Environmental Impact Assessment (EIA) Registration for the Modernization of Electrical Transmission Infrastructure near Neguac, New Brunswick

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1.0 INTRODUCTION

This document is the registration document for the Environmental Impact Assessment (EIA) process for the proposed Modernization of Electrical Transmission Infrastructure near Neguac, New Brunswick, (the Project) being proposed by the New Brunswick Power Corporation (NB Power) (the proponent). The Project is being carried out in two phases and consists of the construction and operation of a new substation and new transmission line (Phase 1), and the decommissioning of an existing substation and two existing transmission lines (Phase 2) near Neguac, New Brunswick (Figure 1.1). This Project will be financed entirely by NB Power. No applications for grants or loans of capital funds from any other government agency will be submitted for this Project.

This document is submitted to the New Brunswick Department of Environment and Local Government (NBDELG) as part of the environmental impact assessment (EIA) process under Section 5(2) of the *Environmental Impact Assessment Regulation* 87-83 of the *Clean Environment Act*.

1.1 ORGANIZATION OF THIS DOCUMENT

This document is organized into ten chapters, as follows:

- Chapter 1 provides introductory information regarding the Project, including Project scope, information on the proponent, the purpose of the Project, and the regulatory framework that is anticipated to apply to the Project.
- Chapter 2 provides a description of the Project as it is currently conceived, including location; siting considerations; components and infrastructure; how construction, operation, and decommissioning and abandonment will be achieved; mitigation of potential environmental effects through Project design; and anticipated workforce and schedule.
- Chapter 3 provides an overview of the environmental setting of the Project.
- Chapter 4 provides a description of the methods used to assess potential interactions between the Project and valued components (VCs)
- Chapter 5 contains information regarding potential interactions between the Project and VCs, including a description of existing conditions, potential Project-environment interactions, and mitigation for those interactions.
- Chapter 6 provides a summary of mitigation for the Project, through design and in response to potential environmental interactions.
- Chapter 7 outlines public involvement activities conducted and planned for the Project.
- Chapter 8 describes the Aboriginal engagement activities conducted to date and planned for the Project.
- Chapter 9 includes closing remarks and a statement of limitations about use of this document.
- Chapter 10 lists the references cited in this work.

1.2 OVERVIEW OF THE PROJECT

NB Power is proposing a two-phased project to modernize electrical transmission infrastructure near Neguac, New Brunswick. The two phases will consist of the following:

- Phase 1 of the Project is the construction of a new 138 kV electrical substation near the village of Neguac to replace an existing 69 kV substation, and a new 23 km-long, 138 kV transmission Line 1220 that will connect the new substation to an existing 138 kV transmission line (Line 1106) located west of Neguac (Figure 1.1). Following completion of construction, the new line and substation will be commissioned and energized.
- Phase 2 will follow Phase 1 and will involve the decommissioning and removal of the then-obsolete 69 kV Neguac substation, and the decommissioning and removal of the then-obsolete 23 km-long, 69 kV Line 0104, and a 29 km-long portion of the 69 kV Line 0012 (Figure 1.1).

Further details are provided below.

1.2.1 Phase 1 –New Neguac Substation and New 138 kV Transmission Line

In Phase 1, a new 23 km-long, 138 kV transmission line (Line 1220) and a new 138 kV electrical substation will be constructed near the village of Neguac, Northumberland County, New Brunswick (Figure 1.1). The 30.48 m-wide right-of-way (RoW), referred to herein as a 30 m RoW, for the new Line 1220 will be built along the northern edge of the existing RoW of Line 0104 such that only 15.24 m of new RoW (referred to herein as 15 m RoW) will be required, with the other 15 m of width using the existing RoW of Line 0104. The new transmission line will interconnect the new substation with a nearby 138 kV transmission line (referred to as Line 1106) that runs from the Milbank Terminal near Miramichi, NB, in a south-north direction west of Neguac. The new Line 1220 will require a connection to the existing Line 1106 by way of new tap off Structure 88, located at the current intersection between Line 1106 and Line 0012 (to be decommissioned in Phase 2).

Phase 1of the Project, as currently conceived, would include the following major components and infrastructure:

- A 23 km-long, 30 m-wide RoW for linear infrastructure (15 m of which is newly acquired RoW)
- A 23 km-long, 138 kV transmission line including wood H-frame poles and angle structures
- Conducting wires and insulators
- A new electrical substation to enable an upgrade to138 kV service for the Neguac area

1.2.2 Phase 2 – Decommissioning and Abandonment of Existing Neguac Substation and Existing 69 kV Transmission Lines (0104 and 0012)

Phase 2 will commence once the new 138 kV transmission line and new substation are operating. The new substation is being supplied with electricity from the new transmission Line 1220. Once this is complete, the existing 23 km-long, 69 kV transmission Line 0104 will become redundant and will be decommissioned. A 29 km-long section of the 69 kV Line 0012 that currently supplies electricity to the existing 69 kV Neguac substation from Allardville, Madawaska County, New Brunswick (Figure 1.1), will become redundant and will be decommissioned. The decommissioning associated with Lines 0104 and 0012 will require the removal of poles, conductors, and insulators, and will allow for the natural revegetation over time of the 29 km of RoW for Line 0012, and approximately 15 m of width along the southern portion of the 23 km RoW for Line 0104.

Phase 2 will also include the decommissioning of the existing 69 kV Neguac electrical substation.

1.3 PROPONENT INFORMATION

NB Power's responsibilities include the operation and maintenance of the high voltage electricity transmission system in New Brunswick and to serve as a common carrier, providing access to all parties wishing to use the transmission system for delivery of electricity within the province, for exports, or for wheeling through by other parties.

As such, the proponent for the proposed undertaking is as follows:

Name of Proponent	New Brunswick Power Corporation (NB Power)
President & Chief Executive Officer	Mr. Gaëtan Thomas
Mailing Address of Proponent	P.O. Box 2000, 515 King Street Fredericton, NB E3B 4X1
Contact Person for this EIA Registration	Mr. Matthew Gorman Corporate Environmental Services NB Power P.O. Box 2000, 515 King Street Fredericton, NB E3B 4X1
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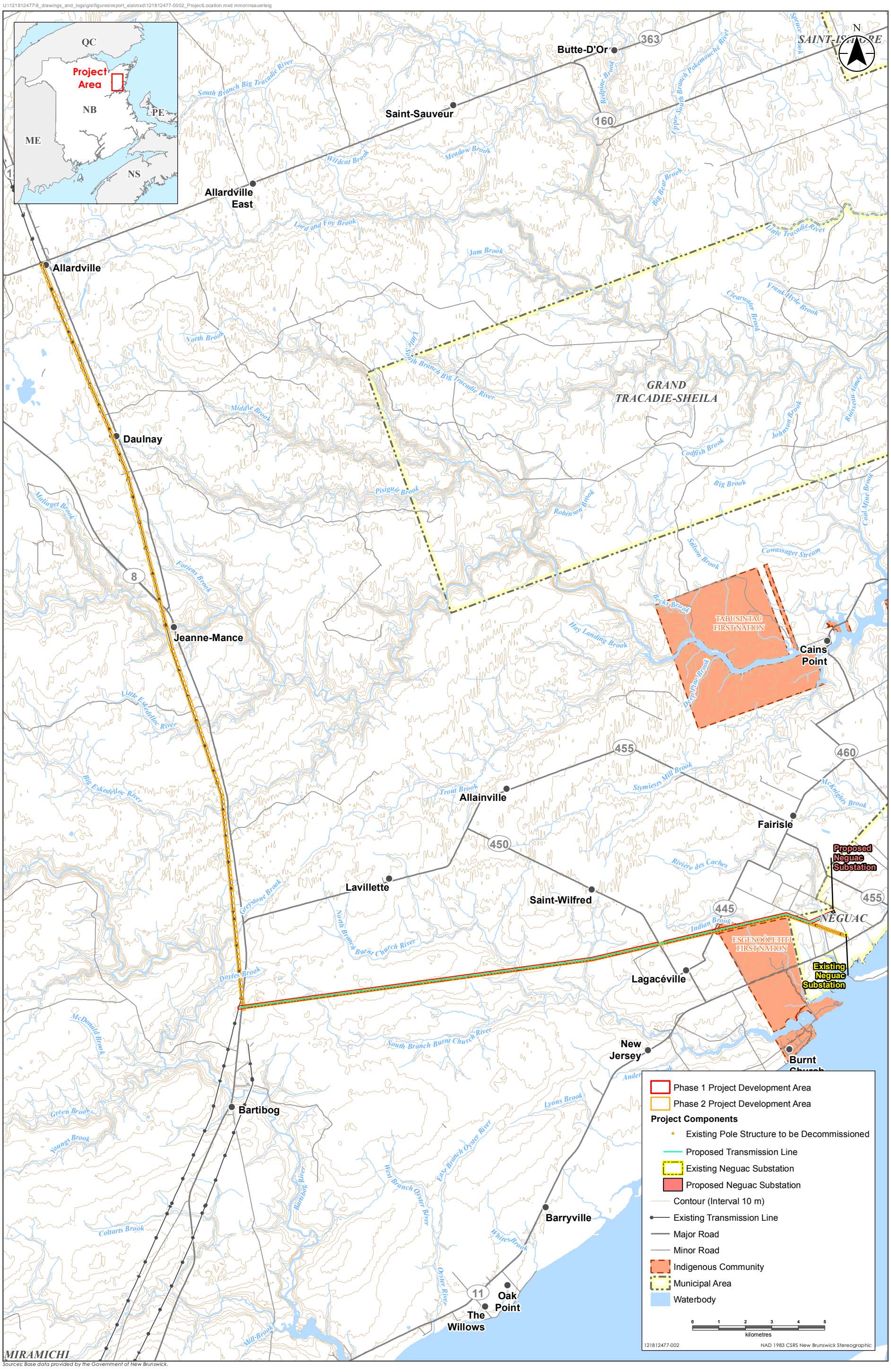

Sources: Base data provided by the Government of New Brunswick.

Project Development Area for the Proposed Neguac Transmission Line Project

Stantec

121812477 - NEGUAC TRANSMISSION LINE

Figure 1.1

1.4 PURPOSE/RATIONALE/NEED FOR THE UNDERTAKING

The existing Neguac substation, which supplies electricity to the village of Neguac and surrounding communities, currently receives its 69 kV electrical supply from Line 0012 fed out of Bathurst. Line 0012 then feeds Line 0104 and the substation. Both of these electrical supply lines have moderate reliability, with customers at moderate risk of experiencing power outages, resulting in line losses and increased maintenance costs to NB Power. The Project involves replacing the existing 69 kV Line 0104 with a new 138 kV Line 1220 and tying it into an existing 138kV Line 1106 fed from Bathurst and Newcastle. This allows for future energy growth in the region as well as improving the electrical grid reliability overall for NB Power. Additionally, the Project will provide improved storm hardening, with the upgrade from existing single pole structures to H-frame structures, and redundancy in the transmission of electricity from both Bathurst and Newcastle in the event of a power interruption, as compared with the single existing supply of electricity coming from Bathurst. This modernization project is intended to improve electrical service and reliability to customers in the village of Neguac and surrounding communities, as well as to meet the needs of potential future electrical power users in the area.

1.5 REGULATORY FRAMEWORK

This section provides an overview of the anticipated major regulatory processes that could be applicable to the Project, including federal and provincial environmental assessment requirements and the roles of regulatory authorities.

1.5.1 Provincial

1.5.1.1 New Brunswick Environmental Impact Assessment Regulation

The New Brunswick *Environmental Impact Assessment Regulation 87-83* under the *Clean Environment Act* (EIA Regulation) governs the EIA process in the province. The EIA Regulation requires that all undertakings listed in "Schedule A" of the Regulation (including their proposed construction, operation, modification, extension, abandonment, demolition, or rehabilitation) require registration and a "Determination Review" led by the New Brunswick Department of Environment and Local Government (NBDELG) to review the Project's information and potential environmental effects. At the conclusion of the Determination Review, the NBDELG's technical review committee (TRC) will recommend to the New Brunswick Minister of Environment and Local Government as to whether a proposed undertaking can proceed, with or without conditions, or whether it requires a more formal Environmental Impact Assessment (referred to as a "Comprehensive Review").

The Project is an undertaking under the EIA Regulation, according to item (d) of Schedule A of the regulation, as follows:

> *"(d) all electrical transmission lines exceeding sixty-nine thousand volts in capacity or five kilometres in length."*

Based on the Project as currently conceived, a formal registration of the Project is therefore required under Section 5(1) of the EIA Regulation and will undergo, at minimum, a Determination Review, coordinated by NBDELG.

1.5.1.2 New Brunswick Species at Risk Act

Schedule A of the New Brunswick *Species at Risk Act* (NB *SARA*) lists species in New Brunswick that are classified as being *extirpated*, *endangered*, *threatened*, or of *special concern*. The NB *SARA*, by way of Section 28(2), prohibits the killing, harming harassing or taking of any species listed in Schedule A.

The Project will require a review of desktop accessible (i.e. office-based) data and a field assessment to determine the potential interaction with species listed under Schedule A of NB *SARA*, including their residences or critical habitat. If potential interactions with listed species are identified, the Project will implement measures to comply with the NB *SARA*.

1.5.1.3 New Brunswick Community Planning Act

The New Brunswick *Community Planning Act* governs the administration of regional development plans in the province, and confers administrative power of planning authority and variance on regional service commissions. EIA registrations for undertakings occurring in areas with established regional development plans must include a letter from the planning authority indicating that the undertaking is in conformance with the regional plan (NBDELG 2012a).

NB Power is a Crown corporation of the Province of New Brunswick and derives its authority from the *Electricity Act*, S.N.B, 2013, c.7. As such, requirements of some provincial legislation such as the *Municipalities Act* and the *Community Planning Act* do not apply to NB Power because they do not expressly bind the Crown. Nevertheless, it is the policy of NB Power to follow the spirit and intent of such legislation with local zoning restrictions.

The Project is partly situated in the Greater Miramichi Regional Service Commission (GMRSC) Planning Area, and partly in the area managed by the Commission de Services Régionaux de la Péninsule Acadienne (CSR). NB Power has informed the GMRSC and CSR of the Project.

1.5.1.4 New Brunswick Heritage Conservation Act

Heritage resources in New Brunswick are regulated under the New Brunswick *Heritage Conservation Act*. The Act defines requirements relating to heritage in the province and its municipalities, protection for heritage resources, permitting requirements for those doing research on and/or encountering these resources (Archaeological Field Research Permit or AFRP), and penalties for those who violate the requirements of the Act. The regulatory management of heritage resources falls under the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC), and is administered by its Heritage Branch (for built heritage resources and palaeontological resources) and its Archaeological Services Branch (for archaeological resources). The NBDTHC also manages and maintains provincial heritage databases, coordinates the administration of provincial legislation including archaeological permitting, and participates in environmental assessment reviews and land use policy and planning.

Key provisions of the Act include:

- Designation of Provincial Heritage Places
- Designation of Heritage Places in Municipalities and Rural Communities
- Designation of Heritage Places in Unincorporated Areas
- Archaeological Field Research
- Palaeontological Field Research
- Conservation of Heritage Sites and Heritage Objects
- Protection of Burial Grounds

Among these provisions, the Act, which binds the Crown (Section 2), requires mandatory reporting of all potential heritage resource discoveries to provincial authorities (Section 9), introduces regulations for heritage impact assessments (Section 13), and prohibits the alteration of any heritage place in the province without specific government approval (Section 11). Approval for the alteration of any heritage place may be obtained following submission of an application for a Site Alteration Permit to NBDTHC.

1.5.1.5 Other Potential Provincial Permit Requirements

Table 1.1 contains a representative list of other provincial permits, approvals, and authorizations that may be applicable to the Project. Note this is not necessarily an all-inclusive list.

Table 1.1 Other Potential Provincial Permit Requirements

Project Component	Permit, Approval, or Authorization	Issuing Provincial Agency
Right-of-Way (RoW)	Archaeological Field Research Permit	New Brunswick Archaeological Services Branch, Department of Tourism, Heritage, and Culture
	Site Alteration Permit	New Brunswick Archaeological Services Branch, Department of Tourism, Heritage, and Culture
	Watercourse and Wetland Alteration Permit - *Clean Water Act*	New Brunswick Department of Environment and Local Government, Sustainable Development, Planning and Impact Evaluation Branch, Surface Water Protection Section
	Highway Usage Permit– *NB Highway Corporation Act*	New Brunswick Highway Corporation
	Access Permit	New Brunswick Department of Transportation and Infrastructure
	Work Permit	New Brunswick Department of Energy and Resource Development
	Crown Lands - License of Occupation	New Brunswick Department of Energy and Resource Development

1.5.2 Federal

This section provides a brief description of the anticipated federal environmental assessment, approval and permitting processes that may apply to the Project.

1.5.2.1 Canadian Environmental Assessment Act, 2012

The requirements for federal Environmental Assessment (EA) are defined by the *Canadian Environmental Assessment Act, 2012* (*CEAA 2012*). *CEAA 2012* only applies to "Designated Projects," which are physical activities listed under the *Regulations Designating Physical Activities* under *CEAA 2010*.

The *Regulations Designating Physical Activities* identify 48 "Physical Activities" that constitute Designated Projects requiring environmental assessment under *CEAA 2012*. Item 39 of the Schedule to the *Regulations Designating Physical Activities* includes:

> "***39.*** *The construction, operation, decommissioning and abandonment of a new electrical transmission line with a voltage of 345 kV or more that requires a total of 75 km or more of new right-of-way.*

Since the voltage and length of the new transmission line do not exceed these thresholds, the Project is not a Designated Project under *CEAA 2012*. Further, as no aspect of the Project will be built on federally regulated land, it is not expected that the components of the proposed Project will require an environmental assessment under *CEAA 2012, Section 67*.

1.5.2.2 Species at Risk Act

The federal *Species at Risk Act* (*SARA*), by way of Schedule 1, lists species in Canada that are classified as being *extirpated*, *endangered*, *threatened*, or of *special concern*. The species listed in Schedule 1 are afforded special measures to protect them and assist in their recovery. These special measures include, amongst other things, prohibitions against:

- Killing, harming, or harassment of these species
- Damage or destruction of their residences
- Destruction of any part of their critical habitat

The Project will require a review of desktop accessible (i.e. office-based) data and a field assessment to determine the potential for Project interaction with any *SARA* Schedule 1 listed species, including their residences or critical habitat. If potential interactions with listed species are identified, the Project will implement measures to comply with the *SARA*.

1.5.2.3 Fisheries Act

The *Fisheries Act*, by way of Section 35(1), defines the provisions by which commercial, recreational, or Aboriginal (CRA) fisheries are protected. Mitigation measures applied to Project-related activities will comply with the *Fisheries Act* to prevent the "serious harm to fish", including fish habitats, and to fish that

support a CRA fishery. Authorization must be provided under Section 35(2) for activities that have the potential to cause serious harm to fish that support a CRA fishery, including appropriate fish habitat offsetting.

1.5.2.4 Migratory Birds Convention Act

The *Migratory Birds Convention Act* (*MBCA*), by way of *Migratory Birds Regulations* and *Migratory Birds Sanctuary Regulations*, defines the provisions by which an estimated 450 native species of migratory birds (including their nests and eggs) are protected in Canada. In the event that activities have the potential to interact with migratory birds in a manner that contravenes *MBCA* regulations, the Project will implement measures to comply with the *MBCA*.

1.6 PROPERTY OWNERSHIP

The proposed Neguac transmission line will be located primarily on Crown land. The transmission line RoW will cross 59 parcels of land, including 57 parcels of private land and 2 parcels of Crown land. NB Power will negotiate options for easements with the private landowners, where applicable (also see Section 2.3.1 and Section 7.5).

1.7 PROJECT-RELATED DOCUMENTS

This EIA registration includes other relevant documents as appendices A to E of this document, as follows;

- Additional information requirements for an EIA Registration, as outlined in the NBDELG document entitled "A Guide to Environmental Impact Assessment in New Brunswick" (NBDELG 2012a), attached as Appendix A
- Environmental attributes of the RoW and substation location, attached as Appendix B
- A map book depicting vegetation and wetlands, and wildlife and wildlife habitat features observed in the local assessment, area attached as Appendix C
- Survey data and supporting information for the Vegetation and Wetlands VC and the Wildlife and Wildlife Habitat VC, attached as Appendix D
- An information package related to the Project which will be provided to landowners, and will be included as part of the public consultation report, attached as Appendix E

Other than this EIA registration document and the appended information, there are no additional Project-related documents that are publicly available.

2.0 PROJECT DESCRIPTION

This chapter describes the Project as it is currently conceived and includes information on environmental planning and management, Project location, siting considerations, and specific Project components and infrastructure. The means by which construction, operation, and decommissioning and abandonment of the Project will be achieved, mitigation by design of the Project, and the anticipated Project workforce and schedule are also described.

2.1 ENVIRONMENTAL PLANNING AND MANAGEMENT

NB Power is a responsible and established proponent with more than 95 years of experience in the planning, design, construction, operation, distribution, and management of electrical power generation and transmission in New Brunswick. Currently, NB Power maintains and operates 6,849 km of transmissions lines that are supported by 48 industrial substations and 49 terminals (NB Power 2017a).

NB Power, through the Transmission System Operator, owns and maintains the New Brunswick transmission grid as the hub of the Maritimes Area, and is one of only 16 Reliability Coordinators in North America with the authority and means to prevent or mitigate emergency situations in order to maintain system reliability (NERC 2016). The management of the Maritimes Area electrical grid incorporates 15 interconnections in New Brunswick with Québec, Nova Scotia, PEI, and New England, including northern Maine.

NB Power will carefully plan and manage all aspects of this Project from initial design to development to site reclamation. Examples of the methods and tools that NB Power will use to avoid, mitigate, and otherwise manage potentially adverse environmental effects include the following, with reference to the document section where more detail is provided:

- Review of the major regulatory processes that may apply to the Project (Section 1.5)
- Use of a diverse suite of physical, biological, and socioeconomic constraints in the selection of a route (Section 2.3)
- Identification of potential sources of emissions and wastes related to the Project (Section 2.7)
- Consideration of potential accidents, malfunctions, and unplanned events (Section 2.8)
- Assessment of potential interactions between the environment and the Project (Chapters 4.0 and 5.0)
- Summary of proposed mitigation (Chapter 6.0)
- Development of a Project-Specific Environmental Management Plan (PSEMP) that follows from the Environmental Protection Plan for New Brunswick Power Corporation Transmission Facilities (NB Power 2012). The PSEMP provides the framework for the management and monitoring of environmental and socio-economic mitigation measures that satisfy corporate and regulatory requirements, best management practices, as well as input from stakeholders and First Nations.

The PSEMP defines roles and responsibilities for employees and contractors and includes plans and procedures to address situations that may occur during construction. The PSEMP will be submitted to the TRC for review following receipt of an approval, and prior to the initiation of construction.

2.2 PROJECT LOCATION

The Project will be located in northeastern New Brunswick, in Northumberland County near the village of Neguac, and in Gloucester County near the rural community of Allardville. The Project Development Area (PDA) of new transmission Line 1220 will be approximately 23 km in length, with a 30 m wide RoW (Figure 1.1). The 30 m RoW, shown in Figure 1.1, will commence at a tap off point on the existing 138 kV transmission Line 1106 and run east for approximately 23 km to supply a new Neguac substation. This new section of transmission line will occupy the 15 m wide easement located north of the existing 30.48 m wide easement (hereafter referred to as 30 m wide easement) currently occupied by Line 0104. NB Power shall retain the additional 15 m of easement located south of the 30 m wide easement after Line 0104 is dismantled.

The existing 69 kV Neguac substation is situated on a 0.28 ha parcel of land located along the northwestern edge of Neguac. The land is currently owned by NB Power. A new substation will be built on a 0.96 ha parcel of land located approximately 800 m north of the existing substation, and will provide an upgrade to138 kV service. Once the new substation and new Line 1220 are commissioned, the existing substation will be decommissioned.

The portion of transmission Line 0012 that is to be decommissioned originates at the Allardville substation and travels approximately 29 km to the south where it terminates at the junction with Line 0104 at Structure 222. Line 0104 to be decommissioned originates at the junction with Line 0112 and travels approximately 23 km east to supply the existing 69 kV Kedgwick substation (Figure 1.1).

2.3 SITING CONSIDERATIONS: NEW TRANSMISSION LINE 1220 TO CONNECT WITH TRANSMISSION LINE 1106

2.3.1 Transmission Line Route

NB Power used best management practices when selecting the proposed route for the Project. The first was to reduce the overall length of the line by maintaining the straightest alignment practicable, since route alignment ultimately influences the extent and magnitude of any effects on the environment, engineering design, socioeconomic factors, and cost.

Next, NB Power chose a route with reduced potential for interactions with known environmental constraints. Aerial photographs, Geographic Information Services (GIS) mapping, and biological databases were used to avoid and reduce the potential for the crossing of wetlands, watercourses, known archaeological sites, and environmentally significant areas, among other constraints.

A further best practice was the incorporation of industry-recognized engineering and design principles. Particular attention was paid to the type and number of structures in order to reduce the overall environmental footprint. Terrain constraints such as accessibility, slope, and crossing windows were also considered when selecting the route.

Finally, route selection was conducted in consideration of existing land use. Where possible, the route followed roadways, property lines, and existing RoWs. It was located away from buildings and residences, and avoided bisecting properties to the extent practicable.

NB Power determined that the most environmentally, socially, and economically feasible route for the Project was to use the existing RoW for the existing transmission Line 0104 and widen it by 15 m to accommodate the new line. This proposed route reduced the amount of new RoW needed, and limited, to the extent practicable, interactions with forested and residential properties. The proposed route allows for the shortest distance to supply the new Neguac substation from 138 kV transmission Line 1106, and would provide an opportunity to allow for the decommissioning and revegetation of 29 km of RoW on Line 0012 (Figure 1.1).

The practices used in selecting the proposed route have negated the need for a route alternatives analysis. A summary of selected environmental attributes of the proposed route (Phase 1) follows in Table 2.1.

Table 2.1 Summary of Environmental Attributes for Proposed Route Phase 1

Constraints / Attributes	Quantity
Total length (km)	22.98
Number of properties crossed by PDA	59
Amount of Crown land crossed (km/ha)	14.5 / 44.3
Amount of private land crossed (km/ha)	7.5 / 23.4
Amount of agricultural land crossed (km/ha)	0.04 / 0.01
Amount of forest crossed (km/ha)	5.2 / 26.2
Number of confirmed watercourse crossings	9 mapped watercourse crossings / 1 unmapped watercourse crossing
Number of waterbodies	0
Number of Environmentally Significant Areas	0
GeoNB Wetland area affected (km/ha)	1.1 / 3.3
Number of roads crossed	4
Number of historic sites within 500 m of centre line	0
Number of pits / mines / quarries / buildings / towers and industrial sites within 500m of centre line	0
Known historical occurrence of rare species (no. of individuals)	1 – Canada Warbler within 500 m.
Elevated archaeological potential crossed (km/ha)	2.9 / 9.1

2.3.2 New Substation Location

NB Power used aerial photographs, GIS mapping, and publicly available databases to initially identify four potential locations for the new substation located near the village of Neguac. The location chosen for the new Neguac substation was determined by NB Power following a review of engineering

considerations, cost analyses, existing land uses, and the potential for interactions with environmental features such as wetlands, watercourses, and environmentally sensitive areas.

2.4 DESCRIPTION OF PROJECT COMPONENTS AND INFRASTRUCTURE

2.4.1 New 138 kV Transmission Line 1220

A high-voltage transmission line consists of a series of structures which support conductor wires that carry electricity. Various structure types and configurations exist to support the conductors such as wood pole H-frame, deadends, and strain configuration structures. During the initial planning stages of the transmission line, an economic evaluation was carried out to determine the structure type. Factors considered include material cost, cost of structure assembly and erection, structure heights and strength, hardware cost, and available RoW. Environmental and social factors, such as weather and property boundaries, are also considered.

2.4.1.1 Structure Type

Structures are used to support the high-voltage conductors and to provide minimum clearance to ground, to objects under the transmission line, and at road crossings. The distance between structures (span) and their height is determined by the topography of the area and the clearance requirements. For a typical 138 kV transmission line, the spans vary between 180 m to 210 m while the height of poles used in structure design range from 15 m to 20 m. Also, structures are designed to withstand known weather conditions and other related constraints.

Standard structure types to be used for this Project include 2-pole wood H-frames, 3-pole wood deadend structures, and 3-pole wood strain configuration structures. The latter two structures are required where angle changes along the route occur (Figure 2.1). These structure types will be approximately 15 m to 20 m in height and consist of wooden poles treated with chromated copper arsenate (CCA) for durability. The use of CCA pressure-treated wood, currently authorized for use in Canada (HCPMRG 2011), protects the wood against fungi and insects, and provides extra protection against moisture content changes (Environment Canada 1999). Untreated wooden poles from hemlock, tamarack, and cedar were not considered for this Project as they are more susceptible to decay from wood rot or damage from wood boring insects which would lead to structural weakening and possibly pole failure. CCA-treated poles have greater wood stability and resistance to splitting, which substantially extends the service life of the wood (i.e., from less than 10 years to 40 years) and increases its durability. In addition, this type of treatment provides resistance to electrical currents and facilitates the climbing of poles by line maintenance staff (Environment Canada 1999). CCA-treated poles are widely available and have the lowest cost. They are a proven product, derived from a renewable resource, are readily available and locally produced. Alternative pole materials (*e.g.*, pre-cast concrete, corrosive-resistant steel, and plastic lumber) have proven to be cost prohibitive and were not considered for this Project.

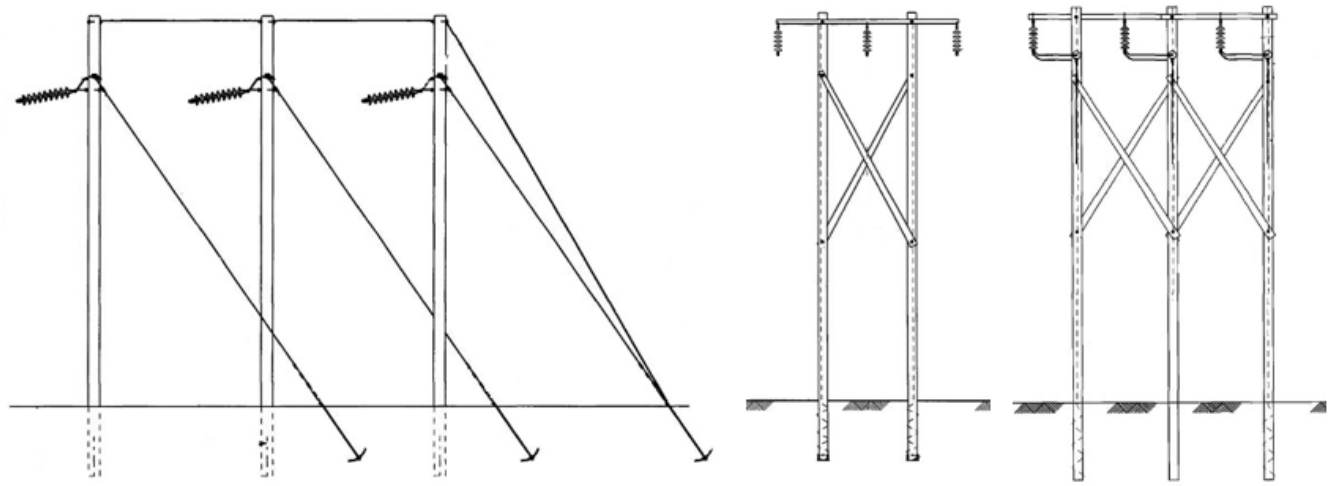

Figure 2.1 Example of structures proposed for 138 kV power line. Left: 3 pole angle structure. Middle: Suspension structure with steel cross-arm, x-brace. Right: Deadend tangent structure. Images provided by NB Power.

The average height from ground to insulator of the wooden H-frame structure will be approximately 15 m. The span between structures will be approximately 180 m on average. Three conductor wires will be strung to the insulators, with a spacing of 3.81 m between them. Angle structures (e.g., deadend structures) will be anchored with six to seven guy wires where the line turns and terminates. Poles will be reinforced with a cross arm and cross braces. Based on preliminary line design analysis, it is expected that approximately 234 structures will be required for the construction of the new Line 1220.

Final structure and pole locations will be determined based on geotechnical field surveys and LiDAR terrain analysis. This will reflect detailed engineering analysis with respect to span, length, local soil conditions, topographic and geologic features, and proximity to existing infrastructure.

Subject to detailed engineering analysis, structure, and pole placement to avoid known constraints or sensitive environmental conditions has been identified as a mitigation measure to reduce environmental effects, where practicable.

2.4.1.2 Guy Wires and Anchors

Although specific information regarding anchor requirements for guy wires at angle structures and strain configuration structures has yet to be determined, cross plate anchors, rock anchors, or log anchors may be used depending on structure location.

Rock anchors will be required in areas where bedrock is present and screw type anchors are not feasible. Wedge style anchors and grouted rock anchors are typical rock anchor configurations. Grouted rock anchors are best suited for areas of fractured bedrock and will most likely be used. Bedrock is drilled to a specific depth and the grouted rock anchor is installed and backfilled with grout to the surface, preventing the anchor from pulling back through the bedrock while under tension.

Log anchors may be used as required. Log anchors will be installed in soft areas (e.g., wetlands) or at structure locations under high tension. Log anchors consist of a 1.2 to 1.8 m section of pole that is typically buried lengthwise 2.4 m under the ground surface. Tension cables are attached to anchor rods through logs and structures; the excavation is then backfilled and the soil compacted.

2.4.1.3 Conductors and Insulators

There are several types of conductors available for use, which depend on a number of factors that are typically considered during preliminary design. A Dove 556 Aluminum Conductor Steel-Reinforced (ACSR) conductor will be used for the transmission line itself. This ACSR wire design, which has been an industry standard since the early 1900's, provides higher corrosion resistance than copper conductors, is lighter in weight, has a recognized longer service life, higher strength-to-weight ratio, and offers reduced power losses (Southwire 2017). The Dove 556 ACSR is composed of 26 strands of aluminum alloy wire surrounding a core of seven steel strands. The outside diameter of the wire is approximately 24 mm and is suspended from the cross arms by insulator strings.

2.4.1.4 Counterpoise

Counterpoise will also be installed on structures to improve grounding capacities. The counterpoise consists of a steel galvanized wire that is attached to the bottom of the poles, is covered with overburden to a depth of approximately 0.5 m, and runs radially for a distance of approximately 1 m.

2.4.1.5 Easement and Width of Right-of-Way (RoW)

An easement is defined as a non-possessory, registered interest right acquired by one person on the land of another, permitting partial use of the other's land for a specific purpose, such as a RoW across it. For transmission line projects, an easement includes the right to build and erect certain towers and/or other supports, and/or trench for underground wires or cables. It also includes the stringing, placing, and maintaining from one tower or support to the other towers or supports, all necessary wires, cables, supporting cables, anchors and ground rods, and/or wires or cables in underground trenches, all works being for the purpose of conducting and transmitting electric power or signals to, on, or across related lands and premises. The easement allows for the construction and operation of a transmission line on part of a property while ownership of the entire parcel of land remains with the original owner. No new easement will be required as there is already an additional 15.24 metres on the northerly side of the existing 30 metre-wide easement currently occupied by Line 0104.

The cleared width of the RoW is governed by a number of factors such as tree height, structure type, height of conductors, and sag of conductors, flashover distances, and safety factors for tree growth and conductor swing. To foster safe electrical clearances and prevent trees from falling onto the line or coming into contact with the conductors, the RoW is cleared of vegetation. The planned RoW width for the 138 kV line will be 30 m. This includes the total of the existing RoW width from Line 0104 to be decommissioned, and the approximately 15 m of new RoW width to be acquired along the northern edge of Line 0104.

2.4.2 New 138 kV Neguac Substation

The new substation will be located northwest of Neguac on land to be acquired and owned by NB Power. The dimensions of the new substation site will be approximately 40 m by 40 m (i.e., approximately 0.16 ha). The site will be cleared of vegetation and graded to take into account the existing drainage patterns surrounding the site and the need to protect the facility from overland flowing during spring runoff or an extreme rainfall event.

The substation will consist of a ground grid, with instrument transformers, circuit switches, battery bank, control and metering panels, and reclosers needed to support the new 138 kV transmission line. The Canadian Electrical Code requires that all metallic objects in an outdoor substation be bonded to ground. The grounding grid will be installed to protect personnel, the public and equipment. The grounding grid reduces the potential for people inside and outside the substation to be exposed to critical electrical shock under normal and fault conditions. Furthermore, it also provides a means to bond the equipment to ground. The grounding grid will be made up of mesh copper conductors and ground rods buried in the soil. The grounding grid typically encompasses the entire substation site and extends about 1 m past the fence and gate.

An on-site spill containment system for the transformer will be included as part of the engineering design, and incorporated during substation construction. Fencing will be established to enclose these structures, and signage will be added to inform the public of electrical hazards.

2.5 PROJECT PHASES AND ACTIVITIES

The Project will be completed in two phases. Phase 1 is construction, and operation and maintenance of a new 138kv substation and associated transmission line. Phase 2 is the decommissioning of the existing 69kV substation and associated transmission lines. The two phases of the Project differ in their respective activities. As such, they are described separately.

2.5.1 Phase 1

The lifecycle of a newly designed substation and transmission line involves initial construction, start-up and commissioning, ongoing operation and maintenance, and eventually decommissioning and abandonment. Since the substation and transmission line will be developed concurrently, share numerous similarities in their activities, and are interconnected, they will be described collectively as Phase 1. Unique attributes of each component will be noted separately.

2.5.1.1 Project Construction

The construction of a transmission line and substation typically involves the following activities:

- Vegetation clearing
- Access and staging
- Excavation, pole placement, structure assembly, and installation
- Stringing conductors
- Connection of transmission line and substation

- Inspection and energization
- Clean-up/revegetation

Both tracked and wheeled equipment and vehicles are used to perform these activities. The type of equipment and vehicles may include, and is not limited to, the following: crane, excavator, auger, dump trucks, dozer, tractor trailer and all-terrain vehicles. A brief description of the construction details is provided below.

2.5.1.1.1 Vegetation Clearing

New Substation

Initial site preparation for the Neguac substation will involve the felling, de-limbing, and removal of all trees and vegetation within the boundaries of the 0.16 ha substation footprint according to clearing contract requirements. Grubbing will then be conducted in preparation for excavation and levelling of the substation site.

New Transmission Line

Clearing involves the removal of vegetation from the RoW which may prohibit the construction and safe operation of transmission lines. The extent of cutting will vary depending on the type of structure selected for the design and on vegetation heights. Some areas may not require cutting such as fields and farmland. Vegetation will be largely removed by mechanical means, except within 30 m of a watercourse or wetland. In these areas, vegetation will be removed manually, using chain saws and other hand held equipment, while leaving the under growth and duff layer undisturbed to prevent erosion.

Trees will be felled, de-limbed, mulched, and/or piled at the edge of the RoW according to clearing contract requirements. The remaining slash and debris will be windrowed a few metres from the edge of the RoW and compacted to a height no greater than 0.5 m. The windrows will be broken (left open) at all roads or access trails, along property lines, and along watercourses. This provides access across the windrow for any wildlife not capable of crossing the low vegetation pile. Felled trees from clearing the RoW may be used to build corduroy access where required and for erosion control. The windrows will be allowed to decompose naturally. Grubbing of the RoW or burning of vegetation will not be undertaken.

Timing of clearing is scheduled for fall 2018, to avoid the bird breeding season, which is generally from April 1 to August 31.

2.5.1.1.2 Access and Staging

Access is required to allow transportation of clearing and construction equipment, materials, and personnel to the RoW. Transmission lines may be located adjacent to, or intersect with, existing linear corridors, which can provide access to or near the line. Access may be required along the RoW and deviate where watercourses and wetlands cannot be crossed with equipment. In all cases, maximum use is made of existing access roads.

As part of the design stage of the Project, NB Power will avoid locating structures next to watercourses and/or wetland habitat, and their 30 m buffers, where possible. Where these areas cannot be avoided, mitigation measures will be developed in consultation with the appropriate authorities. If access is not available on either side of a watercourse or wetland, temporary bridging, or corduroy (for wetlands only) will be used to cross these areas (Figure 2.2), allowing access for both wheeled and tracked vehicles. Where practical, only tracked vehicles (*i.e.*, excavators, dump vehicles, small bulldozers, and terriva-bucket vehicles) will be used in or near watercourses and/or wetlands to reduce the potential for rutting. The figure below provides a generic drawing of a typical temporary bridge crossing.

Existing access roads may require improvements to provide construction vehicle and equipment access to the transmission line RoW. These improvements may include one or more of the following activities:

- Clearing brush overgrowth to widened sections of roads with the use of a mulching head
- Grading existing roadbeds and, where necessary, placing a few inches of gravel on the newly graded areas (*e.g.* crowning)
- Installing cross-drainage in certain areas to divert storm water runoff to the side of the roads
- Installing culverts, where required

Reconnaissance work and a review of aerial photographs suggests that all structure locations on the proposed RoW, with a few exceptions, can be accessed using a combination of existing roads, trails, and the RoW of existing Line 0104. These roads, trails, and existing RoW may require some minor improvements which will be identified following field studies. If new access roads are required they will be constructed in accordance with the PSEMP. Permission from landowners will be obtained to access existing roads and trails as required.

Prior to a tender being issued for construction of the new line, staging/storage areas for equipment and material will be identified.

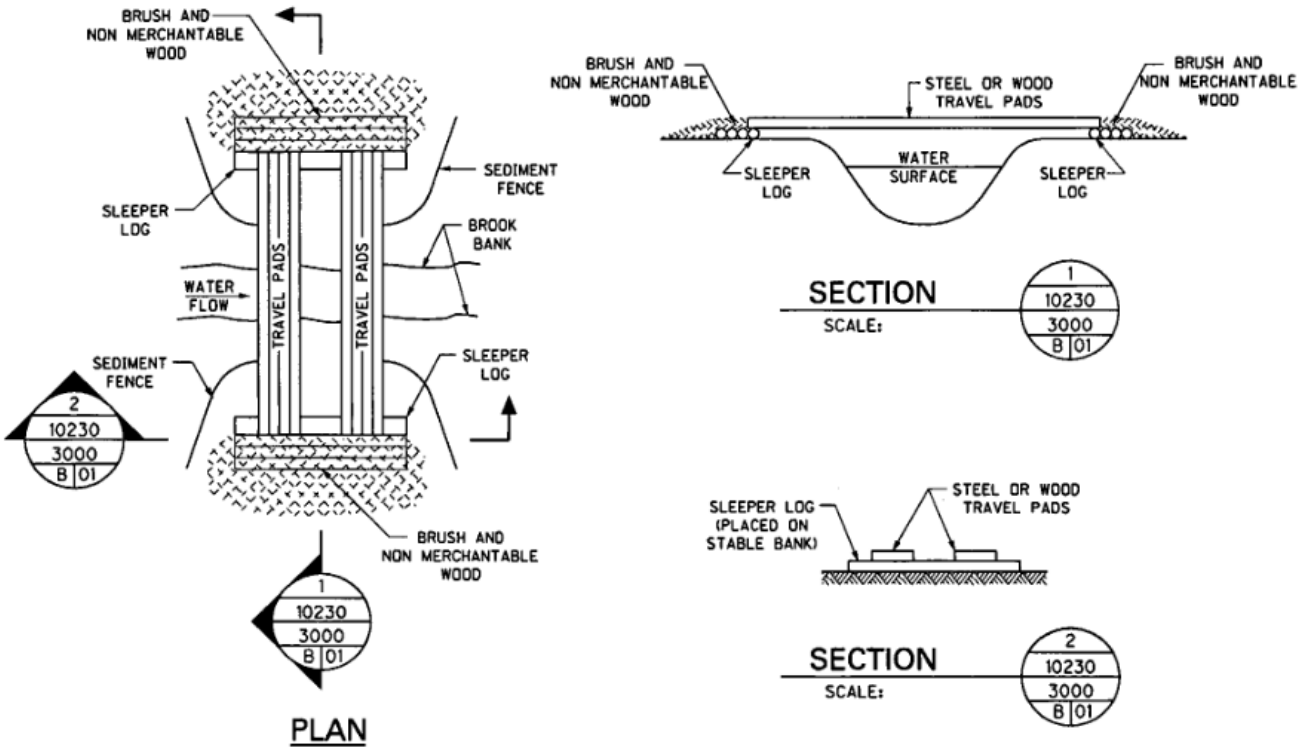

Figure 2.2 Example of a Temporary Bridge Crossing. Image Provided by NB Power.

2.5.1.1.3 Excavation, Pole Placement, Structure Assembly, and Anchoring

New Substation

Site preparation for the substation will include excavation and levelling of the 0.16 ha lot (see Section 2.4.3.1.1). Clean fill will then be used to build up the site to rough grade for the installation of a concrete pad for the control building and reclosers, and an oil-containment foundation for the transformer. Excavation to a depth of up to 3 m may be required during the installation of pier foundations for bus support structures, circuit switcher, and gang switches. Dewatering may be required depending upon subsurface conditions. The ground grid is buried approximately 45 cm below grade. Installation of security fencing will also require the excavation of holes approximately 15 cm in diameter and approximately 1 m in depth. Precise structure locations and numbers have yet to be determined; they will be based on a number of physical and environmental surveys. Structure locations will avoid watercourses, wetlands, and any other environmentally sensitive areas where practicable.

New Transmission Line

Assembly of structures involves the transportation of construction materials to the RoW, excavation (i.e., for pole placement), and backfilling of excavated material. Excavation is commonly carried out by mechanical auger or excavator, hydraulic rock hammer, and/or blasting, depending on soil conditions.

Wood poles of each structure will be embedded a depth of 2.5 m to 3 m (10% of pole length plus 0.6 m). Holes are typically dug using mechanical excavators. However, where soil conditions make this method inefficient, hydraulic hammering or blasting may be required to remove the rock. Excavation footprints for each pole are typically 1 m x 3 m at ground surface and 1 m x 1m at excavation bottom. This yields typical excavation volumes of 4.5 m^3 to 5.5 m^3 per pole. Anchors for guy points are typically 1.5 m deep with a typical excavation footprint of 1 m x 2 m and excavation volumes of 2 m^3 to 3 m^3 per anchor. Cross plate anchors, rock anchors, or log anchors may be used at some guy points where practical and this would reduce the excavation footprint to nil.

The assembly of structures will take place on-site at structure locations. The disturbance area around the structure site for the equipment, structure assembly and erection activities will be limited to 700 m^2 to 900 m^2 for H-frame angle structures. Depending on soil conditions, compacted native soil or material supplied from local established and appropriately licensed quarries will be used to fill the sides of the excavations.

Exact structure locations have yet to be determined. Structure locations will avoid (e.g. span) watercourses and wetlands and their 30 m buffers to the extent practical; therefore, blasting near watercourses and wetlands will be limited or avoided. The Project design will be developed and refined based on available LiDAR data and input from the environmental field surveys.

Although specific information regarding anchor requirements for guy wires at angle structures yet to be finalized, several types may be used during construction depending on structure location.

It is anticipated that cross plate anchors will be used predominantly for the proposed Project. Cross plate anchors are best suited for soil conditions having good load-bearing characteristics. They are installed by auguring or excavating a hole, placing the cross plate assembly at the base and backfilling the hole, and tamping the soil in layers to increase the holding capacity.

Rock and log anchors may also be used as required. Rock anchors and grout will be used in areas where they are to be installed directly into solid rock while log anchors will be installed in soft areas or at structure locations under high tension. Log anchors are a 1.2 m to 1.8 m section of pole that are typically buried lengthwise 2.4 m underground. Tension (guy) wires are attached to the logs and structures before backfilling and compacting of the area.

2.5.1.1.4 Conductor Stringing

Large reels of conductor wire will be delivered to selected areas along the RoW. The wire will be subsequently strung using tension-stringing equipment and attached to the insulators by hand while pulling lines will be used to draw the wire between structures. In areas where the transmission line crosses a watercourse or wetland, the pulling line (p-line) is walked across and then strung using a tension-pulling machine. A 3 m to 5 m strip along the centre line of the transmission line will be cleared of vegetation in order to string the wires across watercourses.

Once the conductors are in place, they will be correctly sagged and tensioned, then permanently clipped into the clamps at each structure. Miscellaneous hardware such as structure marking, vibration damping devices, or air flow spoilers may also be installed, as required.

In areas where the transmission line crosses a road, rider poles will be temporarily installed on either side of the roadway to support conductors during installation to prevent conductor from sagging which could potentially affect traffic flow and pose safety concerns.

2.5.1.1.5 Connection of Substation and Transmission Line

Upon completion of the new substation and the new transmission line, the new transmission line will be connected to the substation breakers. This connection will occur within the footprint of the new substation and complete the connection to the grid for the transmission of electric power.

2.5.1.1.6 Inspection and Energization of the Project

Following construction, and the connection of the substation and transmission line, ground and air acceptance patrols will be conducted by NB Power staff to verify that the line is ready for service. Any deficiencies discovered during these patrols will be corrected prior to energizing the line.

2.5.1.1.7 Clean-up and Revegetation

Clean-up and revegetation of disturbed areas is the final stage of construction. In areas where soil disturbance due to construction may cause erosion, measures will be taken to stabilize the affected area. Such measures may include trimming and back-blading, mulching, seeding, and fabric placement. Erosion control used during construction will be maintained until such time as the disturbed ground has been adequately stabilized with vegetation.

2.5.1.2 Operation and Maintenance

During the operating life of the transmission line (estimated to be 50 years), certain routine activities will be performed in order to maintain reliability of the network. These activities are described in the following sections.

2.5.1.2.1 Operation and Maintenance of Hardware

Line inspections (i.e., ground and aerial) will be performed by maintenance staff on a regular basis to check for the deterioration of the transmission line components, including wood poles, conductors, insulators, and hardware. These inspections will also assist in identifying weakened support structures and foundations, as well as changes in terrain which may affect structure stability. Typically, air inspections will be performed once a year, while ground patrols will be conducted every eight years by all-terrain-vehicle (ATV) or other form of transportation using existing access. Additional inspections may be carried out in the event of an emergency or unplanned outage (e.g., ice storm). Inspection results will be provided to NB Power operational personnel who are responsible for planning and scheduling maintenance work.

2.5.1.2.2 Vegetation Management

NB Power is responsible for providing safe and reliable electricity to homes, businesses, and industries. Uncontrolled vegetation can create fire and safety hazards, hinder routine line maintenance, and cause interruptions in electric service when it grows into or falls onto electric power lines. In order to avoid the constant interruptions in electric service caused by overgrown or fallen vegetation, NB Power restricts the growth of trees and brush along the lines through its integrated vegetation management program.

Integrated vegetation management involves a variety of methods, including use of hand cutting tools (e.g., chainsaws, brush saws, axes), mechanical equipment (e.g., hydro-axes, excavator with mulching head), and herbicide treatments. The frequency of the program varies depending on the vegetation growth rate, but it is typically carried out in 5 to 6 year cycles.

The focus of vegetation management is on the tall growing tree species that have the potential to grow or fall into, or within, the arcing distance of the transmission lines and or facilities and cause an outage. The use of the various methods depends upon a number of factors including site conditions and the sensitivity of surrounding areas.

Herbicide treatments are formulated to target undesirable tall growing trees and are also effective on broadleaf weeds, leaving grasses unaffected. Foliar applications of herbicides are applied during the warmer months while dormant stem applications are typically applied in the fall. A permit for herbicide use is obtained from NBDELG. The process involves public notification as part of the formal permit application. All herbicide applications are completed and supervised by licensed applicators and in accordance with conditions specified in the Permit. Setback distances, ranging from 15 m to 75 m, are established near sensitive areas such as wetlands and watercourses based on the product used. These setback distances are outlined in the permit issued by NBDELG.

2.5.1.3 Decommissioning and Abandonment

The new 138 kV transmission line and new substation will have a design life of 50 years. While decommissioning or abandonment of these components is not currently envisioned, the substation and transmission line will at some point be decommissioned or rebuilt at the end of its useful service life, in accordance with the applicable standards and regulations current at that time. In the event that the substation and/or transmission line is no longer required, NB Power will provide the necessary information to the appropriate regulatory agencies so that the regulatory requirements are met prior to commencement of decommissioning activities. As such, decommissioning and abandonment of the new Neguac 138 kV substation and new 138 kV transmission Line 1220 are not discussed further in this document.

In this document, references to and discussion of decommissioning activities relate to the decommissioning of the existing Neguac substation and existing 69 kV transmission Line 0104 and portion of Line 0012 (Phase 2, described below).

2.5.2 Phase 2

Phase 2 of the Project involves the decommissioning and abandonment of the existing Neguac substation and the existing 69 kV Transmission Lines (0104 and 0012). This phase of the Project will be conducted following the successful construction, connection, and energization of the new 138 kV transmission line to the new Kedgwick substation (Phase 1).

2.5.2.1 Decommissioning and Abandonment

The existing Neguac substation, the existing 69 kV transmission Line 0104, and an approximately 29 km portion of the 69 kV Line 0012 will be dismantled since they will no longer be required. Infrastructure and hardware will be decommissioned and removed. Removable assets will be sold or disposed of prior to or concurrent with their dismantling.

There are two stages to the decommissioning of a substation and transmission line:

- Decommissioning of facilities
- Clean-up and revegetation

2.5.2.1.1 Decommissioning of Facilities

Wires and Hardware Removal

After the new 138 kV Neguac substation is in service and the existing 69 kV substation is de-energized, components such as instrument transformers, switches, circuit breakers, and conductors will be disconnected. Hardware, such as bushings, light fixtures, junction boxes, and electrical panels will be removed.

After the existing transmission lines are de-energized, components such as conductors, overhead ground wires, and anchor wires will be disconnected.

Structure Disassembly

The sections that make up a structure will be disassembled in the reverse order they were assembled. For the existing substation, the metal ground grid will be cut off at ground level. If concrete pads exist, they will be broken and pieces removed until they are below grade. The recycling or reuse of materials, such as scrap metal, will depend on the market and the existing technology.

For transmission lines, the cross arms will be removed and set on the ground. Helix anchors will be removed from the ground. In the case of log anchors, the guy wire is cut and removed and the log anchor is left in the ground to avoid ground disturbance. The anchor wires will be removed from support poles and the support poles will be taken down by cutting them at ground level.

Hardware such as insulators, anchors, and cross arms will be removed from structures and transported off-site for reuse or recycling. If reuse or recycling opportunities are not available, the hardware will be disposed of at approved facilities. Existing woods roads and trails that intersect the RoW will be used to

allow transportation of equipment, hardware, and personnel. A trail will be cleared along the RoW using mechanical and manual methods to access the structures.

2.5.2.1.2 Clean-up and Revegetation

In areas where soil disturbance due to decommissioning may cause erosion, measures will be taken to stabilize the affected area. Such measures may include trimming and back blading, mulching, seeding, fabric placement, and silt fencing. Erosion control used during decommissioning will be maintained until such time as the disturbed ground has been stabilized with vegetation.

The decommissioning of the existing Neguac substation will include a Phase 2 environmental site assessment to determine if there are contaminated soils on the site.

2.6 WORKFORCE AND PROJECT SCHEDULE

Construction (Phase 1) and decommissioning (Phase 2) will require NB Power staff, line clearing/construction contractor, and a contractor for the substation. The Project will result in a small, temporary increase in the workforce. The construction period, including RoW clearing, is anticipated to require approximately 8 months of activities between May 2018 to October 2019. While changes to the Project schedule are possible, NB Power intends to complete all construction activities by March 31, 2019.

Contractors that specialize in building transmission lines and substations typically work 9 to 12 hour days, and Monday to Friday, or Monday to Thursday. Work is not typically conducted overnight or on weekends; however, schedule change may require extended work hours to meet contract completion dates. A summary of key Project activities and timelines is provided in Table 2.2 below.

Table 2.2 High Level Schedule of Key Project Activities

Project Activities	Timeline
Communication with stakeholders and First Nations	Summer 2017 through spring 2018 (and throughout Project activities)
Environmental field studies	April to November 2017 (complete)
EIA Review	Fall 2017 and winter 2018 (assumed)
Permits/approvals acquisition	Spring 2018 to fall 2018 (assumed)
Substation clearing	Spring 2018
RoW clearing	Fall 2018
Construction of substation	Summer 2018
Construction of Line	Fall 2018 and winter 2019
In-service date	Winter 2019
Decommissioning of Line 0104 and a portion of Line 0012	Winter 2020
Decommissioning of existing 69 kV Neguac substation	Winter 2020

2.7 EMISSIONS AND WASTE

2.7.1 Airborne Emissions

Emissions associated with fuel combustion in heavy equipment and vehicles, and dust associated with travel on unpaved surfaces, will occur during the construction and decommissioning Phases 1 and 2 of the Project. Water sprayers will be used to suppress and control dust levels, if and as required, during construction and decommissioning.

Project construction and decommissioning is not anticipated to result in substantial emissions of air contaminants or greenhouse gases (GHG) to the environment (Section 5.1). Airborne emissions are expected to be generally confined to the PDA and are not expected to result in measurable increases in the air quality conditions in Neguac, or to exceed provincial air quality standards.

2.7.2 Hazardous Materials

Potentially hazardous materials used during construction will include, and are not limited to, propane, diesel, gasoline, hydraulic fluids, motor oil, and grease and lubricants for heavy equipment, ATV and vehicle use. Cleaning and maintenance of vehicles and equipment, site inspections, and the monitoring and inventorying of materials will be conducted for environmental protection. Construction is not anticipated to result in substantive releases of hazardous materials into the environment, and the potential for accidental releases are addressed further in Section 2.7.1.

2.7.3 Sound Emissions

Sound emissions will occur during construction, and decommissioning and abandonment of the Project, and would be limited to the use of heavy equipment, vehicles, and chain saws. Mitigation will be used wherever feasible to reduce the potential environmental interactions resulting from sound emissions. Construction is not anticipated to result in substantive emissions of sound into the environment (see Section 5.1).

2.7.4 Solid Waste

Solid wastes generated during construction would include packaging materials, plastics, cardboard, wood, metals, felled vegetation, and sediment runoff. Solid wastes generated during decommissioning and abandonment would include wires, conductors, and poles. Wherever possible, solid wastes will be re-used or recycled, and felled vegetation will be windrowed and/or mulched along the edge of the RoW to decompose naturally. Other materials will be properly disposed of at the Red Pine sanitary landfill site in Allardville, NB that is managed by the Chaleur Regional Service Commission.

2.7.5 Runoff

Erosion and runoff associated with construction activities, is not anticipated to result in a substantive deposition of sediments into watercourses (see Section 5.3). Sedimentation and erosion control

measures will be used to provide slope stability and to reduce and mitigate the potential for construction-related sediments to enter watercourses.

2.7.6 Electromagnetic Fields and Corona

The operation of Extremely high voltage (EHV) transmission lines and substations can result in the production of electromagnetic fields (EMF). EHV lines can also result in corona discharges (an electrical discharge brought on by the ionization of a fluid such as moist air surrounding a conductor that is electrically charged) which, in turn, may result in audible and radio frequency noise. The highest voltage for the proposed transmission line and associated infrastructure is 138 kV, which is not considered an EHV line. No noise from corona discharges will be generated as a result of the operation of the proposed 138 kV transmission line to the new Neguac substation.

2.8 ACCIDENTS, MALFUNCTIONS, AND UNPLANNED EVENTS

This section describes potential accidents, malfunctions, and unplanned events, which are upset conditions or other events that are not part of any planned activity or normal operation of the Project, have a reasonable probability of occurrence, and have the potential to result in adverse environmental interactions. While accidents, malfunctions, and unplanned events could occur during any stage of the Project, many of these can be prevented and addressed by good planning and design, communication, worksite health, safety, and environmental training of personal, 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 PSEMP that will be developed prior to construction, adverse environmental interactions related to accidents, malfunctions, and unplanned events are not likely to occur during Phase 1 or Phase 2 of the Project.

This section describes the potential accidents, malfunctions, and unplanned events that have a reasonable probability of occurrence. Mitigative planning and response procedures are also described below.

2.8.1 Hazardous Material Spills

The potential for the release of hazardous materials can occur from the operation of vehicles, with the most likely source of a release being the rupture of a hydraulic line or the loss of fuel and the operation of oil-filled equipment within the substation. The mitigation and management of hazardous materials will include:

- The training of personnel in spill prevention and response, and Workplace Hazardous Materials Information System (WHMIS)
- Following proper procedures within the PSEMP
- Design and installation of secondary containment for the transformer
- Routine cleaning, preventative maintenance, and visual inspections of hydraulic equipment and vehicles

- On-site spill response equipment
- Reporting spill to the appropriate Project personnel and New Brunswick Power Transmission System Operator (PSO) (1-800-756-8411). During normal business hours (*i.e.*, Monday to Friday from 8:15 am to 4:30 pm), the PSO will notify the appropriate authorities (*i.e.*, NBDELG). Outside of normal business hours, on weekends and on holidays, the PSO will notify the Canadian Coast Guard/Spills Action Centre (1-800-565-1633)

In the unlikely event that a hazardous material spill reaches a body of water or other nearby sensitive area, measures will be taken to stop the spill and isolate the affected area as soon as possible. An assessment of the affected area will be completed and remediation will be completed as required.

2.8.2 Fire

The potential for fire to occur during Project activities is limited to the use of vehicles, or to infrastructure (e.g., new substation). Mitigation and management of fire will include the following activities:

- 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 (i.e., oily rags)
- Avoiding the parking of vehicles in areas of long grass
- Immediate reporting of a fire to local emergency response services

As the Project location is not remote, local emergency response services are available.

2.8.3 Vehicle Collisions

Vehicular activity will be most prevalent during construction, and decommissioning and abandonment of the Project, and will be minimal during operation and maintenance. However, during all phases there is potential for vehicles associated with Project activities to collide with other vehicles, Project infrastructure or other infrastructure, and wildlife.

Mitigation and management measures planned to reduce the potential for vehicle collisions will include the following:

- Implementation, as needed, of traffic control measures to reduce the potential for vehicle-to-vehicle collisions
- Licensing of Project staff, as appropriate, to operate vehicles on-site, will obey traffic rules and regulations, and will exercise due care and attention while on-site
- Use of designated truck routes by truck
- Immediate reporting of a collision to local emergency response services

In the event of a vehicle accident there is the potential for loss of life (human or wildlife) and damage to infrastructure. There is also potential for fire and hazardous materials to be released into the environment. These are addressed in previous sections.

2.8.4 Wildlife Encounters

The potential for an unplanned encounter with wildlife is largely limited to disturbances to birds nesting on electrical infrastructure such as equipment and transmission poles during operation and maintenance, and decommissioning and abandonment.

The mitigation and management of wildlife encounters will include the following activities:

- Documenting, mapping, and identifying raptor species and their nests on Project infrastructure
- Scheduling of maintenance activities outside of nesting periods, where possible
- Consultation with a qualified biologist prior to unplanned/emergency maintenance during nesting periods

2.8.5 Infrastructure Malfunctions

The potential for infrastructure to malfunction is largely limited to the replacement of a transmission pole, or to instrument transformers, switches, or circuit breakers at the Neguac substation.

The mitigation and management of infrastructure malfunctions will include:

- Regular inspection and maintenance of infrastructure
- If a malfunction does occur, it will be responded to within 24 hours of detection/reporting

Given the implementation of the mitigation measures and response plans in the PSEMP, adverse environmental effects related to accidents, malfunctions, and unplanned events are not likely to occur during construction, operation and maintenance, and decommissioning and abandonment of the Project.

3.0 OVERVIEW OF ENVIRONMENTAL SETTING

3.1 PHYSICAL SETTING

3.1.1 Physiography and Geography

New Brunswick is divided into six physiographic (geomorphologic) districts defined largely by the underlying bedrock geology. The Project lies within the New Brunswick Lowlands geomorphologic district, on the Acadian Peninsula (Rampton *et al.* 1984). The Acadian Peninsula is underlain by non-calcareous grey-green sandstone including reddish, fine-textured, sandstone and conglomerate (Colpitts *et al.* 1995: NBDNR 2007).

3.1.2 Topography and Drainage

The Project is located within the Caraquet and Tabusintac ecodistricts of the Eastern Lowlands Ecoregion. The Tabusintac Ecodistrict forms the core of the Acadian Peninsula sitting at a higher elevation than the Caraquet Ecodistrict, which is characterized by gentle slopes and coastal cliffs with elevations ranging from 30 to 100 m (NBDNR 2007). The Project area drains into Miramichi Bay, as well as the Tabusintac, Bartibog and Big Tracadie rivers.

3.1.3 Surficial Geology

The surficial geography in the general vicinity of Phase 1 of the Project (i.e. Caraquet Ecodistrict) is comprised of relatively fertile soils derived from marine or glaciomarine sediments. The soils range from fine textured soils, derived from red mudstone, to medium textured, compact soils derived from red conglomerate, to coarse textured soils derived from grey sandstone. The Caraquet ecodistrict also contains sandy, non-compact material, over a reddish loamy compact till which can be used for agriculture if well drained. In areas containing glacial tills, fine-textured, compact soils are common. Organic soils have developed in coastal areas that are flat and poorly drained, such as peat bogs (NBDNR 2007).

The surficial geography in the general vicinity of Phase 2 of the Project (i.e. Tabusintac Ecodistrict) is comprised of relatively infertile, acidic soils derived from weathered Pennsylvanian sedimentary rocks. The soils range from fine textured, compact soils derived from red mudstone, to course textured, non-compact soils derived from grey sandstone. Despite the relatively low fertility of the soils, The Tabusintac ecodistrict does support agriculture in areas that are well drained (NBDNR 2007).

3.2 BIOPHYSICAL SETTING

3.2.1 Atmospheric Environment

The Government of New Brunswick has not established any ambient air quality monitoring stations in the vicinity of the Project. The nearest air quality monitoring station is in Lower Newcastle (approximately 30 km southwest of the PDA) and recorded no exceedances for ozone from 2010 through 2014 (NBDELG 2012b, 2013, 2015, and 2016). No other compounds are monitored at this station. Because of the rural location with limited sources of air contaminants, air quality in the area is expected to be good.

The closest Environment Canada weather station with available historical data is in Miramichi, approximately 37 km south of the PDA. Climate normals (1981-2010) data from the Miramichi weather station indicate that January is typically the coldest month of the year, with a daily average temperature of -10.8°C. July is typically the warmest month of the year, with a daily average temperature of 19.1°C. The average annual precipitation (including snow as a water equivalent) in Miramichi is 1,072.4 mm, with July being the rainiest month (99.9 mm on average) and January being the snowiest month (70.4 cm on average) (GC 2017a).

The Project is located in a rural, mostly forested area with residential dwellings. Therefore, the existing sound pressure levels (noise) in the area are expected to be typical of rural ambient levels and mainly influenced by human activities and road traffic.

More details on the Atmospheric Environment are provided in Section 5.1.

3.2.2 Freshwater Fish and Fish Habitat

The Project is located within four watersheds which drain into Miramichi Bay and the Gulf of St. Lawrence, including Bartibog River watershed (514 km²), Miramichi Bay watershed (1,664 km²), Tabusintac River (712 km²), and Big Tracadie River (1,465 km²). These rivers start in interior bogs, lakes or springs and flow east to bays within the Gulf of St. Lawrence (NBDNR 2007). The Project makes twenty-eight watercourse crossings, including four watercourses within the Bartibog watershed, fifteen watercourses within the Miramichi Bay watershed, seven watercourses within the Tabusintac watershed and two watercourses within the Big Tracadie watershed.

These watersheds are primarily forested land (NBDNR 2007). Large watercourses in the area are a mix of gravel and cobble streams, and smaller watercourses may be impounded by beaver dams.

There are likely 16 species of freshwater fish and eight species of diadromous fish known to be present in the watersheds of the Project. These watersheds have a number of species that support commercial, recreational, or Aboriginal (CRA) fisheries. Commercial fisheries exist for American eel (*Anguilla rostrata*), rainbow smelt (*Osmerus mordax*), and gaspereau (*Alosa pseudoharengus* and *A. aestivalis*) in the mouths of rivers or estuaries (DFO 2017a; DFO 2017b; DFO 2017c), recreational fisheries exist for a number of fishes including Atlantic salmon (*Salmo salar*) and brook trout (*Salvelinus fontinalis*) (GNB 2016b). Additionally, aboriginal Mi'kmaq groups in the area hold communal commercial eel, smelt and

gaspereau licenses (DFO 2017a; DFO 2017b; DFO 2017c), and have agreements to fish for other fish species for food, social and ceremonial purposes (DFO 2012).

More details on fish and fish habitat are provided in Section 5.3.

3.2.3 Water Resources

There is no municipal water supply in the village of Neguac. Domestic drinking water for the residents and businesses near the Project comes from individual groundwater wells. There are no Designated Wellfield Protected Areas, Designated Watershed Protected Areas, or any known surface water intakes near the Project. More details on water resources are provided in Section 5.2.

3.2.4 Terrestrial Environment

The Project is located within the Eastern Lowlands Ecoregion (NBDNR 2007). This ecoregion is underlain by late carboniferous sedimentary rock ranging from fine-reddish siltstone through grey quartz rich sandstones to course pebble conglomerates. Soils derived from these rocks are generally acidic and infertile but are relatively stone free. The Eastern Lowland Ecoregion is characterized by low relief which results in poor soil drainage and the development of numerous wetlands. This ecoregion has the greatest percentage of wetland cover of all ecoregions in New Brunswick. It also has the greatest area of peatland of any ecoregion in the province.

The Project spans two ecodistricts, the Tabusintac and Caraquet Ecodistricts. The western, inland portion of the Project is situated within the Tabusintac Ecodistrict. The combination of high fire frequency and acidic, wet soils is reflected in the largely coniferous forest cover of this ecodistrict. Areas with fine textured, poorly drained soils are occupied by forest stands dominated by black spruce (*Picea mariana*), balsam fir (*Abies balsamea*), and jack pine (*Pinus banksiana*) along with scattered eastern white pine (*Pinus strobus*). Deciduous forest in this ecodistrict is typically composed of a mixture of trembling aspen (*Populus tremuloides*), white birch (*Betula papyrifera*), and red maple (Acer rubrum). Mixedwood forests are less commonly encountered and are usually dominated by red maple, American beech (*Fagus grandifolia*), red spruce (*Picea rubens*), and balsam fir. Tolerant hardwood forests are rare and are restricted to the tops of hills.

The eastern half of the Project is situated in the Caraquet Ecodistrict. A long history of settlement and forest disturbance in this coastal zone has resulted the development of forests that are dominated by intolerant hardwoods such as red maple, trembling aspen, and grey birch (*Betula populifolia*). Traces of sugar maple (*Acer saccharum*), yellow birch (*Betula alleganiensis*) and American beech occur only along the inland perimeter of this ecodistrict. Valley bottoms and sites with course textured soils are occupied by species such as black spruce and jack pine which indicate a high fire frequency. Mid-slopes typically support more hardwood, particularly red maple, together with red spruce, eastern white pine, balsam fir and eastern hemlock (*Tsuga canadensis*). Eastern white cedar (*Thuja occidentalis*) and tamarack (*Larix laricina*) along with black spruce are associated with areas of poor drainage.

3.3 SOCIOECONOMIC SETTING

The Project will be in northeastern New Brunswick, in Northumberland County, near the village of Neguac (Section 2.2). This location is a part of the Acadian Peninsula Regional Service Commission (Regional Service Commission (RSC) 4), and the Northeast Economic Region of New Brunswick. Neguac, located between Miramichi City and the regional municipality of Tracadie, is the largest centre within the LAA, and is known as the gateway to the Acadian Peninsula from the southern and southwestern parts of the province (The Village of Neguac 2017).

3.3.1 Economic Activity and Economic Drivers

The region is rich in natural resources which provide residents with most of their income (The Village of Neguac, 2017). The private sector, including trade, forestry, and resource extraction, employs the largest component (40%) of the labour force in the region (NBPETL 2013). The public sector is the second largest employer in the region (32.2%) (NBPETL 2013). The regional economy also depends heavily on its the fisheries, and peat harvesting takes place at nearly two dozen coastal bogs within the Caraquet Ecodistrict (NBDNR 2007).

Fishing and forestry are the main economic activities in Neguac, and it is also a service centre for neighbouring local service districts (The Village of Neguac 2017). Tourism is also an economic driver; located on a coastal plain, Neguac offers natural attractions such as the dune-lined ocean lagoons sheltered from St. Lawrence and the broad entrance to Miramichi Bay, with notable beaches and an eco-tourism park (The Village of Neguac 2017).

3.3.2 Land Use

Approximately 70% of the land in the Caraquet Ecodistrict is forested, of which an unspecified amount is used for private woodlot harvesting. Of the remaining 30% un-forested land, 40% is wetland, 25% is used for agricultural purposes, 20% for developments, 5% for roads, and 3% for waterbodies (NBDNR 2007).

Given amount of forested area, recreational activities such as hiking, camping, hunting and fishing are common in the region. Recreational activities along the rivers, beaches, and sand dunes around Neguac are also common for the local residents.

3.3.3 Infrastructure and Services

The most prominent community in the PDA and LAA is Neguac. Located between Miramichi City and the regional municipality of Tracadie, Neguac is a service centre for neighbouring local service districts (The Village of Neguac 2017). In 2016, approximately 1,684 people resided in the Neguac,

The rural community of Neguac offers residents and businesses a number of amenities, including restaurants, a motel, chalets for rent, and a campground. Neguac also has two parks managed by the municipality, and an RCMP detachment. The municipality has a storm sewer system to drain rainwater and snow meltwater. While most residences in the municipality have access to a sewer system, drinking water in the municipality is sourced from private wells. In addition to municipal roads and sidewalks, the

municipality provides household and separated waste collection services to residents (The Village of Neguac 2017).

3.3.4 Transportation and Transportation Infrastructure

The PDA intersects Route 8, Route 445, and Route 440, several secondary roads, including rue Robichaud, Monica St, and chemin Du Lac in Neguac, and 55 unnamed resource roads. Route 8 is an important highway link between northern and southern New Brunswick, is 255 km long, and runs from Fredericton to Bathurst via Miramichi. These roads and other transportation infrastructure in the LAA support local traffic including vehicles associated with the forestry industry.

4.0 METHODS

4.1 VALUED COMPONENTS

Based on professional experience and work with similar projects, Stantec has selected the following valued components (VCs) to be considered in this EIA Registration:

- Atmospheric Environment
- Water Resources (surface water and groundwater)
- Freshwater Fish and Fish Habitat
- Vegetation and Wetlands
- Wildlife and Wildlife Habitat
- Socioeconomic Environment
- Heritage Resources
- Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons
- Effects of the Environment on the Project

The following sections describe each of these VCs, their existing (baseline) conditions, potential interactions with the Project, and planned mitigation to reduce Project-environment interactions.

4.2 VC RATING

A binary qualitative rating system was used to evaluate the potential for interactions between the Project and the environment. One of the following two ratings was prescribed for each Project-VC interaction:

- An interaction between the Project and the environment could occur
- No interaction occurs between the Project and the environment

Project-VC interactions are discussed in Chapter 5.0.

4.2.1 Spatial Boundaries

The assessment of potential environmental interactions with the VCs encompasses two spatial boundaries: Project Development Area (PDA) and Local Assessment Area (LAA).

Project Development Area

The PDA is the immediate area encompassing the Project footprint, and is limited to the anticipated area of physical disturbance associated with the construction, operation and maintenance, and decommissioning and abandonment of the Project. The PDA includes the footprint of the 23 km-long, 30 m-wide RoW for the new 138 kV transmission line to be constructed, and the 0.16 ha footprint of the new Neguac substation. The PDA also includes the existing substation, and the RoW for existing Line 0104 (23 km) and portion of Line 0012 (29 km), all of which will be decommissioned as part of the Project. The PDA is the same for all VCs, and is illustrated in Figure 1.1.

Local Assessment Area

The LAA is defined as the maximum area where Project-specific environmental interactions can be predicted and measured with a reasonable degree of accuracy and confidence (i.e., the zone of influence of the Project for each VC). The LAA can vary amongst the VCs, and is summarized for each VC in Table 4.1.

Table 4.1 Local Assessment Area for Valued Components

Valued Component[1]	Local Assessment Area
Atmospheric Environment (Air, Noise, GHG)	PDA plus 1 km on either side of RoW centre line
Water Resources (Surface Water and Groundwater)	PDA plus 500 m on either side of RoW centre line
Freshwater Fish and Fish Habitat	PDA plus 100 m on either side of RoW centre line, plus a 30 m buffer on either side of watercourses
Vegetation and Wetlands	PDA plus 500 m on either side of RoW centre line
Wildlife and Wildlife Habitat	PDA plus 500 m on either side of RoW centre line
Socioeconomic Environment	PDA plus 500 m on either side of RoW centre line
Heritage Resources	PDA
Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	PDA
Effects of the Environment on the Project[1]	PDA

[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.

4.2.2 Temporal Boundaries

Temporal boundaries identify when a potential environmental interaction is assessed in relation to specific Project phases and activities (see Table 2.2). The temporal boundaries for the assessment of the potential environmental interactions with the Project include the following periods:

- Construction – anticipated to be during the spring 2018 (substation) through winter 2019 (Line 1220)
- Operation and Maintenance – approximately 50 years or the end of service life
- Decommissioning and Abandonment – anticipated to be three months in duration

There is potential for the Project to interact with the VCs, and for the environment to interact with the Project, during various phases of the Project. These will be discussed in detail in Chapter 5.0.

5.0 ASSESSMENT OF POTENTIAL INTERACTIONS BETWEEN THE PROJECT AND THE ENVIRONMENT

Based on the Project Description (Chapter 2.0), the Environmental Setting (Chapter 3.0), and the methods described briefly above (Chapter 4.0), the potential interactions between the Project and the environment are summarized in Table 5.1.

Table 5.1 Potential Interactions between the Project and the Environment

Activities/Physical Works Associated with the Project	Atmospheric Environment	Water Resources (Surface Water and Groundwater)	Freshwater Fish and Fish Habitat	Vegetation and Wetlands	Wildlife and Wildlife Habitat	Socioeconomic Environment	Heritage Resources	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Effects of the Environment on the Project
Construction of New Substation and New Transmission Line									
Site Preparation	✓	✓	✓	✓	✓	✓	✓	✓	
Excavation, Structure Assembly, and Installation	✓	✓	✓	✓	✓		✓	✓	✓
Conductor Stringing	✓							✓	✓
Connection of Transmission Line									✓
Inspection and Energization									✓
Clean-up/Revegetation	✓	✓	✓	✓	✓	✓			✓
Operation and Maintenance									
Operation and Maintenance of Hardware	✓	✓		✓	✓	✓			✓
Vegetation Management	✓	✓	✓	✓	✓	✓		✓	✓
Decommissioning of Existing Substation and Line 0104 and 0012									
Decommissioning of Facilities	✓	✓		✓	✓	✓	✓	✓	✓
Clean-up/Revegetation	✓	✓	✓	✓	✓	✓	✓		✓

In the table above, the interaction with a particular VC is identified when the interaction first occurs.

5.1 ATMOSPHERIC ENVIRONMENT

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the atmospheric environment VC. The atmospheric environment was included as a VC because of the potential for the Project to interact with air quality, greenhouse gases (GHG), and sound quality.

5.1.1 Scope of Assessment

The atmospheric environment consists of three components: air quality, climate/greenhouse gases (GHGs), and sound quality, which are described as follows:

- Air quality is characterized by the composition of the ambient air, including the presence and quantity of air contaminants in the atmosphere in comparison to applicable air quality objectives.
- Climate is characterized by the historical seasonal weather conditions of a region, which can include temperature, humidity, precipitation, sunshine, cloudiness, and winds. Statistical climate data are typically averaged over a period of several decades (ECCC 2017a). Project-based releases of GHGs (such as carbon dioxide ($CO_{2)}$, methane (CH_4) and nitrous oxide (N_2O)) are typically used as an indicator of the potential for environmental interactions with climate change, as it is understood that GHG releases on a global scale from both natural processes/sources and human activities are increasing global concentrations of GHGs in the atmosphere and they are thought to be a contributor to global climate change.
- Sound quality is characterized by the type, frequency, intensity, and duration of noise (unwanted sound) in the outdoor environment. Vibration, or oscillation in matter that may lead to noise or stress in materials of adjacent structures, is also considered to be an element of sound quality.

The atmospheric environment has been selected as a VC for this EIA registration for the following reasons:

- Air Quality-Project-related releases of air contaminants to the atmosphere may adversely affect the quality of the ambient air or adversely affect human and/or ecological health.
- GHG/Climate Change-There is a high level of confidence of the link between anthropogenic releases of GHGs to the atmosphere, global climate change, and the resulting adverse environmental interactions.
- Sound Quality-Unwanted sound and vibration from Project activities may result in community annoyance and/or ecological disturbance.

This assessment of the atmospheric environment considers the air contaminants that are typically associated with this type of Project, which are regulated provincially and in some cases federally. These air contaminants are generated from fuel combustion and the movement of heavy equipment required for construction and decommissioning. For the Project components and activities assessed herein, combustion gases (including but not limited to sulphur dioxide (SO_2), carbon monoxide (CO), and nitrous oxides (NO_x)) and particulate matter are considered to be the potential contaminants of concern relating to air quality. Releases of GHGs from the combustion of fuel in heavy equipment are considered pertaining to the potential for interactions with climate change. Sound pressure levels and vibration are considered relating to sound quality. This section also considers electromagnetic fields (EMF) which may originate from transmission lines.

The *Air Quality Regulation 97-133* under the *New Brunswick Clean Air Act* defines air quality objectives in New Brunswick. Sound is defined as a contaminant in the New Brunswick *Clean Air Act*; however, there are currently no applicable regulatory requirements or objectives relating to GHG or EMF for this type of project.

5.1.1.1 Boundaries

The PDA was described in Section 4.2.1.

The LAA was defined as being the immediate area within 1 km on either side of the PDA (i.e., the LAA has a total width of 2 km), and is illustrated in Figure 5.1. This area is expected to be where most of the notable potential environmental interactions with the atmospheric environment could occur. Air contaminant emissions and noise from construction and decommissioning and EMF during operation attenuate over distance from the PDA. For GHGs and climate change, no LAA is applicable, as climate change is a global phenomenon.

The temporal boundaries were described in Section 4.2.2.

5.1.2 Existing Conditions for Atmospheric Environment

5.1.2.1 Air Quality

Air quality in the vicinity of the PDA is mostly influenced by combustion emissions from vehicle traffic and nearby communities, and various sources of air contaminants located within the area. Industry in the area includes a quarry and gravel pit, a seafood processing plant, and a soil waste management center (Figure 5.1). None of these facilities report annual emissions of air contaminants to the National Pollutant Release Inventory (NPRI), therefore the other facilities are expected to be below reporting thresholds.

There are no ambient air monitoring stations in the vicinity of the Project. The nearest provincial air quality monitoring station to the PDA is located in Lower Newcastle (approximately 30 km southwest of the PDA). There were no exceedances of the provincial air quality objectives (measurements of ozone) at the Lower Newcastle monitoring station from 2010 through 2015 (NBDELG 2012b, 2013, 2015, 2016 and 2017a). The next nearest station, the Bathurst air quality monitoring station, is located approximately 60 km northwest of the PDA. There were also no exceedances of the provincial air quality objectives (measurements of ozone, particulate matter ($PM_{2.5}$) and nitrogen oxides) at the Bathurst monitoring station from 2010 through 2015 (NBDELG 2012b, 2013, 2015, 2016 and 2017a).

Given the rural nature of the area, it is expected that the provincial air quality objectives are met within the LAA.

The Canadian Ambient Air Quality Standards (CAAQS) record long-term trends for fine particulate matter and ground level ozone across Canada. The 2015 CAAQS targets were met at the Lower Newcastle and Bathurst monitoring stations from data collected between 2011 and 2015 (NBDELG 2013, 2015, 2016 and 2017a).

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BARTIBOG/GREYSTONE BROOK ESA

HAY ISLAND/ILE AU FOIN ESA

GRAND DUNE INLET ESA

Proposed Neguac Substation

Existing Neguac Substation

ESGENOÔPETITJ FIRST NATION

NEGUAC

Lavillette

Saint-Wilfred

Lagacéville

Fairisle

New Jersey

Burnt Church

Barryville

Miramichi Inner Bay

Sensitive Receptor

- Building
- Child Care Center
- Health Center
- Nursing Home
- Cemetery
- Church
- Recreational Area
- School
- Recreational Trail (ATV & Snowmobile)

Industrial Facility

- Gas Station
- Landfill
- Pit
- Pumping station
- Processing Plant (Fish)

- Local Assessment Area
- Phase 1 Project Development Area
- Phase 2 Project Development Area

Project Components

- Existing Pole Structure to be Decommissioned
- Proposed Transmission Line
- Existing Neguac Substation
- Proposed Neguac Substation
- Environmentally Significant Area (ESA)
- Contour (Interval 10 m)
- Major Road
- Watercourse
- Crown Land
- GeoNB-mapped Wetland
- Indigenous Community
- Municipal Area
- Waterbody

0 1 2 3 4 5
Kilometres

121812477-0008

NAD 1983 CSRS New Brunswick Stereographic

QC
Project Area
NB
PE
ME
NS

Sources: Base data provided by the Government of New Brunswick.

Local Assessment Area for the Atmostphere Environment

5.1.2.2 Climate

There is an Environment Canada weather station with available historical data located in Miramichi, approximately 37 km south from the PDA. Climate normals at the Miramichi station are discussed in Section 3.2.1.

5.1.2.3 Greenhouse Gas Emissions

According to Canada's National Inventory Report for 2015 (the most recently published data), total Canadian GHG emissions were 722 million tonnes (t) of CO_2e, 14 million tCO_2e of which were released in New Brunswick (ECCC 2017b). Therefore, the province of New Brunswick represents a small portion of Canada's total annual GHG emissions (approximately 2%).

Global GHG emissions in 2014 (latest available data) were estimated to be 44.2 billion tCO_2e (excluding land use change and forestry) (WRI 2017). Therefore, Canada's contribution to global GHG emissions is approximately 1.6%.

5.1.2.4 Sound Quality

The Project is located in a rural, mostly treed area that is made up of timberland and crown land, with small communities throughout. Sound quality in the PDA is likely predominantly influenced by vehicle traffic. Sections of Highway 8, Highway 445 and approximately 40 forest and logging roads are located within the LAA. Nearby communities, and various industrial developments within the rural community also likely contribute to the sound quality in the project area.

Overall, the existing sound pressure levels in the area are expected to be representative of rural ambient sound levels and are expected to be reasonably estimated based on Alberta Energy Regulator methodology (AER 2007). The average ambient sound level in Alberta for areas with similar population densities and rural settings as Neguac was 56 dB_A at night and 66 dB_A during the day (AER 2007). Sound levels were based on number of residences within a 451 m radius of the Project and for dwellings within 30 m from heavily travelled roads using Table 1 from the Alberta Energy Regulator (2007). Ambient sound levels in less populated areas of the route are expected to be lower.

Since interactions between the Project and sound quality are expected to be limited, no background sound pressure level monitoring was conducted.

5.1.3 Assessment of Potential Environmental Interactions with Atmospheric Environment

This section describes how the Project activities could interact with the Atmospheric Environment as well as the techniques and practices that will be applied to mitigate these potential interactions.

5.1.3.1 Phase 1

5.1.3.1.1 Construction

Construction of the new substation and new 138 kV transmission line are expected to release small amounts of combustion gases and GHGs from the operation of equipment, machinery, and large trucks travelling to and from the Project site. However, construction is transient and relatively short in duration, and repair/maintenance will be conducted for Project equipment as required. Unnecessary idling of vehicles, equipment, and machinery will be avoided to the extent possible to reduce combustion gas and GHG emissions.

An estimate was done to calculate GHG emissions from construction based on the quantity and type of equipment required combined with operating hours and the PDA footprint. GHG emissions from the Project are estimated to be approximately 34 tCO_2e, or less than 0.001% of the total provincial GHG reported in 2015, which is considered negligible.

Dust will be generated as a result of excavation activities during construction, and the movement of equipment along unpaved surfaces. Dust can also be generated when topsoil and overburden is transferred to stockpiles. However, standard dust control mitigation practices will be used to suppress dust levels. These practices include the revegetation of areas where soil has been disturbed, as well as the use of dust suppressants and water on access roads to limit dust emissions, especially during dry and windy periods if they occur. In consideration of the available standard mitigation practices, Project-related releases of air contaminants and GHGs are unlikely to cause exceedances of air quality standards or measurably contribute to provincial or national GHG totals.

Noise and vibration will occur from the use of heavy equipment and trucks during construction; however, they will mainly be confined to the PDA and adjacent areas. Noise and vibration will be transient and short in duration during the three months of construction. Construction is expected to be limited to daytime hours (typically between the hours of 7:00 a.m. to 7:00 p.m.) in order to reduce disturbances to nearby residences. The nearest residence is 14 m away to the Phase 1 PDA, where the daytime noise level is expected to be approximately 66 dB_A. Work is typically not conducted overnight or on weekends; however, delays in the schedule may require extended work hours. In the event that evening or nighttime work is required, the planned schedule and activities will be communicated to all residents within 500 m of the activity including providing them information on who to contact in the event they have a noise complaint. Project equipment will be repaired/maintained in good working order which could potentially reduce overall noise levels (e.g., if a malfunctioning muffler is repaired).

5.1.3.1.2 Operation and Maintenance

During operation and maintenance of the new transmission line and substation, no substantial air contaminant, GHG or noise emissions are expected to occur as maintenance activities are infrequent and small in scope. Health Canada reviewed existing information on EMFs and reported that there is insufficient evidence to establish a relationship between EMFs and human health risks for the frequencies of EMF associated with electrical transmission lines (Health Canada 2009). Health Canada also noted that the risk associated with EMFs is sufficiently low that there is no requirement to warn

people who spend time or live near electrical transmission lines (Health Canada 2009). As such, Project-related EMF's are not anticipated to result in any substantial environmental interactions.

5.1.3.2 Phase 2

During decommissioning and abandonment of the Neguac substation and Lines 0104 and 0012 (Phase 2), air contaminant, GHG and noise emissions are expected to be comparable or less than those that would occur during construction of Phase 1. As such, mitigation for decommissioning and abandonment activities will be as described above for construction activities.

5.1.4 Summary for Atmospheric Environment

With mitigation and environmental protection measures, there will not be substantial interaction between the Project and the atmospheric environment during all phases of the Project. The Project is not expected to result in exceedances of the *Air Quality Regulation 97-133* under the New Brunswick *Clean Air Act*. Additionally, Project-related releases of GHGs are unlikely to measurably contribute to provincial or national GHG totals. While there is potential for sound pressure or vibration levels to increase near the Project during construction, they will be mainly confined to the PDA and adjacent areas, will be transient and short in duration, and are currently expected during the daytime only. There is also potential for EMF to increase during operation of the Project (compared to the existing 69 kV line), yet the risk is sufficiently low that there is no requirement to warn people who spend time or live near electrical transmission lines (Health Canada 2009).

5.2 WATER RESOURCES

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the water resources VC. Water resources was included as a VC due to its potable, recreational, and commercial value, and because of the potential for the Project to interact with ground water and surface waters.

5.2.1 Scope of Assessment

Water resources are defined for the purposes of this Project as any water supply from the ground or the surface that is available for human use, including consumption and other residential, agricultural, commercial, and industrial uses. Surface water also plays an important role in supporting freshwater fish and fish habitat, as described further in Section 5.3.

5.2.1.1 Boundaries

The PDA was described in Section 4.2.1.

The LAA was defined as being an area extending 500 m from the centre line of the PDA for the new 138 kV transmission line to be constructed, the new Neguac substation and the PDA of the existing substation, and existing Lines 0104 and 0012, which will be decommissioned. Beyond this area, the effects on water resources are expected to be minimal. The LAA is illustrated in Appendix C.

The temporal boundaries were described in Section 4.2.2.

5.2.2 Existing Conditions for Water Resources

The PDA is located in the Miramichi Bay subwatershed of the Miramichi River Basin watershed. There are no Designated Watershed Protected Areas, nor any known surface water intakes in the LAA. The community of Neguac does not currently have a municipal water supply, drinking water in the municipality and surrounding area comes from private groundwater wells (Village of Neguac 2016). There are no Designated Wellfield Protected Areas within the LAA.

Within the LAA, the New Brunswick Online Well Log System (NBOWLS, NBDELG 2017b) has records of 64 wells within the LAA, 63 of which are domestic drinking water wells and one which is used for a non-drinking water related industrial use. The available characteristics of these wells are summarized in Table 5.2.

Table 5.2 Available Water Well Characteristics in the LAA

Parameter	Minimum	Mean	Maximum	Number of Wells
Wells with Records (NBOWLS)	-	-	-	64
Well Depth (m)	1.7	21.5	48.8	63
Depth to Static Water Level (m)	0.9	7.5	21.3	61
Depth to Bedrock (m)	0.6	4.5	26.5	13
Well Yield (L/min)	22.8	86.2	546.0	59
Notes: Depths are relative to ground surface				

5.2.3 Assessment of Potential Environmental Interactions with Water Resources

This section describes how the Project activities could interact with water resources as well as the techniques and practices that will be applied to mitigate these potential interactions.

5.2.3.1 Phase 1

5.2.3.1.1 Construction

The construction of the new substation will include vegetation clearing activities as well as excavation to level the site, while construction of the new 138 kV transmission line will involve small areas of excavation to install transmission line poles and vegetation clearing along the transmission line right-of-way.

The area excavated for the transmission line poles is limited to a small area surrounding each location. These excavations are typically 2.5 m to 3 m in depth, and have the potential to interact with

groundwater in areas where the water table is shallow (approximately 3 m from the top of ground) if dewatering is required. It is not possible to predict which excavations will require dewatering as the depth of the water table varies both locally, and seasonally. Given this, the requirements for temporary dewatering during construction will be determined based on local water table conditions, and will be evaluated during the pre-construction stage of the Project. Excavation to level the site of the new substation is expected to be relatively shallow, and is not anticipated to require dewatering; however, the installation of pier foundations for the bus support structures could require excavation of up to 3 m depth. Dewatering for pier support structures may be required depending upon subsurface conditions.

Excavation for the transmission line poles are anticipated to be completed by auger or an excavator. Mechanical rock breaking activities completed by auger or excavator are unlikely to interact with water resources. However, where soil conditions make these methods inefficient, blasting or rock hammering of consolidated bedrock may be required. This could include areas near outcrops or where the overburden is thin. Blasting has the potential to result in changes to groundwater quantity and/or quality and 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. As a result, 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 has the potential to change groundwater quality. Rock hammering may also result in vibration to the bedrock, and may result in the same environmental effects as blasting. However, the potential environmental effects from rock hammering will occur at a lesser magnitude and at a more local scale than blasting.

The removal of vegetation within the PDA may interact with surface water resources by increasing runoff coefficients and decreasing evapotranspiration rates. This will likely increase runoff volumes that are discharged to nearby streams. However, given the linear nature of the Project and the scale of its footprint when compared to the watershed where the RoW is located, any increase in runoff is considered to be minimal and can be attenuated by the receiving watersheds.

Clearing of vegetation and excavation within the PDA may also result in an increased risk of local erosion, which has the potential to result in sediment entering surface water feature. NB Power will reduce the potential for interactions between the Project and water resources by adhering to the best management practices and the PSEMP. This includes preventing machinery from entering watercourses, and preventing the movement of sediments and woody debris into watercourses through the use of temporary sediment control features.

Overall, due to careful Project planning, and the construction methods and mitigation to be implemented, the residual environmental effects during construction of the Project are anticipated to be of low magnitude and of short duration, and are not expected to result in any measurable changes in water resources.

5.2.3.1.2 Operation and Maintenance

During operation and maintenance of the Project, vegetation management will be required and will be conducted in accordance with NB Power's integrated vegetation management program. Vegetation management is anticipated to be accomplished largely through the use of manual and mechanical means, in particular near residences, agricultural areas, and watercourses. Should herbicides be required in areas that are difficult to manage by mechanical means, they will be used in accordance with government regulations. Given the scale of the activities, operation and maintenance of the Project is not expected to have substantive interactions with water resources.

5.2.3.2 Phase 2

The decommissioning and abandonment of the existing Neguac substation may require the excavation and removal of contaminated soils, if present, which has the potential to interact with water resources. Due to the potential for the presence of contaminated soils, the decommissioning of the existing Neguac substation will include a Phase 2 environmental site assessment to determine if there are any contaminated soils on the site.

The decommissioning and abandonment of existing 69 kV transmission lines 0104 and 0012 will involve the removal of the conductors and will generally include cutting the transmission line poles at the ground surface. In some cases, removal of poles may require excavation to depths of up to 3 m to remove the buried portion of the poles. This activity will only have the potential to interact with groundwater in areas with a shallow water table (less than 3 m below ground surface) and will be similar to those described for construction in Section 5.2.3.1.1. As such, the potential interactions are not considered substantive.

5.2.4 Summary for Water Resources

With mitigation, the Project is not anticipated to result in be any substantial interaction with water resources during any phase of the Project.

5.3 FRESHWATER FISH AND FISH HABITAT

Freshwater fish and fish habitat was selected as a VC because the Project lies within a number of watersheds that drain into the Gulf of Saint Lawrence. These watersheds contain commercial, recreational, and Aboriginal (CRA) fisheries that are protected by federal and provincial legislation. This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the freshwater fish and fish habitat VC.

5.3.1 Scope of Assessment

The scope of assessment is limited to freshwater fishes. Freshwater fishes are defined here as fishes 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)). The freshwater fish and fish habitat VC also includes:

- Freshwater species at risk (SAR), which are 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 New Brunswick *Species at Risk Act* (NB *SARA*)
- Freshwater species of conservation concern (SOCC), which are species that have been identified by federal and/or provincial species at risk agencies as being rare in New Brunswick, 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 New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC)

Freshwater fish habitat includes the physical (e.g., substrate, water temperature, flow velocity, volume, depth), chemical (e.g., dissolved oxygen, nutrients), and biological (e.g., fish, benthic macroinvertebrates, emergent macrophytes) characteristics that are required by freshwater fish to carry out their life cycle.

5.3.1.1 Boundaries

The PDA was described in Section 4.2.1.

The LAA for freshwater fish and fish habitat is defined as the potential zone of Project interactions with fish and fish habitat. As such, for Phase 1 (construction, operation and maintenance), the LAA extends 100 m immediately upstream and 100 m downstream from any location where the new transmission line (Line 1220) crosses a watercourse, plus a 30 m buffer on either side of the watercourse (Appendix C). For Phase 2 (decommissioning and abandonment), the LAA is the same as Phase 1.

The temporal boundaries were described in Section 4.2.2.

5.3.2 Existing Conditions for Freshwater Fish and Fish Habitat

The Project is located within four major watersheds which drain into Miramichi Bay and the Gulf of St. Lawrence including Bartibog River watershed, Miramichi Bay Watershed, Tabusintac River watershed and Big Tracadie River watershed (Figure 5.2). Phase 1 of the Project crosses nine mapped watercourses and five unmapped watercourses within the Miramichi Bay watershed. The decommissioning of Line 0104 (Phase 2 of the Project) crosses seven mapped and five unmapped watercourses within the Miramichi Bay watershed. The decommissioning of the 29 km portion of Line 0012 (Phase 2 of the Project) crosses seven mapped watercourses in the Tabusintac watershed, two mapped watercourses in the Big Tracadie watershed, and five mapped watercourses in the Bartibog watershed. The Project RoW includes less than 1% of the total watershed areas.

5.3.3 Fish Habitat

5.3.3.1.1 Phase 1

Site visits were made on June 21 and 22, 2017 and September 25, 2017 to eight mapped (WC-NGTL-01 to -08) and five unmapped (WC-NGTL-9 to 13) potential watercourses identified by other field surveys

that were crossed by the proposed new 138 kV transmission line (Figure 5.2). Of the thirteen that were visited, WC-NGTL-10 to -13 were ephemeral, or intermittent watercourses which did not connect to a watercourse or waterbody downstream within the within the LAA, and are not discussed further. A fish habitat survey was not conducted on WC-NGTL-14 because of technical difficulties; however, the watercourse and its associated wetland was observed by vegetation and wetlands as part of their surveys (see Section 5.4), and was confirmed to be a watercourse with a defined channel and flowing water. As such, it was determined that Phase 1 crosses a total of ten confirmed watercourses (WC-NGTL- 01 to 09, and WC-NGTL-14). No watercourses are located within 30 m of the proposed new substation.

Fish habitat surveys were conducted on nine of the ten watercourses 100 m upstream and 100 m downstream of the RoW centre line (Table 5.3). Habitat information was collected as per the Department of Fisheries and Oceans (DFO)/NBDERD guidelines (Hooper *et al.*1995). The in situ water quality parameters measured included water temperature, dissolved oxygen, and conductivity (all measured using a YSI ProPlus meter); pH (measured using a Hanna Instruments 98172 pH meter); and turbidity (measured using a Hach 2100Q turbidimeter). In situ water quality instruments were calibrated daily.

Water temperatures at the time of sampling were generally suitable for cold-water fish species such as Atlantic salmon and brook trout. Dissolved oxygen concentrations for five of the ten watercourses exceeded the CCME (1999) recommended lower limit of 9.5 mg/L for early life stages of fish, one exceeded the CCME (1999) recommended lower limit of 6.5 mg/L for all life stages, and four were below the CCME (1999) recommended lower limit of 6.5 mg/L for all life stages (Table 5.3). The pH was within the accepted range (6.5 to 9.0) for the protection of freshwater aquatic life at one (WC-NGTL-04) of the ten sites surveyed, and below the recommended range at the nine remaining sites (Table 5.3). Specific conductivity ranged from 20 µS/cm to 110 µS/cm. Based on professional experience, this is within the typical range of conductivity measurements found in New Brunswick. At all sites turbidity was low (<10 NTU).

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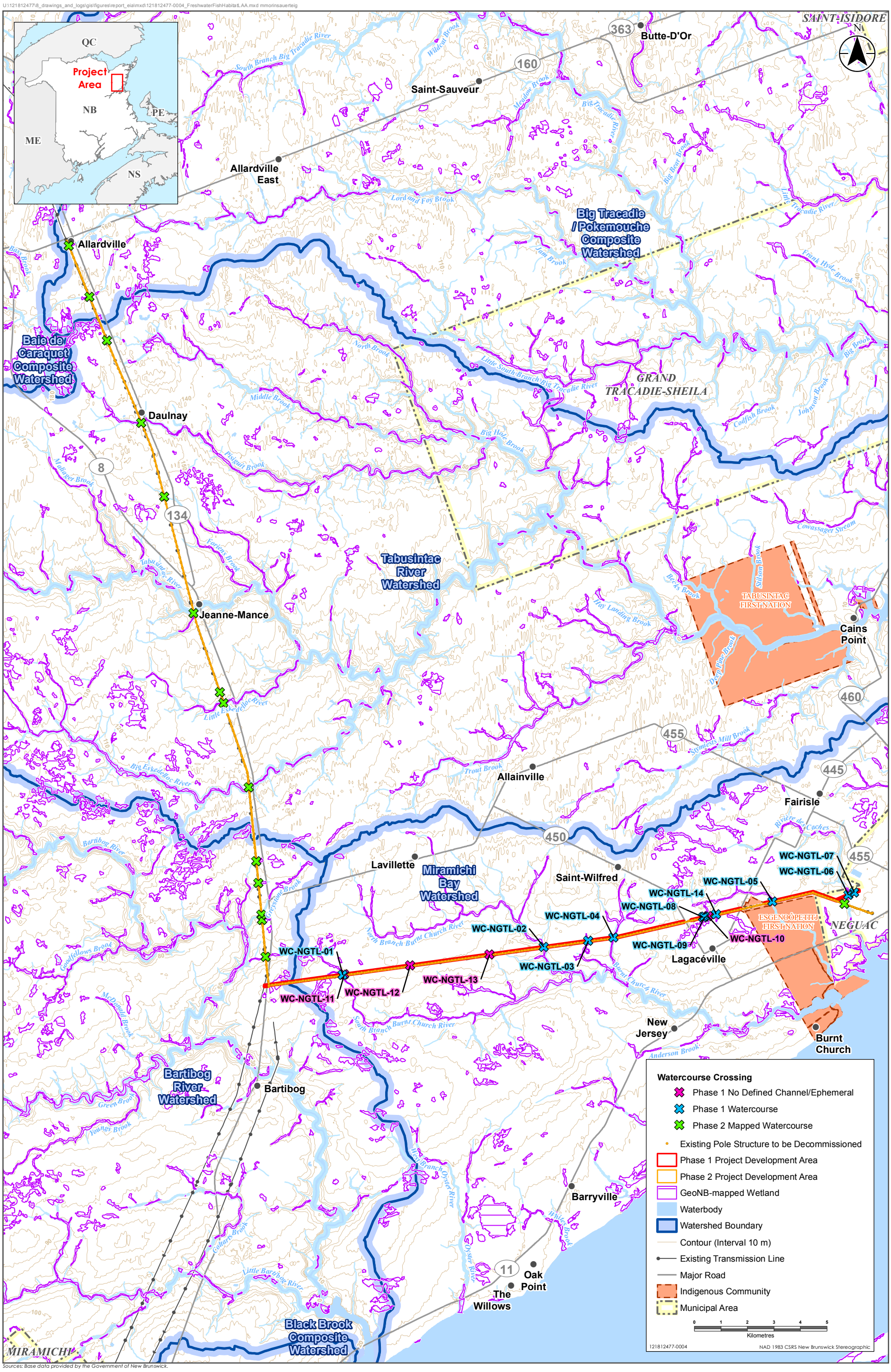

Sources: Base data provided by the Government of New Brunswick.

Local Assessment Area for Freshwater Fish and Fish Habitat

Stantec

121812477 - NEGUAC TRANSMISSION LINE

Figure 5.2

Table 5.3 In Situ Water Quality Parameters for Surveyed Watercourses

Watercourse	Survey Date	Water Temperature (°C)	Dissolved Oxygen (mg/L)	pH	Specific Conductivity (µS/cm)	Turbidity (NTU)
WC-NGTL-01	June 21, 2017	10.5	11.1	5.9	23	1.31
WC-NGTL-02	June 21, 2017	17.5	9.6	6.3	67	1.46
WC-NGTL-03	June 21, 2017	13.4	10.4	6.3	26	ND
WC-NGTL-04	June 21, 2017	19.5	8.5	7	100	2.41
WC-NGTL-05	September 25, 2017	13.1	10.6	6.5	102	2.41
WC-NGTL-06	June 21, 2017	12.4	10.8	6.2	110	1.2
WC-NGTL-07	June 21, 2017	15.3	5.1	5.7	61	5.67
WC-NGTL-08	June 21, 2017	17.6	5.6	6	102	9.75
WC-NGTL-09 (unmapped)	June 21, 2017	21.9	5.9	4.2	46	2.31
WC-NGTL-14	NA	ND	ND	ND	ND	ND

Notes: ND= No Data as this watercourse was not field surveyed, NA = Not Applicable

A summary of key fish habitat characteristics is provided in Table 5.4 and the subsequent discussion of the fish habitat for each watercourse is provided below.

Table 5.4 Summary of Key Fish Habitat Characteristics

Watercourse	% Riffle-Run/Pool	Average Bankfull Width (m)	Average Depth (m)	Dominant Substrate (s)	Bank Stability	Dominant Instream Cover
WC-NGTL-01	98/2	4.49	0.25	Fines	Stable	Aquatic Plants
WC-NGTL-02	98/2	8.25	0.26	Large Gravel	Stable	Woody Debris
WC-NGTL-03	100/0	1.09	0.69	Organics	Stable	Woody Debris
WC-NGTL-04	88/12	6.75	0.28	Large Gravel/Cobble	Stable	Woody Debris
WC-NGTL-05	82/18	13.56	0.29	Organic/Fines	Stable	Aquatic Plants
WC-NGTL-06	71/29	10.71	0.58	Fines	Stable	Water Depth/Clarity
WC-NGTL-07	100/0	1.56	0.14	Fines	Stable	Woody Debris
WC-NGTL-08	33/67	20.68	1.05	Organics	Stable	Aquatic Plants
WC-NGTL-09 (unmapped)	100/0	1.2	0.80	Organics/fines	Stable	Aquatic Plants/Woody Debris
WC-NGTL-14	ND	ND	ND	Organics	Stable	ND

Note: ND = no data

Watercourse WC-NGTL-01 is a second order stream with an average bankfull width of 4.49 m. The substrate was dominated by fines with smaller quantities of gravel, cobble, and organics. The banks

were stable and well-vegetated with grasses and shrubs. At the time of sampling, instream cover was provided by predominantly submergent aquatic vegetation. This watercourse contains habitat for brook trout and Atlantic salmon at various life history stages (rearing, juvenile and spawning).

Watercourse WC-NGTL-02 is a third order stream with an average bankfull width of 8.25 m. The substrate was dominated by small and large gravel, and cobble. Banks were stable and well-vegetated with shrubs and grasses. There was little instream cover which was provided by woody debris. This watercourse contains habitat for brook trout and Atlantic salmon at various life history stages (rearing, juvenile and spawning). Eastern pearlshell (*Margaritifera margaritifera*) mussels were also observed at WC-NGTL-02.

Watercourse WC-NGTL-03 is a mapped intermittent first order watercourse which flows into a series of wetlands and beaver impoundments downstream. Despite being mapped the watercourse does not follow the existing mapped location. It has an average bankfull width of 1.09 m when channelized. The substrate is dominated by organics and fines. The banks are stable and well-vegetated with shrubs and grasses where defined. Instream cover is provided by woody debris. This watercourse contains suitable habitat for brook trout of various life history stages (rearing, juvenile and spawning).

Watercourse WC-NGTL-04 is a third order stream with an average bankfull width of 6.75 m. An old beaver meadow was present upstream of the existing transmission line. The substrate was dominated by large gravel, cobble, and fines. The banks were stable and well-vegetated with grasses and shrubs. There was little instream cover which was provided by woody debris. This watercourse contains habitat for brook trout and Atlantic salmon at various life history stages (rearing, juvenile and spawning).

Watercourse WC-NGTL-05 is a second order stream with an average bankfull width of 13.56 m. There were signs of an old beaver meadow upstream of the existing transmission line. The substrate was dominated by organics and fines. The banks were stable and well-vegetated with grasses and shrubs. There were moderate amounts of instream cover which was provided by primarily by aquatic plants (submergent vegetation and algae). This watercourse contains suitable habitat for brook trout of various life history stages (rearing, juvenile and spawning). At the time of the survey, the habitat was generally not acceptable for Atlantic salmon as a result of organic/fine substrates and low water velocities throughout a large portion of the surveyed area.

Watercourse WC-NGTL-06 is a second order stream with an average bankfull width of 10.71 m. The substrate was dominated by fines, with smaller quantities of small and large gravel, and cobble. The banks were stable and well-vegetated with grasses and shrubs. There was little instream cover which was provided by water depth/clarity. This watercourse contains suitable habitat for brook trout of various life history stages (rearing, juvenile and spawning). At the time of the survey, the habitat was generally not acceptable for Atlantic salmon as a result of low water velocities from the beaver impoundment and elevation of the ford.

Watercourse WC-NGTL-07 is a first order headwater stream which is intermittent for 125 m of the LAA and does not exist within the remaining survey area (75 m). It connects to WC-NGTL-06 130 m downstream of the survey area. It has an average bankfull width of 1.56 m. The substrate was

dominated by fines. The banks are stable and well-vegetated by grasses and mixed forest. There is little instream cover which was provided by woody debris.

Watercourse WC-NGTL-08 is a mapped first order watercourse flowing across the existing transmission line and through a series of abandoned beaver impoundments. It has an average bankfull width of 20.68 m. The substrate is dominated by organics with some fines. The banks are stable and well-vegetated by grasses and mixed forest. There is abundant instream cover provided primarily by aquatic plants and woody debris.

Watercourse WC-NGTL-09 is an unmapped first order watercourse flowing through the existing transmission line and into WC-NGTL-08 at the largest beaver impoundment. It has an average bankfull width of 1.2 m. The substrate is dominated by organics with some fines. The banks are stable and well-vegetated by grasses and shrubs. There is little instream cover which was provided by woody debris and aquatic plants.

Watercourse WC-NGTL-14 is a mapped first order watercourse that flows across the existing transmission line and into a large wetland formed by a beaver impoundment downstream (Google 2017). No fish habitat field survey was conducted on this watercourse as a result of technical difficulties. The wetland survey indicated it was ephemeral within the existing and proposed RoW. The banks appear well-vegetated by wetlands and surrounding forest cover (Google 2017).

5.3.3.1.2 Phase 2

The RoW for the existing 69 kV transmission lines (0104 and 0012) to be decommissioned crosses a total of 21 mapped watercourses in four different watersheds, including the Tabusintac River, Big Tracadie River, Bartibog River, and Miramichi Bay watersheds (Figure 5.2). The decommissioning of Line 0104 (Phase 2 of the Project) crosses seven mapped watercourses within the Miramichi Bay watershed. The decommissioning of the 29 km portion of Line 0012 (Phase 2 of the Project) crosses seven mapped watercourses in the Tabusintac watershed, two mapped watercourses in the Big Tracadie watershed, and five mapped watercourses in the Bartibog watershed. These watercourses range from first order to fourth order streams. Within the Big Tracadie River watershed, the RoW for the existing 69 kV transmission lines cross Lord and Foy Brook; which are first order streams. Within the Bartibog River watershed, the RoW for the existing 69 kV transmission lines cross unnamed tributaries to the Bartibog River; which range from first order to second order streams.

For watercourses that were crossed only by Phase 2 and will not be subject to construction activities, a desktop analysis was primarily used to estimate fish habitat characteristics for the potential watercourse crossing locations. Site visits to the major watercourses crossed by highway 8 (i.e., Big Eskedelloc River, Little Eskedelloc River, Bartibog River, Maliaget Brook) were also used to verify the information from the desktop analysis. The desktop analysis included:

- Aerial imagery (Google 2017)
- Public information data requests from NBDERD on electrofishing site fish habitat survey data

New Brunswick Department of Energy and Resource Development electrofishing fish habitat survey data was collected in July, August, and September between 2007 and 2016 within the three major

watersheds along the RoW (Connell, C., pers. comm., 2017). Water temperatures at the time of sampling between 2007 and 2016 ranged from 10.8°C to 20.1°C and were generally suitable for coldwater fish species such as Atlantic salmon and brook trout. The pH was within the accepted range (6.5 to 9.0) for the protection of freshwater aquatic life at all of the sites surveyed between 2007 and 2016 (CCME 1999). Specific conductivity ranged from 38 µS/cm to 114 µS/cm and based on our professional experience is within the ranges typically observed in New Brunswick. Total dissolved solids were low (<0.1 mg/L) at all sites.

Average bankfull width of the watercourses surveyed was 5.6 m to 13.9 m (Connell, C., pers. comm., 2017). Watercourses typically consisted of riffle/run or flat habitat with some pool habitat (<25%). The substrate was dominated by gravel and rubble (55%), with smaller proportions of rock, sand, fines, bedrock, and boulder. Embeddedness was low. The banks were stable and well-vegetated primarily with shrubs and small amounts of grass. There was little instream cover which was provided primarily by woody debris.

Based on the fish habitat information collected in association with other aspects of the Project, the watercourses assessed by desktop analyses appear to provide a similar range of flowing freshwater fish habitats to other watercourses in the area.

5.3.4 Fish Species

The fish species present in watercourses within the LAA were investigated by desktop research. Specifically, information on the fish species present was derived from:

- Relevant federal reports and publications on fish species of management concern (e.g., Canadian Science Advisory Secretariat Science Advisory Reports, Department of Fisheries and Oceans Integrated Management Plans)
- Public information data requests from NBDERD and DFO for electrofishing survey data
- Relevant federal and provincial reports on SAR and SOCC (e.g., COSEWIC status reports)

Fish community information is available for the Bartibog, Tabusintac, and Big Tracadie rivers. The fish communities within the other rivers in the Project area are expected to be similar based on similar habitat characteristics and proximity of these watercourses to other adjacent rivers; however, fish communities may differ slightly based on size of the watercourses. Based on this desktop analysis, there are likely 16 species of freshwater fish and eight species of diadromous fish known to be present in the watersheds of the Project. Freshwater fish species include banded killifish (*Fundulus diaphanous*), blacknose dace (*Rhinichthys atratulus*), brook trout, brown bullhead (*Ameiurus nebulosus*), common shiner (*Luxilus cornutus*), creek chub (*Semotilus atromaculatus*), fourspine stickleback (*Apeltes quadracus*), golden shiner (*Notemigonus crysoleucas*), lake chub (*Couesius plumbeus*), mummichog (*Fundulus heteroclitus*), ninespine stickleback (*Pungitius pungitius*), slimy sculpin (*Cottus cognatus*), threespine stickleback (*Gasterosteus aculeatus*), white perch (*Morone Americana*), white sucker (*Catostomus commersoni*), and yellow perch (*Perca flavescens*) (DFO 2017d; Connell, C., pers. comm., 2017; UNB 2017). Diadromous fish species include rainbow smelt, gaspereau, American shad (*Alosa sapidissima*), Atlantic salmon, American eel, sea lamprey (*Petromyzon marinus*), and striped bass (*Morone saxatilis*). Of the diadromous fish species that have the potential to be present, American eel, Atlantic salmon and sea lamprey are most likely to occur within the Project area.

Among the fish species identified, many may be considered to hold commercial, recreational, and Aboriginal value. Commercial fisheries exist for American eel, rainbow smelt, and gaspereau (alewife and blueback herring) in the mouths of rivers or estuaries associated with the Bartibog River, Burnt Church River, Rivière des Caches, Indian Brook, Tabusintac River, and Big Tracadie River (DFO 2017a; DFO 2017b; DFO 2017c). Among the commercial fish species, American eel has the highest potential to be present in the Project area because they are known to migrate far up inland watersheds and into smaller watercourses. Recreational fisheries exist for Atlantic salmon, brook trout, American eel, gaspereau, rainbow smelt, American shad, striped bass, white perch, and yellow perch on the Bartibog, Burnt Church, Tabusintac and Big Tracadie rivers (GNB 2017a). Further, Aboriginal Mi'kmaq groups in the area hold communal commercial eel, smelt, and gaspereau licences (DFO 2017a; DFO 2017b; DFO 2017c), and have agreements to fish for other fish species for food, social, and ceremonial purposes (DFO 2012), and these are described in more detail in Section 5.8.
In addition to CRA fisheries, the LAA has the potential to contain fish SAR. Atlantic salmon that may be present in the LAA (DFO 2012) are of the Gaspe-Southern Gulf of St. Lawrence population, which is listed as *special concern* by COSEWIC and NB *SARA*. American eel is listed as *threatened*, by both COSEWIC and NB *SARA*. Gulf of St. Lawrence populations of American eel have generally shown an increasing trend in abundance (DFO 2010). Although both of these species are listed, their current status does not provide them legal protection; however, the overall effects of the Project on these species are precited to be low as described in Section 5.3.5.

There are no freshwater fish SOCC known within the Project area.

5.3.5 Assessment of Potential Environmental Interactions with Freshwater Fish and Fish Habitat

This section describes how the Project activities could interact with freshwater fish and fish habitat as well as the techniques and practices that will be applied to mitigate the potential effects of these interactions.

5.3.5.1 Phase 1

Phase 1 consists of the construction, operation and maintenance of a new 138 kV substation near the village of Neguac, and a new 23 km-long 138 kV transmission Line 1220 (see section 2.0).

5.3.5.1.1 Construction

There are no watercourses within 30 m of the new substation. Therefore, construction activities associated with the new substation are not anticipated to interact with fish and fish habitat.

Construction activities associated with transmission line construction have potential to interact with fish and fish habitat. Specifically, the use of heavy equipment around watercourses or in riparian areas during riparian clearing or grading for excavation of holes or structure assembly may interact with fish and fish habitat. A change in fish habitat could result through alterations to riparian habitats (e.g., change in structure or cover) or as a result from the erosion and transportation of soils within the RoW (e.g., change in sediment concentrations or increase in fines downstream). The removal of riparian vegetation adjacent to the watercourse has the potential to increase water temperatures by exposing the watercourse to direct sunlight, and to reduce protective overhead cover for fish. However,

substantial warming is unlikely because of the size of the streams crossed, and the small water surface area available for warming within the RoW.

During construction of the new 138 kV transmission line will include the use of heavy equipment (e.g., excavators, clearing equipment) for clearing vegetation, and upgrading or building access roads. A potential interaction with freshwater fish and fish habitat could occur as a result of washing, fueling, or repairing machinery or storing other deleterious substances within the riparian area could allow deleterious substances to enter watercourses.

NB Power will reduce the potential for interactions between the Project and freshwater fish and fish habitat by adhering to best management practices and the PSEMP. Overall, NB Power will mitigate risks to freshwater fish and fish habitat by preventing machinery from entering watercourses; preventing the movement of sediments and woody debris into watercourses; limiting the clearing of riparian areas adjacent to watercourses (e.g., prune or top vegetation instead of grubbing); and, reducing the potential for deleterious substances to enter watercourses. Specifically, best management practices will include:

- Clearly mark watercourses and riparian buffers prior to accessing or operating heavy equipment in the RoW
- Use existing bridges, roads or temporary structures when crossing watercourses
- Use and maintain silt fencing or hay bales in areas where soil disruption could result in the transport of sediment into watercourses
- Remove silt fencing after revegetation has occurred
- Plan activities (e.g. fueling) so that deleterious substances do not enter watercourses
- Maintain a buffer zone on the banks of watercourses
- Prune or top vegetation within the riparian area where practical
- Relocate brush and woody debris to areas where it cannot enter watercourses
- Adhere to a maximum RoW width of 30 m as part of Project design

The practices used to mitigate risks to freshwater fish and fish habitat will be applied to all phases and activities of the Project.

5.3.5.1.2 Operation and Maintenance

During operation and maintenance activities for the new 138 kV transmission line (Line 1220) and new substation, accessing the RoW to trim vegetation or repair equipment could result in heavy equipment entering the watercourse which could result in changes to fish health (including possible direct mortality of fish) or changes in fish habitat through instream or riparian disturbances (e.g., bank erosion). Mitigation for operation and maintenance activities will be as described above for construction activities, including the use of temporary bridges to cross watercourses, where access requires.

5.3.5.2 Phase 2

Phase 2 consists of decommissioning and abandonment activities associated with the existing 69 kV Neguac substation and existing 69 kV transmission Lines 0104 and 0012.

Phase 2 activities have the potential to interact with freshwater fish and fish habitat in that heavy equipment may require the use of temporary bridges to cross watercourses to remove poles, conductors, and hardware. In areas where soil disturbance due to decommissioning causes erosion, measures will be taken to stabilize the affected area as described in Section 5.3.5.1.1.

There are no activities associated with the decommissioning of the existing Neguac substation that would interact with freshwater fish and fish habitat.

5.3.6 Summary for Freshwater Fish and Fish Habitat

With mitigation, it is not anticipated that there will be any substantial interaction between the Project and freshwater fish and fish habitat during any phase of the Project. The Project, as planned is not anticipated to result in fish mortality, a substantive change in fish habitat, or a loss in fisheries productivity. The Project is not anticipated to result in serious harm to any CRA species as defined in the Fisheries Act, or result in the killing, harming, or harassment, and damage or destruction of the habitat of any freshwater fish SAR as defined in the federal *SARA* or NB *SARA*.

5.4 VEGETATION AND WETLANDS

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the vegetation and wetlands VC.

5.4.1 Scope of Assessment

Vegetation and wetlands has been selected as a VC due to the potential for interactions between the Project and plant species at Risk (SAR), Species of Conservation concern (SOCC), and habitats including wetlands and Ecological Communities of Management Concern (ECMC).

This VC focuses on vegetation SAR and SOCC, as well as wetlands. 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 NB *SARA*.

SOCC are species not listed or protected by any legislation, but are considered rare in New Brunswick, 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 New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC).

ECMC are typically vegetation communities which fulfill special management objectives on Crown land in New Brunswick. They may also have been identified on Crown or private land through field work or by local conservation organizations as supporting unique ecological features (e.g., Environmentally Significant Areas (ESA)).

Wetlands are defined as lands that are permanently or temporarily submerged, with water near the soil surface for long enough to maintain wet or poorly drained soils, support plants adapted to saturated soil

conditions, and have other biotic conditions characteristic of wet environments (GC 1991; NBDNRE and NBDELG 2002). Wetland conservation is addressed in both The Federal Policy on Wetland Conservation (GC 1991) and the New Brunswick Wetlands Conservation Policy (NBDNRE and NBDELG 2002).

The federal policy aims to protect wetlands on federal lands and waters or within federal programs where wetland loss has reached critical levels, and also within federally designated wetlands, such as Ramsar sites (GC 1991). None of these conditions apply to the Project.

In New Brunswick, regulation and conservation of wetlands are under the jurisdiction of NBDELG. The provincial wetland policy focuses on protecting wetlands in New Brunswick through securement, increasing education and awareness, and maintaining wetland function. These policy goals are enforced through the New Brunswick *Clean Water Act* and associated *Watercourse and Wetland Alteration (WAWA) Regulation*, and the New Brunswick *Clean Environment Act* and associated *Environmental Impact Assessment Regulation* (*EIA Regulation*). The *WAWA Regulation* applies to all wetlands of 1 hectare (ha) or greater in size, or any wetland contiguous to a watercourse. The *EIA Regulation* considers any activities or projects affecting 2 or more ha of wetland to be an undertaking requiring registration. Any wetlands considered to be "Provincially Significant Wetlands" (primarily tidal wetlands and wetlands adjacent to the lower Saint John River) are subject to a greater level of protection under the provincial policy (NBDNRE and NBDELG 2002).

NBDELG maintains a publicly-available official map of "Regulated Wetlands" in the province on the GeoNB website (SNB 2011). Current guidance from NBDELG (the "Short Term Strategy") released in November 2011 indicates that the wetlands on the GeoNB website, or "GeoNB-mapped wetlands," represent the extent of regulated wetlands within New Brunswick (NBDELG 2011). The Short-Term Strategy states that permits are required for any alterations occurring in GeoNB-mapped wetlands or within 30 m of the boundary of a GeoNB-mapped wetland, and that wetland habitat lost from GeoNB-mapped wetlands will require compensation at a ratio of 2:1 (NBDELG 2011).

Currently, wetland area is frequently used in New Brunswick and other Canadian jurisdictions as a surrogate when discussing potential loss of wetland function. This assessment discusses noteworthy wetland functions that were observed, but potential environmental interactions are reported in terms of amount of wetland area affected. It is assumed that wetland compensation may be required for any permanent loss of wetland area, to achieve the goal of no net loss of wetland function described in the provincial wetland conservation policy.

5.4.1.1 Boundaries

The PDA was described in Section 4.2.1.

The LAA is defined as the potential zone of Project interactions with vegetation and wetland habitat. For Phase 1, the LAA is a 500 m buffer of PDA, which includes the 138 kV transmission line and new substation. For Phase 2, the LAA is a 500 m buffer of the centre line of the PDA, which includes existing sub-station and existing Lines 0104 and 0012, which will be decommissioned. The temporal boundaries were described in Section 4.2.2.

5.4.2 Existing Conditions for Vegetation and Wetlands

5.4.2.1.1 Field Surveys

5.4.2.1.1.1 *Vegetation and Wetlands*

A vascular plant and wetland survey was completed from July 17 to 20, 2017 within the PDA. A follow-up botanical and wetland survey was conducted on September 14, 2017. Wetlands were also delineated within an additional 30 m buffer around the PDA. During the survey, all vascular plant species encountered were recorded and a GPS location was recorded for each vascular plant SAR or SOCC incidence encountered, along with information such as population size. Any plants for which identification was uncertain were collected and later identified with the assistance of vascular plant flora manuals.

Wetland surveys were conducted concurrently with vascular plant surveys. Wetlands encountered within 30 m of the PDA were delineated and classified per the Canadian Wetland Classification System (CWCS, NWWG 1997). This system classifies wetlands to three levels: class, form/subform, and type. There are five wetland classes: bog, fen, swamp, marsh, or shallow water. Form and subform indicate the physical morphology and hydrological characteristics of the wetland. Wetland type distinguishes wetland plant communities based on one of eight groups of dominant vegetation. Information on wetland function was also recorded for each wetland within 30 m of the PDA, and geographic coordinates and field notes were recorded for wetland boundaries. Wetlands that extended beyond 30 m of the PDA were interpreted using aerial imagery, forest cover data, and LiDAR data.

5.4.2.1.2 Overview of Existing Conditions

Ecological Communities of Management Concern

Wildlife habitat includes Ecological Communities of Management Concern (ECMC). ECMC are typically vegetation communities which fulfil special management concerns in New Brunswick (e.g., deer wintering areas (DWAs), Protected Natural Areas (PNAs), interior forest, ESAs). Interior forest is addressed in wildlife and wildlife habitat (Section 5.5)

There is one ECMC found within the LAA. This is the North Branch Burnt Church River PNA. The southern boundary of this PNA extends approximately 100 m into the northern half of the LAA. One other PNA, the South Branch Burnt River PNA is located approximately 1.7 km south of the LAA. The Hay Island ESA is located approximately 2 km south of the eastern end of the LAA. Two ESA's are found along Highway 8 at the western end of the LAA. These include the Green Brook ESA located approximately 2 km south of the west end of the LAA and the Bartibog/Greystone Brook ESA situated approximately 3 km north of the western end of the LAA.

Vascular Plant SAR and SOCC

During field surveys conducted in support of the Project, 312 vascular plant species were recorded within the PDA and surrounding areas (Appendix D, Table D.1). Three of these species are SOCC

including white fringed orchid (*Platanthera blephariglottis*), Pickering's reed-grass (*Calamagrostis pickeringii*) and Wiegand's sedge (*Carex wiegandii*).

White Fringed Orchid

The New Brunswick population of white fringed orchid is listed as Vulnerable (S3) by the AC CDC but is listed as Secure by the Canadian Endangered Species Conservation Council (CESCC). This species is typically found growing on wet peaty soil with little overhead cover such as bogs and wet meadows. White fringed orchid was found at the western and eastern ends of the PDA. Of the 157 white fringed orchid plants recorded during the field surveys, 153 were found at the western end of the PDA. Fifty plants were recorded in Wetland 2, 60 in Wetland 3, 10 in Wetland 4 and 33 in Wetland 5. At the eastern end of the PDA, two plants were recorded in Wetland 28 and two more plants were found growing in a forested area approximately 200 m northwest of Wetland 28. White fringed orchid was found growing in several types of wetland including treed bog, deciduous treed swamp and mixedwood treed swamp. In forested swamps, it tended to occur in small numbers in gaps in the tree canopy. It was much more abundant in wetlands with little overhead cover such as bogs. Large numbers were observed in treed bog in Wetland 2, 4 and 5. White fringed orchid was found both in undisturbed wetland and on the existing RoW. It was found on the existing RoW in Wetlands 4, 5 and 28 with all of the plants from Wetland 4 and 28 found in the existing RoW. Seventy-seven percent of the white fringed orchids recorded during the field surveys were found in the existing RoW rather than the proposed transmission line RoW. An AC CDC data search conducted for an area extending 5 km out from the PDA indicated that this species had not previously been recorded in this area. There are 112 records of white fringed orchid within a 100 km radius of the PDA with the nearest recorded population found 8.6 km from the PDA.

Pickering's Reed-grass

Pickering's reed-grass is listed as Vulnerable (S3) in New Brunswick by the AC CDC but is listed as Secure in the province by CESCC. This species grows on open wet peaty soils in bogs and wet meadows. One 3 m X 2 m patch of Pickering's reed-grass was found growing on treed bog in Wetland 3. These plants were growing in the existing RoW with none present in the proposed RoW. The AC CDC data search revealed that one record of Pickering's reed-grass has been recorded within 100 km of the PDA at a distance of 62.5 km.

Wiegand's Sedge

The New Brunswick population of Wiegand's sedge is listed as Vulnerable (S3) by the AC CDC but is listed as Secure by the CESCC. It has similar habitat preferences to white fringed orchid and Pickering's reed-grass. Wiegand's sedge typically grows in treed bogs and coniferous treed swamps on wet peaty soils. During the field survey four small patch of Wiegand's sedge were recorded in treed bog in Wetland 3 not far from the Pickering's reed-grass record. These patches were found on the existing RoW. Twenty-three records of Wiegand's sedge have been recorded within 100 km of the PDA with the nearest record 8.1 km away.

Invasive Vascular Plants

The area that the PDA is situated in has been subjected to light to moderate levels of anthropogenic disturbance. The western end of the PDA is uninhabited and disturbance consists of road crossings and clear-cuts, and light ATV use on the existing RoW. Human habitation is present near the eastern end of the PDA. In addition to road crossings and forestry activity there is some agricultural activity in this area. ATV activity on the existing RoW in this area is heavy. The presence of anthropogenic disturbance is an important factor in the establishment and spread of non-native plant species. Disturbance activities that create gaps in native plant cover provide opportunities for non-native plants to be come established. Linear disturbance features such as roads provide conduits for non-native plant species to move around the landscape. Construction equipment can also act as a vector to spread non-native plant species by moving seeds and plant parts from one site to another. The proportion of non-native plant species present along the PDA was low with 28 non-native species present out of a total of 312 species recorded (9.0%) (Appendix D; Table D.1). Most exotic species are unlikely to cause extensive changes to native plant communities; however, invasive species are non-native species that can spread rapidly (sexually, asexually, or both) and can cause harm, either ecological, economic, or to human health (NISC 2006). Ecological harm can include outcompeting native species and reducing biodiversity, and changing ecological function (e.g., reducing wildlife habitat). Economic harm could include damage to crops or timber, and harm to human health includes the effects of poisonous plants (NISC 2006). None of the exotic plants recorded along the PDA are considered to be invasive species.

Land Classification

Forest covers 67.6% of the LAA (Table 5.5) and forested wetlands occupy an additional 14.9%. Most forest in the LAA is immature; with 42.9% of the LAA occupied by immature stands and 24.7% of the LAA occupied by mature stands. Coniferous forest occupies 31.5% of the LAA while hardwood and mixedwood stands occupy 19.0 and 16.4% of the LAA.

Table 5.5 Land Classification within the PDA and LAA

Land classification	PDA		LAA	
	Hectares	%	Hectares	%
Agricultural	0.85	2.3	72.17	3.0
Anthropogenic	0.23	0.6	60.40	2.5
Transmission Line	4.46	12.2	49.16	2.0
Industrial	0.18	0.5	16.34	0.7
Esgenoôpetitj Indian Reserve No.14	0	0	82.16	3.4
Forest Types				
Clearcut	0	0	11.34	0.06
Regeneration-sapling Hardwood	1.83	5.0	57.05	2.4
Regeneration-sapling Mixedwood	0.34	0.9	16.71	0.7

Table 5.5 Land Classification within the PDA and LAA

Land classification	PDA		LAA	
	Hectares	%	Hectares	%
Regeneration-sapling Softwood	1.01	2.8	70.51	2.9
Young-immature Hardwood	4.90	13.4	228.74	9.4
Young-immature Mixedwood	3.92	10.7	234.37	9.7
Young-immature Softwood	6.30	17.2	419.69	17.3
Mature-overmature Hardwood	2.68	7.3	174.04	7.2
Mature-overmature Mixedwood	1.52	4.2	144.19	6.0
Mature-overmature Softwood	2.23	6.1	272.47	11.3
Forestry Other	0	0	7.08	0.3
Forest Total	24.73	67.8	1636.19	67.6
Wetlands				
Bog	0.45	1.2	27.48	1.1
Treed Bog	0.69	1.9	72.11	3.0
Fen	0	0	1.11	0.05
Freshwater Marsh	0.52	1.4	8.57	0.4
Shallow Water Wetland	0.08	0.2	1.32	0.05
Low Shrub Swamp	0	0	0.08	0.003
Tall Shrub Swamp	0.62	1.7	33.53	1.4
Deciduous Treed Swamp	0.95	2.6	19.43	0.8
Mixedwood Treed Swamp	0.76	2.1	98.51	4.1
Coniferous Treed Swamp	1.95	5.3	241.16	10.0
Wetland Total	6.02	16.5	503.3	20.8
Total	**36.47**	**100.00**	**2419.71**	**100.00**

Overall, approximately 21% of the LAA is wetland, which is slightly higher than the provincial average of about 18%. This is to be expected since the Eastern Lowlands Ecoregion in which the LAA is situated has the highest percentage of wetland cover of all the ecoregions in New Brunswick. The wetlands within the LAA tend to occur as relatively large wetland complexes interspersed with large areas containing relatively few wetlands. The western end of the RoW is particularly rich in wetland habitat as is the area near Big Brook and Indian Brook.

Anthropogenic and industrial presence/activity represents only 3.2% of the LAA, as the LAA over most of its length is relatively remote from human habitation. All human habitation is restricted to the eastern end of the route. Agricultural land accounts for only 3.0% of the LAA. Agricultural activity consists

largely of hay and blueberry production which is largely restricted to the eastern half of the route. Approximately 3.4% of the LAA falls within land owned by the Esgenoôpetitj First Nation which is almost entirely forested.

The PDA is 36.47 ha in size; most of it is located adjacent to and within the existing transmission line right-of-way (RoW). Transmission line accounts for 12.2% of the PDA compared to 2.0% in the LAA.

Other than the higher percentage of transmission line in the PDA, the PDA is generally representative of the land cover present in the LAA. Forest covers 67.8% of the PDA and 67.6% of the LAA, while wetland covers 16.5% of the PDA and 20.8% of the LAA. Forest cover in the PDA is largely immature with immature softwood and hardwood forests the most abundant forest classes. Agricultural, anthropogenic, and industrial land cover types together occupy 3.4% of the PDA.

Wetland Types

Softwood treed swamp is the most common wetland type within the PDA, accounting for 5.3% of the PDA. Two distinct types of coniferous tree swamp are present in the PDA. The most common type is associated with acidic, oligotrophic wetlands. The tree layer is typically dominated by black spruce (*Picea mariana*), while the dense shrub understory is composed largely of a mixture of mountain holly (*Nemopanthus mucronatus*), rhodora (*Rhododendron canadense*) and northern wild raisin (*Viburnum nudum*) along with stunted black spruce. The ground vegetation layer consists of a sphagnum moss (*Sphagnum* spp.) carpet that is punctuated by patches of forbs and sedges including bunchberry (*Cornus canadensis*) and three-seeded sedge (*Carex trisperma*).

The second type of coniferous treed swamp is found on rich seepy slopes along river valleys. The tree canopy is composed mainly of eastern white cedar (*Thuja occidentalis*) along with some balsam fir (*Abies balsamea*). The shrub understory is relatively sparse and is composed largely of a mixture of advanced regeneration of balsam fir, mountain maple (*Acer spicatum*) and beaked hazel (*Corylus cornuta*). The ground vegetation layer consists largely of bunchberry, spotted jewelweed (*Impatiens capensis*), cinnamon fern (*Osmunda cinnamomea*), common oak fern (*Gymnocarpium dryopteris*), and dwarf red raspberry (*Rubus pubescens*).

The second most abundant wetland type is deciduous treed swamp which covers 2.6% of the PDA. The tree canopy is composed mainly of red maple (*Acer rubrum*); however, in some deciduous treed swamps the canopy is dominated by a mixture of red maple and trembling aspen (*Populus tremuloides*). The shrub layer is characterized by the presence of speckled alder (*Alnus incana*) and advanced regeneration of either balsam fir or red maple. Other common shrub species in these wetlands include northern wild raisin and mountain holly. The ground vegetation layer is characterized by the presence of dwarf red raspberry, three-seeded sedge, and bunchberry. Other commonly encountered ground vegetation species include sensitive fern (*Onoclea sensibilis*), royal fern (*Osmunda regalis*), wild lily-of-the-valley (*Maianthemum canadense*), sphagnum moss, nodding sedge (*Carex gynandra*), and hairy flat-topped white aster (*Doellingeria umbellata*).

Mixedwood treed swamps occupy 2.1% of the PDA. These swamps typically have a tree overstory composed of a mixture of balsam fir and red maple. The shrub understory is usually composed of

balsam fir saplings and speckled alder; however, in some mixedwood treed swamps, the speckled alder is replaced by mountain holly or beaked hazel. The species composition of the ground vegetation layer is highly variable. The most abundant ground vegetation species include sensitive fern, cinnamon fern, sphagnum moss, spotted jewelweed, fowl manna grass (*Glyceria striata*), and three-seeded sedge.

Tall shrub swamps are found mainly along watercourses and occupy 1.7% of the PDA. These wetlands are characterized by a dense shrub layer composed largely of speckled alder. Scattered red maple and eastern white cedar make up the sparse tree canopy. The ground vegetation layer is often dominated by grasses including slender manna grass (*Glyceria melicaria*), fowl manna grass, and bluejoint reed grass (*Calamagrostis canadensis*). Other common ground vegetation species include spotted jewelweed and sphagnum moss.

Bogs are present at the western end of the PDA. Bog and treed bog together cover 3.1% of the PDA. They are similar in species composition but differ in structure. The treed bogs have a very sparse tree canopy composed of black spruce and tamarack (*Larix laricina*). These species are present in the bogs but do not reach tree size. The shrub layer of the bogs is typically composed of a mixture of ericaceous shrubs including leatherleaf (*Chamaedaphne calyculata*), sheep laurel (*Kalmia angustifolia*), common Labrador tea (*Ledum groenlandicum*), and rhodora. Stunted black spruce and tamarack are also present in the shrub layer. The ground vegetation layer consists of a sphagnum moss mat that is punctuated by patches of narrow-leaved cotton-grass (*Eriophorum angustifolium*).

Freshwater marsh is present at many locations along the PDA but typically are small in size, accounting for only 1.4% of the PDA. These wetlands are typically associated with disturbed areas such as drained beaver ponds and areas along the existing transmission line that have been subjected to ATV traffic. The vegetation of these wetlands is characterized by a dense graminoid sward composed of a variety of grasses, sedges, bulrushes, and rushes. The most abundant of these species are bluejoint reed grass, Canada manna-grass (*Glyceria canadensis*), slender manna grass, black-girdled bulrush (*Scirpus atrocinctus*), small-fruited bulrush (*Scirpus microcarpus*), rice cut-grass (*Leersia oryzoides*), silvery sedge (*Carex canescens*), awl-fruited sedge (*Carex stipata*), and broom sedge (*Carex scoparia*). Shrub cover is patchy and consists mainly of speckled alder along with saplings of red maple and paper birch (*Betula payrifera*). Tree cover consists of scattered balsam fir, black spruce, and paper birch.

One shallow water wetland was encountered in the PDA. This is a roadside pond near the western end of the PDA. The water in the pond is heavily stained by tannins so there is little growth of submerged aquatic plants other than sphagnum moss. Some emergent graminoids are present around the margin of the pond including black-girdled bulrush and bluejoint reed grass. Shrub cover consists of scattered speckled alder, pussy willow (*Salix discolor*) and black spruce.

Wetland Functions

Wetlands present along the PDA can be divided into five main categories based on the wetland types present in them and their locations on the landscape. Wetlands 3, 5, 15, 17, and 20 are all large wetland complexes composed of between 4 and 8 wetland types (Appendix D, Table D2). These wetlands often contain mixtures of bogs, forested wetlands, shrub swamps, and freshwater marshes. They contain wetlands at headwater positions as well as riparian wetlands.

Headwater riparian wetlands include mostly mixedwood treed swamp and freshwater marshes that are located at the headwater positions of streams (Wetlands 8, 9, 12, 13, 19 and 26). They are characterized by the presence of small intermittent or permanent streams and scattered pools.

Riparian wetlands are long linear wetlands that occupy the floodplains of larger streams and rivers (Wetlands 14, 25 and 29). They are subject to flooding seasonally and during heavy rainfall events. Wetland types typically associated with these wetlands are tall shrub dominated swamp, coniferous treed swamp and mixedwood treed swamp.

Basin wetlands are situated in topographically defined declivities and have no well defined inlets or outlets. Most of these wetlands are quite small and are mostly forested swamps. Wetlands that fall within this category include Wetlands 1, 2, 6, 10,18, 21, 22, and 28.

Right-of-way wetlands are small wetlands that are entirely located within the existing transmission line RoW (Wetlands 4, 7, 11, 16, 23, 24, and 27). These wetlands generally do not have an inflow or outflow. Most have been subjected to heavy wheel rutting which has deranged wetland drainage and led to the development of shallow pools. Most of these wetlands support freshwater marshes probably due to exposure to heavy soil disturbance and implementation of vegetation control measures on a regular basis.

An overview of the functional character of wetlands intercepted by the PDA is provided below based on field observations, analysis of aerial imagery and professional judgement. Functional attributes of individual wetlands are presented in Appendix D in Table D.2.

Wildlife Habitat

All wetlands intercepted by the PDA had potential to serve as habitat for terrestrial mammals. Most wetlands also provided suitable habitat for terrestrial birds. The wetlands that had low value as habitat for terrestrial birds were small freshwater marshes that had developed on the existing RoW (right-of-way wetlands) as a result of impeded drainage (Wetlands 4, 7, 11, 23, 24, and 27). The combination of small size and lack of structural complexity of the vegetation limits their ability to support terrestrial bird populations.

Only a few wetlands offered suitable habitat for waterfowl and waterbirds. These species require relatively large areas of open water which were present only in a few of the larger wetland complexes including (Wetlands 15, 17, and 20) where large beaver ponds were present.

Habitat for semi-aquatic mammals was restricted to large wetland complexes containing stream networks large enough to support beaver ponds (Wetlands 15, 17, and 18) as well as riparian wetlands through which larger streams and rivers flowed (Wetlands 5, 14, 25, and 29).

Amphibian breeding habitat was present in most of the wetlands intercepted by the PDA. Basin wetlands were the only wetland group that provides few opportunities for amphibian breeding. These wetlands were generally small and contained little standing water. The wheel rut pools in the right-of-way wetlands provide good amphibian breeding opportunities particularly for species that prefer to breed in ephemeral pools.

Aquatic invertebrate habitat was found in all but a few wetlands intercepted by the PDA. Most wetlands had pools or streams present in them. A few of the drier basin and right-of-way wetlands did not have standing water in them.

Species at Risk that were associated with wetlands along the PDA included olive-sided flycatcher (*Contopus cooperi*), eastern wood-pewee (*Contopus virens*), Canada warbler (*Wilsonia canadensis*) and common nighthawk (*Chordeiles minor*). Olive-sided flycatchers were associated with Wetland 5 where there was an interspersion of recent clearcuts and coniferous treed swamp. The recent clear-cuts provided the open areas favored by olive-sided flycatchers for feeding and displaying while the interspersed patches of coniferous treed swamp provided nesting and perching sites. Common nighthawks were found in this same area. This species was probably less reliant on the wetland habitat and was likely nesting in the recent clear-cuts and foraging over the wetlands. Canada warblers were associated with Wetlands 15 (coniferous treed swamp) and 26 (mixedwood treed swamp). Canada warblers require forested areas with open overstory tree cover with a dense shrub understory and a mossy hummocky ground surface. Coniferous and mixedwood treed swamps provide these conditions. Eastern wood-pewees prefer mature hardwood or mixedwood forest located at the edge of a clearing. An eastern wood-pewee was found at the edge of Wetland 9. It is likely that this eastern wood-pewee was attracted more to the edge habitat at this location rather than the wetland habitat.

Three plant SOCC were associated with wetlands along the PDA including Wetlands 2, 3, 4, 5 and 28. These included white-fringed orchid, Pickering's reed-grass, and Wiegand's sedge. These species are associated with cool, acidic peatlands. The western end of the PDA (Wetlands 2, 3, 4, and 5) contains large areas of bog and treed bog that provide suitable habitat for these species. White-fringed orchid is also found in Wetland 28 at the eastern end of the PDA. At this location, it is associated with acidic mixedwood treed swamp.

Carbon Sequestration

Carbon sequestration is associated mainly with the large wetland complexes (Wetlands 3, 5, 15, 17, and 20). These wetland complexes typically have bogs associated with them that are capable of storing large amounts of carbon in the form of peat.

Stream Flow Functions

Stream flow regulation is associated with the large wetland complexes (Wetlands 3, 5, 15, 17, and 20), the headwater riparian wetlands (Wetlands 8, 9, 12, 13, 19, and 26), and the riparian wetlands (Wetlands 14, 25 and 29). These larger wetlands are able to store and gradually release large amounts of surface water and contain groundwater discharge sites. The smaller basin wetlands and right-of-way wetlands generally do not have outflows and do not appear to contribute substantially to stream flow.

The large complex wetlands (Wetlands 5, 15, 17, and 20) and riparian wetlands (Wetlands 14, 25 and 29) could play a role in flood amelioration. These wetlands all have large streams running through them that are flanked by flood plains occupied by dense stands of tall shrubs which would help to slow the flow of water when these streams overtop their banks.

Water Quality Functions

The riparian wetlands (Wetlands 14, 25 and 29) and large wetland complexes (Wetlands 5, 15, 17, and 20) can be expected to contribute towards stream cooling. These wetlands have dense tall shrub and tree cover that overhangs the surfaces of the streams that pass through them. This shading helps to slow the rate of heating of the water. Ground water discharge associated with these wetlands would also contribute to cooling of stream water.

The PDA passes through an area with little human presence so there is little opportunity to provide water quality improvement services. In certain areas of the PDA there is evidence of heavy ATV traffic which disturbs the ground surface producing muddy water. Various wetlands at the more populated eastern end of the PDA (Wetlands 20, 22, 23, 24, 26, 27, 28, and 29) provide stable vegetated surfaces that can filter sediment from the muddy water that enters them.

5.4.3 Assessment of Potential Environmental Interactions with Vegetation and Wetlands

5.4.3.1 Phase 1

5.4.3.1.1 Construction

Construction activities have the potential to result in adverse environmental effects resulting in the change and loss of vegetation communities (including wetland and ECMC) as well as the loss of vascular plant SAR and SOCC. Clearing will remove overstory vegetation such as trees and shrubs from within the PDA, and could damage understory vegetation.

Construction will result in disturbance to approximately 36.1 ha of vegetation communities. This includes forest, wetland, and agricultural land, but excludes anthropogenic and industrial land classes which together account for 0.4 ha of the PDA. All forested land, treed swamps, and shrub swamps within the PDA will require clearing. With mitigation, most of this disturbance will result in a change, but not a permanent loss of vegetation communities. Forested areas will be converted to shrub or regenerating/sapling aged forests following initial construction activities. The conversion of forested habitat represents approximately 1.5% of available forested habitat within the LAA. The forest type that will experience the highest percentage of loss (3.2%) is regeneration-sapling hardwood. Of 57.1 ha of this forest type in the LAA, 1.8 ha are within the PDA. This class of forest stand will experience the least amount of functional change, given that the area beneath the transmission line is expected to be maintained in a regeneration-sapling stage. Agricultural areas will likely be maintained in a similar state, with the exception of the area within the footprint of permanent structures. The substation will result in the permanent loss of approximately 0.16 ha of young-immature softwood forest. The total loss of various habitats associated with pole structure footprints is estimated to be approximately 850 m^2. Approximately 161 m^2 of this habitat loss will occur in wetlands along the route.

Of the vegetation communities that will be disturbed as a result of construction of the Project, approximately 6.0 ha, or 16.4% of the PDA, is wetland. It is anticipated that 4.4 ha of wetland habitat will be subject to vegetation clearing, none of which is located within GeoNB-mapped wetlands. The 1.6 ha

of wetland that will not require clearing is mostly bog that supports vegetation low enough that clearing will not be required. The 4.4 ha of wetland that will be subjected to vegetation clearing includes 1.9 ha of coniferous treed swamp, 1.0 ha of deciduous treed swamp, 0.8 ha of mixedwood treed swamp and 0.7 ha of treed bog. Clearing and subsequent vegetation control will likely result in the conversion of these wetland types to shrub-dominated wetlands or freshwater marsh. Approximately 0.6 ha of tall shrub swamp will be cleared and temporarily disturbed, but likely will be maintained as tall shrub swamp throughout the life of the Project.

In order to reduce the adverse effects of clearing on wetlands, clearing activities should be restricted to the minimum amount required. Only as much wetland vegetation as is required to safely install poles, draw conductors, and provide adequate clearance between conductors and vegetation should be removed. Where avoidance is not possible, compensation for the permanent net loss of wetland function according may be considered, following a plan to be developed in coordination with, and approved by, NBDELG.

No plant SAR were encountered along the proposed transmission route; however, three plant SOCC have been recorded within the PDA including white-fringed orchid, Pickering's reed-grass and Wiegand's sedge. Vegetation clearing and excavation activities could lead to the loss of these individuals within the PDA. All of these species were found growing on the existing transmission line indicating that the new transmission line RoW will provide suitable habitat for these species. The greatest threat to these species would be physical damage to the plants or disturbance of the soils that they grow in caused by vegetation clearing, pole placement and movement of heavy equipment. With planned mitigation, including flagging and avoiding direct disturbance, these species will likely not be directly affected by construction activities. The existing transmission line RoW would provide a source of seed to facilitate colonization of the new transmission line RoW by these species. Prior to the onset of clearing activities, the populations of plant SOCC identified during the field surveys should be marked with symbolic fencing to prevent accidental damage to these plants. Where feasible, adjust pole spacing to avoid populations of plant SOCC found in the proposed transmission line RoW. Where feasible, install poles in wetlands during the winter months when the ground is frozen to reduce disturbance from the movement of vehicles and equipment to plant SOCC and wetland soils and vegetation. In areas where plant SOCC are present, plan access routes to pole placement sites to avoid populations of plant SOCC or particularly sensitive wetland features such as peatlands where feasible.

No grubbing is planned for the transmission line PDA; however, excavation of holes with a footprint of 1 m x 3 m (i.e., 3 m²) will be required for each of the approximately 238 poles that are required for the Project, plus an excavation footprint of 1 m x 2 m for each anchor point for guy wires. The total area of wetland habitat lost as a result of pole and guy wire placement is estimated to be 161 m² with 30 m² lost in GeoNB-mapped wetlands and 131 m² lost in field-identified wetlands. It is anticipated that H-frame poles will be used for the majority of the Project. Steel H-frame structures with a longer spanning distance will be used over sensitive areas, and three pole dead end structures will be used where angles or line tensioning are required. Excavation removes soil and the associated seed bank layer and heavy machinery used during construction can cause soil compaction, changing habitat quality. These two factors could potentially change the species that regenerate following construction disturbance. Wheel rutting associated with clearing and construction activities can alter surface and sub-surface flow paths

potentially altering a wetland's ability to regulate stream flow or conduct biogeochemical processes such as nutrient and contaminant uptake. Wheel rutting can also result in the mixing of mineral and organic soil layers resulting in changes in the availability of nutrients that can change the trophic status of a wetland and cause changes in plant species composition. Wheel rutting can also have some beneficial effects such as the creation of amphibian breeding habitat, aquatic invertebrate habitat, and habitat for plant SOCC that thrive in wet disturbed soils. Excavation for pole placement, where it occurs in wetlands, is expected to result in permanent wetland loss, although individual poles occupy a small footprint on a pole-by-pole basis. Where clearing and excavation occur in wetlands, these activities can cause a loss of wetland function. If wetland soils are soft, some infilling immediately around poles may be required for the integrity of the backfill material in order to properly secure the poles.

A number of mitigation measures can be employed to reduce the adverse effects of soil disturbance in wetlands. Wherever feasible, poles should be situated outside of wetlands and conductors should span the wetland. Conductors should be drawn though the wetland by hand using progressively larger cables. Where it is not feasible to span a wetland, poles should be established as close to the edges of the wetland to minimize traffic on wetland soils. The locations of poles in wetlands should be planned to minimize the distance that heavy equipment must travel through wetlands. When travelling through wetlands, swamp mats should be used to reduce soil disturbance through rutting. The areas where vehicles are permitted to operate in wetlands should be restricted to the minimum area required. Standard erosion and sedimentation control measures, should be employed to minimize erosion and sedimentation in wetlands and areas adjacent to wetlands.

Vegetation clearing and placement of poles and conductors can potentially adversely affect wetland functions and services. Alteration of plant communities can reduce a wetland's ability to support plant and wildlife species including SOCC and SAR. With the implementation of mitigation to protect SAR, SOCC and reduce soil and vegetation disturbance in wetlands, there should not be a substantial loss of wetland functions. Very little wetland area will be lost as a result of construction of the new transmission line. Instead, forested wetland will be converted to shrub wetland or freshwater marsh. The wetland function that would most likely be adversely affected by conversion of forested wetland to shrub wetland would be the change in the terrestrial bird species using the wetlands.

Decommissioning of the old transmission line RoW will allow shrub wetland and freshwater marsh on the old RoW to return to forested wetland. The highest functioning wetlands are the larger wetlands with the greatest diversity of wetland types. The amount of wetland lost to pole placement or converted to shrub wetland will be small relative to the overall size of the wetland so the probability that important wetland functions will be lost is very low. Eventually, recovery of forested wetlands on the old RoW should restore the wetland functions that are associated with the presence of trees.

There is one ECMC found within the LAA. This is the North Branch Burnt Church River PNA. The southern boundary of this PNA extends approximately 100 m into the northern half of the LAA. The PDA is located 400 m south of the North Branch Burnt Church River PNA. One other PNA and three ESA's are found outside of the LAA. Given the distance of these ECMC from the PDA, none are expected to be adversely affected by construction of the new transmission line. The PNA is already separated from the PDA by a forest road.

Vegetation clearing can have indirect effects on areas adjacent to the PDA through edge effects. Changes in abiotic environmental factors such as light availability, wind penetration, humidity, and temperature because of vegetation removal constitute edge effects, and a change in these factors can influence the success of species that inhabit the area, including SAR and SOCC. Edge effects can also allow the establishment of invasive or exotic species, resulting in a change in community dynamics. Many invasive plant species are strong competitors and can thrive in disturbed (i.e., cleared) habitats. When these species are introduced to an area, their presence can result in native species being outcompeted and lost. Invasive plants that are already found within the existing RoW and PDA can be spread into adjacent areas through edge effects, and new invasive plant species can be introduced into the PDA by equipment that was previously operated in areas with invasive plants.

Various mitigation can be used to reduce the potential for invasive or exotic species to become established on the transmission line RoW. All equipment arriving on site should be examined to make sure it is clean and free of soil or vegetative debris before it enters the Project RoW to begin work. Use quarried, crushed material for road building to reduce the risk of introducing or spreading exotic and/or invasive vascular plant species. The area of soil disturbed by heavy equipment should be minimized to reduce the amount of open soil available for exotic species to become available. Wherever possible, allow natural regeneration to occur to re-establish native plant communities. This can be encouraged by minimizing soil disturbance and leaving the root mat and seed bank in place. If natural regeneration is not possible, use a seed mix that contains native species or exotic species that are known to be non-invasive.

Staging (i.e., temporary work spaces) may require additional clearing outside of the PDA. Although the areas where these activities will occur have not yet been identified, these activities could result in minor changes to vegetation communities including wetlands. In order to reduce adverse effects of clearing in these areas, the sizes of temporary workspaces should be kept to the minimize size feasible. These sites should be restored to pre-construction conditions as soon as possible. Where practical, use already developed areas for staging.

5.4.3.1.2 Operation and Maintenance

Operation and maintenance activities have the potential to result in adverse environmental effects resulting in the loss of vascular plant SOCC, or changes in vegetation communities including wetlands. Periodic vegetation management during operation and management could result in adverse environmental effects resulting in further change to previously-disturbed vegetation communities including wetlands. Plant SOCC growing on the RoW could be adversely affected by vegetation management activities such as the use of hydro-axes and herbicides. The creation of a cleared RoW can attract ATV activity which can result in secondary disturbance of wetland soils and vegetation, however ATV activity is already present on the existing transmission RoW. Vegetation control in wetlands and in areas where plant SOCC are present will be conducted by mechanical means only, using hand tools where feasible, to minimize disturbance to soils and to non-target vegetation.

5.4.3.2 Phase 2

Decommissioning and abandonment will involve the removal of conductors and poles along the existing transmission lines 0104 and 0012. Heavy equipment will be required to remove the infrastructure from the RoW which can result in physical disturbance of plant communities that have become established in the existing RoW. Most of the plant SOCC that were encountered during the field surveys were found on the existing RoW of Line 0104. These populations could be adversely affected by decommissioning activities. Similarly, wetland plant communities are present in the existing RoW. These communities and the wetland functions and services that they provide could be adversely affected by decommissioning activities. The mitigation methods outlined for construction of the Project can also be applied to Phase 2 of the Project to reduce the effects of these activities on the vegetation and wetlands.

Reclamation activities will result in an increase in native vegetation communities relative to operation and maintenance. Reclamation of the existing transmission line RoW will essentially offset the loss of vegetation communities associated with construction of the new transmission line RoW; however, there will not be an immediate equivalency since it will take decades for tree cover to become established on the existing RoW.

5.4.4 Summary for Vegetation and Wetlands

With mitigation, it is not anticipated that there will be substantial interaction between the Project and plant SOCC, ECMC or wetlands. The plant SOCC found in the PDA were found growing on the existing transmission line RoW. Clearing of the new transmission line RoW may create suitable habitat for these species. Mitigation to protect existing populations of these species in the PDA from injury or disturbance of the soil that they are growing in will be implemented to facilitate the survival of existing populations.

The PDA does not intersect any ECMC and does not pass close enough to any ECMC to have any adverse effect on vegetation and wetlands found in them.

The PDA intersects 29 wetlands which comprises 6.0 ha of wetland habitat. Construction of the electrical transmission line will affect wetlands as a result of clearing of trees and tall shrubs on the RoW and placement of poles and guy wire anchors in the wetlands. The amount of forested wetland cleared will be 4.4 ha. Periodic vegetation control in these areas will likely convert these cleared areas to shrub dominated wetlands and freshwater marsh. Another 0.6 ha of tall shrub swamp will also be cleared but it will remain as shrub swamp. All tree clearing will occur in field-identified wetlands with none occurring in GeoNB-mapped wetlands. Placement of poles and anchors will result in the permanent loss of 161 m² of wetland area, 30 m² of which will occur in GeoNB-mapped wetlands.

With the implementation of appropriate mitigation, construction of the new transmission line is not expected to have any substantial effect on wetland functions and services associated with wetlands along the PDA. The amount of wetland habitat lost to construction activity is small (0.02 ha) and conversion of forested wetland to shrub-dominated wetland is not expected to substantially affect most wetland functions associated with these wetlands with the exception of a change in the forest bird species using the wetland habitat. The loss of forested wetland and any functions strongly associated

with it will be offset by the decommissioning of the existing transmission lines which will allow forested wetland to redevelop on it. Any permanent loss of wetland associated with construction of the new transmission line may be compensated.

5.5 WILDLIFE AND WILDLIFE HABITAT

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the wildlife and wildlife habitat VC. Wildlife and wildlife habitat was included as a VC due to its environmental, cultural, and social importance, and for the potential for the Project to interact with wildlife and wildlife habitat in the PDA.

5.5.1 Scope of Assessment

This VC includes wildlife and wildlife habitat, including species at risk (SAR) and species of conservation concern (SOCC). 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 NB *SARA*. Some of the species defined as SAR in this document currently have regulatory protection under Schedule 1 of the federal *SARA* or the Prohibitions Regulation of NB *SARA*. The definition used in this document also includes species on the NB *SARA List of Species at Risk Regulation* and those listed by COSEWIC that may become protected within the timeframe of this Project. SOCC are species not listed or protected by any legislation, but are considered rare in New Brunswick, 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 New Brunswick by the Atlantic Canada Conservation Data Centre (AC CDC).

Migratory birds in Canada are protected under the *Migratory Birds Convention Act* (*MBCA*), by way of the Migratory Birds Regulations and Migratory Birds Sanctuary Regulations. These regulations define the provisions by which an estimated 450 native species of migratory birds (including their nests and eggs) are protected in Canada.

5.5.1.1 Boundaries

The PDA was described in Section 4.2.1.

The LAA is defined as defined as the potential zone of Project interactions with wildlife and wildlife habitat. For Phase 1, the LAA is a 500 m buffer of PDA, which includes the 138 kV transmission line and new substation. For Phase 2, the LAA is a 500 m buffer of the center line of the PDA, which includes existing sub-station and existing Lines 0104 and 0012, which will be decommissioned.

The temporal boundaries were described in Section 4.2.2.

5.5.2 Existing Conditions for Wildlife and Wildlife Habitat

5.5.2.1 Information Sources

Records for wildlife occurring within the LAA and surrounding area were obtained from various sources including the AC CDC, the Maritimes Breeding Bird Atlas (MBBA), and the North American Breeding Bird Survey (NA BBS). AC CDC data, including SAR, SOCC, and managed areas, were obtained for the area within 5 km of the Project (AC CDC 2017). The proposed transmission lines fall into four MBBA atlas squares: 20LT13, 20LT23, 20LT33, and 20LT43. A search of the NA BBS database (ECCC 2017c) was conducted to obtain records of bird species observed near the PDA. The nearest route, #56015 - Lauvergot, is less than 5 km from the proposed transmission line. This route has been surveyed 19 times between 1996 and 2016. Data was obtained from this NA BBS route for all survey years.

No Atlantic Canada Nocturnal Owl Surveys (ACNOS) routes or Christmas Bird Count (CBC) circles are located near the LAA.

5.5.2.2 Field Methods

Wildlife field surveys were conducted in the spring and summer of 2017. Wildlife field work included early bird surveys, breeding bird surveys, common nighthawk surveys and owl surveys.

5.5.2.2.1 Early Breeding Bird Surveys

Early breeding bird surveys were conducted on May 12 and 13th, 2017 by one team consisting of a Stantec biologists working independently. These surveys consisted of 10-minute point counts, that were conducted in good weather with low winds and no precipitation. A total of 30 point counts were conducted over the two days. Because of access limitations, all point counts were conducted from the existing transmission line. All survey points were at least 250 m from another survey point. Surveys began near dawn, and continued until approximately 10:00 am. Observers collected data on each bird species observed, and information about environmental conditions at each survey point including wind conditions, cloud cover, temperature, and precipitation. These early bird surveys targeted early breeders, including woodpeckers and raptor species. All species observed during the surveys were recorded.

5.5.2.2.2 Nocturnal Owl Surveys

Nocturnal owl surveys were conducted on Friday May 12th at five different locations along the proposed transmission line by one team consisting of two Stantec biologists. Playback surveys were used that played boreal owl (*Aegolius funereus*) and barred owl (*Strix varia*) songs, and included silent listening periods. Each survey was a total of 12 minutes. Surveys were conducted in good weather with low winds and no precipitation, and occurred between 9:50 pm and 11:10 pm.

5.5.2.2.3 Common Nighthawk Surveys

Common nighthawk surveys were conducted on June 13 and 14, 2017 at nine locations by one team consisting of two Stantec biologists. Survey locations were chosen in suitable habitat for common

nighthawks. Surveys began with 6-minutes of silent listening, as per the CWS Canadian Nightjar Survey Protocol (2016). If no common nighthawks were observed, an audio playback was broadcasted, followed by another two-minutes of silent listening. Surveys were conducted in good weather with low winds and no precipitation.

5.5.2.2.4 Breeding Bird Surveys

Breeding bird surveys were conducted as a series of point counts from June 13 to 15th, 2017 by one team consisting of a Stantec biologists working independently. All surveys were established within 500 m of the PDA, and were placed a minimum of 250 m from another survey point, and 100 m from the edge of another habitat type where possible. Ten-minute surveys based on a modified fixed-radius point count sampling procedure (Bibby et al. 2000) were conducted once at each survey point. Surveys began near dawn, and continued until approximately 10:00 am. Observers collected data on each bird species observed, and information about environmental conditions at each survey point including wind conditions, cloud cover, temperature, and precipitation.

5.5.2.2.5 Other Wildlife

Incidental wildlife observations were recorded during all bird surveys, as well as during vegetation and wetland surveys conducted during the 2017 breeding bird season.

5.5.2.3 Overview of Existing Information

5.5.2.3.1 Information from Existing Data Sources

The AC CDC data search produced 77 records of species of conservation concern within 5 km of the proposed transmission line. These included 55 birds, 2 mammals, 1 reptile, 7 invertebrates and 12 plants. Seventeen of the 77 records are SAR. The AC CDC data report is included in Appendix D.

The maritime breeding bird atlas identified 130 species of birds that have been observed in the four atlas squares that the proposed transmission line crosses. These results are presented in Appendix D.

The Lauvergot, NB, NA BBS route (route 56015) has identified 108 species since surveys began in 1996. Of these, 106 breeders, and 2 are non-breeders. All species identified by the NA BBS are presented in Appendix D.

Species of conservation concern and SAR identified by in the above data sources are presented in section 5.5.2.3.3.

5.5.2.3.2 Field Survey Results

Early Breeding Bird Surveys

During the early breeding bird surveys, 36 species were identified. An additional 12 species were identified as incidentals (for a total of 48 species). These species included three raptors: red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and broad-winged hawk (*Buteo platypterus*).

Seven species of woodpeckers were also observed, including pileated woodpecker (*Dryocopus pileatus*), black-backed woodpecker (*Picoides arcticus*), northern flicker (*Colaptes auratus*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), yellow-bellied sapsucker (*Sphyrapicus varius*) and three-toed woodpecker (*Picoides dorsalis*). All results of the early breeding bird surveys are presented in Appendix D.

Nocturnal Owl Surveys

One barred owl was observed during the nocturnal owl surveys on May 12, 2017. This owl was heard at the survey point OWL-09, and was first heard after the first barred owl playback. This owl was first observed at approximately 10:45 pm, and remained at the same position throughout the survey.

Common Nighthawk Surveys

Six common nighthawk were observed during the surveys on June 14, 2017. Five of the six common nighthawk were observed during the silent listening period, and no playback was required. One nighthawk was observed only after doing the playback. These birds were observed at five of the common nighthawk locations: CONI-3 (two individuals observed), CONI-11, CONI-7, CONI-4, and CONI-12. This species is discussed in detail in section 5.5.2.3.3.

Breeding Bird Surveys

A total of 49 point counts were conducted on June 13 to 15th, 2017 within Phase 1 and Phase 2. During these point counts, 49 species were identified, all of which were passerines. Incidental observations were also recorded during these surveys, which identified three additional species. All species recorded are presented in Appendix D, and SOCC and SAR are highlighted in section 5.5.2.3.3. Detailed results of the breeding bird surveys are presented in Appendix D.

Species richness (defined as the number of different species recorded within a habitat type) was calculated for each of the habitat types sampled within the LAA (Table 5.6). Species richness indicates the number of species observed in each habitat type. Level of effort varied between habitat types, and as such, species richness is not directly comparable between habitats. Due to the highly-fragmented habitat within the LAA, species were often recorded in a different habitat type than the location of the observer. In calculating species richness, birds that were observed as fly-bys were excluded, as there was no evidence that they were using the habitat type over which they were seen.

Table 5.6 Habitat Types Sampled During Field Surveys, and Species Richness

Land classification type	Breeding Bird Point Counts Completed	Area within LAA (ha): Phase 1	Species Richness (Number of Species)
Clearcut	1	11.34	7
Mature - Overmature Hardwood	10	174.04	25
Mature - Overmature Mixedwood	8	144.19	18
Mature - Overmature Softwood	10	272.47	33

Table 5.6 Habitat Types Sampled During Field Surveys, and Species Richness

Land classification type	Breeding Bird Point Counts Completed	Area within LAA (ha): Phase 1	Species Richness (Number of Species)
Regeneration - Sapling Softwood	1	70.51	8
Regeneration – Sapling Mixedwood	-	16.71	-
Young - Immature Hardwood	5	228.74	18
Young - Immature Mixedwood	4	234.37	14
Young - Immature Softwood	6	419.69	25
Mixedwood Treed Swamp	-	98.51	7
Deciduous Treed Swamp	-	19.43	3
Coniferous Treed Swamp	4	241.16	22

5.5.2.3.3 Species at Risk and Species of Conservation Concern

As a result of all field surveys and desktop information, a total of 44 SOCI and 17 SAR were identified. All were birds, with one exception; the wood turtle. All SOCI and SAR and their rankings are presented below in Table 5.6. All SAR are discussed in detail.

Table 5.7 Wildlife SAR and SOCC Reported within or near the LAA

Common Name	Scientific Name	SARA	COSEWIC	NB Provincial Ranking	AC CDC S-Rank	General Status Rank	Sources
Birds							
brant	*Branta bernicla*				S1N, S2S3M	secure	AC CDC
northern pintail	*Anas acuta*				S3B,S5M	sensitive	AC CDC, MBBA
northern shoveler	*Anas clypeata*				S2S3B,S2S3M	secure	AC CDC, MBBA
gadwall	*Anas strepera*				S2B,S3M	secure	NA BBS
greater scaup	*Aythya marila*				S1B,S4M,S2N	secure	AC CDC
lesser scaup	*Aythya affinis*				S1B,S4M	secure	AC CDC
common eider	*Somateria mollissima*				S3B,S4M,S3N	secure	AC CDC
black scoter	*Melanitta nigra*				S3M,S1S2N	sensitive	AC CDC
Barrow's goldeneye - eastern pop.	***Bucephala islandica (Eastern pop.)***	***special concern***	***special concern***	***special concern***	**S2M,S2N**	**sensitive**	**AC CDC**
bufflehead	*Bucephala albeola*				S3M,S2N	sensitive	AC CDC
red-breasted merganser	*Mergus serrator*				S3B,S5M,S4S5N	secure	AC CDC, MBBA
ruddy duck	*Oxyura jamaicensis*				S1B,S2S3M	secure	AC CDC
bald eagle	***Haliaeetus leucocephalus***		***not at risk***	***endangered***	**S4**	**at risk**	**MBBA, NA BBS**
cooper's hawk	*Accipiter cooperii*		*not at risk*		S1S2B,S1S2M	may be at risk	NA BBS
black-bellied plover	*Pluvialis squatarola*				S3S4M	secure	AC CDC
American golden-plover	*Pluvialis dominica*				S2S3M	sensitive	AC CDC

Table 5.7 Wildlife SAR and SOCC Reported within or near the LAA

Common Name	Scientific Name	SARA	COSEWIC	NB Provincial Ranking	AC CDC S-Rank	General Status Rank	Sources
piping plover melodus ssp	***Charadrius melodus melodus***	***endangered***	***endangered***	***endangered***	**S1B,S1M**	**at risk**	**AC CDC, MBBA**
killdeer	*Charadrius vociferus*				S3B,S3M	sensitive	AC CDC, MBBA, NA BBS
greater yellowlegs	*Tringa melanoleuca*				S1B,S5M	secure	AC CDC
willet	*Tringa semipalmata*				S3B,S3M	sensitive	AC CDC, MBBA
spotted sandpiper	*Actitis macularius*				S3S4B,S5M	secure	AC CDC, MBBA, NA BBS
ruddy turnstone	*Arenaria interpres*				S3M	secure	AC CDC
red knot rufa ssp	***Calidris canutus rufa***	***endangered***	***endangered***	***endangered***	**S2M**	**at risk**	**AC CDC**
semipalmated sandpiper	*Calidris pusilla*				S3S4M	secure	AC CDC
Baird's sandpiper	*Calidris bairdii*				S1S2M	sensitive	AC CDC
pectoral sandpiper	*Calidris melanotos*				S3S4M	secure	AC CDC
Wilson's snipe	*Gallinago delicata*				S3S4B,S5M	secure	AC CDC, Field, NA BBS
ring-billed gull	*Larus delawarensis*				S3S4B,S5M	secure	AC CDC, NA BBS
common tern	*Sterna hirundo*		*not at risk*		S3B,SUM	sensitive	AC CDC, MBBA, NA BBS
arctic tern	*Sterna paradisaea*				S1B,SUM	may be at risk	AC CDC

Table 5.7 Wildlife SAR and SOCC Reported within or near the LAA

Common Name	Scientific Name	SARA	COSEWIC	NB Provincial Ranking	AC CDC S-Rank	General Status Rank	Sources
black-billed cuckoo	*Coccyzus erythropthalmus*				S3B,S3M	secure	NA BBS
short-eared owl	***Asio flammeus***	***special concern***	***special concern***	***special concern***	**S2B,S2M**	**sensitive**	**AC CDC**
boreal owl	*Aegolius funereus*		*not at risk*		S1S2B,SUM	may be at risk	AC CDC, MBBA
common nighthawk	***Chordeiles minor***	***threatened***	***threatened***	***threatened***	**S3B,S4M**	**at risk**	**AC CDC, Field, MBBA**
chimney swift	***Chaetura pelagica***	***threatened***	***threatened***	***threatened***	**S2S3B,S2M**	**at risk**	**AC CDC, NA BBS**
American three-toed woodpecker	*Picoides dorsalis*				S2S3	sensitive	Field
olive-sided flycatcher	***Contopus cooperi***	***threatened***	***threatened***	***threatened***	**S3B,S3M**	**at risk**	**AC CDC, Field, MBBA, NA BBS**
eastern wood-pewee	***Contopus virens***	***special concern***	***special concern***	***special concern***	**S4B,S4M**	**secure**	**AC CDC, Field, MBBA, NA BBS**
great crested flycatcher	*Myiarchus crinitus*				S2S3B,S2S3M	sensitive	AC CDC, MBBA
eastern kingbird	*Tyrannus tyrannus*				S3S4B,S3S4M	sensitive	AC CDC, MBBA, NA BBS
horned lark	*Eremophila alpestris*				S1B,S4N,S5M	may be at risk	AC CDC, MBBA
bank swallow	***Riparia riparia***	***threatened***	***threatened***		**S2S3B,S2S3M**	**sensitive**	**AC CDC, MBBA, NA BBS**
cliff swallow	*Petrochelidon pyrrhonota*				S2S3B,S2S3M	sensitive	AC CDC, MBBA, NA BBS
barn swallow	***Hirundo rustica***	***threatened***	***threatened***	***threatened***	**S2B,S2M**	**sensitive**	**AC CDC, MBBA, NA BBS**

Table 5.7 Wildlife SAR and SOCC Reported within or near the LAA

Common Name	Scientific Name	SARA	COSEWIC	NB Provincial Ranking	AC CDC S-Rank	General Status Rank	Sources
wood thrush	***Hylocichla mustelina***	***threatened***	***threatened***	***threatened***	**S1S2B,S1S2M**	**may be at risk**	**AC CDC**
northern mockingbird	*Mimus polyglottos*				S2B,S2M	sensitive	AC CDC, MBBA
brown thrasher	*Toxostoma rufum*				S2B,S2M	sensitive	AC CDC, MBBA
warbling vireo	*Vireo gilvus*				S3B,S3M	secure	AC CDC, MBBA, NA BBS
cape may warbler	*Dendroica tigrina*				S3B,S4S5M	secure	AC CDC, Field, MBBA, NA BBS
Canada warbler	***Wilsonia canadensis***	***threatened***	***threatened***	***threatened***	**S3B,S3M**	**at risk**	**AC CDC, Field, MBBA, NA BBS**
rose-breasted grosbeak	*Pheucticus ludovicianus*				S4B,S4M	sensitive	MBBA, NA BBS
indigo bunting	*Passerina cyanea*				S3B,S3M	secure	AC CDC
vesper sparrow	*Pooecetes gramineus*				S2B,S2M	may be at risk	AC CDC, MBBA
bobolink	***Dolichonyx oryzivorus***	***threatened***	***threatened***	***threatened***	**S3B,S3M**	**sensitive**	**AC CDC, MBBA, NA BBS**
rusty blackbird	***Euphagus carolinus***	***special concern***	***special concern***	***special concern***	**S3B,S3M**	**may be at risk**	**AC CDC, Field, NA BBS**
brown-headed cowbird	*Molothrus ater*				S3B,S3M	may be at risk	AC CDC, MBBA, NA BBS
pine grosbeak	*Pinicola enucleator*				S2B,S4S5N,S4S5M	sensitive	AC CDC
red crossbill	*Loxia curvirostra*				S3	secure	AC CDC
pine siskin	*Carduelis pinus*				S3	secure	AC CDC, MBBA

Table 5.7 Wildlife SAR and SOCC Reported within or near the LAA

Common Name	Scientific Name	SARA	COSEWIC	NB Provincial Ranking	AC CDC S-Rank	General Status Rank	Sources
evening grosbeak	*Coccothraustes vespertinus*		*special concern*		S3B,S3S4N,SUM	sensitive	AC CDC, MBBA, NA BBS
Herpetiles							
wood turtle	*Glyptemys insculpta*	*threatened*	*threatened*	*threatened*	S2S3	at risk	AC CDC

Barrow's Goldeneye

The eastern population of the Barrow's goldeneye (*Bucephala islandica*) is listed as *special concern* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*, and has an AC CDC S-rank of S2M, S2N, indicating that it is imperiled as both a migrant and non-breeder in New Brunswick. It has a general status rank of *sensitive*. This species does not breed in New Brunswick, but can be found along the coast during the non-breeding season. In Atlantic Canada and Maine, it is likely that fewer than 500 individuals overwinter, most of which are found in the St. Lawrence estuary (Eadie et al. 2000). There is no suitable habitat for this species in the PDA or LAA.

Bald Eagle

Bald eagle (*Haliaeetus leucocephalus)* is listed as *endangered* under Schedule A of NB *SARA*, and has an AC CDC S-rank of S4, indicating that it is apparently secure. This species can be found throughout New Brunswick year-round. Bald eagles are associated with aquatic habitats during all times of year. Breeding habitat typically includes forested shorelines or cliffs. Nests are built in one of the largest trees available, with a large canopy capable of holding the large nest built by this species. Coniferous or deciduous trees may be used, depending on what is dominant in the region (Buehler 2000). Suitable nesting habitat for bald eagle does not occur in the PDA, but it could be found in near-by coastal areas.

Piping Plover

Piping plover (*Charadrius melodus melodus*) is listed as *endangered* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*, and as S1B, S1M by the AC CDC, indicating that they are critically imperiled during breeding and migration in New Brunswick. Piping plovers occur along the eastern coast of New Brunswick during the breeding season, where they nest on open, sandy beaches. Nest scrapes are dug in sandy substrate, and are sometimes lined with pebbles or shells (Elliott-Smith and Haig 2004). Piping plovers have been observed nesting on the Neguac Sandspit, which is an important bird area (IBA) in Miramichi Bay. The Neguac Sandspit is over 7 km east of the PDA. As such, there will be no Project interactions with the Neguac Sandspit or piping plovers.

Red Knot

Red knot (*Calidris canutus rufa*) is listed as *endangered* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. It has a AC CDC S-rank of S2M, indicating that migrating population is considered to be imperiled. Red knots do not nest in New Brunswick; however, they do stop in New Brunswick during migration. During fall migration, the stopover sites are used to build up fat reserves for their long migration flights. The *rufa* subspecies has declined largely as a result of overfishing of horseshoe crabs (*Limulus polyphemus*) in Delaware Bay, which are a critical energy source for this species during spring migration (COSEWIC 2007a). Red knots are most frequently observed in areas where sandy beaches are found adjacent to mud flats. Peak red knot abundance in New Brunswick typically occurs in August and September during fall migration. There is no coastal habitat in the PDA, and as such the red knot is not likely to be affected by the Project.

Short-eared Owl

Short-eared owl (*Asio flammeus*) is listed as *special concern* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. The AC CDC ranks this species as S2B, S2M, which indicates that the breeding and migrating populations of short-eared owl are considered to be imperiled. This species occurs in New Brunswick during the breeding season, where it is active during both the day and night and hunts low about the ground. Short-eared owls occur in open areas with low vegetation, such as grasslands, prairie, marshes, or agricultural areas, where small prey mammals are common. Nests are built directly on the ground on dry areas with dead or matted down vegetation (Wiggins et al. 2006). No short-eared owls were observed during 2017 field surveys. There are no large grasslands or marshes in the LAA, and as such, short-eared owls are not expected to occur.

Common Nighthawk

The common nighthawk (*Chordeiles minor*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. The AC CDC ranks this species as S3B, S4M, indicating the breeding population is conserved to be vulnerable and the migrating population is considered to be apparently secure in New Brunswick. The common nighthawk is a medium-sized crepuscular bird in the nightjar family. Common nighthawks breed in open areas, including gravel pits, clear-cuts, burnt over areas, barrens, and pastures. They sometimes nest on gravel rooftops. Eggs are laid directly on exposed ground, and no actual nest is made (Brigham et al. 2011). Forest harvesting is common in the LAA, and as such, suitable habitat for common nighthawks is relatively common. Common nighthawks do occur within the PDA; six individuals were observed during the common nighthawk surveys in June 2014.

Chimney Swift

Chimney swift (*Chaetura pelagica*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. The AC CDC ranks this species as S2S3B, S2M, indicating that the breeding population ranges from imperiled to vulnerable, and the migratory population is imperiled in New Brunswick. Chimney swifts breeds throughout New Brunswick. In pre-colonial North America, the chimney swift nested in hollow trees in mature forests. Since the arrival of Europeans, chimney swifts have been using chimneys as nesting cavities. However, as chimneys are now becoming less common, populations of chimney swifts appear to be declining (COSEWIC 2007b). The LAA may include buildings with chimneys, or mature, hollow trees. As such, chimney swifts have the potential to occur in the PDA.

Olive-sided Flycatcher

The olive-sided flycatcher (*Contopus cooperi*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. The AC CDC lists the olive-sided flycatcher as S3B,S3M, indicating that the breeding and migratory populations of this species are considered to be vulnerable in New Brunswick. The olive-sided flycatcher is a medium-sized insectivore which breeds in scattered locations throughout most of forested Canada (COSEWIC 2007c). Olive-sided flycatchers are most often associated with edge habitats with open areas with edges, including forest openings, open wetlands, burned or harvested forest. This bird is often observed perching in tall trees or snags in these habitats,

where they forage for flying insects (COSEWIC 2007c). Olive-sided flycatchers were observed during field surveys in 2017; they do occur in the PDA.

Eastern Wood-Pewee

The eastern wood-pewee (*Contopus virens*) is listed as *special concern* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*. The provincial AC CDC ranking for the eastern-wood pewee is S4B, S4M indicating that the breeding and migratory populations are considered to be apparently secure.

During the breeding period, the eastern wood-pewee is generally associated with the mid-canopy layer within forest clearings and edges of hardwood and mixed forest stands (COSEWIC 2012). In migration periods this species utilizes a variety of habitats including edges, and clearings (COSEWIC 2012). Suitable habitat for this species is found within the PDA and LAA. Eastern wood-pewees were observed in the LAA during field surveys conducted in 2017.

Bank Swallow

The bank swallow (*Riparia riparia*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA* and has an AC CDC rank of S2S3B, S2S3M, indicating that both the breeding and migratory populations range from imperiled to vulnerable in New Brunswick. The bank swallow is a small, colonial which feeds primarily on aerial insects (COSEWIC 2013). This species breed in a wide variety of natural and anthropogenic sites including riverbanks, aggregate pits, road cuts, and vertical sand banks or stock piles of soil. Nesting sites are generally situated adjacent to open terrestrial habitat used for aerial foraging (COSEWIC 2013). No bank swallows were observed in the LAA during field surveys in 2017.

Barn Swallow

The barn swallow (*Hirundo rustica*) is ranked as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and Schedule A of NB *SARA*, and S2B,S2M by the AC CDC, indicating that the breeding and migratory populations are imperiled in New Brunswick. This mid-sized aerial insectivore is closely associated with rural human settlements. The barn swallow shifted from nesting in caves and on ledges to nesting largely in man-made structures following European settlement of North America (COSEWIC 2011). This insectivorous species prefers open habitats for foraging such as agricultural fields, shorelines, and cleared rights-of-way. Barn swallows were not identified during the 2017 field surveys. However, suitable habitat does exist in the LAA, and as such, this species has the potential to occur.

Wood Thrush

The wood thrush (*Hylocichla mustelina*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and under Schedule A of NB *SARA*. The wood thrush has an AC CDC s-rank of S1S2B, S1S2M, which indicates that the breeding and migratory populations range from imperiled and critically imperiled. This species is present in New Brunswick throughout the breeding season. Breeding habitat includes a variety of forests, including both deciduous and mixedwood forest. Key elements of suitable habitat include tall

trees (>16m), a variety of deciduous tree species, shade, moist soil, and open forest floor (Evans et al. 2011). Nests are built in shrubs or trees, usually in the shade and concealed. Common trees used for nesting include American beech, oaks, and eastern hemlock (Evans et al. 2011). Wood thrush were no observed during field surveys. However, suitable habitat does exist in the LAA, and as such, they have the potential to occur.

Canada Warbler

The Canada warbler (*Cardellina canadensis*) is ranked as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and under Schedule A of NB *SARA*. It has an AC CDC rank of S3B, S3M, indicating that the breeding and migratory population is considered vulnerable in New Brunswick. Canada warblers are present in New Brunswick during the breeding season. Canada warblers breed in a wide range of forest types, including deciduous, coniferous and mixedwood forests. It is often associated with moist mixedwood forest and riparian shrub forests on slopes and ravines (COSEWIC 2008). The presence of a well-developed shrub layer also seems to be associated with preferred Canada warbler habitat. Two Canada warblers were observed during field surveys in the LAA, both as incidentals during the breeding bird surveys in June 2017.

Bobolink

The Bobolink (*Dolichonyx oryzivorus*) is listed as *threatened* by COSEWIC, under Schedule 1 of *SARA*, and under Schedule A of NB *SARA*. AC CDC has ranked the bobolink as S3B, S3M, indicating that both the breeding and migratory populations are considered to be vulnerable. Bobolink originally nested in the tall-grass prairie of the mid-western U.S and south central Canada. As this habitat was converted to agricultural land, and forests of eastern North America were cleared to hayfields and meadows, the range of bobolink expanded (COSEWIC 2010). Bobolink presently nest in a variety of forage crop habitats, and natural grassland habitats including wet prairie, graminoid peatlands, and abandoned fields dominated by tall grasses. No bobolinks were observed during 2017 field surveys. Agricultural land does occur in the LAA, which could provide habitat for this species.

Rusty Blackbird

The rusty blackbird (*Euphagus carolinus*) is listed at *special concern* by COSEWIC, under Schedule 1 of *SARA*, and under Schedule A of NB *SARA*. This species is listed as S3B, S3M indicating that the breeding and migratory populations are considered to be vulnerable. Rusty blackbirds are present in New Brunswick during the breeding season. Breeding habitat typically consists of wet coniferous or mixedwood forests. Nests are typically built near open water in coniferous trees or shrubs, living or dead. Black spruce, red spruce and balsam fir are commonly used for nesting (Avery 2013). Suitable habitat, including forested wetlands, does exist for this species in the LAA and PDA. One rusty blackbird was observed during field surveys in June 2017.

Evening Grosbeak

Evening grosbeak (*Coccothraustes vespertinus*) has recently been listed as *special concern* under COSEWIC. It has an AC CDC s-rank of S3B,S3S4N,SUM, indicating that it the breeding population is

considered to be vulnerable, the nonbreeding population is ranges from vulnerable to apparently secure, and the migratory population is unrankable due to lack of information. Evening grosbeaks are typically found in coniferous, northern forests. They breed in mature or second growth conifer or mixedwood forests. This species can be found in high numbers during forest insect outbreaks, and spruce budworms are a preferred food during the breeding season (Gillihan and Byers 2001). They often form large feeding flocks. Evening grosbeaks nest in both hard and softwood trees, as well as in large shrubs. Although suitable habitat does occur within the LAA, evening grosbeaks were not observed during field surveys.

Wood Turtle

Wood turtle was identified in the AC CDC data search; at least one occurrence of this species has been recorded within 5 km of the PDA. Wood turtle is designated as *threatened* under *SARA* and has an AC CDC rank of S2S3 in New Brunswick, indicating that the population is considered to range from imperiled to vulnerable. Wood turtles are semi-aquatic, and spend more time in terrestrial environments than any other turtle. It is generally found associated with clear rivers or streams with moderate currents. Nesting occurs between late may to mid-June, when females dig their nests in sandy or gravel banks or beaches in riparian areas. Nestlings typically hatch between late August and early October (COSEWIC 2007). Wood turtles over winter in deep pools, often under overhanging roots or logs. As discussed in section 5.3, Phase 1 of the Project crosses eight mapped watercourses and five unmapped watercourses, and Phase 2 crosses 14 mapped watercourses. Several of these watercourses do have the potential for wood turtles, including water crossings WC-NGTL-03, WC-NGTL-05 and WC-NGTL-07 (Appendix C). No wood turtles were observed in the field; however, dedicated wood turtle surveys were not conducted.

5.5.2.3.4 Incidental Wildlife Observations

A wide variety of wildlife were observed as incidentals during wildlife, vegetation and wetland field surveys. The following species were either observed directly, or indirectly (e.g. scat, foot prints):

Mammals

- moose (*Alces Americanus*)
- black bear (*Ursus Americanus*)
- American red squirrel (*Tamiasciurus hudsonicus*)
- snowshoe hare (*Lepus Americanus*)
- striped skunk (*Mephitis mephitis*)
- eastern coyote (*Canis latrans*)
- red fox (*Vulpes vulpes*)
- bobcat (*Lynx rufus*)
- beaver (*Castor canadensis*)
- red-backed vole (*Myodes gapperi*)

Herpetiles

- northern spring peeper (*Pseudacris crucifer*)
- wood frog (*Lithobates sylvaticus*)

- American toad (*Anaxyrus Americanus Americanus*)
- yellow-spotted salamander (*Ambystoma maculatum*)
- blue-spotted salamander (*Ambystoma laterale*)
- green frog (*Lithobates clamitans*)
- garter snake (*Thamnophis sirtalis*)

All of these species have a general status rank of secure, and have an AC CDC s-rank of S4 or S5. No non-bird SAR or SOCC are expected to be found in the LAA, other than some potential for wood turtle.

5.5.2.3.5 Interior Forest Habitat

For the purpose of this report, interior forest was defined as continuous stands of forest greater than 10 ha, with a maturity class of either "mature" or "overmature", and free of edge effect (i.e., more than 100 m from a natural or anthropogenic edge), and identified using forest cover data obtained through NBDERD. Interior forest was calculated for baseline conditions (pre-PDA), as well as for post-construction (post PDA), shown in Table 5.8.

Table 5.8 Pre-and Post-PDA Interior Forest in the LAA for Phase 1

Patch Number	Stantec Habitat Type	Area (hectares)	
		Pre-PDA	Post-PDA
1	Mature - Overmature Hardwood	12.99	12.99
2	Mature - Overmature Hardwood	11.16	10.70
3	Mature - Overmature Hardwood	11.29	11.29
4	Mature - Overmature Mixedwood	15.35	15.35
5	Mature - Overmature Mixedwood	12.84	12.31
6	Mature-Overmature Softwood	32.01	32.01
7	Mature-Overmature Softwood	12.24	11.94
8	Mature-Overmature Softwood	14.87	14.87
TOTAL		**122.75**	**121.46**

Eight patches of interior forest were identified in the Phase 1 LAA, which include three patches of overmature hardwood, two patches of overmature mixedwood, and three patches of overmature softwood (Appendix C). Overall, softwood forest accounts for the largest portion of interior forest (59 ha (pre-PDA)). This is representative of the LAA as a whole, where forest cover is dominated by softwood. The largest patch of interior forest in the LAA is patch 6, which is a 32 ha softwood patch located just west of the north branch of the Burnt Coat River, near the middle of the LAA. Hardwood and mixedwood forest account for similar amounts of interior forest, at 28 ha and 35 ha, respectively. All of the interior forest is located western half of the LAA, and most is located between the south and north branches of the Burnt Church River.

5.5.3 Assessment of Potential Environmental Interactions with Wildlife and Wildlife Habitat

5.5.3.1 Phase 1

5.5.3.1.1 Construction

Construction activities may affect wildlife and wildlife habitat in a variety of ways, which can vary seasonally. Most clearing and construction is occurring along the RoW, which is schedule for the fall and winter seasons. The clearing and construction for the substation, however, is schedule to occur in the spring. During construction, large equipment will be operating onsite during vegetation clearing and other construction activities. These activities will result in sensory disturbance to wildlife resulting from the lights and noise of construction equipment. Wildlife may react to this disturbance in different ways. Some species may simply avoid the area, which results in temporary habitat loss for the duration of construction (Bayne *et al.* 2008). For birds, construction activities occurring in the spring could influence breeding and rearing success resulting in reduced productivity or nest abandonment. Clearing and construction of the substation is schedule for the spring, which coincides with breeding bird season. During this time, clearing activities have the potential to destroy nests, eggs, or unfledged chicks. To mitigate this risk, nest searches should be conducted prior to any clearing in the breeding bird season. If nests are found, a species-specific set-back buffer should be established and flagged around that nest that must not be disturbed until chicks have fledged. Regardless of the season, direct mortality of birds could also occur during construction through collisions with construction equipment. Lighted equipment can attract migrating birds, a phenomenon more pronounced at night and in poor weather conditions (Avery et al. 1976; Longcore and Rich 2004; Ogden 1996; Wiese *et al.* 2001). During construction, full cut-off temporary lighting should be used to reduce attraction to migrating birds.

Some small mammals and herpetiles may leave protective cover in response to construction noise and activity, which could increase direct mortality resulting from increased predation rates or collision with equipment. Wood turtles are slow moving, and may not be able to get out of the way of vehicles or equipment, which could result in injury or mortality. Wood turtle nests may also be at risk if construction is occurring in the riparian zone. Nests could be destroyed if they are run over by vehicles or equipment, or as a result of ground disturbance. Wood turtles' nests hatch in the fall, which means that eggs or young turtles may be present during the RoW clearing and transmission line construction.

During construction, wildlife habitat will be altered through the creation of more edges. Edge effects can also increase access for herbivores and predators, resulting in changes to indirect mortality through herbivory or predation, and can also lead to increased nest parasitism. Nest predators and parasites (e.g., brown headed cowbirds) are more abundant near forest edges (Lloyd et al. 2005; Rich et al. 1994). Edge habitats are already abundant throughout the LAA. Where most of the new transmission line will be paralleling an existing line, no new edges will be created; the RoW will simply be widened. However, in the limited area where the new transmission line does not parallel an existing line (i.e., a 500 m section of new transmission line near the new substation), new edges will be created.

Interior forest provides habitat for birds that rely on interior forest habitat, such as ovenbirds (*Seiurus aurocapilla*). Ovenbirds are an interior specialist that breed in contiguous tracts of mature deciduous or

mixedwood forests. Studies have found that the minimum contiguous habitat area required for ovenbirds to breed successfully ranges from 100 to 885 ha ((Robbins 1979, Robbins et al. 1989, Porneluzi et al. 2011). As such, a loss of interior forest can reduce habitat availability for ovenbirds. American three-toed woodpeckers are also sensitive to forest fragmentation and forest loss, and are particularly sensitive to the loss of old-growth forest. The loss of mature interior forest can reduce food availability, as this wood pecker relies on insect-infested snags (Leonard 2001). A loss in interior forest affects forest interior birds not only as a direct loss of habitat, but also by the edge effects that are created. For example, some studies have shown that wood thrush nesting success is higher in the interior forest than in forest edges (Newell and Kostalos 2007). Habitat fragmentation may also lead to increased levels of cowbird parasitism, which decreases nesting success in wood thrushes. However, the effects of edges on wood thrush are complex, and are not fully understood (Evans *et al.* 2011).

In total, 1.3 hectares of interior forest will be lost as a result of Phase 1 of the Project. This accounts for only 1% of the interior forest in the LAA. None of the interior forest patches will be bisected, as the PDA follows an existing corridor for most of its length. Three of the eight patches will be reduced in size: patch two (softwood), patch five (mixedwood), and patch seven (softwood). The largest reduction occurs in patch five, which decline by 0.5 hectares, due to encroachment on the forest interior buffer. The remaining five patches of interior forest will not be impacted. Overall, the decline in interior forest is small, and it not expected to have substantial effects on local wildlife populations.

5.5.3.1.2 Operation and Maintenance

Operation and maintenance includes the presence of transmission lines, and vegetation management activities along the RoW.

The presence of transmission lines can pose an increased mortality risk for wildlife, through collisions with the lines. Transmission line collision was recently estimated to be the third leading cause of bird-mortality from human influences (Calvert et al. 2013). Waterfowl and waterbirds are at higher risk of collisions due to their higher wing loading (body weight relative to wing area) and reduced maneuverability in the air (Bevanger 1998; Rioux et al. 2013). Transmission line design can also influence bird mortality, e.g., transmission lines with inadequate spacing between components such as conductors can lead to electrocutions. This occurs when birds with large wing spans, such as raptors, touch more than one conductor with fleshy body parts (touching with dry feathers will not cause electrocutions). Diurnal migrants, including waterfowl, waterbirds and raptors, may fly at lower elevations during migration. This increases their vulnerability to collisions with transmission lines.

There are no major waterfowl staging areas near the PDA. There are also very few areas of open water that waterfowl may use as breeding or stopover or habitat. As such, although waterfowl may occur in the PDA, or may pass through during migration, this group of birds is not abundant, and not at a high potential for collisions. Transmission line collisions, if they occur, will likely be limited to local movements of resident birds.

Vegetation management activities along the RoW include hand-cutting, mechanical cutting and the use of herbicides (as described in section 2.5.1.2.2). These activities have the potential to affect nesting birds. Many small passerines, including various species of warblers, nest in thick shrubs often found in re-

growing or disturbed habitats. Edge habitats are also preferred by many species. Vegetation management activities should occur outside of breeding bird season (mid-April to late August, for most migratory bird species expected to nest within the LAA (Allardville Ecodistrict); BSC 2017), to reduce the likelihood that nests, eggs, or young birds are destroyed or otherwise negatively affected.

5.5.3.2 Phase 2

While decommissioning and abandonment is unlikely to result in substantive adverse environmental effects to wildlife and wildlife habitat, it is possible that some bird species (e.g., osprey) may build nests on Project structures such as transmission line poles. These structures are attractive nesting sites for some birds, as they are typically stable, easily assessable, and the tallest point in an area. Decommissioning poles may interact with nesting birds if they are present. If birds are nesting on poles, nesting platforms should be provided during decommissioning to provide alternative nesting sites.

Decommissioning and abandonment may produce sensory disturbance to wildlife, similarly to that produced during construction, depending on the scheduling of the work. This sensory disturbance could result in temporary habitat loss through avoidance. Additionally, breeding and rearing success may be decreased as a result of the sensory disturbance (Bayne *et al.* 2008). Full cut-off temporary lighting should be used during decommissioning to reduce attraction to migrating birds. Lighting should be limited whenever it is safe to do so.

5.5.4 Summary for Wildlife and Wildlife Habitat

With mitigation and environmental protection measures, it is not anticipated that there will be any substantial changes to wildlife populations or wildlife habitat that overlaps the LAA. The habitat in this area is already highly fragmented. In addition, most of the new transmission line is following an existing transmission line. As such, edge habitats and the risk for collisions already exist in these areas. The Project schedule limits potential disturbance to wildlife, as the majority of the Project clearing and construction will occur in the fall and winter, outside of the breeding bird season. Clearing and construction will occur for the substation during the spring; however, this component of the Project has a small footprint of only 0.16 ha. For all work occurring in the spring, nest searches will be conducted prior to work to identify and avoid active nests. No SAR or SOCC are expected to be lost as a result of this Project.

5.6 SOCIOECONOMIC ENVIRONMENT

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the socioeconomic environment VC. The socioeconomic environment was included as a VC due to the potential for this Project to interact with land and resource use, transportation, infrastructure, and services, and employment and the economy.

Most of potential environmental effects on the Socioeconomic Environment will occur during construction due to peak employment levels and restrictions surrounding physical construction sites. Some socioeconomic effects, such as operation of the power transmission infrastructure, and economic

benefit by returning revenue to New Brunswick rate payers, and temporary interruptions in land use during maintenance (e.g., clearing) of the RoW, will last the life of the Project.

5.6.1 Scope of Assessment

Land use refers to the current and future use of public and private land/resources in the immediate vicinity of the Project. It includes industrial and commercial use, private ownership, and changes in the use of land for any recreational purposes. The current use of land and resources for traditional purposes by Aboriginal persons is discussed in Section 5.8.

Transportation, infrastructure, and services refers to current and future estimated daily traffic, and potential resultant effects on infrastructure (i.e., change in road surface quality as a result of changes in daily traffic volumes and types).

Employment and the economy refers to current and future employment and revenue generating opportunities for the local area and the province.

The scope of assessment is based on applicable regulations and policies, professional judgment and knowledge of the study team, and potential interactions.

5.6.1.1 Boundaries

In considering a change in socioeconomic environment, the spatial boundaries of the PDA and LAA are consistent with those defined in Section 4.2.1, with the following exceptions:

For the LAA a change in transportation, Infrastructure, and services encompasses the PDA, LAA, as well as the municipal boundaries of the village of Neguac.

For the LAA a change in employment and the economy encompasses the PDA, LAA, as well as the municipal boundaries of the village of Neguac, and boundaries of Northumberland County and Gloucester County, and New Brunswick.

The temporal boundaries were described in Section 4.2.2.

5.6.2 Existing Conditions for the Socioeconomic Environment

5.6.2.1 Information Sources

A combination of spatial analysis and baseline research was used to characterize the socioeconomic environment in the PDA and LAA. Baseline research included a review of online sources for land and resource use information, as well as directed interviews with representatives of relevant groups and organizations. Information on existing conditions was drawn from the following sources:

- GIS databases
- Published maps and aerial photography
- Government sources, including

  - Statistics Canada and other agencies and departments of the Government of Canada
  - various departments of the Government of New Brunswick
  - municipal governments
- Community organizations
- Past project assessments and technical reports.

5.6.2.2 Overview

The Project, as described in Sections 1.2 and 3.3, is located near the village of Neguac in Northumberland County, New Brunswick. Combined with Gloucester and Restigouche Counties, the area makes up the Northeast Economic Region of the province (NBPETL 2013). This region is the province's largest geographic area, but has the lowest population density (NBPETL 2013). Of the estimated 158,741 people who live in this region, approximately 30.5% of them are settled in Northumberland County (NBPETL 2013). In 2016, approximately 1,684 people resided in the Neguac, which demonstrated a slight growth (0.4%) in population over the past decade, like other communities in the region (Statistics Canada 2017).

In 2012, approximately 40% of the Northeast region was part of the core working age population but had an employment rate of 45.9%, well below the New Brunswick average of 56.6% (NBPETL 2013). The largest labour force in this region was the private, services-producing sector (accounting for upwards of 40% of employment), followed by the public sector (including healthcare and social assistance, education services and public administration) which accounted for approximately 32.2% of the labour force (NBPETL 2013). Key industries driving the economy in the Northeast region include trade, forestry, fishing, mining, quarrying, oil and gas, and manufacturing (GNB 2013).

For Phase 1 of the Project, the largest component of the PDA is crown land (44.3 ha, or 62.8%) followed by private land (23.4 ha, or 33.1%). For Phase 2, the largest component of the PDA is also crown land (87.9 ha, or 54.8%) followed by private land (68.5 ha, or 42.7%). Consistent with the proportion of crown land and key industries in the area, about 1,966 ha (81%) of land within the LAA of Phase 1 is forested, and the remaining area is being used for anthropogenic purposes (buildings, residential and industrial purposes, transportation, utilities, and recreation) as well as agricultural uses (<1.5% of the PDA, and <5% of the LAA for the Project).

According to the Service New Brunswick data catalogue (SNB 2017), there are no businesses within the PDA. There are 58 properties with the PDA of Phase 1, and 196 properties within the PDA of Phase 2.

The following eight businesses are within 500 metres of the PDA (i.e., within the LAA) for the Project:

Phase 1

- Salon Sophie
- Cinepark

Phase 2

- Ultramar

- Salon Sophie
- Great Canadian Dollar Store
- Chez Raymond (restaurant)
- Canada Post
- Esso, Shell
- Tabu Airport

The nearest private residence to the Project is located approximately 14 metres from the Phase 1 PDA.

There are no Oil and Natural Gas Licences or mining licences within the LAA (GNB 2005; SNB 2017).

There are no registered recreational sites within the PDA of the Project. There is, however, one recreational site, a drive-in movie theater, within the LAA of Phase 1 (Figure 5.3).

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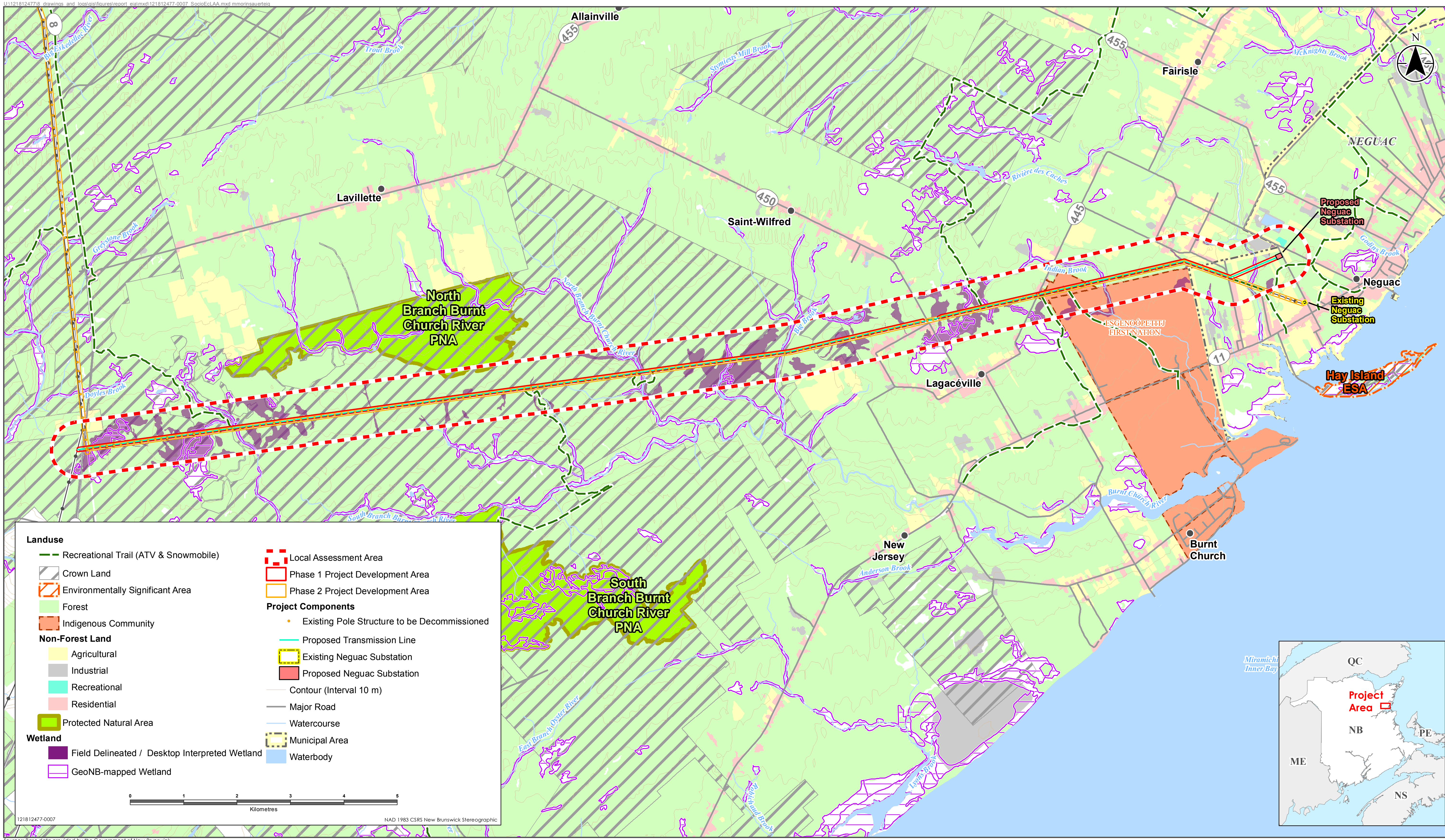

Allainville
Fairisle
NEGUAC
Lavillette
Saint-Wilfred
Proposed Neguac Substation
Neguac
Existing Neguac Substation
North Branch Burnt Church River PNA
Lagacéville
ESGENOÔPETITJ FIRST NATION
Hay Island ESA
Burnt Church
New Jersey
South Branch Burnt Church River PNA
Landuse
Recreational Trail (ATV & Snowmobile)
Crown Land
Environmentally Significant Area
Forest
Indigenous Community
Non-Forest Land
Agricultural
Industrial
Recreational
Residential
Protected Natural Area
Wetland
Field Delineated / Desktop Interpreted Wetland
GeoNB-mapped Wetland
Local Assessment Area
Phase 1 Project Development Area
Phase 2 Project Development Area
Project Components
Existing Pole Structure to be Decommissioned
Proposed Transmission Line
Existing Neguac Substation
Proposed Neguac Substation
Contour (Interval 10 m)
Major Road
Watercourse
Municipal Area
Waterbody
Kilometres
121812477-0007
NAD 1983 CSRS New Brunswick Stereographic
QC
Project Area
NB
PE
ME
NS

Sources: Base data provided by the Government of New Brunswick.

Local Assessment Area for Socio-Economic

Figure 5.3

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121812477 - NEGUAC TRANSMISSION LINE

There are ATV and snowmobile recreation trails (21.7 km total Phase 1 and 2), watercourses (10 watercourses for Phase 1; and 22 watercourses for Phase 2 (Section 5.3.3.), along with forested areas (26.2 ha, or 63.1% of Phase 1; 15.3 ha, or 36.9% of Phase 2) within the PDA of both phases of the Project. As such, common recreational activities, such as walking, hiking, biking, camping, hunting and fishing, are likely to occur in the PDA and LAA.

Fishing is likely a popular recreation activity within the PDA and LAA of the Project. Many of the fish species identified are thought to hold commercial, recreational, and Aboriginal value. Fish species in watercourses are discussed further in the Freshwater Fish and Fish Habitat section (Section 5.3.4).

Hunting and trapping are also a popular recreational activity in the region. The LAA is located within New Brunswick Wildlife Management Zone (WMZ) 8, which is typically open for deer, game bird, varmint, small game, moose, bear hunting, and trapping (GNB 2017d). In 2017, 243 moose licenses were issued for WMZ 8, which was among the higher licensed zones in the province (GNB 2017e). More information on the wildlife species observed in the LAA is discussed in Section 5.5.2.3. Historic hunting activities by Indigenous populations and early European settlers are discussed further in Section 5.8.

The PDA for Phase 1 intersects three major roadways (provincial highways, Route 8 and Route 445, as well as rue Robichaud), and 10 unnamed resource roads. The PDA for Phase 2 intersects 10 major roadways (provincial highways, Route 8, Route 440, and Route 445, rue Robichaud, Monica St, chemin Du Lac), four DNR unpaved resource roads, and 45 unnamed resource roads. Route 8 is an important highway link between northern and southern New Brunswick; it is 255 km long, and runs from Fredericton to Bathurst via Miramichi. Routes 440 and 450 are secondary highways that are 10 km (mostly north-south) and 13 km (running mostly west–east), respectively.

The Village of Neguac includes a number of services, including restaurants, motel, chalets, a campground and two parks for accommodations and recreation. The Village also includes municipal roads and sidewalks and waste management services. Water is sourced from private wells (The Village of Neguac 2017). Emergency services within the LAA are provided by Neguac; the community outsources policing services to the RCMP, and fire fighting services are provided by the Neguac Fire Department, which has 23 volunteer members. The municipality provides fire protection services in the Neguac region, from Wishart's Point in the south to Bartibogue Bridge in the north and Lavillette in the west (Village of Neguac 2017). While Neguac offers ambulance service, along with a medical centre and dental clinic (Village of Neguac 2017), the nearest hospitals are the Tracadie-Sheila Hospital 33 km to the North, and the Miramichi Regional Hospital 52 km to the south.

The labour market in the Northeast region has fared worse than other regions in New Brunswick over the last six years. Employment in the Northeast (58,700 in 2012) is lower than it has been historically (prior to 2007) after suffering from the recent recession and slow recovery (GNB 2013). Natural resources, such as fishing and forestry, are important drivers of the economy in this region. Industries in Neguac include fish processing, oyster marketing, food processing; and Christmas wreath plants (The Village of Neguac 2017).

From 2006 to 2011, the number of individuals employed in the province increased by 2.1%, from 344,770 to 351,935 (Statistics Canada 2007). In 2011, the employment rate in New Brunswick was 56.6%, slightly lower than the national average of 60.9% (Statistics Canada 2017) (Table 5.9).

Table 5.9 Labour Force Statistics: New Brunswick, Northumberland County and Neguac, 2011

Location	Labour Force	Employed	Participation Rate (%)[1]	Employment Rate (%)[2]	Unemployment Rate (%)[3]
New Brunswick	395,425	351,935	63.5	56.5	11.0
Northumberland County	40,495	23,790	58.7	46.5	20.8
Neguac	815	625	59.0	46	22.7

Notes:
1 Percentage of the working-age population employed or actively looking for employment.
2 Number of employed persons expressed as a percentage of the total population 15 years and older.
3 Number of unemployed persons expressed as a percentage of the labour force.
Note: totals may not add due to rounding.
Source:
Statistics Canada (2013a, 2013b)

In 2011, the experienced labour force in Northumberland County numbered 40,495 (Table 5.9), and the employment rate was 58.7%, which is 10% lower than the provincial employment rate. The experienced labour force in Neguac numbered 815 (Table 5.9), and the employment rate was 46%, which is 10.5% lower than the provincial employment rate.

In 2011, the top occupations for employment in Northumberland County were sales and service occupations (19%); trades, transport and equipment operators and related occupations (18%), and natural resources, agriculture and related production occupations (16%) (Statistics Canada 2013b).

5.6.3 Assessment of Potential Environmental Interactions with the Socioeconomic Environment

This section describes how the Project activities could interact with the socioeconomic environment as well as the techniques and practices that will be applied to mitigate the potential environmental effects and enhance beneficial effects of these interactions.

5.6.3.1 Phase 1

5.6.3.1.1 Construction

Construction activities will affect the socioeconomic environment through interactions with land use, transportation, infrastructure and services, as well as employment and the economy.

Construction activities will have an environmental effect on land use due to safety restrictions which will result in short term restricted access to portions of the PDA. However, owners of private land will be

consulted and accommodated for use of their land as appropriate, prior to construction. Access to private properties will be maintained during the Project. NB Power will communicate schedules for all Project activities, particularly those related to access restrictions. Access restrictions will be defined and will be limited in size to reduce the interactions with land and resource users. Transmission route planning (Section 2.3) reduced disruption of land use throughout most of the PDA. For example, siting considerations helped minimize the overall length of the line by maintaining the straightest alignment possible. Aerial photographs, GIS based mapping, and biological databases were referenced to reduce the potential for the crossing of wetlands, and other constraints.

Noise, vibration, and dust related to construction activities could also cause short term nuisance issues with residents in the area and subsequently affect residential and commercial land use for short periods. Mitigation described for the Atmospheric Environment (Section 5.1.3) will be used to reduce these nuisance effects. These include limiting noise emitting construction activities to daytime hours (i.e., between the hours of 7:00 am and 7:00 pm); and the use of dust suppressants and water on access roads to limit dust emissions.

Project environmental effects on transportation, infrastructure and services result primarily from project-related interactions with the road transportation network. Construction activities 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 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. 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, and construction.

Project hiring of local labour during construction will affect the LAA (for employment and economy) labour supply. Project spending will affect LAA businesses and government revenue. Changes in land use can affect the activities of commercial business within the LAA. NB Power will follow its existing practice of encouraging local and Aboriginal content and will, where possible and relevant, work toward a hire-local-first practice. Workers will be paid wages consistent with the Eastern Canadian labour market, and NB Power will procure goods and services from local and Aboriginal businesses in accordance with its existing purchasing policies and procedures. Construction is anticipated to be beneficial to both employment and the economy, because local employment and business opportunities will be created, and taxes will be paid to municipal and provincial governments. However, these benefits will be relatively short-term (e.g., 8 months).

5.6.3.1.2 Operation and Maintenance

Operation and maintenance activities is expected to have minimal interactions with the socioeconomic environment and are not expected to have an adverse environmental effect on the socioeconomic environment through interaction with transportation, infrastructure and services, as well as employment and the economy.

Operation and maintenance of the Project are expected to have limited effects on land use. Vegetation management activities within the RoW will limit vegetation growth, preventing further maturation and harvesting, but will be restored upon decommissioning at the end of its useful life. Temporary disruptions may occur during maintenance activities (occasional clearing of RoW), which may interrupt informal recreational use of the PDA; but these disruptions are expected to be infrequent and short-term, and thus are not expected to be substantive.

The operation and maintenance of the Project are not expected to affect transportation, infrastructure and services. The workforce required for these activities will be minimal and would not stress the capacity of public services within the LAA.

Operation and maintenance activities will be carried out by NB Power, and there are no new job opportunities expected for these activities; therefore, no substantive effects on employment are anticipated during operation and maintenance. The Project will modernize the electrical transmission infrastructure (Section 1.0); therefore, operation and maintenance activities are expected to have a positive effect on the community and economy resulting in a more reliable energy source for the life of the Project.

5.6.3.2 Phase 2

Phase 2 is not expected to have a substantive effect on land use, transportation, infrastructure and services, or employment and the economy. Further to the mitigation discussed in Section 5.6.3.1.1, land use that was affected by the placement of transmission towers will be allowed to return to the former land use (e.g., agriculture or forestry) or near natural state, over time, following the removal of these structures. Phase 2 is also expected to have a slight economic benefit from the temporary hiring of workers, and for their local expenditures on food, lodgings, fuels, etc. Temporary disruptions to recreational use may occur during decommissioning and abandonment, which may interrupt recreational use of the PDA; but these disruptions are expected to be short term, and thus are not expected to be substantive. There will not be a substantial interaction between the decommissioning and abandonment of the existing Neguac substation, and the socioeconomic environment.

5.6.4 Summary for the Socioeconomic Environment

Adverse interactions will be mitigated through consultation and accommodation with private land owners for use of their land as appropriate, communication with nearby landowners and businesses, nuisance mitigation (e.g. dust and noise), and restricting access for safety reasons during construction activities. Residual effects are temporary, localized, and of low magnitude. These interactions will be temporary (approximately 8 months total) during construction with negligible interactions during operation and maintenance. Socioeconomic benefits are expected through the provision of upgraded energy transmission lines, possibly resulting in increased long-term economic activity and employment and tax revenue. Based on the predicted characterization of residual environmental effects and mitigation measures described above (including compensation for loss of land, and maintenance of access to private properties, it is anticipated that Project activities will not cause a longstanding disruption or degradation of land use to a point for the socioeconomic environment

where it cannot continue at current levels. Power infrastructure is improved allowing for a general improvement in the regional socioeconomic environment.

5.7 HERITAGE RESOURCES

This section includes an assessment of potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the heritage resources VC. Heritage resources has been selected as a VC in recognition of the interest of: provincial and federal regulatory agencies who are responsible for the effective management of these resources; the scientific community; First Nations that have an interest in the preservation and management of heritage resources related to their history and culture; and the interest the general public has in the management of its history. For this VC, heritage resources include consideration of historical, archaeological, built heritage, and palaeontological resources. Heritage resources will focus on archaeological resources (consisting of Indigenous and Euro-Canadian archaeological sites), built heritage (historical buildings and structures), and palaeontological resources (fossil sites), as all resources that would be understood to be "historical" are captured under one of these heritage resource types.

5.7.1 Scope of Assessment

Heritage resources are those resources, both human-made and naturally occurring, related to human and natural activities from the past, that remain to inform present and future societies of that past. Heritage resources are permanent, although highly tenuous, features of the environment. If heritage resources are present, their integrity is highly susceptible to construction and ground-disturbing activities. The value of heritage resource sites is measured in terms of the information about the past that might be obtained from studying the materials that remain and, where applicable, their spatial relationship and context within the site and landscape. These resources are particularly susceptible to disturbance in terms of losing information that comes from the context of the ground. As a result, removing or disturbing these resources from an *in situ* context without scientifically recording that original context can result in a permanent loss of information, as in many cases, these resources are the only means society has of learning about this past.

Any Project activity that includes surface or sub-surface ground disturbance has the potential for interaction with heritage resources, where they are present. Accordingly, construction represents the greatest potential for interaction with heritage resources, as it is during construction that the majority of the ground breaking and earth moving activities of surface soils will take place to construct Project components. Decommissioning is also included, as the existing 69kV transmission line would not have been subject to and EIA or an Archaeological Impact Assessment.

Heritage resources in New Brunswick are regulated under the *Heritage Conservation Act*. The regulatory management of heritage resources falls under the NBDTHC, and is administered by its Archaeological Services Branch (for archaeological resources), Historic Places Section (for built heritage resources), and Natural Sciences Section (for palaeontological resources).

The review for heritage resources has been undertaken through the completion of historical, archaeological, built heritage, and palaeontological research. The Province of New Brunswick does

provide some guidance for conducting heritage assessments, such as the *Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick* (the "Archaeological Guidelines"; Archaeological Services 2012).

Consultation and engagement activities have been ongoing as part of the Heritage Resources component of the Project. During the background research for Heritage Resources, regional experts, and regulatory agencies were contacted in order to gather information on potential Heritage Resources within the PDA (Table 5.10).

Table 5.10 Experts Consulted as Part of Engagement Activities for Heritage Resources

Name of Expert	Affiliation
Archaeological Services Staff Members (various)	Archaeological Services – NBDTHC
Dr. Randall Miller	Curator, Geologist, New Brunswick Museum

NB Power has initiated First Nations consultation for the Project. As the engagement process progresses, any areas of interest and concern regarding heritage resources expressed by First Nations representatives, with respect to the potential for them to be located within the PDA, will be taken into consideration during the planning stage of the Project. Mitigation will be developed, as warranted, in consultation with regulatory agencies, and First Nations, as applicable. First Nations representatives were present and participated in the fieldwork undertaken for the archaeological impact assessment for the Project.

Consultation has occurred with staff at Archaeological Services, NBDTHC. This consultation involved requesting and reviewing the provincial archaeological potential maps and map data to identify registered archaeological sites and heritage resources in the Archaeological Services Sites Database, identifying any potential Palaeo-shorelines, and areas of elevated archaeological potential within, or potentially interacting with, the PDA. An Archaeological Field Research Permit (AFRP) application, detailing the methodology to be employed in the Archaeological Impact Assessment for the Project, was submitted to, and approved by Archaeological Services. The results of the walkover survey portion of the archaeological impact assessment have been submitted to Archaeological Services. This included areas of elevated archaeological potential identified during the fieldwork, and associated recommendations for shovel testing and further assessment.

Consultation has occurred with Dr. Randall Miller, Curator at the New Brunswick Museum, to discuss any concerns with respect to palaeontological resources. No concerns were expressed by Dr. Miller who noted that there are no known fossil occurrences within the PDA (Miller 2017).

5.7.1.1 Boundaries

The PDA and LAA were described in Section 4.2.1. The temporal boundaries were described in Section 4.2.2.

5.7.2 Existing Conditions for Heritage Resources

Archaeological resources, palaeontological resources, and built heritage were considered when describing existing conditions as part of this VC.

5.7.2.1 Archaeological Resources

A Search of the Archaeological Services report databased was conducted on May 23, 2017, and identified a list of archaeological project manuscripts and reports on file at Archaeological Services for projects and research conducted in and around the PDA. While no formal archaeological assessments have previously taken place within the PDA, several assessments have been undertaken in the surrounding area (Allen 1981; Bishop 1982; Burley 1976; Christianson and Ferguson 1981; Hale 1988; Jeandron 2004; Theriault 1981).

Pre-contact Period

A review of the Archaeological Potential Map for the Project revealed that there are no documented Pre-contact Period archaeological sites located inside of the PDA (Figure 5.4). There are however, five Pre-contact sites recorded along the banks of the Burnt Church River located 2 to 3 km south of the PDA.

Archaeological evidence from Debert, Nova Scotia, and Pennfield, New Brunswick, indicates that the first peoples to inhabit modern day New Brunswick likely arrived in the region at the end of the Pleistocene (McMillan and Yellowhorn 2004; Suttie et.al 2013). Much of northwestern New Brunswick would have remained under glacial ice sheets until around10,600 BP. After that time, the retreating glaciers would have opened the land for human occupation and early Indigenous populations could have settled the PDA (Bonnichsen *et.al* 1985; Cwyner et.al 1994).

During the Woodland Period (approximately 2500 - 500 BP), the climatic and environmental conditions of New Brunswick were near those of the present. Most archaeological sites in the province have been dated to this period, largely based on cultural sequences for lithic and ceramic evidence (Petersen and Sanger 1993; Rutherford 1993). Sites such as the Oxbow Site in Metepenagiag First Nation offer a glimpse of continuous occupation from the Early Woodland Period to Contact Period, and serves as the base for comparison for the region (Allen 1979).

The PDA lies within the traditional territory of the Indigenous people of the Mi'kmaq First Nations. According to Ganong (1899), the Mi'kmaq meaning of Neguac is "it springs up out of the ground".

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KRH-2017-ARCH-037
High Potential
Not Tested

KRH-2017-ARCH-025
Medium Potential
Tested

KRH-2017-ARCH-035
Medium Potential
Not Tested

VJB-ARCH-010
Medium Potential
Tested

ESGENOÔPEHTJ
FIRST NATION

Phase 1 Project Development Area
Phase 2 Project Development Area
Field Identified Area of Archaeological Potential

Archaeological Features (Archaeological Services)

Cemetery
Suspected Plane Crash
Pre-contact Site
Cemetery Buffer
Historic Site Buffer
Pre-contact Site Buffer
Plane Crash Buffer (1km)
Plane Crash Buffer (5 km)
Confluence Buffer
High Potential Buffer
Medium Potential Buffer
Palaeo Shoreline (2)
Palaeo Shoreline (3)
Indigenous Community
Watercourse
Waterbody

0 1 2 3
kilometres

121812477-0001
NAD 1983 CSRS NBDS

Project Location
NB
PE
NS

Sources: Base data provided by Service New Brunswick, Archaeological data provided by the Government of New Brunswick, Archaeological Services Department. Service Layer Credits: Service New Brunswick/Service Nouveau Brunswick

Archaeological Features within and in the vicinity of the Neguac Project Area

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121812477 - NEGUAC TRANSMISSION LINE

Figure 5.4

Historic Period

A review of the Archaeological Potential Map for the Project (Archaeological Services 2017) revealed that there are no Historic Period archaeological sites located inside the PDA. There are however, 11 historic sites located 2 to 3 km to the south of the PDA along the Burnt Church River (Figure 5.4). There are also two suspected plane crashes near the PDA, one of which is the Royal Canadian Air Force Vampire 17001 adjacent to the PDA near Robichaud Settlement. Six cemeteries are in the vicinity of the PDA, two of which are between 1 and 2 km from the PDA.

While no documented Historic sites were identified in the PDA, early Euro-Canadian settlers began occupying this area in the late 18th Century. The first Acadian settler in Neguac is Jean Savoie, who is said to have settled the area in 1756 and fleeing deportation. Ganong (1908) mentions that by 1761 there was a considerable village at Neguac, which included 35 families mostly relocated from Shepody and Petitcodiac. Various reproduced historic maps show clusters of structures along the coastal areas (ibid.). The English and Scottish began settling the area of Burnt Church ca. 1790. The 19th century grant maps show several named properties that are crossed by the PDA, with those east and north of Burnt Church (Esgenoôpetitj) First Nations being mostly Acadian names and those to the west being of British origin (NBPA 2017).

Results of the Archaeological Impact Assessment

An archaeological impact assessment (AIA) was completed in the summer of 2017 in the form of a walkover survey of the PDA. During the AIA, a total of four areas of elevated archaeological potential were identified, and subsequently recommended for shovel testing if they could not be avoided through planning and design. Archaeological shovel testing was completed during the fall of 2017 within the footprints of three pole locations that overlapped with areas identified as exhibiting elevated archaeological potential during the walkover surveys (Figure 5.4, Figure 5.5, Figure 5.6). No archaeological resources were identified.

5.7.2.2 Palaeontological Resources

A palaeontological report based on known data sources within the PDA, was prepared by Dr. Randall Miller with the New Brunswick Museum (Miller 2017). Dr. Miller noted that geological formations along the PDA consist of sedimentary rocks of the Pennsylvanian Age Pictou Group. In general, this group is comprised primarily of sandstones, siltstones, and mudstones deposited in terrestrial fluvial and lacustrine conditions. While such deposits have the potential to yield fossils, the report states that there are no known fossil localities located within the PDA (Miller 2017).

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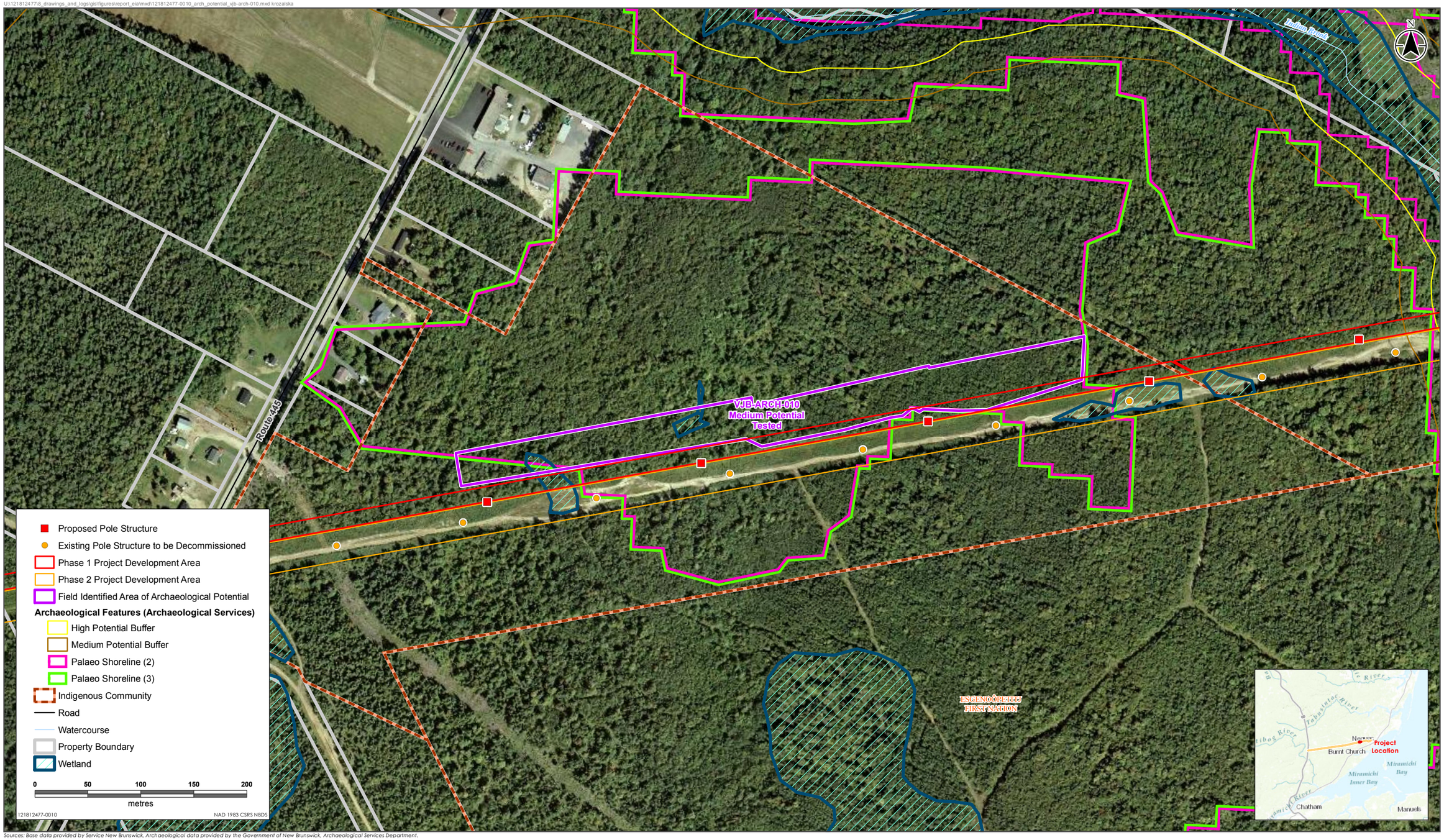

Sources: Base data provided by Service New Brunswick, Archaeological data provided by the Government of New Brunswick, Archaeological Services Department.

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Service New Brunswick/Service Nouveau Brunswick

Archaeological Potential Area VJB-ARCH-010

Stantec

121812477 - NEGUAC TRANSMISSION LINE

Figure 5.5

U:\121812477\8_drawings_and_logs\gis\figures\report_eia\mxd\121812477-0011_arch_potential_krh-2017-arch-025.mxd krozalska

Sources: Base data provided by Service New Brunswick; Archaeological data provided by the Government of New Brunswick, Archaeological Services Department.

Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community
Service New Brunswick/Service Nouveau Brunswick

Archaeological Potential Areas KRH-2017-ARCH-025, KRH-2017-ARCH-037, and KRH-2017-ARCH-035

Stantec

5.7.2.3 Built Heritage

A search of the Canadian Register of Historic Places (CRHP) (2017) and the New Brunswick Register of Historic Places (NBRHP) (2017) revealed that no registered historic places or heritage sites are located within the PDA. However, two are in the vicinity of the PDA. The Maison Otho Robichaud, located approximately 500 m east of the eastern limit of the PDA, is a designated Provincial Historic Place that dates from c 1781 (CRHP 2017). It is considered the oldest extant Acadian house in New Brunswick. The Former Lighthouse Rear Range in Lower Neguac is also a designated Provincial Historic Place, located approximately 4 km northeast of the PDA. Constructed in 1873, the lighthouse operated on Crabb Island until 1892. The structure was relocated many times before its current location was established in 1956, further inland (CRHP 2017). Given that these buildings are located several hundred metres form the PDA, they will not be affected by Project activities. Further, no built heritage resources have been identified within or in proximity to the PDA, and therefore built heritage will not be considered further in this assessment.

5.7.3 Assessment of Potential Environmental Interactions with Heritage Resources

This section describes how the Project activities could interact with heritage resources as well as the techniques and practices that will be applied to mitigate these potential interactions.

5.7.3.1 Phase 1

5.7.3.1.1 Construction

During construction, activities that could result in a potential interaction with heritage resources include: site preparation, and excavation and structure assembly. Though the RoW will be cleared for the Project, ground breaking and earth moving activities will be limited to the areas where excavations are carried out to place the transmission line poles, and guy wires for some pole locations. At this time, no excavation activities are planned for the construction of the new substation and it is expected that the site will be built up using fill materials. Archaeological resources, where present, are typically located in the upper soil layers of the earth and therefore potential interactions between these resources, if they are present, and the Project would take place during construction. Any potentially adverse interactions with 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.

Vegetation clearing 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, as a result of rutting along the RoW. Where access and staging occurs, 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 and structure assembly involve mechanical augering, excavation, or blasting all of which have the potential to 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 and thus, no new ground disturbing activities will occur. Therefore, no interactions with heritage resources will occur from these activities and they are not considered further in this assessment.

The following mitigation measures, through careful design and planning, will be implemented to avoid or reduce the potential for adverse interactions with Heritage Resources:

- Planned avoidance (e.g., transmission tower and guy wire placement) for areas identified during the walkover survey to exhibit elevated potential for archaeological resources will be implemented
- Shovel testing as per the Archaeological Guidelines, where avoidance is not practicable, will be implemented in an effort to determine the presence or confirm absence of potential archaeological resources in areas determined to have elevated potential for archaeological resources
- Should any heritage resources be identified that could be affected by the Project, additional mitigation, as required, will be developed in consultation with provincial regulators and First Nations, as applicable
- In areas of elevated archaeological potential, archaeological monitoring will be implemented, if shovel testing is not practicable
- A First Nations field monitor will be present during construction activities
- A heritage resource discovery contingency plan outlined in the PSEMP will be followed during all phases of the Project

5.7.3.1.2 Operation and Maintenance

During operation, it is anticipated that there will be no interaction between heritage resources and any equipment brought onto the RoW during vegetation management. In the unlikely event that a heritage resource is discovered during this activity, NB Power would implement the Heritage Resource Contingency Plan in the PSEMP and contact the appropriate regulating agency to assess the discovery and develop appropriate mitigation.

Maintenance of hardware in the form of ground and air line inspections will not result in ground disturbance and, therefore, a potential environmental effect on heritage resources is not anticipated.

5.7.3.2 Phase 2

Due to their age, the transmission lines to be decommissioned would not have been subject to a previous EIA or archaeological impact assessment as there was no EIA requirement at that time. Therefore, while the activities associated with the decommissioning and abandonment of lines 0104 and 0012 are only anticipated to result in limited ground disturbance, it is possible that heritage resources could be located within the ground. The decommissioning and abandonment of the existing Neguac substation may require the removal of contaminated soils and fill material, if they are found to be present; however, no environmental interactions with heritage resources would be expected to occur.

The following mitigation measures, through careful design and planning, will be implemented to avoid or reduce the potential for adverse interactions with Heritage Resources during the Decommissioning and Abandonment Phase of the Project:

- A Heritage Resource Contingency Plan outlined in the PSEMP will be followed during all phases of the Project; and
- Should any heritage resources be identified that could be affected by the Project, additional mitigation, as required, will be developed in consultation with provincial regulators and First Nations, as applicable.

5.7.4 Summary for Heritage Resources

In consideration of the above, and considering the nature of the interactions between the Project and heritage resources as well as the planned implementation of known and proven mitigation as well as adherence to applicable Acts, Regulations, and Guidelines, there will not be any substantial interaction between the Project and heritage resources during all phases of the Project. At this time, no follow-up work or additional archaeological assessment is warranted or recommended.

5.8 CURRENT USE OF LAND AND RESOURCES FOR TRADITIONAL PURPOSES BY ABORIGINAL PERSONS

This section assesses the potential environmental interactions between construction, operation and maintenance, and decommissioning and abandonment of the Project and the current use of land and resources for traditional purposes by Aboriginal persons (Current Use) VC. Current Use was chosen as a VC in recognition of the potential importance of the lands and resources within the PDA for current use by Aboriginal persons, as well as the constitutionally protected rights of Aboriginal persons to carry out those activities.

In addition, as described in the *Guide to Environmental Impact Assessment in New Brunswick*, pursuant to Section 5(2) of the New Brunswick *Environmental Impact Assessment Regulation 87-83*, proponents are required to take into consideration all cultural activities, hunting, fishing, gathering and traditional uses and practices by Aboriginal persons.

5.8.1 Scope of Assessment

Current use of land and resources for traditional purposes by Aboriginal persons is a VC because Aboriginal persons carry out traditional activities that use the land and resources as an integral part of their lives and culture. In this chapter, "current" refers to use of the land and resources for traditional purposes in the area of the proposed Project within the last 100 years of "living memory", which includes the period prior to the construction of the present-day alignment of the existing 69 kV transmission Lines 0104 and 0012. "Use" refers to traditional activities such as hunting, fishing, and gathering conducted by Aboriginal persons for traditional purposes, and considers subsistence, social, and ceremonial uses, and for which the right to engage in those activities is afforded constitutional protection.

The assessment of environmental effects in this VC has been made based on data and documentary information available at the time of writing. NB Power will maintain communications and information exchange through Aboriginal engagement (Section 8.0), and will consider the implications of any new information related to current use of land and resources for traditional purposes on Project planning, design, and mitigation, if applicable.

For the assessment of potential environmental effects of the Project on the use of the PDA by Aboriginal persons prior to 100 years ago, the reader is referred to the Heritage Resources VC (Section 5.7), where such use would result in archaeological sites that may have been created during earlier timeframes.

The PDA is located within the traditional territory of the Mi'kmaq, an area that would have been used in the past for hunting, fishing, gathering, and travel within and outside of Mi'kma'ki (the traditional name of Mi'kmaq territory). While there are no current First Nations communities located within the PDA, Esgenoôpetitj First Nation is located only 120 metres south of the PDA; Tabusintac First Nation is approximately 8 km north of the PDA; and five other First Nations communities are located within 100 km of the PDA.

The proposed route for the new 138 kV transmission line, as well as that of the existing Line 0104, cross both private and Crown land, with more than half (*ca*. 14 km) of the RoW for Line 0104 located on Crown land. For the purposes of this assessment only traditional activities practiced on Crown or publicly-owned land (as those lands were not ceded as part of peace and friendship treaties with colonial Europeans) will be considered. Any current use activities that may be taking place on privately-owned land within the RoW are anticipated to be incidental (i.e., at the convenience of the private landowner and subject to landowner permission).

In addition to Crown land identified on Figure 5.3, all watercourses within the PDA are also considered Crown land. As such, they include riparian rights by all members of the public including Aboriginal persons. Therefore, the ability to access and fish watercourses as well as to hunt and gather resources within the Crown portion of the RoW is included in the assessment of current use of land and resources for traditional purposes by Aboriginal persons.

As a Crown agency, the NBDELG has a duty to consult with First Nations prior to carrying out any activity or authorization that might infringe Aboriginal and treaty rights held by Aboriginal people. As a Crown corporation, NB Power is similarly responsible for implementing consultation with First Nations. The *New Brunswick Duty to Consult Policy* (Aboriginal Affairs Secretariat of New Brunswick or AASNB 2011) provides direction to the provincial government on consultation with the Mi'kmaq and Maliseet First Nations of New Brunswick. Similarly, federal regulatory agencies also have a duty to consult prior to exercising any power, duty or function that might infringe Aboriginal and treaty rights.

5.8.1.1 Boundaries

The PDA and LAA were described in Section 4.2.1. The temporal boundaries were described in Section 4.2.2.

5.8.2 Existing Conditions for Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

There are many areas in New Brunswick which have historical and cultural significance to Aboriginal people. These areas include locations where Aboriginal people continue to pursue traditional activities that are an element of a practice, custom, or tradition integral to the distinctive culture of the Mi'kmaq.

5.8.2.1 Methods

Engagement activities with First Nation leaders and organizations in northeastern New Brunswick have been initiated by NB Power and are on-going. The exact nature, scope, and detail of First Nations engagement will be determined with the First Nations involved. At this time, the assessment presented below should be considered preliminary as engagement activities are ongoing. This basis for the assessment of potential environmental effects to current use of land and resources for traditional purposes by Aboriginal persons is derived primarily from information included in biophysical assessments associated with other VCs (e.g., fish and fish habitat) regarding the availability of species currently being used for fishing, hunting, trapping and other traditional activities. This, in combination with information from a literature review, past project experience in relation to current use of land and resources for traditional purposes by Aboriginal persons as documented through engagement of Aboriginal communities for those past projects, and professional judgment of the Stantec study team, have formed the basis for the information on current use for this assessment.

The reliance on other VC assessments is based on the assumption that assessments of resources such as fish, wildlife, and vegetation species can be used to inform an assessment of traditional land and resource-use activities. The assessment of effects on fish species for example, may not capture the conditions that influence the act of harvesting (e.g., personal choice); however, effects by the Project on the availability of such species will directly affect the current use of those species.

5.8.2.2 Overview of Existing Conditions

Mi'kma'ki, the traditional Mi'kmaq territory (Figure 5.7), is understood to be comprised of what is now all of Nova Scotia, PEI, and the eastern shore of New Brunswick, extending north to the Gaspé Peninsula. Mi'kmaq territory in New Brunswick extends west, where it meets the neighbouring Wolastoquey Nations, the divide with which is generally seen as the drainage area of the Saint John River watershed as far north as the Gulf of St. Lawrence and south to the Bay of Fundy (Paul 1993; Berneshawi 1997).

There are 15 First Nations communities within the province of New Brunswick, consisting of six Wolastoquey Nation communities and nine Mi'kmaq Nation communities (Figure 5.8). Based on ethno-historical accounts, oral histories, archaeological research, and historical texts, Wolastoqiyik and Mi'kmaq Nations and their ancestors have lived and used the land and resources of what is now New Brunswick since the retreat of the glaciers approximately 13,000 years ago.

The majority of land within the PDA is forested or wetland and is primarily rural in nature. The Project (Phase 1 and Phase 2) crosses a total of twenty-eight watercourses. Based on the literature review and field observations as outlined in the freshwater fish and fish habitat VC (Section 5.3), the watercourses crossed by the Project contain freshwater fish and fish habitat that are likely to support commercial, recreational, or Aboriginal (CRA) fisheries, including American eel, Atlantic salmon, brook trout, gaspereau, rainbow smelt, American shad, striped bass, white perch, and yellow perch. Further, aboriginal groups in the area hold commercial rights to eel, smelt and gaspereau licences (DFO 2017a; DFO 2017b; DFO 2017c), and have agreements to fish for other fish species for food, social and ceremonial purposes (DFO 2012). The PDA is located on both privately-owned land and on Crown land and at this time, it is not known if any traditional use activities are taking place within the PDA,

however, given the proximity of First Nations communities in the areas of the PDA, for the purposes of this assessment it is assumed that there are current use activities taking place in the areas of the PDA.

Should any information regarding current use be identified during NB Power's discussions with First Nations, or at any time during the regulatory approval process for the Project, this information will be provided to the NBDELG.

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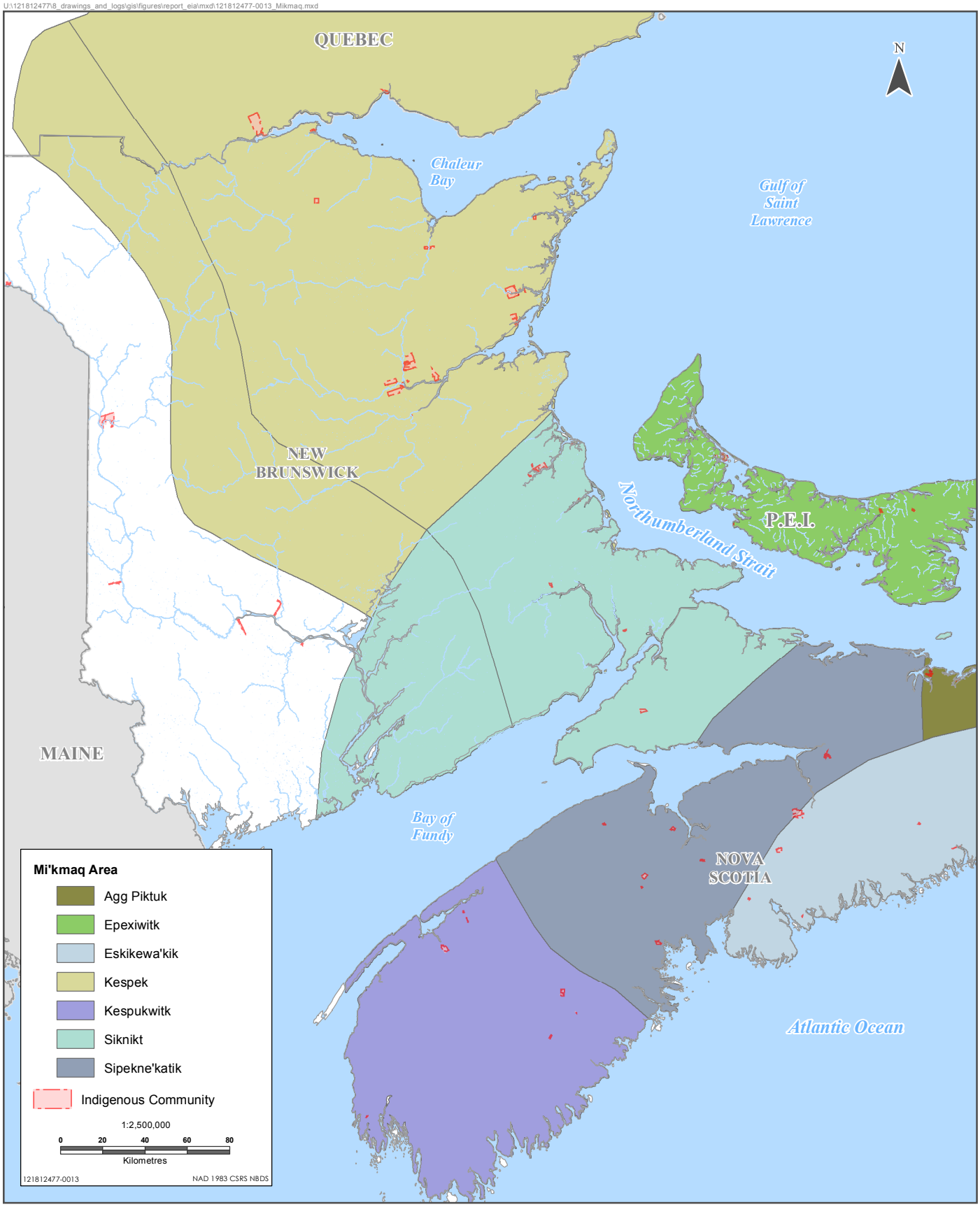

Sources: Base Data - SNB, NBDNR. Mi'Kmaq Areas Data - Paul, Danieln: http://www.danielnpaul.com/Map-Mi'kmaqTerritory.html. Ganong, W.F. 1899. Map of New Brunswick in Prehistory (Indian) Period., Natural Resources (2011).

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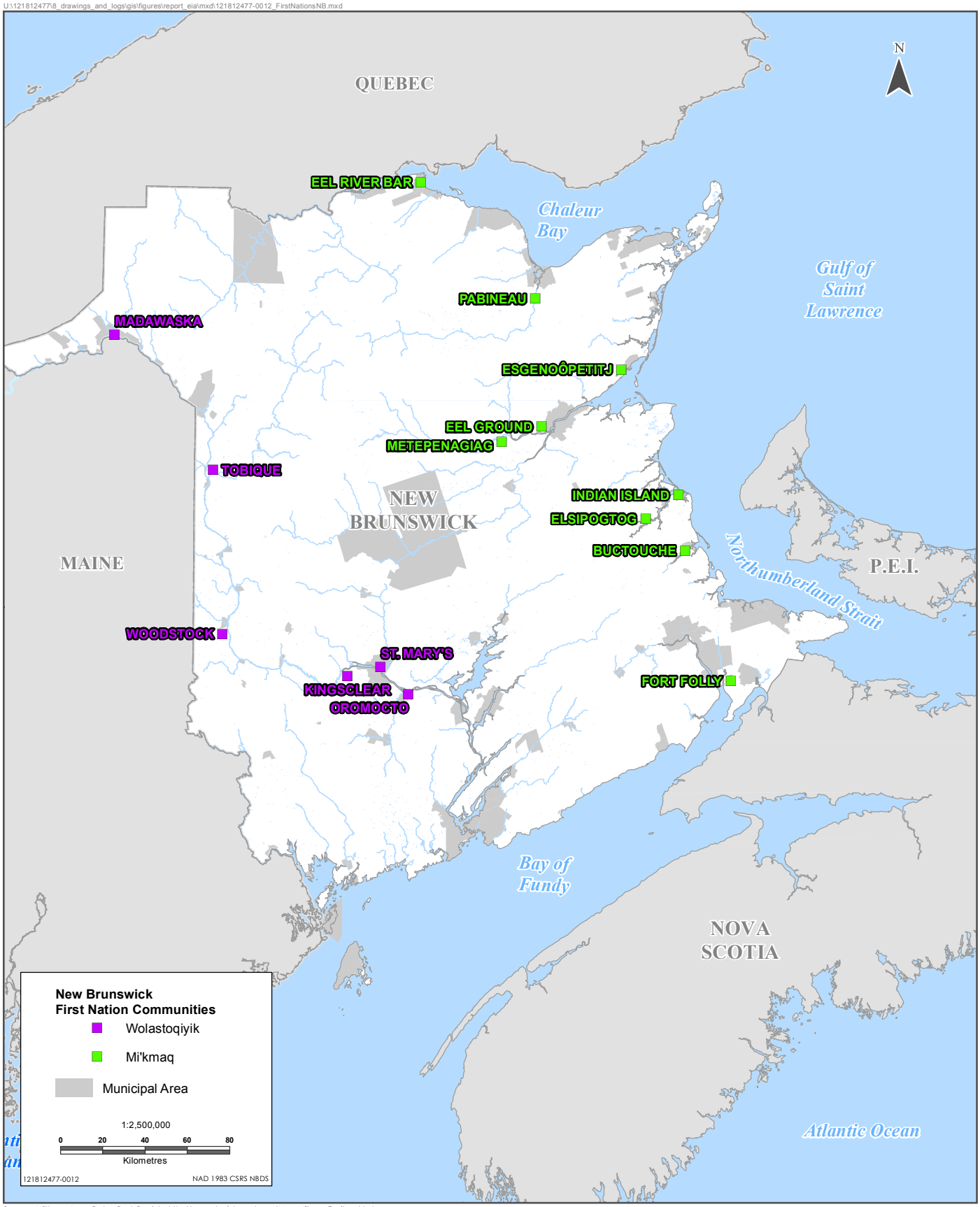
121812477 - Neguac Transmission Line

Traditional Mi'kmaq Territory

Figure 5.7



Sources: Mi'Kmaq Areas Data - Paul, Danieln: http://www.danielnpaul.com/Map-Mi'kmaqTerritory.html. Natural Resources (2011). Base data from the government of New Brunswick and Canada.

New Brunswick First Nation Communities

Figure 5.8

5.8.3 Assessment of Potential Environmental Interactions with Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

This section describes how the Project activities could interact with current use of land and resources for traditional purposes by Aboriginal persons as well as the techniques and practices that will be applied to mitigate those potential interactions.

5.8.3.1 Phase 1

5.8.3.1.1 Construction

The Project could result in a change in current use of land and resources for traditional purposes by Aboriginal persons if Project construction activities result in temporary loss of access to resources on Crown land, or freehold land owned by the Esgenoôpetitj First Nation within the PDA.

During construction, it is anticipated that activities that require the use of heavy equipment, including access and staging, excavation, structure assembly, anchoring, and conductor stringing, could result in temporary restrictions in access to portions of the RoW as well as the watercourses within the PDA. It is anticipated that temporary exclusion zones will be established for safety reasons and the need for heavy equipment to operate within the RoW and cross the watercourses. These exclusions zones could, during construction, result in a short-term restriction to Aboriginal fishing, harvesting hunting, gathering opportunities, and ceremonial activities (if practiced) within the PDA.

Vegetation clearing required for the RoW for the new transmission line and the new substation has the greatest potential to interact with current use of land and resources for traditional purposes by Aboriginal persons as the removal of trees and shrubs within the PDA will result in the modification of vegetation communities and wildlife habitat that could be used for hunting and gathering opportunities. The majority of the new transmission line will be constructed on Crown land, and vegetation clearing required for the development of the RoW for the new 23 km-long 138 kV transmission line and the excavation for placement of poles will result in the loss of vegetation and trees and the consequential loss of wildlife habitat, and may also cause sensory disturbance to wildlife. These activities may affect current use if traditional activities are practiced there, on a short-term basis while construction is taking place. The lights and noise generated by construction equipment could result in reduced productivity or nest abandonment. These activities can also have subsequent indirect effects to wildlife habitat due to the changing habitat; however, the cleared width of the new RoW will be narrow (i.e., 15 m for its northern half) since its southern half will be using the already cleared existing RoW for Line 0104, the construction period will be relatively short-term, and similar wildlife habitat will remain adjacent to the RoW and surrounding area.

Vegetation clearing required for the Project may also result in the removal of some vegetative canopy (overhang) in the RoW, where it currently exists, which has the potential to result in a change in fish habitat (freshwater fish and fish habitat VC, Section 5.3) and potentially in vegetation habitat in the riparian areas. While complete clearing of the riparian zone is not likely (no in-water work will be done, and alteration within the 30 m watercourse buffer will be limited and subject to a Watercourse and Wetland Alteration permit), it is likely that tall trees will be removed so as to not interfere with

transmission conductors. Such an alteration in habitat may result in a change in the ability to participate in traditional activities, if practiced, at the specific RoW location for each watercourse, but given the limited amount of disturbance in the riparian zone (i.e., limited to the width of the RoW—15 m), a substantive change in availability of resources (e.g., fish) at these crossing locations is not likely.

Given the location of the new substation in a semi-residential setting on private land and within the Neguac village limits, it is not anticipated that there will be any interaction between the construction of the new substation and current use of land and resources for traditional purposes by Aboriginal persons.

The mitigation for this VC relies on other assessments where terrestrial, aquatic, and heritage resources may be affected by the Project.

Mitigation that will be implemented to protect habitats and species of traditional importance to Aboriginal people that may use land within the PDA for traditional purposes include the following:

- Continued engagement activities with First Nations communities to determine if there is any Current Use within the proposed Project RoW
- If any use is identified, provide First Nations communities or individuals who currently use the PDA the opportunity to harvest/gather any species of importance to traditional activities that might be affected by Project activities prior to the initiation of construction activities. It is further recommended that the opportunity to conduct these harvesting/gathering activities be timed appropriately for the seasonality of the species of interest.
- Measures used to mitigate the risk of fish mortality and fish habitat as included in the freshwater fish and fish habitat VC, Section 5.3
- Measures used to mitigate a change in plants, vegetation, and wetlands as included in the vegetation and wetlands VC, Section 5.4
- Measures used to mitigate a change in wildlife habitat or risk of wildlife mortality as included in the wildlife and wildlife habitat VC, Section 5.5
- Measures used to mitigate sites of cultural and/or ceremonial importance as included in the heritage resources VC, Section 5.7
- Signage will be placed on access roads used by construction equipment to warn the public of activities in that area

The changes to forest conditions as a result of the clearing of trees are not anticipated to affect wildlife or fish populations adjacent to the PDA. Given the narrow RoW in areas paralleling the existing RoW, traditional activities will be able to resume following the completion of construction activities either within the existing RoW or in the areas immediately adjacent to the new RoW. Further, the forests in the existing RoW will be allowed to fully regenerate after decommissioning of that line and forest habitat lost within that area will return in time.

NB Power is committed to continuing engagement of, and dialogue with, First Nation groups that may have an interest in the Project by providing information about the Project and its potential environmental effects. Should any additional interaction be identified, appropriate mitigation will be developed in consultation with the affected First Nations and regulatory agencies as warranted. As engagement is ongoing, should traditional knowledge information become available, this information

will be considered and residual effects on current use of land and resources for traditional purposes by Aboriginal persons will be reviewed.

5.8.3.1.2 Operation and Maintenance

During operation and maintenance, vegetation management will consist of limiting the extent of revegetation within the RoW through manual and mechanical means, on a periodic basis (e.g., every five years). After the completion of construction, the vegetation communities and wildlife habitat within the 138 kV transmission line RoW will convert from primarily forest to tall shrub habitat (with periodic vegetation management to maintain access to the line and its safe operation), for the life of the transmission line. Species that prefer forested habitat will likely relocate to adjacent forested areas outside of the RoW, while different species than those that use the current forested habitat will occupy the new habitat (Section 5.4). There is no critical habitat for any species at risk in the RoW for the new 138 kV transmission line, and there is an abundance of similar habitat nearby to the Project. Some larger mammal species such as moose may be drawn to the open area of the RoW as it revegetates with tall shrub. Given the openness of the existing RoW, no substantive net change in habitat and related mammal behaviour is expected, and the environment will remain suitable for hunting by Aboriginal people on Crown lands within the PDA.

Vegetation management will be carried out periodically by NB Power. These activities could also result in some temporary restricted access to watercourses in the PDA used for fishing, plant harvesting, and ceremonial activities, if practiced there. Any interruption in access due to Vegetation Management would be infrequent and temporary.

During operation and maintenance activities, there could be brief restrictions to Aboriginal persons' access to the portions of Crown land within the PDA where equipment is operating (e.g., for vegetation maintenance), due to health and safety protocols. However, these restrictions will be brief and access would resume after the maintenance activities are completed.

5.8.3.2 Phase 2 - Decommissioning and Abandonment of Existing Neguac Substation and Existing 69 kV Transmission Lines (0104 and 0012)

During decommissioning and abandonment of the existing substation and 69 kV transmission lines 0104 and 0012 and the existing substation, any activities that could temporarily restrict access to the Crown land portions within the PDA and watercourse crossings within the PDA could result in very brief access restrictions (e.g., a few days) to areas used for fishing, plant harvesting, and ceremonial activities by Aboriginal persons on any sections of Crown land.

Any interruption to access to the PDA will be temporary and not affect areas immediately adjacent to the PDA, which would still be available for use. After decommissioning activities are complete, any watercourses and the portion of the RoW on Crown land will be readily available for use so that traditional activities could resume following decommissioning. Over time, natural vegetation growth will occur in the formerly cleared RoW, such that vegetation and wildlife might return to this area and enable the resumption of traditional activities.

5.8.4 Summary for Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons

With mitigation and environmental protection measures, it is not anticipated that there will be any substantial interaction between the Project and current use of land and resources for traditional purposes by Aboriginal persons. The Project is not anticipated to result in large-scale changes to an Aboriginal person's ability to participate in traditional activities due to changes in availability of resources (e.g., change in fish species or populations or terrestrial environment). Areas immediately adjacent to the PDA will remain unaffected by Project activities and will be available for traditional uses even during construction activities on the RoW. Following the removal of the poles, conductors, and insulators as part of decommissioning of the existing substation and lines 0104 and 0012, the RoW will be allowed to revegetate naturally, returning it to a near natural state over time. Any current use in this area will be able to resume as it was prior to the construction of the existing substation and Lines 0104 and 0012.

5.9 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Effects of the environment on the Project are assessed in this EIA registration because of the potential for natural hazards and environmental conditions to interact with the Project. Interactions between the environment and the Project may include naturally-occurring events associated with climate (including weather), climate change, seismic activity, and forest fires.

The effects of natural hazards and environmental conditions, if unanticipated or unmanaged, can result in adverse changes to Project components, schedule, and costs. Typically, these potential effects are addressed through project design (including site and materials selection), scheduling, and operational procedures implemented in consideration of expected normal and extreme environmental conditions.

NB Power adheres to generally accepted engineering practices, designs, and design standards to consistently manage the potential effects of the natural environment on transmission infrastructure, including extreme conditions. Such engineering design incorporates a considerable margin of safety that fosters the safe and reliable operation of a facility throughout its lifetime. NB Power will monitor any observed Effects of the Environment on the Project, and take action as required to maintain, repair, and upgrade Project infrastructure and modify operations to facilitate its continued safe operation.

Some effects, such as damage to infrastructure, could also result in consequential effects on the environment; these environmental effects are addressed as Accidents, Malfunctions, and Unplanned Events in Section 2.8.

5.9.1 Scope of Assessment

This section assesses the potential interactions between the environment and the construction, operation and maintenance, and decommissioning and abandonment of the Project, with consideration of the following environmental conditions:

- Climate (including weather and weather variables such as air temperature, precipitation, winds, and extreme weather events)
- Climate change
- Seismic activity
- Forest fires (from causes other than the Project)

Boundaries

The PDA and LAA were described in Section 4.2.1. The temporal boundaries were described in Section 4.2.2.

5.9.2 Existing Conditions for Effects of the Environment on the Project

5.9.2.1 Climate

Climate is defined as the prevalent meteorological/weather conditions experienced in an area or region over a number of years (ECCC 2017a). Climate includes, but is not limited to, elements such as temperature, precipitation, sunshine, cloudiness, and wind, and is often characterized by the statistical average (mean and variability) of meteorological conditions of a region over a substantial period of time (typically 30 years) (GC 2017b).

The current climate conditions are generally described by the most recent 30-year period (1981 to 2010; GC 2017a) for which the Government of Canada has developed statistical summaries, referred to as climate normals. The closest Environment and Climate Change Canada (ECCC) weather station with available historical data is located in Miramichi, NB, approximately 37 km southwest of the proposed new substation in Neguac.

5.9.2.2 Air Temperature and Precipitation

Annual climate readings at the Miramichi weather station indicate that January is typically the coldest month of the year, with a daily average temperature of -10.8°C (GC 2017c). July is typically the warmest month of the year, with a daily average temperature of 19.1°C.

The average annual precipitation in Miramichi is 1,072 mm, with July having the most rain (99 mm on average) and January the most snow (70.4 cm on average) (GC 2017c).

5.9.2.3 Wind

The strongest winds measured at the Miramichi weather station have been predominantly from a southerly direction between the months of May and December, with a maximum hourly wind speed of 89 km/hr recorded in the month of September (GC 2017c). The maximum wind gust measured at the Miramichi weather station was from a southerly direction in December 1960 at 143 km/h.

5.9.2.4 Extreme Weather Events

The Government of Canada lists severe storms, storm surges, hurricanes, floods, earthquakes, and tornadoes amongst New Brunswick's regional environmental hazards in the federal "Get Prepared" campaign (GC 2015). Earthquakes (seismic activity) are discussed in Section 5.9.2.6. Although tornadoes are rare, they do occasionally occur in New Brunswick (Cheng et al. 2013).

Extreme storms and precipitation in New Brunswick tend to be more common and severe during the winter months. Winter storms can consist of high winds and a mixture of snow, rain, and ice. New Brunswick has experienced recent power outages related to excessive ice build-up on distribution lines that resulted in poles failing. In general, distribution power lines are more susceptible to damage during storm events than transmission power lines due to distribution power lines requiring a relatively narrow cleared RoW through vegetation (trees, overhanging branches, etc.) and thereby at greater risk from falling vegetation. A low-pressure system brought torrential rain to New Brunswick in December 2010, and was focused over the southwestern and mid-western regions. Damages from flooding and heavy rainfall threatened public safety and transportation systems, and cost the province over $15 million (NBDELG 2012c). In February 2015, extreme snowfall events exceeded the recorded provincial average winter snowfall total (CBC News 2015). An ice storm swept through central and southern New Brunswick in January 2017 bringing high winds and ice accretion that felled trees and toppled distribution lines, disrupting power distribution in the region (GNB 2017b).

5.9.2.5 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC 2014) 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*. *Climate change may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use*"

Predictions of future climate change trends are derived from mathematical representations (models) of climate systems. While climate change models can provide useful information for predicting and preparing for climate change, their ability to forecast regional changes is generally more limited than larger-scale predictions (e.g., continental climate change) (Randall et al. 2007; Flato et al. 2013).

Future climate change, such as increases in temperature, frequency and magnitude of precipitation, and increased incidences and intensity of storm events, could affect the long-term integrity and reliability of the Project. Despite differences in climate change model outputs, there is an overall consensus among the climatological community in that, over the next century, Atlantic Canada will likely experience warmer temperatures, more frequent storm events, increased storm intensity, and increased flooding (Lemmen et al. 2008; Lines et al. 2005, 2008). This 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).

5.9.2.6 Seismic Activity

Seismic activity is defined by the local geography of an area and occurs through the sudden release of stored elastic energy caused by the fracture and/or movement 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 2013a).

The Project is located within the Northern Appalachians seismic zone which includes New Brunswick and extends towards New England. Historically, seismic activity in this area has been low. Earthquakes with a magnitude of 3 (on the Richter scale) have occurred in the general area of the Project, with a magnitude 3.1 quake occurring approximately 25 km southwest of the PDA on November 1, 2016 (Earthquake Track 2017); however, it is unlikely that an earthquake with a magnitude of less than 5 would cause damage (NRCan 2013b).

5.9.2.7 Forest Fires

The Canadian Wildland Fire Information System is a computer-based fire management information system that monitors the risk of forest fires in Canada on a short-term (daily and seasonally) and long-term basis (NRCan 2017a). The average Fire Weather Index, a component of the Canadian Wildland Fire Information System, is a numeric rating of fire intensity. It combines the Initial Spread Index and the Buildup Index, and is a general index of fire danger throughout the forested areas of Canada (NRCan 2017a).

The Fire Weather Index 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). New Brunswick, for the years 1981 to 2010, is rated from 0 – 10 for August, which is the month which has the highest risk of forest fires in the province. This ranking places New Brunswick at the lower range of the fire index scale, which correlates to a low risk of forest fires in the province (NRCan 2017b).

5.9.3 Assessment of Potential Effects of the Environmental on the Project

This section describes how the environment could interact with planned Project activities to result in adverse change to Project components, schedule, and costs. The techniques and practices that will be applied to mitigate the potential negative effects of these environmental interactions are also noted.

5.9.3.1 Phase 1

5.9.3.1.1 Climate

During construction, and operation and maintenance of the Project, there are several climatic conditions that have the potential to adversely affect project activities, equipment, and/or infrastructure.

Extreme low temperatures have the potential to reduce the ductility of construction materials and increase their susceptibility to brittle fracture.

High winds, especially those greater than 90 km/h have the potential to break trees and limbs which can strike and break transmission infrastructure (NB Power 2017b). Wind also has the potential to increase structural loadings on infrastructure and could result in damage to Project infrastructure and/or equipment.

Wet snow, freezing rain, and ice accretion pose some of the most serious risks to transmission infrastructure. The excessive build-up of snow and ice can increase loadings on Project infrastructure, and has the potential to exceed the tensile strength of the conductors, causing them to break (NB Power 2017b).

Extreme precipitation has 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. Heavy rains can also exacerbate the effects of freezing or high winds on project infrastructure, by allowing water to enter stress fractures in the insulators resulting in a power failure (NB Power 2017b).

Extreme winter precipitation could also affect winter construction activities, including those associated with the decommissioning of lines 0104 and 0012, by causing a delay in the receipt of materials, and result in additional effort for snow clearing and removal. Extreme precipitation, storms, and hurricanes could result in the inability for workers to access the site, cause damage to infrastructure/equipment, and/or cause an interruption of Project operation (electrical power services) for extended periods of time.

During electrical storms, fault currents (electric currents that flow from one conductor to ground, or to another conductor due to an abnormal connection between the two (IESO 2010)) may occur during a lightning strike. This could result in danger to workers and/or damage to Project infrastructure and equipment. Lightning strikes during electrical storms can also ignite a fire (see Section 2.8.2 for additional discussion of fire as an accidental event).

Measures to mitigate the potential effects of climate on the Project will include the following.

- The Project will be constructed to meet the standards of the Canadian Electrical Code (a CSA Group Standard) which includes the applicable building, safety, industry codes, and standards for wind, snowfall, extreme precipitation, and other weather variables associated with climate. These standards and codes provide factors of safety regarding environmental loading and Project specific activities and events.
- All aspects of Project design, including selection of materials and equipment to be used, planning, and maintenance, will consider normal and extreme climate/weather conditions that may be encountered throughout the life of the Project. Delays due to poor weather are anticipated and can often be predicted, and allowance for them will be included in the construction schedule.
- A minimum RoW width and the removal of danger trees adjacent to the RoW will be maintained to avoid wind-related tree strikes (NB Power 2012).
- All components and physical activities associated with the Project will follow the PSEMP.
- A maintenance and safety management program will be implemented.

- Emergency measures will be in place, in conjunction with existing NB Power, community, and provincial plans to provide rapid detection and response to any fire threat, and quickly control and extinguish the flames prior to contact with any flammable structures (e.g., wood). Mitigation for Project-caused fires is discussed in Section 2.8.

5.9.3.1.2 Climate Change

Total Annual Precipitation

New Brunswick Climate Change Projections (GNB 2017c) are derived from the application of existing ECCC historical weather station data in New Brunswick to the guidance provided by the Intergovernmental Panel on Climate Change (IPCC) in their Fifth Assessment Report (AR5) (IPCC 2014). The climate projections available for New Brunswick (GNB 2017c) are based on greenhouse gas (GHG) concentration trajectories adopted by the IPCC in the AR5. These GHG concentration trajectories are referred to as representative concentration pathways (RCP), and are indicative of the potential range of radiative forcing values that could result in GHG-related heating of the planet in the year 2100, as compared to pre-industrial values (Moss et al., 2010). The RCP4.5 used in this assessment represents a scenario in which GHG-related heating of the planet in the year 2100 occurs at a rate of 4.5 W/m².

The AR5 data are extrapolated to predict climate change scenarios across several regions of NB. The nearest ECCC weather station to the Neguac Project is in Miramichi, NB, approximately 37 km southwest of the Project, and is considered representative of the degree of climate change that may be experienced at the Project location. The climate change variables that are available and applicable from the NB AR5 data for an assessment of potential effects on Project infrastructure (e.g. transmission poles and lines) are limited herein to those related to precipitation, since moderate changes in temperature will not directly affect the integrity of Project infrastructure.

Mean total annual precipitation for the Miramichi station from 1980 to 2010 was 1,061 mm (GNB 2017c). The projected mean total annual precipitation for the Miramichi area for the year 2080 is 1,146.5 mm per year (Figure 5.9, GNB 2017c). The long-term projection for the Miramichi region, which includes similar projections for the Project PDA (Figure 5.9) is less than the mean total precipitation historically experienced elsewhere in New Brunswick, such as at the Saint John ECCC weather station which has a historical mean total annual precipitation of 1,293.4 mm (GNB 2017c). As transmission infrastructure in Saint John has not been adversely affected by the relatively higher total precipitation, climate change related effects associated with an increase in total annual precipitation are not expected to cause adverse effects on the Project infrastructure.

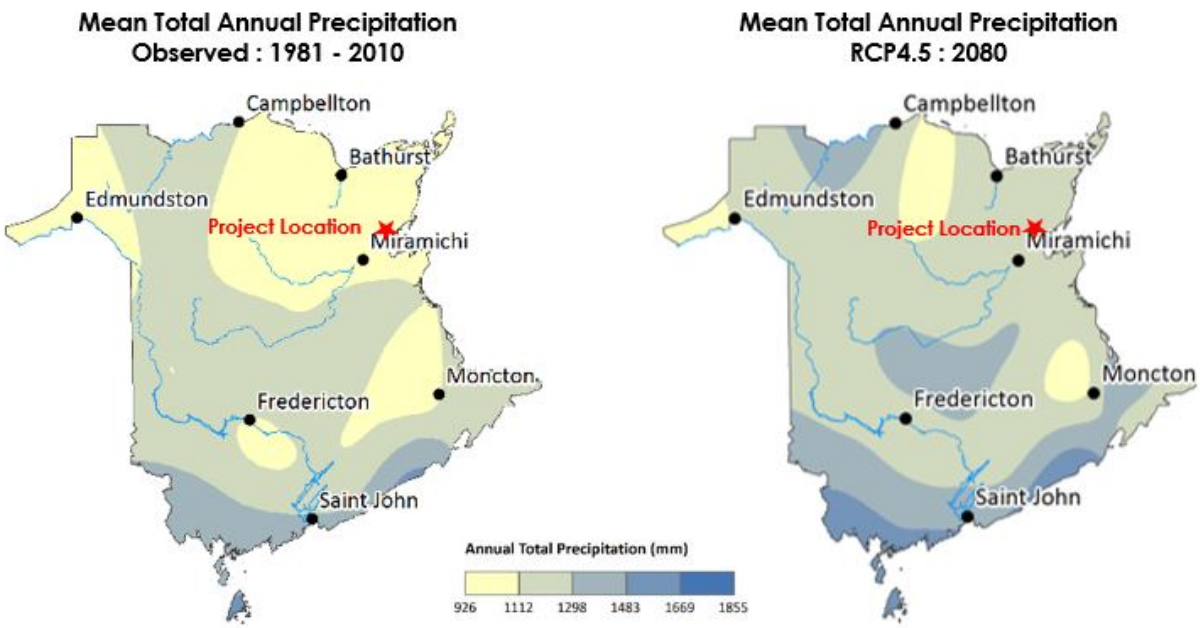


Figure 5.9 Mean total annual precipitation in New Brunswick: (left) historical observations for the years 1981 – 2010, and (right) climate projections RCP4.5 for the year 2080. (Source GNB 2017c)

Winter Precipitation

Winter precipitation could be considered a surrogate for snowfall and/or freezing rain, both of which could affect the integrity of the infrastructure through load bearing on lines and poles, or trees falling across the lines, from snow/ice load. Winter precipitation for the Miramichi weather station has averaged 239.2 mm per year from 1981 to 2010 (GNB 2017c). The projected mean winter precipitation for the Miramichi weather station for the year 2080 is 268 mm, which represents a projected increase of 12% above historical values. The long-term projection for the Miramichi area is less than the mean winter precipitation historically experienced elsewhere in New Brunswick, such as at the Saint John ECCC weather station which has a historical mean winter precipitation of 384.8 mm (GNB 2017c).

Localized historical climate observations and projections indicate that the Project is situated in an area that could experience greater mean winter precipitation than that recorded at the ECCC weather station in Miramichi (Figure 5.10). However, the projected mean winter precipitation for the PDA is still less than what has been historically observed in Tracadie-Sheila located approximately 29 km to the northwest (Figure 5.10). As transmission infrastructure in Tracadie-Sheila has not been adversely affected by the relatively higher winter precipitation, climate change related effects are not expected to cause adverse effects on the Project infrastructure. Note: the lifespan of Project infrastructure is estimated to be 50 years, or until 2068. Based on the information provided above, there are no anticipated effects from projected changes in annual precipitation or winter precipitation on the Project.

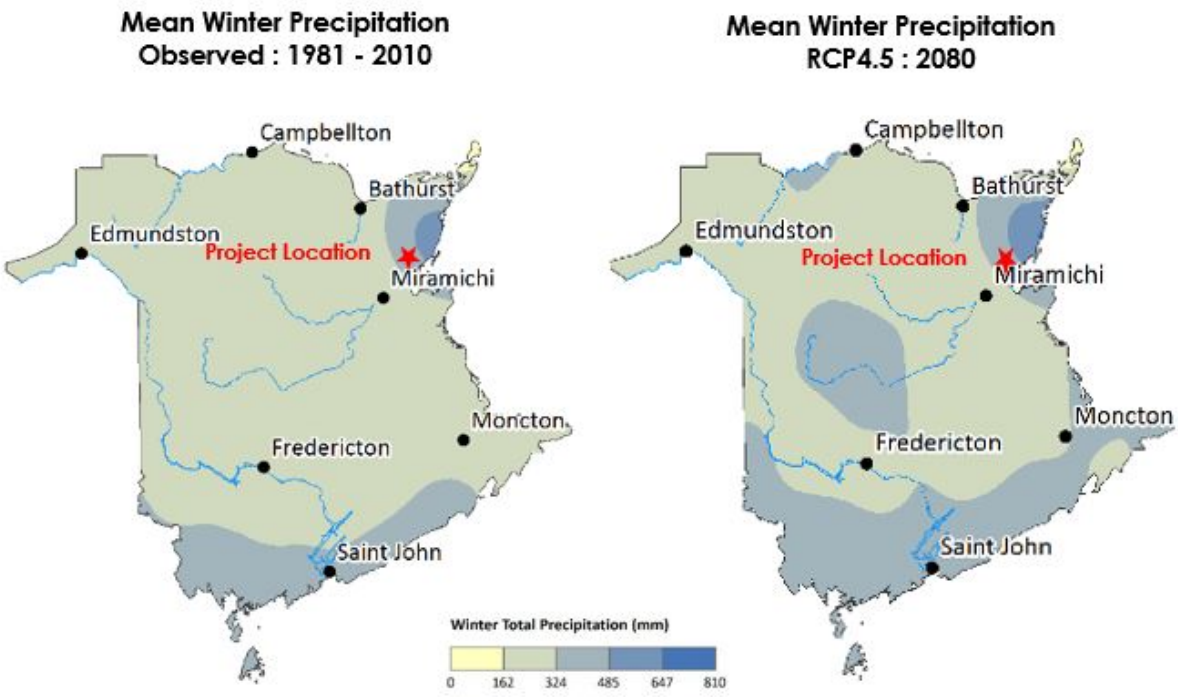


Figure 5.10 Mean winter precipitation in New Brunswick: (left) historical observations for the years 1981 – 2010, and (right) climate projections RCP4.5 for the year 2080. (Source GNB 2017c)

Extreme Rainfall

Heavy rains can exacerbate the effects of freezing or high winds on project infrastructure, by allowing water to enter stress fractures in the insulators resulting in a power failure (NB Power 2017b). Cornell University uses weather stations to predict extreme rainfall trends in northeastern North America, including Atlantic Canada (Cornell University 2016). The nearest weather station to the Project that is used by Cornell University to predict future extreme rainfall events is the ECCC Miramichi station located in Miramichi, NB, approximately 25 km southwest of the Project. The 50-year, 24-hour extreme rainfall estimate for Miramichi, NB has a depth of 96.2 mm, which is comparable to the maximum precipitation depth of 93.0 mm recorded at the ECCC Miramichi weather station in July 1996(GC 2017c). This represents a modest increase of up to 3.4% when compared with the largest extreme precipitation event recorded for the Project area. The projected extreme rainfall for Miramichi is also less than historical extreme rainfall events recorded at other ECCC weather stations in northeastern NB, including 96.3 mm for Bathurst and 117.6 mm for Buctouche, both of which occurred in July 1973 (GC 2017c).

The potential effects of extreme rainfall will be taken into consideration in the Project design. As transmission infrastructure in Bathurst and Buctouche has not been adversely affected by the relatively higher extreme rainfall, these climate change-related effects are not expected to cause adverse effects on the Project infrastructure.

5.9.3.1.3 Seismic Activity

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 generally been low on the Richter scale (see Seismic Activity 5.9.2.6). 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 any Project-related activities or phases is low. Project structures will be built in accordance with industry standards to withstand minor seismic events.

5.9.3.1.4 Forest Fires

The average incidence of forest fires in the province is relatively low (see), and the likelihood of a major, uncontrolled forest fire event occurring in the vicinity of the Project that would cause substantive damage to the Project or interruption to any Project-related activities or phases is low.

5.9.3.2 Phase 2

As there is no new infrastructure or equipment associated with Phase 2, the potential effects of the environment on the Project are limited to delays in scheduled decommissioning and abandonment activities due to extreme weather, forest fires, or seismic events, and/or erosion or flooding caused by extreme precipitation events. Mitigation for effects of the environment on the decommissioning and abandonment activities in Phase 2 will include the following.

- Delays due to poor weather are anticipated and can often be predicted. Allowance for delays will be included in the decommissioning and abandonment schedule components and physical activities associated with the Project
- All components and physical activities associated with the Project will follow the PSEMP.

5.9.4 Summary for Potential Effects of the Environmental on the Project

Project construction techniques, best practices, scheduling, and equipment design codes account for environmental factors such extreme weather conditions and climate predictions. Other environmental factors such as seismic activity and forest fires are considered to have a low likelihood of occurrence. Therefore, the chance of environmental conditions affecting Project infrastructure or operations resulting in a change to Project schedule 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, NB Power will rely on standard contingency and response plans to repair damaged equipment and reduce service interruptions.

6.0 SUMMARY OF PROPOSED MITIGATION

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
1.	N/A	Construction	Where practical, use only of tracked vehicles in or near watercourses and/or wetlands to reduce the potential for rutting.	2.4.3.1.2
2.	N/A	Construction and Decommissioning	Water sprayers will be used to supress and control dust levels, if and as required during construction and decommissioning.	2.6.1
3.	N/A	Construction	Mitigation will be used wherever feasible to reduce the potential environmental interactions resulting from sound emissions.	2.6.3
4.	N/A	Construction	Sedimentation and erosion control measures will be used to provide slope stability and to reduce and mitigate the potential for construction-related sediments to enter watercourses.	2.6.5
5.	N/A	All Activities	The training of personnel in spill prevention and response, and Workplace Hazardous Materials Information System (WHMIS)	2.7.1
6.	N/A	All Activities	Following proper procedures within the PSEMP	2.7.1
7.	N/A	All Activities	Design and installation of secondary containment for the transformer	2.7.1
8.	N/A	All Activities	Routine cleaning, preventative maintenance, and visual inspections of hydraulic equipment and vehicles	2.7.1
9.	N/A	All Activities	On-site spill response equipment	2.7.1
10.	N/A	All Activities	Reporting spills to the appropriate Project personnel and New Brunswick Power Transmission System Operator (PSO) (1-800-756-8411). During normal business hours (i.e., Monday to Friday from 8:15 am to 4:30 pm), the PSO will notify the appropriate authorities (i.e., NBDELG). Outside of normal business hours, on weekends and on holidays, the PSO will notify the Canadian Coast Guard/Spills Action Centre (1-800-565-1633)	2.7.1
11.	N/A	All Activities	Equipping all vehicles with fire extinguishers sized and rated as appropriate	2.7.2

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
12.	N/A	All Activities	Training personnel in the location and use of fire extinguishers	2.7.2
13.	N/A	All Activities	Safely storing wastes that may be soaked in flammable materials (i.e., oily rags	2.7.2
14.	N/A	All Activities	Avoiding the parking of vehicles in areas of long grass	2.7.2
15.	N/A	All Activities	Immediate reporting of a fire to local emergency response services	2.7.2
16.	N/A	All Activities	Implementation, as needed, of traffic control measures to reduce the potential for vehicle-to-vehicle collisions	2.7.3
17.	N/A	All Activities	Licensing of Project staff, as appropriate, to operate vehicles on-site, will obey traffic rules and regulations, and will exercise due care and attention while on-site	2.7.3
18.	N/A	All Activities	Use of designated truck routes by truck	2.7.3
19.	N/A	All Activities	Immediate reporting of a collision to local emergency response services	2.7.3
20.	N/A	All Activities	Documenting, mapping, and identifying raptor species and their nests on Project infrastructure	2.7.4
21.	N/A	All Activities	Scheduling of maintenance activities outside of nesting periods, where possible	2.7.4
22.	N/A	All Activities	Consultation with qualified biologists prior to unplanned/emergency maintenance during nesting periods	2.7.4
23.	N/A	Operation	Regular inspection and maintenance of infrastructure	2.7.5
24.	N/A	Operation	If a malfunction does occur, it will be responded to within 24 hours of detection/reporting	2.7.5
25.	Atmospheric Environment	Construction and Decommissioning	Unnecessary idling of vehicles, equipment, and machinery will be avoided to the extent possible to reduce combustion gas and GHG emissions.	Section 5.1.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
26.	Atmospheric Environment	Construction and Decommissioning	Standard dust control mitigation practices will be used to suppress dust levels. These practices include the revegetation of areas where soil has been disturbed, as well as the use of dust suppressants and water on access roads to limit dust emissions, especially during dry and windy periods if they occur.	Section 5.1.3.1.1
27.	Atmospheric Environment	Construction and Decommissioning	Construction is expected to be limited to daytime hours (typically between the hours of 7:00 a.m. to 7:00 p.m.) in order to reduce disturbances to nearby residences. The nearest residence is 14 m away to the Phase 1 PDA, where the daytime noise level is expected to be approximately 66 dBA. Work is typically not conducted overnight or on weekends; however, delays in the schedule may require extended work hours. In the event that evening or nighttime work is required, the planned schedule and activities will be communicated to all residents within 500 m of the activity including providing them information on who to contact in the event they have a noise complaint. residences.	Section 5.1.3.1.1
28.	Atmospheric Environment	Construction and Decommissioning	Project equipment will be repaired/maintained in good working order which could potentially reduce overall noise levels (e.g., if a malfunctioning muffler is repaired).	Section 5.1.3.1.1
29.	Water Resources	Construction	Blasting has the potential to result in changes to groundwater quantity and/or quality and will be carried out in accordance with best management practices.	Section 5.2.3.1.1
30.	Water Resources	Construction	NB Power will reduce the potential for interactions between the Project and Water Resources by adhering to the best management practices and the PSEMP. This includes preventing machinery from entering watercourses, preventing the movement of sediments and woody debris into watercourses.	Section 5.2
31.	Water Resources	Operation and Maintenance	Vegetation management will be required and will be conducted in accordance with NB Power's integrated vegetation management program.	Section 5.2.3.1.2
32.	Water Resources	Operation and Maintenance	If herbicides are required, they will be used in accordance with government regulations.	Section 5.2.3.1.2

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
33.	Freshwater Fish and Fish Habitat	Construction and Decommissioning	Clearly mark watercourses and riparian buffers prior to accessing or operating heavy equipment in the RoW	Section 5.3.5.1.1
34.	Freshwater Fish and Fish Habitat	All Activities	Use existing bridges, roads or temporary structures when crossing watercourses	Section 5.3.5.1.1
35.	Freshwater Fish and Fish Habitat	Construction	Use and maintain silt fencing or hay bales in areas where soil disruption could result in the transport of sediment into watercourses	Section 5.3.5.1.1
36.	Freshwater Fish and Fish Habitat	Construction	Remove silt fencing after revegetation has occurred	Section 5.3.5.1.1
37.	Freshwater Fish and Fish Habitat	All Activities	Plan activities (e.g. fueling) so that deleterious substances do not enter watercourses	Section 5.3.5.1.1
38.	Freshwater Fish and Fish Habitat	Construction and Operation	Maintain a buffer zone on the banks of watercourses	Section 5.3.5.1.1
39.	Freshwater Fish and Fish Habitat	Construction and Operation	Prune or top vegetation within the riparian area where practical	Section 5.3.5.1.1
40.	Freshwater Fish and Fish Habitat	Construction and Operation	Relocate brush and woody debris to areas where it cannot enter watercourses	Section 5.3.5.1.1
41.	Freshwater Fish and Fish Habitat	Construction and Decommissioning	Adhere to a maximum RoW width of 30 m as part of Project design	Section 5.3.5.1.1
42.	Freshwater Fish and Fish Habitat	Decommissioning	Phase 2 activities have the potential to interact with freshwater fish and fish habitat in that heavy equipment may require the use of temporary bridges to cross watercourses to remove poles, conductors, and hardware. In areas where soil disturbance due to decommissioning causes erosion, measures will be taken to stabilize the affected area as described in Section 5.3.5.1.1.	Section 5.3.5.2
43.	Vegetation and Wetlands	Construction and Decommissioning	Prior to the onset of construction or decommissioning activities, locate populations of plant SOCC identified during the field surveys and mark them with symbolic fencing to prevent accidental damage to these plants.	Section 5.4.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
44.	Vegetation and Wetlands	Construction	Where feasible, adjust pole spacing to avoid populations of plant SOCC found in the proposed transmission line RoW.	Section 5.4.3.1.1
45.	Vegetation and Wetlands	Construction and Decommissioning	Where feasible, install or remove poles in wetlands during the winter months when the ground is frozen to reduce disturbance from the movement of vehicles and equipment to plant SOCC and wetland soils and vegetation.	Section 5.4.3.1.1
46.	Vegetation and Wetlands	Construction and Decommissioning	In areas where plant SOCC are present, plan access routes to pole placement or removal sites to avoid populations of plant SOCC or particularly sensitive wetland features such as peatlands wherever feasible.	Section 5.4.3.1.1
47.	Vegetation and Wetlands	Construction and Decommissioning	Wherever feasible, minimize movement of heavy equipment through wetlands by approaching wetlands from either end.	Section 5.4.3.1.1
48.	Vegetation and Wetlands	Construction and Decommissioning	Minimize disturbance to wetland vegetation and soils by spanning wetlands where feasible. Where not feasible, place poles as close to the edge of the wetland as possible to minimize traffic on wetland soils.	Section 5.4.3.1.1
49.	Vegetation and Wetlands	Construction and Decommissioning	Remove only as much wetland vegetation as is required to safely install poles and draw conductors and provide adequate clearance between conductors and vegetation.	Section 5.4.3.1.1
50.	Vegetation and Wetlands	Operation	Vegetation control in wetlands and in areas where plant SOCC are present will be conducted by mechanical means only, using hand tools where feasible, to minimize disturbance to soils and to non-target vegetation.	Section 5.4.3.1.2
51.	Vegetation and Wetlands	Construction and Decommissioning	Avoid disturbance of all wetlands to the extent possible, and where avoidance is not possible, compensate for the permanent net loss of wetland function according to a plan to be developed in coordination with, and approved by, NBDELG.	Section 5.4.3.1.1
52.	Vegetation and Wetlands	Construction	Restrict clearing activities to the minimum amount required, particularly around wetlands.	Section 5.4.3.1.1
53.	Vegetation and Wetlands	Construction and Decommissioning	Employ standard erosion and sedimentation control measures, particularly to avoid silt laden runoff entering wetlands.	Section 5.4.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
54.	Vegetation and Wetlands	Construction and Decommissioning	Implement standard dust control measures to avoid siltation of wetlands.	Section 5.4.3.1.1
55.	Vegetation and Wetlands	Construction and Decommissioning	Use quarried, crushed aggregate for road building in and near wetlands to reduce the risk of introducing or spreading exotic and/or invasive plant species.	Section 5.4.3.1.1
56.	Vegetation and Wetlands	Construction and Decommissioning	Examine all equipment that arrives at the site to make sure it is clean and free of soil or vegetation debris.	Section 5.4.3.1.1
57.	Vegetation and Wetlands	Construction, Operation and Decommissioning	Operate vehicles and equipment on previously disturbed areas wherever feasible.	Section 5.4.3.1.1
58.	Vegetation and Wetlands	Construction and Decommissioning	Allow for natural regeneration when possible, and when not possible, use a native species seed mix for revegetation.	Section 5.4.3.1.1
59.	Vegetation and Wetlands	Operation	During the Operation and Maintenance activities, restrict travel through wetlands for inspection or maintenance activities.	Section 5.4.3.1.2
60.	Vegetation and Wetlands	Construction and Decommissioning	Restore temporarily disturbed areas to pre-construction conditions.	Section 5.4.3.1.1
61.	Vegetation and Wetlands	Operation	Comply with the conditions of the integrated vegetation management program and the permit issued by NBDELG.	Section 5.4.3.1.2
62.	Wildlife and Wildlife Habitat	Construction	To mitigate this risk, nest searches should be conducted prior to any clearing in the breeding bird season. If nests are found, a species-specific set-back buffer should be established and flagged around that nest that must not be disturbed until chicks have fledged.	Section 5.5.3.1.1
63.	Wildlife and Wildlife Habitat	All Activities	Full cut-off temporary lighting should be used to reduce attraction to migrating birds. Lighting should be minimized whenever it is safe to do so.	Section 5.5.3.1.1
64.	Wildlife and Wildlife Habitat	All Activities	Vegetation management activities should occur outside of breeding bird season (April1 to August 31), to reduce the likelihood that nests, eggs, or young birds are destroyed or otherwise negatively affected.	Section 5.5.3.1.2
65.	Wildlife and Wildlife Habitat	Construction	Conduct nest searches prior to any clearing in the breeding bird season (April 1 to August 31).	Section 5.5.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
66.	Wildlife and Wildlife Habitat	Decommissioning	If birds are nesting on poles, nesting platforms should be provided during decommissioning to provide alternative nesting sites.	Section 5.5.3.2
67.	Socioeconomic Environment	Construction	Owners of private land will be consulted and accommodated for use of their land as appropriate, prior to construction.	Section 5.6.3.1.1
68.	Socioeconomic Environment	Construction	NB Power will communicate schedules for Project activities, particularly those related to access restrictions.	Section 5.6.3.1.1
69.	Socioeconomic Environment	Construction	Mitigation described for the Atmospheric Environment (Section 5.1.3) will be used to reduce these nuisance effects. These include limiting noise emitting construction activities to daytime hours (i.e., between the hours of 7:00 am and 7:00 pm); and the use of dust suppressants and water on access roads to limit dust emissions.	Section 5.6.3.1.1
70.	Socioeconomic Environment	Construction	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. Moving large equipment involving road closures will be conducted at low traffic times, where possible. The public will also be notified about long delays or disruptions to the transportation network, and construction.	Section 5.6.3.1.1
71.	Socioeconomic Environment	Construction	NB Power will follow its existing practice of encouraging local and Aboriginal content and will, where possible and relevant, work toward a hire-local-first practice. Workers will be paid wages consistent with the Eastern Canadian labour market, and NB Power will procure goods and services from local and Aboriginal businesses in accordance with its existing purchasing policies and procedures.	Section 5.6.3.1.1
72.	Heritage Resources	Construction	Planned avoidance (e.g., transmission tower and guy wire placement) for areas identified during the walkover survey to exhibit elevated potential for archaeological resources will be implemented.	Section 5.7.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
73.	Heritage Resources	Construction	Shovel testing as per the Archaeological Guidelines, where avoidance is not practicable, will be implemented in an effort to determine the presence or confirm absence of potential archaeological resources in areas determined to have elevated potential for archaeological resources.	Section 5.7.3.1.1
74.	Heritage Resources	Construction	Should any heritage resources be identified that could be affected by the Project, additional mitigation, as required, will be developed in consultation with provincial regulators and First Nations, as applicable.	Section 5.7.3.1.1
75.	Heritage Resources	Construction	In areas of elevated archaeological potential, archaeological monitoring will be implemented, if shovel testing is not practicable.	Section 5.7.3.1.1
76.	Heritage Resources	Construction	A First Nations field monitor will be present during construction activities	Section 5.7.3.1.1
77.	Heritage Resources	Construction and Decommissioning	A heritage resource discovery contingency plan outlined in the PSEMP will be followed during all phases of the Project.	Section 5.7.3.1.1
78.	Heritage Resources	Operation and Maintenance	In the unlikely event that a heritage resource is discovered during this activity, NB Power would implement the Heritage Resource Discovery Contingency Plan in the PSEMP and contact the appropriate regulating agency to assess the discovery and develop appropriate mitigation.	Section 5.7.3.1.2
79.	Heritage Resources	Decommissioning	Should any heritage resources be identified that could be affected by the Project, additional mitigation, as required, will be developed in consultation with provincial regulators and First Nations, as applicable.	Section 5.7.3.2
80.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Continued engagement activities with Aboriginal communities to determine if there is any Current Use within the proposed Project RoW.	Section 5.8.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
81.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Measures used to mitigate the risk of fish mortality and fish habitat as included in the Freshwater Fish and Fish Habitat VC, Section 5.3.	Section 5.8.3.1.1
82.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Measures used to mitigate a change in or risk to vegetation and wetland habitat as included in the Vegetation and Wetlands VC, Section 5.4	Section 5.8.3.1.1
83.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Measures used to mitigate a change in wildlife habitat or risk of wildlife mortality as included in the Wildlife and Wildlife Habitat VC, Section 5.5.	Section 5.8.3.1.1
84.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Measures used to mitigate sites of cultural and/or ceremonial importance as included in the Heritage Resources VC, Section 5.7.	Section 5.8.3.1.1
85.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	Construction	If any use is identified, provide Aboriginal communities or individuals who currently use the PDA the opportunity to harvest/gather any species of importance to traditional activities that might be affected by Project activities prior to the initiation of any construction activities. It is further recommended that the opportunity to conduct these harvesting/gathering activities be timed appropriately for the seasonality of the species of interest.	Section 5.8.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
86.	Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons	All Activities	Signage will be placed on access roads used by construction equipment to warn the public of the activities in that area.	Section 5.8.3.1.1
87.	Effects of the Environment on the Project	Construction and Operation	The Project will be constructed to meet the standards of the Canadian Electrical Code (a CSA Group Standard) which includes the applicable building, safety, industry codes, and standards for wind, snowfall, extreme precipitation, and other weather variables associated with climate. These standards and codes provide factors of safety regarding environmental loading and Project specific activities and events.	Section 5.9.3.1.1
88.	Effects of the Environment on the Project	Construction and Operation	All aspects of Project design, including selection of materials and equipment to be used, planning, and maintenance, will consider normal and extreme climate/weather conditions that may be encountered throughout the life of the Project. Delays due to poor weather are anticipated and can often be predicted, and allowance for them will be included in the construction schedule.	Section 5.9.3.1.1
89.	Effects of the Environment on the Project	Construction and Operation	A minimum RoW width and the removal of danger trees adjacent to the RoW will be maintained to avoid wind-related tree strikes.	Section 5.9.3.1.1
90.	Effects of the Environment on the Project	Construction and Operation	All components and physical activities associated with the Project will follow the PSEMP.	Section 5.9.3.1.1
91.	Effects of the Environment on the Project	All Activities	A maintenance and safety management program will be implemented.	Section 5.9.3.1.1
92.	Effects of the Environment on the Project	Construction and Operation	Emergency measures will be in place, in conjunction with existing NB Power, community, and provincial plans to provide rapid detection and response to any fire threat, and quickly control and extinguish the flames prior to contact with any flammable structures (e.g., wood). Mitigation for Project-caused fires is discussed in Section 2.8.	Section 5.9.3.1.1

Table 6.1 Summary of Proposed Mitigation

#	Valued Component (VC) (if applicable)	Project Phase	Proposed Mitigation/Compensation Measure	Location within EIA Registration Document where Mitigation Measure is Identified
93.	Effects of the Environment on the Project	Decommissioning	Delays due to poor weather are anticipated and can often be predicted. Allowance for delays will be included in the decommissioning and abandonment schedule components and physical activities associated with the Project	Section 5.9.3.2

7.0 PUBLIC INVOLVEMENT

A Public Involvement Program was initiated by NB Power to inform elected officials, landowners, stakeholders, and the general public about the Project. The Public Involvement Program, which followed guidance from *A Guide to Environmental Impact Assessment in New Brunswick* (NBDELG 2012a), and *Additional Information Requirements for Linear Facilities* (NBDELG 2008), uses a multi-faceted approach to distribute Project information to reach as many people as possible. The approach includes maintaining a Project mailing list, distributing Project information across multiple platforms in various formats, placing information on the NB Power website, and conducting an open house.

The key elements of the Public Involvement Program are presented below in Sections 7.1 and 7.2, with a summary of public involvement to date presented in Section 7.3. Future involvement initiatives to fulfill the public involvement requirements of the New Brunswick *Environmental Impact Assessment Regulation* under the *Clean Environment Act* and the *Guide to Environmental Impact Assessment in New Brunswick* (NBDELG 2012a), are summarized in Section 7.4.

7.1 OBJECTIVES

The objectives of the Public Involvement Program are as follows:

- Provide information on the proposed Project directly to potentially affected landowners, as well as stakeholders, the general public, community groups, and other interested parties
- Provide information on the proposed Project directly to elected officials and local service districts
- Address issues and concerns raised during this process
- Identify measures that will mitigate or resolve public issues or concerns
- Identify need for further consultation initiatives

7.2 PUBLIC INVOLVEMENT PROGRAM ELEMENTS

The following section describes the Public Involvement Program elements as they relate to the Project.

7.2.1 Communication Methods

The methods employed to communicate with elected officials, stakeholders, community groups, and affected property owners are described below:

- **Letters to Landowners –** NB Power informed potentially affected landowners as well as stakeholders of the Project in August 2017, with the goal of informing them about the Project in advance of scheduled open houses.
- **Information Package –**Information packages were distributed to provide interested parties (with basic information about the Project (Appendix E).
- **Web Postings –** The NB Power website (www.nbpower.com) served as an electronic method for members of the public to access Project documents, view maps, and send comments.
- **Public Notice –** A paper copy of the EIA Registration document will be made available for viewing during the public review period at the following locations:

New Brunswick Department of Environment and Local Government,
Project and Approvals Branch
20 McGloin St,
Fredericton, NB E3A 5T8
Neguac Village Office
1175 Rue Principale,
Neguac, NB E9G 1W7

- **Media Interviews** – To demonstrate transparency and general public awareness about the Project, media requests for interviews or information will be responded to promptly by NB Power.
- **Open Houses –** A public open house was conducted on November 15, 2017 from 5:00 to 8:00 p.m. to share information about the Project. The public open house was held at the Neguac Village Office located at 1175 Rue Principale, Neguac, NB, E9G 1W7. Advertising in local newspapers and on radio stations notified the public about the time, location, and purpose of the open house (Appendix E). Further open houses may be considered during the EIA review period, if required.
- **Summary Report –** A brief summary report on the public notification initiatives carried out, and the key issues raised by the public during the EIA review, will be provided to NBDELG within 60 days following registration.
- **Project Telephone Number** – A toll-free Project Information Line (1-866-754-7727) appeared on communications and provided an easy-to-access means of contacting Project personnel for those who do not have easy access to computers.

Table 7.1 List of Key Groups, Stakeholders, and Organizations

NB Department of Environment and Local Government Marysville Place P. O. Box 6000 Fredericton, NB E3B 5H1	**NB Department of Public Safety** 364 Argyle St Fredericton, NB E3B 1T9 Tel: (506)426-3992
New Brunswick Department of Energy and Resource Development Hugh John Flemming Forestry Centre P.O. Box 6000 Fredericton, NB E3B 5H1	**New Brunswick Department of Agriculture, Aquaculture and Fisheries** Agricultural Research Station P.O. Box 6000 Fredericton, NB E3B 5H1 Tel: (506) 453-2666
New Brunswick Department of Tourism, Heritage and Culture Marysville Place P.O. Box 6000 Fredericton, NB E3B 5H1 Tel: (506) 453-3115	**New Brunswick Department of Transportation and Infrastructure** Kings Place, P.O. Box 6000 Fredericton, NB E3B 5H1 Tel: (506) 453-3939
Transport Canada 95 Foundry Road Moncton, NB E1C 8K6 Tel: (506)851-7040	**New Brunswick Federation of Snowmobile Clubs** Le Club Autoneige de Neguac Inc. Philippe Breau
Village of Neguac Mayor Georges R. Savoie 1175 Rue Principale, Suite 1 Neguac, NB E9G 1T1 Phone : 506-776-3950 Email : info@neguac.com	**Provincial MLA** Lisa Harris (Liberal) Constituency: Miramichi Bay-Neguac 1 Marina Drive Miramichi E1V 6S8 Phone : 506.778.8713 Email: lisa.harris@gnb.ca

Table 7.1 List of Key Groups, Stakeholders, and Organizations

Federal MP Pat Finnigan (Liberal) Miramichi-Grand Lake 50 Airport Drive PO Box 338 Miramichi, NB Tel: 1506-778-8448 Email: pat.finnagan@parl.gc.ca	

Upon Registration of the Project with NBDELG, a public notice will be issued in the local newspapers and on the NB Power website, and the public will be encouraged to forward comments and concerns to Project personnel.

7.2.2 Issues Tracking and Reporting

NB Power maintains a database that is used to track issues and concerns raised during the public involvement process. The database provides Project personnel with the ability to conduct queries, print specific reports, and review the status of all issues, concerns, or commitments.

Issues or concerns raised by, or commitments made to, affected landowners and stakeholders are entered into the database and monitored regularly during Project meetings until appropriate actions have been taken to address them.

Based on the methods described above, NB Power is able to monitor potential issues and concerns associated with the Project.

7.3 RESULTS OF PUBLIC INVOLVEMENT PROGRAM TO DATE

7.3.1 Meeting with Local Officials

NB Power Project staff attended a meeting with the Village of Neguac on Tuesday, September 26, 2017 to provide information on the Project and address questions or concerns. This meeting was hosted by the Village and included Neguac Mayor George Savoie and village administrators, and approximately seven representatives from Local Service Districts invited to attend from the surrounding area. A summary of comments and NB Power responses is included in Table 7.2.

Table 7.2 Summary of Key Comments Heard and Addressed During the September 26, 2017 Meeting with Village of Neguac Representatives

Comments	Response from NB Power
The new line is generally seen as positive by local officials.	No response required
Like the idea of double capacity but would also like a backup transmission line delivering power if this one is damaged by weather.	The new line will result in improved capacity and reliability for Neguac and surrounding areas.

Table 7.2 Summary of Key Comments Heard and Addressed During the September 26, 2017 Meeting with Village of Neguac Representatives

Comments	Response from NB Power
Will this new line result in higher power rates for the Neguac area?	No.
During the 2017 ice storm, the Village of Neguac had power while immediate surrounding areas did not. Will this new line improve reliability for everyone?	The new line will result in improved capacity and reliability for Neguac and surrounding areas.
What will happen to existing ATV/snowmobile bridges when the new line is constructed?	NB Power will not maintain structures built by third parties along Right of Ways.

7.3.2 Open House

NB Power hosted an open house on November 15, 2017 in the Village of Neguac. The event was arranged to provide information directly to property owners and stakeholders, to discuss their comments and concerns, and to receive input from them on the Project. The open house was advertised in local English and French newspapers and radio stations immediately prior to the event (Table 7.3: Appendix E). A bilingual NB Power representative greeted the public and asked them to sign-in. A series of information displays about various aspects of the Project, were set up and each display station was staffed by Project representatives, to provide specific information about the Project, and to answer questions. Right-of-Way Agents were also available to speak with landowners regarding land issues. In addition to the displays, a number of maps and other documents related to the displays were made available.

Approximately 12 people attended the event. Not everyone who attended the session signed the sign-in sheet. Specific details on how concerns and issues were addressed are provided below in Table 7.4.

Table 7.3 Advertisement Dates and Frequencies for Neguac Open House

Location where Advertisement Appeared	Dates
L'Acadie Nouvelle	November 11 and 14, 2017
L'Etoile	November 11 and 14, 2017
Times and Transcript	November 11 and 14, 2017
95.9 Radio Miramichi (English)	November 8-15, three times daily
93.7 Radio Miramichi (French)	November 8-15, three times daily

Table 7.4 Summary of Key Comments Heard and Addressed During the November 15, 2017 Open House

General topic of Interest	Details of Concerns	Response
Release of easement	Four (4) landowners would like to have the easement released once NB Power dismantles the line. Two landowners were of the opinion that the easement should be "automatically" released.	NB Power will decide whether to release the easement or retain it for future use. If NB Power decides to release the easement, the landowner is responsible for having the document duly registered at the county registry office so that it goes on title (an $85 fee). NB Power will notify landowners by letter of its decision regarding the easement once the Transmission Line is dismantled.
Survey Plan	Two of the four landowners requested a copy of the survey plan.	Survey plan will be mailed directly to landowners who requested it.
Jobs	Would local contractors be hired?	NB Power tries as much as possible to hire local contractors understanding that special skills and qualifications are required and that the corporate is bound by the *Crown Construction Act* in procuring certain types of services.
Recreational use of the easement	Would snowmobiles have access to the new area (replacing the line where the substation will be replaced)?	Ownership of the easements are private and Crown Lands and, as such, NB Power cannot grant permission to anyone or any club to use the transmission line corridor as a snowmobile trail.
Service to First Nation	Former band councillor for Esgenoôpetitj First Nation very pleased to have improved service to wastewater treatment plant.	No response required.
Firewood on easements	Several landowners asked about the firewood that is on the areas of their lands where an extra 15.24 m of easement is required and whether they should cut it before the Project starts.	NB Power will need to determine the amount of stumpage where there is merchantable timber within the additional 15.24 m.

7.4 FUTURE ENGAGEMENT

NB Power will publish a one-day notice in local newspapers and online informing the public that the Project has been registered with NBDELG and identify locations where the EIA registration document can be reviewed. The public will be asked to forward comments or concerns about the proposed Project to NB Power. Following the registration of this Project with the NBDELG, and during the Determination Review process, NB Power will track, respond to and report on key issues raised by the public, First Nations, and elected officials.

7.5 LAND ACQUISITION

There are three properties that are affected by the proposed transmission line Project. The remaining 56 properties have pre-existing easements for the new section of RoW.

The process for the acquisition of land for the new substation site and the acquisition of two easement rights required for the construction and operation of the transmission line is well underway. The acquisition of the substation site and easement rights will be in accordance with New Brunswick Legislation and compensation paid to landowners will be based upon fair market value of the affected lands.

The substation land is privately-owned (Table 7.5) and the two easement areas required are comprised of a parcel of land owned by the Esgenoôpetitj First Nation (non-Federal designated land) and one parcel of Provincial Crown land (Table 7.6). The 1.96 ha land acquisition for the new substation site has successfully been negotiated and is in the final stages of being acquired by NB Power. Negotiations are ongoing for the easement rights with the Esgenoôpetitj First Nation and with the Province for the provincial Crown land.

Table 7.5 Property for Acquisition

Property Identification	Ownership	Status of Easement Agreement
PID 40422784	Private Owner	The acquisition of the land is in the final stages of being acquired.

Table 7.6 Properties for Easement Acquisition

Property Identification	Ownership	Status of Easement Agreement
PID 40002149	Esgenoôpetitj First Nation	Negotiations continue and are progressing. Offer of compensation has been made and easement documentation provided to the Esgenoôpetitj First Nation for review.
PID 40281073	Department of Energy and Resource Development	Licence of Occupation has been filed with NBDERD. Upon the receipt of the EIA Certificate of Determination and survey plans, an Easement will be granted by NBDERD to NB Power.

8.0 ABORIGINAL ENGAGEMENT

NB Power has been working to build long-lasting, mutually respectful relationships with NB First Nations to facilitate meaningful consultation on projects that have the potential to impact First Nations rights and interests. Engagement is one of three pillars in NB Power's Strategic Approach to First Nations Affairs. For the purposes of Project Engagement, this includes monthly update meetings that have occurred throughout 2017 and agreements to support needed capacity for meaningful information exchange with the Wolastoqey Nation in New Brunswick (WNNB) and Mi'gmawe'l Tplu'taqnn Incorporated (MTI).

While not a part of WNNB, Woodstock First Nation is invited to participate in, and receive all the benefits associated with the agreement with WNNB.

NB Power also makes Elsipogtog and its delegated consultative body, Kopit Lodge, as well as the Peskotomuhkati Nation, aware of all projects and invites inquiries for further information. Regular communication regarding all projects will be established in a manner suitable to both of these groups going forward.

8.1 OBJECTIVES

As with the Public Involvement Program, the objectives of the Aboriginal Engagement Program are as follows:

- Provide information directly to First Nations communities in the vicinity of the Project and associated First Nations groups
- Address issues and concerns raised during this process
- Identify measures that will mitigate or resolve First Nations issues or concerns proposed during future consultation initiatives

8.2 ABORIGINAL ENGAGEMENT PROGRAM ELEMENTS

An effective Aboriginal Engagement Program has many elements. The following section describes those elements as they relate to the Project.

8.2.1 Agreements

NB Power and MTI are in the process of finalizing a Relationship and Consultation Agreement, and NB Power and WNNB have entered into a Consultation and Capacity Funding Agreement. The purposes of the agreements are to:

- Foster a long term relationship between the Nations and NB Power
- Build upon the established relationship
- Facilitate engagement and consultation and, where appropriate, accommodation discussions between NB Power and the First Nations
- Provide funding to promote an effective approach to engagement and consultation and, where appropriate, accommodation in an effort to foster meaningful, good faith consultation about, and accommodation measures for, projects being undertaken by NB Power

The following principles will guide the Parties' consultations and relationships under these agreements:

- Seek to understand and respect one another's values, interests, constraints, and aspirations at all times
- Engage with each other in good faith, honestly and with as much transparency as possible
- Strive to avoid adversarial positions and strive to reach an agreement on the nature of any potential impacts on Aboriginal Rights associated with projects and any appropriate mitigation and accommodation measures to address such potential impacts
- Acknowledgment of the importance of, and the need for, NB Power to provide energy in a sustainable, safe, reliable way at low and stable rates for all residents of New Brunswick

NB Power is working to engage effectively with New Brunswick First Nations to design and implement agreements with both MTI and WNNB to facilitate First Nation participation in discussions with NB Power in a meaningful way.

8.2.2 Communication Methods

The methods employed to communicate with affected First Nations communities and groups are described below:

- **Letters of Notification-** An official letter of notification regarding the Neguac Project dated July 20, 2017 was sent to MTI, Elsipogtog First Nation, WNNB, Woodstock First Nation, and the Peskotomuhkati Nation.
- **Monthly Update Meetings-** Regularly scheduled monthly update meetings with both MTI and WNNB have been in place throughout 2017. During the meetings, Project updates are delivered followed by discussions. Minutes of the previous meetings are reviewed, during which time; any outstanding actions items are revisited. The monthly meetings foster ongoing communication between the First Nations communities/groups and NB Power and provide an avenue to give advance notice of projects being contemplated.
- **Field Reports-** Any fieldwork related to generation and transmission projects is monitored by a NB Power's First Nations Field Monitor and Liaison. The Field Monitor participates in all aspects of work in the field and compiles detailed reports which are delivered electronically to MTI and WNNB. The reports outline the nature of the work being performed, tasks associated with the study, detailed photographs and interests and concerns from a First Nations Perspective. Feedback is generally received promptly and is incorporated into our project planning at NB Power.
- **Project Specific Meeting**- Because freehold land owned by the Esgenoôpetitj First Nation is preferred for an easement for this Project, NB Power met with the Chief and some Council on September 7th, 2017 to discuss the possibility of acquiring additional space in an existing easement for a temporary period.
- **Community Meetings and Open House Events-** When supported by a consultative body, Community Meetings and Open House events are organized, facilitated, and delivered within First Nations communities (Table 8.1). The Community Meetings and Open House events allow face to face interaction with NB Power staff, where Project details can be discussed in a more holistic fashion. Recent Open House events/ Community Meetings in Mi'kmaq Territory have been delivered in the communities of Bouctouche (October 16, 2017), Eel Ground (October 26, 2017), Eel River Bar (October 25, 2017), Elsipogtog through Kopit Lodge (October 23, 2017), Esgenoôpetitj (October 17, 2017), Fort Folly (December 7, 2017), Indian Island (October 17, 2017), Metepenagiag (December 6, 2017) and Pabineau First Nation (October 25, 2017). During the Open House events/ community meetings, presentations and information packages associated with all NB Power projects were made available.
  Open House events were delivered in the Wolastoqey Territory where Project information was included in an overall Project handout. An Open House event held in The Tobique First Nation was attended by members of the host community and members of the Madawaska First Nation on August 17, 2017. Another was held in St. Mary's First Nation on September 18, 2017.

- **Project Registration and Information Exchange** - In an effort to be as inclusive, efficient, and transparent as possible, all Environmental Impact Assessment Documents are sent to the First Nations consultative bodies at the same time as the Department of Environment and Local Government (DELG) and Aboriginal Affairs Secretariat (AAS). The same is true for Responses to

Recommendations of Traditional Land and Resource Use/ Indigenous Knowledge Studies (if conducted), and Technical Review Committee Questions and Answers.

- **Information Package-** Information packages were used to provide interested First Nations that wish to receive it with basic information about the Project.
- **Web Postings-** The NB Power website (www.nbpower.com) will serves as an electronic method for First Nation communities to access Project documents, view maps, and send comments.
- **Viewing of the EIA Registration-** A paper copy of the EIA Registration document will be made available for viewing during the review period at the following locations:
  - Neguac Village Office
    1175, rue Principale, suite 1
    Neguac, NB E9G 1T1
  - New Brunswick Department of Environment and Local Government
    Project and Approvals Branch
    20 McGloin St.
    Fredericton, NB E3A 5T8

In addition, an electronic or paper copy of the EIA Registration document will be provided to any First Nation community requesting it. A brief summary report on the First Nations engagement initiatives carried out, and the key issues raised during the EIA review, will be provided to AAS via Consultation and Engagement log filing.

Table 8.1 List of First Nations Communities and Groups

Mi'gmawe'l Tplu'taqnn Incorporated (MTI) Contact: Samantha Robichaud 40 Micmac Road Eel Ground, NB E1V 4B1 Tel: (506) 455-1881 or (506) 627-4696	**Bouctouche First Nation** Chief: Ann Mary Steele 9 Reserve Road Bouctouche Reserve, NB E4S 4G2 Tel: (506) 743-2520
Eel Ground First Nation Chief: George Ginnish 47 Church Road Eel Ground, NB E1V 4E6 Tel: (506) 627-4600	**Eel River Bar First Nation** Chief: Thomas (Everett) Martin 11 Main Street, Unit 201 Eel River Bar, NB E8C 1A1 Tel: (506) 684-6277
Elsipogtog First Nation Chief: Arren Sock 373 Big Cove Road Elsipogtog First Nation, NB E4W 2S3 Tel: (506) 523-8200	**Esgenoôpetitj First Nation** Chief: Alvery Paul 620 Bayview Drive Burnt Church, NB E9G 2A8 Tel: (506) 776-1200
Fort Folly First Nation Chief: Rebecca Knockwood PO Box 1007 Dorchester, NB E4K 3V5 Tel: (506) 379-3400	**Indian Island First Nation** Chief: Kenneth Barlow 61 Indian Island Drive Indian Island, NB E4W 1S9 Tel: (506) 523-8100
Kingsclear First Nation Chief: Gabriel Atwin 77 French Village road Kingsclear First Nation, E3E 1K3 Tel: (506) 363-3028	**Kopit Lodge** Consultation Coordinator: Kenneth Francis 33 Riverside Dr. Elsipogtog First Nation, NB E4W 2Y6 Tel: (506) 338-0125

Table 8.1 List of First Nations Communities and Groups

Madawaska Maliseet First Nation Chief: Patricia Bernard 1771 Main Street Madawaska Maliseet First Nation, NB E7C 1W9 Tel: (506) 739-9765	**Metapenagiag Mi'kmaq Nation** Chief: William (Bill) Ward PO Box 293 Metapenagiag Mi'kmaq Nation, NB E9E 2P2 Tel: (506) 836-6111
Oromocto First Nation Chief: Shelley Sabattis PO Box 417 Oromocto, NB E2V 2J2 Tel: (506) 357-2083	**Pabineau First Nation** Chief: David Peter-Paul 1290 Pabineau Falls Road Pabineau First Nation, NB E2A 7M3 Tel: (506) 548-9211
Peskotomukhati Nation at Skutik Chief: Hugh Akagi 3 Prince of Wales Street Qonaskamkuk (St. Andrews), NB E5B 3W9 Tel: (506) 529-4657	**St. Mary's First Nation** Chief: Candice Paul 150 Cliffe Street Fredericton, NB E3A 0A1 Tel: (506) 458-9511
Tobique First Nation Chief: Ross Perley 13156 Route 105 Tobique First Nation, NB E7H 5M7 Tel: (506) 273-8439	**Wolastoqey Nation in New Brunswick (WNNB)** Executive Director of Consultation: Shyla O'Donnell 150 Cliffe Street, 2nd Floor, Box 14 Kchikhusis Commercial Centre St. Mary's First Nation, NB E3A 0A1 Tel.: (506)-459-6341
Woodstock First Nation Chief: Timothy (Tim) Paul 3 Wulastook court Woodstock, NB E7M 4K6 Tel: (506) 328-3303	

8.2.3 Issues Tracking and Reporting

NB Power maintains a log to track issues and concerns raised during the Aboriginal engagement process. The log provides Project personnel with the ability to review the status of all issues, concerns, or commitments.

Issues or concerns raised by, or commitments made to, Aboriginal groups are entered into the log and monitored regularly during the Project meetings until the appropriate actions have been taken to address them. During the meetings, outstanding items are reviewed and updated. Results of Aboriginal Engagement activities conducted will be reported to NBDELG as along with the public engagement summary report.

8.3 RESULTS OF ABORIGINAL ENGAGEMENT PROGRAM TO DATE

Focus has been with MTI as this Project is located in traditional Mi'kmaq territory, closest to, and involving property owned by the Esgenoôpetitj First Nation (which is adjacent to the Project corridor). As the Neguac Project is located on traditional Mi'kmaq land, MTI was given early notification of the

potential Project through a monthly update meeting. Official letters of notification to MTI, Elsipogtog, WNNB, and the Peskotomuhkati Nation followed. WNNB recognized that the Project is located on traditional Mi'kmaq lands, therefore their interest in terms of consultation was reduced.

Information was shared as it became available through monthly update meetings. Additionally, as previously outlined in Section 8.2.2, Open House sessions have been carried out in both Mi'kmaq and Wolastoqey First Nations. Project details were discussed at the Open Houses, questions asked and information packages made available.

Given the open dialogue and exchange during the Mi'kmaq Open House events and the meeting with Kopit Lodge, a number of topics were raised. These ranged from green energy opportunities for First Nations, electricity rates, to fish passage. More specific feedback from the Mi'kmaq Open House events is expected from MTI in the New Year as they consult with the communities following the Open House events and have committed to sharing that feedback with NB Power. There was no specific feedback related to this Project received from WNNB or the Wolastoqey Community Open Houses.

For the purposes of the Neguac Project, specific topics of interest included job opportunities associated with the line construction, particularly in regard to clearing. NB Power is bound by the *Procurement and Crown Construction Contracts Act* when undertaking capital project work such as the Neguac Project. NB Power tender documents state that successful bidders are required to hire from the local community and the name of the closest First Nation is provided, in this case, Esgenoôpetitj First Nation. NB Power is also continuing to incorporate strategies to facilitate Aboriginal businesses/resources in securing contract and/or sub-contract work when tender documents are filed through the NB Opportunities Network.

Archaeological fieldwork associated with the Project has been monitored by A. Paul, an NB Power First Nations Field Monitor and Liaison. Detailed reports outlining the nature and findings of archaeological studies have been provided to MTI and WNNB. There has been both First Nations monitoring through NB Power as well as direct involvement from the Esgenoôpetitj Watershed Committee when conducting environmental walkovers.

Throughout monthly meeting updates, there was no interest expressed for an Indigenous Knowledge Study. MTI confirmed in early December that there was no need for such a study for this Project. MTI did suggest having a Mi'kmaq environmental monitor in place for Project fieldwork in the future.

8.4 FUTURE ENGAGEMENT

On-going communication will be maintained through NB Power's regularly scheduled monthly meetings with MTI and WNNB and will be established with the Peskotomuhkati and Kopit Lodge, as appropriate.

The ongoing communication will support the following:

- Ongoing engagement, including required capacity, with First Nations regarding the Project
- Reviewing the results of environmental studies
- Inviting feedback and identifying opportunities to reduce, mitigate or otherwise accommodate potential adverse effects to First Nations' treaty rights and other interests

Aboriginal Engagement
December 22, 2017

While communication regarding all NB Power Projects has been shared with the Mi'kmaq and Wolastoqey communities through Open House events that took place throughout the summer and fall of 2017, NB Power remains committed to facilitating other Open House events in First Nations communities when requested and feasible.

Interests and concerns identified during engagement with First Nations, particularly if any are identified in relation to the practice of traditional activities in the Project area, will be documented. Appropriate mitigation measures will be implemented as necessary to minimize any impact of the Project on the practice of traditional activities.

It is the recent practice of NB Power to provide answers to questions, as part of the Environmental Assessment Process, to NBDELG, AAS, and First Nations at the same time. This includes questions about the EIA document as well as questions coming from the Technical Review Committee.

Aboriginal interests will be incorporated into the Project Specific Environmental Management Plan (PSEMP) to help facilitate appropriate action and follow up following support to proceed.

9.0 CLOSURE

This report has been prepared by Stantec for the sole benefit of the New Brunswick Power Corporation (NB Power). The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of Stantec and NB Power.

This report was undertaken exclusively for the purpose outlined herein and was limited to the scope and purpose specifically expressed in this report. This report cannot be used or applied under any circumstances to another location or situation or for any other purpose without further evaluation of the data and related limitations. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties. Stantec accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

Stantec makes no representation or warranty with respect to this report, other than the work was undertaken by trained professional and technical staff in accordance with generally accepted engineering and scientific practices current at the time the work was performed. Any information or facts provided by others and referred to or used in the preparation of this report were assumed by Stantec to be accurate. Conclusions presented in this report should not be construed as legal advice.

The information provided in this report was compiled from existing documents and data provided by NB Power and by applying currently accepted industry standard mitigation and prevention principles. This report represents the best professional judgment of Stantec personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect the any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

This report has been prepared by a team of Stantec professionals on behalf of NB Power.

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