarity or other factors.
S3: Vulnerable – Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer).
S4: Apparently Secure – Uncommon but not rare; some cause for long-term concern due to declines or other factors (80+ occurrences).
S5: Secure – Common, widespread, and abundant in the province.
S#S#: A numeric range rank (*e.g.*, S2S3) is used to indicate any range of uncertainty about the status of the species or community.
SH: Possibly Extirpated (Historical) – Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20-40-year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
SU: Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
B: Breeding – Conservation status refers to the breeding population of the species in the province.
N: Nonbreeding – Conservation status refers to the non-breeding population of the species in the province.
M: Migrant – Migrant species occurring regularly on migration at particular staging areas or concentration spots where the species might warrant conservation attention. Conservation status refers to the aggregating transient population of the species in the province.

Old Growth Forest

No stands meeting the criteria of old-growth forest were identified during the field program. Two stands with old growth potential were found to be almost entirely harvested, and additional stands have experienced significant blowdown. Stands with old growth potential that were investigated contained the appropriate vegetation for an old growth classification but have not yet reached the age required to be considered old growth. Detailed result of the assessments and Old Growth Report can be found in Appendix J (Strum 2023).

9.3.3.3 Mainland Moose

The following is a high-level summary of the mainland moose field program. Detailed results can be found in Appendix I (Strum 2022).

Snow Tracking Surveys

Three observations of potential moose browse were observed. In all cases the browse was observed on young regenerating saplings and was not noted to be recent.

Spring Pellet Group Inventory

No observations of moose or moose pellets were observed during the spring pellet group inventory surveys.

9.3.3.4 Incidental Observations and Other Wildlife

Incidental observations of wildlife are included in the appropriate data section above. No new SOCI were observed incidentally.

9.3.4 Species at Risk

Six SAR (three vegetation and three wildlife species) were identified during the field studies. The following provides information on each species. Locations of flora can be found in Appendix H (Strum 2021), and locations of avian SAR can be found in Appendix G (Strum 2020a).

9.3.4.1 Frosted Glass Whiskers

Frosted glass whiskers is listed as Special Concern under the federal SARA and is not listed under the provincial NS ESA. Frosted glass whiskers is a small arboreal lichen found throughout Europe, Russia, and Canada. It is considered rare throughout the global range. Frosted glass whiskers grows on old deciduous trees, in humid and shaded locations (COSEWIC 2014). Field surveys recorded one instance of frosted glass whiskers in the PDA.

9.3.4.2 Eastern Waterfan

Eastern waterfan is listed as Threatened under both the federal SARA and the provincial NS ESA. Eastern waterfan is an aquatic cyanolichen that grows on rocks at and below water level. Threats to Eastern waterfan vary, but some threats with high impact include logging, droughts, and flooding (COSEWIC 2013). Field surveys recorded two instances of Eastern waterfan in the PDA.

9.3.4.3 Eastern White Cedar

Eastern white cedar is not listed under federal SARA but is listed as Vulnerable under the provincial NS ESA. Eastern white cedar is an evergreen tree that typically grows in swamps, sphagnum bogs, or shallow dry soils over limestone rock, varying soil pH and drainage can support the growth of eastern white cedar (Newell 2005). Field studies recorded one instance of Eastern white cedar in the PDA.

9.3.4.4 Eastern Wood-Pewee

Eastern wood-pewee is listed as Special Concern under the federal SARA and as Vulnerable under the provincial NS ESA. Eastern wood-pewee is a small flycatcher that is typically found in the mid-canopy layer of forest clearings and edges (COSEWIC 2012). Threats impacting eastern wood-pewee are poorly understood, but like most aerial insectivores, a decline in insect populations is thought to be a key contributor. Habitat for eastern wood-pewee is present throughout the LAA and likely concentrated along the edge of the previously disturbed areas. Avian surveys recorded two instances of eastern wood-pewee in the PDA, one sighting in each of the two survey areas.

9.3.4.5 Mainland Moose

Mainland moose is not listed under federal SARA; it is however listed as Endangered under NS ESA. Mainland moose are the largest member of the cervids and are typically found in varying ages of boreal and temperate coniferous and mixed wood forests, with the access to wetlands and water features for temperature regulation and emergent aquatic vegetation for food (Parker 2003). No observations of moose were made during field studies. Three instances of moose browse were observed, but none of the signs appeared recent.

Mainland moose populations in Nova Scotia have declined by 20% in the last 30 years and are considered critically imperiled (NSNRR 2021 in Strum 2022). Furthermore, mainland moose are protected under the Nova Scotia *Endangered Species Act*. In 2021, NSNRR released an updated recovery plan for the moose in Mainland Nova Scotia in which they set a goal for increasing the mainland moose population by 10%. The MMRP 2021 also designated core habitat that is critical for Mainland moose recovery, and identified threats to mainland moose based on the World Conservation Union– Conservation Measures Partnership's unified threat classification system. The L8006 RoW extends through core habitat identified in the MMRP 2021 (which encompasses much of Cumberland and Colchester Counties). Furthermore, the MMRP 2021 identifies 'utility and service lines' as a threat to mainland moose owing to their potential to contribute to habitat and population fragmentation and isolation (see Table 2 in section 4 of the MMRP; NSNRR 2021 in Strum 2022).

As the L8006 RoW is proposed to be co-located alongside the existing L8001 transmission line corridor, the Project's contribution to habitat fragmentation is small. Mainland moose are using habitat within the existing L8001 corridor, as evident by the observation of mainland moose browse to the west of Highway 366 (Drawing 2-2 in Strum 2022). However, the cumulative effect of increasing the width of the corridor to accommodate the L8006 infrastructure should be considered for its contribution to habitat alteration and fragmentation.

9.3.4.6 Olive-sided Flycatcher

Olive-sided flycatcher is listed as Special Concern under the federal SARA and as Threatened under the provincial NS ESA. It was first federally listed as Threatened in 2007; however, due to a stabilization in the rate of decline, COSEWIC (2018) revised the status to Special Concern in 2018. The official federal SARA status was downgraded from Threatened to Special Concern in 2023.

Olive-sided flycatcher is a medium-sized songbird that is typically found along forest edges, and near forest openings, especially in wet areas (COSEWIC 2018). Habitat for the species within the PDA is likely limited to disturbed areas (e.g., previously disturbed forest corridors, clearings near watercourses).

Avian surveys recorded six observations of olive-sided flycatcher in the Amherst Section and one observation in the Onslow Section.

9.3.4.7 Wood Turtle

Wood turtle is listed as Threatened under both the federal SARA and the provincial NS ESA. Wood turtles typically inhabit areas around sand, gravel, or cobble-bottomed watercourses that are meandering and shallow. Clear watercourses with moderate flow and frequent oxbows are preferred (COSEWIC 2007). The Nova Scotia Significant Species and Habitat Database contains four records that are classified as ‘Species at Risk’ which relate to wood turtle habitat, NSDNR identified three watercourses crossed by the line listed as "critical habitat", and the AC CDC data returned for the Project includes five records of wood turtle with 5 km of the PDA.

9.4 Effects Assessment

9.4.1 Assessment Criteria

9.4.1.1 Residual Effects Characterization

Table 9.3 presents definitions for the characterization of residual environmental effects on wildlife, vegetation, and habitat. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not practicable.

Table 9.3 Characterization of Residual Effects on Wildlife, Vegetation and Habitat

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to wildlife, vegetation, and habitat relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to wildlife, vegetation, and habitat relative to baseline
Magnitude	The change in flora SOCI or wildlife abundance and/or distribution	**Negligible –** a measurable change in abundance in the LAA is not anticipated **Low –** a measurable change in abundance in the LAA is not anticipated, although temporary local shifts in distributions in the LAA might occur **Moderate –** a measurable change in abundance in the LAA might occur **High –** a measurable change in abundance and/or distribution may extend past the LAA
Geographic Extent	The geographic area in which a residual effect occurs	**PDA –** residual effects are restricted to the PDA **LAA –** residual effects extend into the LAA
Duration	The time required until the measurable parameter or the VC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	**Short term** – residual effect extends for less than 1 year **Medium term** – residual effect extends through the construction phase **Long term** – residual effect extends through the operation phase **Permanent** – recovery to baseline conditions unlikely
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant	**Not applicable –** effect does not occur during critical life stage or timing does not affect the VC **Applicable –** effect occurs during a critical life stage
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event –** the residual effect occurs once **Multiple irregular event –** the residual effect occurs at no set schedule **Multiple regular event –** the residual effect occurs at regular intervals **Continuous –** the residual effect occurs continuously

Table 9.3 Characterization of Residual Effects on Wildlife, Vegetation and Habitat

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and reclamation **Irreversible –** the residual effect is unlikely to be reversed
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	**Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

9.4.1.2 Significance Definition

A significant adverse residual effect on wildlife, vegetation, and habitat is one that, following the application of avoidance and mitigation measures, threatens the long-term persistence or viability of a population in the LAA, particularly SOCI.

9.4.2 Potential Project Interactions with Wildlife, Vegetation and Habitat

Table 9.4 summarizes the potential environmental effects of Project activities on wildlife, vegetation, and habitat, as well as effect pathways and measurable parameters used for evaluating effects. Potential environmental effects and measurable parameters were selected based on professional judgment, recent environmental assessments in Nova Scotia, and regulatory concern for certain species.

Table 9.4 Potential Environmental Effects, Effect Pathways, and Measurable Parameters for Wildlife, Vegetation and Habitat

Potential Environmental Effects	Effect Pathways	Measurable Parameter(s)
Change in SOCI Habitat	Construction and operation and maintenance of the Project could result in a: • Direct loss or alteration of wildlife habitat (e.g., vegetation clearing) • Indirect loss or alteration of wildlife habitat (*e.g.*, sensory disturbance, edge effects)	Quantitative evaluation of the amount of direct habitat lost or altered for wildlife, especially for SOCI. Qualitative evaluation of the indirect habitat lost or altered for wildlife and vegetation, especially for SOCI.
Change in Mortality Risk	Construction and operation and maintenance of the proposed Project could result in a direct increase in mortality risk to SOCI (e.g., vegetation clearing activities, vehicular collisions, infrastructure collisions, human-wildlife conflicts).	Qualitative evaluation of direct mortality risk due to: • Vegetation clearing, site preparation and clearing, and maintenance • Collisions with Project vehicles or infrastructure • Loss of vascular plant SOCI individuals or populations

Table 9.5 identifies the physical activities that may interact with the VC and result in an environmental effect. These interactions are discussed in detail in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 9.5 Potential Interactions Between Physical Activities and Wildlife, Vegetation and Habitat

Physical Activities	Change in SOCI Habitat	Change in Mortality Risk
Construction		
Site Preparation and Clearing	✓	✓
Excavation and Structure Assembly	✓	✓
Conductor Stringing	✓	✓
Expansion of Onslow Terminal	✓	✓
Inspections and Energization	–	✓
Clean-Up and Revegetation	✓	✓
Employment and Expenditure	–	–
Operation and Maintenance		
Presence of Conductors and Towers	✓	✓
Inspections and Maintenance	–	✓
Vegetation Management	✓	✓
Notes: ✓ = Potential interaction – = No interaction		

Project inspection and energization activities during construction, and inspection and maintenance activities during operation and maintenance should be limited to existing infrastructure and are therefore not expected to result in changes to SOCI habitat. Changes in employment and expenditure are aspatial and not expected to interact with wildlife, vegetation, and habitat.

9.4.2.1 Potential Effects on Wildlife, Vegetation, and Habitat During Construction

Construction of the Project has the potential to interact with wildlife, vegetation, and habitat in the following ways:

- A direct loss or alteration of wildlife, vegetation, or habitat will occur within the PDA for construction activities (i.e., site preparation and clearing) that result in vegetation clearing, ground disturbance, and above ground infrastructure installation.
- An indirect loss or alteration of vegetation and/or habitat may occur within the PDA and LAA for construction activities (i.e., site preparation and clearing, excavation and structure assembly, conductor stringing, expansion of terminals, clean-up, and revegetation) that result in sensory disturbance (i.e., noise emissions) that can result in avoidance or reduce the ecological effectiveness of habitats within and adjacent to the PDA.
- A direct increase in mortality risk may occur through construction activities (i.e., site preparation and clearing, conductor stringing, expansions of terminals, inspections and energization, clean-up and revegetation) that involve vegetation clearing and ground disturbance and/or the movement of machinery and traffic within the LAA.

9.4.2.2 Potential Effects on Wildlife, Vegetation, and Habitat During Operation and Maintenance

Operation and maintenance of the Project has the potential to interact with wildlife, vegetation, and habitat in the following ways:

- A direct loss or alteration of wildlife, vegetation, or habitat will occur within the PDA for operation and maintenance activities (i.e., vegetation management) that result in vegetation clearing, and ground disturbance.
- An indirect loss or alteration of vegetation and/or habitat may occur within the PDA and LAA for operation and maintenance activities (i.e., vegetation management) that result in sensory disturbance (i.e., noise and light emissions) that can result in avoidance or reduce the ecological effectiveness of habitats within and adjacent to the PDA.
- A direct increase in mortality risk (i.e., collisions) may occur from the presence of infrastructure during operation and maintenance.
- A direct increase in mortality risk may occur through operation and maintenance activities (i.e., vegetation management, inspections and maintenance) that involve vegetation clearing and ground disturbance and/or the movement of machinery and traffic within the LAA. The risk of mortality due to inspections is expected to be low as inspections are infrequent.

9.4.3 Mitigation for Wildlife, Vegetation and Habitat

Mitigation measures will include standard, proven measures for wildlife, vegetation, and habitat protection, outlined in the NSPI Contractor Environmental Requirements (NSP 2023) which will be incorporated into a Project specific EPP. The measures include:

- The Project will use previously disturbed areas for Project infrastructure and workspaces to the extent practicable.
- Project design will include paralleling an existing line.
- The Project will make use of diverters in high-risk areas to make the conductors more visible, especially for birds (APLIC 2012).
- Vegetation clearing will be limited to areas required for construction and safe operations.
- Travel of vehicles will be confined to existing roads and trails, where practical, to avoid disturbing vegetated areas.
- Travel of vehicles not confined to existing roads will avoid sensitive areas, including riparian habitats and watercourses, to the extent practical.
- Streams identified as potential wood turtle habitat will not be forded, whenever possible.
- Equipment will be cleaned prior to mobilization to avoid introduction of invasive species.
- Material stockpiles will be kept a minimum of 30 m from a watercourse or waterbody with the appropriate erosion control mitigation in place to prevent sediment from entering a watercourse or waterbody.
- Vegetation clearing will be completed outside the migratory bird nesting period of April 1 to August 31 (NSPI best practice, Zone C3; ECCC 2023). Where activities may result in risk of harm to migratory bird nests if work during this season cannot be avoided, a qualified biologist will complete a pre-activity nest survey in accordance with federal guidelines (ECCC 2022).

- If an active bird nest is found, beneficial management practices will be followed, including applying an appropriate setback and timing restriction, and NS Natural Resources and Renewables and/or Canadian Wildlife Service (CWS) will be consulted, as appropriate.
- Seek permits for bird mitigation under MBCA, as warranted.
- NSPI will engage with regulatory agencies regarding the need for pre-construction bird surveys and implement those surveys as required. Results from those surveys will determine additional required mitigation in consultation with NSECC and CWS.
- Vegetation clearing will be completed outside the core maternity roosting period for bats of May 1 to August 31. If habitat tree removal or general tree clearing is required during the maternity roosting period, a qualified biologist will review the trees to determine bat occupancy before removal.
- Known locations of vascular plant SOCI within 30 m of the PDA will be flagged and avoided, if feasible.
- The use of herbicides will be limited, and mechanical and/or hand clearing will be used when practical, particularly within 30 m of wetlands.
- Vehicle and equipment emissions will be managed by conducting regular maintenance on all machinery and equipment.
- Idling of vehicle engines, equipment, and machinery will be avoided, where practical.
- Approved noise arrest mufflers will be used on equipment where practical to reduce potential environmental effects of noise.
- Haul routes will be managed to reduce engine idling and dust.
- Haul distances to disposal sites will be reduced where practical.
- Construction-related fugitive road dust will be controlled through measures such as speed limits on Project-controlled gravel roads and road watering on an as-needed basis.
- Disturbed areas will be revegetated as soon as practical to limit dust emissions.
- Known locations of rare lichen within the PDA that may be affected by Project activities will be flagged with a species-specific buffer and avoided, if feasible
- Known locations of wood turtle streams within the PDA that may be affected by Project activities will be flagged with a 20-200 m buffer and avoided, if feasible.
- Known locations of active raptor nests within the PDA that may be affected by Project activities will be flagged with a 200 m buffer and avoided, if feasible
- Construction activities that can generate noise disturbance will be limited to daytime hours as feasible to limit nuisance noise to off-site receptors at night.
- All staff will report wildlife incidents to their supervisor which will be reported to NS Natural Resources and Renewables and/or CWS, as appropriate.
- Snow depth in Deer Winter Areas will be monitored and mitigation will be developed if the snow exceeds 2 m depth.
- Personnel will not feed, harass, or hunt wildlife while working on the Project.
- Food and other wildlife attractants will be stored in odour-proof containers.
- Crews will be trained on wildlife awareness.
- Food waste will be stored and disposed of in a manner to avoid attracting wildlife.

Seasonality should be considered when planning construction and maintenance activities. Strum (2022) indicates that where mainland moose presence is likely the highest along the RoW (e.g., the Amherst Marsh area and the Higgins Mountain area), moose appear to be absent or in low abundance during the winter. Targeting late fall or winter for construction and post-construction maintenance activities in these areas will help reduce the impact of construction on the animals (Strum 2022).

9.4.4 Characterization for Residual Project Environmental Interactions for Wildlife, Vegetation and Habitat

9.4.4.1 Residual Effects on Wildlife, Vegetation, and Habitat During Construction

Change in SOCI Habitat

The PDA has been subject to anthropogenic disturbance via the initial construction and operation and maintenance of the existing adjacent transmission line infrastructure. The PDA is largely forested (**Table 9.1**) but contains a large amount of edge habitat (e.g., cleared forest edge). Forest edges can provide habitat for several species, including some SAR (see section 9.3.3). Loss of vegetation and habitat will largely affect forested areas of the PDA. Open habitats (e.g., bogs, wetlands, agricultural lands) will not be cleared and direct impacts will be limited to tower infrastructure. Habitat remaining post-construction will reflect a similar quality to the habitat present along the existing RoW. Edge habitat will largely be moved, but not destroyed, by vegetation clearing. The most substantial impact will be the loss of interior forest in the LAA resulting from vegetation clearing and the moving of the forest edge.

The PDA and LAA are currently subject to periodic anthropogenic noise (e.g., traffic, operations and maintenance of existing infrastructure, private land use) and light emissions. Construction of the Project is anticipated to result in an incremental increase in existing noise and light emissions levels (Section 6.2.5). Construction noise is typically intermittent, fluctuates during active construction, will occur during daytime only, and is generally confined to the LAA. Since wildlife are subject to existing anthropogenic sources of sensory disturbance, indirect habitat loss and alteration is anticipated to be temporary. Portions of the LAA may temporarily be avoided by some species, but post-construction, species are anticipated to return (Bayne et al. 2008). Habitats will be returned to a similar condition as baseline, following construction (i.e., forest and edge habitat) albeit with some loss of interior forest habitat.

Existing SOCI in the LAA may be affected by the Project; however, relatively few instances of SAR were recorded. Mitigation measures proposed should limit the loss of flora SOCI (e.g., flagging and avoiding known specimens). The effects of the Project on moose are anticipated to be limited including temporary avoidance of the area during construction. However, moose would be expected to return to the area during the operation and maintenance phase as the conditions and habitat are expected to be similar to their current state.

Following the implementation of mitigation measures described above, residual effects relating to change in SOCI habitat during the construction phase are summarized in **Table 9.6** and characterized by the following:

- Direction is adverse: there will be a direct and indirect loss or alteration of vegetation and/or habitat. The habitat remaining at the conclusion of construction will resemble closely the habitat present before construction; however, vegetation clearing will reduce the overall forest habitat, including interior forest habitats, permanently. Long-term transmission line infrastructure (i.e., towers, lines) will also alter the habitat permanently, though to a lesser extent than vegetation clearing.
- Magnitude is low: a measurable change in the abundance of wildlife in the LAA is not anticipated, although temporary local shifts in distributions in the LAA might occur during construction.
- Geographic extent is the PDA/LAA: direct loss of vegetation and habitat is expected within the PDA, and indirect loss or alteration of habitat associated with sensory disturbance is unlikely to occur beyond the LAA.
- Duration is medium to long term: sensory disturbance will cease following the construction phase but cut trees and transmission line infrastructure is anticipated to be long-term.
- Timing is applicable: construction will occur throughout the year, including during sensitive periods for wildlife (e.g., nesting); however, tree/shrub removal should occur outside of the breeding season for forest bird species.
- Frequency is continuous: effects will occur throughout the construction phase.
- Change is largely irreversible: habitat will be lost for the duration of the operating life of the Project; however, sensory disturbance will largely cease following the construction phase.
- Ecological and socioeconomic context: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.

Change in SOCI Mortality Risk

As described above, the PDA provides some habitat value due to the presence of forest edge; however, existing levels of anthropogenic disturbance and altered habitats effect that value. Many species inhabiting the PDA forage in the LAA, including previously disturbed areas, and are exposed to existing levels of mobile equipment and traffic. The risk of increased injury or mortality to these species is anticipated to be low; although increased mobile equipment use and slow-moving construction traffic can slightly increase risks. The proposed mitigation measures (e.g., avoiding vegetation clearing during breeding season, marking and avoiding known flora SOCI, confining traffic to existing roads where feasible, working during daytime) will further reduce the potential for the Project to interact with wildlife or vegetation unnecessarily (ECCC 2022; Longcore and Rich 2004; Ogden 1996). Construction also presents an increased mortality risk during site preparation and activities that cause ground disturbances, especially for flora SOCI. Proposed mitigation measures will reduce the risk, and the risk will largely cease following construction, though some risks will remain during the operation phase, especially for wildlife.

Following the implementation of mitigation measures described above, residual effects relating to change in mortality risk during the construction phase are summarized in Table 9-6 and characterized by the following:

- Direction is adverse: construction activities will increase vegetation and wildlife mortality risk.
- Magnitude is negligible: a measurable change in the abundance of SOCI in the LAA is not anticipated.

- Geographic extent is the PDA: mortality risk is expected to be localized and not extend past the LAA.
- Duration is medium: mortality risk from construction will cease following the construction phase.
- Timing is applicable: construction will occur through the year, including during sensitive periods for wildlife (e.g., nesting).
- Frequency is continuous: effects will occur throughout the construction phase.
- Change is reversible: mortality risk from construction activities will cease following the completion of those activities.
- Ecological and socioeconomic context: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.

9.4.4.2 Residual Effects on Wildlife, Vegetation, and Habitat During Operation and Maintenance

Change in SOCI Habitat

Project activities that may result in direct or indirect habitat loss or alteration (i.e., sensory disturbance, vegetation management) during the operation and maintenance phase are not expected to differ from activities undertaken during baseline conditions on the existing transmission line. Except for wildlife avoidance due to acute sensory disturbances, no additional change in vegetation, or habitat is anticipated to occur during the operation and maintenance phase that was not already lost or altered during the construction phase. As a result, residual effects on wildlife, vegetation, and habitat during operation and maintenance of the Project are anticipated to be negligible.

Following the implementation of mitigation measures described above, residual effects relating to change in habitat during the operation and maintenance phase are summarized in Table 9-6 and characterized by the following:

- Direction is adverse: there could be an indirect alteration of wildlife habitat, but the LAA is subject to existing anthropogenic disturbance.
- Magnitude is negligible: a measurable change in the abundance of vegetation, wildlife, or wildlife habitat in the LAA is not anticipated.
- Geographic extent is the LAA: indirect loss or alteration of habitat associated with sensory disturbance is unlikely to exceed the LAA.
- Duration is long term: sensory disturbance will extend through the operation and maintenance phase, but should be infrequent.
- Timing is applicable: activities will occur throughout the year (though infrequently), including during sensitive periods for wildlife (e.g., nesting).
- Frequency is continuous: effects will occur throughout the operation and maintenance phase due to the presence of towers and conductors.
- Change is reversible: indirect habitat loss or alteration will persist throughout the life of the Project, but will cease when Project activities are not occurring.
- Ecological and socioeconomic context: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.

Change in Mortality Risk

Mortality risk from Project related activities during the operation and maintenance phase (i.e., vegetation maintenance, movement of machinery or traffic, presence of conductors and towers) is expected to increase marginally from baseline conditions. Of potential significance is the presence of conductors and towers in high-risk areas such as major watercourse crossings and protected areas. Residual effects on wildlife, vegetation, and habitat during operation and maintenance of the Project are anticipated to be negligible, as these areas are exposed to existing anthropogenic disturbances including the operation and maintenance of an existing transmission line.

Following the implementation of mitigation measures described above, residual effects relating to change in mortality risk during the operation and maintenance phase are summarized in Table 9-6 and characterized by the following:

- Direction is adverse: operation and maintenance activities will increase wildlife mortality risk but are anticipated to be similar to current activities undertaken for the existing transmission line(s). Birds may be at particular risk due to the increased presence of overhead transmission lines, but proposed mitigation measures should limit collisions (e.g., diverters on lines in high-risk areas).
- Magnitude is negligible: a measurable change in the abundance of vegetation, or wildlife in the LAA is not anticipated as the Project parallels an existing transmission line. It is not anticipated that the presence of additional conductors will linearly increase the risk, but instead only marginally increase risk. This risk should be mediated by the targeted mitigation above (e.g., diverters in high-risk areas; APLIC 2012).
- Geographic extent is the LAA: mortality risk will be localized and not exceed the LAA.
- Duration is long term: mortality risks will extend through the operation and maintenance phase.
- Timing is applicable: operation and maintenance will occur throughout the year, including during sensitive periods for wildlife (e.g., nesting, migration).
- Frequency is continuous: effects will occur throughout the operation and maintenance phase.
- Change is reversible: mortality risk will cease following the operation and maintenance phase.
- Ecological and socioeconomic context: the Project is situated adjacent to a previously disturbed landscape subject to existing anthropogenic disturbances.

9.4.4.3 Summary of Project Residual Effects

A summary of the residual environmental effects characterization (**Table 9.3**), following the application of mitigation measures described in Section 9.4.3, on wildlife, vegetation, and habitat during the construction and operation and maintenance phases of the Project is provided in **Table 9.6**.

Table 9.6 Project Residual Effects on Wildlife, Vegetation and Habitat

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in Habitat	C	A	L	PDA/ LAA	MT/LT	A	C	I/R	D
	O	A	N	LAA	LT	A	C	R	D
Change in Mortality Risk	C	A	N	PDA	MT	A	C	R	D
	O	A	N	LAA	LT	A	C	R	D

KEY
See Table 9.3 for detailed definitions

Project Phase
C: Construction
O: Operation and Maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project development area
LAA: Local assessment area

Duration:
ST: Short term
MT: Medium term
LT: Long term

Timing:
N/A: Not Applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

9.5 Determination of Significance

The Project involves construction and operation and maintenance activities adjacent to existing infrastructure where there is currently landscape alteration and anthropogenic disturbance. While the PDA provides some habitat opportunities for SOCI the Project is not expected to have long-term measurable effects. There appear to be limited SOCI in the PDA and LAA (see field surveys, Section 9.3.2) and there is an abundance of similar and suitable habitats in the LAA and beyond. SOCI populations that occur within the LAA are unlikely to be affected permanently by the incremental changes created by the Project.

With the application of mitigation measures, residual effects on wildlife, vegetation, and habitat are not expected to threaten the long-term persistence or viability of SOCI. The residual environmental effects of the Project on wildlife, vegetation, and habitat during all phases of the Project are not significant, with a high level of confidence.

9.6 Follow-up and Monitoring

A dedicated follow-up and monitoring plan is not required for wildlife, vegetation, and habitat to verify the environmental effects predictions of the assessment or to verify the effectiveness of mitigation.

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10 Assessment of Environmental Effects on Water Resources

This section assesses the potential interactions between construction and operation and maintenance of the Project and water resources. Water resources are defined for the purposes of this VC as a water supply from the ground or the surface that is available for human use, including recreational uses, as well as consumption and other residential, agricultural, commercial, and industrial uses.

10.1 Rationale for Selection as a Value Component

Water resources was selected as a VC because of its importance to natural and human environments, particularly with respect to Project activities that are anticipated to occur in or near water, such as the temporary installation of bridging and matting for watercourse and wetland crossings.

Water resources, as it pertains to the quality and quantity of surface water, is important for providing recreational waters for activities such as swimming and boating. Surface water and ground water is an important source of water for public water supplies, and for agricultural, industrial, and commercial supplies throughout the province. The role of surface water as a component of the aquatic environment is described further in Section 11.

10.2 Scope of Assessment for Water Resources

The Project Development Area (PDA) is the immediate area of physical disturbance associated with construction and operation and maintenance of the Project (Section 6). The LAA for water resources is defined as the area within which the environmental effects of the Project can be reliably measured or predicted. For considering a potential change in the water resources, the LAA for water resources is the PDA plus 500 m on either side of RoW center line. This LAA is sufficient to capture potential upstream and downstream effects related to the placement of culverts and temporary bridges, clearing of the RoW, and operation and maintenance of the access roads, RoW, and terminals. The LAA can be thought of as the theoretical “zone of influence” of the Project on water resources.

10.2.1 Regulatory Context

Provincial legislation applicable to the assessment of surface water resources includes the *Water Resources Protection Act*, as well as the Activities Designation Regulations, and Environmental Emergency Regulations (under the *Environment Act*).

The Nova Scotia *Water Resources Protection Act*, administered by NSECC, is in place to protect provincial water resources, including surface water, recreational waters, and existing and future sources of drinking water. The Project activities do not fall under the Act’s listed prohibitions respecting the Atlantic Drainage Basin.

The *Environment Act* is the primary piece of environmental legislation in Nova Scotia to establish mechanisms for the governance of many environmental matters that are under provincial government control. The Project may require a Division I Approval under the Activities Designation Regulations of the provincial *Environment Act*. Under the regulation, designated activities such as a watercourse alteration (section 5A) to construct or modify a culvert or structure (section 5B) may require an approval or notification.

Where surface water resources are designated as municipal source water supply areas, municipalities can request that the source water supply area be designated as a protected water area under the *Environment Act*. The North Tyndal Wellfield (See Appendix K) in Amherst, is a Protected Water Area under the *Environment Act*, and is crossed by the PDA. The North Tyndal Wellfield Protected Water Area Designation and Regulations under the Act designate the boundaries of the protected area and specify activity restrictions within these boundaries. Transmission lines can be built within the protected area; however, such activities are subject to Ministerial approval as per the regulations as follows:

"***Easement restrictions***

10 *Unless approved in writing by the Minister or the Administrator, no person shall grant an easement for or construct or permit the construction of any road, railway, power transmission line, gas transmission line on, over or across the Protected Water Area*."

Federally, Health Canada's Guidelines for Canadian Drinking Water Quality (GCDWQ) pertain to potable water and have been adopted by the Canadian Council of Ministers of the Environment (CCME). Nova Scotia has adopted the GCDWQ as legally binding standards for regulated public drinking water supplies and recommended for private well owners (NSECC 2023a).

Acts and regulations pertaining to the protection of aquatic life are described in Section 11 Aquatic Environment.

10.3 Existing Conditions for Water Resources

10.3.1 Approach and Methods

The existing surface water conditions in the LAA were characterized based on a review of the following published databases, digital maps, and reporting:

- Water Survey of Canada HYDAT database (ECCC 2023)
- Nova Scotia Digital Topographic Database (Government of Nova Scotia 2020,2021)
- Nova Scotia Hydrographic Network geographic dataset (Government of Nova Scotia 2020)
- Online Well Log System (OWLS) (NSECC 2023b)
- Protected Water Areas of Nova Scotia Mapping (NSE 2009)
- Nova Scotia Automated Surface Water Quality Monitoring of Kelly River at Eight Mile Ford and St. Mary's River at Stillwater (NSECC 2023c)

In addition to the available hydrographic network, additional watercourses and waterbodies were identified from a Project-specific field report (Strum 2020) as discussed in Section 11 Aquatic Environment.

10.3.2 Description of Existing Conditions

10.3.2.1 Surface Water

Watershed Characteristics

The Project crosses the primary watersheds of Missaguash, Kelly/Maccan/Hebert, Economy, Tidnish/Shinimicas, Phillip/Wallace, Salmon/Debert (NSECC 2007). The Project crosses the Tantramar Marsh (or border lowland), the Northumberland Lowlands, the Cumberland and Cobequid Hills, the Cobequid Slopes and the Minas Lowlands near Onslow.

The PDA crosses 92 watercourses (Strum 2020b; Appendix C). Areas with a higher concentration of mapped watercourses intersecting the PDA occur near Belmont, Wentworth, and Greenville Station. Larger named watercourses that intersect the PDA include the Missaguash River, River Philip, Chiganois River, Staples Brook, Folly River, West Branch Folly River, East Branch Folly River, Debert River, Upper Nappan River, Warm Run Stream and the Pugwash River.

The PDA crosses numerous agricultural areas; however, it is unclear as to whether these agricultural areas draw water for irrigation from watercourses crossed by the PDA. Information on other water uses such as recreation or industrial uses was not available.

Nova Scotia has an abundance of fresh surface water (NSECC 2023c). Total average annual precipitation is relatively high (1,300 mm) and the geology and prevailing slope of the terrain produces an average runoff of about 70%. Large areas of impermeable rock and thin soils, and the effects of glaciation have resulted in numerous lakes, streams, and wetlands. Approximately four percent of Nova Scotia's land surface is covered by freshwater. Normal (1981-2010) annual precipitation in the Kelley River watershed, as recorded at the Environment Canada Climate Station at Nappan is 1,155 mm, including 886 mm of rainfall and 254 cm of snowfall. The mean annual ambient temperature is 6.0°C with a mean monthly high of 18.5°C in July and a low of –7.7°C in January (GC 2023).

Flow Regime

Surface water is an important source of water for public, agricultural, industrial, and commercial water supplies throughout the province (NSECC 2023c). Of the 82 municipal water supplies in Nova Scotia, approximately 54% obtain their water from surface water sources and 12% use a combination of groundwater and surface water. Surface water is also used by some small registered public water systems in Nova Scotia which provide water to facilities such as rural schools, day cares, nursing homes, restaurants, and campgrounds. Other important surface water uses include recreational uses such as swimming and boating and habitat services for an interconnected web of aquatic life including insects, fish, fish-eating birds, and mammals.

Routine monitoring of watercourses in Nova Scotia conducted by the Water Survey of Canada (WSC) has established long-term records of flow regimes throughout the province (ECCC 2023). Several WSC stations exist within the PDA. Four of the WSC stations were used to characterize the flow regime of watercourses that are crossed by the Project. **Table 10.1** summarizes the minimum, mean, and maximum daily flow records for each of these four WSC stations.

Table 10.1 Flow Regime Characteristics of Select Watercourses Crossed by the Project

Water Survey of Canada (WSC) Hydrometric Station (ID)	Period of Record	River Flow (m^3/s)			Drainage Area (km^2)	Average Unit Flow ($m^3/Day/km^2$)
		Minimum	Mean	Maximum		
Great River Near Scrabble Hill (01DJ005)	1993-2020	0.09	3.1	113	89	3,009
North River at North River (01DH004)	1973-2020	0.08	6.1	248	202	2,609
Wallace River at Wentworth Centre (01DN004)	1964-1999	0.39	8.8	216	298	2,551
Kelly River (Mill Creek) at Eight Mile Ford (01DL001)	1969–2020	0.02	1.9	47.3	63.2	2,597

Average daily flow records from these WSC stations were used to generate the unit flow, as shown in **Figure 10.1**. The unit flow represents the average daily flow divided by the drainage area upstream of the WSC hydrometric stations. When river flows are compared draining the same size area, the watershed response varies at WSC stations across the transmission line due to variation in gradient, land use, runoff coefficients, soil conditions and climate. For example, the Great River unit flow response has higher peaks than the Wallace River unit flow response.

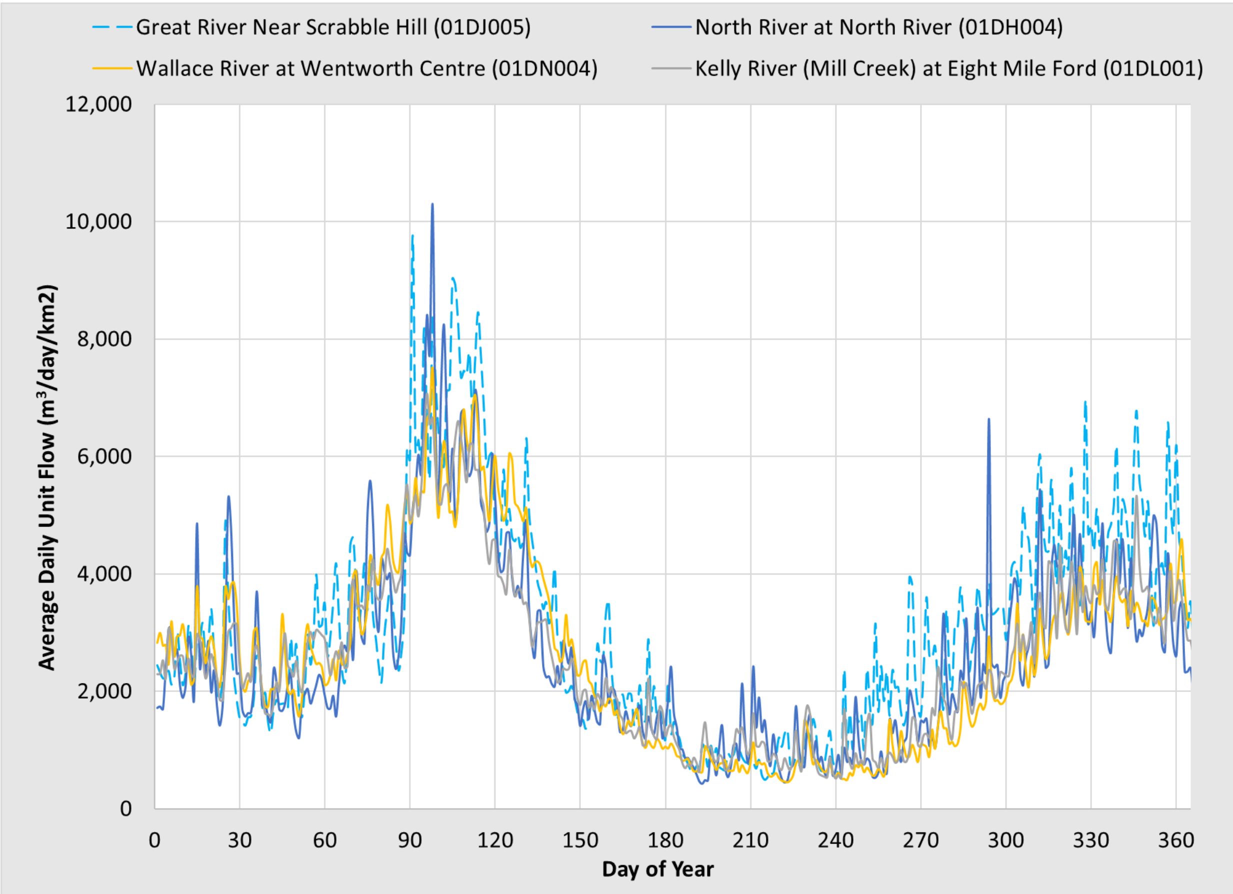


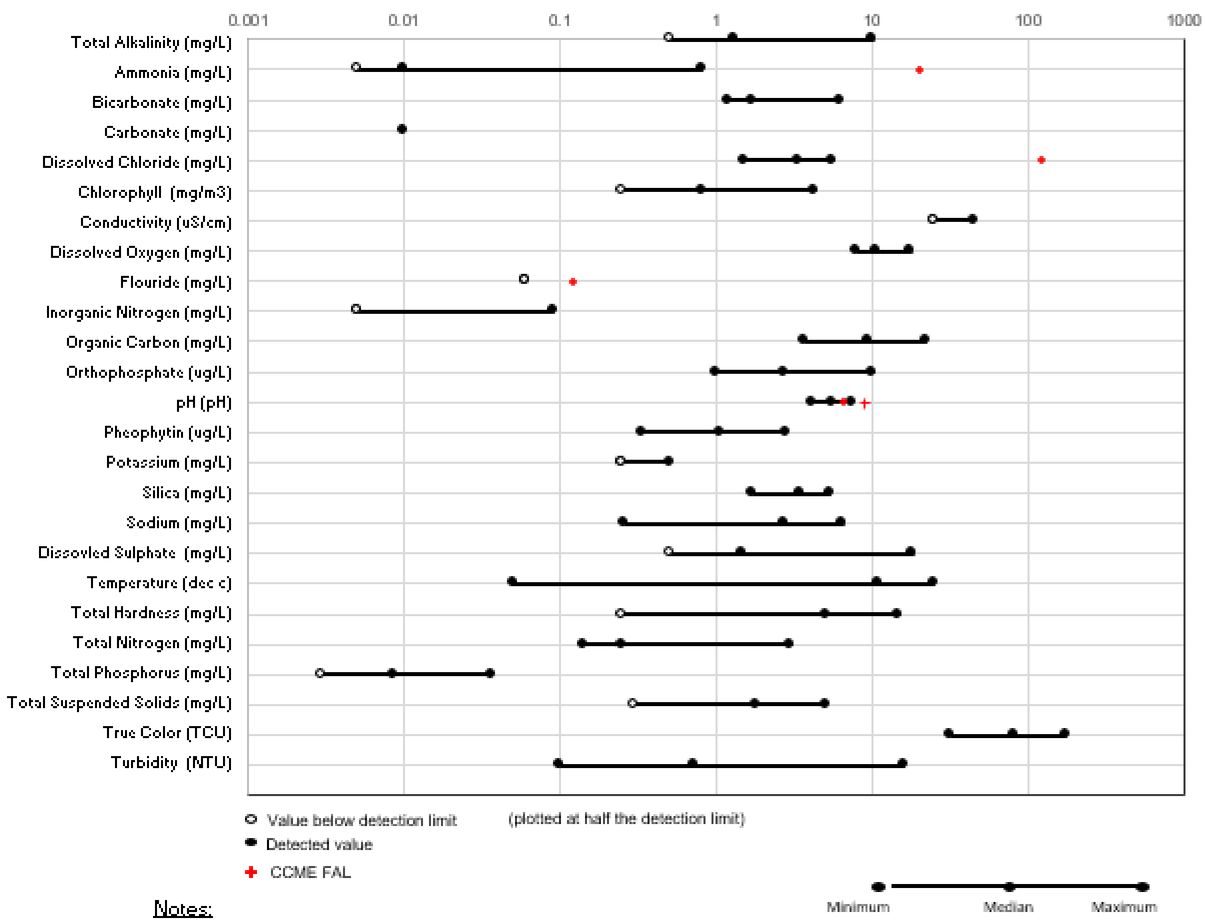
Figure 10.1 Average Unit Flow – Eastern WSC Hydrometric Stations

Surface Water Quality

Surface water quality in Nova Scotia is generally good (NSECC 2023c). However, surface waters can be affected by a number of naturally occurring and human-made substances, such as silt, acids, nutrients, metals, mercury, petroleum products, chlorides from road salt, and coliform bacteria (NSECC 2007).

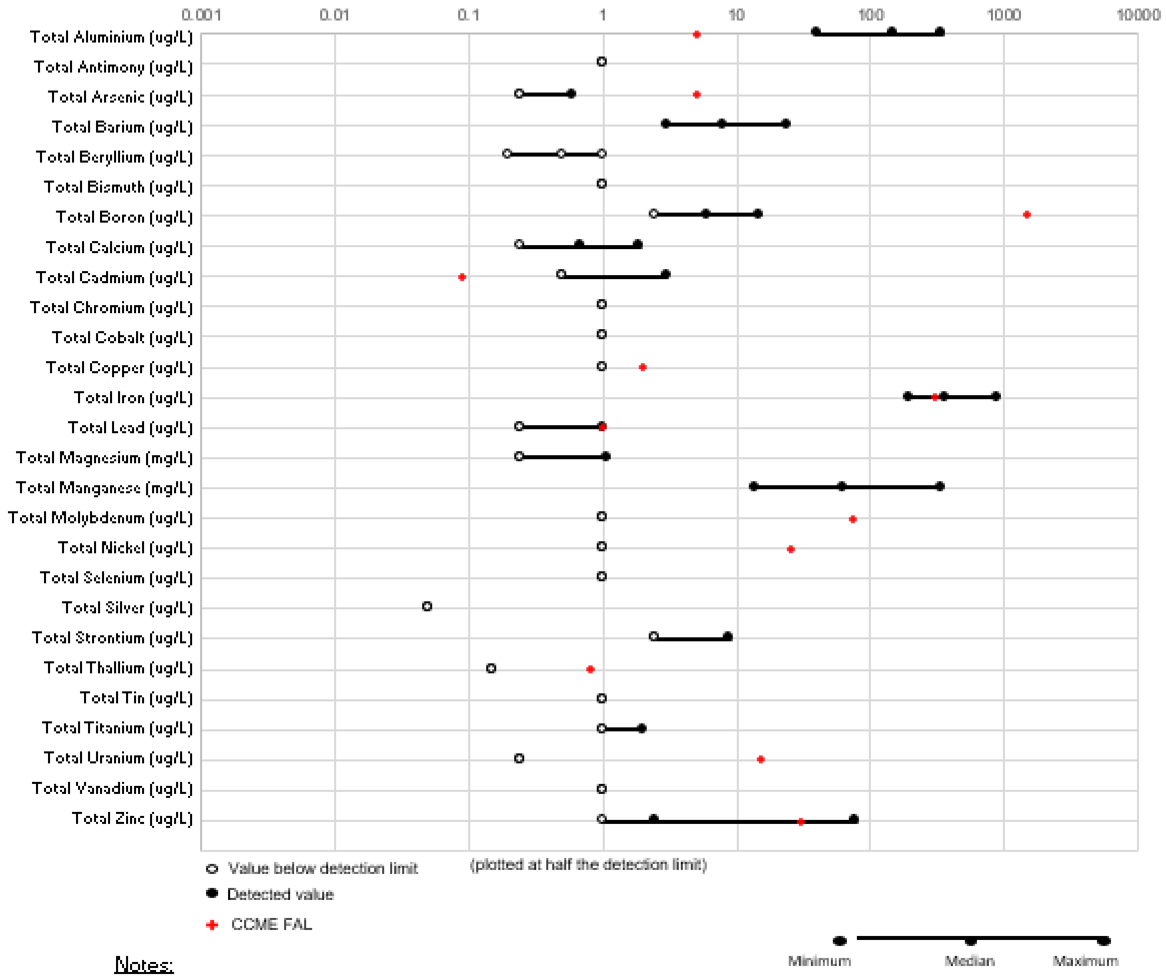
Some areas of the province have highly colored surface waters which are naturally occurring and result from drainage from peat bogs and other wetlands. These waters have high acidity and low pH and can be less suited for drinking water supplies and recreational uses. They are also sensitive to other acid inputs such as acid rain, and some have become less suited for fish habitat. Erosion of soil and nutrients from the land are natural processes which contribute to lowered water quality and impairs various water uses.

The Nova Scotia Automated Surface Water Quality Monitoring Network was established in 1999 to assess water quality in surface waters across the province. The results are used to help manage water resources, determine baseline water quality in lakes and streams throughout the province, evaluate the impact of human activities on surface water, and assess long term trends in water quality (NSECC 2023c). Kelly River at Eight Mile Ford is a water quality monitoring station that is within the Kelly/Maccan/Hebert watershed. This station is located south and outside of the PDA. Fresh water quality parameters from this station are summarized for general chemistry and for metals in **Figure 10.2** and **Figure 10.3**, respectively (NSECC 2023c). The results are based on quarterly surface water quality collected between 2004 and 2022. The surface water quality data are compared to the Canadian Council of Ministers of the Environment Guidelines for the Protection of Freshwater Aquatic Life (CCME FAL; CCME 2023). The water quality did not meet CCME FAL for cadmium and zinc in one out of 75 results, 51 out of 75 iron results, and each of the 75 aluminum results. Elevated concentrations of metals including aluminum and iron in Nova Scotia surface and groundwaters are well documented and are reflective of historical deposition of acid precipitation (Sterling et al., 2020) and from acid rock drainage (ARD) when naturally occurring sulphide minerals in rocks are exposed to air and water (NSDNR 2013).



Notes:
CCME FAL = Canadian Council of Ministers of the Environment – Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 2023)

Figure 10.2 Surface Water Quality (General Chemistry) for the Kelly River Watershed (ECCC 2023c)



Notes:

CCME FAL = Canadian Council of Ministers of the Environment – Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 2023)

Figure 10.3 Surface Water Quality (Metals) for the Kelly River Watershed (ECCC 2023c)

10.3.2.2 Groundwater

Aquifer Characteristics

In Nova Scotia, groundwater is found in bedrock aquifers and in aquifers in the overburden, which is loose soil and rock located above the bedrock (NSECC 2023b). An aquifer is a water-bearing formation that will yield water in a usable quantity to a well. The water table in Nova Scotia is usually found within about 5 m of ground surface, but can be deeper in areas with higher topography, such as the Cape Breton Highlands. Bedrock aquifers along the PDA generally consist of sedimentary rocks such as sandstone, shale, and conglomerate, which yield water from spaces between the grains and from fractures. In most places in Nova Scotia, the overburden aquifer above the bedrock is made up of glacial till, which consists of a mixture of clay, silt, sand, and rock (NSECC 2023d).

About half of Nova Scotians rely on groundwater for their water supply (NSECC 2023d). Wells in Nova Scotia are either shallow dug wells in the overburden aquifers or deeper drilled wells in the bedrock aquifers. The most common water supply for homes that are not served by a public system is a drilled well.

Water Wells

The Project starts in Amherst and crosses through the communities of Oxford, Debert, and finally to Onslow. The RoW crosses the North Tyndal Wellfield Protected Water Area. The North Tyndal Wellfield is a protected water area in Nova Scotia as this wellfield is the primary drinking water supply for the Town of Amherst. While some of the residents and businesses within the Project area receive their domestic drinking water from a municipal supply, it is anticipated that the remaining population source their domestic drinking water from private groundwater wells.

The Nova Scotia Groundwater Observation Well Network (OWN) was established in 1965 to monitor groundwater levels across the province. The OWN is operated by NSECC and is used for monitoring both groundwater levels and groundwater quality. The monitoring results are used to help manage groundwater resources, assess drought conditions, evaluate the effect of human activities on groundwater, and evaluate long-term groundwater trends. The number of years of groundwater level data available at each observation well ranges from one to 48 years. Based on results of the groundwater level monitoring, overall groundwater level fluctuations of less than 1 m were observed (NSE 2015) at Fraser River Monitoring Station.

The Nova Scotia Well Logs Database provides information on more than 100,000 water wells in the province, including information on well locations, geology and well construction, well depth and yield (NSECC 2023b). The location of groundwater wells within the LAA are identified in Appendix K. Groundwater samples from the database within the LAA included sample results from 238 groundwater wells. Summary statistics for the analyzed water quality parameters were prepared and are presented in **Table 10.2**.

Table 10.2 Available Water Well Characteristics in the LAA

Parameter	Minimum	Mean	Maximum	Number of Wells
Wells with Records (OWN)	-	-	-	238
Well Depth[1] (m)	4.2	31	91	238
Depth to Static Water Level[1] (m)	0	5.9	34	190[2]
Depth to Bedrock[1] (m)	0	8.4	26	209[2]
Well Yield (L/min)	0	54	454	232[2]
Notes: [1]Depths are relative to ground surface; [2]well data parameters were not reported by NSECC at all locations; data were current up to 2020.				

Groundwater Quality

Groundwater quality in Nova Scotia is generally good, and in most areas of the province a properly constructed and maintained well can provide a good source of clean, safe drinking water (NSECC 2023d). Naturally-occurring elevated water quality parameters in Nova Scotia include arsenic, chloride, hardness, iron, manganese, radionuclides, radon, sulphate and uranium (NSECC 2023d). These elevated parameters are related to the natural chemistry of the soil and rock where the well is located. Chloride concentrations may also come from seawater and elevated concentrations of chloride is common in wells that are located close to the ocean. Chloride concentrations can also increase following winter road salting.

10.4 Effects Assessment

10.4.1 Assessment Criteria

10.4.1.1 Residual Effects Characterization

Table 10.3 provides definitions for the characterization of residual environmental effects on water resources. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not possible.

Table 10.3 Characterization of Residual Effects on Water Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual water resources effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to water resources relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to water resources relative to baseline
Magnitude	The amount of change in water quality and quantity relative to existing conditions	**Negligible –** no measurable change to water quality/quantity relative to baseline **Low** – a measurable change to water quality/quantity is detectable and within the normal variability that would be expected (baseline) **Moderate** – a measurable change to water quality/quantity occurs that is considered elevated above baseline and within acceptable limits **High –** a measurable change to water quality/quantity occurs that is considered elevated above acceptable limits or regulatory objectives
Geographic Extent	The geographic area in which a residual effect occurs	**PDA –** residual effects are restricted to the Project Development Area **LAA –** residual effects extend into the Local Assessment Area
Duration	The period of time required until the	**Short term –** residual effect extends for less than 1 year

Table 10.3 Characterization of Residual Effects on Water Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
	measurable parameter returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived	**Medium term –** residual effect extends through the construction phase **Long term –** residual effect extends through the operation and management phase **Permanent –** recovery to baseline conditions unlikely
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant.	**Not applicable –** effect does not occur during critical life stage or timing does not affect the VC **Applicable –** effect occurs during a critical life stage
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event –** occurs only once **Multiple irregular event** – occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously
Reversibility	Describes whether a measurable parameter can return to its existing condition after the Project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and rehabilitation **Irreversible –** the residual effect is unlikely to be reversed
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	**Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

10.4.1.2 Significance Definition

A significant adverse residual effect on water resources is defined as one that:

- Increases surface water runoff such that a greater than 10% change to watershed flow regimes occurs
- Results in changes to the flow regime that cause erosion of the riverbed or its banks to such an extent that they cannot be mitigated or remediated by engineered erosion controls
- Decreases the quantity or quality of groundwater or surface water such that it becomes inadequate for its current intended use or, if used as drinking water, is no longer suitable for human consumption, or

- Increases total suspended solid (TSS) concentrations from previously acceptable baseline values to those exceeding the CCME FAL guideline for two consecutive monthly sampling events

10.4.2 Potential Project Interactions with Water Resources

Project activities and components could potentially interact with water resources to result in adverse environmental effects on water resources. In consideration of these potential interactions, the assessment of Project-related environmental effects on water resources is focused on the potential environmental effects listed in **Table 10.4**. These potential environmental effects will be assessed in consideration of specific measurable parameters, also listed in **Table 10.4**.

Table 10.4 Potential Environmental Effects and Measurable Parameters for Water Resources

Potential Environmental Effects	Effects Pathways	Measurable Parameters
Change in surface water flow regime	• Site preparation, including clearing/grubbing for structure assembly and Onslow terminal expansion may change local runoff conditions • Vegetation management for RoW may change local runoff conditions • Installation of temporary crossings and culvert structures may change local runoff conditions	• Flow rates (m^3/sec)
Change in surface water quality	• Vegetation management involving the application of herbicides may change surface water quality • Potential increase of TSS levels from clearing/grubbing activities and in water work or isolating work areas, culvert installation	• Water quality, including TSS (mg/L); turbidity (NTU), pH; water temperature (°C); hardness (as mg/L $CaCO_3$); and specific conductance (µS/cm)
Change in groundwater quality/quantity	• Vegetation management, such as application of herbicides or reduction in vegetative cover may change groundwater quality or quantity • Excavation and structure assembly may change fracture patterns in bedrock aquifers resulting from blasting or other construction activities • Dewatering of hydraulically isolated zone may change groundwater level	• Groundwater quality (GCDWQ parameters) • Aquifer yield (L/min)

Table 10.5 identifies the physical activities that may interact with the VC and result in an environmental effect. These interactions are discussed in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Avoidance measures including physically relocating Project components (e.g., structures and substations) and activities away from watercourses and wetlands and residences have reduced potential direct interactions between Project components or activities and water resources, where practicable.

Without mitigation, the Project may interact with water resources in the following ways:

- Site Preparation and Clearing, and the Expansion the 67N Onslow substation including clearing vegetation and stream crossings may alter surface water flow regime and surface water quality related to increase runoff conditions in disturbed areas and the potential for sediment laden runoff.
- Shallow excavation and potentially temporary dewatering or blasting activities during Foundation Excavation and Expansion of the 67N Onslow substation could result in a change in fracture patterns in bedrock aquifers, and/or localized changes to groundwater quantity/quality.
- Clean-Up and Revegetation will stabilize and grade disturbed areas surrounding watercourses and waterbodies. This will provide benefits to surface water flow and surface water quality by indirectly supporting the regrowth of riparian vegetation and reducing the potential for erosion and sediment-laden runoff.
- Vegetation Management during operation and maintenance will require herbicide application and/or manual cutting which could result in changes in surface water and groundwater quality. Surface water flow regime is not expected to interact with activities during operation and maintenance.

Table 10.5 Potential Interactions between Physical Activities and Water Resources

Phase	Change in Surface Water Flow Regime	Change in Surface Water Quality	Change in Groundwater Quality/Quantity
Construction			
Site Preparation and Clearing	✓	✓	-
Excavation and Structure Assembly	-	-	✓
Conductor Stringing	-	-	-
Expansion of Onslow Substation	✓	-	✓
Inspections and Energization	-	-	-
Clean-Up and Revegetation	✓	✓	-
Employment and Expenditure	-	-	-
Operation and Maintenance			
Presence of Conductors and Towers	-	-	-
Inspections and Maintenance	-	-	-
Vegetation Management	-	✓	✓
Notes: ✓ = Potential interaction – = No interaction			

The following Project activities are not expected to interact with water resources:

- During construction, Employment and Expenditure is not expected to interact with water resources as no change to surface water or ground water quality or quantity is expected. No loss or reduction of use of surface or groundwater due to reduced quantity or quality is therefore expected for residential, commercial, industrial, or agricultural purposes.
- During operation and maintenance, Inspections and Maintenance and the Presence of Conductors and Towers do not interact with water resources as these activities do not include alterations to vegetation or riparian areas and will not require the application of herbicides. As such, effects to water resources are not expected.

10.4.2.1 Potential Effects to Water Resources During Construction

Change in Surface Water Flow Regime

The main Project components that could result in adverse changes to the surface water flow regime are vegetation removal, grubbing/clearing, and culvert installations that will occur during site preparation and clearing, conductor stringing, and expansion of the 67N Onslow substation. The removal of vegetation, root structures, and dense mats of grasses and shrubs can increase surface runoff as they provide functions to reduce the velocity and occurrence and/or mobility of sediment in surface runoff.

A potential interaction could also occur with water resources from the removal of riparian vegetation which may increase the runoff coefficients and decrease evapotranspiration rates. Altogether, this may result in increased runoff volumes that are discharged to nearby streams. Culverts can also alter flow regimes by constricting watercourses, making them more prone to blockages by debris than natural watercourse channels.

Change in Surface Water Quality

The clearing of riparian vegetation and the installation of temporary crossing structures or drainage culverts could result in localized erosion due to the disturbed ground. These vegetation clearing activities can increase the amount of sediment in surface water runoff that could enter a surface water feature. An increase in sediment and/or TSS in surface waters could reduce the aesthetic value of surface water resources for recreational uses. Exposure of sulphide mineral rocks to air and water could increase ARD and increase the leaching of metals in surface waters.

Change in Groundwater Quality/Quantity

During construction, excavation for the installation of the transmission towers and foundations for the expansion of the 67N Onslow substation may require temporary dewatering. Although, the depth of excavation is expected to typically be shallow (maximum 4 m in depth), dewatering may affect groundwater levels in areas where the water table is also shallow, like shallow wells located close to excavations.

Blasting of rocks for the installation of towers and/or terminal foundations result in changes to groundwater quantity and/or quality. In rare cases, vibration from blasting in bedrock may alter the fracture geometry, open new fractures, change the aperture of existing fractures, or permanently change the local groundwater flow patterns. The effect on groundwater flow patterns on a nearby receptor well user depends on many factors, including separation distance, seismic properties of the bedrock, strength of the charge and the yield, age, and condition of the well. Well yield can increase, or if fracture apertures are reduced or closed off, the yield of nearby wells could decrease. Changes in fracture patterns or casing integrity can lead to movement of surface water into a well, which change groundwater quality.

Rock hammering can also cause vibration to the bedrock and may result in the same environmental effects as blasting, although at a lesser magnitude and at a more localized scale.

10.4.2.2 Potential Effects to Water Resources During Operation and Maintenance

Change in Surface Water Flow Regime

During operation and maintenance, vegetation clearing associated with vegetation management activities could result in localized changes to surface water runoff conditions. Increased runoff could occur due to compaction of vegetation or rutting from heavy equipment and increase localized flooding or bank erosion. Either of which could contribute to a reduction in surface water quality (see below).

Change in Surface Water Quality

Vegetation management activities and maintenance of RoW access roads could result in disturbed areas with increased potential for erosional runoff. Similar to construction-related activities, operation and maintenance activities could result in localized increases in sediment laden runoff entering surface water resources which can increase TSS and turbidity and decrease the quality of surface water resources for recreational uses and for use by aquatic organisms (see Section 11 Aquatic Environment).

The use of herbicides during vegetation management could also result in a decrease in the quality of surface waters if the herbicides enter the aquatic environment. Terrestrial herbicides, if applied directly to surface waters or runoff shortly after use could affect aquatic life and is addressed in Section 11 Aquatic Environment.

Change in Groundwater Quality/Quantity

Herbicides are chemicals that could affect human physiology, and the use of herbicides during vegetation management could result in a decrease in the quality of ground water if herbicides were to enter the groundwater.

10.4.3 Mitigation for Water Resources

Interactions between Project activities and water resources will be managed in consideration of the environmental effects pathways. Mitigation measures will include standard, proven measures for sediment and erosion control, outlined in the NSPI Contractor Environmental Requirements (NSPI 2023) which will be incorporated into the Project-specific EPP. Employees and contractors working on the Project will be trained on the EPP and briefed on the Access Plan prior to commencing work. Clearing and construction activities will be carried out in accordance with applicable provincial and federal regulations and requirements and following the EPP for clearing and construction of the line.

Response procedures related to the temporary control of a release of deleterious substances are addressed in Section 17 Incidents and Unplanned Events and will be outlined in an Emergency Response Plan that will be part of the EPP, including spill prevention measures, erosion prevention and sediment control failure, hazardous material spills, and waste management.

The following mitigation measures specific to water resources have been identified for this Project.

- Placing structure locations to avoid watercourses and wetlands and their 30 m buffers to the extent practical, therefore avoiding or reducing in-water work or ground disturbances near surface waters
- Using clear-span bridges to avoid direct interactions with watercourses
- Development of an Access Plan that will, where practical, help to avoid areas where conditions could elevate the potential for erosion and sedimentation such as erodible soils and steep slopes
- Limiting the Project footprint and disturbed areas to the extent practical and adhering to a maximum RoW width of 38.1 m
- Limiting the area and timing of exposed soil without mitigation (e.g., mulching, seeding, rock lining) through schedule work progression

- Restricting the movement of equipment/vehicles to defined work areas and roads, and specified corridors between work areas
- Access of clearing and construction equipment, materials, and personnel to the PDA will be through existing public and private roads where practical to limit the new footprint
- Siting of staging areas and marshaling yards that are required to offload and store equipment will, to the extent practical, be on previously disturbed areas to reduce the need for vegetation clearing
- Installing temporary bridges to provide access for machinery and equipment to cross watercourses where existing roads are insufficient, as per the EPP and applicable watercourse alteration permitting requirements and the *Nova Scotia Watercourse Alterations Standard*
- Heavy equipment will not be used for clearing of vegetation for areas within 30 m of the banks of a watercourse
- If required, vegetation within 30 m of a watercourse will be managed according to the EPP and watercourse alteration permit (WAP) conditions. This 30 m buffer will be clearly marked at each watercourse.
- Erosion and sediment control (ESC) measures such as silt curtains and sediment control fences will be implemented prior to construction and maintained throughout construction, until the area is stabilized
- ESC measures will be regularly inspected, repaired, and maintained as required with emphasis on before and after forecasted heavy rain events, and on water-based control structures with a capacity to withstand wind, flow, and hydrostatic pressures
- Weather advisories will be followed, and work will not be scheduled during high precipitation events, to the extent practical to reduce potential erosion/sedimentation
- Placing overburden storage piles and exposed topsoil at an appropriate distance from bodies of water to reduce the potential for sediment laden runoff to reach water bodies
- If culverts are required, limiting the duration of in-water works and operating machinery above the high-water mark or inside isolated areas, to the extent practical to reduce the risk of sediment release
- If applicable, using clean, low permeability material and rockfill to construct cofferdams
- Refueling machinery at least 30 m from watercourse, wetland, or water supply area to reduce likelihood of deleterious substances entering the water resource
- Placing transmission towers at locations that reduce the requirement for blasting or rock hammering, especially within the Tyndal Protected Wellfield
- If blasting is required, a pre-blast survey for water wells within 800 m of the point of blast will be conducted in accordance with the NSE Procedure for Conducting a Pre-Blast Survey
- Implementing vegetation management in accordance with NSPI's vegetation management program
- Controlling the release of sediment-laden water from dewatering of excavated areas by filtration through vegetation or engineered ESC devices
- If culvert installation is required, water pumped out of the site excavation to create dry conditions for construction will be monitored for quality to be consistent with background suspended sediment and pH concentrations and with applicable regulatory approval criteria. The effectiveness of hydraulic isolation and erosion and sedimentation control measures will be assessed through water quality monitoring.

- Herbicide applications, if required for vegetation management, will be used in accordance with government regulations and will not occur within the within the Tyndal Protected Wellfield or within 30 m of a wetland or watercourse.
- Manually clearing vegetation within 30 m of a watercourse or wetland while leaving the undergrowth and duff layer undisturbed to prevent erosion
- With the exception of the locations for structures and guy wire placement, clearing activities do not typically remove the stumps and roots of the vegetation within the RoW, thus retaining the integrity of forest floor and root mat which will help mitigate erosion
- NSPI will seek approval from NSECC for an easement to construct a power transmission line in the Tyndal Protected Wellfield

10.4.4 Characterization for Residual Project Environmental Interactions with Water Resources

This section discusses the residual Project-related effects to water resources following the application of mitigation.

Change in Surface Water Flow Regime

Project activities during construction, including the use of heavy equipment, vegetation clearing, grading, culvert upgrades/installation, and the physical footprints of the transmission towers and Onslow terminal can interact with the surface water flow regime as a result of the change in drainage patterns, runoff conditions, and evapotranspiration losses. Runoff will be mitigated by way of ESC as described above in Section 10.4.3, and by avoiding areas with erodible soils or steep slopes where conditions could elevate the potential for erosion and sedimentation. Given the linear nature of the Project and the small scale of the PDA when compared to the respective watersheds in which it is located, the potential increase in runoff can be attenuated by the root mat left in place during clearing and the receiving forested watersheds outside of the RoW. Therefore, the change in surface water flow regime resulting from Project activities is considered negligible. This negligible change will occur once during construction, and as required during vegetation management during operation.

Based on past evidence, the residual environmental effects will be reversible following decommissioning and rehabilitation. Overall, with the application of best practices and the Project EPP, residual Project related effects are anticipated to be negligible in magnitude for surface water flow regime, as they are small in scale, restricted to the LAA, occur as a single event during construction, and regular event during operation.

Change in Surface Water Quality

The main Project activities during construction that interact with surface water quality are site preparation and clearing and, to a lesser degree, conductor stringing. The interactions with surface water quality are related to heavy equipment use in the RoW, clearing of riparian vegetation that results in disturbed runoff conditions that have the potential for the release of sediment laden runoff entering a surface water feature or an increase in ARD from the unearthing and exposure of sulphide minerals in rocks to air and water. NSPI will reduce the potential for interactions between the Project and water resources by adhering to the best management practices in their *Contractor Environmental Requirements* (NSPI 2023) and EPP. With the exception of the locations for structures and guy wire placement, clearing activities do not typically remove the stumps and roots of the vegetation within the RoW, thus retaining the integrity of forest floor and root mat which will help mitigate against erosion. This practice also mitigates the potential for ARD. Machinery is not permitted to enter watercourses, heavy equipment will not be used within 30 m of a watercourse, and movement of sediments and woody debris into watercourses is avoided using temporary sediment control features. Riparian vegetation within 30 m of watercourses will be cleared manually to avoid the use of heavy equipment near water.

During the final stage of construction, disturbed areas will be stabilized, such as removing refuse, grading disturbed areas, contouring disturbed slopes to a stable profile, and re-establishing natural drainage patterns and vegetation. Erosion control measures will be implemented until soil is stabilized, and will include trimming and back blading, mulching, seeding, and fabric placement. Given adherence to standard management practices and the Project EPP, and the effective implementation of mitigation measures, effects to surface water quality are anticipated to be low during construction.

During operation and maintenance, the frequency of integrated vegetation management varies depending on vegetation growth rates, but it is typically carried out in 5-to-6-year cycles. Herbicide application will follow appropriate set back distances from water features and will be applied in a manner consistent with the EPP, permits issued by regulators, and provincial law Riparian vegetation within 30 m of watercourses will be cut manually. Given the infrequent occurrence and adherence to the management practices described above and to be included in the EPP, effects to surface water quality are predicted to be low during operation and maintenance.

With mitigation, the Project will result in a residual change in surface water quality in the LAA, as a result of changes in runoff conditions. Overall, the magnitude of residual environmental effects is predicted to be low as water quality parameters are anticipated to remain near baseline levels. The duration of environmental effects on water quality will be short term (i.e., during site preparation activities) and predicted to occur as irregular events during RoW clearing, installation of culverts or temporary crossings, or grading activities. This will occur once during construction, and as required during operation and maintenance. Based on past evidence, the residual environmental effects will be reversible following decommissioning and rehabilitation.

Overall, with the application of best practices and the Project EPP, residual Project related effects are anticipated to be low in magnitude for surface water quality, as they are restricted to the LAA, occur as a single event during construction, and regular event during operation.

Change in Groundwater Quantity and Quality

During construction, excavation for the transmission towers, and excavation to level the 67N Onslow substation or install foundations may require temporary dewatering. The depth of excavation is expected to typically be shallow (3 m to 4 m in depth) but could interact with groundwater in areas where the water table is also shallow.

Excavation for the transmission line structures will be completed by an excavator. Mechanical rock breaking activities completed by excavator are unlikely to interact with groundwater resources. However, where soil conditions make these methods inefficient, blasting or rock hammering of consolidated bedrock may be required. Blasting has the potential to result in changes to groundwater quantity and/or quality and, if required, will be carried out in accordance with best management practices. In rare cases, vibration from blasting in bedrock may alter the fracture geometry, open new fractures, change the aperture of existing fractures, or permanently change the local groundwater flow patterns. The effect on groundwater flow patterns on a nearby receptor well user depends on many factors, including separation distance, seismic properties of the bedrock, strength of the charge and the yield, age, and condition of the well. Well yield, a measure of groundwater quantity, can increase, or if fracture apertures are reduced or closed off, could decrease. Changes in fracture patterns or casing integrity can lead to movement of surface water into a well, which has the potential to adversely affect groundwater quality. Rock hammering may also result in vibration to the bedrock and may result in similar environmental effects as for blasting. However, the potential environmental effects from rock hammering will occur at a lesser magnitude and at a more local scale than blasting. Best management practices to mitigate potential effects on groundwater wells includes placing towers in locations that avoid the need for blasting and hydraulic fracturing to the extent practical.

The location of the PDA within the North Tyndal Protected Wellfield could adversely affect groundwater quality and quantity if blasting or hydraulic fracturing of rock were conducted. Project design will locate towers to avoid blasting or hydraulic fracturing of rock in the North Tyndal Protected Wellfield.

Given adherence to standard management practices, implementation of an Access Plan and the Project EPP, and effective pro-active mitigation measures, effects to groundwater quantity are anticipated to be negligible during construction.

During operation and maintenance, the use of herbicides during vegetation management could result in a decrease in the quality of ground water if herbicides were to enter the groundwater. Herbicide application will follow appropriate set back distances (15 to 75 m) from water bodies and will be applied in a manner consistent with the Project EPP and permit issued by the regulator. Herbicides will not be applied within the Tyndal Protected Wellfield.

Overall, with the application of best practices and the Project EPP, the residual Project related effect of a change in groundwater quantity and quality is anticipated to be negligible in magnitude for groundwater quantity and quality, as they are restricted to the Project Area, occur as a single event during construction, and as a regular event during operation and maintenance.

10.4.5 Summary

The residual environmental effects of the Project on water resources are predicted to be adverse in direction as they could result in a potential reduction in surface water and groundwater quality and quantity. However, overall, the magnitude of residual environmental effects are predicted to be low for surface water quality and negligible for quantity parameters, and negligible for groundwater quality and quantity parameters as they are anticipated to remain near baseline levels. These changes will be primarily within the LAA. The duration of environmental effects on water resources will be short term and predicted to occur as irregular events during installation of culverts, if required, and initial clearing activities, and regular events during herbicide applications. The timing is not applicable to the assessment of water resources.

The Project is not expected to affect industrial, agricultural, or recreational uses, and has a detailed emergency response plan to address spills and other accidental releases of materials near water features.

Table 10.6 summarizes the environmental effects assessment and prediction of residual environmental effects resulting from those interactions between the Project and Water Resources.

Table 10.6 Project Residual Effects on Water Resources

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in Surface Water Flow Regime	C	A	N	LAA	ST	N/A	IR	R	D
	O	A	N	LAA	ST	N/A	R	R	D
Change in Surface Water Quality	C	A	L	LAA	ST	N/A	IR	R	D
	O	A	L	LAA	ST	N/A	R	R	D
Change in Groundwater Quality/Quantity	C	A	N	LAA	ST	N/A	IR	R	D
	O	A	N	LAA	ST	N/A	R	R	D

KEY:
See Table 10.4 for detailed definitions

Project Phase
C: Construction
O: Operation and maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project development area
LAA: Local assessment area

Duration:
ST: Short term
MT: Medium term
LT: Long term

Timing:
N/A: Not applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

10.5 Determination of Significance

In consideration of the VC-specific significance criteria defined in the Section 10.4.1.2, and with effective implementation of Project mitigation, the residual effects of Project activities on water resources are predicted to be not significant, as described below:

- The Project will not result in an increase in surface water runoff that results in a greater than 10% change to watershed flow regimes
- The Project will not result in changes to the flow regime that cause erosion of the riverbed or its banks to such an extent that they cannot be mitigated or remediated by engineered erosion controls
- The Project will not cause a decrease in the quantity or quality of groundwater or surface water such that it becomes inadequate for its current intended use or, if used as drinking water, is no longer suitable for human consumption
- The Project will not cause an increase in baseline water quality exceeding the CCME FAL guideline for total suspended solids (TSS) for two consecutive monthly sampling events

This conclusion has been determined with a high level of confidence based on a good understanding of the general environmental effects of in-water construction activities on surface water and groundwater, the recognized quantification of potential effects such as sedimentation, and the effectiveness of mitigation measures described in Section 10.4.3, such as the implementation of the ESC plan and EPP.

10.6 Follow Up Monitoring

Due to the limited interactions between Project activities and water resources, and proven mitigation such as access planning and ESC measures, a dedicated follow-up and monitoring plan for water resources is not required to verify the environmental effects predictions of the assessment or to verify the effectiveness of mitigation. If blasting is required, the pre-blasting survey of water wells within 800 m of the blast point will be used as the baseline for follow-up monitoring, if applicable.

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11 Assessment of Environmental Effects on the Aquatic Environment

The assessment of potential environmental effects of the Project on the aquatic environment is provided in this section.

For the purposes of this valued component (VC), the aquatic environment includes the watercourses and waterbodies near the Project which provide habitat and food for fish, benthic communities, aquatic plants, and other aquatic species. For the purposes of this assessment, the freshwater aquatic environment includes fish and fish habitat. Freshwater fish are defined here as fish that live in freshwater for at least part of their lifecycle. The federal Fisheries Act defines fish habitat as spawning, nursery, rearing and feeding grounds, food supplies, and areas used for migration by fish or other organisms that fishes depend on to carry out their life processes (Fisheries Act Section 34(1)).

11.1 Rationale for Selection as a Valued Component

The aquatic environment has been assessed as a VC because it provides ecological, cultural, recreational, and economic value to the public, Indigenous groups, local businesses, and government agencies. The aquatic environment is important for supporting fisheries resources, fish that support those fisheries, and providing food for other organisms (e.g., birds and mammals). The Project spans six major watersheds: the Missaguash, Tidnish/Shinimicas, Kelly/Maccan/Herbert, Philip/Wallace, Economy and Salmon/Debert watersheds which provide social and economic opportunities to the people of Nova Scotia and local Indigenous communities. Fish are valued by resource users and are protected by federal and provincial legislation and policies in Canada and Nova Scotia (NS).

The aquatic environment VC is also linked to:

- Water Resources (Section 10) – changes in water resource use can affect the aquatic environment
- Use of Land and Resources for Traditional Purposes by the Mi'kmaq (Section 13) – changes in the aquatic environment can affect the current use of land and resources for traditional purposes by Indigenous groups (i.e., for fishing)

11.2 Scope of Assessment for the Aquatic Environment

For the purposes of this assessment, the aquatic environment VC includes fish and fish habitat which are defined under the federal Fisheries Act as follows:

- "Fish includes: (i) parts of fish, (ii) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (iii) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals"
- "Fish habitat means waters frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas"

The aquatic environment can be affected by Project-related changes in water resources (Section 10) through localized changes in surface water runoff which may result in changes in fish habitat (i.e., water quality, sediment transport) and fish passage. Therefore, residual effects predicted for surface water were also used to inform potential Project effects on the aquatic environment.

11.2.1 Regulatory Context

In addition to Nova Scotia's Environmental Assessment Regulations, the Project is subject to other federal and provincial legislation, policies, and guidance. This section identifies the primary regulatory requirements and policies which influence the scope of the assessment on the aquatic environment and govern the management and protection of fish and fish habitat in Canada and Nova Scotia.

11.2.1.1 Federal

Fisheries Act

The federal *Fisheries Act* is administered primarily by the Department of Fisheries and Oceans Canada (DFO) with some provisions administered by Environment and Climate Change Canada (ECCC). The *Fisheries Act* protects fish and fish habitat and addresses national interests in marine and fresh waters with the goal of protecting the long-term sustainability of aquatic resources. The Fisheries Act includes prohibitions against works, undertakings or activities that result in the harmful alteration, disruption, or destruction (HADD) of fish habitat (Section 35(1)) without authorization from DFO. HADD of fish habitat is defined under the Fisheries Act policies as "any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat's capacity to support one or more life processes of fish." The *Fisheries Act* also prohibits the carrying out of a work, undertaking, or activity, other than fishing, that results in the death of fish (Section 34.4(1)).

In both cases, works can be approved by and carried on in accordance with conditions established by the Minister of Fisheries, Oceans and the Canadian Coast Guard (the Fisheries Minister). Any such work requires an authorization (Section 35(2)(b) and Section 34.4(2)(b)) and with an appropriate offsetting (e.g., habitat compensation) of residual adverse effects after avoidance and mitigation steps have been taken.

Section 34.3(2) provides provisions for maintaining adequate flow and respecting the free passage of fish.

Under Section 36 of the *Fisheries Act*, "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish" without authorization.

Species at Risk Act

The federal SARA provides protection for SAR in Canada. The legislation provides a framework to facilitate recovery of species listed as Threatened, Endangered, or Extirpated, and to prevent species listed as Special Concern from becoming Threatened or Endangered. Endangered or Threatened SAR on Schedule 1 and their habitats are protected under SARA, which prohibits: 1) the killing, harming, or harassing of Endangered or Threatened SAR (Sections 32 and 36), and 2) the destruction of critical habitat of an Endangered or Threatened SAR (Sections 58, 60, and 61). Species listed as Special Concern on Schedule 1 of SARA, species listed on Schedule 2 and 3, and species with no SARA status are not subject to these prohibitions.

11.2.1.2 Provincial

Nova Scotia Environment Act

The *Environment Act*, enforced by NSECC supports the preservation, management, and sustainable use of environmental resources in Nova Scotia. Within the *Environment Act* there are a number of other regulations to protect the aquatic environment, including the environmental assessment process, release of substances, dangerous goods, waste management, and water resource management.

Nova Scotia Endangered Species Act

The NS ESA provides protection, designation, recovery, and conservation for species at risk and their habitats to prevent extirpation or extinction because of human activity. The NS ESA defines species as a plant, animal, or other organism, and includes one or more populations of a species, and the eggs, larvae or other forms of developmental life of a species and any part of an individual of a species but does not include a domesticated species.

Nova Scotia Wildlife Act

The Nova Scotia *Wildlife Act* is an act to provide for the protection, management and conservation of wildlife and wildlife habitat. The *Wildlife Act* defines wildlife as vertebrates that, in their natural habitat, are usually wild by nature and includes (i) domestic organisms that are physically similar to their wild counterparts, (ii) exotic wildlife, (iii) hybrid descendants of wildlife or of wildlife and a domestic organism, (iv) the eggs, sperm or embryos of wildlife, and (v) any other organism designated as wildlife by the Governor in Council in accordance with this Act and the regulations.

11.2.1.3 Other

Canadian Environmental Quality Guidelines (CEQG)

The Canadian Council of Ministers of the Environment (CCME) has established environmental quality guidelines for chemical-specific concentrations in various environmental media (CCME 2022). For the aquatic environment, the Canadian Environmental Quality Guidelines include the Canadian Water Quality Guidelines for the Protection of Aquatic Life (Freshwater) and the Canadian Sediment Quality Guidelines (CSQG) Probable Effects Level (PEL) and Interim Sediment Quality Guidelines (ISQG). As the CEQG environmental quality values are guidelines, they do not have force of law unless formally adopted by the provinces; however, they do provide a reasonable basis for establishing environmental quality.

11.2.2 Spatial Boundaries

The assessment of potential environmental interactions between the Project and the aquatic environment is focused on a PDA and an LAA.

The PDA for the Project is defined as the immediate area of physical disturbance associated with construction, operation and maintenance, and decommissioning of the Project. The PDA encompasses the Project footprint and includes the 38 m wide right-of-way (RoW) for the transmission line.

The LAA for the aquatic environment is defined as the Project Area and watercourses and waterbodies that intersect with the Project Area. A 500 m buffer has also been applied to the transmission line RoW to capture potential upstream and downstream effects related to clearing and operation and maintenance of the RoW.

11.3 Existing Conditions for the Aquatic Environment

11.3.1 Approach and Methods

11.3.1.1 Existing Information Sources

The review of existing literature and information included:

- Publicly available scientific information (e.g., CSAS, DFO Stock Assessment or COSEWIC reports)
- Recreational fisheries information obtained from provincial angling guides or databases
- Project specific field reports (Strum 2020)

11.3.1.2 Field Studies

A desktop study was conducted by Strum in 2020 to identify watercourse crossings along the proposed transmission line RoW. Field surveys were then undertaken to assess the fish habitat present at a subset of the watercourses (Strum 2020). A total of 92 watercourses within the RoW were identified. Of those, 79 were surveyed for fish habitat in the field and the 13 larger watercourses were not surveyed as they were large enough to assume to be fish bearing and were assessed by satellite imagery only. The fish habitat characterization assessed the potential for fish habitat within the RoW. Fish habitat information was collected on a habitat type scale and included: substrate composition, bank condition, riparian vegetation, instream cover, wetted and channel width and depth.

11.3.2 Description of Existing Conditions

11.3.2.1 Fish Habitat

The desktop assessment identified 92 watercourse crossings along the proposed transmission line, and field surveys determined that 48 are permanent watercourses, 27 are intermittent (i.e., irregular flow within defined channels) and 17 are ephemeral (i.e., seasonal flow with poor channelization; Strum 2020).

Of the 48 permanent watercourses, 31 were classified as small and were characterized by either fine substrates or cobbles, and riparian vegetation dominated by shrubs and grasses (Strum 2020). These small watercourses have significant instream cover and approximately half have instream vegetation. The remaining 17 watercourses were large, with channel widths larger than 2 m. Of the 17 large watercourses, thirteen were not surveyed for fish habitat as they were large enough to assume to be fish bearing. There was some uncertainty regarding the fish-bearing status of the remaining four larger watercourses; these were surveyed by Strum (2020). The larger watercourses which were surveyed, had a range of substrates (i.e., fines to bedrock), and generally had riparian vegetation dominated by shrubs and grasses (Strum 2020).

11.3.2.2 Fish Communities

The watersheds crossed by the Project, may include Atlantic salmon (Salmo salar), brook trout (Salvelinus fontinalis), brown trout (Salmo trutta), American eel (Anguilla rostrata), chain pickerel (Esox niger), white perch (Morone americana), yellow perch (Perca flavescens), smallmouth bass (Micropterus dolomieu), brown bullhead (Ameiurus nebulosus) and gaspereau (Alosa aestivalis or A. pseudoharengus) (Nova Scotia Department of Fisheries and Aquaculture 2019). Other species found in these watersheds include but are not limited to blacknose dace (Rhinichthys atratulus), white sucker (Catostomus commersonii), common shiner (Luxilus cornutus), lake chub (Couesius plumbeus), creek chub (Semotilus atromaculatus), golden shiner (Notemigonus crysoleucas), banded killifish (Fundulus diaphanus), stickleback (Gasterosteus sp.). Brown trout, smallmouth bass and chain pickerel are introduced species (Nova Scotia Department of Fisheries and Aquaculture 2019).

As no in-field fish surveys were undertaken, all watercourse crossings (including ephemeral and intermittent streams) are assumed to be fish bearing.

11.3.2.3 Aquatic Species at Risk and Conservation Concern

Freshwater aquatic species at risk (SAR) include species listed as extirpated, endangered, threatened, or special concern by the federal SARA, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), or the NS SARA. For aquatic SAR, only species listed as Extirpated, Endangered, or Threatened on Schedule 1 and their habitats are protected by the prohibitions of SARA. Freshwater species of conservation concern (SOCC) are species not listed or protected by any legislation, but are considered rare in Nova Scotia, or their populations may not be considered sustainable. SOCC are here defined to include species that are not SAR, but are ranked S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable) in Nova Scotia by the AC CDC.

Seven aquatic SAR/SOCC have the potential to inhabit the LAA: American eel (COSEWIC 2012), Inner Bay of Fundy (iBoF) and Gaspe-Southern Gulf of St. Lawrence (GSGSL) Atlantic salmon (COSEWIC 2010), brook trout (Strum 2020), brook floater (Alasmidonta varicosa; COSEWIC 2009), eastern lampmussel (Lampsilis radiata), creeper (Strophitus undulatus) and tidewater mucket (Leptodea ochracea; Strum 2020). The conservation status for each species is provided in **Table 11.1**.

Table 11.1 Freshwater Species at Risk/Species of Special Concern Potentially Occurring within the LAA

Species		Conservation Status		
Scientific Name	**Common Name**	**SARA**	**COSEWIC**	**S-Rank**
Anguilla rostrata	American eel	No Status	Threatened	S3N
Salmo salar	Atlantic salmon - Inner Bay of Fundy (iBoF)	Schedule 1, Endangered	Endangered	S1 (Critically Imperiled)
Salmo salar	Atlantic salmon - Gaspe-Southern Gulf of St. Lawrence	No Status	Special Concern	S1 (Critically Imperiled)
Salvelinus fontinalis	Brook trout	No Status	No Status	S3 (Vulnerable)
Alasmidonta varicosa	Brook floater	Schedule 1, Special Concern	Special Concern	S3 (Vulnerable)
Strophitus undulatus	Creeper	No Status	No Status	S3 (Vulnerable)
Margaritifera margaritifera	Eastern pearlshell	No Status	No Status	S2 (Imperiled)
Leptodea ochracea	Tidewater mucket	No Status	No Status	S1 (Critically Imperiled)

American eel and Atlantic salmon are diadromous meaning they spend a portion of their life cycle in both the marine and freshwater environments and are not resident in the watersheds of the Project Area for the duration of their life cycle. Brook trout may be anadromous or resident.

Atlantic salmon that occur within the Missaguash, Kelly/Maccan/Hebert, Economy and Salmon/Debert watersheds are part of the iBoF population. Atlantic salmon that occur within the Tidnish/Shinmicas and Philip/Wallace watersheds are part of the Gaspe- Southern Gulf of St. Lawrence (GSGSL) population.

The brook floater, creeper, eastern pearlshell, and tidewater mucket are species of mussels and reside within freshwater environments.

11.3.2.4 Fisheries

The Inner Bay of Fundy/North Shore area of Nova Scotia has recreational fisheries for several freshwater fish species including brook trout, brown trout, rainbow trout, and landlocked Atlantic salmon (Nova Scotia Department of Fisheries and Aquaculture 2023). The sea-run Atlantic salmon fishery in iBoF rivers has been closed since 1984 (DFO 2010). The rivers crossing the Project Area are a traditional and cultural resource for local Indigenous Groups (detailed in Section 13).

11.4 Effects Assessment

11.4.1 Assessment Criteria

This section describes the criteria used to assess environmental effects on the aquatic environment. Residual environmental effects (Section 11.4.4) are assessed and characterized using criteria defined in

Section 11.4.1.1, including direction, magnitude, geographic extent, timing, frequency, duration, reversibility, and ecological or and socioeconomic context. The assessment also evaluates the significance of residual effects using threshold criteria or standards beyond which a residual environmental effect is considered significant. The definition of a significant effect for aquatic environment VC is provided in Section 11.4.1.2 below. Section 11.4.2 identifies the environmental effects to be assessed for the aquatic environment, including effect pathways and measurable parameters. This is followed by the identification of potential Project interactions with this VC (Section 11.4.2).

11.4.1.1 Residual Effects Characterization

Table 11.2 presents definitions for the characterization of residual environmental effects on the aquatic environment. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not practical.

Table 11.2 Characterization of Residual Effects on the Aquatic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to the aquatic environment relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to the aquatic environment relative to baseline
Magnitude	The amount of change in measurable parameters of the VC relative to existing conditions	Change in Fish Habitat Quality **Negligible –** no measurable change from baseline conditions • **Low –** a measurable change in habitat quality that is within the range of natural variability • **Moderate –** a measurable change in habitat quality that is greater than the range of natural variability however, that does not affect the ability of fish to use this habitat to carry out one or more of their life processes • **High –** a measurable change in habitat quality that is greater than the range of natural variability and large enough that fish can no longer rely on this habitat to carry out one or more of their life processes
		Change in Fish Health and Survival **Negligible –** no measurable change in the abundance or survival of local fish populations **Low –** a measurable change in the abundance or survival of local fish populations that is within the range of natural variability **Moderate –** a measurable change in the abundance or survival of local fish populations that is greater than the range of

Table 11.2 Characterization of Residual Effects on the Aquatic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		natural variability. However, does not affect the sustainability of fish populations **High –** a measurable change in abundance or survival of local fish populations that is greater than the range of natural variability and is large enough to potentially affect the sustainability of fish populations
Geographic Extent	The geographic area in which a residual effect occurs	**PDA –** residual effects are restricted to the Project development area **LAA –** residual effects extend into the local assessment area
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	Single event Multiple irregular event – occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously
Duration	The period of time required until the measurable parameter or the VC returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived	**Short term** – residual effect extends for less than five years **Medium term** – residual effect extending five to fifteen years **Long term** – residual effect extends more than fifteen years **Permanent –** recovery to baseline conditions unlikely
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant	**Not Applicable –** Effect does not occur during critical life stage or timing does not affect the VC **Applicable –** Effect occurs during a critical life stage or timing affects the VC
Reversibility	Describes whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and rehabilitation **Irreversible –** the residual effect is unlikely to be reversed after activity completion and rehabilitation
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	Change in Fish Habitat Quality and/or Quantity **Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

Table 11.2 Characterization of Residual Effects on the Aquatic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
		Change in Fish Health and Survival **Resilient –** populations are stable and able to assimilate the additional change **Not Resilient –** populations are not stable and are not able to assimilate the additional change because of having little tolerance to imposed stresses due to fragility or near a threshold

11.4.1.2 Significance Definition

A significant adverse residual effect on the aquatic environment is defined as one that results in one or more of the following:

- A Project-related HADD of fish habitat or the death of fish, as defined by the Fisheries Act, that cannot be mitigated, authorized, or offset
- A Project-related death of fish, as defined by the Fisheries Act, that cannot be mitigated, authorized, or offset
- A Project-related activity restricting the free passage of fish, as defined by the Fisheries Act
- A Project-related deposit of a deleterious substance into the aquatic environment which results in the death of fish or HADD of fish habitat, as defined by the Fisheries Act, that is not authorized and cannot be mitigated
- A change to the sustainability of fish populations or SAR/SOCC within the LAA where recovery to baseline is unlikely

11.4.2 Potential Project Interactions with Aquatic Environment

Activities and components could potentially interact with the aquatic environment and result in adverse environmental effects. In consideration of these potential interactions, the assessment of Project-related environmental effects on the aquatic environment is therefore focused on the potential environmental effects listed in **Table 11.3**. These potential environmental effects will be assessed in consideration of specific measurable parameters, also listed in **Table 11.3**.

Table 11.3 Potential Environmental Effects and Measurable Parameters for the Aquatic Environment

Potential Environmental Effect	Effect Pathways	Measurable Parameter
Change in fish habitat quality	• Alteration of riparian vegetation • Erosion and sedimentation • Release of deleterious substances	• Water quality, including but not limited to total suspended solids (TSS) (mg/L); dissolved oxygen (DO) (mg/L); water temperature (°C); pH. • Fish habitat (physical characteristics including substrate, velocity, cover, sediment quality)
Change in fish health and survival	• Alteration of riparian vegetation • Erosion and sedimentation • Release of deleterious substances	• Abundance (numbers of fish) • Community structure (proportion of each species) • Mortality (numbers of fish)

Table 11.4 identifies the physical activities that may interact with the VC and result in an environmental effect. These interactions are discussed in detail in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 11.4 Potential Interactions Between Physical Activities and the Aquatic Environment

Phase	Change in Fish Habitat Quality	Change in Fish Health and Survival
Construction		
Site Preparation and Clearing	✓	✓
Excavation and Structure Assembly	-	-
Conductor Stringing	✓	✓
Expansion of Onslow Terminal	-	-
Inspections and Energization	-	-
Clean-Up and Revegetation	✓	✓
Employment and Expenditure	-	-
Operation and Maintenance		
Presence of Conductors and Towers	-	-
Inspections and Maintenance	-	-
Vegetation Management	✓	✓
Notes: ✓ = Potential interaction – = No interaction		

Avoidance measures including physically relocating Project components (e.g., structures and substations) and activities away from the aquatic environment and reducing the number of watercourses crossed by heavy equipment (through use of existing access) have reduced potential direct interactions between Project components or activities and the aquatic environment, where practicable.

In the absence of mitigation, the Project may interact with fish habitat quality or fish health and survival in the following ways:

- Site Preparation and Clearing and Conductor Stringing including clearing vegetation and installation of temporary bridges, may alter fish habitat quality related to run-off, changes in temperature and the removal of overhead cover.
- Clean-Up and Revegetation will stabilize and grade disturbed areas surrounding watercourses and waterbodies which will provide benefits to fish habitat quality and fish health and survival by indirectly supporting the regrowth of riparian vegetation and providing overhead cover.
- Vegetation Management will result in the need for spraying and/or manual cutting after initial RoW clearing which could result in changes in fish habitat through instream or riparian disturbances (i.e., bank erosion and sedimentation), which may in turn effect fish health and survival as a result of exposure to sediments or contaminants.

The following Project activities are not expected to result in a change in fish habitat quality or fish health and survival:

- During construction, excavation and structure assembly, expansion of Onslow terminals, and inspections and energization will occur on land, away from watercourses and waterbodies and will not interact with fish habitat quality or fish health and survival.
- During construction, employment and expenditure is not expected to interact with fish and fish habitat as no new access to watercourses or waterbodies will be provided. As access to the Project area will remain the same, angling activity in the area will likely go unchanged and therefore no change in fish health and survival is anticipated.
- During operation and maintenance, the presence of conductors and towers, and inspections will all occur on land, away from watercourses and waterbodies and will not interact with fish habitat quality or fish health and survival.

11.4.2.1 Potential Effects to the Aquatic Environment During Construction

Change in Fish Habitat Quality

The main Project components which interact with freshwater fish habitat quality are the site preparation and clearing and conductor stringing. Their interactions with fish habitat quality are well known as they involve the clearing of riparian vegetation in the RoW. These activities can increase the potential for changes in fish habitat quality because of changes in riparian vegetation, and overhead cover, and water temperature. The removal of tall riparian vegetation adjacent to the watercourse has the potential to increase water temperatures by exposing the watercourse to direct sunlight and reducing protective canopy cover for fish.

A potential interaction could also occur with freshwater fish and fish habitat because of heavy equipment being used on land during site preparation and clearing and installation of temporary bridges. A change in fish habitat could potentially occur from inadequate erosion and sedimentation controls within the RoW to limit siltation to nearby watercourses/waterbodies (e.g., change in-stream sediment concentrations). The effect of increased sediment reaching fish habitat may be compounded if it occurs during the spawning, incubation, or hatching period of a fish species (DFO 2019).

Deleterious substances could enter watercourses and degrade fish habitat if not properly managed within the RoW or if construction equipment is improperly cleaned or maintained.

Change in Fish Health and Survival

During the construction of the new 138 kV transmission line, the main Project components that will interact with fish health and survival will be site preparation and clearing and conductor stringing. The clearing of riparian vegetation during construction could affect fish health due to changes in shade, protective cover, and/or external nutrient/energy inputs (Zalewski et al. 2001). Changes in overhead cover may affect predation rates on fish, alter water quality (i.e., temperature) or affect primary and secondary productivity on which fish rely as food sources (Zalewski et al. 2001).

A potential interaction could also occur with fish health and survival as a result of heavy equipment being used on land during site preparation and clearing and installation of temporary bridges. A change in fish health and survival could result from the erosion and transportation of soils within the RoW to nearby watercourses/waterbodies (e.g., change in sediment concentrations). Sedimentation events can inhibit the ability of fish to forage, cause behavioural or physiological changes in fish and the smothering of eggs (Sweka and Hartman 2001; Herbert and Merkens 1961; Kjelland et al. 2015). Fish eggs and larvae have been shown to be the life stage most sensitive to increased sedimentation through the reduction of water flow and decreased oxygen delivery to eggs (Greig et al. 2007; Wood and Armitage 1997; Kemp et al. 2011).

Deleterious substances could enter watercourses and result in changes in fish health and survival if not properly managed within the RoW or if construction equipment is improperly cleaned or maintained.

11.4.2.2 Potential Effects to the Aquatic Environment During Operation and Maintenance

Change in Fish Habitat Quality

Integrated vegetation management during operation and maintenance could result in a change in riparian vegetation, overhead cover, and temperature along watercourses/waterbodies. The removal of riparian vegetation adjacent to the watercourse has the potential to increase water temperatures by exposing the watercourse to direct sunlight and reducing protective canopy cover for fish.

During operation, the introduction of deleterious substances to watercourses has the potential to degrade fish habitat if fuels and lubricants are not properly managed within the RoW or if construction equipment is improperly cleaned or maintained.

Change in Fish Health and Survival

During operation and maintenance, vegetation management including spraying and/or cutting of vegetation could result in changes in riparian vegetation, overhead cover, external nutrient/energy inputs or exposure to contaminants which may affect the health and survival of fish species through changes in predation rates on fish, water quality (i.e., temperature) or primary and secondary productivity which fish rely on for food (Zalewski et al. 2001).

During operation, the introduction of deleterious substances to watercourses has the potential to effect fish health and survival if fuels and lubricants are not properly managed within the RoW or if construction equipment is improperly cleaned or maintained.

11.4.3 Mitigation for the Aquatic Environment

Interactions between Project activities and the aquatic environment will be managed in consideration of the environmental effects pathways. Mitigation measures will include standard, proven measures for sediment and erosion control, outlined in the NSP Contractor Environmental Requirements (NSP 2023) which will be incorporated into a Project specific EPP. Mitigation measures will also incorporate DFO's "Measures to Protect Fish and Fish Habitat", DFO standards and codes of practice, Watercourse Alteration permit (WAP) conditions, which consider regulations and guidelines that govern fish and fish habitat protection. The Project has been designed to avoid these pathways to the extent practicable through shifting the placement of infrastructure away from waterbodies/watercourses and by using existing access roads to the extent practicable. Where this is not practically feasible, the mitigation measures described below have been selected in consideration of the environmental effects pathways and include standard proven mitigation measures from the Project EPP, DFO measures to protect fish habitat, standards, and best management practices, and consider regulations and guidelines that govern fish and fish habitat protection. Mitigation measures for the aquatic environment are identified in **Table 11.5**.

While existing access for construction equipment will be used where possible, temporary bridges may be used if necessary to cross watercourses. The temporary bridges will be located above the normal high-water mark of watercourses, and thus no in-water work is planned. If culverts are installed to provide access, the installation will be in accordance with the Project EPP, WAP requirements and other relevant permits.

Table 11.5 Mitigation Measures: Aquatic Environment

Category	Mitigation	Construction	Operation and Maintenance
Site Preparation	• Project footprint and disturbed areas will be limited to the extent practicable. The Project will adhere to a maximum RoW width of 38 m.	✓	-
	• Movement of equipment/vehicles will be restricted to defined work areas and roads, and specified corridors between work areas.	✓	✓
	• Where existing roads are insufficient, temporary bridges may be used to provide access for all machinery and equipment to cross watercourses (DFO 2020). All bridges will be installed as per the EPP and any applicable WAP requirements.	✓	-
	• Heavy equipment will not be used for clearing of vegetation for areas within 30 m of the banks of a watercourse. If required, vegetation within 30 m of a watercourse will be managed according to the PSEPP and WAP conditions. This 30 m buffer will be clearly marked at all watercourses.	✓	✓
	• Standard erosion and sedimentation control structures will be used (*e.g.*, silt curtains, sediment control fences), inspected regularly, and maintained throughout construction activities. Sediment control fences will be removed following stabilization or revegetation.	✓	-
	• Weather advisories will be followed, and work will be scheduled to avoid high precipitation and runoff events	✓	-

Table 11.5 Mitigation Measures: Aquatic Environment

Category	Mitigation	Construction	Operation and Maintenance
	or periods to the extent practicable, to reduce potential for erosion/sedimentation.		
	• All equipment will be inspected and cleaned prior to use onsite to prevent the transfer of non-native species.	✓	-
	• Overburden storage piles and exposed topsoil will be placed away from bodies of water.	✓	-
	• Waste material (i.e., construction debris) will be contained and disposed of in an approved manner.	✓	-
	• Surplus or sediment-laden water will be controlled and treated prior to release (*e.g.*, filtration through vegetation or engineered erosion control devices or settling ponds).	✓	-
Materials Handling and Waste Management	• All fuels and lubricants used during construction will be stored according to regulated containment methods in designated areas. Storage areas will be located at least 30 m from watercourses, wetlands, and water supply areas (including known private wells).	✓	✓
	• Refueling of machinery will not occur within 30 m of watercourses and water supply areas to reduce the likelihood that deleterious substances will enter watercourses. Where stationary equipment is situated, special precautions will be implemented to prevent spills during refueling. Spill response kits will be located at the refueling site.	✓	✓
	• Disposal and handling of waste oils, fuels, and hazardous waste will be as recommended by the suppliers and/or manufacturers in compliance with federal, provincial, and municipal regulations.	✓	✓

11.4.4 Characterization for Residual Project Environmental Interactions for the Aquatic Environment

This section discusses the residual Project-related residual effects to the aquatic environment following the application of mitigation in Section 11.4.3.

Change in Fish Habitat Quality

The main Project components which interact with fish habitat quality are site staging preparation and clearing and conductor stringing. The interactions with fish habitat quality are related to heavy equipment use in the RoW, installation of temporary access bridges, changes in riparian vegetation, overhead cover and water quality. Potential erosion and transportation of soils in the RoW will be mitigated with best practices for sediment and erosion control, and riparian vegetation within 30 m of watercourses will be cleared manually to avoid the use of industrial equipment near water. Given adherence to standard management practices and the Project EPP, effects to fish habitat quality are anticipated to be negligible.

The frequency of integrated vegetation management during operation and maintenance varies depending on vegetation growth rates, but it is typically carried out in 3-to-6-year cycles. Herbicide application will follow required set back distances (30 to 60 m) and will be applied in a manner consistent with NSPI's Vegetation Management Operations Procedures and permit issued by NSECC. Riparian vegetation within 30 m of watercourses will be cut manually. Given the infrequent occurrence and adherence to the management practices described above and the Project EPP, effects to fish habitat quality are anticipated to be negligible to low.

With mitigation, the Project will result in a change in fish habitat quality in the Project Area, due to changes in riparian vegetation and overhead cover. This will occur once during construction, and as required during operation. Based on past evidence, the residual environmental effects will be reversible following decommissioning and rehabilitation. Overall, with the application of best practices and the Project EPP, residual Project related effects are anticipated to be low in magnitude for fish habitat quality, restricted to the Project Area, occur as a single event during construction, regular event during operation, and be reversible.

Change in Fish Health and Survival

Pathways that affect fish health and survival as outlined in Section 11.4.2 are related to site preparation and clearing, conductor stringing and integrated vegetation management. In general, the pathways of effects for fish habitat quality can also affect fish health and survival.

Removal of riparian vegetation during construction could affect fish health due to changes in shade, protective cover, and/or external nutrient/energy inputs (Zalewski et al. 2001). Changes in fish habitat may affect predation rates; however, there are unlikely to be substantial alterations to primary and secondary productivity, upon which fish rely as food sources, given the limited area of disturbance (Zalewski et al. 2001).

The Project has been designed to avoid these pathways to the extent practicable through shifting the placement of infrastructure away from waterbodies/watercourses. Where avoidance is not feasible, mitigation (Table 11.4) will be used to reduce the potential for effects for activities near water. When working near water, interactions for fish and fish habitat are well known, and the Project EPP and DFO's Measures to Protect Fish and Fish Habitat and codes of practice will be followed. Key mitigation will be manual clearing of riparian vegetation near watercourses/waterbodies, sediment and erosional control within the RoW, and preventing the introduction of deleterious substances. With mitigation, the Project is not anticipated to result in a change in fish health and survival in the LAA. Overall, with avoidance, and mitigation included in the Project EPP, DFO guidance and best practices, residual Project related effects on fish health and survival are anticipated to be negligible.

Summary

A summary of the residual environmental effects on the aquatic environment during Project construction and operation and maintenance is provided in **Table 11.6**.

Table 11.6 Project Residual Effects on the Aquatic Environment

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in Fish Habitat Quality	C	A	L	PDA	LT	A	S	R	D
	O	A	L	PDA	LT	A	R	R	D
Change in Fish Health and Survival	C	N/A	N	LAA	N/A	N/A	N/A	N/A	D
	O	N/A	N	LAA	N/A	N/A	N/A	N/A	D

KEY:
See Table 11.2 for detailed definitions

Project Phase
C: Construction
O: Operation and Maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project Development Area
LAA: Local Assessment Area

Duration:
ST: Short term
MT: Medium term
LT: Long term
P: Permanent

Timing:
N/A: Not Applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
Change in Fish Habitat Quality and/or Quantity:
D: Disturbed
U: Undisturbed

Change in Fish Health and Survival:
R: Resilient
NR: Not resilient

N/A: Not applicable

11.5 Determination of Significance

For the purposes of this environmental assessment, a significant residual environmental effect on fish and fish habitat is defined as a Project-related environmental effect that results in:

- HADD of fish habitat or the death of fish, as defined by the Fisheries Act, that cannot be mitigated, authorized or offset

- an activity restricting the free passage of fish, as defined by the Fisheries Act
- a change to the productivity or sustainability of fish populations or fisheries within the LAA where recovery to baseline is unlikely, or is contrary to or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans
- contravention of any of the prohibitions stated in Sections 32-36 of the Species at Risk Act or relevant provincial acts regarding SAR

In consideration of the VC-specific significance criteria defined above in Section 11.4.3, and with application of avoidance (through Project design) and mitigation, the residual effects of routine Project activities on the Aquatic Environment are predicted to be not significant.

The Project has been designed to avoid effects to fish habitat through careful planning of the placement of infrastructure and shifting locations of activities away from waterbodies/watercourses. Where avoidance was not feasible, the application of the Project EPP, best practices in accordance with DFO's "Measures to Protect Fish and Fish Habitat", DFO standards and codes of practices and other standard mitigation will be employed to reduce the potential for effects. Work near water will be reduced to the extent practical. The potentially affected fish species are widely distributed, and their habitat preferences are well known to allow for prediction of effects. The environmental effects from construction and operation of transmission lines are well understood. NSPI has well-developed construction practices for environmental protection and mitigation, a Project-specific EPP will be developed that will include best practices to avoid or reduce adverse effects throughout the Project lifecycle.

Therefore, the overall determination is made with a high level of confidence, given that best management practices and standard mitigation will be in place when working around water.

11.6 Follow-up and Monitoring

Follow-up and monitoring are intended to verify the accuracy of predictions made during the EA, to assess the implementation and effectiveness of mitigation, and to manage adaptively, if required. 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 will include the adaptive management process. This may include identification of existing and/or new mitigation measures to be implemented to address it (i.e., increased sediment and erosion control). Follow-up or monitoring required by applicable permits will be provided, as appropriate to regulators.

11.7 References

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12 Assessment of Environmental Effects on Archaeological and Heritage Resources

12.1 Rationale for Selection as a Valued Component

Archaeological and heritage resources have been selected as a VC in recognition of the interest that provincial and federal regulatory agencies, which are responsible for management of these resources, the general public as a whole, and potentially affected Mi'kmaq First Nations have in the preservation and management of archaeological and heritage resources related to their culture.

Archaeological and heritage resources are defined as any physical remnants found on top of and/or below the surface of the ground that inform us of past human use of, and interaction with, the physical environment. These resources may be from the earliest period of human occupation (Pre-contact Period) or from the more recent Historic Periods. These resources are relatively permanent features of the environment, and their integrity is highly susceptible to the effects of construction and ground disturbing activities. The context, or archaeological landscape, of built heritage resources is also considered susceptible to changes, such as the addition of new structures in the immediate area of these resources.

12.2 Scope of Assessment for Archaeological and Heritage Resources

12.2.1 Regulatory Context

Archaeological and heritage resources in Nova Scotia are administered by the Special Places Program (SPP) of the Nova Scotia Department of Communities, Culture, Heritage and Tourism (NSCCTH).

Archaeological sites are considered to be non-renewable resources and the disturbance of such resources is only authorized under strictly controlled conditions imposed by terms of a Heritage Research Permit (Archaeology) or Heritage Research Permit (Palaeontology). These permits are only issued to qualified personnel by the provincial government through the Minister responsible for the administration of the Special Places Protection Act. This Act provides for the preservation, protection, regulation, exploration, excavation, acquisition, and study of archaeological and historical remains and palaeontological sites which are considered important parts of the natural or human heritage of Nova Scotia. In addition to meeting the requirements under the Special Places Protection Act, all phases of the Project have involved, and will continue to involve, engagement with the Mi'kmaw Rights Initiative (KMKNO), including the review of archaeological studies in support of the Project.

12.2.2 Spatial Boundaries

The assessment of potential environmental interactions between the Project and archaeological and heritage resources is focused on a PDA and an LAA.

The PDA for the Project is defined as the area of physical disturbance associated with the construction and operation of the Project. The PDA is described in Section 2 and depicted on **Figure 2.1**.

The LAA for archaeological and heritage resources is defined as the area within which the environmental effects of the Project can be measured or predicted and can be thought of as the "zone of influence" of the Project on archaeological and heritage resources. The LAA for archaeological and heritage resources is the same as the PDA, as it is only within the PDA that construction and ground-disturbing activities could interact with archaeological and heritage resources. Archaeological and heritage resources located outside of the PDA are discussed in the "existing conditions" section below only to inform this assessment regarding the potential for unknown archaeological and heritage resources within the PDA (i.e., desktop study area). However, the resources outside of the PDA will not be directly affected by the Project and are not considered further in this assessment.

The PDA is located in both Colchester and Cumberland counties, within the greater Mi'kmaw territories of Sipekne'katik and Siknikt. Beginning approximately 5 km northwest of Truro and ending approximately 7.5 km northwest of Amherst, the PDA for the proposed L8006 RoW measures approximately 96 km long by 40 m wide. A broader study area was used for a desktop study of existing registered Maritime Archaeological Resource Inventory (MARI) sites, measuring 96 km along by 5 km wide. The PDA also includes the proposed expansion of the 67-N Onslow Substation which will encompass an area at the north end of the existing substation measuring approximately 80 m by 175 m.

12.3 Existing Conditions for Archaeological & Heritage Resources

Existing conditions for the Archaeological and Heritage Resources VC were established through an Archaeological Resource Impact Assessment (ARIA) in 2021 by Boreas Heritage Consulting Inc. (Boreas Heritage) with follow up work conducted in 2022 by Cultural Resource Management Group Limited (CRM Group). Boreas Heritage undertook archaeological screening and reconnaissance for the Transmission Line L8006 portion of the PDA, which included, but was not limited to, background research, the development and application of an archaeological potential model, preliminary aerial reconnaissance, and select pedestrian surveys. CRM Group then conducted select archaeological testing in 2022 in relation to a geotechnical program at four high archaeological potential areas identified by Boreas 2021. In 2023, CRM Group conducted a separate ARIA, including background research and pedestrian surveys, for the proposed expansion of the 67-N Onslow Substation. A brief summary of existing conditions regarding archaeological and heritage resources, with emphasis on the PDA is provided below (excerpts from Boreas Heritage 2021, CRM Group 2023a, and CRM Group 2023b;).

12.3.1 Approach and Methods

The purpose of the desktop component of the ARIA was to identify areas considered to exhibit high potential for encountering archaeological resources within the PDA. Any areas of elevated archaeological potential identified during the desktop component were targeted during pedestrian surveys in the field. Areas confirmed to exhibit high archaeological potential during the surveys were delineated and designated as High Potential Areas (HPA) and additional mitigation (i.e., shovel testing) will be required if these areas cannot be avoided by Project-related construction activities. The results of the desktop component provide interpretative and evaluative context for potential archaeological resources identified during the field component of the ARIA. As per Heritage Research Permit requirements, the Kwilmu'kw

Maw-klusuaqn Negotiation Office (KMKNO) was advised of the proposed Project as part of the desktop component of the ARIA.

The desktop component of the ARIA examined three elements: the environmental context, the archaeological context, and the historical context of the PDA. The environmental context is examined to identify past and current environmental influences or conditions that may elevate archaeological potential within the PDA (e.g., topography, local resources, and potential for agriculture). The archaeological context is examined to identify how people used and occupied the surrounding landscape based on evidence from previously registered archaeological sites and past archaeological work conducted near the Project. The historical context of the PDA is examined to identify how people used and occupied the local area based on evidence from published archival documents, ethno-historic records, local oral traditions, historic maps, local and/or regional histories, scholarly texts, and available property records.

In Nova Scotia, the Maritime Archaeological Resource Inventory (MARI) is maintained by the Nova Scotia Museum, on behalf of NSCCTH. Reports from past archaeological assessments and academic research conducted near the PDA provide archaeological context, which informs the interpretation and evaluation of any potential archaeological resources identified during the field component of the ARIA. Additionally, the desktop component of the ARIA involves a general review of topographic maps, coastal charts, and aerial photographs related to the PDA, to identify topographical and hydrological attributes that correlate with high archaeological potential (e.g., waterfalls/rapids as focal points for fishing or requiring portage, submerged marine terraces representing former coastline). These attributes are incorporated into the archaeological potential model (APM), developed by Boreas Heritage. The model described above has been developed by analyzing a range of natural and cultural attributes considered to have influenced past patterns of land use and settlement, and by extension, archaeological potential across the landscape. The attributes include proximity to water (essential for drinking and transportation), slope, aspect, and elevation, as well as proximity to known archaeological sites. The result of the modelling is a continuous depiction of archaeological potential within the PDA.

In general, 21st century maps, satellite imagery and GIS data reflect the land and coastline as they are today. Where possible, the APM uses topographic data that reflects the original, unmodified landforms as they were in the past. Modifications such as causeways, canals, and reservoirs, as well as shoreline reclamation and development, have substantively reshaped the modern landscape. The APM takes these variables into account and provides a continuous representation of the predicted archaeological potential across the entire landscape. The historical and cultural information is integrated with the environmental and physiographic date to identify areas of archaeological potential within the PDA and to provide a framework for the initial interpretation of any archaeological resources encountered during the field component of the ARIA. Combined, these critical lines of inquiry inform the results of the ARIA and provide context for the PDA as it relates to episodes of past human land-use, cultural interaction, settlement, and development.

12.3.2 Description of Existing Conditions

12.3.2.1 Environmental Context

Geological, topographical, hydrographical, and ecological factors have influenced the land use patterns of Precontact and historic period Indigenous peoples, as well as later historic period settlers. These factors are key to identifying and evaluating the archaeological potential of the PDA. Specific considerations for determining archaeological potential applied during the desktop and field components of the ARIA include the slope and drainage of landforms, available mineral resources, soil types and agricultural value, access to potable water, access to travel corridors (networks of footpaths and roadways, navigable coastline, and inland waterways), and the accessibility, seasonal variation and diversity of targeted flora and fauna species. The following paragraphs describe the environmental attributes specific to the PDA.

Higher ground and elevated positions, surrounded by low or level topography, often indicate past settlement and land use. Other geographic features, such as eskers, drumlins, sizable knolls, plateaus, and distinctive land formations (e.g., rock outcrops, caverns, mounds) are also strong indications of archaeological potential. The PDA extends through several terrestrial regions. Beginning in the greater terrestrial region known as the Carboniferous Lowlands – Rolling Upland – St. Marys Fault Block (572), the Transmission Line corridor progresses into the Avalon Uplands – Hardwood Plateau – Cobequid Hills before entering the Carboniferous Lowlands – Hills and Valleys – Cumberland Hills and Coastal Plain – Northumberland Plain – Northumberland Strait, ending within the greater terrestrial region of the Coastal Plain – Tantramar Marshes.

The east end of the Transmission Line corridor, occupying the St. Marys Fault Block, consists of a band of Horton rocks laying in a downfaulted block between two parallel faults (Davis & Browne 1996:134). The tills within this region are derived from the grey sandstone of the Horton bedrock. The soils commonly found within this region are Halifax soils, a well-drained brown sandy loam, Shulie soils, a brown gravelly silty loam to sandy loam, Springhill soils, a brown sandy loam, and Millbrook soils, a very dark greyish brown gravelly clay loam.

The Cobequid Hills represent a series of hills created by a steep-sided, elongated fault block, which forms a highland on the north side of the Minas Basin (Davis & Browne 1996:26). These highlands are composed of granites and volcanic deposits that have been crushed, folded, and faulted. The hills themselves form a “cigar-shaped block about 120 kilometres long, 15 kilometres wide, and on average 275 metres high” (Davis & Browne 1996:27). The Cobequid series of soils cover the majority of the region, comprised of a well-drained, dark brown sandy loam. Wyvern soils, a friable brown or dark brown sandy loam, occupy the northern portion of the region (Davis & Browne 1996:28). Hebert series soils, a well to excessively drained grayish brown to brown gravelly, sandy loam, are found around lakes.

The Cumberland Hills represent a hilly terrain underlain by sandstone and sandstone conglomerate bedrock. The soils within this region are generally coarse textured and well drained (Davis & Browne 1996:138). The gravelly sandy loams of the Rodney and Westbrook series of soils are common, as are the Queens, Kingsville, Joggins, and Diligence soils, all fine textured, clay loams with various inclusions (Davis &

Browne 1996:138). In river valleys, Hebert soils appear, while Economy soils, a mottled brown coarse sandy loam, are found in poorly drained or gently sloping sites within the region, predominate.

The Northumberland Strait region is a coast plain underlain by fine red sandstone, thrown into broad folds. Low ridges and valleys determine the outline of the coast in this region, with ridges running out to the sea as headlands, and valleys forming inlets and harbours along the coast. The sandstones and shale that underlie the region produce glacial tills of sandy loam and sandy clay loam. The two most common soils in this area include the Debert series, an imperfectly drained reddish brown, dark brown or brown sandy loam, and the Queens series, a fine-textured, imperfectly drained brown to reddish brown sandy clay loam. Within the more sloped topography of this region, more well-drained soils occur, including the Pugwash series, a reddish brown to brown sandy loam and the Tormentine series, a brown to yellowish red sandy loam. Kingsville and Masstown series of soils occupy the poorly drained areas of this region, while Hebert and Cumberland series, a brown sandy loam to loam, and Chaswood series, a mottled dark grey or grayish brown silty loam to silty clay loam, occupy stream and river areas.

The Transmission Line corridor terminates within the Tantramar Marshes region. These marshes occupy an area at the head of the Cumberland Basin, where the natural flat terrain meets the sediment- rich waters of the Bay of Fundy. These marshes consist of built-up silt and clay carried by the Bay of Fundy's spring tides (Davis & Browne 1996:113). Over the last 6,000 years, the Bay of Fundy has dictated the formation of marshes in the region, as the land subsided and sea levels rose. These silts and clays were transformed into agriculturally fertile grasslands through dyking, beginning with the Acadians in the 17th century. Future foundations of salt marshes continue to be created as the Bay of Fundy enlarges with rising sea levels and the erosion of headlands in the modern period. Three soils are common within this region, Acadia series, which exhibit little horizon development and are made up entirely of red-brown or grey silty clay loams, Peat, which is formed in low-lying areas and consists mostly of moss or sedge peat, and finally Masstown series soils, which consist of a mottled brown sandy loam to loam.

Proximity to water, for drinking, resource exploitation and transportation, is a key factor in identifying Precontact and historic Mi'kmaq, as well as early Euro-Canadian and African Canadian, archaeological potential. The Transmission Line corridor crosses three watersheds over its length. It begins in the Salmon and Debert watershed, which encompasses an area of approximately 1168 km^2 and progresses into the Philip and Wallace watershed, which encompasses an area of approximately 1494 km^2. The corridor terminates within the Tidnish and Shinimicas watershed, which encompasses an area of approximately 479 km^2. These watersheds provided corridors for transportation and represented an important resource base. Furthermore, other waterways in Mi'kma'ki are accessible through the Tidnish and Shinimicas watershed, including the Bay of Fundy.

Resource areas, including food or medicinal plants, and migratory routes and spawning areas, are also considered characteristics that indicate archaeological potential. Within the St. Marys Fault Block (572), balsam fir, white spruce, white pine, red spruce and eastern hemlock are preferred, as much of the topography is flat and poorly drained (Davis & Browne 1996:135). On some of the better-drained portions of the region, mixed hardwood stands survive. Within the Cobequid Hills (311), the common forest types depend upon the parts of the region, particularly the plateaus, in which the forests lay. At the top of the Cobequid plateau, sugar maple, yellow birch and American beech are interlaced with balsam fir and red and black spruce (Davis & Browne 1996:28). The northern portion of this plateau has large stands of hardwoods, while conifers become common in the southern portions. Within the ravines, eastern hemlock is common, while white spruce, red spruce, balsam fir, sugar maple, yellow birch and red maple form on the slopes, with black spruce, white spruce and white pine found in the valley bottoms (Davis & Browne 1996:28). In areas that were cleared for agriculture, blueberry fields now dominate. Deer are common and the Cobequid Hills support moose populations year-round (Davis & Browne 1996:28). Snowshoe hare are common, as are their predators, such as bobcats and coyotes. The Great Horned Owl nests in softwoods on the tops of hills, while Goshawks, Red-tailed Hawks and Barred Owls also call this region home (Davis & Browne 1996:29). Freshwater fish within this region include brook trout, brown trout, and Atlantic salmon.

In the Cumberland Hills, conifers and mixed forest are common, including red spruce, balsam fir, red maple, and birch (Davis & Browne 1996:138). On the more well-drained slopes of the Cumberland Hills, sugar maple, yellow birch, and American beech are common (Davis & Browne 1996:138). Moose occur within this region, particularly around Shulie Lake and Little Forks, and deer are also common (Davis & Browne 1996:138). Freshwater fish in this region include the white sucker, white perch, yellow perch, and banded killifish.

In the Northumberland Plain, black spruce, jack pine, white spruce, red spruce, and red maple are the most common species of tree in the heterogeneous mixed forests making up this region (Davis & Browne 1996:109). Eastern hemlock and white pine are found, with eastern hemlock sometimes occurring in pure stands, being amongst the first tree species to colonize disturbed areas. Within extensive boggy areas, larch and black spruce occur, while American beech and sugar maple are common upon the slopes close to larger streams. Muskrat, mink, raccoon, and red fox are common (Davis & Browne 1996:109) and river otter also occur, to a lesser degree. The freshwater in this region is productive, supporting Atlantic salmon, gaspereau, brown trout and brook trout. Finally, most ducks and marsh birds are common, as are Osprey, Bald Eagle, Semipalmated Plover, and the Common Tern (Davis & Browne 1996:109).

The Tantramar Marshes are covered by grasslands, which blanket the majority of the former salt marshes, now dyked. Dominant species of vegetation are cord grasses, rushes, sedges, and common reeds. At low tide, extensive mud flats are exposed beyond the remaining salt marshes (Davis & Browne 1996:114). A poorly drained forest composed of spruce and fir remains inland from the dyked fields and salt marshes of the Chignecto Isthmus, forming the coastal forest around the Cumberland Basin. Thousands of shore birds congregate to feast upon marine crustaceans in July and August on the mud flats of the Basin. Furthermore, the marshes provide waterfowl breeding areas. Canada Geese, Black Ducks, Green-winged Teals, Pintails, American Wigeon, Blue-winged Teal, and Ring-necked Ducks often land in these marshes to feed. Hawks and owls hunt year-round. Lakes, such as Long Lake, support large populations of brown bullhead and white perch, along with gaspereau runs in the rivers of the Cumberland Basin. Finally, the marshes provide a good habitat for raccoon, muskrat, mink, fox, beaver, and sometimes even otters (Davis & Browne 1996:114).

12.3.2.2 Archaeological Context

Pre-contact Overview of the Maritime Provinces

There is a general consensus regarding the broad patterns of regional cultural history in northeastern North America, and recognized terminology has been established for precontact development periods based on current archaeological knowledge (**Table 12.1**). Although our understanding of the prehistoric archaeology of the Maritimes is fragmented, available archaeological data reveals evidence of Indigenous occupation spanning most of the time period from the retreat of the last glacier to European contact and beyond. The prehistory of the region is thus discussed within the parameters of the existing cultural history framework. Prehistoric cultures are defined by a shared technology, settlement and subsistence patterns, and social systems, including political and religious beliefs, existing during a specific time period (Deal 2016). It is important to note; however, that the cultural history sequence and terminology presented below has been imposed exclusively by archaeologists and does not reflect Mi'kmaw perceptions of the past. Although an historical timeline has been developed for Nova Scotia (Lewis 2006; **Table 12.1**) that is more attuned to Mi'kmaw awareness and culture, it cannot be presumed to fully accommodate all Mi'kmaq within the Maritimes.

Sa'qiwe'k L'nu'k

In north-eastern North America, the Sa'qiwe'k L'nu'k or Palaeo-Indian period generally begins approximately 13,000 years ago. Based upon the established sequence of diagnostic projectile point styles, the period can be divided into Early and Late subperiods, and several regional phases have also been identified (Deal 2016). Artifacts associated with the Sa'qiwe'k L'nu'k have been recovered throughout the Maritimes; however, the region's acidic soil chemistry dissolves perishable materials, such as wood and bone, thus preventing the preservation of a complete Palaeo-Indian toolkit. Indeed, relatively few Sa'qiwe'k L'nu'k sites have been excavated in the northeast.

Table 12.1 Archaeological Periods for the Maritime Provinces

Archaeological Period	Date Range (BP = before present)	Mi'kmaw
Precontact Period	ca. 13,000 – 500 BP	
Palaeo Period	ca. 13,000 – 9,000 BP	*Sa'qiwe'k L'nu'k* The Ancient People
Early	ca. 13,000 – 10,000 BP	
Late	ca. 10,000 – 9,000 BP	
Archaic Period	ca. 9,000 – 3,000 BP	*Mu Awsami Kejikawe'k L'nu'k* The Not So Recent People
Early	ca. 9,000 – 7,000 BP	
Middle	ca. 7,000 – 5,000 BP	
Late	ca. 5,000 – 3,000 BP	
Terminal	ca. 4,000 – 3,000 BP	
Ceramic Period	ca. 3,000 –500 BP	*Kejikawe'k L'nu'k* The Recent People
Early	ca. 3,000 – 2,000 BP	
Middle	ca. 2,000 – 1,000 BP	
Late	ca. 1,000 –500 BP	
Historic Period	ca.1500 – Present (AD)	*Kiskukewe'k L'nu'k*
Contact Period	ca. 1500 – 1600 AD	
Early	ca. 1600 – 1750 AD	
Late	ca. 1750 – 1900 AD	
20th Century / Recent	ca. 1900 – Present	

The movement and melting of the glaciers changed sea levels, temperature, and precipitation, and greatly influenced the animals and plants that could survive in the region. Climatic changes associated with the Younger Dryas dramatically altered floral and faunal colonization patterns, which undoubtedly influenced human resource procurement strategies and migration patterns. Tundra vegetation, characterized by sedges, willows, grasses, sage, alders, and birch, developed behind retreating ice and was well-suited to the emerging peri-glacial landscape. This new environment attracted migrating caribou herds, followed by people of the northeastern Palaeo-Indian tradition.

Although the early human occupation of the Maritimes coincides with the Younger Dryas stadial, it is possible that humans followed late Ice Age fauna into the region at the end of the Allerød (Stea 2011). In any case, the earliest evidence of human presence in what is now Nova Scotia is the Debert-Belmont complex, representing one of the largest and most intact Sa'qiwe'k L'nu'k sites in North America and the oldest sites of human habitation in Eastern Canada (Rosenmeier et al. 2012). The inhabitants of Debert and other Palaeo-Indian sites in the region are generally described as mobile hunter-gatherers dependent upon migrating caribou herds, however there is evidence to suggest the presence of a biologically rich habitat that supported diverse subsistence patterns (Deal 2016).

The diagnostic artifact of the Sa'qiwe'k L'nu'k is the fluted projectile point, which has a central channel, or flute, running up both faces of the point from the base. This distinctive flute likely facilitated hafting onto a spear or lance (Bourque 2001). It is interesting to note that points recovered from Debert are considered a distinct variant of the classic Early Palaeo-Indian form (Tuck 1984). In addition to fluted projectile points and manufacturing debris, other tool forms from the period are known, including gravers, bifacial knives, and spurred scrapers, suggesting a range of living activities, including hunting and processing. Isolated finds with characteristics of Palaeo tool assemblages have been recovered from across the Maritimes and, although lacking temporal control, illustrate widespread distribution of Sa’qiwe’k L’nu’k throughout the region.

With the gradual onset of warmer temperatures at the end of the Younger Dryas, the tundra-like vegetation was replaced by wide- spread closed forests, including temperate conifer and deciduous populations, more suitable to solitary cervids like moose and deer. The Sa’qiwe’k L’nu’k had to respond and adapt to this changing environment and develop new procurement strategies, including changes to their lithic tool kit (Deal 2016). The most important and discernible change is the replacement of the fluted projectile points with non-fluted forms, generally used to signify the beginning of the Late Palaeo-Indian period (Deal 2016). Based on this changing technology, two distinct groups have been tentatively identified in the Maritime region; one manufacturing parallel-flaked, lanceolate, unfluted projectile points and the other using small triangular projectile points (Deal 2016). Although isolated artifacts have been recovered from coastal locations suggesting seasonal use of coastal resources, acidic soils and sea-level rise have prevented a broader understanding about the nature and associated lifeways of Sa’qiwe’k L’nu’k culture. Indeed, the margins between the Late Palaeo-Indian period and the Early Archaic period are poorly defined.

Mu Awsami Kejikawe’k L’nu’k

Our understanding of the Mu Awsami Kejikawe’k L’nu’k or Archaic period is also relatively limited. The period has been divided into Early, Middle, and Late subperiods, representing a mosaic of cultures spanning the millennia between the Late Palaeo-Indian period and the appearance of ceramics. Evidence related to Mu Awsami Kejikawe’k L’nu’k in the Maritimes is poorly represented in the archaeological record before the appearance of Late Archaic cultures around 5,000 BP, although there is some evidence for continuous occupation in coastal areas (Tuck 1991). A rapid climatic warming around 8,000 years ago, known as the Hypsithermal interval, led to an increasingly diverse forest. Boreal species began to decline while pine, birch, and oak spread throughout the region, attracting a variety of fauna, including moose, deer, bear, and other smaller mammals. Site locations in the Maritimes suggest an interior lacustrine and riverine settlement pattern, along with coastal adaptation and occupation; however, sea levels for the region at 7,000 years ago were approximately 30 metres below present level and virtually all Early Archaic coastal sites have been eroded by sea-level rise and attendant shoreline erosion (Deal 2016; Bourque 2001). Evidence also suggests a variable subsistence pattern based on terrestrial mammals, anadromous and catadromous fish species and sea mammals (Deal 2016).

Early and Middle Mu Awsami Kejikawe’k L’nu’k preferred manufacturing stone tools from raw materials such as quartz and rhyolite, and an abundance of quartz-flaking debris is one of the hallmarks of Early Archaic sites. The period is also characterized by the development of ground stone tools, such as full-channelled gouges and rods used, at least in part, for woodworking, adzes, hand spears, atlatls, and specialized mortuary artifacts (Deal 2016). Furthermore, a high degree of specialization is apparent, including tools and ornaments made of ground slate, bone, and ivory, as well as evidence of increased trading activity. Mortuary practices also become evident in the archaeological record of the Maritime Peninsula in the Early Archaic period (Bourque 2001). Diagnostic projectile point styles include stemmed and bifurcate-base points.

During the Late Archaic period, a hemlock and oak forest developed in Nova Scotia and New Brunswick, followed by a spruce, birch and beech forest, which is associated with a decrease in temperature around 4,000 BP (Deal 2016). At the same time, there appears to be a rapid re-emergence of evidence for the presence of Indigenous people in the Maritime region, although it is important to note that the modern shoreline was established approximately 3,000 years ago, thus providing more opportunity for encountering Late Archaic period material culture. The Late Archaic period includes two distinctive cultural traditions; one that is primarily a coastal marine adaptation, sometimes referred to as the Maritime Archaic tradition, and one that is interior adapted, known as the Laurentian Archaic tradition. Similar tool forms associated with both traditions suggest a shared technology and interlocking trade networks. Site assemblages include adzes, gouges, plummets, and ulus but the main diagnostic tool form of this period is the slate bayonet, which is often associated with burials (Deal 2016).

The final Archaic tradition in the Maritimes is often referred to as the Terminal Archaic period. Between 4,000 and 3,000 years ago, a distinct tradition with markedly different technology, subsistence practices, and mortuary rituals, known as the Susquehanna tradition, emerged across the Northeast. The mechanism by which these characteristic features reached the Maritimes, whether by migration or cultural diffusion, has yet to be determined. Nevertheless, artifacts associated with the Susquehanna tradition have been identified throughout Nova Scotia and New Brunswick. A settlement-subsistence system that made seasonal use of both coastal and interior resources is evident and interior Susquehanna sites were generally located where fish were plentiful and especially where the seasonal capture of anadromous fish was relatively easy (Tuck 1991; Bourque 2001). These sites are characterized by a distinctive tool making tradition, including broad-bladed, broad-stemmed projectile points, drills, polished stone atlatl weights and grooved axes.

Kejikawe'k L'nu'k

The Kejikawe'k L'nu'k or Ceramic Period (also known as the Woodland Period) is the last major cultural episode in the Maritimes prior to European contact and has been divided into Early, Middle, and Late subperiods. Although cooking containers made of wood or bark were used during earlier periods, the Ceramic period is defined by the introduction and full-scale adoption of pottery by Indigenous peoples in the region. The Early Ceramic period is characterized by cylindrically shaped, pointed based vessels, which were textured with fabric impressions. The appearance of this early pottery may be associated with large seasonal gatherings, more complex mixtures of food sources and the preparation of aquatic resources (Deal 2016). Over the next two millennia, pottery style underwent a series of changes and more numerous and larger vessels appeared during the Middle and Late Ceramic periods. The salient characteristics of the Middle Ceramic period are thin-walled, grit-tempered vessels decorated with pseudo-scallop or fine dentate stamping techniques, while the quality of Late Ceramic period pottery declined with vessels becoming thicker, courser and less well fired (Davis 1991). Later vessels feature a more spheroidal shape, and the last major decorative form is known as cord-wrapped stick, which remained the dominant decorative technique until ceramic usage terminated shortly before sustained European contact (Rutherford 1991). Indeed, decoration and temper are considered temporal indicators.

The archaeological record suggests significant population growth during the period with the highest concentration of known occupation sites found along the coasts, perhaps representing locations of long-term occupation. Interior sites may represent more specialized locations associated with the procurement of single resources, such as anadromous fish and eels, and residue analysis indicates a predominately marine diet in traditional Mi'kmaw territory (Davis 1991). The Ceramic period lithic industry is defined by regional variation and characterized by changes in flint-knapping and raw materials. Distinctive projectile point styles have been associated with the appearance of bow-and- arrow technology, which had replaced the use of the spear-thrower by the time of European contact (Bourque 2001). Shellfish exploitation also emerged as an important socio-economic activity and coastal shell middens were common features associated with Kejikawe'k L'nu'k occupation in the region.

Elaborate mortuary rituals flourished during the Early Ceramic period and both Meadowood- and Adena-related burial sites have been discovered in the region. Meadowood burials, which resemble those of the same tradition in New York State, include side-notched projectile points, cache blade, slate gorgets, and bird stones, and are often located near habitation sites or on the coast (Deal 2016). Adena-related burials, also referred to as the Middlesex Phase, are often, although not exclusively, identified by the presence of burial mounds and include various exotic grave offerings, such as stemmed points, gorgets, block-ended tubular pipes, celts and copper beads. Stemming from the Ohio Valley, numerous Adena burial sites have been identified throughout the region, including the Augustine burial mound in New Brunswick; however, there is limited evidence to suggest these burial practices reflect a physical movement of people into the region. The absence of habitation sites associated with a peripheral culture suggests this cultural manifestation represents a diffusion of Adena ritual elements into the region, which were adopted by local peoples (Deal 2016). This scenario also implies contact, direct or otherwise, with extra-regional groups and external influences (Rutherford 1991). Nevertheless, these elaborate burial practices did not survive into the Middle Ceramic period and were replaced by simple primary burials with limited grave inclusions (Deal 2016). The later period is also characterized by the exploitation of a wider range of local resources and inter-regional trade (Deal 2016).

Protohistoric Period

The Middle and Late Ceramic periods represent a pattern of settlement and subsistence that persisted until European contact. The initial period of contact, heavily influenced by European fishermen and traders, is often referred to as the Protohistoric period, generally held to begin in the 16th century. Our understanding of Mi'kmaw lifeways during this period is enhanced by available ethnographic sources, as well as archaeological evidence, often in the form of "copper kettle burials". Single component Protohistoric period sites are rare in the archaeological record, as local Indigenous populations continued to occupy Late Ceramic period sites; however, subsistence patterns were dramatically altered by the mid-16th century. By this time, "Mi'kmaw groups who normally wintered on the coast, were spending the late winter and early spring inland to harvest furs and moving to the coast in the late spring and summer to trade with the Europeans" (Deal 2001).

Although this period is often represented in the archaeological record by the presence of trade beads and copper tinkling cones, the most distinct sites are associated with the Copper Kettle Burial tradition, dating from around 1500 to the late 1600s (Deal 2001). This tradition has been associated primarily with the Mi'kmaq, who occupied most of the region's coastal areas and were heavily involved in the fur trade. Copper Kettle Burial sites are marked by overturned kettles and caches of European manufactured trade goods, including glass beads, iron swords, knives, and daggers (Deal 2001). By the end of the 17th century, contact has resulted in the introduction of European goods, a destabilized human-ecosystem and a wave of epidemics that devastated Indigenous populations.

Pre-contact Overview of the PDA

A review of the MARI database revealed an absence of registered archaeological sites located within the PDA for Transmission Line L8006. This likely reflects a lack of archaeological investigation, rather than an absence of archaeological sites. The review also established the presence of 40 registered archaeological sites within a 5 km radius of the PDA. Of these, 31 are affiliated with the Pre-contact Period, ranging from the Saqiwe'k L'nuk ("Ancient People" or Palaeo Period - 13,500 – 10,000 years Before Present (BP)) to the Kejikawe'k L'nu'k ("Recent People" or Woodland Period – 3,000 – 500 years BP) with all the Palaeo Period sites being part of the Debert-Belmont complex.

There are numerous registered Saqiwe'k L'nuk sites within the Debert-Belmont complex. The main Debert site (BiCu-01), from which over 5,000 complete or fragmentary lithic tolls were recovered, was excavated by George MacDonald between 1962 and 1964 and is located on a relatively high flat drainage divide situated approximately 5 km from both the Debert and Chiganois rivers, and approximately 10 km north of the existing marine shoreline (Borns 2011:35). Belmont I/Ia (BiCu-06), located approximately 1 km northeast of the main site on a prominent ridge in the extreme northeastern corner of the Debert Tree Breeding Centre, was discovered in 1989 and contains 16 discreet artifact scatters and additional isolated finds consistent with the raw materials from the Debert assemblage (Rosenmeier 2012). Belmont II/IIa (BiCu-07), which included a large number of flakes, a fluted point preform, and an assortment of scarpers and gravers, was exposed in a bulldozer cut over the edges of a small side terrace 200 m southwest of Belmont I (Rosenmeier 2012). BiCu-08, identified as the location of a chalcedony flake with a graving spur recovered from a cleared area between Debert and Belmont I (Davis 2011) and BiCu-09 are both described as isolated find sites. The Hunter Road site (BiCu-10), discovered in 1989, is a relatively small site located on a knoll 600 m southeast of the Debert site that may have been substantively altered by previous forestry activity (Rosenmeier 2012).

As a result of the recent Debert Site Delineation Project and the implementation of Debert regulations for archaeological trusting, ten new archaeological sites have been identified in the area, including three new sites within the Debert survey perimeter (BiCu-16, BiCu-17 and BiCu-18), two new sites on the margins of the upper Belmont II terrace (BiCU-19 and BiCu-20), one new site located on a raised sandy ridge southwest of Belmont IIa (BiCu-21), a scatter of two loci on a knoll situated between Belmont II and the main Debert site (BiCu-23), as well as the newest site in Debert, (BiCu-24), located within the northeastern portion of the Debert-Belmont complex, consisting of 35 lithics, including a spurred scraper and a wedge. Finally, two new sites on adjacent industrial lands located approximately 1 km south of the Debert site (BiCu-13 and BiCu-14), and an additional site (BiCu-15), consisting of an isolated coronet graver, were recorded in the vicinity of Lancaster Crescent.

12.3.2.3 Historical Context – Indigenous

The PDA is located with the traditional Mi'kmaw territories known as Sipekne'katik, meaning 'where the wild potatoes grow' and Siknikt, meaning 'the drainage area'. These regions represented a productive and diverse ecosystem, providing a resource base for the Mi'kmaq and their Ancestors for millennia prior to the arrival of European settlers. These network of navigable rivers, streams, coastal routes, portage routes, and footpaths facilitated travel, and allowed fluid movement and access to overlapping resource areas throughout Mi'kma'ki. Following the coast to rivers like the Philip and Debert allowed access to the interior and a vast resource base. These conduits also represented important transportation corridors which facilitated interaction and trade with neighbouring groups. The Mi'kmaq seasonally moved throughout the greater region between areas where shelter and resources, including food and medicinal plants, were available and annually migrated between hunting and fishing grounds (Chute 1999).

Mi'kmaw placenames, those which have survived the influx of European travelers and settlers, demonstrate that the Mi'kmaq had a strong understanding of the local landscape and resources. Mi'kmaw placenames are known for at least 14 landmarks within a 5 km radius of the corridor and include descriptions of the landscape (The bay runs far up, at the attractive place, flowing downward, river of the fork, flowing through hemlock, his/her lungs), reference specific human experience on the land (place of eel weirs, flashy, where beavers are caught), and indicate local species and resources (Salmon river, place of eel weirs, where beavers are caught). Placenames in the area may also connect to Mi'kmaw legends that speak to physical transformations of the landscape.

Notably, one Mi'kmaw legend describes Glooscap's time at Cape d'Or or L'mu'juiktuk, meaning 'place of the dogs', and his creation of a portage route, known as Wo'qn, meaning 'spine':

"He now pitched his tent near Cape d'Or, and remained there all winter; and that place still bears the name of Wigwam (house). To facilitate the passing of his people back and forth from Partridge Island to the shore of Cumberland Bay [Cumberland Basin], he had thrown up a causeway, which still remains and is called by the white people "the Boar's Back." It is this ridge which gives the Indians name Owokun [Wo'qn] (means crossing over place) to the place and to the river [River Hebert]." (Rand 1894)

This portage route follows the Parrsboro River and River Hebert and was an important corridor between the Minas Basin and Cumberland Basin. Archaeological evidence from Newville Lake, located approximately halfway along the portage, indicates this route has been used for thousands of years, and was home to a Mi'kmaw village into the mid-20th century (Sable and Francis 2012). This route is also well documented on historic maps, including Thomas Lewis' map of 1755 entitled A Map of a Part of Nova Scotia or Acadie, on which the portage route, located adjacent to the western shoreline of River Herbert, is labelled "An Indian path from Minas to Chignecto". The portage was still being used as a major transportation route during the historic period, as indicated on the 1735 map by George Mitchell and Edward Amhurst as "Carrying Place from Minas Basin to Chignecto". Oral history within the region also indicates that the local Mi'kmaq encamped each year at two village sites, the southern ridge above the Amherst marsh, and further west at Amherst point (Furlong 2001).

Before European disruptions, Mi'kmaw lifeways involved maritime adaptations and seasonal mobility oriented to intercept available marine and freshwater aquatic resources (Lewis 2007). The Mi'kmaq followed a general seasonal pattern, living on the coasts during the spring and summer, moving upriver and inland during the fall and winter, though this pattern varied by geographic region. In 1611, Father Biard indicates the Mi'kmaq hunted calving seals in January, not only for their flesh and fur, but for fat to sustain them throughout the year (Whitehead 1991). Black Bear and Moose were also hunted in late autumn and winter and valued for their fur, flesh, and fat. Emphasis was placed on a sustainable form of living, to ensure food for future generations. In an interview (ca. 1740), Shaman-Chief Arguimaut (L'kimu) from Prince Edward Island describes pre-European hunting and states, "We killed only enough animals and birds to sustain us for one day" (Whitehead 1991). Following intermittent and later sustained European contact (ca. 1500 – 1650 AD), the Mi'kmaq shifted from long-established and sustainable food harvesting practices to subsistence patterns based on trading furs for European commodities. Whether the shift was by choice or necessity, the consequences were substantial as overhunting led to stress within Mi'kmaw society.

By the mid-17th century, and throughout the 18th century, the fur trade had evolved from opportunistic exchanges with fishermen-entrepreneurs on the beach or at anchor. Permanent and semi-permanent European settlements and fishing stations, such as those found at Port La Tour in Shelburne County, St. Peters in St. Ann's Bay, and later at the fortress of Louisbourg, gave rise to more structured transactions of higher volume for goods and credit at established trading posts (Johnston 2004). By the mid-18th century, "[the] Mi'kmaq were caught in the middle, suffering both the indifference and political machinations of their French co-religionists and the campaigns of the English, who loosed their Mohawk allies against them" (Whitehead 1991). In 1761, the Mi'kmaq negotiated a truce with the English and, though a measure of peace was formed, the erosion of the traditional Mi'kmaw way of life continued, with devastating effect to the people:

"By 1761…. the great numbers of Loyalist settlers, fleeing the American Revolution, made vast inroads on traditional Mi'kmaw lands. Game was no longer plentiful; salmon rivers were blocked by dams and choked with sawdust. The fur-trade was in decline, and smallpox epidemics swept the Maritimes. The Mi'kmaq, their seventeenth-century population already reduced by approximately 90 percent, were particularly hard hit….a change which had begun in 1500." (Whitehead 1991)

In 1801, perhaps seeking a solution, or merely to move them out of sight, the colonial government of Nova Scotia set aside 8,650 acres of lands on mainland Nova Scotia as “Indian Reserves” (Paul 2008). The Mi’kmaq continued to reside within the Amherst and Truro areas during this time.

12.3.2.4 Historical Context – Non-Indigenous

The proposed transmission line corridor intersects portions of a number of historic Euro-Canadian communities. A brief description of each community is presented below. Details relevant to the interpretation of specific areas within the greater study area are presented elsewhere in appropriate fieldwork discussions.

Onslow, Colchester County

Located at the eastern end of the PDA, the community of Onslow is situated at the mouth of the Salmon River. Euro-Canadian settlement of the general area began with the arrival of Acadians in the early 18th century, and it is believed that Village Dugas, settled by Claude and Joseph Dugas around 1702, was located near the North River Bridge in Onslow. Following the removal of the Acadian population, it was resolved "that a Township should be erected at the Head of Cobequid Bason, to be called the Township of Onslow", in 1759 (Campbell and Smith 2011). Named after British politician, Arthur Onslow, the settlement was divided into Central Onslow, Lower Onslow (originally King's Village and Queen's Village) and Onslow Mountain. By 1761, thirty families of Scots-Irish were settled in the area, with farming considered to be the primary industry (PANS 1967:509). The closest registered archaeological site is BiCu-05, the remains of a possible Acadian cellar, located in Old Barns.

Belmont, Colchester County

Located in the eastern portion of the PDA and meaning "beautiful mountain," the community of Belmont is situated along the Chiganois River, approximately 8 kilometres north of Cobequid Bay. In the early 18th century, Acadians settled the area and named it Vil Nigeganish, a variation of the Mi’kmaw name, Nesakunechkik or Nisaganisgig (PANS 1967:56; Pacifique 1934). By 1755, Acadians, perhaps as many as fifteen families, had abandoned the area to avoid deportation, and Captain Lewis' troops burned what buildings and farms were left behind (PANS 1967:56). In 1762, Robert Barnhill and his family, emigrants of Donegal, Ireland, arrived in Chiganois, followed by Thomas Baird, Alexander Deyarmond, Joseph Crowe and John Barnhill (Miller 1873). Belmont is part of the Debert-Belmont complex, representing one of the largest and most intact Palaeo-Indian sites in North America and the oldest sites of human habitation in Eastern Canada (Rosenmeier et al. 2012).

McCulloch's Corner/Debert, Colchester County

Formerly known as McCulloch's Corner, the community of Debert is situated approximately 9.5 km up the Debert River, north of Cobequid Bay (PANS 1967). The community of Debert was named after Martin and Marie Bourque, who, among other Acadian families, lived near the mouth of the Debert River in the mid-18th century. Sometime in the 1790's, Thomas Crowe arrived in the area, building a log house and farm. In 1940, the Federal Government expropriated land to build a military training centre, known as Camp Debert (PANS 1967). Debert is part of the Debert-Belmont complex, representing one of the largest and most intact Palaeo-Indian sites in North America and the oldest sites of human habitation in Eastern Canada (Rosenmeier et al. 2012).

Folly Mountain, Colchester County

Located in and around Folly Mountain, approximately 10 km north of the Debert River, the community of Folly Mountain was established in 1805. The Nova Scotia government, seeking to promote settlement in the back country of the Londonderry Township, hired a surveyor to cut a road east and west, parallel to the Bay of Fundy. Once completed, it became known as the "Base Line Road." At the most easterly part of Base Line Road was Folly Mountain, and the original settlers were most likely descendants of Londonderry Township proprietors (Matheson 1989). Before the Cobequid Pass was completed, Highway Trunk 4, which passes over Folly Mountain and through the community, served as the easterly extension of the Trans-Canada Highway. The closest registered archaeological site to Folly Mountain is BiCu-11, a registered archaeological site within the Debert-Belmont complex, consisting of three lithic cores and one flake.

Westchester, Cumberland County

The community of Westchester, located approximately 20 km southeast of the town of Oxford, was settled by Loyalists in 1784 who were originally from Westchester County in New York (PANS 19672). The community became a railway hub when the Intercolonial Railway was built through Westchester in 1872. The closest registered archaeological sites are located upon Higgins Mountain, consisting of five registered sites (BjCv-04, BjCv-06, BjCv-07, BjCv-08, BjCv-09) making up a small community situated on top of the mountain. These registered sites include a small family cemetery (BjCv- 04), consisting of three burials, and five small dry-laid stone foundations.

Greenville Station, Cumberland County

Located approximately 18 km southeast of the town of Oxford, the small community of Greenville was founded in 1803 (PANS 1967). The first Baptist meeting house was erected in 1860 and the first school was created in 1867 (PANS 1967). The closest registered archaeological sites are located upon Higgins Mountain, consisting of five registered sites (BjCv-04, BjCv-06, BjCv-07, BjCv-08, BjCv-09) making up a small community situated on top of the mountain. These registered sites include a small family cemetery (BjCv-04), consisting of three burials, and five small dry-laid stone foundations.

Hansford, Cumberland County

Located upon the Pugwash River, approximately 6 km east of Oxford, Hansford was settled in 1819 (PANS 1967). In the early 20th century, Hansford was known as Lower Victoria. The closest registered archaeological sites are within Oxford, to the west. Two of the registered sites (BkCx-01 & BkCx-02) are situated on either side of the River Philip. They consist of a collection of artifacts dating to the Late Archaic and Ceramic periods (see Table 12.1). Two additional registered sites represent surface scatters, the first located at an oxbow along the River Philip and consisting of a general scattering of flakes (BkCx-03) and the second being an impacted Mi’kmaw site with no diagnostic material (BkCx-04).

Oxford, Cumberland County

Located on the River Philip and Black River, Oxford was founded in 1791 by the settler Richard Thompson, who built a sawmill and created the settlement's first industry. The name "Oxford" is derived from the fording of the two rivers by the town's early settlers, making it easy to navigate back and forth through the settlement with oxen carts (PANS 1967). Early Oxford had an abundance of sawmills and was known for its slab wood. In the modern period, Oxford is known for its blueberry industry. There are four registered Precontact archaeological sites within Oxford. Two of the registered sites (BkCx-01 & BkCx-02) are situated on either side of the River Philip. They consist of a collection of artifacts dating to the Late Archaic and Ceramic periods (see Table 12.1). Two additional registered sites represent surface scatters, the first located at an oxbow along the River Philip and consisting of a general scattering of flakes (BkCx-03) and the second being an impacted Mi'kmaw site with no diagnostic material (BkCx-04).

Mansfield, Cumberland County

Located approximately 9 km northwest of Oxford, the settlement was founded in 1818 and named after Lord Mansfield (PANS 1967). In the mid-20th century, a log schoolhouse was still being used for the small community. There are four registered Precontact archaeological sites within Oxford. Two of the registered sites (BkCx-01 & BkCx-02) are situated on either side of the River Philip. They consist of a collection of artifacts dating to the Late Archaic and Ceramic periods (see Table 12.1). Two additional registered sites represent surface scatters, the first located at an oxbow along the River Philip and consisting of a general scattering of flakes (BkCx-03) and the second being an impacted Mi'kmaw site with no diagnostic material (BkCx-04).

Truemanville, Cumberland County

Located approximately 11 km east of Amherst, the settlement was founded in 1817 by Amos Trueman, who by Provincial Statute in 1876, gave name to the community (PANS 1967). There are no registered archaeological sites within a 10 km radius of Truemanville.

Amherst, Cumberland County

Major European settlement in the upper Bay of Fundy began with the establishment of a trading post at Beaubassin by Jacques Bourgeois near present day Amherst, in 1674 (Schmeisser 1970). The Acadian settlers created elaborate systems of dykes to turn the tidal salt marshes of the Amherst region into fertile land used for agriculture and pasture. By 1685, De Meulles surveyed 22 farms on the Isthmus, consisting of 127 individuals (Schmeisser 1970). The next year, the Bishop of Quebec, de Saint-Vallier, noted approximately 150 people working dyked marshlands around this early settlement (Schmeisser 1970).

By 1696, the settlement was almost entirely destroyed when it was attacked by New England raiders from Boston, led by Colonel Benjamin Church. During this attack, several buildings were burned, inhabitants of the settlement were killed, and their homes were looted. Joseph Robineau de Villebon, governor of Acadia at the time, noted that "[…] the English stayed at Beaubassin nine whole days without drawing any supplies from their vessels, and even those settlers to whom they had shown a pretense of mercy were left with empty houses and barns and nothing else except the clothes on their backs" (Reid 1994). In 1704, Colonel Church returned and raided Beaubassin once more. Despite English and American hostilities, Acadian communities persisted on the Chignecto Isthmus, and by 1737 over 1800 Acadians were living within the Chignecto area (Schmeisser 1970).

The Acadian community of Beaubassin was destroyed in 1750 when Major Charles Lawrence, along with 800 troops, attempted to seize control of the Chignecto Isthmus. Fort Lawrence would later be constructed on top of the remains of the Acadian village. This also marked the beginning of the expulsion, as Acadians departed the region to escape rising tensions and border disputes between the French and British. The expulsion of Acadians from the region became a systematic programme in 1755, when British forces rounded up Acadians families, destroyed their homes, and deported them to various territories.

Following the expulsion of the Acadians, new English-speaking settlers arrived from Yorkshire and New England (Brown 2002) in the 1760s. Some Acadians were able to escape deportation, or find their way back to their former settlements, including the town of Minudie (Brown 2002). The town of Amherst was first settled in 1764, when immigrants from New England made their homes in the area. In total, 42 families were settled in the area, with each family being granted a wood, farm, and marsh lot (Boomer 1907). These early settlers did not utilize the dyked marshland as agricultural land, rather their farm lots were located on the southern slopes of the ridge, while the saltmarshes were used for pasturage or haying.

In 1774, settlers from Yorkshire, England, arrived in Amherst. From its early beginnings in the 1760s, the town of Amherst began to grow. With the influx of settlers from Yorkshire, and with later influxes of United Empire Loyalists following the American War of Independence, the Tantramar marsh began to be worked again. During this period, the Amherst marshes grew by 80,000 acres through the construction of dykes in the region (CCMA n.d.).

By the 19th century, Amherst developed into not only an agricultural base, but also a centre of shipbuilding, until the advent of steel ships in the 20th century made wooden sailing vessels obsolete. During the expansion of the railway in the 1870s, Amherst became a hub for industrialization, as the Intercolonial Railway of Canada constructed the main line from Halifax to Quebec (Wood 1992). This main line ran straight through Amherst, providing an economic boom for the town, as foundries, factories and mills opened, utilizing this important railway link to produce and ship goods.

Following the first World War, and into the 1930s, Amherst began to experience an economic decline, as the market for marsh hay crashed. The invention of the combustion engine and the rise of gasoline-powered vehicles meant that horses were less important, generally, and thus less hay was needed both locally and internationally. During the Second World War, high-quality marsh hay was in demand again. Between 1943 and 1947, the dykes that were left to decay in fallow fields were repaired, and marsh hay was once again harvested (CCMA n.d.). These dykes continued to be maintained through the 20th century, as wooden aboiteaux and sluice-gates were replaced with ones made from modern materials, such as concrete, fiberglass, and plastic.

Five registered archaeological sites are located on the outskirts of the town of Amherst. Four of the archaeological sites are historic in nature, two being Acadian settlements associated with Beaubassin (BlDb-07 & BlDb-20), while one consists of the remnants of Fort Lawrence (BlDb-08) and the other represents the Chignecto Ship Railway (BlDb-09). Finally, BlDb-17 is a multi-component archaeological site discovered in 1999. Artifacts recovered from this site include an Adena celt, a chert flake, trade beads, iron spear tips, and a stone pipe fragment.

12.3.2.5 Archaeological Potential Modeling

The results of the APM developed by Boreas Heritage suggest that certain portions of the PDA exhibit high potential for encountering archaeological resources due to proximity to notable water courses or sources (see Boreas 2021). Based on the background study and the APM, a total of 52 individual areas within the greater study area were identified as possibly exhibiting high archaeological potential.

12.3.2.6 Field Results – Transmission Line L8006

The field component of the ARIA was carried out between November 11 and December 8, 2020, under varying field conditions. The field component involved a visual assessment of the PDA in order to: (1) evaluate the archaeological potential of the PDA, (2) investigate topographic or potential archaeological features highlighted during the desktop component of the ARIA, and (3) evaluate areas identified as featuring high archaeological potential in the APM. Areas of exposure, including tree falls, road-cuts, and accessible shorelines, were visually examined for evidence of archaeological resources (e.g., artifacts, soil staining, or built-features).

Measuring approximately 96 km in length, the proposed transmission line corridor spans a variety of different landscapes and environments, ranging from low, wet marshlands to high steep, and rugged uplands of the Cobequid Mountain Range. Vegetation ranged from grassy marshes to cleared agricultural land to mixed forest. Throughout most of the proposed line, evidence of prior forest harvesting was observed. During the background study, 52 areas within the greater PDA were identified as possibly exhibiting high archaeological potential. Each of the 52 areas surveyed as part of the field component of the PDA are discussed in Boreas 2021: 44 – 161. The field component of the archaeological survey resulted in the identification of 36 HPAs for encountering archaeological resources and additional mitigation (i.e., shovel testing) was recommended for any planned Project-related ground disturbance within these areas (Boreas Heritage 2021).

In 2022, a geotechnical program for the Project was initiated by NSPI which included 4 of the 36 HPAs identified in 2020 by Boreas Heritage and therefore shovel testing would be required in these areas (i.e., HPA 12, HPA 25, HPA 31, and HPA 34). CRM Group, under Heritage Research Permit A2022NS218, undertook the shovel testing program in these 4 areas and the results were reported on (CRM Group 2023a). No archaeological and heritage resources were identified during the shovel testing program at each of the four 4 HPAs. As the geotechnical testing footprints within these areas was small (i.e., 2.5 m radius of the geotechnical test location), recommendations resulting from that work included the continued avoidance of ground disturbing activities within the remaining portions of the 4 HPAs that were not subject to the shovel program (CRM Group 2023a: 53).

12.3.3 Field Results – 67-N Onslow Substation Expansion

The ARIA for the proposed expansion of the 67-N Onslow Substation was undertaken by CRM Group under Heritage Research Permit A2023NS085 and the results were reported on (CRM Group 2023b).

Archaeological reconnaissance and analysis of detailed topographic maps determined that most of the substation PDA is low-lying and marshy. Development of the existing substation, transmission line, and access road has caused considerable ground disturbance, including the diversion of an unnamed McCurdy Brook tributary that extends through the PDA. Other development-related ground disturbance includes an elevated ridge of fill within the eastern half of the PDA, used for the placement of and access to transmission line structures. The only area of relatively dry terrain, unaffected by past ground disturbance is located in the northeast corner of the PDA. An exploratory shovel test conducted in this area identified an intact podzolic soil profile and contained no artifacts.

In consideration of the PDA’s position encompassing a section of a tributary of McCurdy Brook, that portion of the PDA containing dry terrain is ascribed elevated archaeological resource potential. This zone includes the relatively dry area located north of the access road in the northeast portion of the PDA and, since the state of the underlying natural topography is currently unknown, it also applies to areas currently impacted by the deposition of fill in the western portion of the PDA. Those areas of the PDA that exhibit permanently wet, marshy conditions are ascribed low archaeological resource potential (CRM Group 2023b).

12.4 Effects Assessment

12.4.1 Assessment Criteria

12.4.1.1 Residual Effects Characterization

Table 12.2 presents definitions for the characterization of residual environmental effects on archaeological and heritage resources. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not possible.

Table 12.2 Characterization of Residual Effects on Archaeological and Heritage Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive** - an effect that moves measurable parameters in a direction beneficial to archaeological and heritage resources relative to baseline. **Adverse**— an effect that moves measurable parameters in a direction detrimental to archaeological and heritage resources relative to baseline.
Magnitude	The amount of change in measurable parameters of the VC relative to existing conditions	**Negligible**—no measurable change to archaeological and heritage resources. **Low to Moderate**—if archaeological and heritage resources are encountered within the PDA and cannot be avoided, mitigation (*e.g.*, removal) will create a change to heritage resources. • **High** – a measurable change resulting in a permanent loss of information relating to archaeological and heritage resources (*e.g.*, destruction that occurs without mitigation).
Geographic Extent	The geographic area in which a residual effect occurs	**PDA/LAA –** residual effects are restricted to the PDA/LAA
Duration	The period of time required until the measurable parameter or the VC returns to its existing (baseline) condition, or the residual effect can no longer be measured or otherwise perceived	**Short-term** – the residual effect is restricted to the construction phase. **Long-term** – the residual effect will extend for the life of the Project. **Permanent** - heritage resources cannot be returned to their existing condition.
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the residual environmental effect, where applicable or relevant	**Not applicable** – timing does not affect the VC **Applicable** – time affects the VC
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event** – an effect on archaeological and heritage resources occurs only once (*i.e.*, disturbance results in the loss of context). **Multiple irregular event –** the residual effect occurs at no set schedule **Multiple regular event –** the residual effect occurs at regular intervals **Continuous –** the residual effect occurs continuously
Reversibility	Describes whether a measurable parameter or the VC can return	**Reversible** – the effect is likely to be reversed **Irreversible**—the effect cannot be reversed as damage or removal will result in a change to archaeological and heritage resources.

Table 12.2 Characterization of Residual Effects on Archaeological and Heritage Resources

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
	to its existing condition after the Project activity ceases	
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	**Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

12.4.1.2 Significance Definition

A significant adverse residual environmental effect on archaeological and heritage resources is defined as one that:

- Results in a non-permitted contravention of the Special Places Protection Act (1989), or
- Threatens the long-term persistence or viability of a heritage resource or the information and context relating to it in the PDA, including effects that are contrary to or inconsistent with the goals, objectives, or activities of Indigenous communities, the general public, and provincial or federal heritage management objectives.

12.4.2 Potential Project Interactions with Archaeological and Heritage Resources

Undocumented heritage resources, where present, are typically located in the soil or rock layers of the earth. Therefore, potential interactions between these resources (particularly archaeological resources (if they are present) and the Project would take place during construction. Groundbreaking, earth moving, and in-filling activities will be limited to the areas of the PDA where major construction components are anticipated such as the expansion of the 67-N Onslow Substation and where excavations are carried out for the placement of the transmission line structures and guy wires. These activities will largely be carried out by mechanical means and can interact with archaeological and heritage resources as these activities may result in some ground disturbance. Specifically, ground disturbance could interact with unrecorded sub-surface archaeological and heritage resources, if present, within the PDA. Any potential for interactions with archaeological and heritage resources that might occur due to construction activities will be permanent, as no archaeological site can be returned to the ground in its original state after it has been disturbed.

In consideration of these potential interactions, the assessment of Project-related environmental effects on heritage resources is therefore focused on the potential environmental effects listed in **Table 12.3**. These potential environmental effects will be assessed in consideration of specific measurable parameters, also listed in **Table 12.3**.

Table 12.3 Potential Environmental Effects and Measurable Parameters for Archaeological and Heritage Resources

Potential Environmental Effect	Effect Pathway	Measurable Parameter
Change in heritage resources	• Disturbance or alteration of whole or part of an archaeological and heritage resource considered significant by regulating agencies as a result of Project-related ground disturbance during construction.	• Presence/absence of heritage resource

Table 12.4 identifies the physical activities that may interact with the VC and result in an environmental effect. These interactions are discussed in detail in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 12.4 Potential Interactions Between Physical Activities and Archaeological and Heritage Resources

Physical Activities	Potential Interaction between Physical Activities and Archaeological and Heritage Resources
Construction	
Site Preparation and Clearing	✓
Excavation and Structure Assembly	✓
Conductor Stringing	-
Expansion of Onslow Substation	✓
Inspections and Energization	-
Clean-Up and Revegetation	-
Employment and Expenditure	-
Operation and Maintenance	
Presence of Conductors and Towers	-
Inspections and Maintenance	-
Vegetation Management	-
Notes: ✓ = Potential interaction – = No interaction	

Archaeological and heritage resources are located on or immediately beneath the ground surface and because these resources are static and finite, Project interactions that may affect heritage resources are restricted to physical works that are associated with ground disturbance and are associated with the construction phase. Operation and maintenance activities are not anticipated to require ground disturbance and therefore, not anticipated to interact with heritage resources.

During operation, it is anticipated that there will be no interaction between archaeological and heritage resources and equipment used for vegetation management, nor presence of conductors and towers as there will be no groundbreaking activities. The RoW is anticipated to be stable with no ground disturbance during vegetation management activities.

12.4.2.1 Potential Effects to Archaeological and Heritage Resources During Construction

During construction, activities that could result in a potential interaction with heritage resources include site preparation (e.g., clearing, grubbing, detouring and ditching, excavation, and blasting, if required), excavation and structure assembly, and works at the Onslow substation.

Vegetation clearing during construction for the Project will largely be carried out by mechanical means and has the potential to interact with heritage resources as these activities may result in some ground disturbance due to potentially deep rutting along the RoW. Where access and staging occur, there is the potential for the use of heavy equipment which may also cause rutting resulting in ground disturbance and potential interaction with subsurface heritage resources. Excavation for structure foundations may involve mechanical augering, excavation, rock-breaking or blasting all of which have the potential to interact with archaeological and/or heritage resources. Construction activities related to the Onslow substation will require excavation of soils that may interact with archaeological and/or heritage resources.

With no built (i.e., architectural) heritage resources identified inside or near the PDA, interactions between Project construction activities and built heritage resources are not anticipated. Therefore, built heritage resources will not be assessed further in this VC. Any equipment that may need to be installed will take place after foundations and other surface and subsurface infrastructure are installed and will not interact with heritage resources.

Activities listed under construction that are not anticipated to interact with heritage resources include: conductor stringing, connection of the transmission line, inspection and energization, and clean-up/revegetation. Clean-up and revegetation may involve back blading but will occur within the existing previously disturbed construction footprint for structure placement and thus, no new ground disturbing activities will occur. Therefore, interactions with heritage resources are not anticipated to occur from these activities and they are not considered further in this assessment.

12.4.3 Mitigation for Archaeological & Heritage Resources

The following mitigation measures, through careful design and planning, will be implemented to avoid or reduce the potential for interactions with archaeological and heritage resources:

- Planned avoidance (e.g., transmission line structures, new access and pull sites), where practical, of areas identified during the ARIAs that exhibit elevated potential for archaeological resources (i.e., 36 HPAs along the L8006 Transmission Line and the HPA identified within the 67-N Onslow Substation PDA)

- Use of low impact equipment or other methods to avoid rutting in areas of elevated archaeological potential
- Implement additional mitigation (e.g., shovel testing, archaeological excavation, or monitoring) as recommended for the Project where avoidance of elevated archaeological potential areas or HPAs is not practical, depending on the nature of the resource and the potential impact. (Boreas Heritage 2021, CRM Group 2023a, and CRM Group 2023b)
- Should any archaeological or heritage resources be identified that could be affected by the Project it is recommended that NSPI develop appropriate mitigation in consultation with SPP and Indigenous Communities, as applicable
- Develop a Heritage Resource Discovery Response Plan for circumstances of an accidental discovery of an archaeological or heritage resource, as part of the Environmental Protection Plan or Project EPP

12.4.4 Characterization for Residual Project Environmental Interactions for Archaeological & Heritage Resources

12.4.4.1 Residual Effects on Archaeological and Heritage Resources during Construction

Potential pathways for interactions with archaeological and heritage resources are related to direct ground disturbance resulting from site preparation and construction activities planned within the PDA. ARIAs conducted for the PDA identified 36 HPAs along the corridor for the L8006 Transmission Line, many of which will be avoided through Project design, and 2 HPAs within the PDA for the 67-N Onslow Substation.

The RoW has been subject to ARIAs (Boreas Heritage 2021, CRM Group 2023a, and CRM Group 2023b) and areas with elevated potential for archaeological resources were identified. These areas will be avoided by Project construction activities to the extent practical. Should a structure be required in an area of elevated archaeological potential, further investigation through shovel testing will be initiated to determine if archaeological resources are present at this location. No archaeological resources have been identified through shovel testing completed to date which included participation from KMKNO representatives. More shovel testing is anticipated during the 2024 field season. If archaeological resources are identified during shovel testing, then the structure will be moved to an alternative location or additional mitigation such as archaeological excavation will be implemented under provincial permit to remove the archaeological site using approved, scientific techniques. If the site is from the Pre-Contact Period, NSPI would engage Indigenous communities prior to considering any archaeological excavation.

The interaction with heritage resources during construction would be adverse in direction and low to moderate magnitude as the disturbance of a heritage resource may result in the loss of information and the ability to implement mitigation following the identification of a heritage resource. The geographic extent is limited to the PDA, the area of physical disturbance during this phase of the Project where heritage resources are located and thus the implementation of mitigation is achievable. Within the PDA, the potential interaction would be limited to those areas where pre-construction mitigation was not implemented. Timing of the effect is not applicable since heritage resources are relatively permanent features of the environment, and frequency of the effect would be a single event as the disturbance of a heritage resource can only be adversely affected once. Duration of the effect is permanent, and the effect would be irreversible as the disturbance of heritage resources may result in the permanent loss of some information and context relating to the heritage resource. The implementation of a heritage response protocol, however, would likely result in the rescue of most information. The ecological context of the PDA is disturbed/undisturbed for construction activities, since portions of the PDA has been subject to agricultural and previous construction activities in the relatively recent past, but many areas remain where pre-Project disturbance is minimal.

In the unlikely event that a heritage resource is encountered, if it is damaged and determined by provincial agencies to be important, then the interaction would be adverse. However, with the implementation of the mitigation described above (Section 12.4.3), this interaction is unlikely and, if it were to occur, would be further mitigated by the implementation of the requirements in the Heritage Resource Discovery Response Plan.

A summary of the residual environmental effects characterization (**Table 12.1**), following the application of mitigation measures described above, on archaeological and heritage resources during the construction phase of the Project is provided in **Table 12.5**.

Table 12.5 Project Residual Effects on Archaeological and Heritage Resources

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in heritage resources	C	A	L/M	PDA	P	N/A	S	I	D/U
	O	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

KEY:
See Table 12.2 for detailed definitions

Project Phase
C: Construction
O: Operation and maintenance

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project development area
LAA: Local assessment area

Duration:
ST: Short term
MT: Medium term
LT: Long term
P: Permanent

Timing:
N/A: Not applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed

N/A: Not applicable

12.5 Determination of Significance

With the implementation of mitigation and environmental protection measures as described in this assessment including avoidance of known sites, and areas of elevated archaeological potential where practical, and with the implementation of additional mitigation measures (e.g., archaeological excavation) in consultation with NSCCTH and the Indigenous community , as appropriate, it is anticipated that Archaeological and Heritage Resources will not be adversely affected by Project activities and the residual adverse environmental effects of the Project on heritage resources will be not significant. The implementation of the mitigation described in this section will result in the Project adhering to the requirements of the Special Places Protection Act, and the Project will not adversely affect the long-term viability of heritage resources within the PDA. NSPI will also follow the Heritage Resources Discovery Response Plan in the Project Specific Environmental Protection Plan to mitigate unexpected discoveries. If heritage resources are discovered during construction activities, a mitigation plan will be developed in consultation with NSPI, CCTH, and Indigenous communities, as appropriate.

12.6 Follow Up and Monitoring

A dedicated follow-up and monitoring plan is not required to verify the environmental effects predictions for the assessment of archaeological and heritage resources or to verify the effectiveness of mitigation. It is anticipated that all mitigation regarding heritage resources will be determined prior to construction activities (e.g., shovel testing, documentation, or excavation prior to construction or archaeological monitoring during construction) and implemented, as warranted. No archeological resources have been found through the shovel testing completed to date, and additional shovel testing is anticipated in the 2024 field season to check any impacts to HPAs that cannot be avoided. Monitoring by the KMKNO during shovel testing in areas of interest has been and will continue to be coordinated. There will also be a Heritage Resources Discovery Response Plan in the event that heritage resources are encountered during the initial, ground disturbing phases of construction.

12.7 References

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13 Use of the Land and Resources for Traditional Purposes by the Mi'kmaq

Use of the Land and Resources for Traditional Purposes by the Mi'kmaq was selected as a VC in recognition of the constitutionally protected rights of Indigenous people, current and historical use of land and resources as an integral part of the lives and culture of the Mi'kmaq, potential for the Project to interact with current use of land and resources for traditional purposes by the Mi'kmaq, and provincial regulatory requirements.

13.1 Background

This section provides general background information about possible traditional activities of Indigenous persons that may occur within or near the PDA. This section does not presume or replace information that has been made available to NSPI in confidence or that may become available through further engagement or consultation with Indigenous communities. Information on Mi'kmaw activities within a 5-km radius of the Project (the "Study Area") was also acquired from a Mi'kmaq Ecological Knowledge Study (MEKS; MGS 2023) and a brief summary of the findings of the MEKS is provided in Section 13.2. Additional information on historical activities or artifacts related to these activities is presented in Section 12 (Archaeological and Heritage Resources).

Indigenous people have lived on the land now known as Nova Scotia for at least 13,000 years (Davis 2023). The Project is located in the traditional territory of the Mi'kmaq. The following is a brief overview of the existing conditions of the Mi'kmaw people and communities near the Project.

The Project is situated in two Mi'kmaw Districts: Epegoitnag in the north-northwestern section of the Project near the Chignecto Isthmus of Nova Scotia, and Sipekne'katik in the south-southeastern section. Millbrook First Nation, in Truro, Nova Scotia, also referenced as Millbrook No. 27, is the closest Mi'kmaw community to the Project, located approximately 8 km south of the PDA at the Onslow Terminal. There are an estimated 2,312 registered members in Millbrook First Nation (GC 2023). The Mi'kmaw community of Pictou Landing, or Pictou landing no. 24, is located approximately 60 km northeast of the Onslow Terminal and has an estimated population of 683 registered community members (GC 2023). Franklin Manor No. 22 Reserve is located approximately 42 km southwest of the PDA near Amherst, and is jointly administrated by Paqtnkek Mi'kmaw Nation, Reserve No. 19, and Pictou Landing First Nation.

A portion of the Project is within the Chignecto Isthmus. The geographical area that includes the Chignecto Isthmus and the nearby coastal watercourses served as important trade and corridors during the precontact (i.e., prior to European settlement) and historic periods (Ganong 1899).

The Mi'kmaq traditionally lived in villages along the coastal areas during the warmer seasons and moved inland during fall and winter months to hunt moose and caribou (FFHR 2018). The Mi'kmaq acquired what they needed for nutrition, clothing and shelter, medicines, and tools entirely from the resources in the area such as shellfish, land and marine mammals and birds, fish, berries, and timber. This close and complete reliance upon natural resources has created a strong spiritual bond between the people and their environment.

Despite substantial changes and access to the land over the past 400 years as a result of colonial settlement by European settlers moving in its territory and the resultant associated practices such as infrastructure development, and mining, forestry, farming, and fishing, the Mi'kmaw people continued to carry out their traditional practices into the 19th and 20th centuries. Hunting, fishing, and the gathering of plants for food and herbal medicines continue to be important activities of the Mi'kmaw people today (MGS 2023).

Section 13.2 provides a summary of information and knowledge provided by the MEKS and provides information that can be used to identify how the Project might interact with Indigenous communities and traditional activities (see Section 13.3).

Additional information on potential Project-related interactions with the environment that could affect Indigenous communities are discussed in Sections 9 (Wildlife, Vegetation, and Habitat SOCI VC), 11 Aquatic Environment VC, 12 (Archaeological and Heritage Resources VC), and 14 (Socio-economic VC).

13.2 Information from Mi'kmaq Ecological Knowledge Study

The Mi'kmaq possess knowledge of traditional and current hunting, trapping, fishing, gathering, and other land and resource uses that can meaningfully contribute to Project-related research and the environmental assessment process. NSPI retained MGS to conduct a Mi'kmaq Ecological Knowledge Study (MEKS) for the Project.

The MEKS focused largely on the proposed PDA, but also considered Indigenous activities within a larger Study Area comprised of a 5 km wide radius around the PDA. The MGS team used the following three-step process to acquire traditional use data for the MEKS:

- Face to face interviews with knowledge holders from Indigenous communities near the Project, as well as virtual interviews conducted by way of an online portal. Interviews followed the Mi'kmaq Ecological Knowledge Study Protocol (Assembly of Nova Scotia Mi'kmaq Chiefs 2007). Twenty-six individuals were engaged in the interview process between October 2022 and February 2023.
- Literature and archival research of historical maps, documents, published works, and oral histories. Forty-three documented information sources were reviewed in the MEKS.
- Site visits were conducted to allow for field sampling and investigations of plants, trees, animal signs, fish and wildlife habitats or other land feature which would hold significance to the Mi'kmaq with respect to food and sustenance, social, cultural, or ceremonial purposes. The site visits were conducted in November 2022 with a Mi'kmaw knowledge holder accompanying the MGS team.

The MEKS considered the timing of traditional activities based on Current Use (within the last 10 years), Recent Past (11 to 25 years ago), and Historic Past (more than 25 years ago). For the assessment of species of significance, the MEKS also considered the type of use (Medicinal/Ceremonial, Food/Sustenance, and Tool/Art), the availability of the resource being used, and the significance of the resource in terms of its importance to Mi'kmaw traditional use activities. Collectively these criteria allow for a detailed understanding of how the Project could affect traditional land and resource uses by the Mi'kmaq (MGS 2023).

13.2.1 Traditional Use of Resources

13.2.1.1 Fishing

Interviews with knowledgeable individuals determined that fishing occurred within the PDA in the Folly Mountain area, with 50% of the activity being Current Use and 50% being in the Recent Past. Fishing within the larger Study Area occurred in several areas, with salmon fishing having occurred at seven of these areas, bass at six areas, and trout in three areas. Approximately 33% of the fishing was Current Use, with 42 % being in the Recent Past, and 21% being in the Historic Past.

13.2.1.2 Hunting

Hunting within the PDA was only identified for deer and was determined to have occurred in the Recent Past near the East Hansford Area. Information on hunting within the larger Study Area indicated deer was the predominant species of interest and occurred in 10 areas. Other species hunted included porcupine (two areas), mink (one area), beaver (one area), fox (one area), raccoon (one area), and wild cat (one area). Hunting activities had occurred 12% of the time as Current Use, 24% in the recent past and 64% in the Historic Past.

Moose (*Alces alces*) habitat was identified in the MEKS along the wetlands of the Chignecto Isthmus; however, moose hunting was not identified as a resource use or activity.

13.2.1.3 Gathering

Gathering within the PDA occurred in the Belmont and Cumberland areas. Sweetgrass (*Hierochloe odorata*) was gathered in four areas and berries in three areas, with 50% of this activity being Current Use and 50% being in the Recent Past. Gathering within the larger Study Area indicated berry harvesting was the most common activity being reported in 11 areas. Sweetgrass gathering was identified in six areas and Ash in four areas. These gathering activities occurred 19% as Current Use, with 15% and 65% being in the Recent Past and Historic Past, respectively.

13.2.1.4 Mi'kmaw Significance Species

The number of areas and species identified by use by Mi'kmaw in the Study Area is shown in **Table 13.1**. Of the species that were mentioned in the interviews, the Atlantic salmon (*Salmo salar*) is listed as endangered by the federal Species at Risk Act. Salmon are an important species to the Mi'kmaq who rely on them for sustenance and for cultural ceremonies and activities. The Striped bass (*Morone saxatilis*) is considered a species of special concern and is noted as a favoured activity in this MEKS.

Black ash (*Fraxinus nigra*) is listed by COSEWIC as threatened, and is a valuable resource used by the Mi'kmaq for baskets and tool handles for sale and for their own use. It has been reported and confirmed to occur in abundance in the Study Area on the north slopes of the Cobequid Hills and Cumberland Hills, with a single location near Debert.

Table 13.1 Mi'kmaw Resource Use Within the Project Study Area

Type of Use	Number of Areas	Number of Species
Food/Sustenance	55	18
Medicinal/Ceremonial	7	3
Tools/Art	1	1

Notes:
[1] Source: Membertou Geomatic Solutions. 2023. L8006 Transmission Line Project, Colchester & Cumberland Co., NS. MEKS. DRAFT.

13.3 Potential Project-Related Environmental Effects for the Mi'kmaq

Traditional activities or use of resources currently occurring in the PDA would be affected during Project construction, and for limited and infrequent periods, during vegetation management activities during operation and maintenance. During construction, access to the PDA will be limited and controlled for safety, and access through the RoW for fishing, hunting, or gathering by the Mi'kmaq may experience brief interruptions. Access may be periodically restricted at various locations along the RoW when construction is active at those locations.

As discussed in Section 7, throughout construction, there will be emissions of dust and sound from the Project. Sound emissions will increase during construction from RoW clearing, and during the preparation and construction of the towers. These activities may result in occasional annoyance and nuisance effects to Mi'kmaw resource users near the PDA but will be short in duration. Sound emissions and the presence of people and equipment may temporarily scare animals away from the work area.

There will be changes to plant life within the RoW due to the removal of the forest cover. The ecology of plants will change as the revegetation within the RoW will be managed to facilitate the safe operation of the new transmission line as well as maintain access to the line for maintenance and repairs. Tree species such as black ash (Fraxinus nigra) and taller shrubs that currently inhabit the PDA will be removed and succeeded by shorter plant species which are tolerant of a more open and less shaded environment.

As discussed in Sections 8, 9, and 11, while there may be changes to wildlife and fish for the locations within the Project RoW, significant change to various species and populations in the Project area are not expected as a result of the Project; therefore, substantive changes in the availability of these resources are not anticipated.

13.4 Mitigation

NSPI is committed to providing meaningful opportunities both present and future for ongoing dialogue about the Project with Mi'kmaw communities as Project planning and design continues and throughout the execution and remaining life of the Project. Engagement that has occurred to date and will continue throughout the Project is described in Section 4.

As noted in the VC sections above, the resultant environmental effects to natural resources potentially used by the Mi'kmaq, including populations of plants, animals, and fish are not anticipated to be significantly affected by the Project. Black Ash were not identified in the PDA during field assessments and there are no known occurrences within the PDA (Strum 2020); however, if black ash trees are found within the PDA, consideration will be made to provide the Mi'kmaq with an opportunity to harvest these trees prior to RoW clearing, pending discussion with landowner.

While there may be changes to plant life within the RoW, adjacent treed, watercourse, and wetland areas will remain unchanged and the current use of resources from these areas is not anticipated to affected by the Project. Although the treed habitat within the Project RoW will be changed to more open habitat, the changes may enhance the habitat for certain species used by the Mi'kmaq. This could include creating young regenerating vegetation for forage for deer and moose and could increase the amount of open habitat that is better suited for plant species such as sweetgrass and berries.

While there may be some interruptions to access to certain locations during construction and operation and maintenance activities such as vegetation management, these interruptions will be temporary and access to locations with resources either within or in proximity to the RoW will resume following the brief interruption. The possible scaring of animals away from the RoW due to noise and the presence of people and equipment during construction or operation is also anticipated to be temporary and wildlife will likely return to the RoW following the completion of Project-related activities.

13.5 Summary

The main Project activities that will interact with the use of land and resources by the Mi'kmaq are the changes in vegetation habitats in the RoW, and access issues during construction and during periodic vegetation management activities for operation and maintenance.

Since the alteration to vegetation will be limited to a change from treed habitats to open habitats within a 38.1 m wide strip of land adjacent to open habitat in the existing RoW, the effects will be recognized as a change in plant species used by the Mi'kmaq, and potentially those used by wildlife. The relatively small amount of treed habitat that will be lost and unavailable as cover for species of hunting interest, may be offset or balanced in its value as forage for deer and moose. Overall, the residual Project related effects are anticipated to be low in magnitude for vegetation species and wildlife habitat, as they are restricted to the RoW, and the effects are reversible.

Potential interruptions to access to the PDA for safety considerations during construction and periodically during operation and maintenance, will be short in duration. The Mi'kmaq will be able to access the lands and resources following completion of these Project-related activities. Overall, the residual Project related effects are anticipated to be low in magnitude for accessibility to land and resources as they are restricted to the PDA and are short in duration.

13.6 References

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14 Assessment of Environmental Effects on the Socioeconomic Environment

This section assesses the potential environmental interactions between the construction, and operation and maintenance phases of the NS-NB Reliability Intertie ("the Project") and the socioeconomic environment valued component (VC).

14.1 Rational for Selection as a Valued Component

The socioeconomic environment was selected as a VC in consideration of potential Project interactions with local communities, including effects on land and resource use, infrastructure, and services, as well as potential effects on employment and the local economy. These potential interactions concern regulatory agencies, non-governmental organizations, and the public because they can have a direct influence on the lives of those living and working in the vicinity of a project. The socioeconomic environment has therefore been selected as a VC in recognition of these concerns and values of Nova Scotians.

The main components of the socioeconomic environment, in relation to this assessment, are defined as follows:

- Land and resource use refers to the current and future use of public and private land and resources in the vicinity of the Project. It includes industrial and commercial land use, private land ownership (including potential nuisance effects), and the use of land and resources for recreational purposes (e.g., hunting, boating, fishing, and hiking). The use of land and resources by Indigenous people and communities is discussed in Section 13 (Current Use of Land and Resources for Traditional Purposes by the Mi'kmaq).
- Infrastructure and services refers to the public services and infrastructure that are provided to local populations through various public and governmental programs, as well as the services provided by businesses and organizations to meet societal needs.
- Employment and economy refers to the labour market and availability, employment, employment income, business income, and their aggregate influence on the local, regional, and provincial economies.

For the socioeconomic environment, the potential interactions between the Project and use of land and resources, infrastructure and services, employment, and the economy, in the PDA and LAA are considered.

14.2 Scope of Assessment for Socioeconomic Environment

14.2.1 Regulatory Context

The NS-NB Reliability Intertie is situated in Colchester and Cumberland counties in northern Nova Scotia. In 2018, the Provincial Government enacted Bill 58 amending the *Municipal Government Act* to require every municipality to develop and maintain planning approaches for their respective municipalities that meet or exceed minimal planning standards as defined in the *Minimum Planning Requirements Regulations* made under section 214(4) of the *Municipal Government Act.*

As a result of the legislation, both Colchester and Cumberland Counties have launched planning projects. *Plan It Colchester* is an initiative to develop a County-Wide Municipal Planning Strategy and Land Use Bylaw. A County-Wide Municipal Planning Strategy Background Summary Report (Plan it Colchester 2023) was issued in April 2023 and provides some fundamental characteristics of the municipality that will help identify key topics for public consultation.

Plan Cumberland is a similar initiative launched by the county to review planning strategy and Land-Use By-Laws. Cumberland County issued their Municipal Planning Strategy in 2018 and released updates in 2022 (Plan Cumberland 2022). Section 4.3.9 of the strategy discusses utilities – noting that offices and maintenance depots being used to support utility construction shall be required to be located in an appropriate zone that permits these uses.

14.2.2 Spatial Boundaries

The assessment of potential environmental interactions between the Project and the socioeconomic environment is focused on the Project development area (PDA) and a local assessment area (LAA).

The PDA for the Project is defined as the immediate area of physical disturbance associated with construction and operation and maintenance of the Project. The PDA encompasses the Project footprint and includes the 96 km, 38.1 m wide right-of-way (RoW) for the transmission line. The PDA also includes the upgraded existing terminal at 67N-Onslow. The Onslow substation will be expanded northward from its current location with an expansion area of 80 m by 175 m wide. For construction, it is anticipated that various temporary facilities will be required including the temporary installation of bridging and matting for watercourse and wetland crossings, temporary marshalling yards, temporary access roads/trails, and where required, improvements to existing access roads/trails. The PDA is illustrated in **Figure 2.1**.

To consider a change in the socioeconomic environment, which may affect infrastructure and services, employment, and economy, the LAA includes the PDA as well as the municipal boundaries of the Towns of Oxford and Amherst, and boundaries of Colchester County, Cumberland County, and Nova Scotia.

14.3 Existing Conditions for the Socioeconomic Environment

14.3.1 Approach and Methods

Information on existing conditions for the socioeconomic environment was obtained from:

- Published sources, including statistical data and reports from Statistics Canada, the Government of Nova Scotia (various departments), and other sources.
- Past project assessments and technical reports.
- Professional judgment of the study team and knowledge of potential interactions.

14.3.2 Description of Existing Conditions

The NS-NB Reliability Intertie runs through rural areas in both Colchester and Cumberland counties in northern Nova Scotia. The line passes outside of the Town of Oxford and the Town of Amherst. The two most prevalent uses of land resources in the Project area are:

- **Resource land use:** Agriculture is the predominant land use in the Project Area, with Colchester and Cumberland counties accounting for one third of the farms in Nova Scotia. The area is home to several blueberry farms in addition to forestry activities occurring on private and Crown land along and adjacent to the transmission line.
- **Recreational land use:**
    - This includes hunting and fishing (e.g., Atlantic salmon, brook trout), motorized (e.g., ATV and snowmobiles) and non-motorized (e.g., hiking) activities, skiing and cabin and cottage use. Protected areas such as the wilderness areas in the Project vicinity also provide recreational activities.
    - The use of trails in the Project area is likely as the NS-NB Reliability Intertie will parallel the existing transmission line and expand its Right-of-Way. There are numerous official ATV and groomed snowmobile trails in the area.

Below is a description of existing conditions related to the demographics, labour and economy, infrastructure and services, land use, and tourism and recreation within the LAA.

14.3.2.1 Demographics

The corresponding census divisions that best represent the Project area are Colchester and Cumberland counties. As outlined in **Table 14.1** below, data from the 2021 Census shows Colchester County has a total population of 51,476 and Cumberland County has a total population of 30,538. Both counties saw a population growth rate of 1.8 percent from 2016 to 2021 which was below Nova Scotia's overall growth rate of 5 percent during the same time period. **Table 14.1** outlines key demographic characteristics of both Colchester and Cumberland counties, including statistics on the Indigenous population as part of a Gender-based Analysis Plus on vulnerable sub-populations in proximity to the Project. The Mi'kmaw community of Millbrook is located in Colchester County and is the closest Indigenous community to the Project. Section 4 Indigenous Engagement outlines the engagement completed to date as well as effects on the Mi'kmaq and steps taken to mitigate impact.

Table 14.1 Colchester and Cumberland Counties Demographic Data

Demographic Data	Colchester	Cumberland	Nova Scotia
Population 2021	51,476	30,538	969,383
Population 2016	50,585	30,005	923,598
2016-2021 Population Change (%)	1.8	1.8	5
Indigenous identity*	2,785	805	52,430
Total private dwellings (2021)	25,638	18,363	476,007
Private dwellings occupied by usual residents (2021)	23,056	14,139	428,228
Population density per square km (2016)	14	7	18
Land area in square km (2016)	3,628	4,276	52,825
Median Age of the Population (2016)	48	53	46

* Indigenous identity includes persons who identify as First Nations (North American Indian), Métis and/or Inuk (Inuit) and/or those who report being Registered or Treaty Indians (that is, registered under the *Indian Act* of Canada), and/or those who report having membership in a First Nation or Indian band.
Source: Statistics Canada (2023)

Age Distribution

The age distribution for both Colchester and Cumberland counties is outlined in **Table 14.2**. As the data show, both Colchester and Cumberland counties have older populations compared to the province-wide distribution of population by age groups. This finding can be considered in the context of a Gender-based Analysis Plus, identifying the prevalence of older, more vulnerable segments of the population in proximity to the Project.

Table 14.2 Colchester and Cumberland Counties Age Statistics

Age statistics	Colchester	Distribution of the population by age groups (%)	Cumberland	Distribution of the population by age groups (%)	Nova Scotia	Distribution of the population by age groups (%)
0 - 14 years	7,435	14.4	3,920	12.8	136,710	14.1
15 - 64 years	31,565	61.3	17,875	58.5	617,345	63.7
65+ years	12,475	24.2	8,745	28.6	215,325	22.2
85+ years	1,460	2.8	945	3.1	23,035	2.4
Source: Statistics Canada (2023)						

Languages

An overview of languages spoken in both Colchester and Cumberland counties shared in **Table 14.3**. English is the primary language spoken, followed by French, and very few Indigenous language speakers. All stakeholder outreach and communication for the Project has been, and will continue to be, issued in English.

Table 14.3 Languages Spoken in Colchester and Cumberland Counties

Language(s)	Total (Colchester & Cumberland)
English only	79,740
French only	710
Neither English nor French	110
English and French	65
Indigenous	10
Total respondents *(excludes institutional residents, i.e., those living in hospital, nursing home or prison)*	80,615
Source: Statistics Canada (2023)	

14.3.2.2 Labour and Economy

As noted in **Table 14.4**, the unemployment rate for Cumberland County (13.5%) is higher than both the Colchester County's unemployment rate (12.2%) and the Provincial rate of (12.7%). In tandem, the employment rate is lower in Cumberland County (43.6%) compared to Colchester County (51.1%) and Nova Scotia's rate of (51.9%).

Table 14.4 Colchester and Cumberland Labour Force Status

Labour Force Status	Colchester	Cumberland	Nova Scotia
In the labour force	25,110	13,015	487,260
Employed	22,050	11,245	425,190
Unemployed	3,060	1,760	62,070
Not in the labour force	18,050	12,775	332,055
Participation rate	58.2%	50.5%	59.5%
Employment rate	51.1%	43.6%	51.9%
Unemployment rate	12.2%	13.5%	12.7%
Source: Statistics Canada (2023)			

As part of a Gender-based Analysis Plus, **Table 14.5** shows median income by jurisdiction and by gender. Here we can identify lower incomes among women in all jurisdictions; however, Colchester and Cumberland have lower incomes for women than the provincial median. As part of the Project, we will implement a Gender and Diversity Plan that encourages employment of women. More information on gender-based effects and mitigation is included in section 14.4.5.

Table 14.5 Income by County and by Gender

	Colchester		Cumberland		Nova Scotia	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Median employment income in 2020 among recipients	$38,400	$26,800	$31,600	$27,200	$38,000	$29,200
Source: Statistics Canada (2023)						

As noted in **Table 14.6**, retail trade and health and social services employ the greatest number of residents in Colchester and Cumberland counties, respectively. Other industries of significance in the Project area include manufacturing, public administration, and educational services.

Table 14.6 Major Industries in Colchester and Cumberland Counties

Industry	Colchester	Cumberland
Health and Social Services	3,510 (14%)	1,985 (16%)
Construction	2,145 (9%)	760 (6%)
Retail Trade	3,820 (16%)	1,655 (13%)
Manufacturing	2,435 (10%)	1,835 (14%)
Educational Services	1,800 (7%)	825 (7%)
Public Administration	1,620 (7%)	1,100 (9%)
All Industries	24,550	12,690
Source: Statistics Canada (2023a)		

The Town of Truro, located approximately 5 km west of the NS-NB Reliability Intertie Project Area, has a population of 46,573 (Statistics Canada 2023b). The Town is a large retail centre and of the 3,820 jobs in the ‘retail trade’ Industry in Colchester County, 3,390 are located within the Town of Truro itself.

Approximately 15 km West of the 67N Onslow Substation, the NS-NB Reliability Intertie passes adjacent to the Debert Industrial Park. The Home Hardware Eastern Distribution Centre, Sobeys Distribution Centre, Kohltech Windows and Entrance Systems, and Richie Brothers Refurbishment Facility are located in the park. The Amherst Industrial Park, located close to where the transmission line crosses into New Brunswick, is home to Atlantic All-Weather Windows Ltd., IMP Aerospace and LED Roadway Lighting among other businesses.

Oxford Frozen Foods, located in Oxford, NS, is the world’s largest provider of wild blueberries, one of North America’s largest producers of frozen carrots and one of Canada’s major manufacturers of onion rings and breaded appetizers. The facility was opened in 1968 and currently has three year-round processing lines. Bragg Lumber is the Canadian Division of farming operations of Oxford Food Group. Along with their American Division, Cherryfield Foods, the company manages over 24,000 acres of Wild Blueberry fields. Numerous fields are located in Cumberland County with additional fields located in other parts of Nova Scotia, PEI, and New Brunswick. Fields managed by Cherryfield Foods are located on the East Coast of Maine.

Short-Term Accommodation in Colchester and Cumberland Counties

It is anticipated that the need for accommodation for workers during site clearing and construction phases will be provided by accommodations in the larger centers of Truro, Oxford, and Amherst as needed, or by local rentals, B & B’s and AirBnb’s. **Table 14.7** provides a preliminary list of accommodations options; as Project development progresses, a robust list of local accommodations as well as restaurants and hospitality services will be compiled and shared with contractors as a means of supporting the local economy to the extent possible.

Table 14.7 Short-Term Accommodations in Colchester and Cumberland Counties

Name	Location	Description
Travel Lodge Convention Hotel	1539 Southampton Road, Amherst, NS	84 rooms, restaurant, laundry
Super 8 Amherst	40 Lord Amherst Drive, Amherst, NS	Hotel with 50 rooms and breakfast service
Comfort Inn	143 Albion Street, Amherst, NS	Hotel with a 24-hour front desk, full breakfast and laundry
Parkview Family Inn	4670 Main Street, Oxford, NS	10 rooms with a restaurant close by
Comfort Inn	12 Meadow Drive, Truro, NS	24-hour front desk with full breakfast and laundry
Inn on Prince	437 Prince Street, Truro, NS	24-hour front desk with full breakfast and laundry
Best Western Glengarry	150 Willow Street, Truro. NS	Hotel with 24-hour front desk, full breakfast and laundry
Super 8 Wyndham	85 Treaty Trail, Millbrook First Nation, NS	Large hotel with 24-hour front desk with full breakfast and laundry
Hampton Inn by Hilton	35 Legends Avenue, Millbrook First Nation, NS	Large Hotel with 24-hour front desk with full breakfast and laundry
Willow Bend Motel	277 Willow Street, Truro, NS	Motel with breakfast service

14.3.2.3 Infrastructure and Services

The following outlines local infrastructure and public services that may be used by site workers during Project construction.

The Colchester East Hants Health Centre and the Cumberland Regional Health Care Centre are the two hospitals closest to the Project area. They are located in Truro and Amherst, respectively. Health and Social Services is the largest industry within Cumberland County with 625 positions in the Health and Social Services Industry located in the Town of Amherst.

There are numerous fire departments along the transmission line route that could be utilized in case of emergency. For a full list of fire departments, please see Appendix D: Stakeholder Mapping. Likewise, there are multiple police services in the Project area, with RCMP detachments in Amherst, Springhill, Oxford, Pictou, Millbrook and Bible Hill as well as municipal police agencies such as the Amherst Police and Truro Police.

The 102 and 104 highways will serve as the primary transportation route in the Project area.

14.3.2.4 Land Use

As outlined above, the NS-NB Reliability Intertie runs through predominantly rural portions of Colchester and Cumberland counties. The most common land uses along the transmission line route include recreational land used by snowmobile and All-Terrain Vehicle clubs, and resource use (e.g., blueberry farming, forestry).

Agricultural Use

According to the Cumberland County Agricultural Profile (Nova Scotia Federation of Agriculture 2021b), the County accounted for 36 percent of Nova Scotia's fruit tree and nut farms. This includes both blueberry and strawberry cultivation. Further, Colchester and Cumberland counties account for almost one-third of the farms in Nova Scotia. **Table 14.8** outlines the various types of farming in the counties.

Table 14.8 Agriculture Producers by Type: Colchester County and Cumberland County

Production Type	Colchester County		Cumberland County	
	2021	Provincial Share	2021	Provincial Share
Cattle Ranching & Farming	97	13%	73	10%
Hog & Pig Farming	2	20%	2	20%
Poultry & Egg Production	6	4%	5	3%
Sheep & Goat Farming	9	13%	10	14%
Horse production	10	14%	11	15%
Beekeeping (apiculture)	16	25%	5	8%
Fruit and tree nut farming (Blueberries/Strawberries)	82	13%	223	36%
Hay Farming	33	14%	59	14%
Sources: Nova Scotia Federation of Agriculture (2021a, b)				

14.3.2.5 Tourism and Recreation

Tourism in Nova Scotia is a significant economic activity as well over a million visitors typically travel to the province each year. According to Tourism Nova Scotia (2023b), the province saw its highest level of tourism revenues in 2017 at $2.8 billion. In 2019 before the pandemic set in, tourism revenues were $2.6 billion; however, due to COVID-19 restrictions and general travel sentiment, revenues declined dramatically by approximately $1.6 billion to $1 billion in each of the 2020 and 2021 seasons. This was followed by a strong recovery in 2022 that saw 1.9 million non-resident visitors flock back to the province (Tourism Nova Scotia 2023a).

Table 14.9 presents tourist visitation per region from the *Community Report – 2019 Visitor Exit Survey* (Tourism Nova Scotia 2021). The Halifax Region, followed by the Bay of Fundy and Annapolis Valley, and the South Shore, have the highest visitation (defined as those who stopped for at least 30 minutes, or overnight).

Table 14.9 Tourist Visitation by Region

Region	Visitation by Region (%) (those who stopped at least 30 minutes or overnight)
Halifax Region	73%
Eastern Shore	7%
Cape Breton Island	18%
Northumberland Shore	18%
Bay of Fundy and Annapolis Valley	37%
Yarmouth and Acadian Shore	4%
South Shore	30%
Source: Tourism Nova Scotia (2021) *shaded rows pertain to the regions in which the NS-NB Reliability Intertie is located.	

The Project Area is home to a variety of recreational activities including ATVing, snowmobiling, hiking, hunting, fishing (e.g., Atlantic salmon, brook trout), and skiing at nearby *Ski Wentworth.* **Table 14.10** outlines a list of recreational groups in the area, many of which have already been engaged on the Project and will continue to be engaged throughout Project development, construction, and operation.

Table 14.10 Recreational Activities and Groups in the Project Area

Organization	Area/Location	Description
Wentworth Ski Hill	14595 Route #4 Wentworth, NS	Ski Hill with 20 alpine trails, 2 terrain parks and lodge with restaurant.
Fundy Trail Snowmobile Club	Folly Lake off Highway #4, Wentworth, NS	200km of groomed trails in the vicinity of the Project area.
North Shore Snowmobile Club	554 Warwick Mountain Rd., Tatamagouche, NS	145 km of groomed and signed trails. Club has approximately 80 members.
Cumberland Snowmobile Club	514 Wyvern Road, Collingwood Corner, NS	450 km of groomed trails with canteen and clubhouse.
Sutherland Lake Trail Groomers Association	120 Sutherlands Lake Rd., Londonderry, NS	Club which delivers grooming and maintenance of area trails including clubhouse and canteen service.
South Colchester ATV Association	c/o 253 Carter Road, Brookfield, NS	Club and trail guide service to the area trails.
Sunrise ATV Club	c/o PO Box 75, Pugwash, NS	Membership includes a trail guide service to the area trails.
North Shore ATV Club	c/o Po Box 1292, Truro, NS	Club representing over 200 members with safety and outdoor recreation in mind.
Cumberland Co Riders ATV Club	4534 Highway 302, Upper Nappan, NS	ATV Club which represents membership in Cumberland County.
Colchester Five Islands ATV Club	c/o PO Box 734, Parrsboro, NS	A club based in western Colchester County. The club aims to promote & provide a safe environment & trail system for the sport of ATV use.
Cobequid Off Highway Vehicle Club	c/o PO Box 609, Springhill, NS	Club of Off Highway vehicle users with a membership from Cumberland County.
ATV Association of Nova Scotia	11 Glendale Avenue, Unit 3, Lower Sackville, NS,	Association representing ATV clubs with a vision to promote responsible, fun, and safe ATV recreation across NS.
Nova Scotia Off Road Riders Association	20 Silver Fox Avenue, PO Box 10006, Dartmouth, NS	A club which promotes education, races, rides, and social events dedicated to off road motorcycling in NS.
Snowmobile Association of Nova Scotia	5516 Spring Garden Road, 4th Floor, Halifax, NS	An association which provides leadership and support to member clubs for recreational snowmobiling on safe well-developed trails.
Hike Nova Scotia	PO Box 31076 Gladstone, Halifax, NS	An organization which promotes hiking culture and supports those which build and maintain hiking trails.

14.3.2.6 Recreational Use Areas

The NS-NB Reliability Intertie is within 5 km or intersects with the parks, protected areas and other areas potentially used for recreational purposes outlined in **Table 14.11**.

Table 14.11 Recreational Use Areas within 5 km of the Transmission Line

Designation	Name	Location and Details
Provincial Parks and Reserves	Wentworth Provincial Park	Near Highway #4, located nearly 3.75 km east of the proposed NS-NB Reliability Intertie
Designated Watersheds	North Tyndal Protected Water Area	Located in the Town of Amherst, the proposed NS-NB Reliability Intertie will run through Zone 3 of the North Tyndal Protected Water Area
Wilderness Areas	Chignecto Isthmus Wilderness Area	Located near the NS-NB border, the existing transmission line Right-of-Way spans 2.65 km of the Chignecto Isthmus Wilderness Area, south of Long Lake. The Chignecto Isthmus Wilderness Area is 3,748 hectares and is an essential land bridge to the rest of North America which provides a means for wildlife connectivity. This land bridge ensures the genetic flow between wildlife populations and facilitates wildlife movement in response to environmental changes (Government of Nova Scotia 2008).
	Wentworth Valley Wilderness Area	Near Highway #4, adjacent to Ski Wentworth, located over 3.5 km east of the proposed NS-NB Reliability Intertie. The Wentworth Valley Wilderness Area is 2,019 hectares and protects a portion of the Cobequid Mountains (Government of Nova Scotia 2022).
	Chase Lake Wilderness Area	Near Town of Oxford, located over 3 km west of the proposed NS-NB Reliability Intertie
Nature Reserves	Steepbank Brook Nature Reserve	Near Hwy 104 and Oxford Junction, located near 4.5 km southwest of the proposed NS-NB Reliability Intertie
	Staples Brook Nature Reserve *(Pending cabinet submission, current protection under interim policy)*	Near Debert, located about 700 m east of the proposed NS-NB Reliability Intertie
Heritage Rivers	None near the Study Area	N/A
Other	Trans Canada Trail	The Project's RoW traverses the Trans Canada Trail in two locations: *SANS no 104* and *Short Line Trail.* The Trans Canada Trail is a unique system of connected urban and rural trails spanning coast to coast.

14.4 Effects Assessment

14.4.1 Assessment Criteria

14.4.1.1 Residual Effects Characterization

Table 14.12 presents definitions for the characterization of residual environmental effects on the socioeconomic environment. The criteria are used to describe the potential residual effects that remain after mitigation measures have been implemented. Quantitative measures have been developed, where possible, to characterize residual effects. Qualitative considerations are used where quantitative measurement is not practicable.

Table 14.12 Characterization of Residual Effects on the Socioeconomic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive –** a residual effect that moves measurable parameters in a direction beneficial to land and resource use as well as the economy relative to baseline **Adverse –** a residual effect that moves measurable parameters in a direction detrimental to land and resource use as well as the economy relative to baseline
Magnitude	The change in flora SOCI or wildlife abundance and/or distribution	**Negligible –** a measurable change in land and resource use as well as the economy in the LAA is not anticipated **Low –** a measurable change in land and resource use as well as the economy in the LAA is not anticipated, although temporary disruptions in the LAA might occur **Moderate –** a measurable change in land and resource use as well as the economy in the LAA might occur **High –** a measurable change in land and resource use as well as the economy may extend past the LAA
Geographic Extent	The geographic area in which a residual effect occurs	**PDA –** residual effects are restricted to the PDA **LAA –** residual effects extend into the LAA
Duration	The time required until the measurable parameter or the VC returns to its existing condition, or the residual effect can no longer be measured or otherwise perceived	**Short term** – residual effect extends for less than 1 year **Medium term** – residual effect extends through the construction phase **Long term** – residual effect extends through the operation phase **Permanent** – recovery to baseline conditions unlikely
Timing	Considers when the residual environmental effect is expected to occur. Timing considerations are noted in the evaluation of the	**Not applicable –** effect does not occur during critical life stage or timing does not affect the VC **Applicable –** effect occurs during a critical life stage

Table 14.12 Characterization of Residual Effects on the Socioeconomic Environment

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
	residual environmental effect, where applicable or relevant	
Frequency	Identifies how often the residual effect occurs and how often during the Project or in a specific phase	**Single event –** the residual effect occurs once **Multiple irregular event –** the residual effect occurs at no set schedule **Multiple regular event –** the residual effect occurs at regular intervals **Continuous –** the residual effect occurs continuously
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible –** the residual effect is likely to be reversed after activity completion and reclamation **Irreversible –** the residual effect is unlikely to be reversed
Ecological and Socioeconomic Context	Existing condition and trends in the area where residual effects occur	**Undisturbed –** area is relatively undisturbed or not adversely affected by human activity **Disturbed –** area has been substantially previously disturbed by human development or human development is still present

14.4.1.2 Significance Definition

For the purposes of socioeconomic environment VC, significant residual adverse environmental effects are defined here as:

- **Change in land and resource use** – where the use of land for the Project and related facilities is not compatible with adjacent land and resource use activities as designated through a legislative/regulatory land use area (e.g. wilderness area), or a Project-related change or disruption that widely restricts or degrades present land and resource use (includes infrastructure and services) to a point where the activities cannot continue at current levels and for which the environmental effects are not mitigated.
- **Change in economy** – where the Project results in an unmitigated extended loss of employment or business income within the Project Area.

It should be noted there can be positive environmental effects, particularly with respect to change in economic conditions.

14.4.2 Potential Project Interactions with the Socioeconomic Environment

Table 14.13 summarizes the potential environmental effects of Project activities on the socioeconomic environment, as well as effect pathways and measurable parameters used for evaluating effects. Potential environmental effects and measurable parameters were selected based on professional judgment, recent environmental assessments in Nova Scotia, and regulatory concern for certain socioeconomic features.

Table 14.13 Potential Environmental Effects, Effect Pathways, and Measurable Parameters for Socioeconomic Environment

Potential Environmental Effects	Effect Pathways	Measurable Parameter(s)
Change in land and resource use	• Disruption to landowner enjoyment of their private lands • Disruption to existing recreational activities • Alteration of agricultural or forestry lands	• Number community complaints received by Project team • Area (hectare) of land affected (e.g., access restrictions, recreational land use)
Change in economy	• Changes (positive or negative) to local employment opportunities and business income	• Number of employment opportunities created • Change to business income as a result of Project-related procurement

Table 14.14 identifies the physical activities that may interact with the socioeconomic environment VC and result in an environmental effect. These interactions are discussed in detail in the following sections, including potential environmental effects, mitigation and environmental protection measures, and residual environmental effects.

Table 14.14 Potential Project Environmental Effects on the Socioeconomic VC

Project Activities and Physical Works	Potential Environmental Effects	
	Change in Land and Resource Use	Change in Economy
Construction		
Site Preparation and Clearing	✓	✓
Excavation and Structure Assembly	✓	✓
Conductor Stringing	✓	✓
Expansion of Onslow Terminal	✓	✓
Inspections and Energization	✓	✓
Clean-Up and Revegetation	✓	✓
Employment and Expenditure	-	✓
Operation and Maintenance		
Presence of Conductors and Towers	-	-
Inspections and Maintenance	-	-
Vegetation Management	-	-

Notes:
✓ = Potential interaction
– = No interaction

The following Project activities are not expected to interact with the socioeconomic environment:

- During construction, employment and expenditure are not applicable to changes in land use and resources.
- During operation and maintenance, the presence of conductors and towers, inspections and maintenance, and vegetation management will not interact with the socioeconomic environment or if so, would be negligible. As such, a change in economy (e.g., employment opportunities and business income) would not be felt post-construction, as would a change in land and resource use.

14.4.2.1 Potential Effects to Socioeconomic Environment During Construction

Change in Economy

A positive interaction will occur with the local economy during all activities associated with Project construction. In addition to direct employment, goods and services will be required and will be sourced from the local area and the province as much as possible. Providers of local goods and services (e.g., construction, accommodations, and materials) will have an opportunity to learn about the Project and attend supplier information sessions at various points during Project development.

We anticipate that the Project will provide economic benefit and employment to the province and the local communities and that most of these benefits will be achieved during the construction phase. An estimated 20 jobs could be created during the initial line clearing phase of the Project, most of which could be filled by local skilled people and companies. Transmission line construction itself will create an estimated 150-200 jobs with a mix of local and non-local resources used for this scope of work. All employment on the Project will be subject to NSPI's Gender Equity and Diversity Plan and commitment to hire women, local and Mi'kmaw individuals will be made where possible.

It is anticipated that the need for accommodations and hospitality services for workers during construction will be provided by accommodations in the larger centres of Truro, Oxford, and Amherst as needed or by local rentals, B & B's and AirBnb's (see **Table 14.7** in section 14.3.2.2 for listing of local accommodations).Given the linear nature of the Project spread over 96km, the impact on tourism and local accommodations will be small and will not pose an undue impact on housing and accommodation availability in the area. Catering services provided by local businesses may also be used for various Project events. As Project development progresses, a more robust list of local accommodations, restaurants and hospitality services will be compiled and shared with contractors as a means of supporting the local economy.

Change in Land and Resource Use

All construction activities will have an interaction with land and resource use. Residential and recreational land usage and enjoyment, including ATVing, snowmobiling, hiking, hunting, fishing, mountain biking and skiing, may be temporarily interrupted by construction activities resulting in temporarily limited site access for safety reasons. Recreationists may have limited access to the Project area during construction to ensure recreationist and site-worker safety; however, there are expected to be no long-term impacts to existing snowmobile and ATV trails as a result of the Project. Ultimately, recreationists may experience some disturbance with construction activities, but these are anticipated to be infrequent and short in duration.

With regard to noise, all construction activities will produce localized and short-duration noise associated truck and equipment operation. Work in any one area will be limited to a few days at a time, before the activity moves to the next structure. Noise bylaws will be followed, and residents will be kept informed of the schedule of activities near or on their properties.

Farmland and forestry along the transmission line, notably blueberry farming, Christmas tree farming and woodlot activity, may face short term loss of production because of clearing requirements. As the Project follows the existing transmission line in areas where active farms may be located, potential environmental effects will be localized, and small in magnitude.

The process of securing land easements for properties that cross the transmission line began over a decade ago, and to date 90% of individual private landowner easements have already been secured. Landowners with easement agreements fully acknowledge the potential effects of the transmission line on their property and although they may experience some disturbance during the Project's construction phase, impacts are anticipated to be infrequent and short in duration.

There are no impacts anticipated on community infrastructure such as water, sewer, and telecommunications. Project-related interactions with the road transportation network will temporarily and intermittently restrict access for vehicular and/or pedestrian traffic and affect local traffic patterns in the transportation network leading to and from the PDA, substations, terminals, and surrounding area. Construction will also result in a slight increase in passenger vehicles and heavy trucks transporting workers, materials, and equipment to and from the site. However, traffic will be managed through standard procedures such as signage and flagging crews. All large-sized vehicles will obtain appropriate weight and size permits if and as required. Moving large equipment involving road closures will be conducted at low traffic times. The public will also be notified about long delays or disruptions to the transportation network.

Of the recreational use areas listed in **Table 14.11**, the Project will cross only the North Tyndal Protected Water Area (see Section 10 Water Resources), Chignecto Isthmus Wilderness Area (see Section 9 Wildlife, Vegetation, and Habitat), and Trans Canada Trail, similar to the existing transmission line. Potential interactions during construction include limited access to specific areas that will be under construction for short periods of time.

14.4.2.2 Potential Effects to Socioeconomic Environment During Operation and Maintenance

Operational activities related to the presence of conductors and towers, inspections and maintenance, as well as vegetation management will not interact with land and resource use nor the economy. As the new transmission line follows the existing line, landowner and recreationist experience and viewshed are not anticipated to change substantially during operation. Ongoing operation and maintenance will require staff for monitoring and repair; however, these numbers are not anticipated to be substantial over the long term and will likely draw from existing NSPI operations staff.

14.4.3 Mitigation for the Socioeconomic Environment

It is anticipated that there will be a positive impact on the local economy in the Project area (e.g., employment opportunities and increased business income) as a result of the Project and as such, no mitigation is required for the local economy.

Given detailed site design and compatibility with private landownership, recreational, land and resource use activities, minimal mitigation is recommended. However, mitigation may include the following:

- Continued engagement with recreationist groups, notably ATVers and snowmobilers, to keep them informed of Project activities, especially during construction when the greatest impact will be felt.
- Community communications through advertising Project schedules and updates in high traffic locations, in addition to sharing information via the Project website, community newsletters, at one-on-one meetings, and open houses.
- Reasonable efforts will be made during final design and routing to minimize direct interactions and crossings with active agricultural land. Where applicable, financial compensation will be negotiated with landowners along the transmission line whose farmland and forestry activities will face short term loss of production.
- Noise-generating construction activities will comply with the requirements of existing noise by-laws (where applicable) and residents will be kept informed of the schedule of activities on or near their properties.
- Noise will be temporary, intermittent, and restricted to areas where it is generated by construction activities. <u>Construction activities are expected to occur during daylight hours (typically between the hours of 7am and 7pm).</u>

- If construction noise risks exceeding the thresholds set in bylaws, construction noise control mitigation measures may be put in place including sound barriers, shrouds, and enclosures, where warranted.
- Final transmission line design and routing will attempt to avoid recreational use areas (including protected areas) where feasible with the exception of the North Tyndal Protected Water Area, Chignecto Isthmus Wilderness Area and Trans Canada Trail where the existing transmission line currently crosses. Please see *Section 10: Assessment of Environmental Effects on Water Resources* for more information and mitigation activities related to the North Tyndal Protected Water Area.

14.4.4 Characterization for Residual Project Environmental Interactions for the Socioeconomic Environment

This section discusses the residual Project-related residual effects to the socioeconomic environment following the application of mitigation in Section 14.4.3.

Change in Land and Resource Use

By following standard mitigation, best management practices, and implementing additional mitigation as described above, significant residual environmental effects on change in land and resources use are not anticipated. The residual environmental effects on change in land and resources use are expected to be adverse in direction, low in magnitude given the proposed mitigation and twinning of existing transmission line, only felt within the PDA, will occur continuously for the short term (during construction only), and will be irreversible once the transmission line infrastructure is in place. Negligible effects on the land and resource use will be felt during operation and maintenance.

Change in Economy

No mitigation is recommended related to change in economy as there will be an anticipated positive effect on the local economy flowing from the Project. The characterization of the residual effect on the economy during Project construction is deemed to be positive in direction, moderate in magnitude, extends into the LAA, will occur continuously for the short term (during construction only), and will be reversible once construction is complete. Negligible effects on the local economy will be felt during operation and maintenance.

14.4.5 Gender-based Analysis Plus Effects

As part of a Gender-based Analysis Plus, baseline information on socioeconomic data pertaining to women in the Project area was gathered. This includes the finding that women earn a lower median income in both Cumberland and Colchester counties, as identified in section 14.3.2.1. In an effort to provide well-paying employment opportunities for women in a variety of Project roles, a Project-specific Gender Equity and Diversity Plan will be developed. The Plan will describe the gender equity and diversity goals and initiatives that will be implemented through all Project phases, as well as measures taken through stakeholder engagement to allow, where possible, fair and equal access to Project benefits. Throughout the life of the Project, the Gender Equity and Diversity Plan will be followed in the recruitment, selection, and retention of Project employees. The plan will include gender equity policies and initiatives to increase the employment of women and to identify the programs and processes required to facilitate the recruitment, training, and retention of women during all Project phases. Similarly, diversity policies and initiatives will provide employment opportunities for and employment of qualified members of under-represented groups such as visible minorities, Indigenous peoples, and persons with disabilities.

The Project will not establish work camps for on-site workers; instead, workers will be housed in local accommodations or will commute to site from their home community if within a reasonable distance. Work camps for resource development and energy projects have been linked to increased levels of gender-based violence, notably violence against women, Indigenous women, and 2SLGBTQIA+ individuals. This link has been clearly identified in *The Final Report of the National Inquiry for Missing and Murdered Indigenous Women and Girls* stating that sexual violence and racism occur in such camps, exemplified by higher rates drug and alcohol offences, incidents of sexual assault, harassment, STIs and women entering the sex trade as a result of interactions with predominantly male transient workers (National Inquiry into Missing and Murdered Indigenous Women and Girls 2019). To address this directly, no camps will be established for the project. In addition, workplace safety and harassment policies will be established and implemented using a zero-tolerance approach.

Given the proximity of the Project to Mi'kmaw communities, NSPI engagement efforts with the local Mi'kmaq remain a priority as does fulfilling the commitments of the collaboration agreement with the KMKNO. As previously outlined in Section 4, the collaboration agreement will include elements such as capacity funding, employment opportunities, commitment to maximizing Mi'kmaw procurement opportunities, environmental and archaeological monitoring and capacity for the Mi'kmaq to participate throughout the EA and construction process.

As it pertains to the older demographics of the Project area, and identified in Section 14.3.3, the Project's engagement strategy will continue to provide communications and engagement approaches that are accessible to older populations. Hard copy mailouts, advertisements in local newspapers, telephone communication, as well as opportunities for one-on-one conversations have been successful thus far in engaging older community members. This is exemplified by the older demographic of participants that attended the Project open houses held to date. We will continue to build upon this success, in addition to providing approaches that target younger demographics in the community.

NSPI is committed to continuing to develop our understanding of vulnerable populations in proximity to the Project, and specifically as it relates to women, Mi'kmaw people, and the older demographic of the area. By fostering an inclusive stakeholder engagement program as well as creating an environment of social and cultural safety will reduce barriers for employment and general engagement on the Project.

14.4.6 Summary

A summary of the residual environmental effects characterization following the application of mitigation measures described in Section 14.4.3 for the socioeconomic environment during the construction and operation and maintenance phases of the Project is provided in **Table 14.15**.

Table 14.15 Summary of Project Residual Environmental Effects: Socioeconomic Environment

Residual Effect	Residual Effects Characterization								
	Project Phase	Direction	Magnitude	Geographic Extent	Duration	Timing	Frequency	Reversibility	Ecological and Socioeconomic Context
Change in land and resource use	C	A	L	PDA	ST	N/A	C	IR	D
	O	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Change in economy	C	P	M	LAA	ST	N/A	C	R	N/A
	O	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

KEY
See Table 14.12 for detailed definitions

Project Phase
C: Construction
O: Operation and Maintenance

Direction:
P: Positive
A: Adverse

Magnitude:
N: Negligible
L: Low
M: Moderate
H: High

Geographic Extent:
PDA: Project Development Area
LAA: Local Assessment Area

Duration:
ST: Short term
MT: Medium term
LT: Long term

Timing:
N/A: Not Applicable
A: Applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

Ecological/Socioeconomic Context:
D: Disturbed
U: Undisturbed
N/A: Not applicable

14.5 Determination of Significance

The Project will not result in significant residual environmental effects that will restrict or degrade the local economy and land and resource use to a point where activities cannot continue at current levels or be mitigated or compensated. This overall determination is made with a high level of confidence, considering the environmental effects during construction and operation and maintenance, the residual environmental effects rating criteria, and the application of best management practices and standard mitigation for the socioeconomic environment.

14.6 Follow-up and Monitoring

With the implementation of proposed mitigation described in section 14.4.3, and in consideration of the residual environmental effects rating criteria, no additional monitoring is planned at this time.

14.7 References

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15 Assessment of Effects of the Environment on the Project

15.1 Rational for Inclusion

Effects of the environment on the Project has been included in this assessment due to the potential for environmental forces, events, and environmental conditions to interact with the Project. These interactions may include naturally occurring events related to climate (including weather and its variables), climate change, flooding, seismic activity, and forest fires.

If effects of the environment on the Project are not accounted for or are left unmanaged, they can result in adverse changes to Project components and infrastructure, construction schedule, costs, and operational performance. These potential effects are addressed through Project design, scheduling, and applying industry standards, best management practices and operational procedures in consideration of the expected and extreme environmental conditions.

15.2 Scope of Assessment for Effects of the Environment on the Project

15.2.1 Spatial Boundaries

The assessment of potential environmental interactions between the Project and the effects of the environment on the Project is focused on the Project development area (PDA). The spatial boundary for effects of the environment on the Project is limited to those areas having Project-related infrastructure (i.e., the PDA).

The PDA for the Project is defined as the immediate area of physical disturbance associated with construction and operation and maintenance of the Project. The PDA encompasses the Project footprint and includes the 96 km, 38.1 m wide right-of-way (RoW) for the transmission line. The PDA also includes the upgraded existing terminal at 67N-Onslow. The Onslow substation will be expanded northward from its current location for an additional area 80 m by 175 m wide. For construction, it is anticipated that various temporary facilities will be required including the temporary installation of bridging and matting for watercourse and wetland crossings, temporary marshalling and laydown yards, temporary access roads/trails, and where required, improvements to existing access roads/trails. The PDA is illustrated in **Figure 2.1**.

As the zone of influence of effects of the environment on the Project is limited to those Project components and infrastructure, there is no need to define a local assessment area (LAA) for effects of the environment on the Project.

15.2.2 Temporal Boundaries

The temporal boundaries for the assessment of effects of the environment on the Project include the following periods:

- Construction: anticipated to occur from 2024 to 2027
- Operation and maintenance: anticipated to begin in Fall 2027

15.2.3 Significance Definition

A significant adverse residual effect of the environment on the Project is defined as one that results in one or more of the following conditions:

- A substantial change to the Project construction schedule (e.g., a delay resulting in the construction period being extended by one season).
- A Long-term (> 4-hour) interruption in service (e.g., interruption in power transmission activities causing electricity demands not to be met).
- Damage to the Project infrastructure resulting in increased safety risk to the public.
- Damage to the Project infrastructure resulting in serious injury or fatality.
- Damage to the Project infrastructure resulting in required repairs that could not be technically or economically implemented.
- Failed mitigation causing environmental damage that cannot be technically or economically corrected or compensated in a feasible manner.

15.3 Assessment of the Effects of the Environment on the Project

15.3.1 Approach and Methods

The information presented below was primarily obtained from research (including a review of statistical data sources, scientific literature, and other published reports), past project assessments/technical reports that were reviewed for relevant information, and the professional judgement of the study team.

Effects of the environment is defined as a change to the Project that may be caused by the environment. Typically, the potential for such effects is a function of Project planning, infrastructure design and the influences of nature (e.g., natural hazards, climate change and weather events). The severity of the effects may be moderated or amplified depending upon general site characteristics, such as topography, landform, altitude, exposure, *etc.* In general, environmental conditions that can affect the Project infrastructure or operations will be addressed through engineering design and industry standards. Project longevity and long-term environmental management are inherent considerations during all aspects of the development process. Typically, loadings and stresses originating from environmental causes are incorporated into detailed engineering design.

The environmental conditions posing a substantial risk to the integrity of the Project were determined based upon (i) the level of occurrence and the severity of the potential effects (i.e., risk) and (ii) a review of those conditions in the past and how they are predicted to change in the future (e.g., potential effects of climate change). Based on the issues and concerns identified, the following environmental attributes were selected for consideration:

- Climate effects including:
    - Air temperature and precipitation including ice and/or snow buildup
    - Wind (sustained high winds or significant gusts)
    - Fog
    - Extreme weather
    - Climate change

- Geophysical hazards including:
  - Slope instability
  - Geotechnical considerations
  - Karst topography
  - Seismic events
- Flooding
- Wildfires

15.3.2 Climate and Climate Change

15.3.2.1 Existing Conditions

Climate

Climate is defined as the long-term average, seasonal, and extreme meteorological conditions in an area, which includes measurable parameters such as temperature, precipitation, and winds and other factors. Environment and Climate Change Canada (ECCC) has developed statistical summaries of data collected from weather stations located across Canada (typically a 30-year record, with the most recent data available being for the period of 1981 to 2010), known as climate normals data. Updated climate normals data for the 30-year period of 1991-2020 is set to be released in 2023. There are many weather stations along the RoW of the PDA. To get an accurate representation of the climate across the PDA, climate normals data was analyzed from a weather station on either end of the PDA, as well as two along the RoW. The Truro weather station is located 5 km from where the existing substation in Onslow will be expanded and upgraded, on the eastern end of the PDA. The transmission line corridor passes the weather station in Debert within 2 km, and the weather station in Middleboro within 15 km. The Nappan station (station name: Nappan CDA) is approximately 15 km away from where L8006 transmission line will join with the NB Power line at the provincial border.

Air Temperature and Precipitation

Annual climate readings at all four stations indicate that January is typically the coldest month of the year, while July is typically the warmest month. Middleboro experiences the highest daily average temperature, while Nappan has the coldest daily average temperature. The highest annual rainfall on average is 1,011 mm in Debert, with the rainiest month of the year being in the fall for all four monitoring stations. Middleboro has the highest annual snowfall on average with 293 cm, and January is the month where all areas receive the most snowfall (ECCC 2022). Average daily temperatures for January and July, and average snowfall and rainfall are displayed in **Table 15.1** for all four weather monitoring stations.

Table 15.1 1981-2020 Climate Normals Data in PDA

Station	January Daily Average Temperature	July Daily Average Temperature	Average Annual Rainfall	Highest Monthly Rainfall	Average Annual Snowfall	Highest Monthly Snowfall
Truro	-6.9°C	18.4°C	980 mm	October 104.5 mm	215 cm	January 55.1 cm
Debert	-6.7°C	18.6°C	1,011 mm	September 109.1 mm	158 cm	January 38.8 cm
Middleboro	-7.4°C	19.2°C	946 mm	October 109.5 mm	293 cm	January 68.7 cm
Nappan CDA	-7.7°C	18.5°C	886 mm	September 98.4 mm	254 cm	January 62.4 cm
Source: Environment and Climate Change Canada 2022						

Wind

Wind data is only available from the weather station in Truro; however, data from the station at the Moncton Airport (Station Name: Moncton A) is also included to be representative of both sides of the PDA. The maximum hourly wind speed in Truro was observed in January at 93 kilometres per hour (km/h) traveling southwest, while the maximum hourly wind speed observed in Moncton was in September at 103 km/h also travelling southwest. The monthly average wind speeds in Moncton are lowest in August at 13.2 km/h, and highest in January and March, at 19.2 km/h. The wind direction in Moncton is generally southwest in the summer months (May to October), and west in the winter months (ECCC 2022). The average wind speeds and direction are not available for the Truro monitoring station.

Fog

Fog is defined as ground-level clouds that consists of tiny water droplets suspended in the air. Fog can reduce visibility to a distance of less than 1 km (ECCC 2017). The Moncton weather station recorded, on average, 172 hours, or 7.2 days, of fog per year. Visibility is lowest during the month of March and is reduced to a distance of less than 1 km for approximately 24 hours a month (ECCC 2022).

Extreme Weather Events

The Government of Canada lists severe storms and storm surges, hurricanes, tsunamis, floods, landslides, and wildfires amongst Nova Scotia's potential natural risks and hazards (Government of Canada 2022). Extreme weather events such as heavy wind, precipitation, freezing rain, ice formation, and lightning strikes can occur year-round in Atlantic Canada and could potentially have adverse effects on the Project infrastructure and personnel during construction and operation and maintenance.

Extreme storms in Nova Scotia tend to be more common and severe in the winter. Winter storms can consist of high winds and a mix of snow, rain, and ice. Hurricane season occurs between June and November, with the most active months being August, September, and October (ECCC 2009). The center of the hurricane (called the eye of the storm) is surrounded by very strong winds; a minimum of 120 km/h (Government of Canada 2022). The most damaging hurricanes in recent years were Hurricane Fiona (2022), Hurricane Dorian (2019), and Hurricane Juan (2003). Hurricane Fiona resulted in power outages for more than 250,000 Nova Scotia residents and caused significant damage to provincial infrastructure, knocking down trees and powerlines, flooding homes and washing out roads (CBC News 2022). Wind gusts reaching 171 km/hr were felt in Nova Scotia, with the maximum rainfall during the storm being 192 mm (CBC News 2022). Flash flooding resulting from a record amount of rainfall in a 24-hour period caused significant damage in parts of Nova Scotia in July 2023, causing four fatalities and immense damage to infrastructure across the province.

Nova Scotia is at a low risk of experiencing a tsunami due to the province's position on a trailing-edge plate margin (NSDNR 2021). A recent study did find that the lower part of the Scotian Slope, located south of Nova Scotia, experiences underwater landslides at a rate 10 times higher than what was previously thought, which has the potential to cause tsunamis similar to the one that devastated parts of Newfoundland in 1929 (Smith 2019). However, the study concluded that the seabed is statically stable, and the risk is low that an underwater landslide would cause it to collapse (Smith 2019).

Seismic activity (earthquakes), flooding, and forest fires are discussed more below in Sections 15.3.3, 15.3.4, and 15.3.5, respectively.

Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or variability of its properties and that persists for an extended period, typically decades or longer" (IPCC 2014). Climate change can be caused by naturally occurring events (such as volcanic eruptions or solar cycles) and/or human activities that cause changes to land use, or the atmosphere (IPCC 2014).

As discussed in Section 7 (Atmospheric Environment), the release of greenhouse gases (GHGs), on a global scale, increases worldwide concentrations of GHGs in the atmosphere, and they are a contributor to climate change (IPCC 2014). These gases absorb and trap heat in the atmosphere, creating a natural phenomenon commonly called the "greenhouse effect". An increase in GHGs in the atmosphere intensifies the greenhouse effect.

Predictions of future climate change are derived from mathematical and statistical models and predicting the effects of global climate change is extremely complex. Climate models are evolving but are not yet sufficiently accurate to specifically describe future events and conditions. Models agree that temperatures are projected to increase in all seasons. This average temperature change will be gradual over the period and will change precipitation types and patterns. The warmer fall and winter temperatures could mean later freeze up; wetter, heavier snow; more liquid precipitation occurring later into the fall; and possibly more freezing precipitation during both seasons. The results obtained from climate change prediction models can be used as a guide for Project planning and can facilitate Project design and adaptation.

Researchers and scientists have predicted that over the next 100 years, Atlantic Canada is likely to experience warmer temperatures, increased precipitation, more frequent and intense storm events, rising sea level and increased storm surges, coastal erosion, and flooding (Vasseur and Catto 2008). The average temperature change is expected to be gradual and is likely to affect precipitation types and patterns including later freeze up, wetter, heavier snow, more liquid precipitation occurring later into the fall, and possibly more freezing precipitation during both seasons (Lines et al. 2008). Sea level rise in the Maritimes has been occurring since the end of the last ice age, about 10,000 years ago. During the 20th century the sea level at Charlottetown, Halifax, and Sydney has risen at a rate of approximately 0.3 m/century, which included 0.2 m/century of crustal subsidence (Forbes *et al*. 1997). The rate of change in global mean sea level is accelerating in the 21ST century due to global warming impacts, notably the melting of polar ice caps. The future global mean sea level rise will likely be greater than 1 m per century, well above 2007 projections from the Intergovernmental Panel on Climate Change (which were up to 0.59 m/century) (Solomon *et al*. 2007). The global mean sea level rise is now predicted to range from 0.9 m to 1.6 m by 2100, if the melting of polar ice caps continues as predicted (Arctic Monitoring and Assessment Program 2011).

Stantec completed a climate and weather study in March of 2021 for Nova Scotia Power Incorporated (NSPI), for the proposed L-8006 345 kV transmission line between Onslow, Nova Scotia and Salisbury, New Brunswick (Stantec 2021). NSPI has previously experienced tower failure within the proposed corridor due to ice buildup and high winds. The study was conducted to determine how climate change would affect return periods for wind and freezing rain events within the corridor. 1:150 return periods were estimated for 10-Minute Sustained Wind and Freezing Rain events for four locations within the transmission line corridor, seen in **Table 15.4**.

Historical climate data was reviewed along with recommendations for estimating potential loads for transmission lines from CSA 22.3 No. 60826-19. The historical climate data was complemented by the latest climate change projection data related to extreme wind and freezing precipitation for the region. ECCC completed a climate change model of 1:50 return periods for ice thickness and sustained wind pressure for all of Canada in 2020. Projections for Moncton and Truro are displayed in **Table 15.2** and **Table 15.3**.

Table 15.2 Projected Change in Winds for Region near Proposed Corridor

Location	Estimated Change in 1:50 Return Period for Maximum Hourly Wind Pressure (%)			Estimate Change in 1:50 Return Period for Maximum Hourly Wind Speed (%)		
	2030s	2050s	2080s	2030s	2050s	2080s
Truro	1.3	6.9	4.4	0.7	3.3	2.2
Moncton	2.3	4.5	6.4	1.1	2.2	3.1

The Atlantic region is projected to have moderate increases in 1:50 return period wind pressure. For the proposed corridor, 1:50 return period winds are expected to increase by approximately 2 to 3% in the future.

Atlantic Canada was projected by ECCC to see a decrease in the frequency of extreme freezing precipitation. Extreme precipitation events in the corridor are expected to be reduced in the future between 0 and 60%.

Table 15.3 Projected Change in Extreme Freezing Precipitation for Region near Proposed Corridor

Location	Estimated Change in 1:20 Return Period for Ice Thickness (%)		
	2030s	2050s	2080s
Atlantic Canada	-4.4	-23	-40
Truro	-13	-30	-49
Moncton	-13	-33	-45

Table 15.4 Recommended 1:150 Return Period Values for 10-Minute Sustained Wind and Freezing Rain

ERA 5 Grid Location	Ground Elevation (m)	10-Minute Sustained Wind (km/h)		Freezing Rain (mm)	
		1:50 Return Period	1:150 Return Period	1:50 Return Period	1:150 Return Period
1	318	107	118	30.1	36.1
2	23	109	120	37.4	44.8
3	84	109	120	33.7	40.4
4	25	109	120	33.6	40.3

15.3.2.2 Potential Project Interactions with Climate and Climate Change

There are a variety of ways in which climate, extreme weather events, and climate change can interact with the Project, some of which include those described below.

- Delays in receipt of materials and supplies (e.g., construction materials) and in delivering products, therefore delaying construction activities.
- Reduced visibility and inability to maneuver equipment.

- During construction, high winds may result in work stoppages for operational or safety reasons and could limit access. Airborne debris could interact with the cables, causing damage and potential power outages.
- During operation, high winds could add sufficient force on transmission towers and wires to cause structural damage.
- Lightning strikes could cause damage to Project equipment and injury or death to workers.
- Loss of electrical power resulting in potential loss of production.
- Extreme rain events can result in stoppages of outdoor work when it creates unsafe working conditions. It is normal operating practice to conduct work risk assessments prior to the commencement of work.
- Inability of personnel to access the site (e.g., if a road were to wash out, or poor driving conditions)
- Wind and freezing rain can cause ice to build up on one side of the transmission cable thereby interfering with air flow and resulting in an undulating motion of the cable (known as galloping). This motion can induce strain on the cable and associated structures and may result in structural damages and outages.
- Freezing rain could lead to ice build-up (e.g., melting conditions after snowfall) affecting operation as Project components may not bear the additional load.
- Breakage of ice buildup can cause potentially damaging vibrations to the cable.
- Ice debris falling from the lines or towers may damage other Project components or nearby structures.
- In addition to the effects listed above, it is expected that future climate change could result in increased ambient temperatures, sea level rise, increased frequency and intensity of precipitation and storm events, including storm surges, and strong winds, and increased incidence of flooding and erosion. Each of these, if not engineered and designed for, could result in damage to infrastructure. Flooding is assessed below in Section 15.3.4.

15.3.2.3 Mitigation

Interactions between climate and climate change and the Project will be managed through the following mitigation measures:

- The Project will be designed and constructed to meet applicable engineering codes, standards, and best management practices. These include applicable building safety, industry codes, and standards including the National Building Code of Canada, the National Fire Code of Canada, and applicable Canadian Standards Association (CSA) Standards, including CAN/CSA-C22.3 No. 1-10 – Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission Lines.
- Extreme weather, rainfall, and winter precipitation will be considered in Project design, including the selection of materials and equipment, planning and maintenance of the Project.
- Weather forecasts will be monitored to predict poor weather conditions (e.g., extreme precipitation, wind, fog), and allowance for them will be included in the construction and operation and maintenance schedules.
- Work risk assessments are conducted prior to the commencement of work, and work will be scheduled to avoid predicted times of extreme where feasible, for the safety of crews and Project infrastructure. For example, at-risk work will be suspended during weather events where lightning is a known possibility, and where risk to workers is identified.

- NSPI will maintain an adequate RoW width and remove danger trees adjacent to the RoW to avoid wind-related tree strikes.
- Stormwater infrastructure will be designed to withstand predicted increases in precipitation.
- Ground vegetation and low shrubs will be left to grow within the proposed RoW and will filter and absorb runoff, slowing down the movement of runoff and providing protection against surface erosion and runoff channeling.
- All aspects of Project design will consider predictions for climate change and measures for adaptation. Several publications are available to guide design engineers in this regard, such as the Public Infrastructure Engineering Vulnerability Committee's (PIEVC) "Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate" (2011). PIEVC has released a beta version in February 2023, of an updated PIEVC Green Protocol, which can be used to assess how infrastructure components will respond to the impacts of climate change (PIEVC 2023).
- The design and installation of Project components will consider the potential risk indicated by meteorological data (e.g., tower cable sag allowance will consider typical ice loads, and factor in the 1:150 return periods for wind and freezing rain events).
- Project infrastructure will be designed to a standard appropriate for the level of risk. Structures (e.g., towers) will be designed to a 1:150-year return period weather event with potential design enhancements in certain locations depending on climatic conditions (e.g., ice loading, wind, etc.).
- The Project design and Environmental Protection Plan (EPP) will consider normal and extreme weather conditions that may arise and will implement measures for climate adaptation and responding to extreme climate conditions such as storms and flooding to protect workers and the public as well as the security and integrity of infrastructure. As the effects of climate change are difficult to predict in advance, an adaptive management program will be developed to monitor early warning signs for structural weakness or risk due to climate change and rising sea levels.
- NSPI will monitor for observed effects of the environment on the Project, and will act as required to maintain, repair, and upgrade Project infrastructure as required, and modify operations to facilitate its continued safe operation.
- The Project will implement and follow a maintenance and safety management program.
- The Project will implement contingency plans, including emergency back-up power for necessary operations and dispatch crews for emergency repair of storm damage.
- The Project will adhere to a Project-specific environmental management plan.

15.3.2.4 Residual Effects

Extreme weather, including large amounts of heavy snow, freezing rain, and ice could potentially damage infrastructure and construction equipment, especially if ice and wet snow builds to a point where structures are unable to withstand the weight. The proposed transmission line would be constructed within a corridor where ice buildup on transmission lines has been a notorious issue in the Cobequid Hills Eco District, causing sag that led to structural failures in 2015 and 2021. High winds can damage buildings, fences, and other outdoor structures. Fog can reduce visibility, creating challenging working conditions for construction crews. These effects will be considered in Project design and maintenance, including the selection of materials and equipment to withstand extreme weather, rainfall, and winter precipitation.

Storms with high winds and heavy precipitation can cause delays in the receipt of construction materials and supplies, delays in construction activities and operation of the Project, while creating working conditions that are unsafe for Project crews. Delays due to poor weather will be anticipated and can often be predicted; allowance for them will be included in the construction schedule.

Heavy precipitation can result in reduced visibility and inability to maneuver construction equipment on site. Poor driving conditions or damage to infrastructure could result in the inability of personnel to access the site. Extreme weather conditions can also cause electricity outages. NSPI will monitor for observed effects of the environment on the Project and will act as required to maintain, repair, and upgrade Project infrastructure as required, and modify operations to facilitate its continued operation.

Environmental factors including extreme weather conditions and climate predictions are accounted for in Project construction techniques, and best practices for facility and equipment design codes. Therefore, the potential for environmental conditions to affect Project infrastructure or operations resulting in a change to Project schedule (beyond short delays) and/or damage to the Project is considered low over the life of the Project. If such damage or interruption of service was to occur, NSPI will rely on standard contingency and response plans to repair damaged equipment and reduce service interruptions.

The effects of climate change (e.g., warmer temperatures, increased precipitation, frequent and intense storm events, and increased flooding) will be considered in Project design and NSPI will implement measures for climate adaptation, such as designing transmission lines with sag allowance to withstand ice loads and winds determined with a 1:150 return period.

The potential effects of climate and climate change will be considered and incorporated into the planning, design, construction, and operation of the Project, which would reduce the potential for long-term damage to infrastructure and equipment, and changes to construction and operation of the Project. Inspection and maintenance programs will be implemented to prevent the deterioration of Project infrastructure and will help the Project comply with the applicable design criteria, best management practices, standards, and codes, and will maintain the reliability of the Project. The mitigation listed above, including an adaptive management program to respond to early signs of structural risk will reduce the potential effects of climate and climate change on the Project. Therefore, adverse residual effects from climate and climate change on the Project are anticipated to be generally low and infrequent.

15.3.3 Seismic Activity and Geohazards

15.3.3.1 Existing Conditions

Seismic Activity is defined by the local geography of an area and the movement and/or fracture of rocks within the Earth (e.g., movement of tectonic plates). These movements release seismic waves that cause vibration of the ground known as earthquakes (NRCan 2021). Geohazards such as slope instability, karst topography, and seismic events that can damage or destroy Project infrastructure as well as pose a safety risk to personnel involved in construction, and operation and maintenance activities. Each of the hazards and associated mitigation measures are outlined below.

Slope Instability and Geotechnical Considerations

Landslides are defined as the movement of rock or sediment down a slope (NR Canada 2009) and can be land-based or submarine. Major landslides occur less frequently in the Atlantic Provinces than in other regions of Canada; however, landslides do occur in Nova Scotia, with the Cape Breton Highlands being the most susceptible area due to deep gorges and steep cliffs (Wahl *et al*. 2007, Liverman *et al*. 2004). The susceptibility to landslides within the PDA is low overall, with an area of elevated risk in the Tantramar marshes where the transmission line crosses the New Brunswick border which is given the maximum landslide susceptibility rating of 6 (Geological Survey of Canada 2012).

Karst Topography

Karst is a unique geological feature characterized by its distinctive topography in which the landscape is primarily shaped by the dissolution of water on carbonate bedrock such as limestone, dolomite or marble (Government of British Columbia 2023). Over thousands of years, this natural process has given rise to a variety of surface and subsurface features including sinkholes, vertical shafts, disappearing streams, and springs, to complex underground drainage systems and caves (Government of British Columbia 2023). Nova Scotia has a karst Risk Map that displays where there is a low, medium, or high risk of karst topography, and naturally occurring sinkholes caused by soluble bedrock. While the Project RoW is predominantly classified as low risk of karst, there are sections that would be classified as medium or high risk in Cumberland and Colchester Counties, particularly in the Tantramar marshlands outside Amherst (Province of Nova Scotia 2019).

Seismic Events

The Eastern part of the Nova Scotia, where the Project is located, is included within the Northern Appalachians seismic zone which includes New Brunswick and extends towards New England (NRCan 2021). Part of Cape Breton Island in Nova Scotia also falls within the Laurentian Slope Seismic Zone, which is characterized by more severe seismic activity (NRCan 2021). The Geological Survey of Canada assesses the relative hazard for the entire Province of Nova Scotia to be low, meaning there is a less than 1% chance that significant damage will occur every 50 years (Geological Survey of Canada 2015). The most severe earthquake on record in the Northern Appalachian seismic zone was a 5.7 magnitude that occurred in 1982 in the Miramichi area of central New Brunswick (NRCan 2021). In the Laurentian Slope seismic zone, there was a 7.2 magnitude earthquake off the coast of southern Newfoundland in 1927 with caused a tsunami resulting in 27 deaths (NRCan 2021). Earthquakes with a magnitude between 2 and 3 on the Richter scale have occurred in the PDA, however it is unlikely that an earthquake with a magnitude less than 5 would cause damage (NRCan 2021). A summary of earthquakes within 50 km of Oxford (approximately halfway between both ends of the PDA) since 1990 is given below in **Table 15.5.**

Table 15.5 Magnitude of Earthquakes within 50 km of Oxford since 1990

Magnitude	< 2	2 - 3	>3
Total	9	5	0
Source: NRCan 2021			

15.3.3.2 Project Interactions with Seismic Activity and Geohazards

Seismic activity and geohazards could potentially result in the following effects on the Project:

- Damage to Project infrastructure and equipment
- Delays in receipt of materials and supplies (e.g., construction materials) and in delivering products
- Delays in construction activities
- Delays in operation activities
- Inability of personnel to access the site (e.g., if a landslide covered the roads)

Seismic events can directly damage the Project infrastructure through shaking and vibration, while geotechnical instability can indirectly cause structural damage, which poses a hazard to workers and the public nearby. Landslides can result in the failure of Project components such as tower foundations, built on slopes because of soil movement, or components could be affected by falling debris. Unstable ground conditions accompanying bogs, wetlands, and sinkholes can also lead to equipment and component failure, jeopardizing the safety of NSPI workers and the nearby community members. For instance, placing transmission structures on unstable ground may result in their collapse.

15.3.3.3 Mitigation

Interactions between seismic activity and geohazards and the Project will be managed through the following mitigation measures:

- The proposed transmission line follows an existing transmission corridor for most of the line, where previous geotechnical surveys have been conducted and will be consulted.
- Detailed geotechnical investigations and assessments will be completed before construction commences to determine the stability and composition of the soil and underlying geology. Results from the assessments will be factored into site-specific design and site preparation and used to determine materials and methods used at each location.
- When necessary, landslide barriers and catch ditches will be built in unstable areas so debris is contained before impacting infrastructure.
- Construction may include additional stabilizing measures such as replacing *in-situ* materials to increase stability, sub-base preparation, and the use of guywires, as required.
- The Nova Scotia Department of Natural Resources will be engaged to provide information on the known location of karst landforms that could be avoided or would require specific mitigation measures.

15.3.3.4 Residual Effects

The level of seismic activity in the province and near the PDA is low, and the earthquakes that have been recorded in the general area of the Project have been low on the Richter scale (**Table 15.5**). Therefore, the likelihood of a major seismic event occurring in the vicinity of the Project that would cause substantive damage to the Project or interruption to Project-related activities or phases is low. Project structures will be built in accordance with industry standards to withstand minor seismic events. Geotechnical stability of areas designated for facility construction must be determined and incorporated into final site planning and design to prevent damage to substation components, transmission structures and power lines. With the mitigation measures stated above, it is therefore not anticipated that there will be likely interactions between seismic activity, geohazards and the Project.

15.3.4 Flooding

15.3.4.1 Existing Conditions

Spring brings seasonally wet conditions from snowpack melt and heavy rain common from late February to May and Fall brings rains from hurricane or tropical storm and seasonally heavy rain in October-December. Spring weight restrictions and road washouts in these seasons can present a challenge for construction site access and open excavations. Long-term operational access can also be difficult during these seasons in low, wet areas. Climate change is expected to increase the risk and potential impacts of flooding over time, with sea level rise, changing precipitation patterns, and an altered frequency and severity of extreme weather events as compounding factors (NSECC 2023).

The combination of heavy rainfall, snowmelt, and storm surges can overwhelm the local rivers and drainage systems, causing damage to homes and roadways. The Project RoW crosses several watercourses that are prone to flooding, including Debert River, River Phillip, Missaguash River, Chiganois River, the West Branch of Wallace River, and the East Branch of Folly River. The banks of the River Phillip, over which the proposed transmission line will cross, have overflowed due to heavy rainfall leaving the town of Oxford in a state of emergency in 2003 when 90 millimetres of rain fell within 24 hours, and again closing roads in 2013 (Globe and Mail 2003; CBC News 2013). The Province of Nova Scotia received a record amount of rain in late July 2023, when 250 milliliters of rain fell over the province in a single day (Salahieh and Sylla 2023). The damage from the flash flooding event was mainly contained to areas outside the PDA, where 25 Bridges were damaged across the province, with roadways closed in many affected areas including East Hants, West Hants, Lunenburg, Queens, and the greater Halifax region (Salahieh and Sylla 2023). Four hundred people had to be evacuated from their homes near Lunenburg, with another 750 people being displaced outside Halifax (Salahieh and Sylla 2023). The extreme rainfall and flooding in July included two tragic incidents that resulted in the loss of four lives. The unfortunate events involved vehicles being engulfed by rising floodwaters, subsequently being swept away due to the force of the water (CBC News 2023).

Another area of particular concern within the PDA is where the proposed transmission line crosses the Chignecto Isthmus. The Chignecto Isthmus separates the waters in the Bay of Fundy from those in the Northumberland Straight and is particularly vulnerable to sea level rise and climate change impacts as it is only slightly above sea level (Wood 2022). Infrastructure, including the existing transmission line along the corridor is currently protected from flooding by earthen dykes and aboiteaux up to a water level between 7.5 and 8.5 m, but they are at risk of failure from the combination of sea level rise, storm surges, and higher tides (Wood 2022). A combined Project team with members from Transport Canada, the New Brunswick Department of Transportation Infrastructure (NBDTI), and the Nova Scotia Transportation Infrastructure Renewal (NSTIR) are developing a plan to protect infrastructure in the Chignecto Isthmus up to an elevation of 10.6 m (Wood 2022).

15.3.4.2 Project Interactions with Flooding

Flooding could potentially result in the following effects on the Project:

- Damage to infrastructure and equipment
- Delays in receipt of materials and supplies (e.g., construction materials) and in delivering products
- Delays in construction activities
- Delays in operation activities
- Inability of personnel to access the site (e.g., if a road were to wash out, or poor driving conditions)
-

In addition to the effects listed above, flooding could result in erosion, sedimentation, and failures in erosion/sedimentation control structures. Climate change could also affect flood zones in the future, increasing their size and severity.

15.3.4.3 Mitigation

Interactions between flooding and the Project will be managed through the following mitigation measures:

- The Project will be designed and constructed to meet applicable engineering codes, standards, and best management practices. These include applicable building safety, industry codes, and standards.
- The potential effects of flooding will be considered in the Project design, operation, and maintenance, including the selection of materials and equipment.
- NSPI will monitor for observed effects of the environment on the Project, and will act as required to maintain, repair, and upgrade Project infrastructure as required, and modify operations to facilitate its continued safe operation.
- Route selection to reduce the number of crossings or interactions with watercourses, waterbodies, wetlands, and their 30 m buffers. Avoiding these areas increases the distance that surface waters from the RoW must travel before reaching low-lying areas.
- Incorporation of a maximum slope grade of 2H:1V for graded surfaces within the PDA, to improve erosion protection and slope stability where grading must occur.
- The EPP will include provisions for site drainage; sedimentation and erosion control will be designed to withstand extreme flood conditions, so that structures are not put at risk.
- Rain is an expected work condition, and the construction schedule will allow for reasonable rain delays for relevant work activities.
- Ground vegetation and low shrubs will be left to grow within the proposed RoW and will filter and absorb runoff, slowing down the movement of runoff and providing protection against surface erosion and runoff channeling.

- Erodible soils on the construction sites will be mitigated using appropriate site drainage and sedimentation control measures at all sites where soil or sub-soil has been exposed and there is potential for erosion.
- The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be minimized through the scheduled work progression. Steeper slopes susceptible to erosion will be stabilized with rock or hydroseed.
- Erosion and sedimentation control structures will be maintained and inspected regularly during construction with particular emphasis before and after forecasted heavy rain events.
- Structures and anchors will be placed to span watercourses and wetland, including their 30 m buffers to the extend feasible in consideration of the needs of Project design.
- Travel through wetlands and watercourse crossings will be avoided, when feasible. If travel over a wetland or watercourse is required, temporary engineered structures such as swamp matting will be used and designed with hydrological characteristics of the watercourse considered.
- A maintenance and safety management program will be implemented.
- Contingency plans will be implemented, including emergency back-up power and dispatch of crews for emergency repairs.
- The Project design will consider normal and extreme weather conditions that may arise.
- The Project will adhere to the Project-specific environmental management plan.
- Additional mitigation measures to protect infrastructure located in the Chignecto Isthmus to an elevation of 10.6 m will be conducted by a combined Project team of third parties including federal and/or provincial governments and is not the sole responsibility of NSPI.

15.3.4.4 Residual Effects

Flooding could damage infrastructure and equipment or result in delays in construction activities and operation of the Project. These effects will be considered in Project design, operation, and maintenance, including the selection of materials and equipment to withstand the impacts of flooding.

Extreme precipitation has the potential to result in flooding, erosion, and other events (such as access roads being washed out). These events could lead to the release of total suspended solids in runoff, and the related environmental effects of such an occurrence. The Project is not anticipated to result in a measurable increase in runoff or flooding compared to runoff or flooding in the Project area currently and therefore Project infrastructure is not anticipated to increase risk of flooding.

The Project, by design avoids low lying areas such as wetlands, waterbodies, watercourses, and their 30 m buffers where possible; however, the RoW will nevertheless intersect with multiple wetlands and watercourse crossings. Where avoidance is not possible the infrastructure is installed in a fashion that accounts for a permanent or periodically wet environment, including inundation from flooding. For example, transmission structures and anchors will be placed to span watercourses and wetland, including their 30 m buffers to the extend feasible in consideration of the needs of Project design. As the Project design has placed infrastructure on surrounding topography at elevations that are above the watercourse shoulders, and at distances beyond the 30 m buffers, the risk of being affected by flood waters is reduced.

The Project does not alter land use or drainage boundaries, nor does it measurably increase the imperviousness of the ground such that runoff would increase. Apart from locations of the transmission line support structures, the proposed RoW will not be grubbed during construction, and will continue to be vegetated with grasses, shrubs, and bushes.

Flooding could result in delays in the receipt of materials and supplies and in delivering products. Flooding could also result in the inability of personnel to access the site and can cause electricity outages. Delays due to flooding events can often be predicted; NSPI will monitor for observed effects of the environment on the Project, and will take action as required to maintain, repair, and upgrade Project infrastructure as required. Operations will be modified when necessary to facilitate its continued safe operation.

Inspection and maintenance programs will be implemented to prevent the deterioration of Project infrastructure and will help the Project comply with the applicable design criteria, best management practices, standards, and codes, and will maintain the reliability of the Project. The mitigation listed above will reduce the potential effects of flooding on the Project. Therefore, substantive changes to the Project from flooding are not anticipated.

15.3.5 Forest Fires

15.3.5.1 Existing Conditions

Forest fires have become an increasingly pressing concern due to the devasting effects they can have on people’s livelihoods, infrastructure, wildlife habitat, air quality, water sources, and overall ecosystem stability. Natural Resources Canada uses the Canadian Wildland Fire Information System (CWFIS) to monitor daily and seasonal fire danger conditions and fire occurrence across Canada, by creating daily fire weather and behavior maps (NRCan 2023). One component of the CWFIS is the average Fire Weather Index (FWI), a numerical rating of fire intensity. The FWI ranks the potential risk for forest fires in Canada by province and month, on a scale that runs from 0 (low risk) to more than 30 (high risk). Based on Fire Weather Normals, for the 30-year period of 1981-2010, Nova Scotia is rated between 0 to 10 during forest fire season (April to September), with a small area along the coast of the Bay of Fundy reaching up to a rating of 20 during July and August, which corresponds to a low risk of forest fires (NRCan 2023).

Even though overall fire risk for Nova Scotia is low, 2023 has been an uncharacteristically severe year for forest fires in the Maritimes. There were two major wildfires during the late spring of 2023 in Nova Scotia: one in the Tantallon region outside Halifax, and one in Shelburne County. Over 200 homes were lost during the wildfires, 60 from the Barrington Lake fire outside Shelburne, and 150 from the Tantallon fire (Bryden-Blom and Cooke 2023). The Shelburne County fire burned an area greater than 23,000 hectares (ha) and became the largest fire on record in the province’s history, while the Tantallon fire grew to over 837 ha and caused 18,000 people to be evacuated from their homes (The Canadian Press 2023; The Guardian 2023). For comparison, there were only 3,389 ha burned in 2022, and 197 ha burned in 2021 by wildfires (NSDNR 2023). **Table 15.6** shows a breakdown of the total fires and total hectares burned in both counties that will be traversed by the proposed 345 kV transmission line for the previous five years.

Table 15.6 Forest Fires in Cumberland and Colchester Counties from 2018-2022

Year	Cumberland County		Colchester County	
	Total Fires	Total Hectares Burned	Total Fires	Total Hectares Burned
2022	8	8.90	6	2.81
2021	10	2.10	5	2.35
2020	21	27.65	4	0.91
2019	7	1.99	2	0.60
2018	11	12.6	5	1.04
Source: Nova Scotia Department of Natural Resources and Renewables				

The PDA traverses several forested areas where dangers of a forest fire would be elevated. Forest fire weather and behavior indexes and maps will be monitored daily to confirm the safety of crews during the construction phase of the Project. Natural Resources Canada also release daily Fire Danger assessments and maps, which are a relative index of how easily vegetation will ignite, how difficult a forest fire would be to control, and how much damage it could do (NRCan 2023). In late May 2023, the PDA was in a Fire Danger zone given the status of High to Extreme, which is defined as "fast-spreading, high-intensity crown fire. Very difficult to control. Suppression actions limited to flanks, with only indirect actions possible against the fire's head" (NRCan 2023).

15.3.5.2 Project Interactions with Forest Fires

While there is potential for forest fires to occur in or near the Study Area, it is not likely to have a substantive effect on construction or operation of the Project. Certain Project activities can cause wildfires. In a review of the 152 wildfires in 2022, 22% were caused by brush slashing and land clearing, 13.8% were caused by debris, 4.6% were caused by powerlines, and 2.6% were caused by vehicle travel including ATVs and machines (NSDNR 2023). Nova Scotia has well-developed forest fire control programs designed to quickly locate and control fires, thereby minimizing the potential magnitude and extent of any fires, and their effects on the Project. The facility structures will be constructed primarily of concrete and stainless steel, which are not typically affected by fire. Therefore, Project-related infrastructure is not likely to be substantively affected by fire occurring close to facilities. A forest fire could affect Project scheduling through temporary work interruptions, as well as interrupting service during operation. If workers are in the area during a time of a forest fire, their health and safety may also be at risk due to poor air quality.

15.3.5.3 Mitigation

Interactions between forest fires and the Project will be managed through the following mitigation measures:

- The Project will be designed and constructed to meet applicable engineering codes, standards, and best management practices. These include applicable building safety, industry codes, and standards.

- Any signs of forest fires will be immediately reported to local emergency response services.
- Monitor for provincial burn bans within the PDA. All potential flame ignition activities will be ceased in the event of a provincial burn ban.
- During vegetation management for maintenance of the transmission line, brush or slash piles will be cut and distributed as coarse woody debris or chipped / mulched as fine woody debris.
- Brush burning will not be permitted. Alternatives such as chipping or composting, and removal from the RoW.
- An Emergency Response Plan (ERP) will describe fire-related emergency response capabilities, plans, and required training.
- Work sites and Project facilities will be supplied with fire suppression equipment, including water-packs and shovels.
- All vehicles will be equipped with fire extinguishers sized and rated as appropriate.
- All personnel will be trained in the location and use of fire extinguishers.
- Waste that may be soaked in flammable materials (e.g., oily rags) will be safely stored or disposed of.
- Vehicles will not be parked in areas with long grass and other vegetation.
- Fire Danger Maps will be regularly consulted during forest fire season.
- Emergency measures will be in places, in conjunction with existing NSPI, community, and provincial plans to provide rapid detection and response to any fire threat, and quickly control and extinguish flames prior to contact with any flammable structures (e.g., wood).
- There will be a cleared operational buffer zone established around Project components (e.g., RoW) to decrease the likelihood of a fire causing substantive damage to the Project, and to reduce the risk of fallen trees or other debris damaging Project infrastructure.
- The Project will adhere to the Project-specific environmental management plan.
- NSP Operations will adhere to the Contractor Environmental Requirements, ENV-014 Environmental Protection and RoW Maintenance, and Vegetation Management Operation Procedures.

15.3.5.4 Residual Effects

While there is the potential for forest fires to occur near the Project, they are not likely to have a substantive residual effect on the Project, with the previous mitigation measures in place. If a fire was to occur, emergency response plans would be implemented to control and extinguish the flames and protect workers and the public near to the site. Depending on the nature of the fire, site evacuation may be required. There will be a cleared safety buffer zone established around Project components to further decrease the likelihood of a forest or a brush fire causing substantive damage to the Project.

15.4 Summary and Determination of Significance

The environment could potentially have an effect on the Project, but this will be mitigated through careful design in accordance with factors of safety, good engineering practice, and adherence to standards and codes. The Project will be designed and operated to maintain safety, integrity, and reliability in consideration of the effects of the environment. With the implementation of mitigation and environmental protection measures as described in this assessment, there are no environmental attributes that are anticipated to result in one or more of the following conditions:

- A substantial change to the Project construction schedule (e.g., a delay resulting in the construction of period being extended by one season).
- A long-term (>4-hour) interruption in service (e.g., interruption in power transmission activities causing electricity demands not to be met)
- Damage to the Project infrastructure resulting in increased safety risk to the public.
- Damage to the Project infrastructure resulting in required repairs that could not be technically or economically implemented.

The mitigation measures and strategies described in this assessment and the selection of materials that can withstand the environmental conditions that can reasonably be expected in the PDA are considered adequate to address these concerns. Therefore, significant residual effects of the environment on the Project during all phases are unlikely.

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16 Cumulative Environmental Effects

This section of the report assesses potential cumulative environmental effects that could arise from the NS-NB Reliability Intertie Project ("the Project") in combination with other past, present, or reasonably foreseeable future projects or activities. While the assessment of cumulative environment effects is not required under the Nova Scotia (NS) Provincial Environmental Assessment (EA) Regulation, NSPI has elected to consider potential cumulative effects from the Project to consider developing additional mitigation. In the event that effects of the Project interact cumulatively with effects from other past, present, or reasonably foreseeable future projects or activities, Section 12 (h) of the EA Regulation requires consideration of "other undertakings in the area".

16.1 Scope

Cumulative environmental effects are the residual environmental effects that are likely to result from a project in combination with the environmental effects of other projects or activities that have been or will be carried out.

The assessment of cumulative environmental effects will be applied if both of the following conditions are met:

- The Project is assessed as having residual environmental effects on one or more valued components (VCs), whether those residual environmental effects are significant or not.
- The residual environmental effects of the Project on the identified VCs could act cumulatively (or overlap spatially and temporally) with the residual environmental effects of other past, present, or reasonably foreseeable future projects or activities.

The existing environment conditions described for each of the VCs in Sections 7 to 14 generally consider the environmental effects of existing (i.e., past and present) projects or activities that have acted cumulatively and resulted in the baseline conditions for the Project. However, there is also a need to assess the potential for Project-related cumulative environmental effects with respect to potential interactions with other future pending projects or activities that are in advanced planning or development stages (referred to as reasonably foreseeable projects or activities), or existing projects or activities that may be subject to modifications or expansion. In such cases, a cumulative environmental effects assessment is completed to determine if there is potential for substantive interaction with a VC.

16.2 Spatial and Temporal Boundaries

The spatial boundaries for the assessment of cumulative environmental effects are defined by a regional assessment area (RAA) that is common for all VCs. The RAA is defined as the area within which regional context is established and potential cumulative environmental effects are assessed.

For the purpose of this cumulative environmental effects assessment, the RAA for this Project includes a 25 km radius around the proposed new transmission line (**Figure 16.1**) and terminal facilities. This RAA has been selected because it encompasses the PDA and LAAs of all VCs assessed for the Project. The RAA

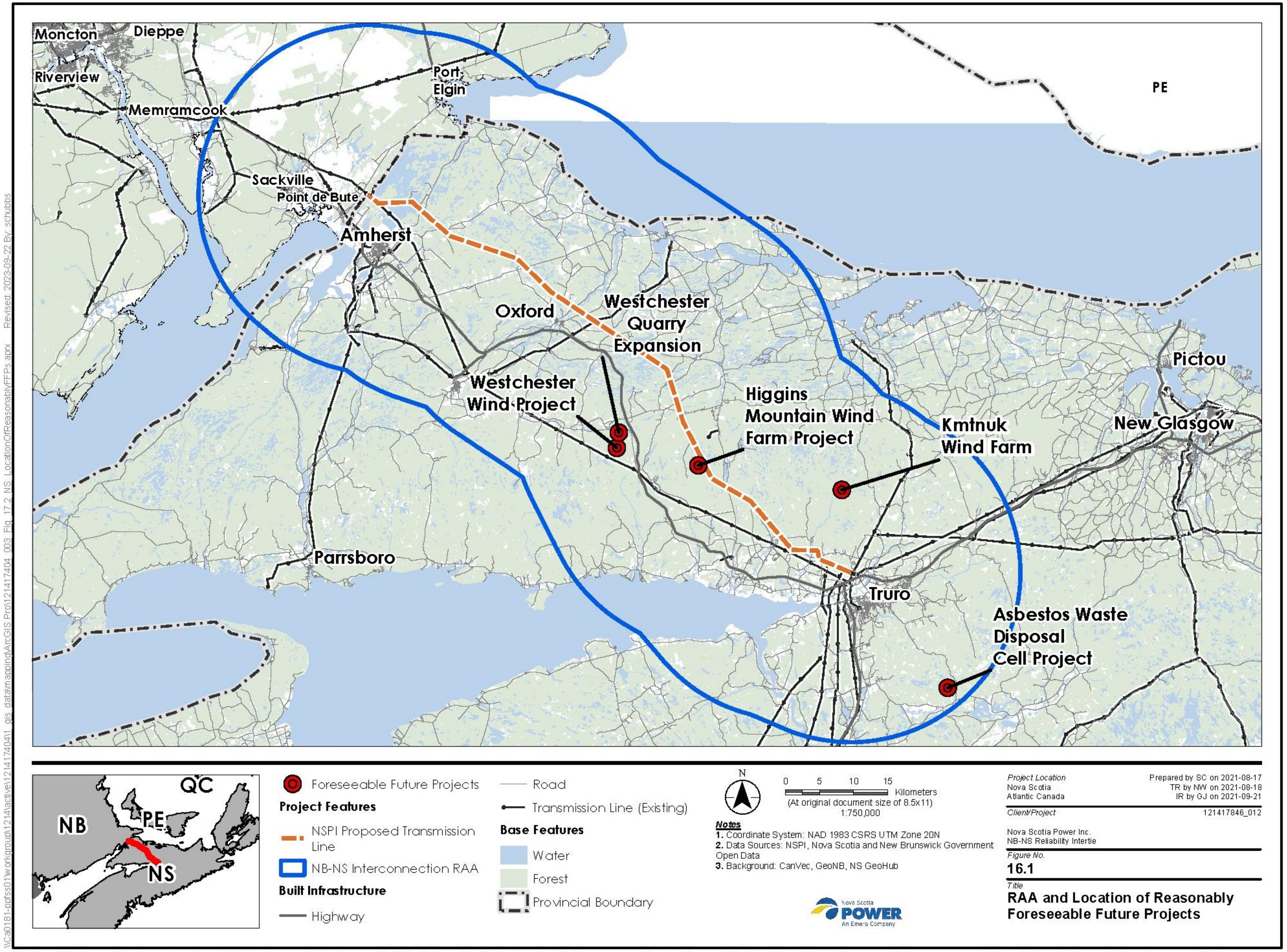

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Figure 16.1 RAA and Location of Reasonably Foreseeable Future Projects

includes several communities in Cumberland County and Colchester County which may be affected by the Project, including Amherst, Oxford, and Truro.

Temporal boundaries for the assessment of cumulative environmental effects are the same for each VC as identified in Section 2. These temporal boundaries encompass periods of construction, and operation and maintenance of the Project.

16.2.1 Significance Criteria

The significance of cumulative environmental effects is determined based upon specified significance criteria. Thresholds of significance for the assessment of cumulative environmental effects are the same as for each applicable VC, as identified in the respective VC sections.

16.2.2 Description of Other Projects or Activities

Reasonably foreseeable future projects or activities are defined as those that either:

- Have been publicly announced with a defined schedule and sufficient project details that allow for a meaningful assessment
- Are currently undergoing an environmental assessment
- Are in a permitting process
- Are approved but not yet operational

A review of federal and provincial environmental assessment registries identified proposed projects within the RAA (**Table 16.1**). The locations of these projects are shown on **Figure 16.1**. The search parameters were limited to the last five years from the date of registration (i.e., 2018 to present).

Table 16.1 Location of Reasonably Foreseeable Future Projects within the RAA

Source of Project Information	Date Registered	Project Name	Approximate Distance from Project (Line of Sight)	Project Scope	Anticipated Construction Schedule
NSECC EA Registry	May 4, 2023	Higgins Mountain Wind Farm Project	0.80 km	The project proposes to construct and operate an onshore wind energy project with up to 17 wind turbines (up to 119 MW) on Higgins and Steven Mountains between the communities of Westchester Station, Wentworth Station, and Londonderry, Nova Scotia.	2024-2025
NSECC EA Registry	February 13, 2023	Westchester Quarry Expansion	8.39 km	The proponent is applying to increase the maximum allowed extent of the existing Westchester Quarry from 3.88 ha to 40.36 ha.	Not listed
N/A	N/A	Kmtnuk Wind Farm	8.5 km	The project is proposed to contain no more than 20 turbines with a total installed capacity of up to 98 MW, using turbines with a generation capacity of around 5.2 to 6.6 MW each. The plan is to use existing roads for access, with overhead collector lines following project roads.	Q3 2024 - Q3 2025
NSECC EA Registry	February 13, 2023	Westchester Wind Project	10.32 km	The project would construct renewable wind power generation turbines capable of generating up to 50 MW of renewable energy (up to 12 wind turbines) near Westchester Station.	2022-2024
NSECC EA Registry	July 5, 2019	Asbestos Waste Disposal Cell Project	21.51 km	The purpose of the proposed undertaking is to construct and operate the Asbestos Waste Disposal Cell to support the current waste management site in Middle Stewiacke.	2019

New Brunswick Power has also recently announced plans to construct a 345 kV transmission line adjacent to their existing 345 kV line from the Nova Scotia border to Salisbury, New Brunswick. While not yet provincially registered, that transmission line project may overlap temporally with the Project.

In addition to the reasonably foreseeable future projects with environmental effects that might overlap those of the proposed Project identified in **Table 16.1**, four broad categories of past, present, or reasonably foreseeable future physical activities within the RAA have been identified with potential to result in residual environmental effects that may act cumulatively with those of the Project:

- Industrial development
- Infrastructure development
- Forestry and agriculture
- Commercial and residential development

These broad categories of activities have been selected based on the nature of the residual environmental effects of the Project that may overlap those of other activities, as well as the study team's knowledge of current activities taking place in the region.

All projects identified in **Table 16.1** are included in one of these broad categories, and therefore only these four activities are carried forward for cumulative effect assessment. Further details on these broad categories of past, present, or future projects or activities are provided below.

16.2.2.1 Industrial Development

There are industrial developments near the Project within the 25 km RAA (e.g., the proposed Asbestos Waste Disposal Cell Project is proposed to be developed approximately 21.5 km from Project in Middle Stewiacke; and the Westchester Quarry Expansion, approximately 8.4 km from the Project in Rose). See **Table 16.1** for more information.

While it is unlikely that there would be substantive interaction between the Project and industrial development within the RAA, the proximity of the Project to other infrastructure and the potential for the environmental effects of the Project to overlap with those of industrial development, industrial development is carried forward in the cumulative environmental effects assessment.

16.2.2.2 Infrastructure Development

The Project is located in Cumberland and Colchester counties, both of which have various existing public and private infrastructure (e.g., proposed Higgins Mountain Wind Farm Project, approximately 0.8 km from the Project, proposed Westchester Wind Project, approximately 10.3 km from the Project, and existing Nuttby Wind Farm, approximately 17.5 km from the Project, and the proposed Kmtnuk Wind Project, approximately 8.5 km from the Project).

Existing public infrastructure includes water and sewage works, other electrical transmission lines, and a local road network within and surrounding the communities of Amherst, Oxford, and Truro. Project construction traffic is likely to use the TransCanada highway and arterial highways throughout these communities.

As it is possible for effects of the Project to overlap with those of infrastructure, infrastructure development is carried forward in the cumulative environmental effects assessment.

16.2.2.3 Forestry and Agriculture

Forestry and agricultural activities are major economic drivers in Nova Scotia but are not prevalent in the communities of Amherst and Truro (Statistics Canada 2023). However, according to the Cumberland County Agricultural Profile (2021), the County accounted for 36 percent of Nova Scotia's Fruit Tree and Nut Farms. This includes both blueberry and strawberry cultivation. Further, Colchester and Cumberland counties account for almost one-third of the farms in Nova Scotia. Oxford is known as the blueberry farming capital, home to Oxford Frozen Foods.

There are no forestry and agriculture projects registered with the NSECC EA registry nor the federal IAA registry (as of July 25, 2023); typical forestry and agriculture activities are not registerable projects. However, given the importance of forestry and agriculture activities as economic drivers in the province, and the potential for the environmental effects of the Project to overlap with those of future forestry and agriculture activities, forestry and agriculture is carried forward in the cumulative environmental effects assessment.

16.2.2.4 Commercial and Residential Development

Commercial and residential development is prevalent throughout the RAA, with sales and service occupations, and trades, being key labour fields in the communities of Amherst and Truro.

Given the prevalence of commercial and residential development and its economic drivers in Amherst, Truro, and surrounding areas, and the potential for the environmental effects of the Project to overlap with those of commercial and residential developments, commercial and residential development is carried forward in the cumulative environmental effects assessment.

16.3 Identification of Potential Cumulative Environmental Effects Interactions

Based on the assessments presented in Sections 7 to 14, all VCs are anticipated to have residual environmental effects. Despite these residual Project effects, interactions between the Project and heritage resources, water resources, and aquatic environment are not anticipated to result in cumulative residual environmental effects with any other project or activity listed in **Table 16.1**, nor with the broad categories of past, present, or reasonably foreseeable future physical activities. The rationale for not carrying these VCs further is provided below.

- Heritage resources: There is stringent mitigation that will be implemented for the Project regarding potential heritage resources. There is very limited potential for overlapping cumulative environmental effects to occur with other projects or activities. Interactions between the Project and heritage resources are not anticipated to result in residual environmental effects. The zone of influence of the Project on Heritage Resources is limited to the PDA. Considering the mitigation that will be implemented for the Project regarding potential heritage resources and since there will be no other projects or activities in the PDA other than the Project, there is no potential for overlapping cumulative environmental effects to occur with other projects or activities. An assessment of cumulative environmental effects on heritage resources is therefore not warranted.
- Water resources: The Project is not expected to result in residual environmental effects to water resources (i.e., surface water or groundwater) during construction. During construction, any mechanical rock breaking or blasting activities, if required, will be limited to structure and anchor locations and therefore be small, localized, and relatively shallow. It is not likely that blasting activities will interact with groundwater within the LAA; should any interactions occur, they can be readily mitigated. Any increase in surface water runoff because of clearing activities during construction will be indistinguishable from baseline conditions and will be attenuated by the receiving watersheds. The residual environmental effects on water resources during the construction phase of the Project are anticipated to be very small and of short duration, and not expected to result in any measurable change

in water resources. There are no known interactions between the Project and water resources during operation and maintenance and thus no overlapping environmental effects to assess with other projects or activities. An assessment of cumulative environmental effects on water resources is therefore not warranted.
- Aquatic environment: The residual environmental effects of the Project on the aquatic environment are limited to those resulting from construction and operation and maintenance including some potential changes in riparian vegetation and cover. Given the 38.1 m width of the RoW, the maintenance of 30 m riparian buffers where possible, pre-existing openings in the canopy, effects to fish habitat that might arise because of the Project are anticipated to be negligible. With mitigation, there is a low likelihood for the introduction of sediments to watercourses during construction because no fording of streams (no in-stream work) is planned. Instead, temporary clear span bridges will be used (as needed) to provide access for all machinery and equipment to cross watercourses. All crossings with temporary bridges will have associated applicable permits, as necessary, and work will adhere to any applicable environmental protection conditions issued with the permit including for herbicide application. With mitigation, no residual environmental effects on the aquatic environment are anticipated, and therefore, an assessment of cumulative environmental effects on the aquatic environment is not warranted.

The following remaining VCs are anticipated to have residual environmental effects with the potential to act cumulatively with other reasonably foreseeable future projects or activities identified:

- Atmospheric Environment
- Wetlands
- Wildlife, Vegetation, and Habitat
- Use of the Land and Resources For Traditional Purposes By the Mi’kmaq
- Socioeconomic Environment

Environmental effects of past or present projects or activities have been encompassed in the existing environmental conditions within the RAA for each VC and are not discussed further. The residual cumulative environmental effects of the Project in combination with those of other past or present projects or activities on all affected VCs during all phases of the Project are rated not significant and are not discussed further.

Table 16.2 highlights the potential for interactions between the residual environmental effects of the Project and those of the other reasonably foreseeable future projects or activities identified.

Table 16.2 Potential Cumulative Environmental Effects Interactions Among Valued Environmental Components and Reasonably Foreseeable Future Projects or Activities

Reasonably Foreseeable Future Activity *	Valued Environmental Components				
	Atmospheric Environment	Wetlands	Wildlife, Vegetation, and Habitat	Use of the Land and Resources For Traditional Purposes By the Mi' kmaq	Socioeconomic Environment
Activities					
Industrial Development	✓	✓	✓	✓	✓
Infrastructure Development	✓	✓	✓	✓	✓
Forestry and Agriculture	✓	✓	✓	✓	✓
Commercial and Residential Development	✓	✓	✓	✓	✓

NOTES:
✓ Indicates that the residual environmental effects of the Project on the VC might overlap spatially or temporally with the residual environmental effects of other projects or activities, and therefore a cumulative environmental effects assessment is required.
"-" Indicates potential overlap with the residual environmental effects of other projects or activities is not anticipated, and a cumulative environmental effects assessment is not required.
* Past or present projects or activities have been encompassed in existing environmental conditions for each VC. They are not discussed further.

16.4 Assessment of Cumulative Environmental Effects

Reasonably foreseeable activities that have been identified in **Table 16.2** as having potentially overlapping environmental effects with those of the Project, for one or more VCs, have been carried forward in the cumulative environmental effects assessment. Those include the following classes of activities:

- Industrial development
- Infrastructure development
- Forestry and agriculture
- Commercial and residential development

Those potential cumulative environmental effects are assessed below, by VC.

16.4.1 Cumulative Environmental Effects on Atmospheric Environment

As detailed in Section 7, the residual environmental effects of the Project on the atmospheric environment during construction include the release of air contaminants, greenhouse gases, and noise above existing conditions. The residual environmental effects of the Project on the atmospheric environment during operation and maintenance are low magnitude, temporary and short-term, and are not discussed further.

In consideration of available standard mitigation practices for construction, Project-related releases of air contaminants are unlikely to cause exceedances of air quality standards and are unlikely to act cumulatively with other projects and activities. Similarly, Project-related releases of GHGs during construction will not measurably contribute to provincial and national GHG totals.

Use of large equipment and vehicles during construction will emit sound and vibration. Noise and vibration will be transient and short in duration and will generally occur inside the PDA and immediately adjacent areas. Construction activities will be restricted to daytime hours to lessen the disturbance (such as noise) to nearby residences. Because of the linear progression of power line construction, it is anticipated that any given nearby residence or other sensitive receptor will be exposed to potentially increased noise levels for less than a week at a given time. Given the likely infrequent use of local pits and quarries, such activity is unlikely to overlap with construction of the Project. Potential cumulative environmental effects of noise are unlikely to extend beyond the LAA (within 500 m).

Highway operation and forestry and agriculture activities in the area are expected to be ongoing and similar to past and present activities in terms of contribution to noise and air quality, and those environmental effects are encompassed in existing conditions for the atmospheric environment.

Cumulative environmental effects of the Project in combination with other past, present, or future activities (including Infrastructure Development, Forestry and Agriculture, and Residential and Commercial Development) on the Atmospheric Environment during all phases of the Project are therefore predicted to be not significant.

16.4.2 Cumulative Environmental Effects on Wetlands

The residual environmental effects of the Project on wetlands during construction of the Project include a minor residual environmental effect on wetlands in the LAA. There are no substantive residual environmental effects of the Project on wetlands during operation and maintenance that were not initially introduced during construction, and therefore the operations and maintenance phase will not be discussed further.

Future infrastructure development activities are likely to result in similar environmental effects to wetlands as with Project environmental effects and could be cumulative. However, the Project is in a fragmented landscape. While no other electrical transmission line projects are known to be currently planned in the RAA or that would overlap the Project, there currently exists various electrical transmission lines from 69 to 345 kV within the RAA.

Forest harvesting activities can result in wetland disturbance and thus can be cumulative. Construction of access roads for forestry operations often results in the crossing of watercourses, which may lead to sedimentation and alteration of physical habitat units. In the context of the Project and LAA for wetlands, limited overlap with forestry activity is anticipated, given the generally disturbed nature of the area and land ownership.

Agriculture can have indirect environmental effects on wetlands in adjacent land where there may be excessive fertilizing and watering that can result in runoff into wetlands and thus interact cumulatively with other projects and activities. However, given the nature of construction for the Project, these potential residual environmental effects of the Project are unlikely, as the Project will not result in excessive fertilizing and watering of the surrounding environment.

Future commercial and residential development activities are likely to result in environmental effects on wetlands similar to the Project effects, though the extent of spatial or temporal overlap with those of the Project would determine whether cumulative environmental effects might occur. However, these potential developments are unlikely to result in substantive environmental effects on wetlands in such a manner as to be above regulatory thresholds, as wetland compensation is required for most disturbances.

In consideration of the residual environmental effects of the Project on wetlands, which are low in magnitude during construction, and negligible during operation and maintenance, the limited number of other likely projects and activities in the RAA, and past residual environmental effects from other projects, the potential cumulative environmental effects of the Project in combination with other past, present, or future activities (including infrastructure development, forestry and agriculture, and residential and commercial development) on wetlands during all phases of the Project are predicted to be not significant.

16.4.3 Cumulative Environmental Effects on Wildlife, Vegetation, and Habitat

The residual environmental effects of the Project on wildlife, vegetation, and habitat during construction of the Project include temporary and permanent disturbance to vegetation in the PDA, disturbance to wildlife habitat in the PDA, and a residual environmental effect on SAR and SOCC in the LAA considered to be low in magnitude. There are no substantive residual environmental effects of the Project on wildlife, vegetation, and habitat during operation and maintenance that were not initially introduced during construction, with the potential exception of an increased mortality risk due to transmission line collisions by birds.

Construction will result in a disturbance of vegetation communities and wildlife habitat. This includes forest and agricultural land. These environmental effects will persist through operation and maintenance. With mitigation, most of this disturbance will result in a change, but not a permanent loss of vegetation communities and wildlife habitat. Forested areas will be converted to shrub or regenerating/sapling aged forests following initial construction activities. Although the treed habitat within the Project RoW will be changed to more open habitat, the changes may enhance the habitat for certain wildlife species, include creating young regenerating vegetation for forage for deer and moose. The PDA will be cleared outside of the normal breeding season for migratory birds (April 1 to August 31), where possible; thus, interactions with birds, particularly SAR and SOCC, are expected to be limited to a future reduction in available habitat and temporary sensory disturbance associated with construction activities. Due to the availability of habitats elsewhere in the RAA, wildlife species that may potentially use the PDA are not expected to be restricted by a lack of suitable habitat.

During operation and maintenance, the presence of transmission lines can lead to increases in bird mortality through collisions and electrocutions. Nocturnal migrants such as passerines are generally high-flyers and are typically not at risk of suffering collision in flight during migration. Groups including waterfowl, waterbirds, and raptors have more variable flight during migration. Migrating individuals in these groups are more likely to fly higher than the transmission line wires, limiting their potential for collision. Diverters will be used in high-risk areas including at major watercourse crossings and near sensitive habitats to mitigate collision potential.

Future infrastructure development activities are likely to result in similar environmental effects to wildlife, vegetation, and habitat as with Project environmental effects and could be cumulative. However, the Project is in a fragmented landscape. While no other electrical transmission line projects are known to be currently planned in the RAA or that would overlap the Project, there currently exists various electrical transmission lines from 69 to 345 kV within the RAA. In addition, several wind farm developments are planned for the RAA, which also includes a transmission line component, and can lead to fragmentation, especially if existing roads are not used. Wind farms also may have impacts on migrating birds, in particular nocturnal migrants, where tall turbines are planned.

Forest harvesting activities can result in the direct removal of terrestrial habitat and plant communities, and loss of plant biomass from the forest ecosystem and thus can be cumulative. There is also the potential to result in the direct removal of terrestrial habitat from the forest ecosystem and increase wildlife mortality risk through several mechanisms including the removal of nests, dens, burrows, and hibernacula; vehicle collisions; and increased access by hunters. Construction of access roads for forestry operations often results in the loss and fragmentation of terrestrial habitat and the crossing of watercourses, which may lead to sedimentation and alteration of physical habitat units. In the context of the Project and LAA for vegetation, there will be limited overlap with forestry. NSPI will use existing forestry and other roads for accessing the new RoW and the development of new access roads is anticipated to be limited. Given the footprint of disturbance of the Project and location adjacent to fragmented landscape, the residual environmental effects of the Project are unlikely to act cumulatively with forestry activities to adversely affect the sustainability of wildlife populations and habitats within the RAA. The habitat types within the PDA are abundant in both the LAA and RAA.

Agriculture can have indirect environmental effects on vegetation communities in adjacent land where there may be excessive fertilizing and watering that can result in runoff into wetlands and thus be cumulative. However, given the nature of construction, these potential residual environmental effects of the Project are unlikely. Agriculture can also result in the disturbance to and mortality of breeding birds. Mitigation will include avoiding the breeding periods of birds during clearing activities, where practicable, which will avoid residual environmental effects on birds. The transient nature of construction means disturbance will be of short duration in any one location along the PDA.

Future commercial and residential development activities are likely to result in environmental effects on wildlife, vegetation, and habitat similar to the Project effects, though the extent of spatial or temporal overlap with those of the Project would determine whether cumulative environmental effects might occur. However, these potential developments are unlikely to result in substantive environmental effects on wildlife and wildlife habitat in such a manner as to cause a measurable change from existing conditions that would be above regulatory thresholds or that would affect the ongoing viability of populations and habitats in the RAA.

In consideration of the residual environmental effects of the Project on wildlife, vegetation, and habitat, and the limited number of other likely projects and activities in the RAA (and the requirement for environmental assessment and post-construction monitoring of proposed wind farms in the RAA), the potential cumulative environmental effects of the Project in combination with other past, present, or future activities on wildlife, vegetation, and habitat during all phases of the Project are predicted to be not significant.

16.4.4 Cumulative Effects on Use of the Land and Resources for Traditional Purposes By the Mi'kmaq

The other identified future projects and activities can potentially alter access to resources used by Indigenous communities, the effects of which may act cumulatively with the effects of the Project, further reducing access to resources. Traditional activities or use of resources currently occurring in the PDA would be affected during Project construction, and for limited and infrequent periods, during vegetation management activities during operation and maintenance. During construction, access to the PDA will be temporarily limited and controlled for safety, and access through the RoW for fishing, hunting, or gathering by the Mi'kmaq may experience brief interruptions. Access may be periodically restricted at various locations along the RoW when construction is active at those locations. These interruptions will be temporary and access to locations with resources either within or in proximity to the RoW will resume following the brief interruption.

NSPI is committed to providing meaningful opportunities for ongoing dialogue about the Project with Mi'kmaw communities as Project planning and design continues and throughout the execution and remaining life of the Project. Consultation and engagement that has occurred to date and will continue throughout the Project is described in Section 4.

As noted in the VC sections above, the resultant environmental effects to natural resources potentially used by the Mi'kmaq, including populations of plants, animals, and fish, are not anticipated to be substantially affected by the Project. Black ash were not identified in the PDA during field assessments (Strum 2020); however, if black ash trees are found within the PDA, the Mi'kmaq will be provided an opportunity to harvest these trees prior to RoW clearing.

While there may be changes to plant life within the RoW, adjacent treed, watercourse, and wetland areas will remain unchanged and the current use of resources from these areas is not anticipated to be affected by the Project. Although the treed habitat within the Project RoW will be changed to more open habitat, the changes may enhance the habitat for certain species used by the Mi'kmaq. This could include creating young regenerating vegetation for forage for deer and moose and could increase the amount of open habitat that is better suited for plant species such as sweetgrass and berries.

The Mi'kmaq will be able to access the lands and resources following completion of these Project-related activities. Overall, the residual Project related effects are anticipated to be low in magnitude for accessibility to land and resources as they are restricted to the PDA and are short in duration. The residual environmental effects of the Project on Indigenous communities are low. There are a limited number of other likely projects and activities in the RAA and a relatively low level of past residual environmental effects from other projects. Therefore, the potential cumulative environmental effects of the Project in combination with other past, present, or future activities (including infrastructure development, forestry and agriculture, and residential and commercial development) on Indigenous communities during all phases of the Project are predicted to be not significant.

16.4.5 Cumulative Effects on the Socioeconomic Environment

The Project will affect the socioeconomic environment during construction, resulting in short-term access restrictions to portions of the PDA affecting land use, including recreational land use. There are no substantive residual environmental effects of the Project on the socioeconomic environment during operation and maintenance that were not initially introduced during the construction phase.

The construction of the Project will also result in the loss of forest land available to forestry; however, this loss will be mitigated through discussion with landowners or compensation, as appropriate. Similarly, other identified or potential projects and activities that may also result in spatial loss of land would be mitigated in the same manner. Where the transmission line crosses active agricultural land, reasonable efforts will be made during final design and routing to reduce direct interactions. As the Project follows the existing transmission line in areas where active farms may be located, potential environmental effects will be localized, and low in magnitude. NSPI will work with agricultural landowners whose crops and land are affected to agree on compensation, where applicable.

The Project is expected to result in a temporary, minor increase in demand in the local labour force and accommodations, considered a positive effect. The Project labour requirements are modest, such that competition for labour or a decline in the availability of local accommodations and public services are unlikely to cause a significant socioeconomic effect, even in combination with other projects or activities.

Limited increases in passenger vehicles and heavy trucks transporting workers, materials and equipment are expected during construction; however, additional traffic from construction activities will be short-term in any one location along the RoW and will be within the design standards for the existing transportation infrastructure. Construction traffic will adhere to laws and regulations with respect to weight restrictions and application will be made for applicable permits and adhere to the conditions therein, as required. A traffic management plan will be developed for the Project if conditions warrant during the transportation of equipment for the transmission line. Therefore, in consideration of the transient nature of the construction, as well as planned mitigation, there will be minimal noticeable increase in overall traffic volumes or patterns through the LAA, and limited adverse environmental effects on traffic and the transportation network. Even with use of highways for oversized loads during construction of other projects such as wind farms, in consideration of the implementation of mitigation for the Project, cumulative effects on transportation are not anticipated.

In summary, while there may be occasional short-term overlapping environmental effects of the Project with those of other projects or activities that have been or will be carried out, given the temporary nature of the environmental effects of the Project during the construction phase, the relatively small footprint of the Project, as well as the small adverse environmental effects during the operation and maintenance phase of the Project within the RAA, it is unlikely that those overlapping environmental effects would result in substantive cumulative environmental effects. Therefore, cumulative environmental effects of the Project in combination with other past, present, or future activities (including infrastructure development, forestry and agriculture, and residential and commercial development) on the socioeconomic environment during all phases of the Project are not expected to be substantive.

16.5 Summary and Determination of Significance

Overall, the PDA for the Project is relatively small, which will reduce residual Project and cumulative environmental effects. While other past infrastructure, commercial and residential development, and past forestry and agriculture activities have affected the existing landscape, those alterations were considered in the baseline conditions used to assess the residual environmental effects of the Project.

The Project will result in some environmental effects on VCs that may potentially overlap with similar environmental effects on those VCs from other past, present, or reasonably foreseeable projects or activities in the area. However, in all cases, these cumulative environmental effects are similar to the residual Project environmental effects presented in this assessment, though having limited temporal and spatial overlap. Residual environmental effects from Project activities are predicted to be not significant. It is understood that other projects or activities defined as undertakings under Provincial legislation that require an EA Registration will also be required to reduce or eliminate potential adverse environmental effects through compliance with government standards and permit stipulations, further reducing the potential for cumulative environmental effects. An example includes requirements for offsetting loss of wetland function from all projects. Based on this, no additional mitigation is recommended for the Project as a result of potential cumulative environmental effects. It is expected that the Project will contribute to regional and provincial economic benefits that will overlap with economic activity created by other undertakings at regional and provincial levels.

Therefore, given the limited residual environmental effects of the Project and with the application of planned Project mitigation, cumulative environmental effects of the Project in combination with other projects or activities that have been or will be carried out (including infrastructure development, forestry and agriculture, and residential and commercial development) during all phases of the Project on all affected VCs are rated not significant. There is a high level of confidence in this prediction for most VCs, and a moderate level of confidence for Indigenous communities pending consultation. There is no follow-up proposed to verify the cumulative environmental effects predictions.

16.6 References

Nova Scotia. 2022 Environmental Assessment Regulations, NS Reg. 328/2022. Available online: https://novascotia.ca/just/regulations/REGS/envassmt.htm

Statistics Canada. 2023. Census Profile, 2021 Census of Population. Available online: https://www12.statcan.gc.ca/census-recensement/2021/dp-pd/prof/index.cfm?Lang=E

17 Incidents and Unplanned Events

This section describes potential incidents and unplanned events, which are upset conditions or other events that are not part of planned activities or normal operation of the Project, but have a reasonable potential of occurrence (i.e., are "credible") and have the potential to result in adverse environmental interactions. While incidents and unplanned events could occur during each phase of the Project, they can be prevented and addressed by good planning and design, communication, worksite health, safety, environmental training of personnel, emergency response planning, vehicle and equipment maintenance, and mitigation.

Given the adherence of Project-related activities to the mitigation measures and response plans in the Project Specific Environmental Management Plan (PSEMP) that will be developed prior to construction, adverse environmental interactions related to incidents and serious (i.e., reportable) unplanned events are not likely to occur during the construction, and operation and maintenance phases of the Project.

This section describes the potential credible incidents and unplanned events that have a reasonable potential for occurrence. Mitigative planning and response procedures are described below.

17.1 Approach

Based on knowledge of the Project, and past experiences and studies, the assessment of incidents and unplanned events focuses specifically on credible incidents that have a reasonable potential for occurrence, and for which the resulting environmental effects could potentially be significant.

The general approach to assessing the potential environment effects of the selected events involves the following:

- Consideration of the potential event that could occur during the life of the Project, including its likelihood of occurrence
- Description of the safeguards established to protect against such occurrences
- Consideration of the contingency or emergency response procedures applicable to the event if it did occur
- Significance determination of potential residual adverse environmental effects

Criteria used for determining the significance of adverse residual environmental effects with respect to incidents and unplanned events generally relate to effects on the sustainability of biological and human environments. Where applicable, significance criteria and definitions are the same as those for the respective VCs.

17.1.1 Identification of Incidents and Malfunctions

The following incidents and unplanned events have been selected for consideration in this assessment and are described in greater detail in the following sections:

- **Electrical Hazards:** The uncontrolled discharge of electrical energy during construction and operation and maintenance
- **Fire:** Includes a fire in a Project component or facility during construction or operation of the Project
- **Infrastructure Failure**: The loss of structural integrity of transmission infrastructure

- **Hazardous Material Spill:** Releases of hazardous materials such as fuel or petroleum products used on-site or in Project components during construction and operation.
- **Discovery of Contaminated Soils or Hazardous Materials:** Discovery of previously unidentified contaminated soils or hazardous materials either through material testing or on-site observations
- **Vehicle/Aircraft Incident:** Project-related vehicle accidents, including terrestrial and aerial vehicles, that could occur during construction and operation and maintenance.

17.1.2 Determination of Credible Scenarios

17.1.2.1 Electrical Hazard

There is potential for electrical hazards to occur during operation and maintenance of the Project, most notable through the unauthorized entry of a person to a restricted and electrified area, or via equipment working within the safe limits of approach without protection. It is unlikely that an electrical hazard will occur by way of a downed conductor or other infrastructure failure (see Section 17.1.2.2).

17.1.2.2 Infrastructure Failure

The potential for infrastructure to fail in a manner that would result in a significant adverse effect is limited to the loss of structural integrity of conductors, and transmission structures or their supports or foundations.

The transmission towers and conductors used for the Project will be designed to withstand extreme weather events, including projected climate change events over the estimated lifespan of the Project. The foundations for transmission towers will be selected based on geotechnical investigations, and towers will be supported with guys using anchors appropriate for the soil or rock conditions. Based on the rigorous design standards to which this Project will be constructed, it is unlikely that transmission infrastructure will suffer a catastrophic failure.

Mitigation and management to prevent infrastructure malfunctions is also integral to the Project design and planning will include regular inspection infrastructure to identify areas and structures that require maintenance before a malfunction occurs. As the Project is adjacent to an existing transmission line and is in close proximity to existing access routes, there is ready access to inspect and maintain the infrastructure.

Given the implementation of the mitigation measures and response plans in the PSEMP, significant adverse environmental effects related to infrastructure failure are not likely to occur during the construction or operation and maintenance phases of the Project. Therefore, this scenario is not considered credible for the Project and will not be assessed further.

17.1.2.3 Fire

There is potential for a fire to occur because of Project-related activities. A fire affecting Project components would likely involve Project infrastructure, a vehicle, or other heavy equipment used during construction or operation and maintenance activities. There is also potential for Project-related machinery to ignite a fire of nearby combustible materials such as grass, brush, or trees. This is considered a credible scenario and is assessed in Section 17.5.

17.1.2.4 Hazardous Material Release

The release of a hazardous material can occur in an environment where fuels, lubricants, hydraulic fluid, paints, and corrosion and fouling inhibitors are used or stored. Hazardous materials will be used during construction, and operation and maintenance of the Project. A release of hazardous materials could result from equipment spills, spills from vehicles, an on-site trucking accident, or tank leak or rupture that occurs within the PDA, with vehicles being the most common source of hazardous materials on-site. Potential scenarios involving the release of hazardous material would most likely be a spill from refueling activities or rupture to a hydraulic line on heavy equipment. A hazardous material spill is considered a credible scenario for the Project and is assessed in Section 17.5.

17.1.2.5 Discovery of Contaminated Soils or Hazardous Materials

Contaminated soils and/or hazardous materials could be encountered from legacy activities such as forestry or illegal dumping within the Project PDA. Construction activities could liberate contaminants such as fuel oil and other hydrocarbons or pesticides into the environment by unearthing and exposing contaminated soils or rupturing old containers. The discovery of contaminated soils or hazardous materials is considered a credible scenario for the Project and is assessed in Section 17.7.

17.1.2.6 Vehicle/Aircraft Incident

During the construction and operation and maintenance phases of the Project, various vehicles including aerial vehicles, will be in motion around the Project site and there is the potential for a vehicle collision to occur, including a vehicle-to-vehicle collision, vehicle-to-pedestrian collision, or vehicle collision with surrounding private property, Project infrastructure, or wildlife. These scenarios are considered credible for the Project and are assessed in Section 17.7.

17.1.3 Potential Interaction with VCs

A preliminary screening was conducted to determine if any of the VCs would likely be affected as a result of possible incidents or unplanned events associated with the Project. **Table 17.1** summarizes potential interactions of Project-related incidents and unplanned events with VCs. Criteria used for determining the significance of adverse residual environmental effects with respect to incidents and unplanned events are the same used in the respective VC sections.

Table 17.1 Potential Interactions of Incidents and Unplanned Events with VCs

Incidents/Unplanned Events	Atmospheric Environment	Wetlands	Wildlife, Vegetation, and Habitat	Water Resources	Aquatic Environment	Heritage Resources	Use of Land and Resources for Traditional Purposes by the Mi'kmaq	Socioeconomic Environment
Electrical Hazards	-	-	✓	-	-	-	-	-
Fire	✓	✓	✓	-	-	-	✓	✓
Hazardous Material Release	✓	-	✓	✓	✓	-	✓	✓
Discovery of Contaminated Soils or Hazardous Materials	-	✓	✓	✓	✓	-	✓	-
Vehicle/Aircraft Incident	-	-	✓	-	-	-	-	✓
NOTE: ✓ indicates a potential interaction - indicates no interaction								

Those incidents or unplanned events that may result in an interaction with a specific VC are identified with a checkmark in the table above and are carried forward for further assessment below.

Incidents or unplanned events that are not identified with a checkmark in the table above are not expected to result in an interaction with a specific VC and are not anticipated to have residual environmental effects.

17.2 Health, Safety, and Security Management Plan

Health and safety is the number one priority of NSPI and all of Emera's operating affiliates. The Project team believes all occupational injuries and illnesses are preventable and is committed to achieving world class safety where no one gets hurt. This commitment to health, safety and security is based upon the following:

- Providing a safe and healthy work environment for all employees and contractors, including proper tools and equipment, effective programs and procedures, and encouraging safety-conscious behaviour at all times.
- Ensuring our workplace conditions meet or exceed applicable legislative obligations and regulatory requirements.
- Implementing effective safety management systems that include goal setting, performance measures, reporting, training, and monitoring to drive continual improvement.
- Supporting and encouraging employees to make safety a priority by proactively identifying and managing risks to prevent uncontrolled outcomes, and speaking up about any unsafe activities, conditions, or behaviours.
- Empowering our safety and health committees to develop, maintain and improve safety initiatives.
- Ensuring our facilities are constructed and well maintained, and our operations are carried out in a way that protects the public from risks arising from the services we provide and the networks we operate.

- Acting with urgency in response to unsafe conditions or emergency events.
- Communicating openly on safety objectives for achieving world class safety.

The Emera/NSPI Safety Management System is designed to provide a comprehensive platform for the implementation, governance, consistency and continuous improvement of the Occupational Health and Safety (OHS) across Emera.

There are ten core elements to the Emera/NSPI Safety Management System:

- Leadership
- Risk Management
- Programs, Procedures and Practices
- Communication, Training & Awareness
- Culture & Behaviour
- Contractor Safety Management Program
- Asset Integrity
- Measuring & Reporting
- Incident Management & Investigation
- Safety Auditing & Compliance

17.3 Assessment of Credible Incidents and Unplanned Events

17.3.1 Electrical Hazards

Live high voltage cables and substations pose the risk of injury or death to individuals and birds if contacted directly or indirectly. Downed conductors are unlikely to occur with this Project (see Section 17.1.2.2); however, unauthorized access to secure locations can put individuals at risk of electrocution and avifauna can also interact with high voltage cables and can become electrocuted in certain circumstances.

The electrocution of an unauthorized person entering a secured area is plausible and could result in the worst credible consequence for an incident involving the electrocution and death of a person. A SARA-listed species coming into contact with live wires that would result in death/electrocution would also be an undesirable scenario.

17.3.2 Project Design and Mitigation to Minimize Risk

The most likely Project incident resulting in potential environmental effects from electrical hazards is the unauthorized access of a restricted area which puts humans at risk of electrocution. NSPI's emergency response procedures will be included in the Emergency Response Plan (ERP). These procedures may also include but are not limited to the following:

- Transmission towers will be designed and installed according to CSA standards and National Standards of Canada (e.g., CAN/CSA-C22.3 No. 1-10 - Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission Lines).

- Project components will be maintained and potential issues will be identified.
- Safe operating procedures will be established for work activities.
- NSPI's safety and environmental policies will be followed.
- The appropriate signage and public warnings will be installed around Project components and facilities (e.g., "High Voltage", "No Anchoring").
- Overhead wire markers will be installed across major water crossings to reduce the potential for avifauna strikes and electrocution.
- Physical safeguards will be implemented such as security fences surrounding facilities.
- Access to facilities will be restricted to authorized personnel only.

17.3.3 Emergency Response

Actions that will be taken in the event of an electrical hazard will include the following measures:

- If an electrical hazard is discovered, the appropriate personnel, authorities and NSPI will be notified immediately.
- Construction and operational staff are trained in the proper procedures to manage an electrical hazard.
- The necessary personal protective equipment will be used when managing an electrical hazard.
- Protocols for dealing with live wires will be included in the Emergency Response Plan.
- NSPI has robust emergency response protocols and procedures in place in the event of an emergency electrical hazard is identified or reported.

17.3.4 Potential Environmental Effects and their Significance

Depending on location, the electrical hazard could potentially affect members of the public and workers in close proximity to the hazard; birds and wildlife; and species of conservation interest. In consideration of the mitigation and response measures to be undertaken to prevent and respond to an electrical hazard, adverse residual environmental effects of an electrical hazard are rated to be not significant for potentially affected VCs.

17.4 Fire

The potential for fire to occur during Project activities is limited to the use of vehicles and is unlikely to occur due to infrastructure failure such as the downing of a conductor (see Section 17.1.2). The worst credible consequence for a fire would be the creation of a large uncontrolled wildfire.

17.4.1 Project Design and Mitigation to Minimize Risk

The most likely Project incident resulting in potential environmental effects from fire is the start of a wildfire from vehicle use, which puts infrastructure and wildlife and wildlife habitat at risk of burning. NSPI's fire response procedures will be included in the Emergency Response Plan (ERP). These procedures may also include but are not limited to the following:

- Equipping all vehicles with fire extinguishers sized and rated as appropriate
- Training personnel in the location and use of fire extinguishers
- Safely storing wastes that may be soaked in flammable materials such as oily rags
- Communication with local and regional emergency response agencies

- Pre-planning for the development of emergency response plans
- Avoiding the parking of vehicles in areas of long grass

17.4.2 Emergency Response

Actions that will be taken in the event of a fire will include the following measures:

- Immediately reporting a fire to local and regional emergency response agencies and services.
- Construction and operational staff will be trained in the proper procedures to manage a small fire
- The necessary personal protective equipment will be available and used when managing a small fire.
- Protocols for dealing with fires will be included in the Emergency Response Plan.

17.4.3 Potential Environmental Effects and their Significance

Depending on location, a fire could potentially affect workers, members of the public, infrastructure, and wildlife and wildlife habitat in close proximity to the fire, as well as access to land and resources use by Indigenous Persons. In consideration of the mitigation and response measures to be undertaken to prevent and respond to a fire, adverse residual environmental effects of a fire are rated to be not significant for potentially affected VCs.

17.5 Hazardous Material Release

Hazardous material releases can occur on the Project site for materials such as fuels, lubricants, and hydraulic fluid. These materials will be used or stored in relatively small quantities, during all Project phases. These types of materials will be most commonly used throughout the construction phase. However, incidental spills could occur during all Project phases, including maintenance activities, resulting in a release of the hazardous substance into the environment.

A probable scenario for a land-based hazardous material spill would be incidental releases during material transfer (e.g., fueling a vehicle or jerry can), rupture of a hydraulic line, or a vehicle incident. There is no spill scenario that is considered likely; any spill is likely to be small (e.g., several litres or less). Given the expected limited spill volume, spill scenarios, and anticipated effectiveness of response plans (including spill containment), the scope of a spill is re anticipated to be limited in size. The worst probable case for a water-based hazardous material spill would likely be a rupture of a hydraulic line near a wetland or watercourse.

The worst credible consequence for an incident involving a hazardous material spill on land would include the death of a SARA listed species from direct contact or ingestion of impacted potable water.

17.5.1 Project Design and Mitigation to Minimize Risk

Project design and mitigation measures to reduce the risk of a hazardous material spill include but are not limited to:

- Fuels and lubricants will be stored in secured approved containers in designated areas, located at least 100 m from known watercourses, wetlands, and water supply areas (including the known location of private wells).
- Where possible, refueling in the field will not occur within 30 m of watercourses and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be

refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors.

- Storage areas will have secondary containment as required by regulation.
- Storage of hazardous materials will comply with WHMIS requirements. Appropriate material safety data sheets (MSDS) will be located at the storage site.
- Transportation of dangerous goods will comply with Transport Canada's Transportation of Dangerous Goods Act.
- Equipment will be kept in good working order, inspected regularly, and leaks will be repaired immediately upon discovery.
- Spill containment equipment (e.g., spill kits) will be available to construction crews and, in the event of an incident, will be put in place to attempt to prevent the spill from spreading to other environmental receptors.
- The ERP will include spill prevention and emergency response protocols, as well as staff and contractor training requirements.
- NSPI's Emergency Notification Plan will support notification of appropriate personnel and agencies.
- Depending on the nature of the spill, it may be a requirement to secure and evacuate the site (e.g., in case of risk of ignition).
- Depending on the nature and location of the spill, there may be a requirement to develop ongoing mitigation and remediation measures.

17.5.2 Emergency Response

Should a hydrocarbon spill occur, all efforts will be made to ensure the safety of onsite workers and to contain the spilled material.

- The containment and/or remediation of spills or releases that occur on the Project site will be managed under the Project ERP which will include, but not be limited to, the following aspects: training, prevention measures, resources, emergency notifications, and spill response equipment.

17.5.3 Potential Environmental Effects and their Significance

Depending on the location of the spill, and type and quantity of material released, hazardous material spills could potentially affect water resources, birds and wildlife, wetlands, rare plants, freshwater fish and fish habitat, and access to land and resources by Indigenous Persons.

With protection measures and a trained workforce, spills are unlikely but if they occurred would be expected to be small and rapidly contained and cleaned up. Such spills are likely to be an occasional occurrence during the different phases of the Project. With appropriate mitigation measures in place (as outlined above), the geographic extent of a potential spill is expected to be highly localized with effects of relatively short duration. Relevant staff will be trained to respond to hazardous materials spills and will use onsite spill containment kits to prevent the spread of materials. However, even small spills can have serious effects, particularly on birds and fish and fish habitat.

Proper storage, use and containment of hazardous materials will help prevent a spill from occurring and minimize the extent of effects should a spill occur. In the event of a heavy equipment spill (e.g., ruptured hydraulic hose), hazardous materials will be contained and remediated as part of the ERP as outlined above.

If a spill damages a wetland or watercourse, an assessment will be undertaken and remedial action proposed to restore the wetland or watercourse to pre-spill conditions; alternatively compensatory habitat would be created if the impacted site was unable to be restored. As with any alteration of wetland or fish habitat, government approval is required and no-net loss of habitat function or productivity is a requirement. Spilled material will be quickly cleaned up, and efforts will be made to exclude wildlife from the area of the spill (e.g., fencing or netting) until the product is recovered.

Any restrictions to access to land for traditional purposes is anticipated to be of very short duration (hours or days) and limited in spatial area.

In consideration of the mitigation and response measures to be undertaken, adverse residual environmental effects of a land-based hazardous material spill are rated to be not significant for potentially affected VCs.

17.6 Discovery of Contaminated Soils or Hazardous Materials

Legacy contaminants and hazardous materials in soils or containers can include fuel oils and other hydrocarbons, antifreeze, and pesticides, which can be exposed to surface runoff from construction activities and enter watercourses, wetlands, or groundwater. These contaminants may be identified during the field investigations or during construction activities involving ground-breaking.

17.6.1 Project Design and Mitigation to Minimize Risk

The Project design and mitigation for discovery of contaminated soils and hazardous materials is similar to that of hazardous material releases described above and includes:

- Training of personnel in the identification of legacy contaminants and WHMIS
- Following proper procedures within the PSEMP

17.6.2 Emergency Response

Should a discovery of contaminated soils or hazardous materials occur, all efforts will be made to protect the safety of onsite workers and to contain the identified material. Workers will report the spill to the appropriate Project personnel, who, during normal business hours will inform the appropriate authorities (i.e., NSECC). Outside of normal business hours, on weekends and on holidays, Project personnel will notify the Canadian Coast Guard/Spills Action Centre (1-800-565-1633).

17.6.3 Potential Environmental Effects and their Significance

Depending on the location, type, and quantity of the contaminant, the discovery of legacy hazardous material spills could potentially affect water resources, birds and wildlife, wetlands, rare plants, freshwater fish and fish habitat, and access to land and resources by Indigenous Persons.

With protection measures and a trained workforce, legacy contaminated sites and hazardous materials spills are expected to be highly localized with effects of relatively short duration. Trained staff are likely to identify these before or immediately after they are exposed to the atmosphere and will stop work and use onsite spill containment kits to prevent the spread of materials until the authorities can advise on proper cleanup, removal, and/or storage of the contaminants.

In consideration of the mitigation and response measures to be undertaken, adverse residual environmental effects from the discovery of contaminated soils or hazardous materials are rated to be not significant for potentially affected VCs.

17.7 Vehicle/Aircraft Incidents

During the construction and operations phases of the Project various vessels, vehicles and aircraft will be in motion around the Project site. These are all at risk of incidents, including collisions with each other as well as with pedestrians and wildlife.

The worst credible consequence for an incident involving a vehicle, vessel, or aircraft would be a collision involving injury or loss of life to humans. The worst case for wildlife would be the death of SARA listed species which could possibly lead to population level effects. In the event of a vehicle or vessel incident there is also the potential for hazardous materials to be released into the environment.

17.7.1 Project Design and Mitigation to Minimize Risk

Project design and mitigation measures to reduce the risk of an incident involving a vehicle, vessel or aircraft include but are not limited to the following.

- Access routes will be identified prior to construction.
- Site access routes including structures (bridges, culverts, etc.) and baseline traffic levels will be reviewed, identifying areas with a high risk for incidents (e.g., due to reduced sight lines).
- Signage identifying areas as high risk will be implemented.
- Signage to delineate work areas will be implemented.
- Areas with unattended hazardous conditions (to the public) will be signed and fenced.
- A communications plan for engagement with communities impacted by traffic will be developed and implemented.
- Project-related equipment will follow traffic regulations and posted speed limits.
- Speed limits will be posted on access roads experiencing heavy vehicle use. Construction in any one area is anticipated to be limited in duration.
- Helicopter contractors will be required to have and implement an aviation safety plan, a health and environmental safety plan, and to be ISO 9001 certified.
- Include presence and location of Debert airport into consideration during helicopter flight planning.
- All incidents (no matter how minor) will be reported and documented following NSPI's Incident Reporting Procedure.
- Wildlife sightings close to roads will be reported and mitigation will be implemented in high-risk areas (e.g., signage, lower speed limits).
- Each work site will have staff trained in First Aid.
- Only trained and licensed individuals will operate equipment.

17.7.2 Emergency Response

Local emergency and response officials will attend to any traffic incident to provide emergency and first aid response as required. NSPI will cooperate with local officials in any incident investigation and conduct an internal incident investigation for any Project-related incident. Remedial action will be taken by NSPI in accord with the results of the investigations.

17.7.3 Potential Environmental Effects and their Significance

A Project-related vehicular incident not resulting in a spill is not expected to result in any adverse environmental effects with the exception of potential property damage – the extent of which depends on the severity of the incident. Although public injury or mortality as a result of a trucking incident cannot be ruled out, the likelihood is very low given the mitigation and emergency response prescribed above. In consideration of the safety-related design standards to be applied to the development of all Project-related permanent and temporary access roads, as well as the mitigation and emergency response discussed above, it is predicted that significant adverse residual environmental effects on VCs from a Project-related vehicle incident are not likely.

17.8 Summary

NSPI will implement design features, mitigation measures, and operational practices intended to reduce the likelihood for incidents and unplanned events to occur and/or the severity of such events if they did occur.

Electrical Hazards: Contact with electrified Project components can result in electrocution of people or wildlife. Warning signs and fencing will reduce the potential for unauthorized personnel to access electrified infrastructure, and bird reflectors and markers will reduce the potential for avifauna to contact conductors. A significant effect associated with electrocution is considered unlikely.

Fire: A fire caused by Project activities can spread to surrounding forested areas. Uncontrolled forest fire could have a significant effect on air quality, biological receptors, and land use. Standard fire prevention mitigation including construction crews trained in the use of fire extinguishers and access to local firefighting services will substantially reduce the potential for fire to become uncontrolled. A significant effect associated with a large Project-caused fire is considered unlikely.

Hazardous material release: Potential spills from construction vehicles and equipment such as a hydraulic hose/line break are likely to be small, cleaned up in a timely manner, and prevented from entering nearby watercourses and wetlands through preventative contingency planning and emergency response procedures. Interruptions to access will be very short term and will return to normal once mitigation is completed. A significant effect associated with a credible spill from Project activities is not likely.

Discovery of contaminated soils or hazardous materials: Legacy contaminants from forestry or illegal dumping activities could be liberated during construction activities and enter wetlands or watercourses. Training of staff to identify and manage legacy contaminants will reduce the likelihood of re-distribution of these materials. Interruptions to access will be very short term and will return to normal once mitigation is completed. A significant effect associated with the discovery of contaminated soils or hazardous materials is not likely.

Vehicle/Aircraft incidents: A Project-related vehicle accident has the potential to result in injury or fatality which would represent a significant effect. Through training and traffic control measures onsite, the Project will mitigate potential effects and reduce the likelihood of terrestrial and aerial vehicle incidents. A significant effect would be highly unlikely.

In summary, while incidents and unplanned events could occur during each of the Project phases, significant adverse effects on VCs are not likely given prevention measures, design mitigation, and emergency response and contingency planning.

18 Summary of Mitigation

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
1	Atmospheric Environment	Construction	Conduct grading and site preparation in phases to minimize disturbed soil areas until just prior to construction or further preparatory activities.	Section 7, Section 7.4.3
2	Atmospheric Environment	Construction	Haul routes will be managed to reduce hauling distance, engine idling, and dust.	Section 7, Section 7.4.3
3	Atmospheric Environment	Construction	Speed limits will be followed on Project-controlled gravel roads to reduce construction-related fugitive road dust.	Section 7, Section 7.4.3
4	Atmospheric Environment	Construction	By design, most of the RoW will be left in a vegetated state and/or with forest floor and duff layer intact, with groundbreaking generally occurring only at the structure locations, minimizing potential for dust emissions.	Section 7, Section 7.4.3
5	Atmospheric Environment	Construction	Stabilize exposed soil surfaces by sloping or using vegetation, stone, soil, or geotextiles to prevent dust.	Section 7, Section 7.4.3
6	Atmospheric Environment	Construction	Cease dust-generating activities during dry periods with high winds or use of dust suppressant (water application) as needed.	Section 7, Section 7.4.3
7	Atmospheric Environment	Construction	Water (with water) aggregate and soil stockpiles to control dust.	Section 7, Section 7.4.3
8	Atmospheric Environment	Construction	Wet roadways and heavy traffic areas with water or dust suppressant technologies to minimize airborne emissions.	Section 7, Section 7.4.3
9	Atmospheric Environment	Construction	Where appropriate, wash down vehicles and equipment using hoses and water to remove accumulated mud/dirt (in a manner that run-off water does not enter watercourse or wetland and is free of fuels, oils and lubricants). Project personnel must adhere to all safety protocols and wear appropriate personal protective equipment in the event of significant fugitive events.	Section 7, Section 7.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
10	Atmospheric Environment	Construction	Equipment must meet all applicable provincial and air quality regulations and emission standards.	Section 7, Section 7.4.3
11	Atmospheric Environment	Construction	Equipment is to be fueled using low-sulphur diesel.	Section 7, Section 7.4.3
12	Atmospheric Environment	Construction	Maintain engines and exhaust systems according to manufacturer's specifications	Section 7, Section 7.4.3
13	Atmospheric Environment	Construction	Remove from service malfunctioning equipment and/or equipment generating excess amounts of smoke, odor, or noise until repairs can be made.	Section 7, Section 7.4.3
14	Atmospheric Environment	Construction	Restrict the idling of equipment where feasible.	Section 7, Section 7.4.3
15	Atmospheric Environment	Construction	Haul distances to disposal sites will be reduced where possible.	Section 7, Section 7.4.3
16	Atmospheric Environment	Construction	Noise control measures (e.g., sound barriers, shrouds, enclosures at the substation) will be used where warranted.	Section 7, Section 7.4.3
17	Atmospheric Environment	Construction	Noise-generating construction activities will comply with the requirements of existing by-laws (where applicable).	Section 7, Section 7.4.3
18	Atmospheric Environment	Construction	In areas close to homes and businesses, construction activities will be limited to daytime hours (typically between the hours of 7:00 a.m. to 7:00 p.m.) as feasible to limit nuisance noise to nearby residences at night.	Section 7, Section 7.4.3
19	Atmospheric Environment	Construction	NSPI staff will monitor noise qualitatively within the RoW and implement appropriate mitigation and responses defined in the EPP in the event that they receive noise complaints from nearby receptors.	Section 7, Section 7.4.3
20	Atmospheric Environment	Construction	The need for additional noise mitigation will be considered through construction planning and lower noise generating alternatives will be considered where available.	Section 7, Section 7.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
21	Atmospheric Environment	Construction	Should blasting be necessary for rock excavation, it will be conducted in accordance with provincial legislation and subject terms and conditions of applicable permits.	Section 7, Section 7.4.3
22	Atmospheric Environment	Construction	Landowners will be notified of any blasting activities through a communication plan, to be developed as part of the EPP.	Section 7, Section 7.4.3
23	Atmospheric Environment	Construction	All blasts are to be conducted and monitored by certified professionals.	Section 7, Section 7.4.3
24	Atmospheric Environment	Construction	Where blasting is planned within 500 m of residences, activities will comply with the requirements of existing by-laws (where applicable).	Section 7, Section 7.4.3
25	Wetlands	Construction	To the extent feasible, access for the purpose of construction will utilize existing roads (public roads, resource roads, trails) and existing cleared transmission corridor. It is preferred that construction equipment and materials advance linearly along the cleared transmission corridor, minimizing the extent of disturbance. In situations where wetlands traverse the entire transmission corridor width, access will deviate around the wetland, where feasible, or temporary mitigation such as swamp mats or brush mats will be used to cross the wetland. Since the mats distribute the load weight over a much larger area, any disturbance is expected to be temporary in nature and may be quickly rehabilitated to original conditions. Mats will be removed at the end of the construction.	Section 8, Section 8.4.3
26	Wetlands	Construction	Alteration as a result of tower foundations is expected to be permanent. Mitigation by design allows for the lengthening of distance between towers and positioning towers laterally to avoid wetlands.	Section 8, Section 8.4.3
27	Wetlands	Construction	Natural vegetated buffers or engineered sedimentation controls will be used if construction activities are required within 30 m of a wetland.	Section 8, Section 8.4.3
28	Wetlands	Construction	Structure placement and access routing will consider the locations of known high concentrations of waterfowl and SAR, to the extent feasible.	Section 8, Section 8.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
29	Wetlands	Construction	Hydrologic function of the wetland will be maintained.	Section 8, Section 8.4.3
30	Wetlands	Construction	Runoff from construction activities and access routes will be directed away from wetlands.	Section 8, Section 8.4.3
31	Wetlands	Construction	Where wetlands cannot be avoided, crossings will be restricted to a single location and ideally at a narrow section of the wetland.	Section 8, Section 8.4.3
32	Wetlands	Construction	Crossings should be located in areas which exhibit a stable soil type and where grades approaching the crossings will not be too steep.	Section 8, Section 8.4.3
33	Wetlands	Construction	If wetland disturbance cannot be avoided, it will be undertaken under the relevant NSECC alteration permitting requirements and offsetting measures will be put in place.	Section 8, Section 8.4.3
34	Wetlands	Construction	Where possible, refueling in the field will not occur within 30 m of wetlands and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors (e.g., absorbent pads located below nozzles and spill response kits fully stocked and located at the refueling location).	Section 8, Section 8.4.3
35	Wetlands	Construction	Temporary storage of waste materials on-site will be located at least 30 m from wetlands and water supply areas (including known groundwater wells).	Section 8, Section 8.1.8
36	Wildlife, Vegetation and Habitat	Construction	The Project will use previously disturbed areas for Project infrastructure and workspaces to the extent practicable.	Section 9, Section 9.4.3
37	Wildlife, Vegetation and Habitat	Construction	Project design will include paralleling an existing line.	Section 9, Section 9.4.3
38	Wildlife, Vegetation and Habitat	Construction	The Project will make use of diverters in high-risk areas to make the lines more visible, especially for birds (APLIC 2012).	Section 9, Section 9.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
39	Wildlife, Vegetation and Habitat	Construction	Vegetation clearing will be limited to areas required for construction and safe operations.	Section 9, Section 9.4.3
40	Wildlife, Vegetation and Habitat	Construction	Travel of vehicles will be confined to existing roads and trails, where practical, to avoid disturbing vegetated areas.	Section 9, Section 9.4.3
41	Wildlife, Vegetation and Habitat	Construction	Travel of vehicles not confined to existing roads will avoid sensitive areas, including riparian habitats and watercourses, to the extent practical.	Section 9, Section 9.4.3
42	Wildlife, Vegetation and Habitat	Construction	Streams identified as potential wood turtle habitat will not be forded, whenever possible.	Section 9, Section 9.4.3
43	Wildlife, Vegetation and Habitat	Construction	Equipment will be cleaned prior to mobilization to avoid introduction of invasive species.	Section 9, Section 9.4.3
44	Wildlife, Vegetation and Habitat	Construction	Material stockpiles will be kept a minimum of 30 m from a watercourse or waterbody with the appropriate erosion control mitigation in place to prevent sediment from entering a watercourse or waterbody.	Section 9, Section 9.4.3
45	Wildlife, Vegetation and Habitat	Construction	Vegetation clearing will be completed outside the migratory bird nesting period of April 1 to August 31 (NSPI Best Practice, Zone C3; ECCC 2023). Where activities may result in risk of harm to migratory bird nests if work during this season cannot be avoided, a qualified biologist will complete a pre-activity nest survey in accordance with federal guidelines (ECCC 2022).	Section 9, Section 9.4.3
46	Wildlife, Vegetation and Habitat	Construction	If an active bird nest is found, beneficial management practices will be followed, including applying an appropriate setback and timing restriction, and NS Natural Resources and Renewables and/or Canadian Wildlife Service (CWS) will be consulted, as appropriate.	Section 9, Section 9.4.3
47	Wildlife, Vegetation and Habitat	Construction	NSPI will engage with regulatory agencies regarding the need for pre-construction bird surveys and implement those surveys as required. Results from those surveys will determine additional required mitigation in consultation with NSDECC and CWS.	Section 9, Section 9.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
48	Wildlife, Vegetation and Habitat	Construction	Vegetation clearing will be completed outside the core maternity roosting period for bats of May 1 to August 31. If habitat tree removal or general tree clearing is required during the maternity roosting period, a qualified biologist will review the trees to determine bat occupancy before removal.	Section 9, Section 9.4.3
49	Wildlife, Vegetation and Habitat	Construction	Seek appropriate permits for bird mitigation under MBCA, as warranted.	Section 9, Section 9.4.3
50	Wildlife, Vegetation and Habitat	Construction	Known locations of vascular plant SOCI within the PDA that may be affected by Project activities will be flagged with a 30 m buffer and avoided, if feasible.	Section 9, Section 9.4.3
51	Wildlife, Vegetation and Habitat	Construction	Known locations of rare lichen within the PDA that may be affected by Project activities will be flagged with a species-specific buffer and avoided, if feasible.	Section 9, Section 9.4.3
52	Wildlife, Vegetation and Habitat	Construction	Known locations of wood turtle streams within the PDA that may be affected by Project activities will be flagged with a 20-200 m buffer and avoided, if feasible.	Section 9, Section 9.4.3
53	Wildlife, Vegetation and Habitat	Construction	Known locations of active raptor nests within the PDA that may be affected by Project activities will be flagged with a 200 m buffer and avoided, if feasible.	Section 9, Section 9.4.3
54	Wildlife, Vegetation and Habitat	Construction	The use of herbicides will be limited, and mechanical and/or hand clearing will be used when practical, particularly within 30 m of wetlands.	Section 9, Section 9.4.3
55	Wildlife, Vegetation and Habitat	Construction	Vehicle and equipment emissions will be managed by conducting regular maintenance on all machinery and equipment.	Section 9, Section 9.4.3
56	Wildlife, Vegetation and Habitat	Construction	Idling of vehicle engines, equipment, and machinery will be avoided, where practical.	Section 9, Section 9.4.3
57	Wildlife, Vegetation and Habitat	Construction	Approved noise arrest mufflers will be used on equipment where practical to reduce potential environmental effects of noise.	Section 9, Section 9.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
58	Wildlife, Vegetation and Habitat	Construction	Haul routes will be managed to reduce engine idling and dust.	Section 9, Section 9.4.3
59	Wildlife, Vegetation and Habitat	Construction	Haul distances to disposal sites will be reduced where practical.	Section 9, Section 9.4.3
60	Wildlife, Vegetation and Habitat	Construction	Construction-related fugitive road dust will be controlled through measures such as speed limits on Project-controlled gravel roads and road watering on an as-needed basis.	Section 9, Section 9.4.3
61	Wildlife, Vegetation and Habitat	Construction	Disturbed areas will be revegetated as soon as practical to limit dust emissions.	Section 9, Section 9.4.3
62	Wildlife, Vegetation and Habitat	Construction	Construction activities that can generate noise disturbance will be limited to daytime hours as feasible to limit nuisance noise to off-site receptors at night.	Section 9, Section 9.4.3
63	Wildlife, Vegetation and Habitat	Construction	All staff will report wildlife incidents to their supervisor which will be reported to NS Natural Resources and Renewables and/or CWS, as appropriate.	Section 9, Section 9.4.3
64	Wildlife, Vegetation and Habitat	Construction	Snow depth in Deer Winter Areas will be monitored and mitigation will be developed if the snow exceeds 2 m depth	Section 9.4.3
65	Wildlife, Vegetation and Habitat	Construction	Personnel will not feed, harass, or hunt wildlife while working on the Project.	Section 9, Section 9.4.3
66	Wildlife, Vegetation and Habitat	Construction	Food and other wildlife attractants will be stored in odour-proof containers.	Section 9, Section 9.4.3
67	Wildlife, Vegetation and Habitat	Construction	Crews will be trained on wildlife awareness.	Section 9, Section 9.4.3
68	Wildlife, Vegetation and Habitat	Construction	Food waste will be stored and disposed of in a manner to avoid attracting wildlife.	Section 9, Section 9.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
69	Water Resources	Construction	Placing structure locations to avoid watercourses and wetlands and their 30 m buffers to the extent practical, therefore avoiding or reducing in-water work or ground disturbances near surface waters.	Section 10, Section 10.4.3
70	Water Resources	Construction	Using clear-span bridges to avoid direct interactions with watercourses	
71	Water Resources	Construction	Development of an Access Plan that will, where, practical, help to avoid areas where conditions could elevate the potential for erosion and sedimentation such as erodible soils and steep slopes.	Section 10, Section 10.4.3
72	Water Resources	Construction	Limiting the Project footprint and disturbed areas to the extent practical and adhering to a maximum RoW width of 30 m.	Section 10, Section 10.4.3
73	Water Resources	Construction	Limiting the area and timing of exposed soil without mitigation (e.g., mulching, seeding, rock lining) through schedule work progression.	Section 10, Section 10.4.3
74	Water Resources	Construction	Restricting the movement of equipment/vehicles to defined work areas and roads, and specified corridors between work areas.	Section 10, Section 10.4.3
75	Water Resources	Construction	Access of clearing and construction equipment, materials, and personnel to the PDA will be through existing public and private roads where practical to limit the new footprint	Section 10, Section 10.4.3
76	Water Resources	Construction	Siting of staging areas and marshaling yards that are required to offload and store equipment will, to the extent practical, be on previously disturbed areas to reduce the need for vegetation clearing	Section 10, Section 10.4.3
77	Water Resources	Construction	Installing temporary bridges to provide access for machinery and equipment to cross watercourses where existing roads are insufficient, as per the EPP and applicable watercourse alteration permitting requirements and the N*ova Scotia Watercourse Alterations Standard*	Section 10, Section 10.4.3
78	Water Resources	Construction	Heavy equipment will not be used for clearing of vegetation for areas within 30 m of the banks of a watercourse	Section 10, Section 10.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
79	Water Resources	Construction	If required, vegetation within 30 m of a watercourse will be managed according to the EPP and watercourse alteration permit (WAP) conditions. This 30 m buffer will be clearly marked at each watercourse.	Section 10, Section 10.4.3
80	Water Resources	Construction	Erosion and sedimentation control (ESC) measures such as silt curtains and sediment control fences will be implemented prior to construction and maintained throughout construction, until the area is stabilized	Section 10, Section 10.4.3
81	Water Resources	Construction	ESC measures will be regularly inspected, repaired, and maintained as required with emphasis on before and after forecasted heavy rain events, and on water-based control structures with a capacity to withstand wind, flow, and hydrostatic pressures	Section 10, Section 10.4.3
82	Water Resources	Construction	Weather advisories will be followed, and work will not be scheduled during high precipitation events, to the extent practical to reduce potential erosion/sedimentation	Section 10, Section 10.4.3
83	Water Resources	Construction	Placing overburden storage piles and exposed topsoil at an appropriate distance from bodies of water to reduce the potential for sediment laden runoff to reach water bodies	Section 10, Section 10.4.3
84	Water Resources	Construction	If culverts are required, limiting the duration of in-water works and operating machinery above the high-water mark or inside isolated areas, to the extent practical to reduce the risk of sediment release.	Section 10, Section 10.4.3
85	Water Resources	Construction	If applicable, using clean, low permeability material and rockfill to construct cofferdams	Section 10, Section 10.4.3
86	Water Resources	Construction	Refueling machinery at least 30 m from watercourse, wetland, or water supply area to reduce likelihood of deleterious substances entering the water resource	Section 10, Section 10.4.3
87	Water Resources	Construction	Placing transmission towers at locations that reduce the requirement for blasting or rock hammering	Section 10, Section 10.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
88	Water Resources	Construction	If blasting is required, a pre-blast survey for water wells within 800 m of the point of blast will be conducted in accordance with the NSE Procedure for Conducting a Pre-Blast Survey	
89	Water Resources	Construction	Implementing vegetation management in accordance with NSPI's vegetation management program.	Section 10, Section 10.4.3
90	Water Resources	Construction	Controlling the release of sediment-laden water from dewatering of excavated areas by filtration through vegetation or engineered ESC devices	Section 10, Section 10.4.3
91	Water Resources	Construction	If culvert installation is required, water pumped out of the site excavation to create dry conditions for construction will be monitored for quality to be consistent with background suspended sediment and pH concentrations and with applicable regulatory approval criteria. The effectiveness of hydraulic isolation and erosion and sedimentation control measures will be assessed through water quality monitoring.	Section 10, Section 10.4.3
92	Water Resources	Construction	Herbicide applications, if required for vegetation management, will be used in accordance with government regulations and will not occur within the wellfield protection area or within 30 m of a wetland or watercourse.	Section 10, Section 10.4.3
93	Water Resources	Construction	Manually clearing vegetation within 30 m of a watercourse or wetland while leaving the undergrowth and duff layer undisturbed to prevent erosion.	Section 10, Section 10.4.3
94	Water Resources	Construction	With the exception of the locations for structures and guy wire placement, clearing activities do not typically remove the stumps and roots of the vegetation within the RoW, thus retaining the integrity of forest floor and root mat which will help mitigate erosion.	Section 10, Section 10.4.3
95	Aquatic Environment	Construction	Project footprint and disturbed areas will be limited to the extent practicable. The Project will adhere to a maximum RoW width of 30 m.	Section 11, Section 11.4.3
96	Aquatic Environment	Construction and Operation and Maintenance	Movement of equipment/vehicles will be restricted to defined work areas and roads, and specified corridors between work areas.	Section 11, Section 11.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
97	Aquatic Environment	Construction	Where existing roads are insufficient, temporary bridges may be used to provide access for all machinery and equipment to cross watercourses (DFO 2020). All bridges will be installed as per the EPP and any applicable WAP requirements.	Section 11, Section 11.4.3
98	Aquatic Environment	Construction and Operation and Maintenance	Heavy equipment will not be used for clearing of vegetation for areas within 30 m of the banks of a watercourse. If required, vegetation within 30 m of a watercourse will be managed according to the PSEPP and WAP conditions. This 30 m buffer will be clearly marked at all watercourses.	Section 11, Section 11.4.3
99	Aquatic Environment	Construction	Standard erosion and sedimentation control structures will be used (*e.g.*, silt curtains, sediment control fences), inspected regularly, and maintained throughout construction activities. Sediment control fences will be removed following stabilization or revegetation.	Section 11, Section 11.4.3
100	Aquatic Environment	Construction	Weather advisories will be followed, and work will be scheduled to avoid high precipitation and runoff events or periods to the extent practicable, to reduce potential for erosion/sedimentation.	Section 11, Section 11.4.3
101	Aquatic Environment	Construction	All equipment will be inspected and cleaned prior to use onsite to prevent the transfer of non-native species.	Section 11, Section 11.4.3
102	Aquatic Environment	Construction	Overburden storage piles and exposed topsoil will be placed away from bodies of water.	Section 11, Section 11.4.3
103	Aquatic Environment	Construction	Waste material (i.e., construction debris) will be contained and disposed of in an approved manner.	Section 11, Section 11.4.3
104	Aquatic Environment	Construction	Surplus or sediment-laden water will be controlled and treated prior to release (*e.g.*, filtration through vegetation or engineered erosion control devices or settling ponds).	Section 11, Section 11.4.3
105	Aquatic Environment	Construction and Operation and Maintenance	All fuels and lubricants used during construction will be stored according to regulated containment methods in designated areas. Storage areas will be	Section 11, Section 11.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
			located at least 30 m from watercourses, wetlands, and water supply areas (including known private wells).	
106	Aquatic Environment	Construction and Operation and Maintenance	Refueling of machinery will not occur within 30 m of watercourses and water supply areas to reduce the likelihood that deleterious substances will enter watercourses. Where stationary equipment is situated, special precautions will be implemented to prevent spills during refueling. Spill response kits will be located at the refueling site.	Section 11, Section 11.4.3
107	Aquatic Environment	Construction and Operation and Maintenance	Disposal and handling of waste oils, fuels, and hazardous waste will be as recommended by the suppliers and/or manufacturers in compliance with federal, provincial, and municipal regulations.	Section 11, Section 11.4.3
108	Archaeological and Heritage Resources	Construction	Use of low impact equipment or other methods to avoid rutting in areas of elevated archaeological potential.	Section 12, Section 12.4.3
109	Archaeological and Heritage Resources	Construction	Planned avoidance (e.g., transmission line structures and guy wire placement), where practical, of areas identified during the ARIAs that exhibit elevated potential for archaeological resources (i.e., 36 HPAs along the L8006 Transmission Line and the shovel testing HPA identified in the northeast corner of the 67-N Onslow Substation PDA).	Section 12, Section 12.4.3
110	Archaeological and Heritage Resources	Construction	Implement additional mitigation (e.g., shovel testing, archaeological excavation, or monitoring) as recommended for the Project where avoidance of elevated archaeological potential areas or HPAs is not practical, depending on the nature of the resource and the potential impact. (Boreas Heritage 2021, CRM Group 2023a, and CRM Group 2023b).	Section 12, Section 12.4.3
111	Archaeological and Heritage Resources	Construction	Should any archaeological or heritage resources be identified that could be affected by the Project it is recommended that NSPI develop appropriate mitigation in consultation with SPP and Indigenous Communities, as applicable.	Section 12, Section 12.4.3
112	Archaeological and Heritage Resources	Construction	Develop a Heritage Resource Discovery Response Plan for circumstances of an accidental discovery of an archaeological or heritage resource.	Section 12, Section 12.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
113	Socioeconomic Environment	Construction	Continued engagement with recreationist groups, notably ATVers and snowmobilers, to keep them informed of Project activities, especially during construction when the greatest impact will be felt.	Section 14, Section 14.4.3
114	Socioeconomic Environment	Construction	Community communications through advertising Project schedules and updates in high traffic locations, in addition to sharing information via the Project website, community newsletters, at one-on-one meetings, and other measures as appropriate.	Section 14, Section 14.4.3
115	Socioeconomic Environment	Construction	Reasonable efforts will be made during final design and routing to minimize direct interactions and crossings with active agricultural land. Where applicable, financial compensation will be negotiated with landowners along the transmission line whose farmland and forestry activities will face short term loss of production.	Section 14, Section 14.4.3
116	Socioeconomic Environment	Construction	Noise-generating construction activities will comply with the requirements of existing noise by-laws (where applicable) and residents will be kept informed of the schedule of activities on or near their properties.	Section 14, Section 14.4.3
117	Socioeconomic Environment	Construction	Noise will be temporary, intermittent, and restricted to areas where it is generated by construction activities. Construction activities are expected to occur during daylight hours (typically between the hours of 7am and 7pm).	Section 14, Section 14.4.3
118	Socioeconomic Environment	Construction	If construction noise risks exceeding the thresholds set in bylaws, construction noise control mitigation measures may be put in place including sound barriers, shrouds, and enclosures, where warranted,	Section 14, Section 14.4.3
119	Socioeconomic Environment	Construction	Final transmission line design and routing will attempt to avoid recreational use areas (including protected areas) where feasible with the exception of the North Tyndal Protected Water Area, Chignecto Isthmus Wilderness Area and Trans Canada Trail where the existing transmission line currently crosses. Please see Section 10: Assessment of Environmental Effects on Water Resources for more information and mitigation activities related to the North Tyndal Protected Water Area.	Section 14, Section 14.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
120	Effects of the Environment on the Project	Construction	The Project will be designed and constructed to meet applicable engineering codes, standards, and best management practices. These include applicable building safety, industry codes, and standards including the National Building Code of Canada, the National Fire Code of Canada, and applicable Canadian Standards Association (CSA) Standards, including CAN/CSA-C22.3 No. 1-10 – Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission Lines.	Section 15, Section 15.2.3
121	Effects of the Environment on the Project	Construction	Work risk assessments are conducted prior to the commencement of work, and work will be scheduled to avoid predicted times of extreme where feasible, for the safety of crews and Project infrastructure. For example, at-risk work will be suspended during weather events where lightning is a known possibility, and where risk to workers is identified.	Section 15, Section 15.2.3
122	Effects of the Environment on the Project	Construction	Stormwater infrastructure will be designed to withstand predicted increases in precipitation.	Section 15, Section 15.2.3
123	Effects of the Environment on the Project	Construction	All aspects of Project design will consider predictions for climate change and measures for adaptation. Several publications are available to guide design engineers in this regard, such as the Public Infrastructure Engineering Vulnerability Committee's (PIEVC) "Engineering Protocol for Infrastructure Vulnerability Assessment and Adaptation to a Changing Climate" (2011). PIEVC has released a beta version in February 2023, of an updated PIEVC Green Protocol, which can be used to assess how infrastructure components will respond to the impacts of climate change (PIEVC 2023).	Section 15, Section 15.2.3
124	Effects of the Environment on the Project	Construction	The design and installation of Project components will consider the potential risk indicated by meteorological data (e.g., tower cable sag allowance will consider typical ice loads, and factor in the 1:150 return periods for wind and freezing rain events).	Section 15, Section 15.2.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
125	Effects of the Environment on the Project	Construction	Project infrastructure will be designed to a standard appropriate for the level of risk. Structures (e.g., towers) will be designed to a 1:150 year return period weather event with potential design enhancements in certain locations depending on climatic conditions (e.g., ice loading, wind, etc.).	Section 15, Section 15.2.3
126	Effects of the Environment on the Project	Construction	The proposed transmission line follows an existing transmission corridor for most of the line, where previous geotechnical surveys have been conducted and will be consulted.	Section 15, Section 15.3.3.3
127	Effects of the Environment on the Project	Construction	Detailed geotechnical investigations and assessments will be completed before construction commences to determine the stability and composition of the soil and underlying geology. Results from the assessments will be factored into site-specific design and site preparation and used to determine materials and methods used at each location.	Section 15, Section 15.3.3.3
128	Effects of the Environment on the Project	Construction	When necessary, landslide barriers and catch ditches will be built in unstable areas so debris is contained before impacting infrastructure.	Section 15, Section 15.3.3.3
129	Effects of the Environment on the Project	Construction	Construction may include additional stabilizing measures such as replacing *in-situ* materials to increase stability, sub-base preparation, and the use of guywires, as required.	Section 15, Section 15.3.3.3
130	Effects of the Environment on the Project	Construction	The Nova Scotia Department of Natural Resources will be engaged to provide information on the known location of karst landforms that could be avoided or would require specific mitigation measures.	Section 15, Section 15.3.3.3
131	Effects of the Environment on the Project	Construction	Route selection to reduce the number of crossings or interactions with watercourses, waterbodies, wetlands, and their 30 m buffers. Avoiding these areas increases the distance that surface waters from the RoW must travel before reaching low-lying areas.	Section 15, Section 15.3.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
132	Effects of the Environment on the Project	Construction	Incorporation of a maximum slope grade of 2H:1V for graded surfaces within the PDA, to improve erosion protection and slope stability where grading must occur.	Section 15, Section 15.3.4.3
133	Effects of the Environment on the Project	Construction	Rain is an expected work condition, and the construction schedule will allow for reasonable rain delays for relevant work activities.	Section 15, Section 15.3.4.3
134	Effects of the Environment on the Project	Construction	Erodible soils on the construction sites will be mitigated using appropriate site drainage and sedimentation control measures at all sites where soil or sub-soil has been exposed and there is potential for erosion.	Section 15, Section 15.3.4.3
135	Effects of the Environment on the Project	Construction	The area of exposed soil will be limited, and the length of time soil is exposed without mitigation (e.g., mulching, seeding, rock cover) will be minimized through the scheduled work progression. Steeper slopes susceptible to erosion will be stabilized with rock or hydroseed.	Section 15, Section 15.3.4.3
136	Effects of the Environment on the Project	Construction	Erosion and sedimentation control structures will be maintained and inspected regularly during construction with particular emphasis before and after forecasted heavy rain events.	Section 15, Section 15.3.4.3
137	Effects of the Environment on the Project	Construction	Structures and anchors will be placed to span watercourses and wetland, including their 30 m buffers to the extend feasible in consideration of the needs of Project design.	Section 15, Section 15.3.4.3
138	Effects of the Environment on the Project	Construction	Travel through wetlands and watercourse crossings will be avoided, when feasible. If travel over a wetland or watercourse is required, temporary engineered structures such as swamp matting will be used and designed with hydrological characteristics of the watercourse considered.	Section 15, Section 15.3.4.3
139	Effects of the Environment on the Project	Construction	The Project design will consider normal and extreme weather conditions that may arise.	Section 15, Section 15.3.4.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
140	Effects of the Environment on the Project	Construction and Operation and Maintenance	Weather forecasts will be monitored to predict poor weather conditions (e.g., extreme precipitation, wind, fog), and allowance for them will be included in the construction and operation and maintenance schedules.	Section 15, Section 15.2.3
141	Effects of the Environment on the Project	Construction and Operation and Maintenance	The potential effects of flooding will be considered in the Project design, operation, and maintenance, including the selection of materials and equipment.	Section 15, Section 15.3.4.3
142	Effects of the Environment on the Project	Construction and Operation and Maintenance	The EPP will include provisions for site drainage; sedimentation and erosion control will be designed to withstand extreme flood conditions, so that structures are not put at risk.	Section 15, Section 15.3.4.3
143	Effects of the Environment on the Project	Construction and Operation and Maintenance	Any signs of forest fires will be immediately reported to local emergency response services.	Section 15, Section 15.3.5.3
144	Effects of the Environment on the Project	Construction and Operation and Maintenance	Monitor for provincial burn bans within the PDA. All potential flame ignition activities will be ceased in the event of a provincial burn ban.	Section 15, Section 15.3.5.3
145	Effects of the Environment on the Project	Construction and Operation and Maintenance	Brush burning will not be permitted. Alternatives such as chipping or composting, and removal from the RoW.	Section 15, Section 15.3.5.3
146	Effects of the Environment on the Project	Construction and Operation and Maintenance	An Emergency Response Plan (ERP) will describe fire-related emergency response capabilities, plans, and required training.	Section 15, Section 15.3.5.3
147	Effects of the Environment on the Project	Construction and Operation and Maintenance	Work sites and Project facilities will be supplied with fire suppression equipment, including water-packs and shovels.	Section 15, Section 15.3.5.3
148	Effects of the Environment on the Project	Construction and Operation and Maintenance	All vehicles will be equipped with fire extinguishers sized and rated as appropriate.	Section 15, Section 15.3.5.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
149	Effects of the Environment on the Project	Construction and Operation and Maintenance	All personnel will be trained in the location and use of fire extinguishers.	Section 15, Section 15.3.5.3
150	Effects of the Environment on the Project	Construction and Operation and Maintenance	Waste that may be soaked in flammable materials (e.g., oily rags) will be safely stored or disposed of.	Section 15, Section 15.3.5.3
151	Effects of the Environment on the Project	Construction and Operation and Maintenance	Vehicles will not be parked in areas with long grass and other vegetation.	Section 15, Section 15.3.5.3
152	Effects of the Environment on the Project	Construction and Operation and Maintenance	Fire Danger Maps will be regularly consulted during forest fire season.	Section 15, Section 15.3.5.3
153	Effects of the Environment on the Project	Construction and Operation and Maintenance	Emergency measures will be in places, in conjunction with existing NSPI, community, and provincial plans to provide rapid detection and response to any fire threat, and quickly control and extinguish flames prior to contact with any flammable structures (e.g., wood).	Section 15, Section 15.3.5.3
154	Effects of the Environment on the Project	Construction and Operation and Maintenance	There will be a cleared operational buffer zone established around Project components (e.g., RoW) to decrease the likelihood of a fire causing substantive damage to the Project, and to reduce the risk of fallen trees or other debris damaging Project infrastructure.	Section 15, Section 15.3.5.3
155	Effects of the Environment on the Project	Construction and Operation and Maintenance	The Project will adhere to the Project-specific environmental management plan.	Section 15, Section 15.3.5.3
156	Effects of the Environment on the Project	Construction and Operation and Maintenance	NSP Operations will adhere to the Contractor Environmental Requirements, ENV-014 Environmental Protection and RoW Maintenance, and Vegetation Management Operation Procedures.	Section 15, Section 15.3.5.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
157	Effects of the Environment on the Project	Operation and Maintenance	Extreme weather, rainfall, and winter precipitation will be considered in Project design, including the selection of materials and equipment, planning and maintenance of the Project.	Section 15, Section 15.2.3
158	Effects of the Environment on the Project	Operation and Maintenance	NSPI will maintain an adequate RoW width and remove danger trees adjacent to the RoW to avoid wind-related tree strikes.	Section 15, Section 15.2.3
159	Effects of the Environment on the Project	Operation and Maintenance	Ground vegetation and low shrubs will be left to grow within the proposed RoW and will filter and absorb runoff, slowing down the movement of runoff and providing protection against surface erosion and runoff channeling.	Section 15, Section 15.2.3
160	Effects of the Environment on the Project	Operation and Maintenance	The Project design and Environmental Protection Plan (EPP) will consider normal and extreme weather conditions that may arise and will implement measures for climate adaptation and responding to extreme climate conditions such as storms and flooding to protect workers and the public as well as the security and integrity of infrastructure. As the effects of climate change are difficult to predict in advance, an adaptive management program will be developed to monitor early warning signs for structural weakness or risk due to climate change and rising sea levels.	Section 15, Section 15.2.3
161	Effects of the Environment on the Project	Operation and Maintenance	NSPI will monitor for observed effects of the environment on the Project, and will act as required to maintain, repair, and upgrade Project infrastructure as required, and modify operations to facilitate its continued safe operation.	Section 15, Section 15.2.3
162	Effects of the Environment on the Project	Operation and Maintenance	The Project will implement and follow a maintenance and safety management program.	Section 15, Section 15.2.3
163	Effects of the Environment on the Project	Operation and Maintenance	The Project will implement contingency plans, including emergency back-up power for necessary operations and dispatch crews for emergency repair of storm damage.	Section 15, Section 15.2.3

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
164	Effects of the Environment on the Project	Operation and Maintenance	The Project will adhere to a Project-specific environmental management plan.	Section 15, Section 15.2.3
165	Effects of the Environment on the Project	Operation and Maintenance	NSPI will monitor for observed effects of the environment on the Project, and will act as required to maintain, repair, and upgrade Project infrastructure as required, and modify operations to facilitate its continued safe operation.	Section 15, Section 15.3.4.3
166	Effects of the Environment on the Project	Operation and Maintenance	Ground vegetation and low shrubs will be left to grow within the proposed RoW and will filter and absorb runoff, slowing down the movement of runoff and providing protection against surface erosion and runoff channeling.	Section 15, Section 15.3.4.4
167	Effects of the Environment on the Project	Operation and Maintenance	A maintenance and safety management program will be implemented.	Section 15, Section 15.3.4.3
168	Effects of the Environment on the Project	Operation and Maintenance	Contingency plans will be implemented, including emergency back-up power and dispatch of crews for emergency repairs.	Section 15, Section 15.3.4.3
169	Effects of the Environment on the Project	Operation and Maintenance	The Project will adhere to the Project-specific environmental management plan.	Section 15, Section 15.3.4.3
170	Effects of the Environment on the Project	Operation and Maintenance	Additional mitigation measures to protect infrastructure located in the Chignecto Isthmus to an elevation of 10.6 m will be conducted by a combined Project team of third parties including federal and/or provincial governments and is not the sole responsibility of NSPI.	Section 15, Section 15.3.4.3
171	Effects of the Environment on the Project	Operation and Maintenance	During vegetation management for maintenance of the transmission line, brush or slash piles will be cut and distributed as coarse woody debris or chipped / mulched as fine woody debris.	Section 15, Section 15.3.5.3
172	Incidents and Unplanned Events	Construction	Transmission towers will be designed and installed according to CSA standards and National Standards of Canada (e.g., CAN/CSA-C22.3 No. 1-10 -	Section 17, Section 17.4.1

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
			Overhead Systems and CAN/CSA-C22.3 No. 60826-10 - Design Criteria of Overhead Transmission Lines).	
173	Incidents and Unplanned Events	Construction	Project components will be maintained and potential issues will be identified.	Section 17, Section 17.4.1
174	Incidents and Unplanned Events	Construction	Safe operating procedures will be established for work activities.	Section 17, Section 17.4.1
175	Incidents and Unplanned Events	Construction	NSPI's safety and environmental policies will be followed.	Section 17, Section 17.4.1
176	Incidents and Unplanned Events	Construction	The appropriate signage and public warnings will be installed around Project components and facilities (e.g., "High Voltage", "No Anchoring").	Section 17, Section 17.4.1
177	Incidents and Unplanned Events	Construction	Overhead wire markers will be installed across major water crossings to reduce the potential for avifauna strikes and electrocution.	Section 17, Section 17.4.1
178	Incidents and Unplanned Events	Construction	Physical safeguards will be implemented such as security fences surrounding facilities.	Section 17, Section 17.4.1
179	Incidents and Unplanned Events	Construction	Access to facilities will be restricted to authorized personnel only.	Section 17, Section 17.4.1
180	Incidents and Unplanned Events	Construction	The use of lighting will be incorporated around Project components (e.g., converter stations and grounding sites) to discourage vandalism and loitering.	Section 17, Section 17.4.1
181	Incidents and Unplanned Events	Construction	Equipping all vehicles with fire extinguishers sized and rated as appropriate.	Section 17, Section 17.5.1
182	Incidents and Unplanned Events	Construction	Training personnel in the location and use of fire extinguishers.	Section 17, Section 17.5.1
183	Incidents and Unplanned Events	Construction	Safely storing wastes that may be soaked in flammable materials such as oily rags.	Section 17, Section 17.5.1

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
184	Incidents and Unplanned Events	Construction	Communication with local and regional emergency response agencies.	Section 17, Section 17.5.1
185	Incidents and Unplanned Events	Construction	Pre-planning for the development of emergency response plans.	Section 17, Section 17.5.1
186	Incidents and Unplanned Events	Construction	Avoiding the parking of vehicles in areas of long grass.	Section 17, Section 17.5.1
187	Incidents and Unplanned Events	Construction	Fuels and lubricants will be stored in secured approved containers in designated areas, located at least 100 m from known watercourses, wetlands, and water supply areas (including the known location of private wells).	Section 17, Section 17.6.1
188	Incidents and Unplanned Events	Construction	Where possible, refueling in the field will not occur within 30 m of watercourses and water supply areas (including the known location of private wells). Where equipment is located near a wetland and must be refueled at that location, special precautions will be used to prevent spilled fuel from entering any sensitive receptors.	Section 17, Section 17.6.1
189	Incidents and Unplanned Events	Construction	Permanent storage areas for containers or drums will be clearly identified.	Section 17, Section 17.6.1
190	Incidents and Unplanned Events	Construction	Storage areas will have secondary containment as required by regulation.	Section 17, Section 17.6.1
191	Incidents and Unplanned Events	Construction	Storage of hazardous materials will comply with WHMIS requirements. Appropriate material safety data sheets (MSDS) will be located at the storage site.	Section 17, Section 17.6.1
192	Incidents and Unplanned Events	Construction	Transportation of dangerous goods will comply with Transport Canada's Transportation of Dangerous Goods Act.	Section 17, Section 17.6.1
193	Incidents and Unplanned Events	Construction	Equipment will be kept in good working order, inspected regularly, and leaks will be repaired.	Section 17, Section 17.6.1

Table 18.1 VCs and Proposed Mitigation

No.	VC (if applicable)	Project Phase	Proposed Mitigation	Location within EA Registration Document where Mitigation is Identified
			immediately upon discovery.	
194	Incidents and Unplanned Events	Construction	Spill containment equipment (e.g., spill kits) will be available to construction crews and, in the event of an incident, will be put in place to attempt to prevent the spill from spreading to other environmental receptors.	Section 17, Section 17.6.1
195	Incidents and Unplanned Events	Construction	The ERP will include spill prevention and emergency response protocols, as well as staff and contractor training requirements.	Section 17, Section 17.6.1
196	Incidents and Unplanned Events	Construction	NSPI's Emergency Notification Plan will support notification of appropriate personnel and agencies.	Section 17, Section 17.6.1
197	Incidents and Unplanned Events	Construction	Depending on the nature of the spill, it may be a requirement to secure and evacuate the site (e.g., in case of risk of ignition).	Section 17, Section 17.6.1
198	Incidents and Unplanned Events	Construction	Depending on the nature and location of the spill, there may be a requirement to develop ongoing mitigation and remediation measures.	Section 17, Section 17.6.1
199	Incidents and Unplanned Events	Construction	Training of personnel in the identification of legacy contaminants and WHMIS.	Section 17, Section 17.7.1
200	Incidents and Unplanned Events	Construction	Following proper procedures within the PSEMP.	Section 17, Section 17.7.1
201	Incidents and Unplanned Events	Construction	Include presence and location of Debert airport into consideration during helicopter flight planning	Section 17, Section 17.8.1

19 Closure

The NS-NB Reliability Intertie Project is a proposed 345 kV transmission line and substation connection that upgrades existing infrastructure using standard engineering practice based on decades of experience supported by well-established environmental standards and protocols. The Project transects a wide area of Nova Scotia geographically, over 96 km across diverse environments.

The environmental assessment is intended to support the Project planning stage with careful consideration being given to avoiding or minimizing potential interactions with environmental and socio-economic constraints that may be encountered along the proposed Project RoW, while at the same time recognizing engineering and costing realities. This EA for the NS-NB Reliability Intertie follows this multifaceted approach and is intended to facilitate a smooth transition from the assessment phase to the subsequent regulatory approval processes (e.g., permitting), and adopt, where applicable, mitigation measures and monitoring activities specific to certain environmental interactions.

Public engagement is a vital element of the environmental assessment process and NSPI appreciates the value of early open public participation regarding its various activities and undertakings. Public and stakeholder engagement began in the summer of 2022 for those parties potentially involved with, or interested in, the Project. In addition to informing the public about the Project, the engagement process, which will continue beyond the environmental assessment process, also enables NSPI to address stakeholder issues, concerns, and suggestions early in the planning and design process.

NSPI places a priority on fostering positive long-term relationships with the Mi'kmaq. NSPI has met with the KMKNO and interested Mi'kmaq Communities and is committed to meaningful and productive collaboration in the future. With respect to this Project, since 2021 there has been regular Mi'kmaq engagement including meetings, site visits, information sessions, conversations, collaborative reviews, and information exchanges. Proactive engagement with the Mi'kmaq will continue throughout the EA process and during the permitting, construction, and operation phases of the Project.

The foundation of any environmental assessment is information. As an initial priority, information is required to focus the EA on the critical environmental, socio-economic, and cultural factors to be considered; described as valued components (VCs). A second priority in the EA process is to obtain sufficient information to determine the significance of the potential effects on these VCs from activities associated with the construction and operation of the Project. To this end, NSPI commissioned studies important to inform both engineering design and environmental management and protection.

Section 18 of this report provides a summary of the mitigation commitments referenced throughout the environmental assessment. Mitigation must be implemented to be successful. In presenting the mitigation measures in this assessment NSPI is making a commitment to implement these in an appropriate and timely manner. The company will develop a number of operational documents focused on reducing various types of environmental risk associated with construction and operational activities. The overarching Environmental Management Plan (EMP) will include Environmental Protection Plans (EPPs) that will clearly set out the environmental protection measures and procedures that must be implemented for each phase and activity of the

Project as planned, including mitigation prescribed in required permits, approvals, and authorizations. The EPPs are the primary mechanism to commit that mitigation is implemented, as required by applicable agencies through permitting processes, and as determined through the EA review process.

In summary, the results of a thorough and rigorous environmental assessment have shown that the NS-NB Reliability Intertie is not likely to result in significant adverse residual environmental effects, including cumulative effects, provided that the proposed design features, mitigation measures, and monitoring are implemented.