ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION DOCUMENT: 69 KV TRANSMISSION LINE UPGRADE TO 138 KV, GRAND FALLS, NB

June 28, 2022

Prepared for:

New Brunswick Power Corporation
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Project Number:
121416999

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1.0 INTRODUCTION

This document is the registration document for the Environmental Impact Assessment (EIA) process for the proposed "69 kV Transmission Line Upgrade to 138 kV, Grand Falls, NB" project (the "Project"). The Project is being proposed by the New Brunswick Power Corporation (NB Power) (the proponent), and consists of the conversion (upgrade) of 2 km of the existing transmission line L0073 ("L0073"; to be renamed L1249) from 69 kV to 138 kV. The Project is needed to serve new regional load requests, allow for improved electrical reliability for customers in the Grand Falls area, as well as provide increased structural reliability to the transmission line structures compared to what exists today.

This document is an EIA Registration and is submitted to the New Brunswick Department of Environment and Local Government (NBDELG) to initiate a Determination Review 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 1.0 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 2.0 provides a description of the Project, 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 3.0 provides an overview of the environmental setting of the Project
- Chapter 4.0 provides a description of the methods used to assess potential interactions between the Project and valued components (VCs)
- Chapter 5.0 contains a description of existing environmental conditions and information regarding the assessment of potential environmental effects as a result of interactions between the Project and the VCs, and mitigation for those interactions
- Chapter 6.0 provides a summary of mitigation for the Project, through design and in response to potential interactions between the Project and valued components
- Chapter 7.0 was provided by NB Power and outlines proposed Aboriginal engagement activities planned for the Project
- Chapter 8.0 was provided by NB Power and outlines proposed public engagement activities planned for the Project.
- Chapter 9.0 includes closing remarks and a statement of limitations about use of this document
- Chapter 10.0 lists the references cited in this report

1.2 OVERVIEW OF THE PROJECT

NB Power is proposing to upgrade the existing transmission line L0073 to increase its capacity from 69 kV to 138 kV. The upgraded L0073 will be renamed L1249. The Project, which is situated entirely within the town of Grand Falls, New Brunswick (Figure 1.1), consists of upgrades to an existing 69 kV transmission line which will occur in the following three phases.

- Phase 1 – The removal of nine and the replacement of five existing wooden transmission line structures and installing 24 new wooden pole transmission line structures between Structure 12 on L0073 and an existing customer's property. This will be energized to 69 kV. The rebuilt structures will be designed to accommodate 138 kV.
- Phase 2 – Addition of 1 new structure below the 138 kV L1175 adjacent to Structure 05. This will be connected to the rebuilt portion of transmission line adjacent to Structure 12 on L0073. The area of physical disturbance associated with the Project (called the project development area or "PDA") will occur within the existing 2 km L0073 right-of-way (RoW); however, the PDA will also include a small easement across PID 65007940 to run conductors (Appendix A).
- Phase 3 – The transmission line between L1175 and the end of the line will be energized to 138 kV. The remaining portion of L0073 between Grand Falls Terminal and Structure 12 will be isolated. A decision on future management of the isolated section will be made by NB Power at a later date.

1.3 PROPONENT INFORMATION

NB Power's responsibilities include the operation and maintenance of the high voltage electricity transmission system in New Brunswick. NB Power also serves 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	Keith Cronkhite
Mailing Address of Proponent	P.O. Box 2000, 515 King Street Fredericton, NB E3B 4X1
Contact Person for this EIA Registration	Christina LaFlamme Corporate Environmental Services NB Power P.O. Box 2000, 515 King Street Fredericton, NB E3B 4X1
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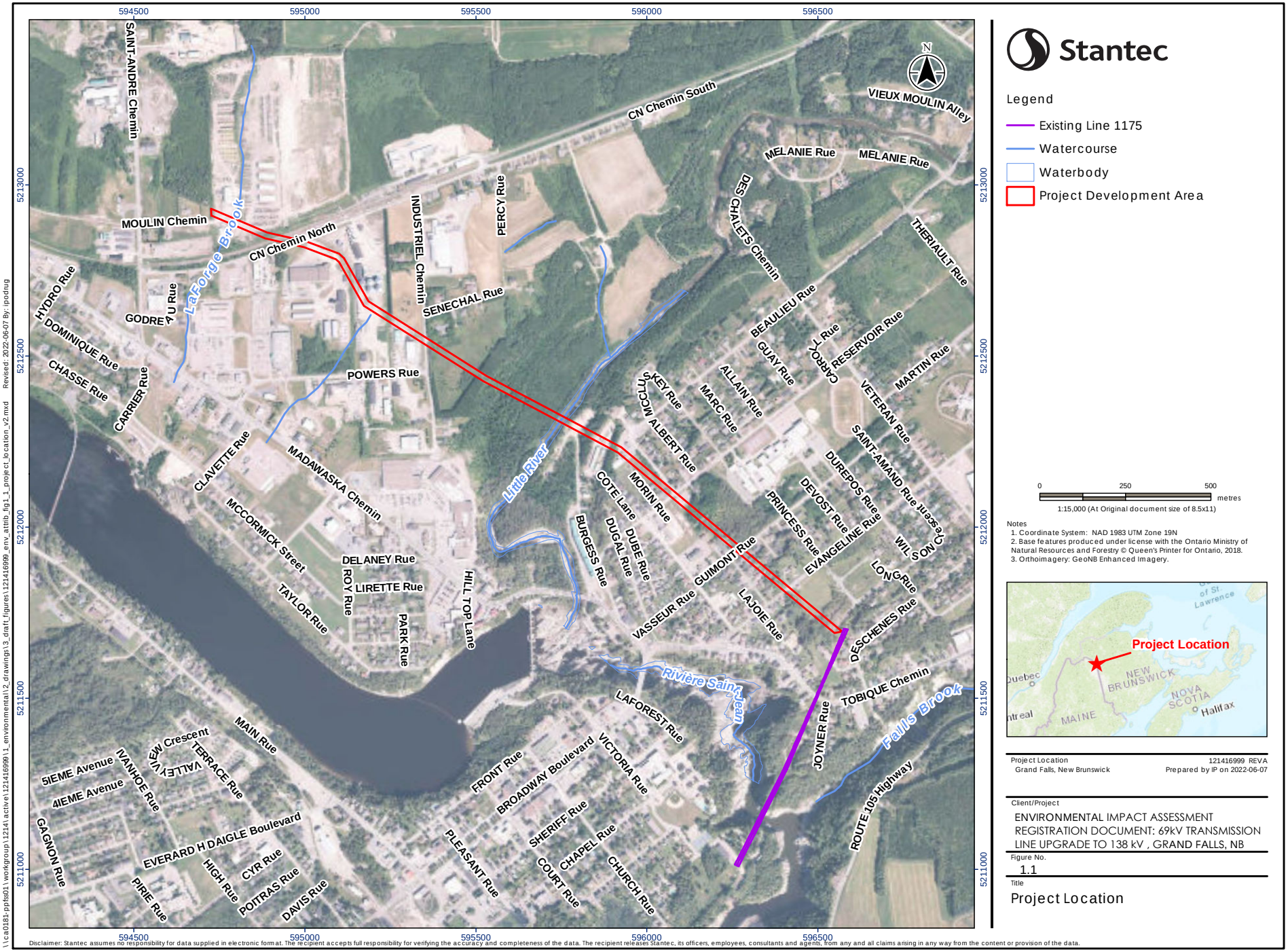


Stantec

Legend

- Existing Line 1175
- Watercourse
- Waterbody
- Project Development Area

0 250 500 metres

1:15,000 (At Original document size of 8.5x11)

Notes
1. Coordinate System: NAD 1983 UTM Zone 19N
2. Base features produced under license with the Ontario Ministry of Natural Resources and Forestry © Queen's Printer for Ontario, 2018.
3. Orthoimagery: GeoNB Enhanced Imagery.

Project Location
Grand Falls, New Brunswick

121416999 REVA
Prepared by IP on 2022-06-07

Client/Project
ENVIRONMENTAL IMPACT ASSESSMENT REGISTRATION DOCUMENT: 69kV TRANSMISSION LINE UPGRADE TO 138 kV , GRAND FALLS, NB

Figure No.
1.1

Title
Project Location

1.4 PURPOSE/RATIONALE/NEED FOR THE UNDERTAKING

The existing 69 kV transmission line L0073 is not sufficient to meet new regional load requests. The upgrade of L0073 to 138 kV will meet the new regional load requests, allow for improved electrical reliability for existing customers in the Grand Falls area, and provide increased structural reliability to the transmission line structures as compared with what currently exists in L0073.

1.5 REGULATORY FRAMEWORK

This section provides an overview of the major regulatory processes that could be applicable to the Project, including federal and provincial environmental assessment requirements and the roles of regulatory authorities. The following list of regulatory processes is not considered to be exhaustive, and provincial and/or federal authorities could require adherence to other regulations.

1.5.1 Provincial Acts and Regulations

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

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 NBDELG to review the Project’s information and its potential environmental effects. At the conclusion of the Determination Review, the NBDELG’s technical review committee (TRC) will make a recommendation 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 underwent pre-registration consultation with NBDELG using the new EIA Portal system. NBDELG determined the proposed Project does require an EIA Registration under the EIA Regulation, item (d) of Schedule A of the regulation:

> *“(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. The Project will be registered through the newly established online EIA portal (GNB 2022a).

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 digitally 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 Clean Water Act

The New Brunswick *Clean Water Act* regulates the release of contaminants to wells, potable water sources, and watersheds, as well as physical alterations to watercourses and wetlands. The Project will span watercourses and wetlands (see Section 5.4 and Section 5.7) and there are no planned Project-related activities that will occur within 30 m of a watercourse or wetland. As such, a Watercourse and Wetland Alteration (WAWA) permit is not anticipated for the Project.

The *Clean Water Act* by way of the Wellfield Protected Area Designation Order Regulation 2000-47 Section 5(c)(i) permits the construction of transmission lines within a Wellfield Protect Area provided that wooden poles placed within 30 m of Zone A shall be untreated. The Project will implement measures to comply with the *Clean Water Act*.

1.5.1.4 New Brunswick Fish and Wildlife Act

The New Brunswick *Fish and Wildlife Act* regulates the protection of wild and captive-bred fish, mammals, reptiles, amphibians, and birds. The Act protects birds through a prohibition on disturbing, injuring, gathering, or taking the nest or eggs of any bird except as otherwise authorized by the Minister. The Project will implement measures to comply with the New Brunswick *Fish and Wildlife Act*.

1.5.1.5 New Brunswick Heritage Conservation Act

Heritage resources in New Brunswick are regulated under the New Brunswick *Heritage Conservation Act*. The *Heritage Conservation Act* defines requirements relating to known heritage resources in the province and its municipalities, protection for heritage resources, permitting requirements for those doing research on and/or encountering these resources (i.e., Archaeological Field Research Permit, or AFRP), and penalties for violations 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 Archaeology and Heritage Branch (AHB) for built heritage resources, palaeontological resources, and 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.

1.5.2 Federal Acts and Regulations

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 Impact Assessment Act

The *Impact Assessment Act* (IAA) came into force on August 28, 2019, and defines the requirements for federal environmental assessments (EA) in Canada. IAA applies mainly to "designated projects", which are the physical activities listed under the Physical Activities Regulations under IAA, as well as physical activities carried out on federal land. The Physical Activities Regulations identify 61 "Physical Activities" that constitute Designated Projects requiring EA under IAA. Item 39 of the Schedule to the Physical Activities Regulations includes:

> *"**39** The construction, operation, decommissioning, and abandonment of either of the following:*
>
> ***(a)** a new international 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;*
>
> ***(b)** a new interprovincial power line designated by an order under section 261 of the* Canadian Energy Regulator Act.

Since the transmission line is neither international nor interprovincial, nor does the voltage and length of the new transmission line exceed these thresholds, the Project is not a Designated Project under IAA. Further, as no component of the Project will be built on federally regulated or owned land, it is not expected that the proposed Project will require an impact assessment under IAA. It is important to note that while, based on precedent, unlikely for this Project, the federal Minister of Environment and Climate Change Canada can designate a project that is not included in the Physical Activities Regulations if they are of the opinion that a project may cause adverse effects within federal jurisdiction, or if public concerns related to those effects warrant the designation.

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 digitally accessible (i.e., office-based) data and a field assessment to determine the potential for Project interaction with 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* defines the requirements for protecting fish and fish habitat in Canada. Specifically, the *Fisheries Act* specifies that any activity that could result in the death of fish (by means other than fishing, Section 34.4) or the harmful alteration, disruption, or destruction (HADD) of fish habitat requires an authorization to be issued, with appropriate offsetting for residual environmental effects of the activity.

Additionally, Section 36(3) of the *Fisheries Act* states that it is illegal to release deleterious substances into a fish-bearing watercourse or waterbody without an authorization. A deleterious substance is considered any substance that can degrade water quality such that it becomes harmful to fish or fish habitat.

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.

1.5.2.5 Canadian Navigable Waters Act

The *Canadian Navigable Waters Act* is administered by Transportation Canada. The Project meets the criteria under Minor Works Order Section 24 (Pipelines and Cables Use for Power or Telecommunication Purposes Attached to an Existing Work) as the proposed work consists of upgrading an existing infrastructure that spans Little River (Appendix A). It is unlikely to interfere with navigation in that watercourse.

1.6 PROPERTY OWNERSHIP

The proposed 138 kV upgrade to L1249 will be located primarily on private land for which NB Power has existing easement agreements. The transmission line RoW will cross 38 parcels of land (Table E.1; Appendix E), including 33 parcels of private land and 5 parcels of municipal land. The Project as planned will occur largely within existing NB Power easements, with the exception of one easement across PID 65007940 that will be acquired by NB Power to connect L1249 to the 138 kV line L1175.

No additional easements will be required.

1.7 PROJECT-RELATED DOCUMENTS

This EIA registration includes other relevant documents as Appendices to this document, as follows;

- Mapbook of environmental attributes of the RoW, attached as Appendix A
- Desktop data that includes species at risk (SAR) and species of conservation concern (SOCC) for the Grand Falls area acquired from the Atlantic Canada Conservation Data Centre (AC CDC), attached as Appendix B
- Archaeological Potential Map for the Grand Falls area, attached as Appendix C
- NB Power's HSEE-02-P004 : Environmental Incident Response, Clean-up and Reporting, attached as Appendix D
- Additional information: a requirement of New Brunswick's EIA Guidance (NBDELG 2018), attached as Appendix E

Other than this EIA registration document and the appended information, there are no additional relevant Project related documents. An addendum to this EIA registration will be provided in summer 2022 to describe the results of a field walkover of the RoW that will field-truth the digital-based information used to prepare this EIA registration document.

2.0 PROJECT DESCRIPTION

This chapter describes the Project as it is currently conceived and includes information on the 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, the anticipated Project workforce and schedule, emissions and wastes, and potential accidents, malfunctions, and unplanned events are also described.

2.1 ENVIRONMENTAL PLANNING AND MANAGEMENT

NB Power is a responsible and established proponent with more than 100 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 transmission lines that are supported by 48 industrial substations and 49 terminals (NB Power 2022).

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 2022). The management of the Maritimes Area electrical grid incorporates 15 interconnections in New Brunswick with Québec, Nova Scotia, Prince Edward Island, 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)
- 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 Project and the environment (Chapter 5.0)
- Summary of proposed mitigation (Chapter 6.0)
- Adherence to NB Powers' Environmental Protection Plan (NB Power 2012)

2.2 PROJECT LOCATION

The Project is located in Victoria County, in the Village of Grand Falls, New Brunswick. The 20 m wide PDA is a 2.2 km section of the existing L0073 transmission line which runs from near the Deschenes Road northwest to CN Road in Grand Falls. The PDA will occur within the existing 2 km RoW; however, it will also include a small easement across PID 65007940 to run conductors from the existing 138 kV line L1175.

The removal of nine existing structures and the replacement of five existing structures will occur within their existing footprints, with an additional 25 new wood pole structures to be installed within the 2.2 km

PDA. This includes the addition of one new structure between the 138 kV L1175 and L1249 to allow for the conductors to be run between these two lines.

2.3 PROJECT ALTERNATIVES AND SITING CONSIDERATIONS

NB Power considered three options when planning the Project. Each of the three options, which are described by section below, were considered with respect to NB Power's responsibility to efficiently and effectively serve new regional load requests, improve electrical reliability for customers in the Grand Falls area, and provide structural reliability to the transmission line structures in Grand Falls.

Status Quo: Maintain the Existing Transmission Infrastructure L0073

NB Power determined that the existing transmission infrastructure in Grand Falls, including the 69 kV L0073, does not have the load capacity and/or physical proximity to meet the specific new regional load demands. While transmission infrastructure in the areas planned for increased load demands currently provides reliable electrical transmission, it is not designed to be stepped up to 138 kV. As such, the existing transmission infrastructure is at increased risk of failing to meet NB Power's reliability standards with the anticipated increase in new customers and load demands. It was determined that an alternative approach to meeting increased load demands is required. A description of the alternatives to maintaining the status quo follows.

Construct New Transmission Line and Decommission L0073 vs Upgrade of existing L0073

NB Power considered the feasibility of constructing and routing new transmission infrastructure in Grand Falls, with the subsequent decommissioning the existing L0073. In comparing this option to that of upgrading L0073 from 69 kV to 138 kV, NB Power utilized several best management practices for project planning and route selection. The first best practice was to minimize the overall length of the line by maintaining the straightest alignment possible, since route alignment ultimately influences: the extent and magnitude of interactions with the environment, engineering design, socioeconomic factors, and cost. Transmission line L0073 was determined to be the shortest and most direct route between a 138 kV power source (L1175 in this case) and the anticipated location for increased load demand.

The second best practice was to reduce interactions with known environmental attributes. Aerial photographs, GIS based mapping, and biological databases were referenced so as to reduce the potential for the crossing of wetlands, watercourses, known archaeological sites, and environmentally significant areas, among other constraints. This practice also considered the time, cost, and social implications of having to negotiate and acquire new RoW lease agreements, and the socioeconomic implications of routing a new RoW through properties that may not have historically been managed for a RoW.

The third best practice incorporated 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 was located to reduce the proximity to buildings and residences, to follow roadways and property lines where possible, and to avoid bisecting properties to the extent possible.

NB Power determined that the most environmentally, socially, and economically feasible route for the Project was to upgrade transmission infrastructure of L0073 without increasing the width of the existing 20 m RoW. This proposed approach will locate to the extent possible the Project entirely within the existing RoW. This will reduce the amount of new RoW, eliminate the need to decommission existing transmission infrastructure, and reduce new interactions with residential, commercial, industrial, and agricultural properties.

A summary of selected environmental attributes of the proposed route (PDA) and a 500 m buffer around the PDA (Local Assessment Area, or LAA), prepared using publicly available digital data follows in Table 2.1, with a mapbook of environmental attributes provided in Appendix A.

Table 2.1 Summary of Select Environmental Attributes for L1249, Grand Falls, NB

Environmental Attribute	Within PDA[1]	Within LAA[2]
Total Footprint (ha)	4.10	302.13
Properties (No.)	38	633
Buildings (No.)	13	964
Railroads (No.)	3	8
ATV and Snowmobile Trails (No.)	0	1
Sensitive Receptors[3] (No.)	2	8
Wellfield Protected Areas (No.)	1	1
Private Drinking Water Wells (No.)	0	0
Airports (No.)	0	0
Archaeological Sites or Heritage Resources (No.)	0	0
Areas of Elevated Archaeological Potential (ha)	0.86	78.18
Wetlands - Mapped (ha)	0	0
Wetlands – Interpreted (ha)	0.226	7.08
Watercourses (No.)	2	6
Waterbodies[4] (No.)	1	3
Forested Area (ha)	0.0228	7.38
Agricultural Area (ha)	0.46	20.40
Environmentally Significant Area (No.)	0	1

[1]PDA is the Project's 20 m RoW where physical disturbances will occur

[2]LAA is a 500 m buffer around centreline of the PDA

[3]Sensitive receptors include senior care homes, daycares, public and private schools, cemeteries, parks, and playgrounds

[4]Waterbody is a water feature that is wide enough to separately delineate its shorelines on a map

2.4 DESCRIPTION OF PROJECT COMPONENTS AND INFRASTRUCTURE

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, dead-ends, 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, climate change, and property boundaries, are also considered.

2.4.1 Structure Type

Standard structure types to be used for this Project include single wood poles, with two-pole wood dead-end structures for confined spaces and three-pole dead-ends on either side of the Little River gorge crossing. 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) may also be used for this Project, especially in locations where the line must span longer distances (e.g., the Little River Gorge).

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 and are designed to withstand known weather conditions and other related constraints. The span between structures will be 50 m to 150 m, with a 450 m span occurring across Little River. Three conductor wires will be strung to the insulators, with a spacing of approximately 3.8 m between them. Angle structures (e.g., dead-end structures) will be anchored with six to seven guy wires where the line turns and terminates.

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, structures and poles will be placed to avoid known constraints or sensitive environmental conditions, where practicable. Mitigation by project design includes using many of the existing pole locations and structures, and maintaining the existing single pole structure format for the 138 k upgrade so that the current 20 m wide RoW can be maintained.

2.4.2 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, screw type Helix 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 or at structure locations under high tension. Log anchors consist of a 1.2 m to 1.8 m section of pole that is typically buried lengthwise approximately 2.4 m under the ground surface. Tension cables are attached to anchor rods through logs and structures; the excavation is then backfilled with imported fill and the soil compacted.

2.4.3 Overhead Ground Wires and Counterpoise

Lightning strikes on transmission lines pose a significant risk to the stability of the electrical network. In order to mitigate impact to the proposed transmission line, steel cables, called overhead ground wire (OHGW), may be strung above the conductor. The OHGW are to protect the transmission line and substation apparatus from the high current and voltage surges present in lightning. In the event the line suffers a direct or indirect strike, these wires provide a path for the high current and voltage to safely discharge down through the structures and into the ground.

Counterpoise and pole bearing plates may also be installed on structures to improve ground capacities. Counterpoise is typically composed of No. 5 galvanized steel wire running the full length of the pole, spun multiple times around the overburdened portion of the pole and stapled to the butt where a bearing plate is not present. The requirement for OHGW and/or counterpoise will be determined based on field verifications and safety requirements.

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

An easement is a non-possessory, registered interest right acquired by one person or entity 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. For this Project, NB Power will use the existing easements for L1249 with the exception of a single new easement of approximately 700 m^2 in size being required on PID 65007940 to allow for conductors to be run from L1175 to the upgraded L1249.

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 upgraded 138 kV line will be maintained at the existing 20 m.

2.5 PROJECT PHASES AND ACTIVITIES

The lifecycle of an upgraded transmission line occurs in three phases that includes initial construction, commissioning and energization, ongoing operation and maintenance, and eventually decommissioning and abandonment. The various activities around these phases as well as the various components of the Project are described separately below.

2.5.1 Project Construction, Commissioning, and Energization

Project construction, commissioning, and energization will occur in three phases as follows.

Phase 1 – This phase involves the most substantial amount of physical interaction between the Project and the environment. Phase 1 activities include the removal of nine existing wooden transmission line structures, the replacement of five existing wooden transmission line structures, and the installation of 24 new wood pole transmission line structures between Structure 12 on L1249 and the most northerly end of L1249. This Phase also includes the energization of the upgraded transmission infrastructure to 69 kV; however, the upgraded structures will be designed to accommodate 138 kV (see Phase 3).

Phase 2 – This phase involves the addition of one new structure adjacent to Structure 05 on the existing 138 kV Line 1175. This new structure will provide the means to connect the 138 kV conductors from L1175 to a point adjacent to Structure 12 on the upgraded L1249 (Phase 1). The addition of this new structure will require a small easement across PID 65007940 to run the conductors. The upgraded transmission infrastructure will be inspected and commissioned prior to energization to 138 kV (Phase 3).

Phase 3 – The section of L0073 between the Grand Falls terminal and the new interconnection between L1175 and L1249 will be disconnected and the upgraded L1249 will be energized to 138 kV. The transmission line between Grand Falls Terminal and Structure 12 on L0073 will be isolated and left in place for future dismantling, potentially as early as 2024. Confirmation on the dismantling of this section of L0073 will be provided to NBDELG at a future date and is not discussed further in this EIA registration document.

The construction and/or upgrading of a transmission line typically involves the following activities:

- Site preparation including vegetation clearing
- Access and staging
- Excavation, pole placement, structure assembly, and installation
- Conductor stringing
- Connection of transmission line to supply (e.g., adjacent transmission line or substation)
- Inspection and commissioning
- Energization of the Project
- Clean-up and 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 Vegetation Clearing

Clearing involves the removal of vegetation from the RoW which may prohibit the construction and the safe operation of transmission lines. The extent of vegetation removal 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 wetlands and watercourses. This provides access across the windrow for 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.

Given that the PDA for this Project will occur within an existing RoW that has been subject to routine vegetation management and maintenance activities, it is expected that there will be a small amount of vegetation clearing and associated windrowing required for this Project. The interconnection between L1175 and L1249 is mostly field and is unlikely to require vegetation clearing. Timing of clearing is scheduled for fall 2022 or early winter 2023 to avoid the bird breeding season, which generally occurs from mid-April to late-August (see Section 5.7).

2.5.1.2 Access and Staging

Access is required to allow transportation of clearing and construction equipment, materials, and personnel to the PDA. Transmission lines may be located adjacent to, or intersect with, existing linear corridors or transportation infrastructure, which can provide access to or near the line. Access may be required along the PDA and deviate where watercourses, waterbodies, and wetlands cannot be crossed

with equipment. In all cases, existing access roads will be used preferentially to reduce the requirement for new access.

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, 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.

Existing and proposed access roads (Appendix A) 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 within the proposed RoW can be accessed using a combination of existing roads, trails, and the RoW of existing L0073 (Appendix A). These roads, trails, and existing RoW may require some minor improvements which will be identified as part of the detailed design. If new access roads are required, they will be constructed in accordance with NB Power's Environmental Protection Plan (EPP; NB Power 2012). 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.

2.5.1.3 Excavation, Pole Placement, Structure Assembly, and Anchoring

Assembly of structures involves the transportation of construction materials to the RoW, excavation for pole placement, and backfilling of excavated material. Excavation is commonly carried out by mechanical auger or excavator, and/or hydraulic rock hammer. There will be no blasting associated with this Project.

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 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.

The assembly of structures will take place on-site at structure locations. The maximum 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 the dead-end 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 finalized. Structure locations will avoid (e.g., span) watercourses and wetlands and their 30 m buffers to the extent practical. 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 is yet to be finalized, several types may be used during construction depending on structure location. It is anticipated that log anchors will be used predominantly for the proposed Project provided soil conditions are suitable. 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. Anchors for guy points typically have an excavation footprint of 1 m x 2 m and excavation volumes of 2 m^3 to 3 m^3 per anchor. Cross plate anchors or rock anchors may be used at some guy points where practical.

Helix anchors may also be used for soil conditions having limited load bearing characteristics and/or wet areas. This type of anchor is composed of a steel shaft and helices that are screwed into the ground to a calculated depth. The helices transfer the stress of the load evenly across the soil. These anchors are easier to install, require little to no site preparation, do not result in excavation spoils, and can be withdrawn and reused.

2.5.1.4 Conductor Stringing

Large reels of 266 Aluminum Reinforced Steel cable (ACSR) Partridge 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 may 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.

2.5.1.5 Connection of Transmission Line to Power Supply

Following the stringing and tensioning of the conductors, the new or upgraded transmission line is connected to a power supply. However, the new transmission line is not energized until it has been inspected and commissioned.

2.5.1.6 Inspection and Commissioning

Upon completion of the upgrades to the renamed L1249, 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. Following this, L1249 will be commissioned.

2.5.1.7 Energization of the Project

Once inspection and commissioning is complete, the upgraded L0073, now L1249, will be energized.

2.5.1.8 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, immediate measures will be taken in a timely fashion 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.

2.5.2 Operation and Maintenance

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

2.5.2.1 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.

2.5.2.2 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.

For this Project, integrated vegetation management will involve brush cutting by excavator and mower head or by manual cutting tools. 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.

2.5.3 Decommissioning and Abandonment

While decommissioning or abandonment of the transmission line components is not currently envisioned, the 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 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 138 kV transmission line is not considered further in this assessment.

2.6 WORKFORCE AND PROJECT SCHEDULE

Construction will require NB Power staff and a line clearing/construction contractor. The Project will result in a small, temporary increase in the workforce. The construction period for the upgraded 138 kV transmission line is anticipated to require approximately two months of activities between November 2022 to January 2023. While changes to the Project schedule are possible, NB Power intends to complete all transmission line construction activities by April 2023.

Contractors that specialize in building transmission lines 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. The Project will adhere to the By-Law No. 70 A By-Law Relating to the Prevention of Excessive Noise and Nuisance in the Town of Grand Falls that allows construction activities to occur between 7:00 a.m. and 10:00 p.m., inclusive (Town of Grand Falls 1973). 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	Proposed Timeline
Communication with First Nations and Stakeholders	Spring and early Summer 2022 (and throughout Project activities)
Environmental field studies	Early Summer 2022
EIA Review	Summer to early Fall 2022
Permits/approvals acquisition	Fall 2022 (assumed)
RoW Preparation and Access Roads	Fall 2022

Table 2.2 High Level Schedule of Key Project Activities

Project Activities	Proposed Timeline
Upgrade of Transmission Line	Fall 2022 to early Winter 2023
In-service date	Late Winter 2023 (date to be determined)

2.7 EMISSIONS AND WASTE

2.7.1 Airborne Emissions

Emissions associated with fuel combustion in heavy equipment and vehicles, and dust associated with site preparation, are anticipated to occur during the construction and decommissioning of the Project. Water sprayers would be used to suppress and control dust levels, as required, during construction.

Project construction is not anticipated to result in substantial emissions of air contaminants or greenhouse gases (GHG) to the environment (Section 5.6). 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 Grand Falls, or to exceed provincial air quality standards.

2.7.2 Hazardous Materials

Potentially hazardous materials used during the construction phase would include, but are not limited to, propane, diesel, gasoline, hydraulic fluids, motor oil, and grease and lubricants for heavy equipment, and vehicle use. Cleaning and maintenance of vehicles and equipment, site inspections, and the monitoring and inventorying of materials would be essential for environmental protection. Construction is not anticipated to result in substantive releases of hazardous materials into the environment and is addressed further in Section 2.8.1.

2.7.3 Sound Emissions

Sound emissions would occur during the construction phase 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 in particular in areas where known sensitive noise receptors are located. Construction, which will only occur between 7 am and 7 pm, is not anticipated to result in substantive emissions of sound into the environment (see Section 5.6).

2.7.4 Solid Waste

Solid wastes generated during the construction phase would include packaging materials, plastics, cardboard, wood, metals, felled vegetation, and old guy wires, poles, and pole butts. 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 through the Northwest Regional Service Commission Solid Waste Service.

2.7.5 Runoff

Erosion and runoff associated with construction activities, is not anticipated to result in a significant deposition of sediments into watercourses or wetlands (see Section 5.4 and Section 5.7). Sedimentation and erosion control measures will be used to provide slope stability and prevent undue siltation of construction-related sediments into watercourses or wetlands.

2.7.6 Electromagnetic Fields and Corona

No noise from corona discharges will be generated as a result of the operation of the upgraded 138 kV transmission line in Grand Falls. The operation of higher voltage transmission lines can result in the production of electromagnetic fields (EMF). Extremely high voltage (EHV) lines (≥ 345 kV) can also result in corona discharges 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.

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 but have at least a possibility of occurrence and have the potential to result in adverse environmental interactions. While accidents, malfunctions, and unplanned events could occur during any phase of the Project, many of them 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 procedures in the EPP, adverse environmental interactions related to accidents, malfunctions, and unplanned events are not likely to occur during any phase 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. The mitigation and management of hazardous materials will include:

- Training of personnel in spill prevention and response, and Workplace Hazardous Materials Information System (WHMIS)
- Following proper procedures within the EPP (NB Power 2012)
- Routine cleaning, preventative maintenance, and visual inspections of hydraulic equipment and vehicles
- On-site spill response equipment

- Reporting spills as per HSEE-02-P004 Environmental Incident Response Clean-up and Reporting Procedure (Appendix D) and disposing of spill clean-up material as per HSEE-02-P007 Disposal of Contaminated Soil and Material (Appendix D).

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 evaluation of the affected area will be completed, and remediation will be completed as required.

2.8.2 Project-Caused Fire

The potential for fire to occur as a result of Project activities is limited to the use of vehicles and chain saws. The mitigation and management of fire will include:

- 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
- Immediately reporting 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 the construction phase of the Project and will be infrequent during operation and maintenance. However, during all phases there is potential for vehicles associated with Project activities to collide with:

- Other vehicles
- Trains
- Project infrastructure or other infrastructure
- Animals (wild and domestic)

The mitigation and management measures planned to reduce the potential for vehicle collisions will include:

- Implementation, as needed, of traffic control measures to reduce the potential for vehicle-to-vehicle collisions and vehicle-to-train collisions
- Project staff will be appropriately licensed to operate vehicles on-site, will obey traffic rules and regulations, and will exercise due care and attention while on-site
- Trucks will use only designated truck routes
- If a collision does occur, Project personnel will immediately contact emergency services

In the event of a vehicle accident there is the potential for injury, including 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 the operation and maintenance phase.

The mitigation and management of wildlife encounters will include:

- Documentation, mapping, and species identification of raptor nests on Project infrastructure
- Scheduling of maintenance activities outside of nesting periods, where possible
- Consultation with New Brunswick Natural Resources and Energy Development (NBNRED) biologists prior to unplanned/emergency maintenance during nesting periods

2.8.5 Legacy Environmental Issues

The potential exists for legacy environmental issues to be encountered during construction activities. These include the contaminated sites or hazardous materials left from illegal dumping activities by the public on the existing RoW. If legacy issues are identified, the NBDELG will be notified and a professional waste disposal company will be contracted to remove the materials.

3.0 OVERVIEW OF ENVIRONMENTAL SETTING

3.1 PHYSICAL SETTING

3.1.1 Physiography and Geography

A main physiography feature in Grand Falls is the Saint John River waterfall, which is one of the largest falls east of Niagara Falls (Donald 2010). Grand Falls also contains a 1.5 km long gorge (Donald 2010). The gorge shows off the multiple thin grey layers with white veins made from calcite which formed from the Ordovician period (Hild and Barr 2020). During this period, the gorge had a deep depression of water, which brought mud and silt from the under-water currents (Hild and Barr 2020). Other physiographic features of the area include wooded and forested areas, agricultural fields, floodplain wetlands, and rivers.

3.1.2 Topography and Drainage

The drainage in Grand Falls flow into meandering rivers and streams, which end up draining into the Saint John River watershed. The gorge at Little River has a change in elevation of approximately 21 m from the low water level to the top of the bank. Drainage in Grand Falls is generally good; however, slope instability in Grand Falls has become a concern in some areas, including Little River upstream of the PDA. The area encompassing the PDA is not considered at current or future risk of slope instability (Gemtec 2012).

3.1.3 Surficial Geology

The surficial geology in Grand Falls was developed in the Late Wisconsinan era (Rampton 2002). The Late Wisconsinan era was part of the glacial history of New Brunswick, where deglaciation occurred (Seaman 2007). The geology of the Grand Falls area is typical of the northwestern New Brunswick Matapédia basin (Hild and Barr 2020) which contains glaciofluvial sediments like sand, gravel, minor silt, and till (Rampton 2002). The underlying bedrock in Grand falls is predominantly sedimentary limestone and mafic intrusive diabase (NBNRED 2022).

3.2 BIOPHYSICAL SETTING

3.2.1 Water Resources

The Project is located in the Saint John River Watershed. In this area the watershed drains a mainly rural, mixed-use landscape comprised largely of forested lands. The Saint John River contributes to the community by creating electricity for the surrounding area (Grand Falls hydroelectric power plant), and creating tourism opportunities from the view of the falls.

There are no known surface water intakes or Designated Watershed Protected Areas within the general vicinity of the Project, but there is a Wellfield Protected in the PDA and LAA (Appendix A). There are no known private potable wells within 100 m of the PDA (NBDELG 2022a) (see Section 5.2).

3.2.2 Freshwater Fish and Fish Habitat

The Project is located in the upper reach of the Saint John River, approximately 1 km from Grand Falls/Grand Falls Dam. The project spans Little River, which drains into the Saint John River. Fish species in Little River include brook trout (*Salvelinus fontinalis*), slimy sculpin (*Cottus cognatus*), blacknose dace (*Rhinichthys atratulus*), threespine stickleback (*Gasterosteus aculeatus*), and creek chub (*Semotilus atromaculatus*) (Gray 2003).

The Saint John River watershed has one of the greatest natural diversities of freshwater fish in New Brunswick with a total of 53 fish species having been identified (Kidd et al. 2011). The most common fish species that are in Grand Falls area and that support commercial, recreational, or Indigenous fisheries on the Saint John River are smallmouth bass (*Micropterus dolomieu*), Atlantic salmon (*Salmo salar*), American shad (*Alosa sapidissima*), and Rainbow trout (*Oncorhynchus mykiss*) (Kidd et al. 2011).

The Project area is not reported to support critical habitat for aquatic SAR (DFO 2022).

3.2.3 Atmospheric Environment

The Project is located in an area that includes residential, industrial, agricultural, and wooded areas, along with communications and electrical transmission infrastructure. Air contamination and GHG emissions as well as sound pressure levels (noise) in the area surrounding the Project are expected to be predominantly influenced by vehicle traffic, rail activity, and machinery and/or equipment located on neighboring properties. Sound pressure levels may also be influenced by the Grand Falls waterfall and rapids that are located within 1 km of the Project. There are currently several industrial facilities located within 500 m of the Project, including a paper bag manufacturing facility that could also contribute to the noise in the Project area.

The Government of Canada has developed statistical summaries of climate data collected from weather stations located all over the country. An Environment and Climate Change Canada (ECCC) weather station located in St Leonard (St Leonard A), approximately 15 km northwest of the PDA, has historical data going back to 1985 (GC 2022). Climate normal data (1985 – 2010) from the St Leonard A weather station indicate that January is typically the coldest month of the year, with a daily average temperature of -12.6 ºC. July is typically the warmest month of the year, with a daily average temperature of 18.0 ºC. The average annual precipitation (including snow) is 1104.1 mm per year, with July being the month with the most precipitation (119.3 mm on average). The snowiest month of the year is typically January (78.2 cm per year). The strongest hourly winds measured at the St Leonard A weather station have predominantly been from the west and southeast between the months of October and April, with a maximum hourly wind speed of 70 km/h, recorded in November 1995. The maximum wind gusts, 135 km/h NW, were measured in November 2001 (GC 2022).

3.2.4 Terrestrial Environment

The center of Grand Falls contains the distinct morphological and geographical feature in the form of a water fall and gorge. The west side of Grand Falls has multiple agricultural areas that are surrounded by the wooded areas, with fewer agricultural areas and wetlands on the eastern side. The Project is largely located in an urbanized setting with residential and industrial developments.

Most of the habitat in the LAA is highly altered urban habitat and is occupied by buildings, paved surfaces, and lawns. There are small patches of residual trees that make up approximately 17.5% of the total area in the LAA. These patches include regenerating softwoods (6.0%), young, immature hardwoods (9.0%), and mature/overmature hardwoods (2.5%).

Wildlife species, including birds, mammals, and herptiles, known to be in the LAA are those generally tolerant of disturbance and urbanization. The Project setting in Grand Falls has the potential for vegetation and wildlife SAR to occur within the LAA or PDA. A list of recorded SAR within 5 km of the PDA is provided in Appendix B.

The Project is situated within the Little River watershed, which is approximately 77% forested area. The predominant tree species in the watershed include eastern cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), white spruce (*Picea glauca*), red spruce (*Picea rubens*), balsam fir (*Abies balsamea*)), white birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*) (Chow et al. 2011).

3.3 SOCIOECONOMIC SETTING

3.3.1 Economic Activity and Economic Drivers

The Project is located within the Northwest Economic Region of New Brunswick, which includes the counties of Victoria, Carleton, and Madawaska.

Grand Falls is a town in Victoria County, New Brunswick, with a population of 5,220 residents in 2021 (Statistics Canada 2022). Grand Falls makes up approximately 28.5% of the total population in Victoria County (WTRFLL 2021). In 2021, Victoria County experienced the greatest population decline of all counties in New Brunswick, decreasing a by 2% as compared with the 2016 census (Statistics Canada 2022). This trend of decline in population numbers was not observed in most other counties in New Brunswick which had contributed to overall population growth in the province (WTRFLL 2021). Grand Falls relies on three major economic drivers: potato farming, potato processing (McCains) and tourism such as kayaking tours, rock climbing, and historical sites around the area (Grand Falls 2016).

3.3.2 Land Use

The majority of the land use in Grand Falls is for business purposes like agriculture and tourism, along with residential developments. Land use in the Little River watershed, in which the Project is located, consists of 77% forest, 16.2% agricultural, and 6.8% other uses (e.g., residential, wetted areas) (Chow et

al. 2011). Most of agricultural fields are located on the outside area of the town and support the potato industry.

3.3.3 Transportation, Infrastructure and Services

The most prominent community in the Project area is the municipality of Grand Falls. Grand Falls offers infrastructure typical of a modern municipality in Canada including a municipal drinking water supply and wastewater treatment facilities. Grand Falls provides services and infrastructures for its locals, and for visitors to utilize. These infrastructures include a general hospital, schools, daycares, retirement homes, municipal and federal police forces, a fire station, Service New Brunswick, Canada Post Office, wastewater treatment facility, hydroelectric dam, and commercial and retail buildings.

Grand Falls boasts modern highways such as the Trans-Canada Highway, route 105, route 108, and route 130. These highways provide access to the main roads, secondary roads, and back roads of the Grand Falls area. The main roads that have the majority of services are the Madawaska Road, and Broadway Blvd. It is beneficial for the Project to have access to the services provided by the proximity of these roads. Other transportation includes a railway for cargo shipping, and boats for recreation and fishing.

3.3.4 Heritage Resources

There are several recorded heritage resources in Grand Falls, including a well-documented pre-contact Period portage route, a pre-contact Period archaeological site that is registered with the province of New Brunswick, and over 25 registered historic places or heritage sites (see Section 5.5.2 for more details). Specific examples of heritage resources include the Malabeam Centre, a local historical site that explains about the legend of Malobiannah, and Davis Park which displays the first description of Grand Falls by a voyager named Monsignor de Saint-Vallier (Grand Falls 2016).

4.0 METHODS

Environmental attributes with which the Project could interact were identified from digital information available from various government and non-government sources. Archaeological research was undertaken, including a review of digital information such as the archaeological potential map provided by the Archaeology and Heritage Branch (AHB) of the New Brunswick Department of Tourism, Heritage, and Culture. These data sources were considered appropriate for this Project, as the PDA traversed existing disturbed and developed areas within Grand Falls, and existing information on these areas was readily available. Environmental attributes include biota and their habitats, archaeological and heritage resources, and built infrastructure.

A site visit to provide ground-truthing of selected environmental features that could not be obtained from desktop information is planned for early summer 2022 and will be addended to this EIA Registration document.

4.1 VALUED COMPONENTS

Since 2015, Stantec has prepared five EIA registration documents for transmission line projects in New Brunswick that have been thoroughly reviewed by NBDELG and their respective TRCs. Based on its substantial professional experience and work with similar projects in New Brunswick, lessons learned and direction provided through TRC reviews, guidance provided by NBDELG on the preparation of an EIA (NBDELG 2018a), and the environmental setting within which the Project will be situated (Section 3.0), the Stantec team selected the following valued components (VCs) as those that should be considered as part of this EIA Registration:

- Water resources (surface water and groundwater)
- Freshwater fish and fish habitat
- Heritage resources
- Indigenous Land and Resource Use
- Atmospheric environment
- Terrestrial environment (includes wetlands, vegetation, wildlife, and wildlife habitat)
- Socioeconomic environment
- Effects of the environment on the Project

Chapter 5.0 provides a description of 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. A potential Project interaction is one in which a planned Project activity could adversely affect an environmental attribute, based on existing information on the Project and the environmental setting. One of the following two ratings was prescribed for each individual VC:

- An adverse interaction between the Project and the environment could occur

Methods

- No adverse interaction occurs between the Project and the environment

If there are no Project-related activities that would adversely interact with the environment in a specific VC, no assessment or discussion of that VC would be included in this EIA Registration document. Project-VC interactions are discussed in greater detail in Chapter 5.0.

4.3 VC ASSESSMENT BOUNDARIES

4.3.1 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 and operation and maintenance of the Project. The PDA includes the footprint of the 2.2 km-long, 20 m-wide RoW for the upgraded 138 kV transmission line to be constructed. The PDA is the same for all VCs and is illustrated in Appendix A.

Local Assessment Area

The LAA is defined as the maximum area where Project-specific 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 selection of LAA areas is somewhat subjective, and based on past experiences with preparing EIA registrations that included extensive field programs. The LAA can vary amongst the VCs based on the potential for the effects of Project activities to extend beyond the PDA. The LAA for each VC is summarized in Table 4.1. A figure of the maximum LAA of 500 m is provided in Appendix A.

Table 4.1 Local Assessment Area for Valued Components

Valued Component[1]	Local Assessment Area
Water Resources	PDA plus 500 m on either side of RoW centre line
Indigenous Land and Resource Use	PDA
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
Heritage Resources	PDA
Atmospheric Environment	PDA plus 500 m on either side of RoW centre line
Terrestrial Environment	PDA plus 500 m on either side of RoW centre line
Socioeconomic Environment	PDA plus 500 m on either side of RoW centre line
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.	

4.3.2 Temporal Boundaries

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

- Construction – pending regulatory approvals, anticipated to be during late fall 2022 to early winter 2023
- Operation and Maintenance – In-service in spring 2023 until the end of service life

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 Chapter 5.

5.0 ASSESSMENT OF POTENTIAL INTERACTIONS BETWEEN THE PROJECT AND THE ENVIRONMENT

5.1 POTENTIAL INTERACTIONS OF THE PROJECT WITH THE ENVIRONMENT

Based on the Project Description (Chapter 2), the Environmental Setting (Chapter 3), and the methods described briefly above (Chapter 4), the potential interactions between the Project and the environment are summarized in Table 5.1. The VCs for which the Project will not have interactions are described in Sections 5.2. The VCs for which planned Project activities will have interactions with the environment are described in Sections 5.4 through 5.9.

Table 5.1 Potential Interactions of the Project with the Environment

Activities/Physical Works Associated with the Project	Water Resources	Indigenous Land and Resource Use	Freshwater Fish and Fish Habitat	Heritage Resources	Atmospheric Environment	Terrestrial Environment	Socioeconomic Environment	Effects of the Environment on the Project
Construction								
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					✓	✓	✓	✓

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

5.2 WATER RESOURCES

Water resources consists of water that is available for human use and comes from one of two sources of water: groundwater and surface water. Human use of water resources includes consumption, as well as residential, agricultural, commercial, and industrial use.

The New Brunswick Online Well Log System (NBOWLS) has no records of registered wells within 100 m of the PDA (NBDELG 2022a). The Project does cross a Protected Wellfield (Appendix A) used for the municipal water supply in Grand Falls; however, there is no expansion of the RoW near the Protected Wellfield.

Given the small Project footprint, the lack of water resources in use near the PDA, the preponderance of pre-existing paved, impervious, and landscaped surfaces adjacent to the PDA, municipal wastewater infrastructure and the corresponding lack of private water wells, and the adherence to mitigative methods in NB Power's EPP (NB Power 2012), there will not be adverse environmental interactions between the Project and water resources.

5.3 INDIGENOUS LAND AND RESOURCE USE

Indigenous use of land and resources for traditional purposes considers potential interactions between the Project and traditional activities that Indigenous persons carry out on land and resources as part of their lives and culture. These traditional activities include cultural activities, hunting, fishing, gathering, and traditional uses and practices by Indigenous persons.

Given that the Project occurs within the existing RoW that runs through a developed municipal area that is mostly private property, and does not interact with Crown lands, there is little opportunity for Indigenous persons to carry out traditional activities within the PDA. Furthermore, communications on the Project that were distributed by NB Power to Indigenous groups have not resulted in responses indicating concerns about the Project to date. Engagement with Indigenous groups will continue throughout the life of this Project (see Section 7.3). As such, there will not be adverse environmental interactions between the Project and Indigenous land and resource use.

5.4 FRESHWATER FISH AND FISH HABITAT

Freshwater fish and fish habitat was selected as a VC because the Project crosses two mapped watercourses that drain into the Saint John River. The Saint John River contains fish and fish habitats that are protected by federal and provincial legislation. This section assesses the potential interactions between construction and operation and maintenance of the Project and the freshwater fish and fish habitat VC.

5.4.1 Scope of Assessment

The scope of assessment is limited to freshwater fishes and their habitats. 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) and freshwater 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. 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).

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.

5.4.2 Existing Conditions for Freshwater Fish and Fish Habitat

The Project is located within the Little River watershed, a subdrainage of the Saint John River watershed. The Project crosses two mapped watercourses (LaForge Brook and Little River), with four additional watercourses occurring within 500 m of the Project (i.e., the LAA) (Appendix A). A field walkover will be conducted in summer 2022 to field truth the status of the watercourses in the PDA, and determine if there are any additional unmapped watercourses. The results of the field survey will be addended to this EIA Registration document.

Aerial imagery of LaForge Brook (Google Earth Pro 2019), located near the northwestern end of the PDA (Appendix A), indicates this watercourse has been culverted to run beneath the parking lot and driveway of commercial property used for auto salvage. While this watercourse may have historical implications for elevated archaeological potential (see Section 5.5), it is unlikely to contain fish or viable fish habitat within 50 m upstream or downstream of the PDA.

The predominant watercourse spanned by the Project is Little River. Information obtained from aerial imagery (Google Earth Pro 2019) indicates that while the Little River channel is approximately 25 m wide, waterflow during summer months is periodically intermittent and/or incontiguous resulting in a dry stream bed at the location of the PDA. Research conducted in 1999 found Little River contained brook trout, slimy sculpin, blacknose dace, threespine stickleback, and creek chub (Gray 2003). There is no critical aquatic habitat or aquatic SAR recorded for the LAA (Figure 5.1; DFO 2022). There is little information available on water quality characteristics in Little River; however, the slimy sculpin is reported to prefer watercourses with colder tributaries and cold-water refugia (Gray et al., 2018).

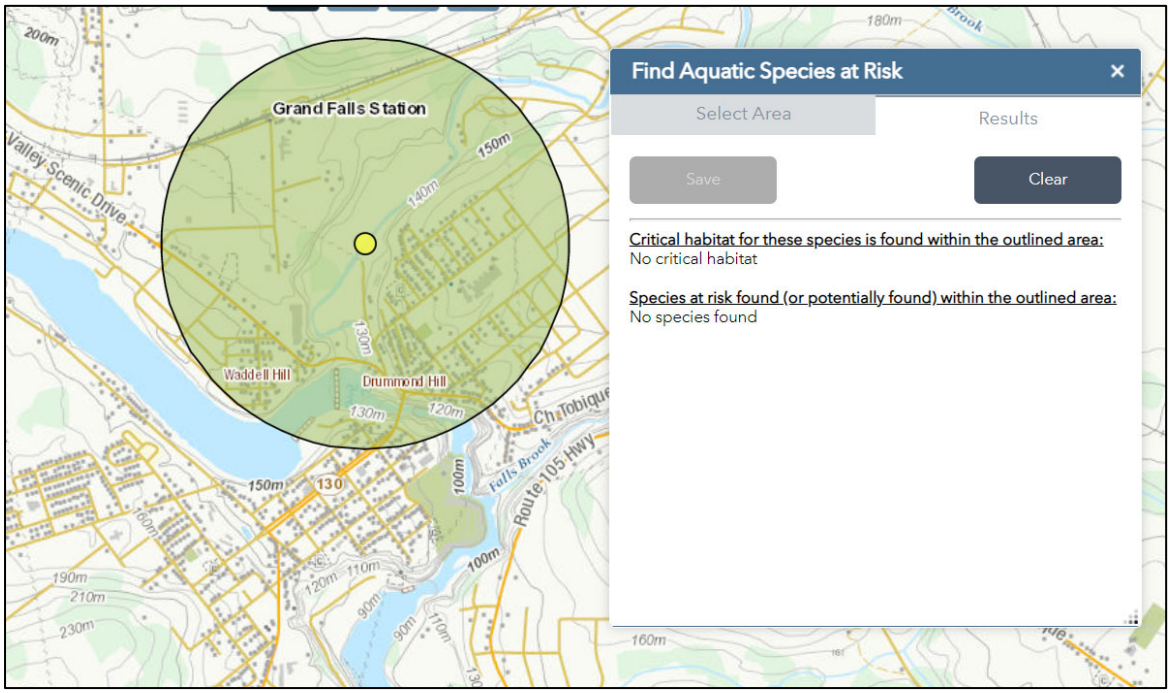


Figure 5.1 Image of Aquatic Species at Risk Map for Project Area (DFO 2022)

This section describes how 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.

5.4.2.1 Construction

During the construction phase of the upgraded 138 kV transmission line, accessing, clearing vegetation, grubbing, and pole placement and/or removal within the PDA will involve the use of heavy equipment (e.g., excavators, clearing equipment). There are no planned activities that involve heavy equipment entering a watercourse and disrupting substrates or altering overhanging riparian vegetation that would adversely affect watercourses through reduced shading. However, a potential interaction between freshwater fish and fish habitat could occur as a result of heavy equipment being used around watercourses or in riparian areas during grading or excavation of holes for structure assembly or riparian clearing. A change in fish habitat could result through alterations to riparian habitats as a result from the erosion and transportation of soils within the RoW (e.g., change in sediment concentrations).

NB Power will reduce the potential for interactions between the Project and freshwater fish and fish habitat by adhering to best management practices including mitigation by design (e.g., avoidance of pole placement within 30 m of a watercourse or wetland), and by following the protocols in the EPP (NB Power 2012). 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, and minimizing the clearing of riparian areas adjacent to watercourses. Specifically, best management practices will include:

- watercourses and riparian buffers will be clearly marked prior to accessing or operating heavy equipment in the RoW
- reasonable measures will be undertaken to prevent the release of deleterious substances such as fuels, lubricants, or hydraulic oil into watercourses. Vehicles will be maintained in good working order, hydraulic hoses and lines will be inspected, and vehicles will not be refueled within 30 m of a watercourse.
- existing bridges or temporary structures will be used when crossing watercourses
- activities such as fueling will be planned so that deleterious substances do not enter watercourses
- silt fencing or hay bales will be used in areas where soil disruption could result in the transport of sediment into watercourses
- silt fencing will be removed after revegetation has occurred
- a buffer zone will be left on the banks of watercourses
- brush and woody debris will be relocated to areas where it cannot enter watercourses
- the Project design will adhere to a maximum RoW width of 20 m, and will utilize the existing 20 m-wide RoW with the exception of the small connection between L1249 and L1175

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

5.4.2.2 Operation and Maintenance

During operation and maintenance activities for the new 138 kV transmission line, accessing the RoW to trim vegetation or repair equipment could result in heavy equipment operating within 30 m of a watercourse. These operations could indirectly result in changes in fish habitat through riparian disturbances and sediment transport from erosion. Mitigation for operation and maintenance activities will be as described above for construction activities.

5.4.3 Summary for Freshwater Fish and Fish Habitat

With mitigation, it is not anticipated that there will be any adverse interactions 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 death to fish or a HADD (see Section 1.5.2.3). The Project is not anticipated to result in serious harm to any fish 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.

5.5 HERITAGE RESOURCES

This section provides an assessment of potential interactions between construction and operation and maintenance of the Project and heritage resources. Heritage resources have been selected as a VC in recognition of the interest of provincial and federal regulatory agencies who are responsible for the management of these resources; the scientific community; and Indigenous peoples and the public who have an interest in the preservation and management of heritage resources. 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.

5.5.1 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. The importance of these resources arises from the fact that in all cases these resources convey different kinds of information than documents or oral histories, and in some cases these resources are the only means society has of learning about the history of places, people, events, and the natural environment. 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. Heritage resources can be permanent, although highly tenuous, features of the environment. Where heritage resources are present, their integrity is highly susceptible to ground-disturbing activities related to construction activities. Heritage resources are particularly susceptible to disturbance in terms of the loss of information that comes from the context of the resource in 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,

Project activities that include surface or sub-surface ground disturbance have the potential to interact with heritage resources, where they are present. Accordingly, construction represents the greatest potential for interaction with heritage resources.

Heritage resources in New Brunswick are regulated under the *Heritage Conservation Act*. The regulatory management of heritage resources falls under the New Brunswick Department of Tourism, Heritage and Culture (NBDTHC) and is administered by its Archaeology and Heritage Branch (AHB).

The review for heritage resources is 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”; AS 2012).

Consultation and engagement activities have been initiated as part of the heritage resources component of the Project. During the background research for heritage resources, regulatory agencies were contacted in order to gather information on potential heritage resources within the PDA.

A field assessment, as required for a confirmation of archaeological potential, has not been conducted at the time of writing of this VC; however, it will be completed and the report resulting from that assessment will be provided to AHB and the TRC for this Project.

Consultation has occurred with staff at AHB to request the provincial archaeological potential map that contains information on registered archaeological sites and heritage resources in the AHB Database, identifying potential palaeo-shorelines, and areas of elevated archaeological potential within, or potentially interacting with the PDA. Provincial and Federal online databases for heritage places were reviewed for potential heritage buildings or places within the PDA.

5.5.2 Existing Conditions for Heritage Resources

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

5.5.2.1 Archaeological Resources

Pre-Contact Period

The pre-contact period, in relation to the Project, is defined as the period of human occupation of what is now New Brunswick for the entirety of the timeframe from the first arrival of humans to this region, approximately 13,000 years Before Present (BP), up to the time of contact between these Indigenous populations and the European explorers when they first encountered what is now New Brunswick, generally interpreted to be approximately 500 years BP. After this time period, the timeframe for all peoples living in what is now New Brunswick is referred to as the “Historic Period” (see below).

A review of the Archaeological Potential Map (APM; Appendix C) received from the Province for the Project indicates that there is one registered pre-contact Period archaeological site located near the PDA. This site, CgDw-4, was registered by Stantec in 2017 after its discovery during an archaeological survey for another project. The site consists of a single pre-contact artifact find on the shoreline of the Saint John River above the intake of the existing Grand Falls generating station. The site is located approximately 1 km from the PDA and will not be affected by the Project.

The PDA lies within the ancestral homelands of the Indigenous people of the Wolastoqey Nation, which is largely defined by the drainage area of the Saint John River, or Wolastoq (“beautiful river”) from which they derive their name (Rayburn 1975). During the pre-contact period, much of the livelihood efforts of the Wolastoqey were focused on major river systems as a means pf navigation and later the primary mode of travel via dugout and birch bark canoes. Due to its size, the Saint John River provided access to a vast territory of land but also, via various tributaries, it provided access to virtually any location in what is now known as Maine and the Maritimes, including the Bay of Fundy and Gulf of Saint Lawrence. It also provided bountiful resources for hunting, fishing, trapping, and other subsistence activities.

The Palaeoindian Period (11,500 - 9,500 BP) was the earliest period of human occupation in the province, although recent evidence from Pennfield, New Brunswick suggests this period began earlier, between 12,9000 - 12,500 BP (Suttie et al. 2013). It occurred during a time of extreme environmental and geographic change in the region immediately following the melting of glaciers in New Brunswick. At the end of the last glaciation, a general warming trend began and the glaciers that covered all the lands that would become New Brunswick began to melt and recede. By 12,000 years B.P., many of the interior portions of New Brunswick were ice-free (Shaw et al. 2006). The mixture of glacial lake mosaics, incremental forest development, and open habitats during this period created favourable conditions for caribou herds (Newby et al., 2005) and a number of other small and large mammals, the migration of which into this newly opened land, are believed to be the primary food sources for people moving into the area at that time.

Stone artifacts from what is labeled by archaeologists as the Archaic Period (9,500 - 3,000 BP) have also been recovered from the Saint John River valley. One of the most significant Late Archaic Period finds was from a terrace opposite the mouth of the Eel River at Meductic, that was excavated prior to the construction of the Mactaquac Generating Station (MGS). This very rich archaeological site served as one of the most important Wolastoqey settlements on the Saint John River and was used continuously up to and including the Historic Period. Prior to the flooding of this location following the completion of the MGS, pre-contact artifacts could be found eroding from virtually every point along the shoreline at this location, where “literally thousands of chippings, many whole and broken artifacts, pottery shards, fire and food pits, [and] burned beach stones” could be found (Clarke 1970, p. 41–42). Clarke also notes that “on practically every yard of the three terraces one finds flint flakes and fire-stones where wigwams once stood” (Clarke 1970, p. 43). Other archaeological sites from the Archaic Period have also been documented along the Saint John River, including at the outlet of Lane’s Creek, located north of Woodstock, where “literally bushels of large broken and chipped flint stones” were found (Clarke 1970, p. 152).

The current inventory of archaeological sites in the province reveals that most have been dated to the Maritime Woodland Period (3,000 - 500 BP), based on the type of stone tools identified as well as evidence from style and dates of pottery found (Petersen and Sanger 1993; Rutherford 1993). Apart from the rich inventory of Woodland Period resources located at Meductic, several other archaeological sites from this period are located throughout the Saint John River shorelines.

Specific to the PDA, there is a well-documented portage route across what is now the town of Grand Falls, avoiding the impassable waterfalls giving the town its name. Archaeologists have speculated about the existence of a considerable archaeological site or sites at both the north and south ends of the portage route at Grand Falls; however, to date no evidence of encampments have been identified in the area thought to be the northern and southern ends of the portage. Regardless, the portage location is over a kilometre from the PDA and will not be affected by the Project.

The PDA is located several hundred metres from the shoreline of the Saint John River; however, the transmission line location does cross Little River, a tributary to the Saint John River. A review of LiDAR for this location reveals a series of terraces, potentially old shorelines from earlier time periods of Little River. The APM for this location indicates the shoreline areas have high potential for archaeological resources. This area will be subject to an archaeological impact assessment later this summer. At this time, it is understood that no transmission line structures will be placed near the shorelines or the bordering terraces of Little River.

Historic Period

The Historic Period is defined as the period from the arrival of mostly European-derived peoples to North America, approximately 500 years BP, until the modern era.

A review of the APM (AHB 2022) reveals no registered Historic Period archaeological sites near the PDA.

The Grand Falls was the site of a small French settlement in the mid-eighteenth century and was, at different times, the site of French and British military posts. In 1790, a military post was established on the

top of the rock bluff that is the current town of Grand Falls, by Lieutenant-Governor Thomas Carleton. At this time, the ownership of the region was in dispute by Québec, New Brunswick, and the United States. In 1816, the British government granted lands in the area between Grand Falls and Presque Isle (Maine) to two different settlers. The dispute of this territory culminated in the Aroostook War in 1838. The conflict involved the United States and Great Britain over the international border between the Dominion of Canada (Canada) and the United States. The war ended with the Webster-Ashburton Treaty in 1842 which resulted in the area becoming a part of the province of New Brunswick (GNB 2016). The town of Colebrooke was established in 1842, named after Sir William MacBean George Colebrooke who was Lieutenant-Governor of New Brunswick from 1841 to 1847 (Rayburn 1975). The name of Colebrooke was changed to Grand Falls in 1870. The population began expanding with the development of sawmills during the 1830s and the town was incorporated in 1890 (Hamilton 1996). The surrounding area was settled by farmers in the ensuing decades, and with the completion of railway links in the 1870s, the town began a period as a tourist and resort attraction in the vein of Niagara Falls.

5.5.2.2 Built Heritage

A search of the Canadian Register of Historic Places (CRHP 2022) and the New Brunswick Register of Historic Places (NBRHP 2022) found over 25 registered historic places or heritage sites in the Grand Falls area; however, none of these structures or places are located in close proximity to the PDA. As indicated on the APM, there is one cemetery, St-Georges Cemetery, that will be crossed by the Project. It is not a registered heritage site and no structures from the Project will be placed within the boundary of the cemetery and the cemetery itself will not be affected by the Project.

5.5.2.3 Palaeontological Resources

A palaeontological report, based on known data sources within the PDA, was prepared by the New Brunswick Museum (Miller 2017) for a previous NB Power project being considered in the Grand Falls area. Dr. Miller noted that the geological formations along in the area are Late-Ordivician to Early Silurian Age sedimentary rocks of marine origin. The report states there are no known fossil localities in the area; however, the bedrock composition in the Grand Falls area has the potential to contain palaeontological resources. The two nearest recorded fossil sites are located several kilometres from the PDA. Similar geological formations have been noted to contain typical Ordivician-Silurian micro-fossils such as brachiopods, trilobites, graptolites, and conodonts (Miller 2017). The installation of new structure as part of the Project will only require very small footprints, relative to the larger area, and thus the potential adverse effects from potential interactions with fossils if bedrock is encountered during construction installation is anticipated to be negligible.

5.5.3 Assessment of Potential 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.

5.5.3.1 Construction

During construction, activities that could result in a potential interaction with heritage resources include vegetation clearing, site preparation, and excavation. Given the mostly urban setting of the Project, most of the transmission line is already cleared of vegetation or there is an existing cleared RoW. Groundbreaking 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. 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 potential for 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.

Only a small amount of vegetation clearing will be required for the Project due to its location in an urban setting. Vegetated areas, such as the Little River valley, that are spanned by the existing transmission lines, will be spanned by the new lines as well.

Where access and staging occur, there is the potential for the use of heavy equipment which may also cause rutting resulting in ground disturbance and potential interaction with subsurface heritage resources; however, given the urban setting of the Project, it is anticipated that brownfield (i.e., already developed or disturbed area) will be used for these facilities. Excavation for pole placement and structure assembly may involve mechanical augering or excavation, all of which have the potential to interact with heritage resources.

The RoW will be subject to an archaeological impact assessment and areas with elevated potential for archaeological resources will be identified and avoided to the extent practical. Should a structure be required in an area of elevated archaeological potential, further investigation though shovel testing will be initiated to determine if archaeological resources are present at this location. If they are, then the structure will be moved to an alternative location or additional mitigation such as archaeological excavation will be implemented under provincial permit to remove the archaeological site using approved, scientific techniques. If the site is from the pre-contact period, NB Power would engage the Wolastoqey community prior to considering any archaeological excavation.

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. Construction activities within the existing substations are not anticipated to interact with intact heritage resources as these areas are already heavily disturbed from previous construction. Clean-up and revegetation may involve back blading but will occur within the existing previously disturbed construction footprint for pole placement and thus, no new ground disturbing activities will occur. Therefore, interactions with heritage resources are not anticipated to occur from these activities and they are not considered further in this assessment.

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

- Complete an archaeological impact assessment (AIA) of the entire RoW, along with any lay-down area located in greenfield sites prior to the initiation of construction activities
- Planned avoidance (e.g., transmission line pole and guy wire placement) of areas identified during the AIA to exhibit elevated potential for archaeological resources, where practical
- Areas of elevated archaeological potential that are identified through this assessment, and that will be impacted by construction will be subject to further research and investigation such as shovel testing or archaeological monitoring if Project structure cannot be moved out of these areas
- Should any heritage resources be identified that could be affected by the Project it is recommended that NB Power developed appropriate mitigation in consultation with provincial regulators and the Indigenous community, as applicable
- To mitigate for the unplanned discovery of a potential heritage resource (including archaeological and palaeontological resources) during all phases of the Project, NB Power will follow the Heritage Resources Discovery protocols in the EPP (NB Power 2012)

5.5.4 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, based on applicable legislation and guidelines, no substantial interactions between the Project and heritage resources are anticipated. The entire RoW will be subject to an archaeological impact assessment prior to construction and the results made available to the AHB, the TRC, and the Indigenous community. Avoidance or an appropriate mitigation plan will be developed for heritage resources that are identified during the AIA, in consultation with AHB and the Indigenous community as appropriate. NB Power will follow the Heritage Resources Discovery protocols in the EPP. If heritage resources are discovered during the shovel testing, or during construction activities, a mitigation plan will be developed in consultation with NB Power, AHB, and Indigenous communities, as appropriate.

5.6 ATMOSPHERIC ENVIRONMENT

This section assesses the potential interactions between construction, and operation and maintenance of the Project and the atmospheric environment. The atmospheric environment is included as a VC because of the potential for the Project to interact with air quality, GHGs/climate change, and sound quality.

Air quality is defined as the composition of the ambient air, including presence and quantity of air contaminants that may cause adverse effects on vegetation, wildlife, or human health. Levels of contaminants in the ambient air can be compared to established air quality criteria and objectives, which are set to be protective of human health and the environment. Air quality is highly dependent on local air contaminant sources, such as industrial facilities or heavy vehicle traffic.

Climate is the long-term historical and seasonal meteorological conditions in a given area, such as temperature, humidity, precipitation, sunshine, wind, and cloudiness. The release of GHGs, on a global scale from natural sources and anthropogenic activity, increase global concentrations of GHGs in the atmosphere, and they are widely understood to be a contributor to global climate change (IPCC 2022a).

Project-based releases of GHGs, mainly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) which are GHGs produced from combustion of fossil fuels, are typically used as an indicator of the potential interactions with climate change although it is understood that any one project's emissions will have a negligible effect on global climate change.

Sound quality is characterized by the sound pressure levels in the ambient air; the type, frequency, and duration of noise (unwanted sound) in the outdoor environment. Sound pressure levels are measured in decibels (dB). For environmental assessments where humans are the focus, an A-weighted dB scale (dBA) is used to report sound pressure levels.

5.6.1 Scope of Assessment

This assessment considers air contaminants that are typically associated with this type of Project. These contaminants are generated from fossil fuel combustion and the movement of heavy equipment that are required for Project construction. Particulate matter (both from combustion and dust from ground disturbance) and combustion gases are considered the main potential air contaminants of concern relating to air quality. Releases of GHGs from the combustion of fossil fuel in vehicles and heavy equipment are considered pertaining to potential interactions with climate change. For sound quality, changes in sound pressure levels due to noise from heavy equipment use are considered. Electromagnetic fields (EMF), which may originate from transmission lines, are also considered.

Air quality in New Brunswick is regulated by the Air Quality Regulation under the *New Brunswick Clean Air Act*. At the federal level, the main guidance available for managing air quality is the Canadian Ambient Air Quality Standards (CAAQS) (CCME 2019) developed by the Canadian Council of Ministers of the Environment (CCME).

There are no overarching sound guideline levels, regulations, or standards that are currently established by the Province of New Brunswick for limiting acceptable sound levels. However, sound is defined as a contaminant in the *New Brunswick Clean Air Act* and is sometimes regulated on a project-by-project basis under that Act. There are currently no applicable requirements, standards or objectives relating to GHGs or EMF for construction or operation of transmission lines. There are provincial GHG regulations for large emitters in New Brunswick; however, this Project is not covered by those requirements. In New Brunswick there is also provincial carbon tax on fossil fuels that would apply to fuel consumed by the Project. This tax is a mechanism to encourage curtailment of fossil fuel consumption and associated GHG emissions and was most recently increased on April 1, 2022.

5.6.2 Existing Conditions for Atmospheric Environment

The sections below describe the existing conditions for air quality, GHG emissions, and sound quality in the Project area.

5.6.2.1 Air Quality

Based on the most recently available data from NBDELG (2019), ambient air quality in New Brunswick is generally characterized as very good, with 12 exceedance events of the provincial ambient air quality

objectives or CAAQS in 2019. The exceedances in 2019 were related to odorous compounds (hydrogen sulphide (H_2S) and sulphur dioxide (SO_2)) released in Saint John, Belledune, and on one occasion, in Nackawic) (NBDELG 2019). The Project is located in New Brunswick's Central Air Zone. The Twin Rivers Paper Company pulp mill in Edmundston, the Arbec Forest Products oriented strand board mill in Miramichi, and the AV Group pulp mill in Nackawic facilities are within this Central Air Zone and have potential to impact the air quality within the zone (NBDELG 2019).

The closest provincial ambient air quality monitoring station in relation to the Project is located in Edmundston, NB, approximately 60 km from the Project PDA. Between the years 2011- 2019, which is the most recently available published data (NBDELG 2013, 2015, 2016, 2017, 2018 and 2019), there were several exceedances of SO_2 (one of the provincial air quality objectives). The other provincial air quality objectives (measurements of carbon monoxide (CO), nitrogen oxides (NOx), H_2S, and total suspended particulates) had no exceedances between 2011 and 2019 at the Edmundston station. Although air quality is not directly measured within the LAA, based on the data collected by NBDELG throughout New Brunswick, only areas that are within close range to large industry record infrequent exceedances of air quality objectives while other stations show full compliance. Therefore, it is expected that the provincial air quality objectives are met within the LAA for the Project.

The CAAQS records long-term trends for particulate matter that is ≤2.5 µm in width ($PM_{2.5}$) and ground-level ozone (O_3) across Canada. The 2019 CAAQS targets were met at all stations in New Brunswick from data collected in 2012 - 2019 (NBDELG 2015, 2016, 2017, 2018b, and 2019).

5.6.2.2 Climate

Climate normals data from the ECCC weather station located in St Leonard are discussed in Section 3.2.3.

5.6.2.3 Greenhouse Gas Emissions

The quantity of GHG emissions released to the atmosphere in Canada in 2020 (the most recently published data from Canada's National Inventory Reports) was 672 megatonnes of carbon dioxide equivalent (MtCO2eq), 12 MtCO2eq of which were released in New Brunswick (ECCC 2022a). Therefore, New Brunswick's GHG emissions represented approximately 1.8% of Canada's emissions in 2020. Canada had a net decrease of 8.9% in annual emissions from 2019 to 2020, and a 9.3% decrease from 2005 to 2020. According to ECCC, Canada's contribution to global GHG emissions in 2018 was 1.6% (ECCC 2022a).

5.6.2.4 Sound Quality

The existing sound quality in the vicinity of the Project is expected to be predominantly influenced by vehicle traffic on nearby roads, and various industrial and rail activities within the LAA. The nearest residential building to the Project is located within 10 m of the southwestern edge of the PDA (Appendix A).

The existing sound pressure levels in the Project area can be estimated based on methodology published by the Alberta Energy Regulator as the contributing factors are the same; population density and traffic patterns (AER 2007). The average ambient sound level in Alberta for areas with comparable population densities and distances from heavily travelled roads as the LAA is estimated to be approximately 56 dBA at night and 66 dBA during the day (AER 2007). For reference, a sound pressure level of 50 dBA is comparable to a quiet suburb or conversions at home; a sound pressure level of 60 dBA is comparable to sound levels in a restaurant or office setting.

Since Project construction is estimated to take only four weeks and will move along the length of the transmission line, interactions between the Project and sound quality are expected to occur over a short time period near any individual property. During operation and maintenance, limited and infrequent activity would occur along the RoW (e.g., manual clearing of vegetation using chain saws and bush hogs) and would be comparable to the activities that have occurred for the existing 69 kV line. Therefore, no background sound pressure level monitoring was conducted as part of this assessment.

5.6.3 Assessment of Potential Environmental Interactions with Atmospheric Environment

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

5.6.3.1 Construction

Project-related releases of air contaminants are not expected to exceed provincial or federal air quality objectives or standards during construction. Combustion gases and GHGs are expected to be released from the operation of construction equipment, machinery, and large trucks travelling to and from Project site. However, construction will be short in duration (four weeks). Repair and maintenance activities will be performed on equipment, machinery, and trucks as required to maintain acceptable performance. Idling of vehicle engines, equipment, and machinery will be avoided where possible, and transportation routes will be managed in order to reduce the release of unnecessary combustion gases and GHG emissions. As the magnitude of construction activities is relatively small, GHG emissions from Project construction activities will be negligible in comparison to annually reported GHG emissions in New Brunswick.

Dust is expected to be generated as a result of construction and excavation activities and from exposed soil along the RoW. Standard dust control and mitigation practices will be used to control dust levels during construction. These include the use of dust suppressants or water on unpaved areas frequented by heavy equipment to limit dust emissions, especially during windy and dry conditions.

Some activities are expected to cause noise and vibration to occur during the construction phase including noise from the use of heavy mobile equipment (e.g., engines and back-up beepers) and noise from chainsaws. Construction activities within the PDA will be short in duration; however, noise may be noticeable by nearby receptors given the relatively short distance to the nearest receptor (the nearest residence is within 10 m of the edge of the PDA). There are approximately 964 residential buildings within

the LAA (including houses, garages, and sheds), of which the majority are more than 200 m from the PDA and would not likely be exposed to excessive construction noise.

Construction is planned to follow the municipality of Grand Falls By-Law No.70 relating to the prevention of excessive noise and nuisance in the town of Grand Falls, which limits excessive noise, including from construction (Grand Falls 1973). By-Law No. 70 limits all construction work to within 7:00 am – 10:00 pm. NB Power often restricts its construction activities to 7 am to 7 pm; therefore, nighttime sound pressure levels are not expected to be affected by Project construction activities. NB Power staff will monitor noise qualitatively within the RoW and implement appropriate mitigation in the event that they receive noise complaints from nearby receptors.

5.6.3.2 Operation and Maintenance

Operation and maintenance activities that could release air contaminants, GHGs, or noise include the use of manual saws and bush hogs for vegetation management, and the use of heavy equipment for pole and/or line replacement. No substantial emissions of air contaminants or GHGs are expected to occur during operation and maintenance of the transmission line; however, noise of short duration is anticipated. Mitigation for noise will be similar to that used for construction activities (Section 5.6.3.1).

There are no anticipated Project-related environmental effects from EMFs. EMFs produced by the transmission and use of electricity are considered to be of “extremely low frequency” (ELF) (Health Canada 2016). EMFs at ELF are produced by the transmission and use of electricity, as well as other sources such as household appliances and cell phones. Health Canada has noted there is “no conclusive evidence of any harm caused by exposures at levels found in Canadian homes and schools, including those located just outside the boundaries of power line corridors” (Health Canada 2016).

5.6.4 Summary for Atmospheric Environment

With the implementation of the mitigation and environmental protection measures described in this assessment, it is not anticipated there will be substantial adverse interaction between the Project and the atmospheric environment during Project construction or operation and maintenance activities. Concentrations of air contaminants are not expected to exceed the provincial or federal objectives, guidelines, regulations, or standards during construction or operation and maintenance phases. The GHG emissions from construction activities will be negligible in comparison to the GHG emissions reported annually for the province of New Brunswick. While there is potential for noise levels to increase temporarily at nearby receptors during construction and operation and maintenance, they will be limited to the PDA, will be short in duration, and will occur during daytime hours. There is the potential for EMF to increase during the operation of the Project; however, Health Canada has noted there is insufficient evidence to establish a relationship between EMFs and human health (Health Canada 2016).

5.7 TERRESTRIAL ENVIRONMENT

This section assesses the potential environmental interactions between construction and operation and maintenance of the Project and the terrestrial environment VC. The terrestrial environment was included

as a VC due to its social, cultural, and economic importance, and because of the potential for the Project to interact with the terrestrial environment in the PDA.

5.7.1 Scope of Assessment

This VC focuses on the vegetation and wildlife SAR and SOCC as well as wetlands. SAR included 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*. A description of SAR and SOCC was provided in Section 1.5.

Ecological Communities of Management Concern (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)). The Grand Falls Gorge is an ESA located more than 250 m from the Project. This ESA was selected primarily for its geology but also for vegetation and aesthetics. In this section of the Saint John River just below the dam, the river has eroded a steep sided gorge with many crevices and ledges that support a community of rare calciphile and arctic plants (Appendix B). Given the location and nature of the Project, and the roads and buildings in between the Project and the Grand Falls Gorge, there is no potential for environmental effects, and thus ECMC's are not discussed further.

Wetlands are defined as, "land that has the water table at, near, or above the land's surface, or which is saturated, for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activities adapted to the wet environment" (NBDELG 2022b, 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 EIA registration. Any wetlands considered to be "Provincially Significant Wetlands" (primarily coastal wetlands and wetlands located within the lower Saint John River floodplain) are subject to a greater level of protection under the provincial policy (NBDNRE and NBDELG 2002).

NBDELG maintains a publicly available online mapping tool, i.e., the "Watercourse and Wetland Alteration (WAWA) Reference Map," that indicates the locations of recorded (mapped) wetlands including Provincially Significant Wetlands (PSW), as well as the 30 m buffers around these mapped wetlands (SNB 2022). Current guidance from NBDELG ("Wetland Guidelines") released in 2020 indicates that all wetlands, regardless of their presence on the WAWA map, are considered regulated wetlands within New Brunswick, but notes there are exemptions within the *Clean Water Act* and associated regulations (NBDELG 2020). The Wetland Guidelines describe that wetland habitat lost from wetlands due to project-related activities will require compensation at a ratio of 2:1, and that PSWs have a restricted list of permissible activities for alteration with a valid WAWA permit (NBDELG 2020).

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 have been assessed or interpreted from digitally available information, 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.

5.7.2 Existing Conditions for Terrestrial Environment

5.7.2.1 Vegetation and Wetlands

Upland Habitat

The habitat in the LAA consists of a mixture of landscaped areas, agricultural land, wooded areas, and wetland habitat. Within the LAA, 20.4 ha (7%) is agricultural land, approximately 189.4 ha (65%) is land used for anthropogenic/industrial purposes, and there are patches of regen-sapling hardwood (18.1 ha; 6%), mature-overmature hardwood (27.3 ha; 9%), and young-immature hardwood (7.38 ha; 2%). Within the PDA approximately 0.46 ha (11%) of the land is used for agricultural purposes and approximately 3.68 ha (88%) of the land is used for anthropogenic/industrial purposes (buildings, asphalt, and lawns). Small patches of young-immature hardwood that compose 0.03 ha (<1%) of the PDA.

Common tree species that have been reported within the Little River watershed and can be expected to be present in the PDA and/or LAA include eastern cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), white spruce (*Picea glauca*), red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), white birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), and red maple (*Acer rubrum*) (Chow et al. 2011).

A field walkover of the PDA by a Stantec biologist is planned for early summer 2022. The field walkover will further establish what predominant tree and understory vascular plant species exist within the PDA.

Wetland Habitat

Based on the GeoNB online map tool, there are no mapped wetlands in the PDA or the LAA; however, a high-level interpretation of digital imagery and LiDAR (light detecting and ranging) data (SNB 2022) indicates there is the potential for one unmapped wetland to occur within the PDA (Appendix A). This

unmapped interpreted wetland is situated in the Little River basin and could potentially comprise approximately 0.23 hectares within the PDA.

There are four interpreted wetlands in the LAA that collectively are an estimated 7.08 ha. The largest interpreted wetland (IW-1) in the LAA is situated on the northwestern side of the Little River basin and is spanned by the PDA (Appendix A). This wetland appears to have both a shrub and forested (predominantly hardwood) wetland component. This interpreted wetland does have good potential to contain black ash (*Fraxinus nigra*) which has a COSEWIC threatened status (COSEWIC 2018) and is an intrinsically important species to indigenous groups (Wolastoqey/Maliseet, Penobscot, and Mi'kmaq people) in the Grand Falls area (ECCC 2022b). The wetland also has potential habitat to support Furbish's lousewort (*Pedicularis furbishiae*), which is only found on the upper Saint John River and is listed as endangered by COSEWIC (GC 2011) and considered a Species at Risk in New Brunswick, both federally (GC 2011) and provincially (GNB 2022c).

The second interpreted wetland (IW-2) is located in the LAA on the southeastern side of Little River, approximately 250 m south of the PDA (Appendix A). This wetland is also interpreted to be a hardwood swamp and has potential to contain black ash and Furbish's lousewort.

The third interpreted wetland (IW-3) is a forested wetland that is situated on the northwestern end of the LAA, approximately 225 m north of the PDA. The fourth interpreted wetland (IW-4) is likely a hardwood swamp situated in the most western end of the LAA, approximately 240 m southwest of the PDA.

Wetlands IW-3 and IW-4 are in close proximity to commercial buildings or roads, which could contribute to surface water drainage to the wetlands. This drainage could potentially contain contaminants such as metals, hydrocarbons, and road salt. The wetland may retain metals and hydrocarbons. The hydrological functions of the wetlands have likely been diminished with the encroachment of urban development. Nevertheless, the wetlands play a role in storing and gradually releasing surface water that enters the wetlands through their attenuated catchment area.

None of the interpreted wetlands appear to have open water habitat. The field walkover of the PDA planned for early summer 2022 will confirm the wetland habitats in the PDA.

Vascular Plants Species of Conservation Concern

Although there are no vascular plant SAR reported within the LAA, there are 39 rare and/or endangered (SOCC or SAR) vascular plants identified within a 5-km radius of the PDA center point. These include butternut (*Juglans cinerea*) and Furbish's lousewort, both of which are listed as endangered under SARA and NB SARA; black ash, which is listed as threatened by COSEWIC, and Kamtchatka fleabane (*Erigeron acris var. kamtschaticus*) which has a provincial rarity rank S1 (Appendix B). The occurrence of these plants within 5 km of the PDA indicates some potential for them to occur within the PDA. A description of the habitat preferences of these four aforementioned rare and/or endangered vascular plant species and their potential to occur in the PDA follows.

Butternut

This tree species is native to central and eastern Canada, but Grand Falls is at or near its northern distribution limit (EC 2010). Butternut prefer rich, moist, well-drained loamy soils that are often found in watercourse riparian areas. This species is intolerant of shade and competition and is often found scattered intermittently among open or edge habitats such as forest roads or stream banks (EC 2010).

There is potential for butternut to occur in the riparian habitat of the Little River gorge in areas that will be spanned by the Project. It is unlikely for mature trees to occur in the portions of the RoW that are situated at higher elevations away from watercourses and wetted soils, which have been subjected to decades of vegetation management that has prevented the establishment of tall trees.

Furbish's Lousewort

This species is native only to the upper Saint John River where it occurs along exposed shorelines that are subject to spring flooding and ice scour (GNB 2022d). There is potential for this species to occur along the banks in the flood plain area of Little River that will be spanned by the Project

Black Ash

Black ash is a facultative wetland species occurring most often in floodplain forests, treed swamps, riparian habitats, and fens (GC 2019). It can tolerate a wide range of soil types from alluvial deposits to muck to clayey soils. This species can also occur in moist upland forest habitats, but in much lower densities than low-lying floodplain areas.

There is potential for black ash to occur in the riparian habitats of Little River in areas that will be spanned by the Project. It is unlikely to occur in the RoW that is situated at higher elevations away from watercourses and wetted soils.

Kamtchatka Fleabane

This species prefers exposed habitats that include meadows, forest openings, and open slopes (Burke Museum 2022) as well as rocky and sandy sites, riverbanks, roadsides, and other disturbed sites (eFloras 2022).

Given that the existing RoW is an open habitat that is subject to vegetation management, there is some potential for Kamtchatka fleabane to occur in some small areas of the RoW if a meadow or forest opening is present.

5.7.2.2 Wildlife and Wildlife Habitat

Wildlife Habitat

Upland and wetland habitats are described above in Section 5.336.-1422297792.336. Habitat in the LAA is a mixture of agricultural lands, wooded areas, and a few watercourses and interpreted wetlands, that are fragmented by paved and landscaped residential, industrial, and infrastructure developments. This type of habitat is generally of fairly low value as wildlife habitat, and is limited to species that have

adapted to urban areas and are not sensitive to disturbance. However, the agricultural habitat in the LAA could support bobolink (*Dolichonyx oryzivorus*), a SAR that has been identified within 5 km of the Project (Appendix B).

The potential wetlands within the LAA and PDA can be expected to support several wetland functions. It would likely provide habitat for passerines and small mammals as well as some larger mammals such as raccoon (*Procyon lotor*), striped skunk (*Mephites mephitis*), and white-tailed deer (*Odocoileus virginianus*). Seasonal pools in the wetlands likely exist, which would provide breeding habitat for ephemeral pool breeding amphibians such as spring peeper (*Pseudacris crucifer*), wood frog (*Rana sylvatica*) and yellow-spotted salamander (*Ambystoma maculatum*). The lack of open water in the interpreted wetlands makes it unlikely for these to be suitable breeding habitat for waterfowl, or SAR such as the rusty blackbird (*Euphagus carolinus*).

A variety of common birds are regularly found in these types of habitats. There are some patches of wooded areas, LiDAR interpreted wetlands, fields, and structures that may support bird species that rely on these different habitats, as well as small mammals such as red squirrel (*Tamiasciurus hudsonicus*). However, natural and/or undisturbed habitat types are highly fragmented in the PDA and LAA, and within the RoW, frequent cutting of vegetation limits the complexity and quality of habitat for wildlife.

Wildlife Species at Risk and Species of Conservation Concern

AC CDC rare species data were obtained for a 5-km radius surrounding the PDA center point. A total of 34 fauna SOCC were identified as have been recorded in this area, including 32 birds and two invertebrates (Appendix B). Of these, nine species are SAR and are discussed further below.

Birds

A variety of bird species have been recorded within 5 km of the PDA, including waterfowl, raptors, shorebirds, nightjars, passerines, and one owl: snowy owl (*Bubo scandiacus*). The nine SAR bird species include wood thrush (*Hylocichla mustelina*), bank swallow (*Riparia riparia*), bobolink, barn swallow (*Hirundo rustica*), eastern wood-pewee (*Contopus virens*), rusty blackbird, evening grosbeak (*Coccothraustes vespertinus*), common nighthawk (*Chordeiles minor*), bald eagle (*Haliaeetus leucocephalus*), and Canada warbler (*Cardellina canadensis*).

The barn swallow could also be present within some of the structures and fields within the LAA, and the eastern wood-peewee has potential to be in the edge habitat within the LAA, although that habitat may not be abundant enough. Common nighthawk do occupy urban areas, and can nest on flat top gravel roofs. As this type of roof exists in the LAA, common nighthawks could potentially occur. Canada warbler could potentially use the habitat present in IW-1 and IW-2, depending on the understory characteristics. Wood thrush are more typically associated with large forest mosaics, but may also nest in small forest fragments, nesting in second-growth mature deciduous and mixed forests, with saplings and a well-developed understory. Evening Grosbeak breeding habitat generally includes open, mature mixedwood forests, where fir species and/or white spruce are dominant, and spruce budworm is abundant. These habitats are generally not present near the PDA. During the one-day site walkover, the presence or absence of these bird species and/or their habitat will be assessed.

Invertebrates

Two invertebrate SOCC were identified within 5 km of the PDA (Appendix B) but not in the LAA. These include the transverse lady beetle (*Coccinella transversoguttata richardsoni*), which is listed as SH (possibly extirpated) and is listed as special concern by COSEWIC. The other species is the triangle floater (*Alasmidonta undulata*), which is listed as S3. It is not expected that the populations of either of these species will adversely affected by the Project.

Mammals

No mammal SAR/SOCC were identified in the AC CDC data search (Appendix B). It is expected that mammals in the LAA would include those found commonly in urban areas of New Brunswick, including red squirrel, striped skunk, raccoon, white-tailed deer, and eastern coyotes (*Canis latrans*).

5.7.3 Assessment of Potential Environmental Interactions with the Terrestrial Environment

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

5.7.3.1 Construction

Construction activities for the upgraded 138 kV transmission line have the potential to result in adverse environmental interactions with the terrestrial environment. Disturbance of the soil surface caused by clearing of the transmission line RoW, movement of equipment along the transmission RoW, and construction of transmission line structures could result in the loss of plant SOCC, if present. However, the PDA does not represent an area of high potential for plant SOCC (Section 5.7.2.1), there will be only a small disturbance of soils associated with new pole replacement and access road upgrades, and the existing RoW has been managed for vegetation for decades. If rare plants such as the Kamtchatka fleabane (Section 5.7.2.1) are identified during the field assessment, their GPS coordinates will be recorded so they can be avoided during future construction activities. Local Indigenous communities will be offered an opportunity to harvest traditional plants, such as black ash and butternut, if present, prior to clearing activities.

As the only interpreted wetland in the PDA (IW-1) will be spanned by the transmission line, there are no anticipated between the Project and wetland vegetation, hydrology, or soils. Similarly, there is no wetland compensation expected for the Project.

Wildlife can be affected directly, such as through collision with construction equipment, indirectly by changes to habitat, or by sensory disturbance which could lead to habitat avoidance. Collisions between birds and construction equipment could result in a Project-related increase in bird mortality. Lighted equipment can attract birds during migration periods; this phenomenon is most pronounced at night and in poor weather conditions (Avery *et. al* 1976; Longcore and Rich 2004; Ogden 1996; Wiese *et al.* 2001); however, the residential and commercial roads and parking lots within the LAA are already well lit. The

use of full cut-off temporary lighting and reduced amounts of lighting when safe to do so can reduce attraction to migrating birds.

Sensory disturbance to wildlife species may be caused by light and noise of construction equipment during site preparation and excavation for pole placement. This sensory disturbance could result in reduced breeding or rearing success through reduced productivity or nest abandonment. Some species may experience temporary habitat loss through avoidance (Bayne et al. 2008). The project is situated in a mainly urban area and is situated near a busy road (chemin Madawaska). Wildlife species present in the LAA can be expected to be habituated to a wide variety of human activities, so disturbance effects associated with construction activities can be expected to adversely affect mobile wildlife only within a few tens of meters of the activities. Small mammal and herptile species may experience increased mortality through predation upon leaving cover in response to construction noise within small sections of the PDA.

The construction phase may result in small and temporary changes to wildlife habitat from the limited vegetation clearing where the new transmission line poles are being added or access roads upgraded. Should plant SOCC be identified during the field surveys, they will be marked (e.g., with coloured stakes, flagging) to reduce potential for damage to the plants through avoidance whenever possible. Equipment arriving on site will be clean and free of vegetative debris before entering the RoW to prevent introduction of non-native and invasive species. Likewise, quarried, crushed material will be used for access road upgrades (if applicable) to reduce risk of spreading or introducing invasive species and open disturbed soil will be kept to a minimum to prevent exotic species from colonizing. Wherever possible, natural regeneration will be allowed to occur to re-establish native plant communities. This can be encouraged by reducing soil disturbance and leaving the root mat and seed bank in place. If natural regeneration is not possible, a seed mix that contains non-invasive species will be used.

All construction including vegetation clearing will occur outside of the bird breeding season, which occurs in northwest New Brunswick from mid-April to late August (ECCC 2022c). Planning construction activities between September and March will avoid disturbing breeding birds, or destroying nests, eggs, or nestlings.

5.7.3.2 Operation and Maintenance

During operation and maintenance, there is potential for bird mortality through collisions with the transmission line. Calvert et al. (2013) estimated transmission line collision to be the third leading cause of human-related bird mortality in Canada. Waterfowl and waterbirds are at greater risk of collision with transmission lines due to their higher wing loading (body weight relative to wing area), which limits their reaction time over other species of birds (APLIC 2012; Bevanger 1998; Rioux *et al.* 2013). There is the potential for some migrating birds to pass through the area. Nocturnal migrants (i.e., most passerines) are generally high-flyers and are at low risk of suffering collision with transmission lines in flight. However, diurnal migrants, including waterfowl, waterbirds, and raptors, may fly at lower elevations during migration. Although these species are more susceptible to wire collision than many other birds (Erickson *et al.* 2001), there are no major waterfowl staging areas available near the PDA; thus, it is likely these species pass over at an elevation higher than the transmission line wires, limiting their potential for collision. Transmission line collisions, if they occur, will likely be limited to local movements of resident

birds. Transmission lines do not pose a new threat in this region, as they already occur in this RoW. This Project merely increases the voltage of electricity passing through the conductors from 69 kV to 138 kV without adding new conductors. NB Power remains committed to working with ECCC and NBDELG to operate the electrical transmission infrastructure with a strategy that best allows for safe and efficient maintenance and operations, while also protecting migratory birds in the region.

During operation and maintenance, plant SOCC (if present) and wetland habitat (in IW-L if applicable) could be adversely affected by periodic vegetation management programs which would result in the direct loss of vegetation and possible disturbance to soils and wetland hydrology if heavy equipment such as brush hogs or hydro-axes are used for vegetation control. Vegetation control in the PDA will be conducted by mechanical means only and no herbicides will be used. Local Indigenous communities will be offered an opportunity to harvest traditional plants, such as black ash and butternut, prior to clearing activities should they be identified within the clearing zone. Operation and maintenance within the existing transmission line RoW will be unchanged from current practices.

5.7.4 Summary for the Terrestrial Environment

With mitigation and environmental protection measures, it is not anticipated that there will be substantial changes in vegetation communities or wildlife habitat within the LAA. No SAR or SOCC are expected to be lost as a result of the Project. Although one LIDAR interpreted wetland does intersect the PDA, it is spanned by the Project and not expected to be subject to adverse interactions.

5.8 SOCIOECONOMIC ENVIRONMENT

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

5.8.1 Scope of Assessment

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

Land use, a component of the socioeconomic environment, 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 recreational purposes. The use of land and resources by Indigenous persons is discussed in Section 5.3.

Transportation, infrastructure, and services refers to what is located within the Project area, and potential Project-related interactions such as changes to traffic use for the passage of heavy equipment.

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

Assessment of Potential Interactions Between the Project and the Environment

In considering a change in socioeconomic environment, the spatial boundaries of the PDA and LAA are consistent with those defined in Section 4.3.1, with the following exceptions:

- The LAA for the change in transportation, infrastructure, and services encompasses the PDA, LAA, as well as the municipal boundaries of Grand Falls
- The LAA for the change in employment and the economy encompasses the PDA, LAA, as well as the municipal boundaries of Grand Falls and boundaries of Victoria County and New Brunswick

5.8.2 Existing Conditions for the Socioeconomic Environment

The Project, as described in Chapter 1.0, is located in the Town of Grand Falls, Victoria County, New Brunswick. The PDA crosses 38 properties, of which 33 are private and the remaining five are municipal. The PDA also spans Little River, which is Crown Land; however, the Project has no planned interactions with Little River or its 30 m buffer (Section 5.4). Seventeen of the 33 private properties can be considered residential, which includes private residences as well as for-profit senior and retirement homes. The remaining 16 private properties include agricultural lands, warehouses, grain and fertilizer facilities, railway infrastructure, and a church. The five municipal properties include park land, and riparian lands in the Little River gorge that house the groundwater pumphouses for the Grand Falls municipal water supply.

Transportation and infrastructure traversed by the PDA includes seven paved municipal roads and a rail line. The existing RoW effectively avoids other transpiration and built infrastructure, such as bridges or pipelines.

There are approximately 5,220 residents living in the Grand Falls Census Subdivision as of 2021, which is a decrease in that population of 2% as compared with 2016 (Statistics Canada 2021).

Grand Falls, being in Victoria County, is situated in the Northwest Economic Region (NER) (NBJobs 2022). The key economic drivers are manufacturing, healthcare, and social assistance. This region has experienced a small overall decline in its labour force between April 2019 and April, 2022, which may have contributed to its slight increase in full-time employment and total employment, and small decrease in the number of people actively looking for employment (i.e., unemployment rate) during that same time period (NBJobs 2022). The NER makes up approximately 9.2% of New Brunswick's labour force, and has a slightly lower unemployment rate than the provincial average as of March 2022 (NBJobs 2022; Table 5.2).

Table 5.2 Labour Force Statistics: New Brunswick, and the Northwest Economic Region in March, 2022

Location	Labour Force	Employed	Participation Rate (%)[1]	Employment Rate (%)[2]	Unemployment Rate (%)[3]
New Brunswick	399,700	371,700	60.6	56.3	7.0
Northwest Economic Region	36,800	34,400	56.7	53.0	6.5

Table 5.2 Labour Force Statistics: New Brunswick, and the Northwest Economic Region in March, 2022

Location	Labour Force	Employed	Participation Rate (%)[1]	Employment Rate (%)[2]	Unemployment Rate (%)[3]

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: NBJobs (2022)

The top occupations for employment in Victoria County and Grand Falls by employment numbers are trades, transport, and equipment operators (Statistic Canada 2021). Other top occupations include sales and services, and business, finance, and administration (Statistic Canada 2021).

5.8.3 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.

5.8.3.1 Construction

Construction activities will interact with the socioeconomic environment largely through land use, and to a lesser extent through transportation and infrastructure, and employment and the economy.

Land use in the PDA, and to a lesser extend at access roads in the LAA, will be adversely affected by safety restrictions put in place during construction, which will result in short-term restrictions on access to portions of the PDA, including private properties with easements. Owners of private land will be consulted on the use of their land prior to construction and will have the opportunity to discuss their concerns through the public consultation portion of the EIA process.

The placement of transmission poles will also be perceived as an inconvenience to some landowners, especially those who have not previously had a pole on their property. While the existing and long-standing easement for the RoW will be maintained along with restrictions (e.g., no structures are allowed to be placed in the easement), and landowners will continue to have conductors across their properties, those with new poles that previously didn't have poles may consider them to be visually unappealing.

Construction activities can also lead to short-term nuisance issues like noise, vibration, and dust. This could temporarily affect employees and/or residents near the PDA. Mitigation for these nuisance effects was described previously in Section 5.6 5.6 (Atmospheric Environment VC).

Project-related effects on transportation, infrastructure and services will be short lived, and result primarily from traffic control to allow heavy equipment to access the PDA. Construction will also result in a slight increase in passenger vehicles and heavy trucks transporting workers, materials, and equipment to and

from the PDA. 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 (if required) will be limited and short term due to the small scale of the Project.

Project construction activities will temporarily benefit the local economy from purchases made by Project workers, but will have little effect on local employment. The upgraded transmission infrastructure will improve reliability for existing electric customers, and increase the potential for supporting future economic growth in the region.

5.8.3.2 Operation and Maintenance

Operation and maintenance activities are not expected to have an adverse effect on the socioeconomic environment through interactions with land use, transportation, infrastructure, and services, or employment and the economy. The vegetation management activities associated with the Project will be similar to those that have been historically conducted in the existing RoW.

5.8.4 Summary for the Socioeconomic Environment

Potentially adverse interactions between Project-related activities and the socioeconomic environment will be mitigated through communication with landowners and businesses within 500 m of the PDA, nuisance mitigation (e.g., dust and noise), and traffic control practices. Adverse effects are temporary, localized, of low magnitude, and not substantive. These interactions will be temporary during construction, with negligible interactions during operation and maintenance.

Socioeconomic benefits are expected through the provision of upgraded energy transmission to the Grand Falls community, resulting in improved reliability and increased potential to support future economic activity. Based on the predicted characterization of environmental effects and mitigation measures described, it is anticipated that Project-related activities will not result in longstanding disruption, restriction, or degradation of land use. Power infrastructure for the Grand Falls area will expand and improve, allowing for a general improvement in the local socioeconomic environment.

5.9 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

This section assesses the potential effects of the environment on the Project. Effects of the environment on the Project is not technically a VC; however, it is analyzed here for continuity in the assessment of the potential interactions between the Project and the environment.

5.9.1 Scope of Assessment

Interactions between the environment and the Project may include events associated with climate, including climate change over time, extreme weather events, natural forest fires, and seismic activity. If adverse effects associated with these events are unanticipated or unmanaged, they can result in adverse changes to Project infrastructure, schedule and costs, and potential effects of the Project on the environment. These potential effects are typically addressed with Project design, scheduling, and

operational procedures that are implemented in consideration of expected and extreme environmental conditions.

This assessment considers the potential interactions between the environment and the construction and operation and maintenance phases of the Project, with consideration of the following environmental conditions/events:

- Climate (including weather and its variables such as temperature, precipitation, wind, and extreme weather events)
- Climate change forecasts in the area of the Project
- Seismic activity
- Forest fires

5.9.2 Existing Conditions for Effects of the Environment on the Project

The following sections describe the existing conditions for climate, extreme weather events, climate change, and seismic activity.

5.9.2.1 Climate

Refer to Section 3.2.1 for a description of historical weather and climate data, and Section 3.2.1 and Section 5.6.2.3 for information on GHGs`.

5.9.2.2 Extreme Weather Events

Earthquakes, floods, hurricanes, landslides, severe storms, wildfires, and tornadoes are amongst New Brunswick's regional environmental hazards or extreme weather events (GC 2018). Earthquakes (seismic activity) are discussed under Section 5.9.2.4. Fires (natural forest fires or wildfires) are discussed under Section 5.9.2.5.

Although a handful of tornadoes have occurred in New Brunswick since 1879 (Global News 2013), their occurrence is rare (Cheng et al. 2013; Western University 2022). Therefore, tornadoes will not be considered further in this assessment.

Mild spring weather and heavy precipitation have the potential to result in rapid spring freshet flows and ice jams, which can lead to flooding along the Saint John River and its tributaries (GNB 2022b). There is potential for flooding to occur within the Little River basin (GeoNB 2022); however, the Project spans this potential flood area and does not have any infrastructure located in areas at risk of flooding.

Extreme weather, storms, and precipitation tend to be more common and severe during the winter months in New Brunswick. Winter storms can consist of high winds and mixed precipitation of snow, ice, and rain. "*Extreme Weather: Climate Change and Your Power*" (NB Power 2019) describes five extreme weather events that occurred within a five-year period (2013 to 2018) and adversely affected infrastructure, including electrical power infrastructure, in New Brunswick (Table 5.3).

Table 5.3 Five Extreme Storm Events in New Brunswick Between 2013-2018

Event	Weather Characteristics	Number of Power Outages	Impacts on the Area
Christmas Storm (2013)	Ice (10-30 mm) Freezing rain Heavy snowfall Extended cold weather	88,000	Not Available
Post-Tropical Storm Arthur (2014)	Wind (100km/h) Rainfall (120-145mm)	195,000	Road closures, infrastructure damage, washouts, and localized flooding
Ice Storm (2017)	Freezing rain Ice buildup (50-100mm)	200,000	Ice buildup on infrastructure, trees, lines, crossarms and telephone poles 600 poles failed
Flood (2018)	Rapid Melting snow Rainfall (230,000 ft^3/s)	Not Available	81 road closures
November Winter Storm (2018)	Wind (119 km/h) Rainfall (97 mm)	1,200 (105,000 customers were affected)	63 poles and 13 transformers damaged

Modified from: "*Extreme Weather: Climate Change and Your Power",* NB Power 2019.

5.9.2.3 Climate Change

Climate change is defined by the International Panel on Climate Change (IPCC 2022b) 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 climate change trends are derived from mathematical and statistical models. While such models can provide useful information for predicting climate change, their ability to predict changes has generally been most applicable to larger-scale predictions such as continental climate change with less reliability for smaller, regional scale predictions (Randall et al. 2007; Flato et al. 2013). However, increasingly reliable climate models provide improved understanding of the processes governing regional responses to climate change (Christensen et al. 2007), and the associated climate predictions can be used as a guide for Project planning and can facilitate Project design and climate adaptation.

Future climate change in New Brunswick is expected to include, but not be limited to, changes (increases) in temperature, increased precipitation in the form of more rainfall days and fewer snowfall

days, more frequent winter thaws, increased risk of ice jams and more significant flooding events, and more extreme and variable weather patterns and storms (GNB 2022b).

5.9.2.4 Seismic Activity

When rocks break apart and slip along a fault under the earth's surface (e.g., the movement of tectonic plates), seismic waves are released. The seismic waves radiate and cause vibration of the ground, known as earthquakes (NRCan 2017a). According to Natural Resources Canada, a magnitude 3 earthquake is strong enough to be felt in the immediate area, whereas an earthquake with a magnitude of 5 is the threshold for damage to infrastructure (NRCan 2017b). New Brunswick's most severe earthquake occurred in 1982 near Miramichi and had a magnitude of 5.7 on the Richter scale.

The Project takes place in the Northern Appalachians seismic zone, which includes most of New Brunswick and parts of New England. Seismic activity in this area has generally been low over the years with only three earthquakes of magnitude 3 occurring within 40 - 50 km of the Project (NRCan 2017b).

The probability of a major seismic event occurring and having an impact on Project-related activities or phases is low. Project structures will be built in accordance with industry standards to withstand minor seismic events. Therefore, seismic activity/earthquakes are not considered further in this report.

5.9.2.5 Fires

The average incidence of forest fires in New Brunswick is amongst the lowest in Canada (NFDP 2022) and is largely related to the New Brunswick climate and relative lack of buildup of combustible materials on the forest floor (NRCAN 2022). The likelihood of a major 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. Therefore, the effects of fires on the Project are not considered further in this report

5.9.3 Assessment of Potential Effects of the Environment on the Project

This section describes how the environment could interact with Project activities. The techniques and practices that will be applied to mitigate potential adverse effects of these interactions are also noted.

5.9.3.1 Construction, Operation and Maintenance

Climate and Extreme Weather

Very low temperatures could reduce the ductility of construction materials and increase their susceptibility to breaking.

Heavy rain has the potential to result in flooding and erosion. These events can lead to sedimentation in watercourses and wetlands through the release of total suspended solids in runoff from the RoW or from access roads being washed out. Extreme precipitation can exacerbate the effects of freezing or high winds on Project components, by allowing water to enter stress fractures in the insulators, resulting in a power failure (NB Power 2021).

Wet snow, freezing rain, and ice could potentially damage infrastructure and construction equipment if ice builds to a point where the structures are unable to bear the weight. Wires and conductors could be weighted down, causing a short circuit and power interruption, or the wires and conductors could break, causing a power outage (NB Power 2021).

The potential effects of extreme weather, rainfall, and winter precipitation will be considered in Project design, including the selection of materials and equipment, planning, and maintenance of the Project. Delays due to poor weather will be anticipated and can often be predicted; allowance for them will be included in the construction schedule.

NB Power adheres to engineering best practices, designs, and design standards to consistently manage the potential effects of the environment on their transmission infrastructure. NB Power will monitor for effects of the environment on the Project, and will take action to maintain, repair, and upgrade Project infrastructure as required, and will modify its operations to facilitate the continued safe operation of Project infrastructure.

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.

High winds (>90 km/h) have the potential to break trees and tree limbs, which can then fall onto transmission infrastructure and cause damage or cause temporary outages by falling onto transmission lines before falling to the ground (NB Power 2021). Strong winds also have the potential to cause damage to other Project infrastructure and/or equipment. NB Power will maintain a minimum RoW width of 20 m and remove danger trees adjacent to the RoW to avoid wind-related tree strikes.

During electrical storms, poles are susceptible to lightning strikes (NB Power 2021). When lightning strikes occur, ground or fault currents (electric currents that flow from one conductor to the ground, or from one conductor to another conductor) can occur (NWS 2022), which may damage infrastructure, equipment, or workers. Lightning strikes can also ignite fires (see Section 2.8.2 for discussion of fire as an accidental event).

Other mitigation actions to be undertaken by NB Power include:

- The Project will adhere to NB Power's EPP (NB Power 2012)
- A maintenance and safety management program will be implemented
- Contingency plans will be implemented, including emergency back-up power and dispatch of crews for emergency repairs

Climate Change Projections

The closest ECCC weather station with climate normals data is located in St. Leonard, New Brunswick (47°09'N, 67°50'W), approximately 20 km northwest of the Project location (GC 2022). The data provided for the St. Leonard weather station are considered to be representative of the Project area.

Intensity-Duration-frequency (IDF) climate change curves, that reflect trends in extreme rainfall patterns in the future, were used to create future climate change scenarios in St. Leonard, NB (UWO 2022). The climate change models were based on a revised IDF_CC Tool v6.0 dataset that incorporated 26 climate models (UWO 2022). The IDF_CC Tool v6.0 provides a number of future climate change scenarios (projections) that are based on four GHG emission scenarios, which are referred to as representative concentration pathways (RCP). The four RCPs are RCP2.6, RCP4.5, RCP6, and RCP8.5. They represent the potential range of radiative forcing (2.6 Watts per square meter (W/m²), 4.5 W/m², 6 W/m², and 8.5 W/m², respectively) that could result in GHG-related heating of the earth by the year 2100, as compared to pre-industrial times (Moss et al. 2010, Van Vuuren et al. 2011).

Table 5.4 and Table 5.5 display the total historical and projected precipitation amounts (mm as rainfall equivalents) in specific time intervals over various return periods (2 years to 100 years).

Table 5.4 Historical Precipitation Accumulation (mm), St. Leonard Station

Interval	Time (years)						
	2	5	10		25	50	100
5 min	8.17	10.74	12.36	13.84	14.30	15.68	16.99
10 min	11.50	15.56	18.09	20.39	21.10	23.21	25.21
15 min	14.08	19.66	23.19	26.46	27.48	30.53	33.46
30 min	18.24	25.73	30.80	35.74	37.32	42.25	47.22
1 h	20.54	28.77	35.57	43.35	46.10	55.60	66.73
2 h	25.93	34.58	41.42	48.97	51.59	60.42	70.42
6 h	36.38	46.90	55.32	64.69	67.96	79.03	88.61
12 h	45.74	58.08	66.23	74.05	76.53	84.15	88.61
24 h	55.23	68.01	74.62	79.85	81.31	85.31	88.61

Source: UWO 2022

Table 5.5 Projected Precipitation Accumulation (mm), St. Leonard Station, RCP4.5, 2018-2118

Interval	Time (years)						
	2	5	10	20	25	50	100
5 min	8.92	11.90	13.81	15.79	16.36	18.19	20.03
10 min	12.56	17.23	20.24	23.26	24.15	26.91	29.62
15 min	15.38	21.77	25.96	30.18	31.42	35.38	39.25
30 min	19.86	28.42	34.16	40.70	42.57	48.77	55.10
1 h	22.26	31.72	39.17	49.04	52.31	63.32	76.13
2 h	28.17	38.29	45.63	55.59	58.73	69.12	80.77
6 h	39.54	51.94	60.91	73.37	77.32	89.92	102.97
12 h	49.86	64.34	73.69	84.24	87.30	97.12	103.39
24 h	60.47	74.97	83.06	90.73	92.80	98.53	103.39
Source: UWO 2022							

As the above results indicate, an increase in precipitation amounts can be expected for all rainfall events. The projected percentage increase from the historic data to the period of 2018-2118 for precipitation events under RCP 4.5 range from 8.4% to 17.9%. There are some areas in New Brunswick, such as Fredericton, which currently have higher rates of precipitation accumulation over 24 hours (202.7 mm over a 100 year timeline) than those predicted for the Project area (103.9 mm) (UWO 2022), and the transmission infrastructure in the Fredericton area has not been adversely affected by precipitation Therefore, in consideration of the design and construction methods used, it is not anticipated that climate change related effects associated with an increase in total annual precipitation will cause adverse effects on the Project.

5.9.4 Summary for Potential Effects of the Environment on the Project

With the implementation of the mitigation and environmental protection measures described in this assessment, it is not anticipated there will be substantial adverse effects of the environment on the Project. Project construction techniques, design, best practices, scheduling, and equipment maintenance account for environmental factors such as extreme weather conditions and climate predictions. If interruption of service or power outages occur, NB Power will rely on standard contingency and response plans to repair damaged equipment and reduce interruptions of service.

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.	Freshwater Fish and Fish Habitat	Construction	Machinery will be prevented from entering watercourses.	Section 5.4.2.1
2.			The movement of sediments and woody debris will be prevented from entering watercourses through the use of silt fencing or hay bales.	Section 5.4.2.1
3.			Clearing of riparian areas adjacent to watercourses will be reduced.	Section 5.4.2.1
4.			Watercourses and riparian buffers will be clearly marked prior to accessing or operating heavy equipment in the RoW.	Section 5.4.2.1
5.			Silt fencing will be removed after revegetation has occurred.	Section 5.4.2.1
6.		All Phases	Reasonable measures will be undertaken to prevent the release of deleterious substances (e.g., fuels, lubricants, hydraulic oil) into watercourses, e.g., activities such as fueling will be planned so that deleterious substances do not enter watercourses	Section 5.4.2.1
7.			Vehicles will be maintained in good working order; hydraulic hoses and lines will be inspected	Section 5.4.2.1
8.			Vehicles will not be refueled within 30 m of a watercourse	Section 5.4.2.1
9.		All Phases	Existing bridges or temporary structures will be used when vehicles are crossing watercourses.	Section 5.4.2.1
10.			A buffer zone will be left on the banks of watercourses.	Section 5.4.2.1
11.			Brush and woody debris will be relocated to areas where it cannot enter watercourses.	Section 5.4.2.1
12.			The Project design will adhere to a maximum RoW width of 20 m and will utilize the existing 20 m-wide RoW with the exception of a small connection between L1249 and L1175.	Section 5.4.2.1

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
13.	Heritage Resources	Construction	Planned avoidance (e.g., transmission line pole and guy wire placement) for registered heritage sites and areas identified during the desktop assessment to exhibit elevated potential for archaeological resources will be implemented.	Section 5.5.3.1
14.			Should a structure be required in an area of elevated archaeological potential, further investigation though shovel testing will be initiated to determine if archaeological resources are present at this location. If they are, then the structure will be moved to an alternative location or additional mitigation such as archaeological excavation will be implemented under provincial permit, to remove the archaeological site using approved, scientific techniques	Section 5.5.3.1
15.			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 Indigenous community, as applicable.	Section 5.5.3.1
16.			To mitigate for the unplanned discovery of a potential heritage resource (including archaeological and palaeontological resources) during construction, NB Power will include a Heritage Resources Discovery Contingency Plan as per the EPP that will be followed during all phases of the Project	Section 5.5.3.1
17.	Atmospheric	Construction	Idling of vehicle engines, equipment and machinery will be avoided where possible, and transportation routes will be managed, to reduce the released of unnecessary combustion gases and GHG emissions.	Section 5.6.3.1
18.			Standard dust control and mitigation practices will be used to control dust levels during construction. These include the use of dust suppressants or water on access roads to limit dust emissions, especially during windy and dry conditions.	Section 5.6.3.1
19.			Construction is planned to be limited to daytime hours (e.g., between the hours of 7:00 am to 7:00 pm)	Section 5.6.3.1
20.			NB Power staff will monitor noise within the RoW and implement appropriate mitigation in the event that they receive noise complaints from nearby receptors.	Section 5.6.3.1

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
21.			An application for a Watercourse and Wetland Alteration Permit will be submitted to NBDELG prior to the commencement of work within 30 m of a watercourse or wetland.	Section 5.6.3.1
22.	Terrestrial Environment	Construction	Conduct vegetation clearing for construction outside of breeding bird season (mid-April to late-August).	Section 5.7.3.1
23.			Standard erosion and sedimentation control measures will be employed to minimize erosion and sedimentation in wetlands and areas adjacent to wetlands.	Section 5.7.3.1
24.			Prior to the onset of clearing activities, the populations of plant SOCC identified during the field surveys will be marked with symbolic fencing to prevent accidental damage to these plants.	Section 5.7.3.1
25.			Quarried, crushed material will be used for road building to reduce the risk of introducing or spreading exotic and/or invasive vascular plant species.	Section 5.7.3.1
26.			Wherever possible, natural regeneration will be allowed 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, a seed mix that contains native species or exotic species that are known to be non-invasive will be used.	Section 5.7.3.1
27.			Vegetation control will be conducted by mechanical means only, using hand tools where feasible, to reduce disturbance to soils and to non-target vegetation	Section 5.7.3.2
28.		Operation and Maintenance	Local Indigenous communities will be offered an opportunity to harvest traditional plants, such as black ash and butternut, prior to vegetation management activities.	Section 5.7.3.2
29.			Use full cut-off temporary lighting to reduce attraction to migrating birds. Lighting should also be reduced whenever it is safe to do so.	Section 5.7.3.1

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
30.		All Phases	NB Power remains committed to working with ECCC and NBDELG to identify a strategy that allows for the safe and efficient maintenance and operation of electrical transmission infrastructure, while also protecting migratory birds in the region.	Section 5.7.3.2
31.			Equipment arriving on site will be examined to make sure it is clean and free of soil or vegetative debris before it enters the Project RoW to begin work.	Section 5.7.3.1
32.	Socioeconomic Environment	Construction	Landowners within 500 m of the PDA will be consulted on the use of their land prior to construction and will have the opportunity to discuss their concerns through the public consultation portion of the EIA process	Section 5.8.3.1
33.			Traffic will be managed through standard procedures such as signage and flagging crews	Section 5.8.3.1
34.			All large-sized vehicles will obtain appropriate weight and size permits.	Section 5.8.3.1
35.			Moving large equipment involving road closures (if required) will be very limited and very short term due to the small scale of the Project.	Section 5.8.3.1
36.			Access restrictions will be defined and limited in size, to reduce the interactions with land and resource users.	Section 5.8.3.1
37.			Noise emitting construction activities will be limited to daytime hours (i.e., between the hours of 7:00 am and 7:00 pm)	Section 5.8.3.1
38.			Mitigation described for the atmospheric environment (Section 5.6.3.1) will be used to reduce these nuisance effects.	Section 5.8.3.1
39.	Effects of the Environment on the Project	Construction	The potential effects of extreme weather, rainfall and winter precipitation will be considered in Project design, including the selection of materials and equipment, planning and maintenance of the Project. Delays due to poor weather will be anticipated and can often be predicted; allowance for them will be included in the construction schedule.	Section 5.9.3.1

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
40.			NB Power will monitor for effects of the environment on the Project, and will take action to maintain, repair, and upgrade Project infrastructure as required, and will modify its operations to facilitate the continued safe operation of Project infrastructure	Section 5.9.3.1
41.			Project structures will be built in accordance with industry standards to withstand minor seismic events	Section 5.9.3.1
42.		All Phases	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
43.			NB Power will maintain a minimum RoW width of 20 m and remove danger trees adjacent to the RoW to avoid wind-related tree strikes.	Section 5.9.3.1
44.		Operation and Maintenance	The Project will adhere to NB Power's EPP (NB Power 2012).	Section 5.9.3.1
45.			A maintenance and safety management program will be implemented	Section 5.9.3.1
46.			Contingency plans will be implemented, including emergency back-up power and dispatch of crews for emergency repairs	Section 5.9.3.1

7.0 ABORIGINAL ENGAGEMENT

This chapter was provided by NB Power.

As an agent of the Crown, NB Power is expected to conduct all of its business in a manner consistent with upholding the honour of the Crown. As such, it meaningfully engages and consults with New Brunswick's Indigenous peoples. The New Brunswick Department of Aboriginal Affairs is kept informed of the engagement and consultation activities, and regularly attends meetings with NB Power staff.

As NB Power regularly engages and consults on multiple projects, it developed a Strategic Approach in 2013 for the First Nations Affairs Department. This strategy focuses on building long-lasting and trusted relationships between each Nation and NB Power that, in part, would support effective engagement and consultation of New Brunswick's Indigenous peoples in relation to NB Power's projects. In support of this strategy, NB Power also developed consultation, relationship, and capacity funding agreements with the Wolastoqey Nation in New Brunswick (WNNB), Mi'gmawe'l Tplu'taqnn Incorporated (MTI), and Peskotomuhkati Nation and meets with them on a regular basis to provide updates on ongoing NB Power projects including this Project. NB Power also informs Elsipogtog, through the delegated entity Kopit Lodge, of all projects and invites inquiries for further information.

7.1 OBJECTIVES

NB Power has established the following objectives to ensure meaningful consultation is carried out and to satisfy the substantive and procedural aspects of the duty to consult:

- Consult frequently with the First Nation communities that wish to be engaged through meaningful written updates and in person meetings, as requested, throughout the life of the Project.
- Record concerns raised by First Nations throughout the process and consider appropriate mitigation measures to address the concerns where possible.
- Communicate when and how mitigation measures have been applied to address comments and concerns that were raised by First Nations.
- Follow the guiding principles agreed to between each Nation, representative organization, or community and NB Power.

7.2 ABORIGINAL ENGAGEMENT PROGRAM ELEMENTS

To effectively consult with First Nations on this Project, the approach is designed to be adaptive and inclusive. The approaches described below have been and will continue to be employed through the consultation process.

7.2.1 Communication Methods

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

7.2.1.1 Letters of Notification

An official letter of notification regarding this Project was sent on May 9, 2022, to:

- Wolastoqey Chiefs, Resource Development and Consultation Coordinators (RDCC), and WNNB
- Miq'maw Chiefs and MTI
- Elsipogtog Chief and Kopit Lodge
- Peskotomuhkati Nation Chief and Nation representatives

7.2.1.2 Monthly Meeting Updates

Regularly scheduled monthly update meetings and any additional meetings necessary with WNNB, MTI, and the Peskotomuhkati Nation have been in place throughout 2022. During the meetings, project updates are provided along with project discussions. Minutes of the previous meetings are reviewed, during which time any outstanding actions items are revisited. The monthly meetings foster ongoing relationships between the First Nations communities/groups and NB Power and provide an avenue to bring forth of projects being contemplated.

7.2.1.3 Project Registration and Information Exchange

In an effort to be as inclusive, efficient, and transparent as possible, NB Power sends all Environmental Impact Assessment Documents to the First Nations consultative bodies at the same time as Environment and Local Government and Aboriginal Affairs. The document will also be available electronically on the NBDELG website:

https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html

Questions, comments, and concerns received in response to the EIA Registration will be recorded and responded to via writing or during a regularly scheduled meeting.

7.2.2 Consultation Log and Reporting

Aboriginal Engagement will be to track, synthesize, and present comments to the applicable regulatory agencies. NB Power maintains a log that is used to track issues and concerns raised during the Aboriginal Engagement Process. The log will provide Project staff with the ability to review the status of all issues, concerns, or commitments. The log will be shared with the New Brunswick Department of Aboriginal Affairs to assure the duty to consult has been fulfilled between NB Power and the First Nations.

Issues or concerns raised by, or commitments made to, Aboriginal groups will be 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 will be reviewed, and updates provided to the Project

Team. Upon completion of each outstanding item, the necessary information will be forwarded to administrative support personnel in order to identify the item as “complete”. Results of the Aboriginal engagement activities conducted will be reported to the NBDELG along with the public engagement summary report.

7.3 SUMMARY OF ABORIGINAL ENGAGEMENT PROGRAM TO-DATE

Prior to the notification letters being issued to all First Nations in New Brunswick on May 9, 2022, the WNNB, MTI, and Peskotomuhkati were provided early notice of the potential Project through monthly update meetings.

The notification letter detailed a description of the Project and nature of the environmental setting of the Project footprint. To date, there has been no inquiries or concerns raised about the construction of the Project.

7.4 FUTURE ENGAGEMENT

NB Power is committed to continuing to share information on the Project and to continue to consult with First Nations throughout the duration of the Project. Although consultation efforts with each Nation will be customized and adaptable, it is anticipated that the efforts will include:

- On-going communication through NB Power’s regularly scheduled monthly meetings with WNNB, MTI, and Peskotomuhkati, and will be established with Kopit Lodge as requested.
- Facilitating a community information event in First Nations communities when requested and feasible.
- NB Power invitations for Indigenous monitors to participate in field activities and to provide oversight during the construction activities.

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 and appropriate mitigation measures will be implemented as necessary to minimize interactions of the Project on the practice of traditional activities.

8.0 PUBLIC INVOLVEMENT

This chapter was provided by NB Power.

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 2018), and Additional Information Requirements for Linear Facilities (NBDELG 2008), uses a multi-faceted approach so that Project information reaches as many people as possible.

NB Power has modified its normally expansive approach to public involvement for this Project to reflect the relatively small scope of the Project, the limited potential for adverse environmental interactions, and the fact that the Project is situated within an existing ROW easement. For this Project, our approach includes maintaining a Project mailing list, and informing affected parties directly either through phone contact, meetings or letters to offer Project information, and opportunities for feedback.

The key elements of the Public Involvement Program are presented below in Sections 8.1 and 8.2. A summary of how comments, questions, or concerns are tracked is presented in Section 8.3. Plans for future engagement are described in Section 8.4.

Future involvement initiatives to fulfill the public involvement requirements of the New Brunswick Environmental Impact Assessment Regulation under the *Clean Environment Act* and A Guide to Environmental Impact Assessment in New Brunswick (NBDELG 2018), are summarized in Section 8.4.

8.1 OBJECTIVES

The objectives of the Public Involvement Program are as follows:

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

8.2 PUBLIC INVOLVEMENT PROGRAM ELEMENTS

The following section describes those elements as they relate to the Project.

8.2.1 Communication Methods

To foster effective stakeholder engagement in the Project, the approach is designed to be adaptive and inclusive through a variety of different communication platforms and methods. The following platforms and methods will be deployed throughout the engagement process.

Public Involvement

Direct Written Communications

- Direct written communications describing the Project and the anticipated environmental effects and mitigation have been and will continue to be provided to elected provincial and municipal officials, and regulatory agencies. Comments and questions received from elected officials and stakeholders have been, and will continue to be, recorded and responded to in a timely manner.
- NB Power informed potentially affected landowners of the Project by letter in June 2022.
- CustomerServices@nbpower.com will appear on all communications to provide a means of contacting Project personnel, and for those who do not have easy access to computers the public can inquire by telephone at 1-800-663-6272.

Community/Stakeholder Meetings

- NB Power will attend community meetings (either in-person or virtually) if requested, and will provide additional information on the Project to interested stakeholder groups at their request.

Website and Social Media

- NB Power recognizes that modern communication techniques are required to effectively reach a large demographic of the general public and has utilized its significant corporate social media profile to reach New Brunswickers. As part of the public and stakeholder engagement process, NB Power will create a dedicated website for the Project that will be updated with relevant information as the project progresses. NB Power will also utilize its social media platforms (with over 17,500 followers) to engage the public and provide updates. News releases may be issued and made available on the website and through NB Power social media channels.
- Upon Registration, public notice will be issued in the local newspapers and the general public will be encouraged to forward comments and concerns to Project personnel.
- For transparency and community awareness of the Project, NB Power will respond to media requests for information as requested.

Public Viewing of the EIA Registration Document

- The EIA Registration document will be made available on the NBDELG website (https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html).

8.2.2 Issues Tracking and Reporting

A major effort of the Public Involvement Program is to track, synthesize, and present comments to the applicable regulatory agencies. NB Power maintains a database that is used to track issues and concerns raised during the public involvement process. The database provides Project staff 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. During any meetings, outstanding items are reviewed and updates provided to the Project Team. Upon completion of each outstanding item, the necessary information is identified as "complete".

Based on the methods described above, NB Power will be able to inform and identify potential issues and concerns associated with the Project. The section below summarizes the results of the public involvement activities to-date, including key issues raised and how they were or will be addressed, as applicable.

8.3 TRACKING OF PUBLIC INVOLVEMENT PROGRAM ELEMENTS

As part of the public and stakeholder engagement process, a database will be created to track each comment, question, or concern as they are received. The database will also enable NB Power to track how each comment, question, or concern is being addressed and what commitments were made.

NB Power will continue to monitor comments or concerns received from the general public regarding the Project, including those received via phone or emails from NB power's website. To date, none have been received.

8.4 FUTURE ENGAGEMENT

NB Power remains committed to engaging the public and key stakeholders on this Project throughout its duration. Future engagement activities will continue to follow the objectives outlined above. It is anticipated that the ongoing consultation activities will involve news releases providing updates on the Project, attendance at community/stakeholder meetings (virtually where necessary), continued response to questions, comments, and concerns as they arise, and continued written communication with elected officials, regulators, and stakeholder groups.

In accordance with the EIA Guide (NBDELG 2018a), NB Power will provide a summary report documenting the engagement efforts and feedback received during the first 45 days following submission of the EIA Registration document to the NBDELG. The report will be submitted to NBDELG for review within 60 days following registration of the Project, so that the information can be considered in the course of decision-making in respect of the Project.

9.0 CLOSURE

This document titled Environmental Impact Assessment Registration Document: 69 kV Transmission Line Upgrade to 138 kV, Grand Falls, NB was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of New Brunswick Power Corporation (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material presented in Chapter 7 and Chapter 8 was provided by NB Power, and Stantec assumes no liability for errors or omissions associated with the material in these two chapters. The material in this document reflects Stantec’s professional judgment in light of the scope, schedule, and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others, including NB Power. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

10.0 REFERENCES

AASNB (Aboriginal Affairs Secretariat Province of New Brunswick). 2011. Government of New Brunswick Duty to Consult Policy.

AER (Alberta Energy Regulator). 2007. Directive 038, Noise Control, revised February 16, 2007. Available online: https://www.aer.ca/documents/directives/Directive038.pdf. Last accessed: June 7, 2022.

APLIC (Avian Power Line Interaction Committee). 2012. Reducing Avian Collisions with Power Lines: The State of the Art in 2012. Edison Electric Institute and APLIC. Washington, D.C. Available online at: http://www.aplic.org/uploads/files/11218/Reducing_Avian_Collisions_2012watermarkLR.pdf. Last accessed: September 22, 2015.

AS (Archaeological Services). 2012. Guidelines and Procedures for Conducting Professional Archaeological Impact Assessments in New Brunswick. Archaeological Services Branch, Department of Tourism, Heritage and Culture, Fredericton, NB.

Avery, M., P.F. Springer, and J.F. Cassel. 1976. The effects of a tall tower on nocturnal bird migration-a portable ceilometer study. The Auk 93(2): 281-291

Bayne, L.M., L. Habib., and S. Boutin. 2008. Impacts of chronic anthropogenic noise from energy-sector activity on abundance of songbirds in the boreal forest. Conservation Biology 22: 1186-1193.

Bevanger, K. 1998. Biological and conservation aspects of bird mortality caused by electricity power lines: a review. Biological Conservation 86: 67-76.

Blair, S.E. 2001. *The Wolastoq and its people*. Unpublished agenda paper prepared for the Maliseet Advisory Committee on Archaeology, Archaeological Services Unit, Fredericton.

Burke Museum. 2022. *Erigeron acris* var. *kamtschaticus*. Available online at: http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Erigeron%20acris%20var.%20kamtschaticus. Last accessed: June 17, 2022.

Calvert, A. M., C. A. Bishop, R. D. Elliot, E. A. Krebs, T. M. Kydd, C. S. Machtans, and G. J. Robertson. 2013. A synthesis of human-related avian mortality in Canada. Avian Conservation and Ecology 8(2): 11. Available online: https://www.ace-eco.org/vol8/iss2/art11/. Last accessed: May 31, 2022.

CCME (Canadian Council of Ministers of the Environment). 2019. Ambient Air Monitoring and Quality Assurance/Quality Control Guidelines. Available online: https://ccme.ca/en/resources/aqms#. Last accessed: May 25, 2022.

Cheng, V.Y., G.B. Arhonditsis, D.M. Sills, H. Auld, T.M.W. Shephard, W.A. Gough, and J. Klassen. 2013. Probability of Tornado Occurrence across Canada. American Meteorological Society. Journal of Climate Vol. 26.

References

Chow, M., Z. Xing, G. Benoy, H.W. Rees, F. Meng, Y. Jiang, and J.L. Daigle. 2011. Hydrology and water quality across gradients of agricultural intensity in the Little River watershed area, New Brunswick, Canada. Journal of Soil and Water Conservation. 66(1): 71-84.

Christensen, J.H., B. Hewitson, A. Busuioc, A. Chen, X. Gao, I. Held, R. Jones, R.K. Kolli, W.-T. Kwon, R. Laprise, V. Magaña Rueda, L. Mearns, C.G. Menéndez, J. Räisänen, A. Rinke, A. Sarr and P. Whetton, 2007: Regional Climate Projections. In: *Climate Change 2007:The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

Clarke, G.F. 1970. *Someone Before Us* (Second Edition). Brunswick Press, Fredericton, New Brunswick.

CRHP (Canadian Register Historic Places). 2022. Available online at: https://www.historicplaces.ca/en/results-resultats.aspx?m=2&Keyword=grand%20falls. Last accessed: June 2, 2022

DFO (Fisheries and Oceans Canada). 2022. Aquatic Species at Risk Map. Available online at: https://www.dfo-mpo.gc.ca/species-especes/sara-lep/map-carte/index-eng.html. Last accessed: May 27, 2022.

Donald, J. 2010. Grand Falls/Gorge Trails. Available at: HikingNB: http://www.hikingnb.ca/Trails/UpperSJRiver/GrandFalls.html. Last accessed: May 24, 2022.

EC (Environment Canada). 2010. Recovery Strategy for the Butternut (*Juglans cinerea*) in Canada

ECCC. 2022a. National Inventory Report 1990 – 2020: Greenhouse Gas Sources and Sinks in Canada. Available online: https://publications.gc.ca/collections/collection_2022/eccc/En81-4-1-2020-eng.pdf. Last accessed:

ECCC. 2022b. Black Ash (Fraxinus nigra): COSEWIC Assessment and Status Report 2018. Available online: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/black-ash-2018.html. Last accessed: May 26, 2022.

ECCC. 2022c. General Nesting Periods of Migratory Birds in Canada. Available at: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html. Last accessed: May 31,2022.

eFloras. 2022. Flora of North America. Available online at: http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250068309. Last accessed: June 17, 2022.

Environment Canada. 1999. Recommendations for the Design and Operation of Wood Preservation Facilities. Prepared for the National Office of Pollution Prevention, Environment Canada, and the Canadian Institute of Treated Wood by G.E. Brudermann, Frido Consulting.

References

Erickson, W. P., G. D. Johnson, M. D., Strickland, D. P. Young Jr., K. J. Sernka, and R. E. Good. 2001. Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States. National Wind Coordinating Committee, RESOLVE, Inc., Washington, D.C.

Flato, G., J. Marotzke, B. Abiodun, P. Braconnot, S.C. Chou, W. Collins, P. Cox, F. Driouech, S. Emori, V. Eyring, C. Forest, P. Gleckler, E. Guilyardi, C. Jakob, V. Kattsov, C. Reason, and M. Rummukainen. 2013. Evaluation of Climate Models. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K.

Ganong, W.F. 1899. A Monograph of Historic Sites in the Province of New Brunswick. Contributions to the History of New Brunswick No. 4, Transactions of the Royal Society of Canada Second Series – 1899-1900, Volume V, Section II. Ottawa.

GC (Government of Canada). 1991. *The Federal Policy on Wetland Conservation*. Director General, Canadian Wildlife Service, Ottawa, Ontario. Available online at: http://publications.gc.ca/site/eng/100725/publication.html. Last accessed: May 26, 2022.

GC. 2011. Species Profile. Furbish's Lousewort. Available online at: https://wildlife-species.canada.ca/species-risk-registry/species/speciesDetails_e.cfm?sid=179. Last accessed: June 1, 2022.

GC. 2018. Get Prepared; Hazards and Emergencies; Regional Hazards: New Brunswick. Available online: http://www.getprepared.gc.ca/cnt/hzd/rgnl/nb-en.aspx. Last accessed: May 24, 2022.

GC. 2019. Black Ash (Fraxinus nigra): COSEWIC assessment and status report 2018. Available online at: https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/cosewic-assessments-status-reports/black-ash-2018.html. Last accessed: June 1, 2022.

GC. 2022. 1981-2010 Canadian Climate Normals Stations. Available online at: https://climate.weather.gc.ca/climate_normals/station_select_1981_2010_e.html?searchType=stnProv&lstProvince=NB. Last accessed: May 25, 2022.

Gemtec. 2012. Slope Stability, Erosion Assessment, and Adaptation Solutions within the Town of Grand Falls, New Brunswick

GeoNB. 2022. New Brunswick Flood Hazard Maps. Available online at: https://flooding-inondations-geonb.hub.arcgis.com/apps/new-brunswick-flood-hazard-maps/explore. Last accessed: May 24, 2022.

Global News. 2013. History of tornadoes in Atlantic Canada. Published July 22, 2013. Available online: https://globalnews.ca/news/733662/history-of-tornadoes-in-atlantic-canada/ . Last accessed: June 8, 2022.

References

GNB. 2016. Territorial development. Founding of the Province of New Brunswick. Available online at: https://archives.gnb.ca/exhibits/archivalportfolio/TextViewer.aspx?culture=en-CA&myFile=Founding. Last accessed: June 2, 2022.

GNB. 2022a. EIA. Registrations and Determinations. Available online at: https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html. Last accessed: June 3, 2022.

GNB. 2022b. How is Climate Change Affecting New Brunswick? Available online: https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/climate_change/content/climate_change_affectingnb.html. Last accessed: May 25, 2022.

GNB. 2022c. Natural Resources and Energy Development. Species at Risk. Available online: https://www2.gnb.ca/content/gnb/en/departments/erd/natural_resources/content/wildlife/content/SpeciesAtRisk.html. Last accessed: May 26, 2022.

GNB. 2022d. Furbish Lousewort. Available online at: https://www2.gnb.ca/content/gnb/en/departments/erd/natural_resources/content/wildlife/content/SpeciesAtRisk/furbish_lousewort.html. Last accessed: June 17, 2022.

Google Earth Pro. 2019. Historical Imagery. Imagery dates: August 9, 2010, through May 11, 2019.

Grand Falls. 1973. By-Law No.70. A By-Law Relating to the Prevention of Excessive Noise and Nuisance in the Town of Grand Falls. Available online: https://www.grandfallsnb.com/_files/ugd/e0dd02_d756f304228145b88a78fd7ca4646710.pdf. Last Accessed: May 25, 2022.

Grand Falls. 2016. MyNewBruswick.ca. Available online: https://mynewbrunswick.ca/grand-falls. Accessed on: May 18, 2022.

Gray, M. 2003. Assessing non-point source pollution in agricultural regions of the upper St. John River basin using the slimy sculpin (*Cottus cognatus*). Ph.D. Thesis. University of New Brunswick, Canada.

Gray, M., Curry, R., Arciszewski, T., Munkittrick, K., and S. Brasfield. 2018. The biology and ecology of slimy sculpin: A recipe for effective environmental monitoring. FACETS February, 2018.

Gyles, J. 1763. Memoirs of Odd Adventures, Strange Deliverances, etc. In the Captivity of John Gyles, Esq. S. Kneeland and T. Green, Boston.

Hamilton, W.B. 1996. Place Names of Atlantic Canada. University of Toronto Press Incorporated: Toronto, ON.

HCPMRA (Health Canada Pest Management Regulatory Agency). 2011. Heavy Duty Wood Preservatives: Creosote, Pentachlorophenol, Chromated Copper Arsenate (CCA) and Ammoniacal Copper Zinc Arsenate (ACZA). Health Canada. Re-evaluation Decision RVD2011-06.

References

Health Canada. 2016. Electric and Magnetic Fields from Power Lines and Electrical Appliances. Available online: https://www.canada.ca/en/health-canada/services/home-garden-safety/electric-magnetic-fields-power-lines-electrical-appliances.html. Last accessed: May 25, 2022.

Hild, M.H., and Barr, S.M. 2020. Geology New Brunswick and Prince Edward Island. In M. H. Hild. Toronto: Boulder Books.

IPCC (International Panel on Climate Change). 2022a. Climate Change 2022: Mitigation of Climate Change. Available online: https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/. Last accessed: June 3, 2022.

IPCC. 2022b. Definition of Terms Used Within the DDC pages. Available online at: https://www.ipcc-data.org/guidelines/pages/glossary/glossary_c.html: Last accessed: May 24, 2022.

Kidd, S.D., R.A. Curry, and K.R. Munkittrick. 2011. The Saint John River: A State of the Environment Report. Canadian Rivers Institute.

Longcore, T., and C. Rich. 2004. Ecological light pollution. Frontiers in Ecology and the Environment 2: 191–198.

Miller, R. 2017. New Brunswick Museum - Palaeontology Report 17-02: Fossil Occurrences, NB Power proposed project, near the Grand Falls Generating Station. Report prepared for Stantec Consulting Ltd. February 22, 2017

Moss, R.H., J.A. Edmonds, K.A. Hibbard, M.R. Manning, S.K. Rose, D.P. van Vuuren, T.R. Carter, S. Emori, M. Kainuma, T. Kram, G.A. Meehl, J.F. Mitchell, N. Nakicenovic, K. Riahi, S.J. Smith, R.J. Stouffer, A.M. Thomson, J.P. Weyant, and T.J. Wilbanks. 2010. The next generation of scenarios for climate research and assessment. Nature 463: 747-756 (11 February 2010).

NBDELG (New Brunswick Department of Environment and Local Government). 2008. Additional Information Requirements For Linear Facilities. Available online at: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/EIA-EIE/SectorGuidelines/LinearFacilities.pdf. Last accessed: June 17, 2022.

NBDELG. 2013. Air Quality Monitoring Results 2011. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQualityMonitoringResults2011.pdf. Last accessed: May 25, 2022.

NBDELG. 2015. Air Quality Monitoring Results 2012 & 2013. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQualityMonitoringResults2013.pdf. Last accessed: May 25, 2022.

NBDELG. 2016. Air Quality Monitoring Results 2014. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQuality-QualiteDeLair/AirQualityMonitoringResults2014.pdf. Last accessed: May 25, 2022.

References

NBDELG. 2017. Air Quality Monitoring Results 2015. Available online: http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQuality-QualiteDeLair/AirQualityMonitoringResults2015.pdf. Last accessed: May 25, 2022.

NBDELG.2018a. A Guide to Environmental Impact Assessment in New Brunswick.

NBDELG. 2018b. Air Quality Monitoring Results 2018. Available online: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQuality-QualiteDeLair/air-quality-monitoring-results-2018.pdf. Last accessed: May 25, 2022.

NBDELG. 2019. Air Quality Monitoring Results 2019. Available online: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Air-Lair/AirQuality-QualiteDeLair/air-quality-monitoring-results-2019.pdf. Last accessed: May 25, 2022.

NBDELG. 2020. Wetland Guidelines. Available online at: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Wetlands-TerreHumides/WetlandGuidelines.pdf. Last accessed: June 8, 2022.

NBDELG. 2022a. Online Well Log System. Available online at: https://www.elgegl.gnb.ca/0375-0001/index.aspx. Last accessed: May 25, 2022.

NBDELG. 2022b. Wetland Guidelines. Available online: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Wetlands-TerreHumides/WetlandGuidelines.pdf. Last accessed: May 26, 2022.

NBDNRE (New Brunswick Department of Natural Resources and Energy) and NBDELG (New Brunswick Department of Environment and Local Government). 2002. New Brunswick Wetlands Conservation Policy. Available online: https://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Wetlands-TerreHumides/WetlandsTerresHumides.pdf. Last accessed: May 26, 2022.

NBJobs. 2022. Economic Regions. Available at: https://www.nbjobs.ca/stats/lfs/economicregions. Last Accessed: June 7, 2022.

NBNRED (New Brunswick Natural Resource and Energy Development). 2022. Bedrock Geology Maps 1:20,000 Scale. Available online at: https://www1.gnb.ca/0078/GeoscienceDatabase/BedrockAgg/BedrockAgg-e.asp. Last accessed: June 5, 2022.

NB Power (New Brunswick Power Corporation). 2012. Environmental Protection Plan for New Brunswick Power Corporation Transmission Facilities. Prepared by: New Brunswick Power Transmission Corporation.

NB Power. 2019. Extreme Weather: Climate Change and Your Power. Available online at: 191220-extreme-weather-report_final-en.pdf (nbpower.com). Last accessed: May 24, 2022.

References

NB Power. 2021. Outages and Weather. Available online at: https://www.nbpower.com/en/outages/preparing-for-outages/outages-and-weather. Last accessed: May 25, 2022.

NB Power. 2022. Transmission & System Operator. Available online: https://www.nbpower.com/en/about-us/divisions/transmission-system-operator/. Last accessed: March 28, 2022.

NBRHP (NB Register of Historic places). 2022. Available online at: https://www.rhp-rlp.gnb.ca/PublicSearch.aspx?blnLanguageEnglish=True. Last accessed: June 2, 2022

NERC (North American Electric Reliability Corporation). 2022. Available online: http://www.nerc.com/pa/rrm/TLR/Pages/Reliability-Coordinators.aspx. Last accessed: May 17, 2022.

Newby, P., J. Bradley, A. Spiess, B. Shuman, and P. Leduc. 2005. A Palaeoindian Response to Younger Dryas Climate Change. Quaternary Science Reviews 24:141–154.

NFDP (National Forestry Database). 2022. Forest Fires. Available online at: http://nfdp.ccfm.org/en/data/fires.php. Last accessed: June 8, 2022.

NRCan (Natural Resources Canada). 2017a. Earthquakes Canada. Frequently Asked Questions about Earthquakes. Available online: http://earthquakescanada.nrcan.gc.ca/info-gen/faq-en.php#What_is_an_earthquake. Last accessed: May 25, 2022.

NRCan. 2017b. Earthquake zones in Eastern Canada. Available online: http://www.seismescanada.rncan.gc.ca/zones/eastcan-en.php#NASZ. Last accessed: May 25, 2022.

NRCan. 2022. Fire Weather Normals. Fire Weather Index. Available online at: https://cwfis.cfs.nrcan.gc.ca/maps/fw?type=fwi. Last accessed: June 8, 2022.

NWS (National Weather Service). 2022. Understanding Lightning: Ground Current. Available online at: https://www.weather.gov/safety/lightning-science-ground-currents#:~:text=When%20lightning%20strikes%20the%20ground%20or%20an%20object,killing%20many%20farm%20animals%20on%20a%20yearly%20basis.Last accessed: May 25, 2022.

Ogden, L. 1996. Collision Course: The Hazards of Lighted Structures and Windows to Migrating Birds. Fatal Light Awareness Program (FLAP) and World Wildlife Fund Canada. Toronto, ON.

Oliver, F. 1930. *The Spell of Acadia*. L.C. Page & Company Inc., Boston.

Perley, K. 2005. Gabe. *New Brunswick Manuscripts in Archaeology no. 41*. Archaeological Services Unit, Heritage Branch, New Brunswick Culture and Sport Secretariat, Fredericton.

Perley, K. and S.E. Blair. 2003. *Wolastoqiyik Ajemseg: The People of the Beautiful River at Jemseg*. Volume 1: Important Stories and Spoken Histories. New Brunswick Manuscripts in Archaeology

References

34E. Archaeological Services, Heritage Branch, New Brunswick Culture and Sport Secretariat, Fredericton.

Petersen, J.B., and D. Sanger. 1993. An Aboriginal Ceramic Sequence for Maine and the Maritime Provinces. In Prehistoric Archaeology in The Maritime Provinces: Past and Present Research, edited by M. Deal and S. Blair, pp. 113–170. Reports in Archaeology No. 8. Council of Maritime Premiers Maritime Committee on Archaeological Cooperation, Fredericton, New Brunswick

Rampton, V.N. 1984. Generalized surficial geology map of New Brunswick. Department of Natural Resources and Energy. Minerals, Policy and Planning Division. NR-8 (scale 1:500,000).

Randall, D.A., R.A. Wood, S. Bony, R. Colman, T. Fichefet, J. Fyfe, V. Kattsov, A. Pitman, J. Shukla, J. Srinivasan, R.J. Stouffer, A. Sumi, and K.E. Taylor. 2007. Climate Models and Their Evaluation. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: https://archive.ipcc.ch/. Last accessed: May 24, 2022.

Rayburn, A. 1975. Geographical Names of New Brunswick. Toponymy Study 2, Surveys and Mapping Branch, Department of Energy, Mines and Resources, Canadian Permanent Committee on Geographical Names, Ottawa.

Rioux, S., J.-P.L. Savard, and A.A. Gerick. 2013. Avian mortalities due to transmission line collisions: a review of current estimates and field methods with an emphasis on applications to the Canadian electric network. Avian Conservation and Ecology 8(2): 7. Available online at: http://www.ace-eco.org/vol8/iss2/art7/ACE-ECO-2013-614.pdf. Last accessed: May 31, 2022.

Rutherford, D.E. 1993. The Ceramic Period in New Brunswick. In Prehistoric Archaeology in The Maritime Provinces: Past and Present Research, edited by M. Deal and S. Blair, pp. 101–111. Reports in Archaeology No. 8. Council of Maritime Premiers Maritime Committee on Archaeological Cooperation, Fredericton, New Brunswick.

Seaman, A.A. 2007. Late Pleistocene History of New Brunswick, Canada. Available at: https://www.sciencedirect.com/science/article/pii/S157108660480195. Last accessed: May 25, 2022

Shaw, J., D. Piper, G. Fader, E. King, B. Todd, T. Bell, B. Batterson, and D. Liverman. 2006. A Conceptual Model of the Deglaciation of Atlantic Canada. Quaternary Science Reviews 25:2059–2081.

SNB (Service New Brunswick). 2022. GeoNB. Available at: http://www.snb.ca/geonb1/e/index-E.asp. Last accessed: May 26, 2022.

References

Stantec. 2016. *Mactaquac Project: Final Comparative Environmental Review (CER) Report*, Chapter 16.0 – Current Use of Land and Resources for Traditional Purposes by Aboriginal Persons. Report prepared for NB Power, August 2016.

Statistics Canada. 2021. census profile, 2016 census. Victoria County [Census division], New Brunswick and New Brunswick [Province]. Available online at: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CD&Code1=1312&Geo2=PR&Code2=13&SearchText=victoria&SearchType=Contains&SearchPR=01&B1=All&TABID=1&type=0. Last accessed: June 7, 2022.

Suttie, B., M. Nicholas, J. Jeandron, G. Aylesworth, A. Brzezicki, and A. Hamilton. 2013. Recent Research on Four Sites Spanning 13,000 years from Southwestern New Brunswick, Canada. Canadian Archaeological Association Newsletter Vol. 31 Issue 1.

Town of Grand Falls. 2015. *History*. Online resource: http://www.grandfallsnb.com/history. Last accessed June 2, 3022.

UWO (University of Western Ontario). 2022. IDF_CC Tool v6. Available online: https://www.idf-cc-uwo.ca/idfstation. Last accessed: May 24, 2022.

Van Vuuren, D., J. Edmonds, M. Kainuma, K. Riahi, A. Thomson, K. Hibbard, and G. Hurtt. 2011. The representative concentration pathways: an overview. Climatic Change (2011) 109: 5.

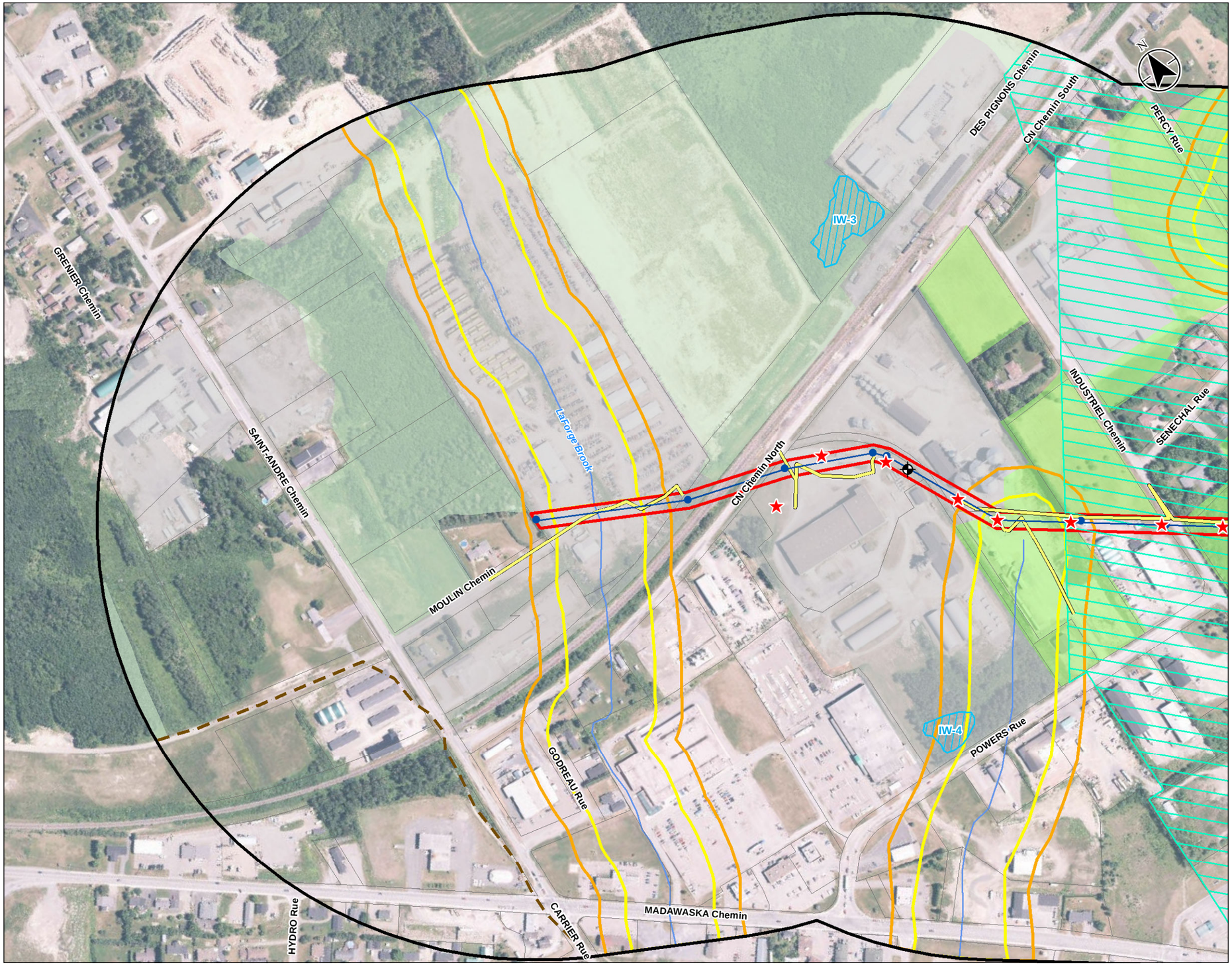
Western University. 2022. Northern Tornadoes Project. Available online at: https://ntpopendata-westernu.opendata.arcgis.com/. Last accessed: May 24, 2022.

Wiese, F.K, W.A. Montevecchi, G.K. Davoren, F. Huettmann, A.W. Diamond, and J. Linke. 2001. Seabirds at risk around offshore oil platforms in the North-west Atlantic. Marine Pollution Bulletin 42(12): 1285-1290.

WTRFLL (Waterfall Analytics). 2021. Population Changes in New Brunswick – 2016 to 2021. Available online at: https://wtrfll.ca/population-changes-in-new-brunswick-2016-to-2021/. Last accessed: June 5, 2022.

APPENDIX A

Mapbook of Environmental Attributes for the Project



Stantec

Legend

- Proposed New Transmission Line Pole
- Existing Transmission Line Pole
- Monitoring Well
- Existing L1249 Transmission Line
- Preliminary Access Route
- New Brunswick Federation of Snowmobile Club Trails
- Watercourse
- Project Development Area
- Local Assessment Area (LAA)
- LiDAR Interpreted Wetlands
- Wooded Area
- Property Lines

Protected Wellfields

- Zone C

Archaeological Services Data

- High Potential Buffer
- Medium Potential Buffer

Primary Land Use

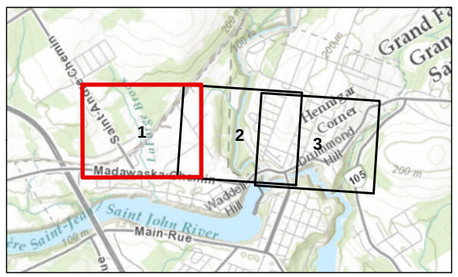
- Land primarily used for growing agricultural products or non-timber tree products as well as fields and pasture land
- Land primarily used for industrial purposes including their processing facilities

0 80 160 metres

1:4,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 20N
2. Site features are based on field observations and should be considered approximate.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.



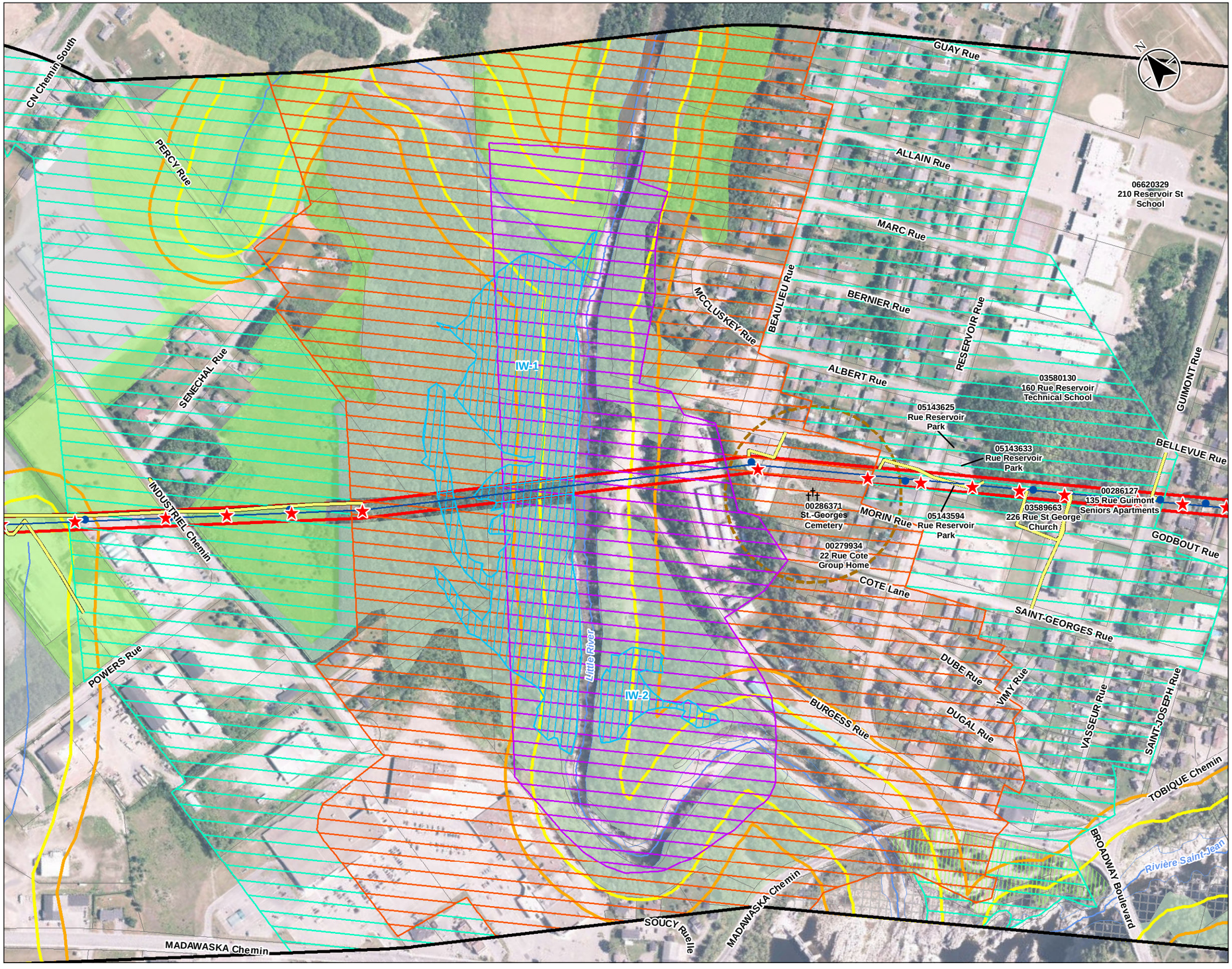
Project Location
Grand Falls, New Brunswick

121416999
Prepared by IP on 6/3/2022

Client/Project
ENVIRONMENTAL ATTRIBUTES ANALYSIS
GRAND FALLS, NEW BRUNSWICK

Figure No.
1 of 3

Title
Environmental Features within 500 m of Transmission Line L1249 Upgrade Project Development Area



Stantec

Legend

- Proposed New Transmission Line Pole
- Existing Transmission Line Pole
- Cemetery
- Existing L1249 Transmission Line
- Preliminary Access Route
- Watercourse
- Project Development Area
- Waterbody
- Local Assessment Area (LAA)
- LiDAR Interpreted Wetlands
- Wooded Area
- Property Lines

Protected Wellfields

- Zone A
- Zone B
- Zone C

Archaeological Services Data

- Cemetery Buffer
- High Potential Buffer
- Medium Potential Buffer

Primary Land Use

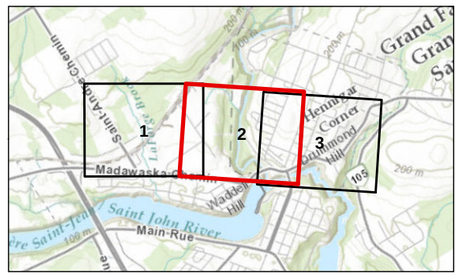
- Land primarily used for growing agricultural products or non-timber tree products as well as fields and pasture land
- Land primarily used for industrial purposes including their processing facilities
- Land primarily used for sport, recreational, cultural and/or entertainment activities
- Land that is incapable of growing trees and uninfluenced by human activity

0 80 160 metres

1:4,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 20N
2. Site features are based on field observations and should be considered approximate.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.



Project Location
Grand Falls, New Brunswick

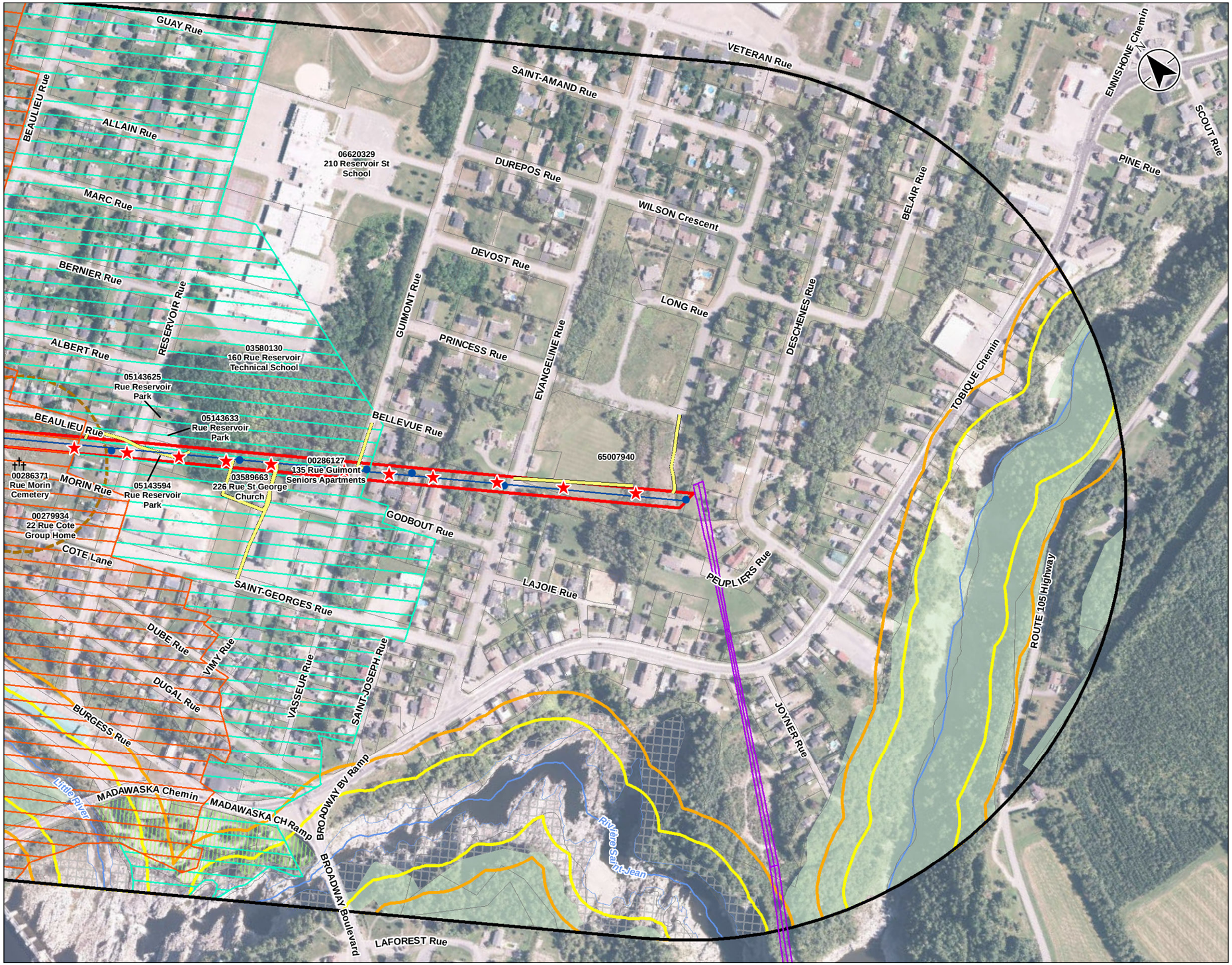
121416999

Prepared by IP on 6/3/2022

Client/Project
ENVIRONMENTAL ATTRIBUTES ANALYSIS
GRAND FALLS, NEW BRUNSWICK

Figure No.
2 of 3

Title
Environmental Features within 500 m of Transmission Line L1249 Upgrade Project Development Area



Stantec

Legend

- Proposed New Transmission Line Pole
- Existing Transmission Line Pole
- Cemetery
- Existing L1249 Transmission Line
- Existing Line 1175
- Preliminary Access Route
- Watercourse
- Project Development Area
- Waterbody
- Local Assessment Area (LAA)
- Wooded Area
- Property Lines

Protected Wellfields

- Zone B
- Zone C

Archaeological Services Data

- Cemetery Buffer
- High Potential Buffer
- Medium Potential Buffer

Primary Land Use

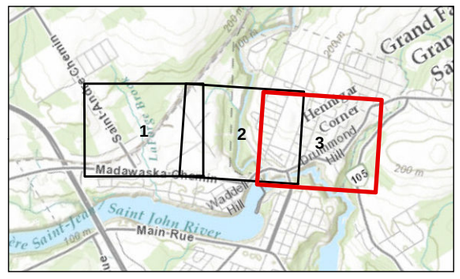
- Land primarily used for sport, recreational, cultural and/or entertainment activities
- Land that is incapable of growing trees and uninfluenced by human activity

0 80 160 metres

1:4,500 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 20N
2. Site features are based on field observations and should be considered approximate.
3. This figure is to be viewed in the context of the accompanying report and is subject to the limitations specified in that report.



Project Location
Grand Falls, New Brunswick

121416999
Prepared by IP on 6/3/2022

Client/Project
ENVIRONMENTAL ATTRIBUTES ANALYSIS
GRAND FALLS, NEW BRUNSWICK

Figure No.
3 of 3

Title
Environmental Features within 500 m of Transmission Line L1249 Upgrade Project Development Area

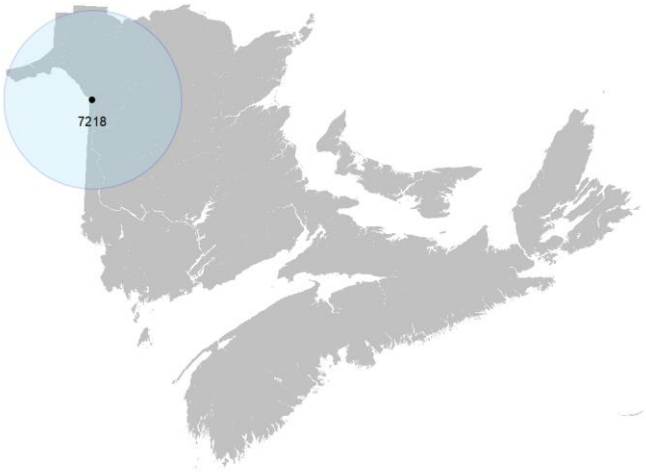
APPENDIX B

AC CDC Data Report 7218: Grand Falls, NB

DATA REPORT 7218: Grand Falls, NB

Prepared 26 March 2022
by J. Churchill, Data Manager

CONTENTS OF REPORT



Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (AC CDC; www.accdc.com) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The AC CDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the AC CDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees.

Upon request and for a fee, the AC CDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the AC CDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
GrFallsNB_7218ob.xls	Rare or legally-protected Flora and Fauna in your study area
GrFallsNB_7218ob100km.xls	A list of Rare and legally protected Flora and Fauna within 100 km of your study area
GrFallsNB_7218msa.xls	Managed and Biologically Significant Areas in your study area

1.2 RESTRICTIONS

The AC CDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting AC CDC data, recipients assent to the following limits of use:

a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
c) The AC CDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
d) AC CDC data responses are restricted to the data in our Data System at the time of the data request.
e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
f) AC CDC data responses are not to be construed as exhaustive inventories of taxa in an area.
g) The absence of a taxon cannot be inferred by its absence in an AC CDC data response.

1.3 ADDITIONAL INFORMATION

The accompanying Data Dictionary provides metadata for the data provided.

Please direct any additional questions about AC CDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries
Sean Blaney
Senior Scientist / Executive Director
(506) 364-2658
sean.blaney@accdc.ca

Animals (Fauna)
John Klymko
Zoologist
(506) 364-2660
john.klymko@accdc.ca

Data Management, GIS
James Churchill
Conservation Data Analyst / Field Biologist
(902) 679-6146
james.churchill@accdc.ca

Billing
Jean Breau
Financial Manager / Executive Assistant
(506) 364-2657
jean.breau@accdc.ca

Questions on the biology of Federal Species at Risk can be directed to AC CDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Hubert Askanas, Energy and Resource Development: (506) 453-5873.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Donna Hurlburt, NS DLF: (902) 679-6886. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NS DLF Regional Biologist:

Western: Emma Vost
(902) 670-8187
Emma.Vost@novascotia.ca

Western: Sarah Spencer
(902) 541-0081
Sarah.Spencer@novascotia.ca

Central: Shavonne Meyer
(902) 893-0816
Shavonne.Meyer@novascotia.ca

Central: Kimberly George
(902) 890-1046
Kimberly.George@novascotia.ca

Eastern: Harrison Moore
(902) 497-4119
Harrison.Moore@novascotia.ca

Eastern: Maureen Cameron-MacMillan
(902) 295-2554
Maureen.Cameron-MacMillan@novascotia.ca

Eastern: Elizabeth Walsh
(902) 563-3370
Elizabeth.Walsh@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

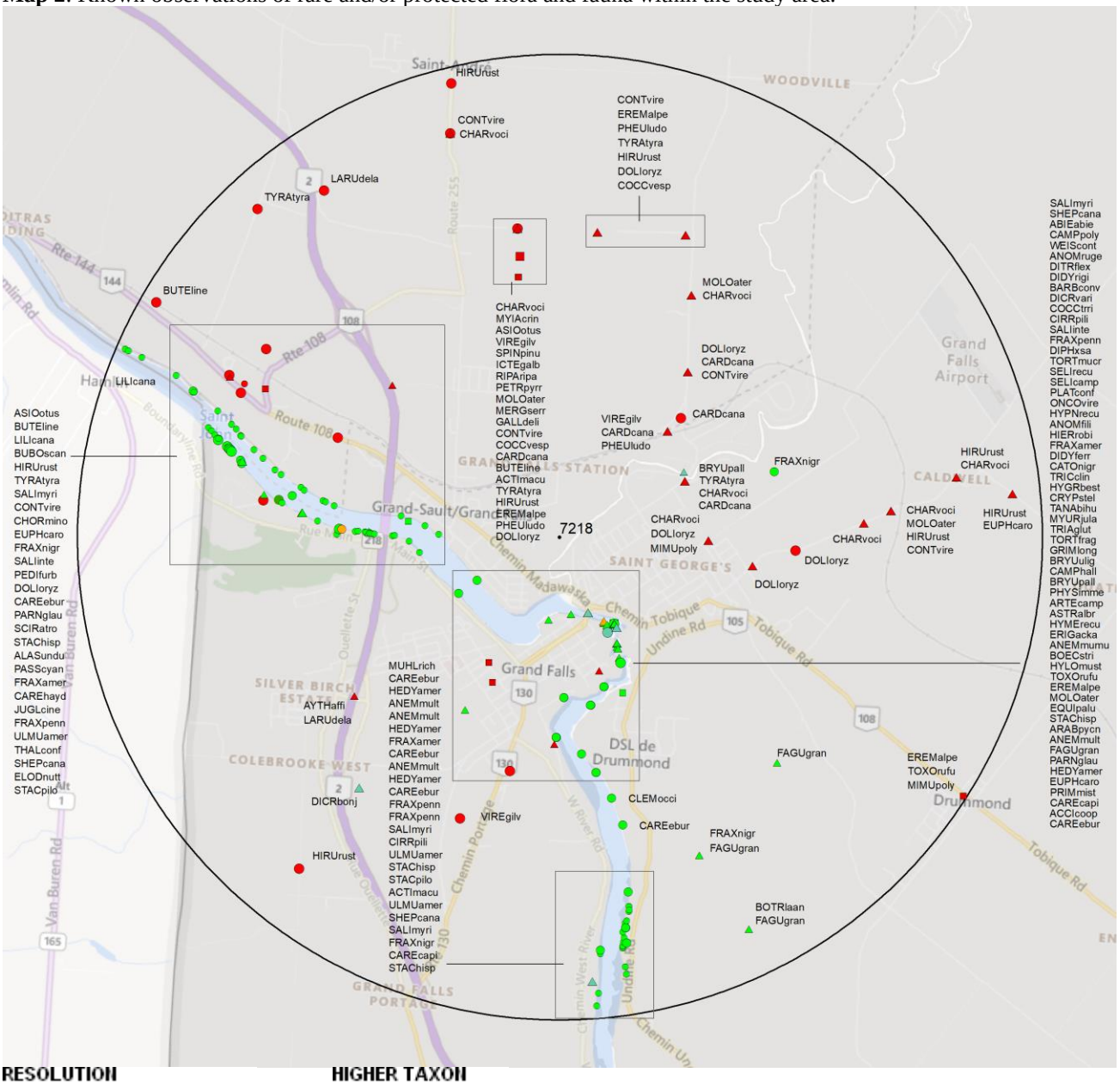
2.1 FLORA

The study area contains 184 records of 39 vascular, 64 records of 29 nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 131 records of 31 vertebrate, 4 records of 2 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



3.0 SPECIAL AREAS

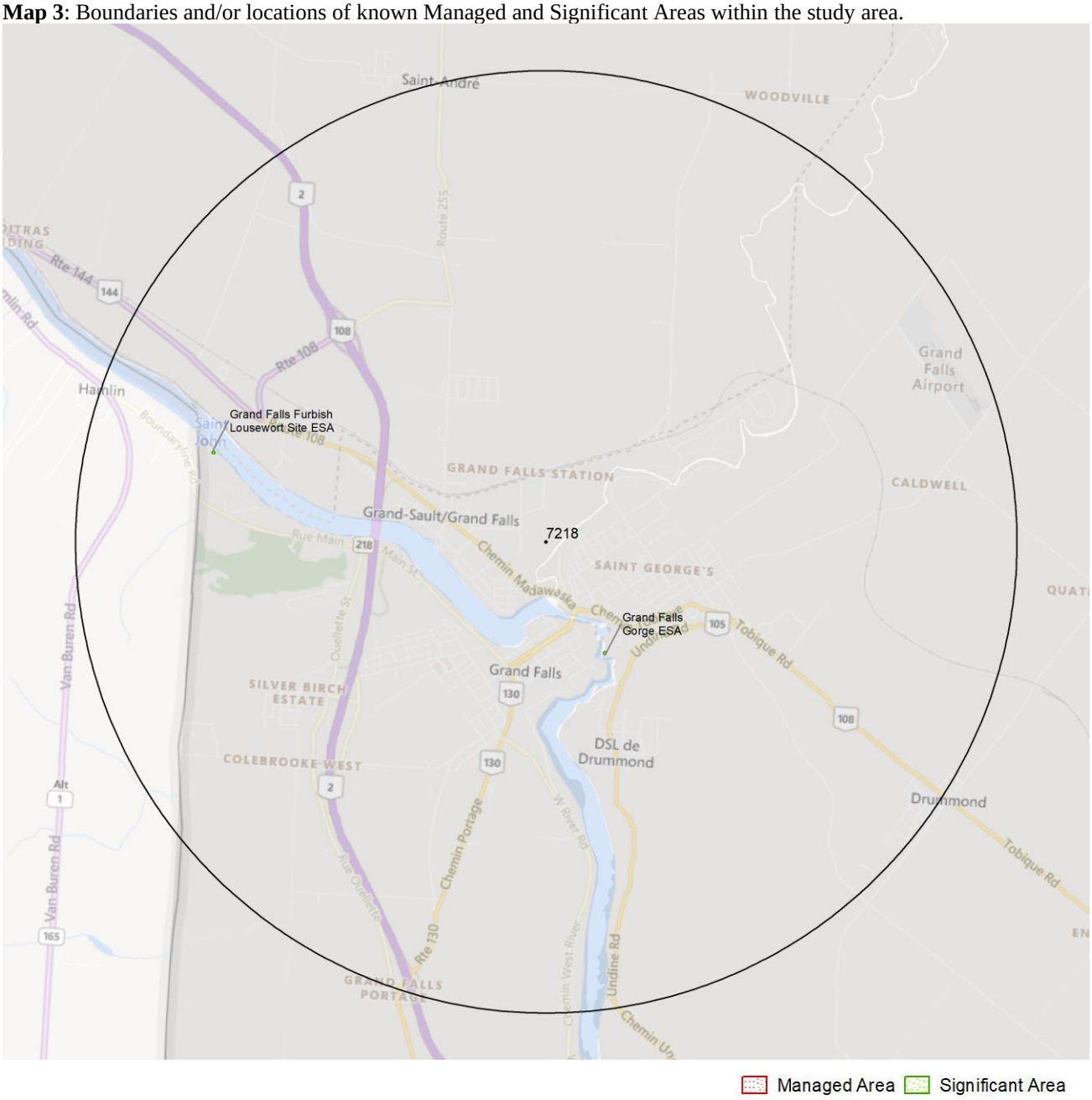
3.1 MANAGED AREAS

The GIS scan identified no managed areas in the vicinity of the study area (Map 3).

3.2 SIGNIFICANT AREAS

The GIS scan identified 2 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *msa.xls).

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
N	*Campylophyllum halleri*	Haller's Fine Wet Moss				S1	2	1.1 ± 1.0
N	*Hypnum recurvatum*	Recurved Plait Moss				S1	3	1.1 ± 1.0
N	*Ptychostomum pallens*	Pale Bryum				S1?	2	1.1 ± 1.0
N	*Catoscopium nigritum*	Black Golf Club Moss				S1?	3	1.1 ± 1.0
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	1	3.3 ± 1.0
N	*Grimmia longirostris*	a Moss				S1S2	1	1.1 ± 1.0
N	*Oncophorus virens*	Green Spur Moss				S1S2	2	1.1 ± 1.0
N	*Platydictya confervoides*	a Moss				S1S2	2	1.1 ± 1.0
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	2	1.1 ± 1.0
N	*Didymodon ferrugineus*	Rusty Beard Moss				S2	1	1.1 ± 1.0
N	*Ditrichum flexicaule*	Flexible Cow-hair Moss				S2	6	0.8 ± 1.0
N	*Hygrohypnum bestii*	Best's Brook Moss				S2	1	1.1 ± 10.0
N	*Physcomitrium immersum*	a Moss				S2	1	1.1 ± 1.0
N	*Seligeria recurvata*	a Moss				S2	5	1.1 ± 1.0
N	*Tortula mucronifolia*	Mucronate Screw Moss				S2	3	1.1 ± 1.0
N	*Anomobryum julaceum*	Slender Silver Moss				S2	1	1.1 ± 1.0
N	*Ptychostomum pallescens*	Tall Clustered Bryum				S2?	1	1.1 ± 1.0
N	*Ptychostomum cernuum*	Swamp Bryum				S2S3	2	1.1 ± 1.0
N	*Drepanocladus polygamus*	Polygamous Hook Moss				S2S3	2	0.8 ± 1.0
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	6	0.8 ± 1.0
N	*Seligeria campylopoda*	a Moss				S2S3	2	1.1 ± 1.0
N	*Tortella fragilis*	Fragile Twisted Moss				S3	1	1.1 ± 1.0
N	*Hymenostylium recurvirostrum*	Curve-beak Beardless Moss				S3	1	1.1 ± 1.0
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S3S4	1	0.8 ± 1.0
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	2	0.8 ± 1.0
N	*Dicranella varia*	a Moss				S3S4	4	0.8 ± 1.0
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	1	1.1 ± 1.0
N	*Weissia controversa*	Green-Cushioned Weissia				S3S4	1	0.8 ± 1.0
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	4	0.8 ± 1.0
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	2	2.3 ± 0.0
P	*Pedicularis furbishiae*	Furbish Lousewort	Endangered	Endangered	Endangered	S1	21	2.0 ± 1.0
P	*Fraxinus nigra*	Black Ash	Threatened			S3S4	6	2.3 ± 0.0
P	*Erigeron acris var. kamtschaticus*	Kamtchatka Fleabane				S1	1	1.3 ± 0.0
P	*Hieracium robinsonii*	Robinson's Hawkweed				S2	1	1.1 ± 1.0
P	*Scirpus atrovirens*	Dark-green Bulrush				S2S3	9	2.5 ± 0.0
P	*Artemisia campestris*	Field Wormwood				S3	3	0.8 ± 0.0
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	1	0.8 ± 0.0
P	*Boechera stricta*	Drummond's Rockcress				S3	1	1.3 ± 0.0
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S3	4	1.1 ± 0.0
P	*Shepherdia canadensis*	Soapberry				S3	8	1.0 ± 0.0
P	*Astragalus alpinus var. brunetianus*	Alpine Milk-Vetch				S3	6	1.0 ± 1.0
P	*Fraxinus pennsylvanica*	Red Ash				S3	5	1.1 ± 1.0
P	*Primula mistassinica*	Mistassini Primrose				S3	6	1.0 ± 0.0
P	*Anemone multifida*	Cut-leaved Anemone				S3	8	1.3 ± 0.0
P	*Anemone multifida var. multifida*	Early Anemone				S3	3	1.3 ± 0.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
P	*Clematis occidentalis*	Purple Clematis				S3	1	2.8 ± 0.0
P	*Salix myricoides*	Bayberry Willow				S3	6	1.2 ± 0.0
P	*Salix interior*	Sandbar Willow				S3	4	1.1 ± 0.0
P	*Elodea nuttallii*	Nuttall's Waterweed				S3	2	2.0 ± 0.0
P	*Muhlenbergia richardsonis*	Mat Muhly				S3	1	3.7 ± 0.0
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	2	1.1 ± 1.0
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	1	4.5 ± 0.0
P	*Hedysarum americanum*	Alpine Hedysarum				S3S4	5	2.1 ± 0.0
P	*Fagus grandifolia*	American Beech				S3S4	5	1.1 ± 1.0
P	*Stachys hispida*	Smooth Hedge-Nettle				S3S4	7	1.3 ± 0.0
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	4	1.5 ± 0.0
P	*Fraxinus americana*	White Ash				S3S4	5	1.1 ± 1.0
P	*Thalictrum confine*	Northern Meadow-rue				S3S4	3	2.0 ± 0.0
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3S4	8	1.1 ± 0.0
P	*Ulmus americana*	White Elm				S3S4	4	1.7 ± 0.0
P	*Carex capillaris*	Hairlike Sedge				S3S4	5	1.0 ± 0.0
P	*Carex eburnea*	Bristle-leaved Sedge				S3S4	14	1.1 ± 0.0
P	*Carex haydenii*	Hayden's Sedge				S3S4	2	1.3 ± 0.0
P	*Trichophorum clintonii*	Clinton's Clubrush				S3S4	1	1.0 ± 0.0
P	*Lilium canadense*	Canada Lily				S3S4	6	1.4 ± 0.0
P	*Triantha glutinosa*	Sticky False-Asphodel				S3S4	10	0.9 ± 0.0
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3S4	2	1.1 ± 0.0
P	*Equisetum palustre*	Marsh Horsetail				S3S4	1	1.7 ± 0.0

4.2 FAUNA

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	1	1.5 ± 7.0
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	1	2.7 ± 7.0
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B	20	1.5 ± 1.0
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	16	2.7 ± 7.0
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S2S3B,S3M	3	2.1 ± 0.0
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	8	2.2 ± 1.0
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	4	2.7 ± 7.0
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	1	3.6 ± 0.0
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	6	1.4 ± 1.0
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	1	2.3 ± 0.0
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	1	2.5 ± 0.0
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S1S2B	4	2.7 ± 7.0
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	1	2.7 ± 0.0
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	6	1.7 ± 7.0
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	1	2.7 ± 7.0
A	*Mimus polyglottos*	Northern Mockingbird				S2B	2	1.5 ± 1.0
A	*Asio otus*	Long-eared Owl				S2S3	2	2.7 ± 7.0
A	*Toxostoma rufum*	Brown Thrasher				S2S3B	2	1.5 ± 7.0
A	*Icterus galbula*	Baltimore Oriole				S2S3B	2	2.7 ± 7.0
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	2	2.7 ± 0.0
A	*Spinus pinus*	Pine Siskin				S3	1	2.7 ± 7.0
A	*Charadrius vociferus*	Killdeer				S3B	15	1.4 ± 1.0
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	2	2.7 ± 7.0
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	6	1.6 ± 1.0
A	*Passerina cyanea*	Indigo Bunting				S3B	1	3.1 ± 0.0
A	*Molothrus ater*	Brown-headed Cowbird				S3B	5	1.4 ± 0.0

	Scientific *Name*	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	1	2.7 ± 7.0
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	8	1.4 ± 1.0
A	*Vireo gilvus*	Warbling Vireo				S3S4B	4	1.6 ± 1.0
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	3	2.7 ± 7.0
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	1	2.7 ± 7.0
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	1	1.0 ± 1.0
I	*Alasmidonta undulata*	Triangle Floater				S3	3	2.3 ± 0.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species "location sensitive". Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with "YES".

New Brunswick

Scientific *Name*	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
Chrysemys picta picta	Eastern Painted Turtle	Special Concern		No
Chelydra serpentina	Snapping Turtle	Special Concern	Special Concern	No
Glyptemys insculpta	Wood Turtle	Threatened	Threatened	No
Haliaeetus leucocephalus	**Bald Eagle**		**Endangered**	**YES**
Falco peregrinus pop. 1	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Endangered	No
Cicindela marginipennis	Cobblestone Tiger Beetle	Endangered	Endangered	No
Coenonympha nipisiquit	Maritime Ringlet	Endangered	Endangered	No
Bat hibernaculum or bat species occurrence		[Endangered][1]	[Endangered][1]	No

1 *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NB Species at Risk Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
51	Pardieck, K.L., Ziolkowski Jr., D.J., Lutmerding, M., Aponte, V.I., and Hudson, M-A.R. 2020. North American Breeding Bird Survey Dataset 1966 - 2019: U.S. Geological Survey data release, https://doi.org/10.5066/P9J6QUF6
42	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
38	Blaney, C.S.; Spicer, C.D.; Popma, T.M.; Hanel, C. 2002. Fieldwork 2002. Atlantic Canada Conservation Data Centre. Sackville NB, 2252 recs.
32	Belland, R.J. Maritimes moss records from various herbarium databases. 2014.
31	Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
29	Mazerolle, D.M. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 13515 recs.
24	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
17	Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
13	Mazerolle, D.M. 2020. Atlantic Canada Conservation Data Centre botanical fieldwork 2019. Atlantic Canada Conservation Data Centre.
13	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs. https://doi.org/10.1037/arc0000014.
11	Bishop, G. 2002. A floristic survey of known & potential sites of Furbish's lousewort. , 18 recs.
11	Chapman, C.J. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 11171 recs.
9	Benedict, B. Connell Herbarium Specimens (Data) . University New Brunswick, Fredericton. 2003.
9	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
9	Chapman, C.J. 2019. Atlantic Canada Conservation Data Centre 2019 botanical fieldwork. Atlantic Canada Conservation Data Centre, 11729 recs.
8	Clayden, S.R. 2007. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, download Mar. 2007, 6914 recs.
8	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
6	MacDougall, A.; Bishop, G.; et al. 1998. 1997 Appalachian Hardwood Field Data. Nature Trust of New Brunswick, 4473 recs.

# recs	CITATION
5	Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
4	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
4	Goltz, J.P. 2012. Field Notes, 1989-2005. , 1091 recs.
3	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
2	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
2	Sollows, M.C,. 2009. NBM Science Collections databases: molluscs. New Brunswick Museum, Saint John NB, download Jan. 2009, 6951 recs (2957 in Atlantic Canada).
1	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
1	Mills, E. Connell Herbarium Specimens, 1957-2009. University New Brunswick, Fredericton. 2012.
1	Sabine, D.L. 2005. 2001 Freshwater Mussel Surveys. New Brunswick Dept of Natural Resources & Energy, 590 recs.
1	Sabine, M. 2016. Black Ash records from the NB DNR Forest Development Survey. New Brunswick Department of Natural Resources.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 13362 records of 108 vertebrate and 305 records of 30 invertebrate fauna; 11600 records of 270 vascular, 502 records of 153 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs (including “location-sensitive” species). All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Myotis lucifugus*	Little Brown Myotis	Endangered	Endangered	Endangered	S1	4	72.2 ± 1.0	NB
A	*Myotis septentrionalis*	Northern Myotis	Endangered	Endangered	Endangered	S1	2	41.6 ± 1.0	NB
A	*Salmo salar pop. 1*	Atlantic Salmon - Inner Bay of Fundy population	Endangered	Endangered	Endangered	S2	427	74.6 ± 50.0	NB
A	*Icteria virens*	Yellow-Breasted Chat	Endangered	Endangered		SNA	1	88.0 ± 7.0	NB
A	*Salmo salar pop. 7*	Atlantic Salmon - Outer Bay of Fundy population	Endangered		Endangered	SNR	2	33.0 ± 0.0	NB
A	*Rangifer tarandus pop. 2*	Caribou - Atlantic-Gasp ├⌐sie population	Endangered	Endangered	Extirpated	SX	2	31.4 ± 1.0	NB
A	*Emydoidea blandingii*	Blanding's Turtle	Endangered	Endangered			1	74.1 ± 1.0	NB
A	*Sturnella magna*	Eastern Meadowlark	Threatened	Threatened	Threatened	S1B	22	14.6 ± 7.0	NB
A	*Asio flammeus*	Short-eared Owl	Threatened	Special Concern	Special Concern	S1S2B	14	21.7 ± 0.0	NB
A	*Ixobrychus exilis*	Least Bittern	Threatened	Threatened	Threatened	S1S2B	5	30.7 ± 7.0	NB
A	*Hylocichla mustelina*	Wood Thrush	Threatened	Threatened	Threatened	S1S2B	166	1.5 ± 7.0	NB
A	*Antrostomus vociferus*	Eastern Whip-Poor-Will	Threatened	Threatened	Threatened	S2B	9	43.6 ± 7.0	NB
A	*Catharus bicknelli*	Bicknell's Thrush	Threatened	Threatened	Threatened	S2B	750	49.3 ± 0.0	NB
A	*Riparia riparia*	Bank Swallow	Threatened	Threatened		S2B	238	2.7 ± 7.0	NB
A	*Glyptemys insculpta*	Wood Turtle	Threatened	Threatened	Threatened	S2S3	56	25.7 ± 0.0	NB
A	*Chaetura pelagica*	Chimney Swift	Threatened	Threatened	Threatened	S2S3B,S2M	220	9.9 ± 0.0	NB
A	*Dolichonyx oryzivorus*	Bobolink	Threatened	Threatened	Threatened	S3B	352	1.5 ± 1.0	NB
A	*Tringa flavipes*	Lesser Yellowlegs	Threatened			S3M	15	18.5 ± 0.0	NB
A	*Anguilla rostrata*	American Eel	Threatened		Threatened	S4N	5	48.1 ± 0.0	NB
A	*Hirundo rustica*	Barn Swallow	Special Concern	Threatened	Threatened	S2B	537	2.7 ± 7.0	NB
A	*Salmo salar pop. 12*	Atlantic Salmon - Gaspe - Southern Gulf of St. Lawrence population	Special Concern		Special Concern	S2S3	777	65.4 ± 0.0	NB
A	*Euphagus carolinus*	Rusty Blackbird	Special Concern	Special Concern	Special Concern	S2S3B,S3M	254	2.1 ± 0.0	NB
A	*Bucephala islandica*	Barrow's Goldeneye	Special Concern	Special Concern	Special Concern	S2S3N,S3M	2	54.1 ± 5.0	NB
A	*Chelydra serpentina*	Snapping Turtle	Special Concern	Special Concern	Special Concern	S3	2	77.3 ± 0.0	NB
A	*Contopus virens*	Eastern Wood-Pewee	Special Concern	Special Concern	Special Concern	S3B	430	2.2 ± 1.0	NB
A	*Contopus cooperi*	Olive-sided Flycatcher	Special Concern	Threatened	Threatened	S3B	810	7.4 ± 7.0	NB
A	*Coccothraustes vespertinus*	Evening Grosbeak	Special Concern	Special Concern		S3B,S3S4N,SUM	337	2.7 ± 7.0	NB
A	*Chordeiles minor*	Common Nighthawk	Special Concern	Threatened	Threatened	S3B,S4M	260	3.6 ± 0.0	NB
A	*Phalaropus lobatus*	Red-necked Phalarope	Special Concern	Special Concern		S3M	2	18.5 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Podiceps auritus*	Horned Grebe	Special Concern	Special Concern	Special Concern	S3N	1	69.3 ± 2.0	NB
A	*Cardellina canadensis*	Canada Warbler	Special Concern	Threatened	Threatened	S3S4B	903	1.4 ± 1.0	NB
A	*Fulica americana*	American Coot	Not At Risk			S1B	2	71.0 ± 0.0	NB
A	*Bubo scandiacus*	Snowy Owl	Not At Risk			S1N,S2S3M	5	2.3 ± 0.0	NB
A	*Accipiter cooperii*	Cooper's Hawk	Not At Risk			S1S2B	13	2.5 ± 0.0	NB
A	*Buteo lineatus*	Red-shouldered Hawk	Not At Risk			S1S2B	16	2.7 ± 7.0	NB
A	*Aegolius funereus*	Boreal Owl	Not At Risk			S1S2B,SUM	2	85.9 ± 7.0	NB
A	*Sorex dispar*	Long-tailed Shrew	Not At Risk			S2	25	51.0 ± 1.0	NB
A	*Chlidonias niger*	Black Tern	Not At Risk			S2B	3	64.6 ± 0.0	NB
A	*Podiceps grisegena*	Red-necked Grebe	Not At Risk			S2N,S3M	1	69.3 ± 0.0	NB
A	*Sterna hirundo*	Common Tern	Not At Risk			S3B,SUM	47	26.1 ± 0.0	NB
A	*Haliaeetus leucocephalus*	Bald Eagle	Not At Risk		Endangered	S4	216	2.7 ± 7.0	NB
A	*Lynx canadensis*	Canada Lynx	Not At Risk		Endangered	S4	128	17.3 ± 0.0	NB
A	*Puma concolor pop. 1*	Cougar - Eastern population	Data Deficient		Endangered	SU	20	37.0 ± 1.0	NB
A	*Thryothorus ludovicianus*	Carolina Wren				S1	2	52.2 ± 7.0	NB
A	*Salvelinus alpinus*	Arctic Char				S1	7	98.0 ± 1.0	NB
A	*Tringa melanoleuca*	Greater Yellowlegs				S1?B,S4S5M	28	18.5 ± 0.0	NB
A	*Gallinula galeata*	Common Gallinule				S1B	1	90.8 ± 0.0	NB
A	*Grus canadensis*	Sandhill Crane				S1B	2	64.5 ± 7.0	NB
A	*Progne subis*	Purple Martin				S1B	63	27.4 ± 7.0	NB
A	*Oxyura jamaicensis*	Ruddy Duck				S1B,S2S3M	5	16.5 ± 7.0	NB
A	*Aythya affinis*	Lesser Scaup				S1B,S4M	1	2.7 ± 0.0	NB
A	*Eremophila alpestris*	Horned Lark				S1B,S4N,S5M	49	1.7 ± 7.0	NB
A	*Chroicocephalus ridibundus*	Black-headed Gull				S1N,S2M	1	10.5 ± 0.0	NB
A	*Calidris alba*	Sanderling				S1N,S3S4M	3	50.2 ± 0.0	NB
A	*Butorides virescens*	Green Heron				S1S2B	15	30.7 ± 7.0	NB
A	*Nycticorax nycticorax*	Black-crowned Night-heron				S1S2B	17	16.5 ± 7.0	NB
A	*Empidonax traillii*	Willow Flycatcher				S1S2B	15	68.1 ± 2.0	NB
A	*Stelgidopteryx serripennis*	Northern Rough-winged Swallow				S1S2B	2	69.2 ± 7.0	NB
A	*Troglodytes aedon*	House Wren				S1S2B	6	16.5 ± 7.0	NB
A	*Calidris bairdii*	Baird's Sandpiper				S1S2M	2	50.2 ± 0.0	NB
A	*Microtus chrotorrhinus*	Rock Vole				S2?	35	34.3 ± 1.0	NB
A	*Petrochelidon pyrrhonota*	Cliff Swallow				S2B	200	2.7 ± 7.0	NB
A	*Mimus polyglottos*	Northern Mockingbird				S2B	49	1.5 ± 1.0	NB
A	*Pooecetes gramineus*	Vesper Sparrow				S2B	35	12.7 ± 7.0	NB
A	*Tringa solitaria*	Solitary Sandpiper				S2B,S4S5M	34	18.5 ± 0.0	NB
A	*Pinicola enucleator*	Pine Grosbeak				S2B,S4S5N,S4S5M	112	27.5 ± 7.0	NB
A	*Phalacrocorax carbo*	Great Cormorant				S2N	1	67.6 ± 1.0	NB
A	*Asio otus*	Long-eared Owl				S2S3	15	2.7 ± 7.0	NB
A	*Picoides dorsalis*	American Three-toed Woodpecker				S2S3	62	29.9 ± 0.0	NB
A	*Toxostoma rufum*	Brown Thrasher				S2S3B	77	1.5 ± 7.0	NB
A	*Icterus galbula*	Baltimore Oriole				S2S3B	95	2.7 ± 7.0	NB
A	*Somateria mollissima*	Common Eider				S2S3B,S2S3N,S4M	2	57.1 ± 0.0	NB
A	*Larus delawarensis*	Ring-billed Gull				S2S3B,S4N,S5M	84	2.7 ± 0.0	NB
A	*Pluvialis dominica*	American Golden-Plover				S2S3M	3	50.2 ± 0.0	NB
A	*Calcarius lapponicus*	Lapland Longspur				S2S3N,SUM	1	90.0 ± 2.0	NB
A	*Larus marinus*	Great Black-backed Gull				S3	2	65.2 ± 2.0	NB
A	*Picoides arcticus*	Black-backed Woodpecker				S3	107	12.7 ± 7.0	NB
A	*Loxia curvirostra*	Red Crossbill				S3	43	27.3 ± 0.0	NB
A	*Spinus pinus*	Pine Siskin				S3	215	2.7 ± 7.0	NB
A	*Prosopium cylindraceum*	Round Whitefish				S3	8	26.4 ± 10.0	NB
A	*Salvelinus namaycush*	Lake Trout				S3	10	59.6 ± 0.0	NB
A	*Spatula clypeata*	Northern Shoveler				S3B	19	16.5 ± 7.0	NB
A	*Charadrius vociferus*	Killdeer				S3B	374	1.4 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
A	*Coccyzus erythropthalmus*	Black-billed Cuckoo				S3B	29	11.0 ± 7.0	NB
A	*Myiarchus crinitus*	Great Crested Flycatcher				S3B	61	2.7 ± 7.0	NB
A	*Piranga olivacea*	Scarlet Tanager				S3B	225	12.7 ± 7.0	NB
A	*Pheucticus ludovicianus*	Rose-breasted Grosbeak				S3B	636	1.6 ± 1.0	NB
A	*Passerina cyanea*	Indigo Bunting				S3B	32	3.1 ± 0.0	NB
A	*Molothrus ater*	Brown-headed Cowbird				S3B	107	1.4 ± 0.0	NB
A	*Setophaga tigrina*	Cape May Warbler				S3B,S4S5M	171	9.8 ± 7.0	NB
A	*Mergus serrator*	Red-breasted Merganser				S3B,S4S5N,S5M	29	2.7 ± 7.0	NB
A	*Anas acuta*	Northern Pintail				S3B,S5M	9	30.7 ± 7.0	NB
A	*Anser caerulescens*	Snow Goose				S3M	1	88.5 ± 0.0	NB
A	*Arenaria interpres*	Ruddy Turnstone				S3M	1	50.2 ± 0.0	NB
A	*Calidris pusilla*	Semipalmated Sandpiper				S3M	12	18.5 ± 0.0	NB
A	*Calidris melanotos*	Pectoral Sandpiper				S3M	7	50.2 ± 0.0	NB
A	*Limnodromus griseus*	Short-billed Dowitcher				S3M	7	18.5 ± 0.0	NB
A	*Bucephala albeola*	Bufflehead				S3N	2	54.4 ± 0.0	NB
A	*Calidris maritima*	Purple Sandpiper				S3N	1	67.6 ± 1.0	NB
A	*Perisoreus canadensis*	Canada Jay				S3S4	284	12.7 ± 7.0	NB
A	*Poecile hudsonicus*	Boreal Chickadee				S3S4	616	11.0 ± 7.0	NB
A	*Eptesicus fuscus*	Big Brown Bat				S3S4	1	19.0 ± 0.0	NB
A	*Tyrannus tyrannus*	Eastern Kingbird				S3S4B	307	1.4 ± 1.0	NB
A	*Vireo gilvus*	Warbling Vireo				S3S4B	91	1.6 ± 1.0	NB
A	*Actitis macularius*	Spotted Sandpiper				S3S4B,S4M	441	2.7 ± 7.0	NB
A	*Melospiza lincolnii*	Lincoln's Sparrow				S3S4B,S4M	359	7.4 ± 7.0	NB
A	*Gallinago delicata*	Wilson's Snipe				S3S4B,S5M	286	2.7 ± 7.0	NB
A	*Setophaga striata*	Blackpoll Warbler				S3S4B,S5M	761	14.6 ± 0.0	NB
C	*Acer saccharum - Fraxinus americana / Gymnocarpium dryopteris - Deparia acrostichoides Forest*	Sugar Maple - White Ash / Common Oak Fern - Silvery Glade Fern Forest				S3	2	76.4 ± 0.0	NB
I	*Danaus plexippus*	Monarch	Endangered	Special Concern	Special Concern	S2S3?B	16	10.4 ± 0.0	NB
I	*Cicindela marginipennis*	Cobblestone Tiger Beetle	Special Concern	Endangered	Endangered	S2S3	20	67.2 ± 0.0	NB
I	*Ophiogomphus howei*	Pygmy Snaketail	Special Concern	Special Concern	Special Concern	S2S3	3	63.3 ± 0.0	NB
I	*Bombus terricola*	Yellow-banded Bumble Bee	Special Concern	Special Concern		S4	55	17.0 ± 0.0	NB
I	*Coccinella transversoguttata richardsoni*	Transverse Lady Beetle	Special Concern			SH	3	1.0 ± 1.0	NB
I	*Tharsalea dorcas*	Dorcas Copper				S1	14	76.9 ± 1.0	NB
I	*Erora laeta*	Early Hairstreak				S1	10	30.7 ± 0.0	NB
I	*Somatochlora septentrionalis*	Muskeg Emerald				S1	4	85.2 ± 0.0	NB
I	*Leucorrhinia patricia*	Canada Whiteface				S1	7	76.2 ± 1.0	NB
I	*Icaricia saepiolus*	Greenish Blue				S1S2	25	13.5 ± 0.0	NB
I	*Cicindela ancocisconensis*	Appalachian Tiger Beetle				S2	3	67.2 ± 0.0	NB
I	*Encyclops caeruleus*	Cerulean Long-horned Beetle				S2	2	93.1 ± 0.0	NB
I	*Satyrium calanus*	Banded Hairstreak				S2	3	92.6 ± 0.0	NB
I	*Aeshna juncea*	Sedge Darner				S2	9	71.9 ± 0.0	NB
I	*Somatochlora brevicincta*	Quebec Emerald				S2	8	81.9 ± 0.0	NB
I	*Ophiogomphus colubrinus*	Boreal Snaketail				S2S3	2	75.0 ± 0.0	NB
I	*Hesperia sassacus*	Indian Skipper				S3	2	60.3 ± 7.0	NB
I	*Euphyes bimacula*	Two-spotted Skipper				S3	1	95.9 ± 7.0	NB
I	*Papilio brevicauda gaspeensis*	Short-tailed Swallowtail				S3	6	13.6 ± 0.0	NB
I	*Satyrium acadica*	Acadian Hairstreak				S3	7	14.8 ± 0.0	NB
I	*Callophrys eryphon*	Western Pine Elfin				S3	12	89.2 ± 1.0	NB
I	*Argynnis aphrodite*	Aphrodite Fritillary				S3	14	23.2 ± 0.0	NB
I	*Boloria eunomia*	Bog Fritillary				S3	21	22.3 ± 0.0	NB
I	*Boloria bellona*	Meadow Fritillary				S3	9	42.3 ± 2.0	NB
I	*Boloria chariclea*	Arctic Fritillary				S3	17	69.5 ± 0.0	NB
I	*Nymphalis l-album*	Compton Tortoiseshell				S3	15	18.2 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
I	*Gomphurus vastus*	Cobra Clubtail				S3	2	25.1 ± 0.0	NB
I	*Alasmidonta undulata*	Triangle Floater				S3	4	2.3 ± 0.0	NB
I	*Pantala hymenaea*	Spot-Winged Glider				S3B	2	70.4 ± 1.0	NB
I	*Somatochlora forcipata*	Forcipate Emerald				S3S4	9	60.2 ± 1.0	NB
N	*Fuscopannaria leucosticta*	White-rimmed Shingle Lichen	Threatened			S2	2	73.6 ± 0.0	NB
N	*Aphanorrhegma serratum*	a Moss				S1	2	31.4 ± 0.0	NB
N	*Arctoa fulvella*	a Moss				S1	2	74.5 ± 1.0	NB
N	*Campylophyllum halleri*	Haller's Fine Wet Moss				S1	2	1.1 ± 1.0	NB
N	*Drepanocladus longifolius*	Long-leaved Hook Moss				S1	1	19.9 ± 1.0	NB
N	*Grimmia donniana*	Donn's Grimmia Moss				S1	4	74.5 ± 1.0	NB
N	*Grimmia unicolor*	a Moss				S1	1	26.8 ± 1.0	NB
N	*Grimmia incurva*	Black Grimmia				S1	4	74.5 ± 1.0	NB
N	*Hypnum recurvatum*	Recurved Plait Moss				S1	3	1.1 ± 1.0	NB
N	*Kiaeria starkei*	Starke's Fork Moss				S1	1	74.5 ± 1.0	NB
N	*Psora pseudorussellii*	Bordered Scale Lichen				S1	2	99.0 ± 0.0	NB
N	*Cetraria ericetorum ssp. ericetorum*	a Lichen				S1	2	76.4 ± 20.0	NB
N	*Ptychostomum pallens*	Pale Bryum				S1?	3	1.1 ± 1.0	NB
N	*Catoscopium nigritum*	Black Golf Club Moss				S1?	5	1.1 ± 1.0	NB
N	*Cinclidium stygium*	Sooty Cupola Moss				S1?	2	36.6 ± 0.0	NB
N	*Dicranum bonjeanii*	Bonjean's Broom Moss				S1?	2	3.3 ± 1.0	NB
N	*Entodon brevisetus*	a Moss				S1?	1	55.1 ± 1.0	NB
N	*Oxyrrhynchium hians*	Light Beaked Moss				S1?	1	78.2 ± 0.0	NB
N	*Paludella squarrosa*	Tufted Fen Moss				S1?	1	36.6 ± 0.0	NB
N	*Rhytidium rugosum*	Wrinkle-leaved Moss				S1?	3	85.1 ± 0.0	NB
N	*Splachnum sphaericum*	Round-fruited Dung Moss				S1?	1	61.1 ± 1.0	NB
N	*Timmia megapolitana*	Metropolitan Timmia Moss				S1?	3	11.6 ± 1.0	NB
N	*Rhizomnium pseudopunctatum*	Felted Leafy Moss				S1?	1	74.1 ± 1.0	NB
N	*Placynthium asperellum*	Lilliput Ink Lichen				S1?	1	45.5 ± 0.0	NB
N	*Enchylium tenax*	Soil Tarpaper Lichen				S1?	5	31.2 ± 0.0	NB
N	*Leptogium massiliense*	a Jellyskin Lichen				S1?	1	82.7 ± 0.0	NB
N	*Euopsis granatina*	Lesser Rockbud Lichen				S1?	1	86.1 ± 0.0	NB
N	*Psorula rufonigra*	Blue-edged Scale Lichen				S1?	2	86.1 ± 0.0	NB
N	*Spilonema revertens*	Rock Hairball Lichen				S1?	2	86.1 ± 0.0	NB
N	*Peltigera venosa*	Fan Pelt Lichen				S1?	5	82.1 ± 0.0	NB
N	*Mesoptychia heterocolpos*	Whip Notchwort				S1S2	1	92.4 ± 0.0	NB
N	*Eocalypogeia schusteriana*	Schuster's Pouchwort				S1S2	2	80.3 ± 1.0	NB
N	*Calliergon richardsonii*	Richardson's Spear Moss				S1S2	4	36.7 ± 0.0	NB
N	*Pseudocampylium radicale*	Long-stalked Fine Wet Moss				S1S2	2	31.4 ± 0.0	NB
N	*Ditrichum pallidum*	Pale Cow-hair Moss				S1S2	2	77.4 ± 0.0	NB
N	*Drummondia prorepens*	a Moss				S1S2	1	88.2 ± 1.0	NB
N	*Fissidens taxifolius*	Yew-leaved Pocket Moss				S1S2	1	31.3 ± 0.0	NB
N	*Grimmia longirostris*	a Moss				S1S2	1	1.1 ± 1.0	NB
N	*Oncophorus virens*	Green Spur Moss				S1S2	3	1.1 ± 1.0	NB
N	*Platydictya confervoides*	a Moss				S1S2	5	1.1 ± 1.0	NB
N	*Timmia austriaca*	Austrian Timmia Moss				S1S2	4	74.4 ± 1.0	NB
N	*Tomentypnum falcifolium*	Sickle-leaved Golden Moss				S1S2	2	19.5 ± 1.0	NB
N	*Hamatocaulis vernicosus*	a Moss				S1S2	3	36.5 ± 0.0	NB
N	*Haplocladium microphyllum*	Tiny-leaved Haplocladium Moss				S1S2	7	13.3 ± 1.0	NB
N	*Umbilicaria vellea*	Grizzled Rocktripe Lichen				S1S2	2	85.1 ± 0.0	NB
N	*Anaptychia crinalis*	Hanging Fringed Lichen				S1S2	1	45.8 ± 0.0	NB
N	*Frullania selwyniana*	Selwyn's Scalewort				S1S3	1	45.8 ± 0.0	NB
N	*Obtusifolium obtusum*	Obtuse Notchwort				S1S3	1	73.1 ± 0.0	NB
N	*Tritomaria scitula*	Mountain Notchwort				S1S3	1	90.8 ± 1.0	NB
N	*Anomodon viticulosus*	a Moss				S2	3	77.0 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
N	*Cirriphyllum piliferum*	Hair-pointed Moss				S2	2	1.1 ± 1.0	NB
N	*Cynodontium strumiferum*	Strumose Dogtooth Moss				S2	1	99.1 ± 0.0	NB
N	*Didymodon ferrugineus*	Rusty Beard Moss				S2	1	1.1 ± 1.0	NB
N	*Ditrichum flexicaule*	Flexible Cow-hair Moss				S2	11	0.8 ± 1.0	NB
N	*Fontinalis hypnoides*	a moss				S2	2	69.1 ± 15.0	NB
N	*Anomodon tristis*	a Moss				S2	1	45.5 ± 0.0	NB
N	*Hygrohypnum bestii*	Best's Brook Moss				S2	1	1.1 ± 10.0	NB
N	*Hypnum pratense*	Meadow Plait Moss				S2	4	72.3 ± 0.0	NB
N	*Meesia triquetra*	Three-ranked Cold Moss				S2	1	36.1 ± 100.0	NB
N	*Physcomitrium immersum*	a Moss				S2	2	1.1 ± 1.0	NB
N	*Pohlia elongata*	Long-necked Nodding Moss				S2	1	85.3 ± 2.0	NB
N	*Seligeria calcarea*	Chalk Brittle Moss				S2	1	73.2 ± 0.0	NB
N	*Seligeria recurvata*	a Moss				S2	5	1.1 ± 1.0	NB
N	*Seligeria brevifolia*	a Moss				S2	2	88.3 ± 1.0	NB
N	*Tayloria serrata*	Serrate Trumpet Moss				S2	1	71.9 ± 0.0	NB
N	*Tortula mucronifolia*	Mucronate Screw Moss				S2	3	1.1 ± 1.0	NB
N	*Zygodon viridissimus var. rupestris*	a moss				S2	2	24.0 ± 0.0	NB
N	*Anomobryum julaceum*	Slender Silver Moss				S2	1	1.1 ± 1.0	NB
N	*Cladonia wainioi*	False Reindeer Lichen				S2	1	84.4 ± 0.0	NB
N	*Leptogium milligranum*	Stretched Jellyskin Lichen				S2	2	68.3 ± 0.0	NB
N	*Nephroma laevigatum*	Mustard Kidney Lichen				S2	1	70.8 ± 0.0	NB
N	*Peltigera lepidophora*	Scaly Pelt Lichen				S2	10	45.3 ± 0.0	NB
N	*Barbilophozia lycopodioides*	Greater Pawwort				S2?	2	50.2 ± 1.0	NB
N	*Anomodon minor*	Blunt-leaved Anomodon Moss				S2?	4	13.3 ± 1.0	NB
N	*Ptychostomum pallescens*	Tall Clustered Bryum				S2?	1	1.1 ± 1.0	NB
N	*Dicranum spurium*	Spurred Broom Moss				S2?	1	86.1 ± 0.0	NB
N	*Hygrohypnum montanum*	a Moss				S2?	2	71.9 ± 0.0	NB
N	*Schistostega pennata*	Luminous Moss				S2?	3	64.8 ± 1.0	NB
N	*Seligeria diversifolia*	a Moss				S2?	2	72.3 ± 1.0	NB
N	*Trichodon cylindricus*	Cylindric Hairy-teeth Moss				S2?	3	73.7 ± 0.0	NB
N	*Plagiomnium rostratum*	Long-beaked Leafy Moss				S2?	3	47.3 ± 1.0	NB
N	*Ramalina labiosorediata*	Chalky Ramalina Lichen				S2?	2	85.1 ± 0.0	NB
N	*Collema leptaleum*	Crumpled Bat's Wing Lichen				S2?	7	78.2 ± 0.0	NB
N	*Imshaugia placorodia*	Eyed Starburst Lichen				S2?	1	44.0 ± 0.0	NB
N	*Hypogymnia bitteri*	Powdered Tube Lichen				S2?	1	96.9 ± 0.0	NB
N	*Ptychostomum cernuum*	Swamp Bryum				S2S3	2	1.1 ± 1.0	NB
N	*Ptychostomum weigelii*	Weigel's Bryum Moss				S2S3	1	71.9 ± 3.0	NB
N	*Calliergonella cuspidata*	Common Large Wetland Moss				S2S3	3	36.7 ± 0.0	NB
N	*Drepanocladus polygamus*	Polygamous Hook Moss				S2S3	3	0.8 ± 1.0	NB
N	*Didymodon rigidulus*	Rigid Screw Moss				S2S3	6	0.8 ± 1.0	NB
N	*Fissidens bushii*	Bush's Pocket Moss				S2S3	3	62.2 ± 0.0	NB
N	*Isopterygiopsis pulchella*	Neat Silk Moss				S2S3	2	76.2 ± 1.0	NB
N	*Orthotrichum elegans*	Showy Bristle Moss				S2S3	4	19.9 ± 3.0	NB
N	*Pohlia proligera*	Cottony Nodding Moss				S2S3	1	85.3 ± 2.0	NB
N	*Saelania glaucescens*	Blue Dew Moss				S2S3	4	69.1 ± 15.0	NB
N	*Scorpidium scorpioides*	Hooked Scorpion Moss				S2S3	4	36.5 ± 0.0	NB
N	*Seligeria campylopoda*	a Moss				S2S3	4	1.1 ± 1.0	NB
N	*Sphagnum centrale*	Central Peat Moss				S2S3	1	36.7 ± 0.0	NB
N	*Sphagnum subfulvum*	a Peatmoss				S2S3	1	73.2 ± 0.0	NB
N	*Taxiphyllum deplanatum*	Imbricate Yew-leaved Moss				S2S3	1	42.1 ± 5.0	NB
N	*Plagiomnium drummondii*	Drummond's Leafy Moss				S2S3	2	19.9 ± 3.0	NB
N	*Cyrtomnium hymenophylloides*	Short-pointed Lantern Moss				S2S3	2	44.3 ± 0.0	NB
N	*Dendriscocaulon umhausense*	a lichen				S2S3	2	45.7 ± 0.0	NB

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N	*Parmeliopsis ambigua*	Green Starburst Lichen				S2S3	2	84.4 ± 0.0	NB
N	*Punctelia caseana*					S2S3	3	71.4 ± 0.0	NB
N	*Hypnum curvifolium*	Curved-leaved Plait Moss				S3	1	78.2 ± 0.0	NB
N	*Tortella fragilis*	Fragile Twisted Moss				S3	4	1.1 ± 1.0	NB
N	*Hymenostylium recurvirostrum*	Curve-beak Beardless Moss				S3	7	1.1 ± 1.0	NB
N	*Collema nigrescens*	Blistered Tarpaper Lichen				S3	12	78.2 ± 0.0	NB
N	*Solorina saccata*	Woodland Owl Lichen				S3	28	44.4 ± 0.0	NB
N	*Ahtiana aurescens*	Eastern Candlewax Lichen				S3	2	50.0 ± 0.0	NB
N	*Cladonia strepsilis*	Olive Cladonia Lichen				S3	1	75.3 ± 0.0	NB
N	*Scytinium lichenoides*	Tattered Jellyskin Lichen				S3	8	31.4 ± 0.0	NB
N	*Peltigera degenii*	Lustrous Pelt Lichen				S3	1	61.6 ± 0.0	NB
N	*Leptogium laceroides*	Short-bearded Jellyskin Lichen				S3	5	45.7 ± 0.0	NB
N	*Peltigera membranacea*	Membranous Pelt Lichen				S3	8	61.7 ± 0.0	NB
N	*Ptychostomum inclinatum*	Blunt-tooth Thread Moss				S3?	1	44.3 ± 0.0	NB
N	*Cystocoleus ebeneus*	Rockgossamer Lichen				S3?	2	69.6 ± 0.0	NB
N	*Scytinium subtile*	Appressed Jellyskin Lichen				S3?	1	82.1 ± 0.0	NB
N	*Peltigera neckeri*	Black-saddle Pelt Lichen				S3?	4	84.0 ± 0.0	NB
N	*Anomodon rugelii*	Rugel's Anomodon Moss				S3S4	11	0.8 ± 1.0	NB
N	*Barbula convoluta*	Lesser Bird's-claw Beard Moss				S3S4	4	0.8 ± 1.0	NB
N	*Brachytheciastrum velutinum*	Velvet Ragged Moss				S3S4	2	92.2 ± 3.0	NB
N	*Calliergon giganteum*	Giant Spear Moss				S3S4	1	11.3 ± 3.0	NB
N	*Dicranella cerviculata*	a Moss				S3S4	2	65.6 ± 1.0	NB
N	*Dicranella varia*	a Moss				S3S4	8	0.8 ± 1.0	NB
N	*Encalypta ciliata*	Fringed Extinguisher Moss				S3S4	1	42.1 ± 5.0	NB
N	*Fissidens bryoides*	Lesser Pocket Moss				S3S4	4	69.1 ± 15.0	NB
N	*Elodium blandowii*	Blandow's Bog Moss				S3S4	4	22.5 ± 3.0	NB
N	*Heterocladium dimorphum*	Dimorphous Tangle Moss				S3S4	2	69.1 ± 15.0	NB
N	*Isopterygiopsis muelleriana*	a Moss				S3S4	4	69.1 ± 15.0	NB
N	*Myurella julacea*	Small Mouse-tail Moss				S3S4	9	1.1 ± 1.0	NB
N	*Orthotrichum speciosum*	Showy Bristle Moss				S3S4	1	76.3 ± 0.0	NB
N	*Physcomitrium pyriforme*	Pear-shaped Urn Moss				S3S4	1	80.6 ± 1.0	NB
N	*Pogonatum dentatum*	Mountain Hair Moss				S3S4	2	65.6 ± 1.0	NB
N	*Splachnum rubrum*	Red Collar Moss				S3S4	1	80.6 ± 2.0	NB
N	*Tomentypnum nitens*	Golden Fuzzy Fen Moss				S3S4	4	22.5 ± 3.0	NB
N	*Weissia controversa*	Green-Cushioned Weissia				S3S4	5	0.8 ± 1.0	NB
N	*Abietinella abietina*	Wiry Fern Moss				S3S4	14	0.8 ± 1.0	NB
N	*Trichostomum tenuirostre*	Acid-Soil Moss				S3S4	2	69.1 ± 15.0	NB
N	*Scorpidium revolvens*	Limprichtia Moss				S3S4	2	36.5 ± 0.0	NB
N	*Rauiella scita*	Smaller Fern Moss				S3S4	5	23.9 ± 0.0	NB
N	*Pannaria rubiginosa*	Brown-eyed Shingle Lichen				S3S4	16	45.7 ± 0.0	NB
N	*Pseudocyphellaria holarctica*	Yellow Specklebelly Lichen				S3S4	10	33.7 ± 0.0	NB
N	*Montanelia panniformis*	Shingled Camouflage Lichen				S3S4	2	69.6 ± 0.0	NB
N	*Nephroma parile*	Powdery Kidney Lichen				S3S4	8	23.8 ± 0.0	NB
N	*Nephroma resupinatum*	a lichen				S3S4	13	45.3 ± 0.0	NB
N	*Protopannaria pezizoides*	Brown-gray Moss-shingle Lichen				S3S4	11	45.4 ± 0.0	NB
N	*Usnea strigosa*	Bushy Beard Lichen				S3S4	1	70.6 ± 0.0	NB
N	*Fuscopannaria sorediata*	a Lichen				S3S4	1	45.7 ± 0.0	NB
N	*Pannaria conoplea*	Mealy-rimmed Shingle Lichen				S3S4	9	33.6 ± 0.0	NB
N	*Anaptychia palmulata*	Shaggy Fringed Lichen				S3S4	3	62.5 ± 0.0	NB
N	*Cladonia amaurocraea*	Quill Lichen				S3S4	2	84.3 ± 0.0	NB
P	*Juglans cinerea*	Butternut	Endangered	Endangered	Endangered	S1	543	2.3 ± 0.0	NB
P	*Pedicularis furbishiae*	Furbish Lousewort	Endangered	Endangered	Endangered	S1	55	2.0 ± 1.0	NB
P	*Fraxinus nigra*	Black Ash	Threatened			S3S4	1021	2.3 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Isoetes prototypus*	Prototype Quillwort	Special Concern	Special Concern	Endangered	S1	1	87.4 ± 0.0	NB
P	*Symphyotrichum anticostense*	Anticosti Aster	Special Concern	Special Concern	Endangered	S3	204	10.2 ± 0.0	NB
P	*Pterospora andromedea*	Woodland Pinedrops			Endangered	S1	6	92.5 ± 0.0	NB
P	*Cryptotaenia canadensis*	Canada Honewort				S1	6	11.9 ± 1.0	NB
P	*Antennaria parlinii ssp. fallax*	Parlin's Pussytoes				S1	1	94.5 ± 0.0	NB
P	*Arnica lonchophylla*	Northern Arnica				S1	10	44.2 ± 5.0	NB
P	*Erigeron acris var. kamtschaticus*	Kamtchatka Fleabane				S1	3	1.3 ± 0.0	NB
P	*Betula glandulosa*	Glandular Birch				S1	6	74.6 ± 0.0	NB
P	*Andersonglossum boreale*	Northern Wild Comfrey				S1	13	27.0 ± 1.0	NB
P	*Cardamine concatenata*	Cut-leaved Toothwort				S1	15	34.9 ± 0.0	NB
P	*Draba arabisans*	Rock Whitlow-Grass				S1	2	99.2 ± 50.0	NB
P	*Draba cana*	Lance-leaved Draba				S1	1	82.2 ± 1.0	NB
P	*Boechera grahamii*	Graham's Rockcress				S1	2	98.0 ± 1.0	NB
P	*Moehringia macrophylla*	Large-Leaved Sandwort				S1	2	84.6 ± 0.0	NB
P	*Chenopodiastrum simplex*	Maple-leaved Goosefoot				S1	1	84.1 ± 0.0	NB
P	*Blitum capitatum*	Strawberry-Blite				S1	8	17.2 ± 0.0	NB
P	*Drosera anglica*	English Sundew				S1	5	36.7 ± 0.0	NB
P	*Drosera linearis*	Slender-Leaved Sundew				S1	4	36.7 ± 0.0	NB
P	*Vaccinium boreale*	Northern Blueberry				S1	1	84.4 ± 0.0	NB
P	*Vaccinium uliginosum*	Alpine Bilberry				S1	1	74.6 ± 0.0	NB
P	*Hylodesmum glutinosum*	Large Tick-trefoil				S1	6	93.8 ± 0.0	NB
P	*Oxytropis deflexa var. foliolosa*	Nodding Locoweed				S1	8	31.3 ± 0.0	NB
P	*Gentiana rubricaulis*	Purple-stemmed Gentian				S1	1	77.0 ± 0.0	NB
P	*Hepatica acutiloba*	Sharp-lobed Hepatica				S1	11	69.8 ± 0.0	NB
P	*Coptidium lapponicum*	Lapland Buttercup				S1	29	30.4 ± 0.0	NB
P	*Amelanchier fernaldii*	Fernald's Serviceberry				S1	1	77.3 ± 0.0	NB
P	*Rubus flagellaris*	Northern Dewberry				S1	7	43.8 ± 1.0	NB
P	*Galium brevipes*	Limestone Swamp Bedstraw				S1	2	42.6 ± 0.0	NB
P	*Valeriana dioica ssp. sylvatica*	Northern Valerian				S1	2	95.1 ± 0.0	NB
P	*Carex annectens*	Yellow-Fruited Sedge				S1	1	100.0 ± 0.0	NB
P	*Carex blanda*	Eastern Woodland Sedge				S1	2	55.6 ± 2.0	NB
P	*Carex merritt-fernaldii*	Merritt Fernald's Sedge				S1	1	37.6 ± 0.0	NB
P	*Carex scirpoidea*	Scirpuslike Sedge				S1	2	27.9 ± 1.0	NB
P	*Carex sterilis*	Sterile Sedge				S1	14	21.3 ± 0.0	NB
P	*Carex grisea*	Inflated Narrow-leaved Sedge				S1	3	12.4 ± 0.0	NB
P	*Carex saxatilis*	Russet Sedge				S1	6	73.1 ± 0.0	NB
P	*Carex bigelowii*	Bigelow's Sedge				S1	6	74.5 ± 0.0	NB
P	*Rhynchospora capillacea*	Slender Beakrush				S1	5	26.8 ± 1.0	NB
P	*Juncus stygius ssp. americanus*	Moor Rush				S1	1	16.9 ± 10.0	NB
P	*Juncus subtilis*	Creeping Rush				S1	1	76.0 ± 0.0	NB
P	*Allium canadense*	Canada Garlic				S1	10	68.8 ± 0.0	NB
P	*Malaxis monophyllos var. brachypoda*	North American White Adder's-mouth				S1	2	67.4 ± 1.0	NB
P	*Platanthera macrophylla*	Large Round-Leaved Orchid				S1	1	36.8 ± 1.0	NB
P	*Dichanthelium xanthophysum*	Slender Panic Grass				S1	2	92.5 ± 0.0	NB
P	*Potamogeton friesii*	Fries' Pondweed				S1	5	89.0 ± 0.0	NB
P	*Potamogeton nodosus*	Long-leaved Pondweed				S1	10	92.6 ± 0.0	NB
P	*Potamogeton strictifolius*	Straight-leaved Pondweed				S1	1	95.9 ± 1.0	NB
P	*Dryopteris clintoniana*	Clinton's Wood Fern				S1	13	16.9 ± 10.0	NB
P	*Gymnocarpium continentale*	Nahanni Oak Fern				S1	5	44.4 ± 0.0	NB
P	*Gymnocarpium robertianum*	Limestone Oak Fern				S1	14	19.9 ± 0.0	NB

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P	*Huperzia selago*	Northern Firmoss				S1	9	26.9 ± 0.0	NB
P	*Botrychium lunaria*	Common Moonwort				S1	7	18.3 ± 0.0	NB
P	*Sceptridium oneidense*	Blunt-lobed Moonwort				S1	4	98.8 ± 0.0	NB
P	*Sceptridium rugulosum*	Rugulose Grapefern				S1	4	99.0 ± 0.0	NB
P	*Selaginella rupestris*	Rock Spikemoss				S1	4	75.1 ± 0.0	NB
P	*Polygonum aviculare ssp. neglectum*	Narrow-leaved Knotweed				S1?	1	95.2 ± 1.0	NB
P	*Galium trifidum ssp. subbiflorum*	Three-petaled Bedstraw				S1?	7	77.2 ± 0.0	NB
P	*Carex laxiflora*	Loose-Flowered Sedge				S1?	3	71.7 ± 0.0	NB
P	*Carex appalachica*	Appalachian Sedge				S1?	1	97.0 ± 0.0	NB
P	*Sisyrinchium mucronatum*	Michaux's Blue-eyed-grass				S1?	10	85.5 ± 0.0	NB
P	*Poa interior*	Inland Bluegrass				S1?	3	76.0 ± 0.0	NB
P	*Galium kamtschaticum*	Northern Wild Licorice				S1S2	18	74.5 ± 1.0	NB
P	*Galearis spectabilis*	Showy Orchis				S1S2	63	12.3 ± 0.0	NB
P	*Spiranthes cernua*	Nodding Ladies'-Tresses				S1S3	14	18.8 ± 0.0	NB
P	*Osmorhiza depauperata*	Blunt Sweet Cicely				S2	7	34.8 ± 10.0	NB
P	*Sanicula trifoliata*	Large-Fruited Sanicle				S2	17	51.0 ± 0.0	NB
P	*Sanicula odorata*	Clustered Sanicle				S2	22	11.8 ± 1.0	NB
P	*Hieracium robinsonii*	Robinson's Hawkweed				S2	3	1.1 ± 1.0	NB
P	*Betula minor*	Dwarf White Birch				S2	18	49.8 ± 0.0	NB
P	*Hypericum x dissimulatum*	Disguised St. John's-wort				S2	1	77.6 ± 1.0	NB
P	*Astragalus eucosmus*	Elegant Milk-vetch				S2	19	23.0 ± 0.0	NB
P	*Quercus macrocarpa*	Bur Oak				S2	2	34.8 ± 1.0	NB
P	*Nuphar x rubrodisca*	Red-disk Yellow Pond-lily				S2	8	40.6 ± 5.0	NB
P	*Polygaloides paucifolia*	Fringed Milkwort				S2	1	37.9 ± 0.0	NB
P	*Persicaria amphibia var. emersa*	Long-root Smartweed				S2	6	27.4 ± 0.0	NB
P	*Anemone parviflora*	Small-flowered Anemone				S2	16	97.5 ± 1.0	NB
P	*Micranthes virginiensis*	Early Saxifrage				S2	5	53.6 ± 0.0	NB
P	*Scrophularia lanceolata*	Lance-leaved Figwort				S2	8	30.9 ± 0.0	NB
P	*Viola canadensis*	Canada Violet				S2	67	19.5 ± 0.0	NB
P	*Carex cephaloidea*	Thin-leaved Sedge				S2	24	12.3 ± 0.0	NB
P	*Carex albicans var. emmonsii*	White-tinged Sedge				S2	2	16.9 ± 5.0	NB
P	*Galearis rotundifolia*	Small Round-leaved Orchid				S2	32	16.9 ± 5.0	NB
P	*Calypso bulbosa var. americana*	Calypso				S2	40	30.0 ± 5.0	NB
P	*Coeloglossum viride*	Long-bracted Frog Orchid				S2	9	44.4 ± 1.0	NB
P	*Cypripedium parviflorum var. makasin*	Small Yellow Lady's-Slipper				S2	36	12.5 ± 0.0	NB
P	*Platanthera huronensis*	Fragrant Green Orchid				S2	7	9.7 ± 0.0	NB
P	*Elymus hystrix*	Spreading Wild Rye				S2	30	54.9 ± 0.0	NB
P	*Festuca subverticillata*	Nodding Fescue				S2	38	12.0 ± 0.0	NB
P	*Diphasiastrum sitchense*	Sitka Ground-cedar				S2	17	23.9 ± 0.0	NB
P	*Botrychium minganense*	Mingan Moonwort				S2	25	14.7 ± 0.0	NB
P	*Toxicodendron radicans var. radicans*	Eastern Poison Ivy				S2?	1	95.0 ± 0.0	NB
P	*Symphyotrichum novi-belgii var. crenifolium*	New York Aster				S2?	1	72.1 ± 1.0	NB
P	*Humulus lupulus var. lupuloides*	Common Hop				S2?	1	88.9 ± 0.0	NB
P	*Osmorhiza longistylis*	Smooth Sweet Cicely				S2S3	10	12.3 ± 0.0	NB
P	*Canadanthus modestus*	Great Northern Aster				S2S3	56	52.4 ± 0.0	NB
P	*Cuscuta cephalanthi*	Buttonbush Dodder				S2S3	10	26.3 ± 0.0	NB
P	*Gentiana linearis*	Narrow-Leaved Gentian				S2S3	5	93.8 ± 1.0	NB
P	*Aphyllon uniflorum*	One-flowered Broomrape				S2S3	4	23.7 ± 0.0	NB
P	*Polygala senega*	Seneca Snakeroot				S2S3	51	26.2 ± 5.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Hepatica americana*	Round-lobed Hepatica				S2S3	17	51.6 ± 0.0	NB
P	*Rosa acicularis ssp. sayi*	Prickly Rose				S2S3	36	88.7 ± 0.0	NB
P	*Galium obtusum*	Blunt-leaved Bedstraw				S2S3	2	76.0 ± 1.0	NB
P	*Dirca palustris*	Eastern Leatherwood				S2S3	98	25.0 ± 0.0	NB
P	*Phryma leptostachya*	American Lopseed				S2S3	76	12.3 ± 0.0	NB
P	*Verbena urticifolia*	White Vervain				S2S3	18	30.3 ± 1.0	NB
P	*Viola novae-angliae*	New England Violet				S2S3	36	46.7 ± 0.0	NB
P	*Carex comosa*	Bearded Sedge				S2S3	8	76.2 ± 0.0	NB
P	*Carex crawei*	Crawe's Sedge				S2S3	6	86.5 ± 0.0	NB
P	*Carex media*	Intermediate Sedge				S2S3	25	45.5 ± 0.0	NB
P	*Carex rostrata*	Narrow-leaved Beaked Sedge				S2S3	18	29.7 ± 0.0	NB
P	*Scirpus atrovirens*	Dark-green Bulrush				S2S3	93	2.5 ± 0.0	NB
P	*Allium tricoccum*	Wild Leek				S2S3	2	84.9 ± 0.0	NB
P	*Corallorhiza maculata var. occidentalis*	Spotted Coralroot				S2S3	1	93.7 ± 0.0	NB
P	*Corallorhiza maculata var. maculata*	Spotted Coralroot				S2S3	10	61.5 ± 0.0	NB
P	*Elymus canadensis*	Canada Wild Rye				S2S3	8	16.9 ± 5.0	NB
P	*Poa glauca*	Glaucous Blue Grass				S2S3	22	26.4 ± 0.0	NB
P	*Piptatheropsis pungens*	Slender Ricegrass				S2S3	6	89.4 ± 0.0	NB
P	*Potamogeton vaseyi*	Vasey's Pondweed				S2S3	2	47.3 ± 0.0	NB
P	*Artemisia campestris ssp. caudata*	Tall Wormwood				S3	28	23.0 ± 0.0	NB
P	*Artemisia campestris*	Field Wormwood				S3	9	0.8 ± 0.0	NB
P	*Nabalus racemosus*	Glaucous Rattlesnakeroot				S3	39	21.9 ± 0.0	NB
P	*Solidago racemosa*	Racemose Goldenrod				S3	38	26.4 ± 0.0	NB
P	*Tanacetum bipinnatum ssp. huronense*	Lake Huron Tansy				S3	166	0.8 ± 0.0	NB
P	*Pseudognaphalium macounii*	Macoun's Cudweed				S3	1	92.5 ± 0.0	NB
P	*Impatiens pallida*	Pale Jewelweed				S3	17	11.9 ± 0.0	NB
P	*Boechera stricta*	Drummond's Rockcress				S3	6	1.3 ± 0.0	NB
P	*Turritis glabra*	Tower Mustard				S3	23	37.5 ± 0.0	NB
P	*Arabis pycnocarpa*	Cream-flowered Rockcress				S3	30	1.1 ± 1.0	NB
P	*Cardamine maxima*	Large Toothwort				S3	66	53.0 ± 0.0	NB
P	*Stellaria longifolia*	Long-leaved Starwort				S3	6	85.3 ± 1.0	NB
P	*Lonicera oblongifolia*	Swamp Fly Honeysuckle				S3	170	18.4 ± 5.0	NB
P	*Triosteum aurantiacum*	Orange-fruited Tinker's Weed				S3	137	26.2 ± 0.0	NB
P	*Viburnum lentago*	Nannyberry				S3	29	87.0 ± 0.0	NB
P	*Shepherdia canadensis*	Soapberry				S3	30	1.0 ± 0.0	NB
P	*Astragalus alpinus*	Alpine Milk-vetch				S3	2	85.6 ± 0.0	NB
P	*Astragalus alpinus var. brunetianus*	Alpine Milk-Vetch				S3	145	1.0 ± 1.0	NB
P	*Oxytropis campestris var. johannensis*	Field Locoweed				S3	82	18.1 ± 0.0	NB
P	*Gentianella amarella ssp. acuta*	Northern Gentian				S3	23	18.3 ± 0.0	NB
P	*Geranium bicknellii*	Bicknell's Crane's-bill				S3	1	92.1 ± 0.0	NB
P	*Myriophyllum farwellii*	Farwell's Water Milfoil				S3	1	82.6 ± 0.0	NB
P	*Fraxinus pennsylvanica*	Red Ash				S3	58	1.1 ± 1.0	NB
P	*Rumex pallidus*	Seabeach Dock				S3	1	53.0 ± 0.0	NB
P	*Rumex occidentalis*	Western Dock				S3	36	47.5 ± 0.0	NB
P	*Primula mistassinica*	Mistassini Primrose				S3	52	1.0 ± 0.0	NB
P	*Pyrola minor*	Lesser Pyrola				S3	32	30.0 ± 0.0	NB
P	*Anemone multifida*	Cut-leaved Anemone				S3	109	1.3 ± 0.0	NB
P	*Anemone multifida var. multifida*	Early Anemone				S3	10	1.3 ± 1.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Clematis occidentalis*	Purple Clematis				S3	17	2.8 ± 0.0	NB
P	*Amelanchier gaspensis*	Gasp ├⌐ Serviceberry				S3	5	64.2 ± 0.0	NB
P	*Crataegus scabrida*	Rough Hawthorn				S3	2	61.7 ± 1.0	NB
P	*Rubus occidentalis*	Black Raspberry				S3	112	37.1 ± 1.0	NB
P	*Salix candida*	Sage Willow				S3	37	30.4 ± 0.0	NB
P	*Salix myricoides*	Bayberry Willow				S3	61	1.2 ± 0.0	NB
P	*Salix interior*	Sandbar Willow				S3	117	1.1 ± 0.0	NB
P	*Comandra umbellata*	Bastard's Toadflax				S3	1	99.1 ± 0.0	NB
P	*Agalinis purpurea var. parviflora*	Small-flowered Purple False Foxglove				S3	3	25.0 ± 0.0	NB
P	*Castilleja septentrionalis*	Northeastern Paintbrush				S3	39	23.8 ± 0.0	NB
P	*Valeriana uliginosa*	Swamp Valerian				S3	83	27.9 ± 5.0	NB
P	*Viola adunca*	Hooked Violet				S3	7	71.7 ± 1.0	NB
P	*Viola adunca var. adunca*	Hooked Violet				S3	1	88.7 ± 0.0	NB
P	*Symplocarpus foetidus*	Eastern Skunk Cabbage				S3	4	68.5 ± 0.0	NB
P	*Carex adusta*	Lesser Brown Sedge				S3	7	19.0 ± 1.0	NB
P	*Carex arcta*	Northern Clustered Sedge				S3	19	16.9 ± 10.0	NB
P	*Carex conoidea*	Field Sedge				S3	18	56.1 ± 0.0	NB
P	*Carex garberi*	Garber's Sedge				S3	51	20.3 ± 0.0	NB
P	*Carex granularis*	Limestone Meadow Sedge				S3	28	67.8 ± 0.0	NB
P	*Carex gynocrates*	Northern Bog Sedge				S3	54	19.8 ± 10.0	NB
P	*Carex hirtifolia*	Pubescent Sedge				S3	49	12.3 ± 0.0	NB
P	*Carex livida*	Livid Sedge				S3	35	16.9 ± 5.0	NB
P	*Carex ormostachya*	Necklace Spike Sedge				S3	26	14.6 ± 0.0	NB
P	*Carex plantaginea*	Plantain-Leaved Sedge				S3	157	16.2 ± 0.0	NB
P	*Carex prairea*	Prairie Sedge				S3	53	34.7 ± 0.0	NB
P	*Carex rosea*	Rosy Sedge				S3	187	16.9 ± 10.0	NB
P	*Carex sprengelii*	Longbeak Sedge				S3	60	6.4 ± 1.0	NB
P	*Carex tenuiflora*	Sparse-Flowered Sedge				S3	28	16.9 ± 5.0	NB
P	*Carex vaginata*	Sheathed Sedge				S3	50	19.8 ± 10.0	NB
P	*Cyperus esculentus var. leptostachyus*	Perennial Yellow Nutsedge				S3	33	5.7 ± 0.0	NB
P	*Eriophorum gracile*	Slender Cottongrass				S3	12	80.4 ± 0.0	NB
P	*Elodea nuttallii*	Nuttall's Waterweed				S3	44	2.0 ± 0.0	NB
P	*Juncus brachycephalus*	Small-Head Rush				S3	83	10.3 ± 0.0	NB
P	*Juncus vaseyi*	Vasey Rush				S3	6	88.2 ± 0.0	NB
P	*Cypripedium reginae*	Showy Lady's-Slipper				S3	132	16.9 ± 5.0	NB
P	*Goodyera oblongifolia*	Menzies' Rattlesnake-plantain				S3	19	36.9 ± 0.0	NB
P	*Neottia auriculata*	Auricled Twayblade				S3	12	40.5 ± 0.0	NB
P	*Platanthera grandiflora*	Large Purple Fringed Orchid				S3	1	76.2 ± 0.0	NB
P	*Platanthera orbiculata*	Small Round-leaved Orchid				S3	38	35.6 ± 2.0	NB
P	*Spiranthes lucida*	Shining Ladies'-Tresses				S3	14	25.3 ± 0.0	NB
P	*Agrostis mertensii*	Northern Bent Grass				S3	2	90.2 ± 0.0	NB
P	*Bromus latiglumis*	Broad-Glumed Brome				S3	130	9.1 ± 0.0	NB
P	*Dichanthelium linearifolium*	Narrow-leaved Panic Grass				S3	3	69.2 ± 0.0	NB
P	*Muhlenbergia richardsonis*	Mat Muhly				S3	129	3.7 ± 0.0	NB
P	*Schizachyrium scoparium*	Little Bluestem				S3	81	17.3 ± 0.0	NB
P	*Adiantum pedatum*	Northern Maidenhair Fern				S3	429	14.7 ± 0.0	NB
P	*Asplenium trichomanes*	Maidenhair Spleenwort				S3	4	54.3 ± 0.0	NB
P	*Dryopteris goldieana*	Goldie's Woodfern				S3	304	11.7 ± 0.0	NB
P	*Woodsia alpina*	Alpine Cliff Fern				S3	50	27.7 ± 0.0	NB
P	*Woodsia glabella*	Smooth Cliff Fern				S3	31	26.5 ± 1.0	NB
P	*Isoetes tuckermanii ssp. tuckermanii*	Tuckerman's Quillwort				S3	2	80.5 ± 1.0	NB
P	*Diphasiastrum x sabinifolium*	Savin-leaved Ground-cedar				S3	17	1.1 ± 1.0	NB
P	*Huperzia appressa*	Mountain Firmoss				S3	1	73.8 ± 0.0	NB
P	*Sceptridium dissectum*	Dissected Moonwort				S3	25	32.4 ± 10.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Botrychium lanceolatum ssp. angustisegmentum*	Narrow Triangle Moonwort				S3	16	4.5 ± 0.0	NB
P	*Botrychium simplex*	Least Moonwort				S3	41	9.9 ± 0.0	NB
P	*Ophioglossum pusillum*	Northern Adder's-tongue				S3	36	15.6 ± 0.0	NB
P	*Selaginella selaginoides*	Low Spikemoss				S3	23	19.8 ± 5.0	NB
P	*Crataegus submollis*	Quebec Hawthorn				S3?	2	31.4 ± 1.0	NB
P	*Platanthera hookeri*	Hooker's Orchid				S3?	29	31.9 ± 15.0	NB
P	*Arnica lanceolata*	Lance-leaved Arnica				S3S4	77	27.1 ± 1.0	NB
P	*Solidago altissima*	Tall Goldenrod				S3S4	112	16.6 ± 0.0	NB
P	*Symphyotrichum boreale*	Boreal Aster				S3S4	133	16.9 ± 10.0	NB
P	*Betula pumila*	Bog Birch				S3S4	15	37.3 ± 0.0	NB
P	*Mertensia maritima*	Sea Lungwort				S3S4	1	86.4 ± 50.0	NB
P	*Subularia aquatica ssp. americana*	American Water Awlwort				S3S4	4	93.1 ± 1.0	NB
P	*Callitriche hermaphroditica*	Northern Water-starwort				S3S4	18	26.5 ± 0.0	NB
P	*Viburnum edule*	Squashberry				S3S4	73	13.3 ± 0.0	NB
P	*Hedysarum americanum*	Alpine Hedysarum				S3S4	242	2.1 ± 0.0	NB
P	*Fagus grandifolia*	American Beech				S3S4	220	1.1 ± 1.0	NB
P	*Stachys hispida*	Smooth Hedge-Nettle				S3S4	86	1.3 ± 0.0	NB
P	*Stachys pilosa*	Hairy Hedge-Nettle				S3S4	102	1.5 ± 0.0	NB
P	*Stachys pilosa var. pilosa*	Marsh Hedge-Nettle				S3S4	1	25.2 ± 1.0	NB
P	*Fraxinus americana*	White Ash				S3S4	147	1.1 ± 1.0	NB
P	*Epilobium strictum*	Downy Willowherb				S3S4	44	37.4 ± 0.0	NB
P	*Fallopia scandens*	Climbing False Buckwheat				S3S4	10	29.3 ± 0.0	NB
P	*Littorella americana*	American Shoreweed				S3S4	5	79.8 ± 1.0	NB
P	*Thalictrum confine*	Northern Meadow-rue				S3S4	44	2.0 ± 0.0	NB
P	*Drymocallis arguta*	Tall Wood Beauty				S3S4	106	26.2 ± 0.0	NB
P	*Rosa palustris*	Swamp Rose				S3S4	1	76.5 ± 0.0	NB
P	*Rubus pensilvanicus*	Pennsylvania Blackberry				S3S4	1	36.8 ± 1.0	NB
P	*Galium boreale*	Northern Bedstraw				S3S4	21	35.0 ± 0.0	NB
P	*Galium labradoricum*	Labrador Bedstraw				S3S4	115	36.4 ± 0.0	NB
P	*Salix pedicellaris*	Bog Willow				S3S4	45	30.4 ± 0.0	NB
P	*Geocaulon lividum*	Northern Comandra				S3S4	9	13.6 ± 0.0	NB
P	*Parnassia glauca*	Fen Grass-of-Parnassus				S3S4	226	1.1 ± 0.0	NB
P	*Ulmus americana*	White Elm				S3S4	223	1.7 ± 0.0	NB
P	*Boehmeria cylindrica*	Small-spike False-nettle				S3S4	2	93.1 ± 0.0	NB
P	*Carex capillaris*	Hairlike Sedge				S3S4	263	1.0 ± 0.0	NB
P	*Carex concinna*	Beautiful Sedge				S3S4	59	31.5 ± 0.0	NB
P	*Carex eburnea*	Bristle-leaved Sedge				S3S4	123	1.1 ± 0.0	NB
P	*Carex exilis*	Coastal Sedge				S3S4	40	34.6 ± 0.0	NB
P	*Carex haydenii*	Hayden's Sedge				S3S4	76	1.3 ± 0.0	NB
P	*Carex tenera*	Tender Sedge				S3S4	20	16.4 ± 0.0	NB
P	*Carex wiegandii*	Wiegand's Sedge				S3S4	7	18.0 ± 5.0	NB
P	*Carex atratiformis*	Scabrous Black Sedge				S3S4	241	25.3 ± 8.0	NB
P	*Cladium mariscoides*	Smooth Twigrush				S3S4	41	34.5 ± 0.0	NB
P	*Cyperus dentatus*	Toothed Flatsedge				S3S4	2	24.4 ± 0.0	NB
P	*Eleocharis quinqueflora*	Few-flowered Spikerush				S3S4	74	24.8 ± 0.0	NB
P	*Rhynchospora capitellata*	Small-headed Beakrush				S3S4	18	56.1 ± 0.0	NB
P	*Trichophorum clintonii*	Clinton's Clubrush				S3S4	81	1.0 ± 0.0	NB
P	*Lilium canadense*	Canada Lily				S3S4	129	1.4 ± 0.0	NB
P	*Triantha glutinosa*	Sticky False-Asphodel				S3S4	172	0.9 ± 0.0	NB
P	*Corallorhiza maculata*	Spotted Coralroot				S3S4	17	25.0 ± 0.0	NB
P	*Liparis loeselii*	Loesel's Twayblade				S3S4	19	10.5 ± 0.0	NB
P	*Neottia cordata*	Heart-leaved Twayblade				S3S4	36	15.7 ± 10.0	NB
P	*Platanthera obtusata*	Blunt-leaved Orchid				S3S4	31	16.9 ± 10.0	NB
P	*Calamagrostis stricta*	Slim-stemmed Reed Grass				S3S4	14	24.8 ± 0.0	NB
P	*Calamagrostis stricta ssp. stricta*	Slim-stemmed Reed Grass				S3S4	4	79.7 ± 0.0	NB

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	# recs	Distance (km)	Prov
P	*Eragrostis pectinacea*	Tufted Love Grass				S3S4	2	22.1 ± 0.0	NB
P	*Stuckenia filiformis*	Thread-leaved Pondweed				S3S4	27	51.9 ± 1.0	NB
P	*Potamogeton praelongus*	White-stemmed Pondweed				S3S4	29	36.7 ± 1.0	NB
P	*Potamogeton richardsonii*	Richardson's Pondweed				S3S4	48	29.7 ± 0.0	NB
P	*Cryptogramma stelleri*	Steller's Rockbrake				S3S4	58	1.1 ± 0.0	NB
P	*Asplenium viride*	Green Spleenwort				S3S4	43	42.3 ± 0.0	NB
P	*Dryopteris fragrans*	Fragrant Wood Fern				S3S4	47	35.2 ± 1.0	NB
P	*Equisetum palustre*	Marsh Horsetail				S3S4	42	1.7 ± 0.0	NB
P	*Polypodium appalachianum*	Appalachian Polypody				S3S4	31	42.1 ± 0.0	NB
P	*Phleum alpinum*	Alpine Timothy				SH	1	94.1 ± 0.0	NB
P	*Botrychium lineare*	Narrow-leaved Moonwort				SH	1	69.2 ± 5.0	NB

5.1 SOURCE BIBLIOGRAPHY (100 km)

The recipient of these data shall acknowledge the AC CDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
5410	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
2377	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
1335	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2015. Atlantic Canada Conservation Data Centre Fieldwork 2015. Atlantic Canada Conservation Data Centre, # recs.
1156	Cowie, F. 2007. Electrofishing Population Estimates 1979-98. Canadian Rivers Institute, 2698 recs.
1079	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2014. Atlantic Canada Conservation Data Centre Fieldwork 2014. Atlantic Canada Conservation Data Centre, # recs.
1046	Pardieck, K.L., Ziolkowski Jr., D.J., Lutmerding, M., Aponte, V.I., and Hudson, M-A.R. 2020. North American Breeding Bird Survey Dataset 1966 - 2019: U.S. Geological Survey data release, https://doi.org/10.5066/P9J6QUF6
842	Blaney, C.S.; Mazerolle, D.M.; Belliveau, A.B. 2013. Atlantic Canada Conservation Data Centre Fieldwork 2013. Atlantic Canada Conservation Data Centre, 9000+ recs.
820	Kouwenberg, Amy-Lee. 2019. Mountain Birdwatch database 2012-2018. Bird Studies Canada, Sackville, NB, 6484 recs.
707	Stantec. 2014. Energy East Pipeline Corridor Species Occurrence Data. Stantec Inc., 4934 records.
555	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2003.
554	Mazerolle, D.M. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 13515 recs.
545	Mazerolle, D.M. 2020. Atlantic Canada Conservation Data Centre botanical fieldwork 2019. Atlantic Canada Conservation Data Centre.
485	Chapman, C.J. 2019. Atlantic Canada Conservation Data Centre 2019 botanical fieldwork. Atlantic Canada Conservation Data Centre, 11729 recs.
464	Wisniowski, C. & Dowding, A. 2019. NB species occurrence data for 2016-2018. Nature Trust of New Brunswick.
409	Blaney, C.S.; Mazerolle, D.M.; Oberndorfer, E. 2007. Fieldwork 2007. Atlantic Canada Conservation Data Centre. Sackville NB, 13770 recs.
382	eBird. 2014. eBird Basic Dataset. Version: EBD_relNov-2014. Ithaca, New York. Nov 2014. Cornell Lab of Ornithology, 25036 recs.
362	Belliveau, A.G. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre, 10695 recs.
336	Blaney, C.S.; Spicer, C.D. 2001. Fieldwork 2001. Atlantic Canada Conservation Data Centre. Sackville NB, 981 recs.
336	Campbell, G. 2017. Maritimes Bicknell's Thrush database 2002-2015. Bird Studies Canada, Sackville NB, 609 recs.
328	Chapman, C.J. 2018. Atlantic Canada Conservation Data Centre botanical fieldwork 2018. Atlantic Canada Conservation Data Centre, 11171 recs.
325	Goltz, J.P. 2012. Field Notes, 1989-2005. , 1091 recs.
318	MacDougall, A.; Bishop, G.; et al. 1998. 1997 Appalachian Hardwood Field Data. Nature Trust of New Brunswick, 4473 recs.
307	Mazerolle, D.M. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
239	Clayden, S.R. 1998. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, 19759 recs.
229	Wisniowski, C. & Dowding, A. 2020. NB species occurrence data for 2020. Nature Trust of New Brunswick.
218	Tims, J. & Craig, N. 1995. Environmentally Significant Areas in New Brunswick (NBESA). NB Dept of Environment & Nature Trust of New Brunswick Inc, 6042 recs. https://doi.org/10.1037/arc0000014.
209	Blaney, C.S.; Mazerolle, D.M. 2009. Fieldwork 2009. Atlantic Canada Conservation Data Centre. Sackville NB, 13395 recs.
202	Benedict, B. Connell Herbarium Specimens (Data) . University New Brunswick, Fredericton. 2003.
201	Chapman-Lam, C.J. 2021. Atlantic Canada Conservation Data Centre 2020 botanical fieldwork. Atlantic Canada Conservation Data Centre, 17309 recs.
185	Blaney, C.S. 2018. Atlantic Canada Conservation Data Centre Fieldwork 2018. Atlantic Canada Conservation Data Centre.
185	Blaney, C.S.; Spicer, C.D.; Mazerolle, D.M. 2005. Fieldwork 2005. Atlantic Canada Conservation Data Centre. Sackville NB, 2333 recs.
162	Honeyman, K. 2019. Unique Areas Database, 2018. J.D. Irving Ltd.
158	Blaney, C.S.; Spicer, C.D.; Popma, T.M.; Hanel, C. 2002. Fieldwork 2002. Atlantic Canada Conservation Data Centre. Sackville NB, 2252 recs.
155	Blaney, C.S. 2000. Fieldwork 2000. Atlantic Canada Conservation Data Centre. Sackville NB, 1265 recs.
151	Anonymous. 2017. Observations from protected sources. Atlantic Canada Conservation Data Centre.
150	iNaturalist. 2020. iNaturalist Data Export 2020. iNaturalist.org and iNaturalist.ca, Web site: 128728 recs.
133	Belliveau, A.G. 2018. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.

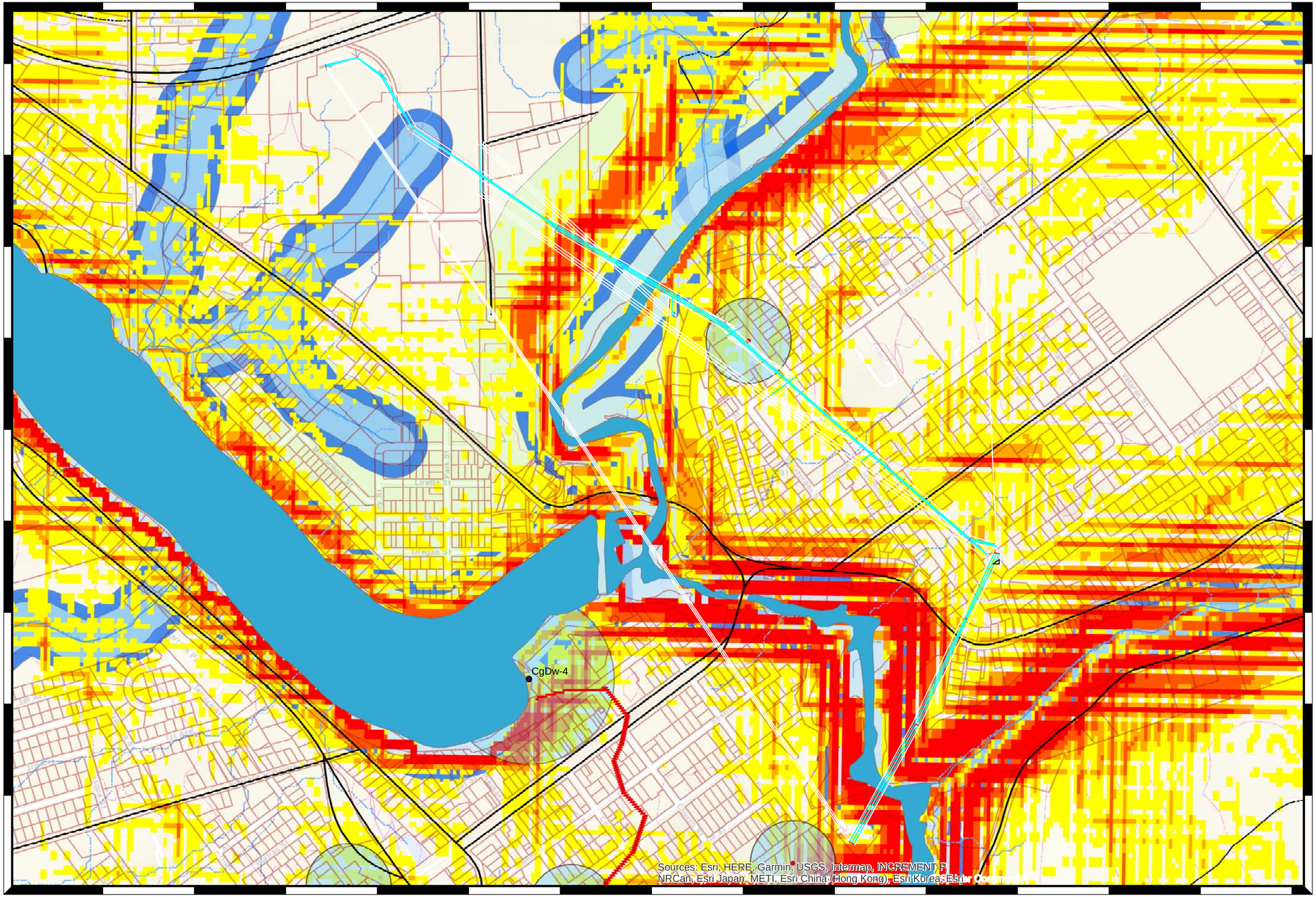
# recs	CITATION
128	Mazerolle, D.M. 2017. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
128	Sabine, M. 2016. Black Ash records from the NB DNR Forest Development Survey. New Brunswick Department of Natural Resources.
123	Wallace, S. 2020. Stewardship Department species occurrence data on NTNB preserves. Nature Trust of New Brunswick.
107	Hinds, H.R. 1986. Notes on New Brunswick plant collections. Connell Memorial Herbarium, unpubl, 739 recs.
106	Bagnell, B.A. 2001. New Brunswick Bryophyte Occurrences. B&B Botanical, Sussex, 478 recs.
106	Clayden, S.R. 2007. NBM Science Collections databases: vascular plants. New Brunswick Museum, Saint John NB, download Mar. 2007, 6914 recs.
103	Benedict, B. Connell Herbarium Specimen Database Download 2004. Connell Memorial Herbarium, University of New Brunswick. 2004.
102	Morrison, Guy. 2011. Maritime Shorebird Survey (MSS) database. Canadian Wildlife Service, Ottawa, 15939 surveys. 86171 recs.
98	Blaney, C.S.; Mazerolle, D.M.; Klymko, J; Spicer, C.D. 2006. Fieldwork 2006. Atlantic Canada Conservation Data Centre. Sackville NB, 8399 recs.
98	Klymko, J. 2019. Atlantic Canada Conservation Data Centre zoological fieldwork 2018. Atlantic Canada Conservation Data Centre.
90	Belliveau, A.G. 2018. E.C. Smith Herbarium and Atlantic Canada Conservation Data Centre Fieldwork 2018. E.C. Smith Herbarium, 6226 recs.
87	Klymko, J. 2020. Atlantic Canada Conservation Data Centre zoological fieldwork 2019. Atlantic Canada Conservation Data Centre.
86	Belland, R.J. Maritimes moss records from various herbarium databases. 2014.
77	Busby, D.G. 1999. 1997-1999 Bicknell's Thrush data, unpublished files. Canadian Wildlife Service, Sackville, 17 recs.
77	Klymko, J. 2021. Atlantic Canada Conservation Data Centre zoological fieldwork 2020. Atlantic Canada Conservation Data Centre.
76	Sollows, M.C,. 2008. NBM Science Collections databases: mammals. New Brunswick Museum, Saint John NB, download Jan. 2008, 4983 recs.
74	Blaney, C.S. 1999. Fieldwork 1999. Atlantic Canada Conservation Data Centre. Sackville NB, 292 recs.
71	Neily, T. H. 2018. Lichen and Bryophyte records, AEI 2017-2018. Tom Neily; Atlantic Canada Conservation Data Centre.
55	Neily, T.H. 2017. Maritmes Lichen and Bryophyte records. Atlantic Canada Conservation Data Centre, 1015 recs.
40	Blaney, C.S.; Spicer, C.D.; Rothfels, C. 2004. Fieldwork 2004. Atlantic Canada Conservation Data Centre. Sackville NB, 1343 recs.
38	Brunelle, P.-M. (compiler). 2009. ADIP/MDDS Odonata Database: data to 2006 inclusive. Atlantic Dragonfly Inventory Program (ADIP), 24200 recs.
38	Klymko, J. 2018. Maritimes Butterfly Atlas database. Atlantic Canada Conservation Data Centre.
36	Paquet, Julie. 2018. Atlantic Canada Shorebird Survey (ACSS) database 2012-2018. Environment Canada, Canadian Wildlife Service.
33	e-Butterfly. 2016. Export of Maritimes records and photos. Maxim Larrivee, Sambo Zhang (ed.) e-butterfly.org.
32	eBird. 2020. eBird Basic Dataset. Version: EBD_relNov-2019. Ithaca, New York. Nov 2019, Cape Breton Bras d'Or Lakes Watershed subset. Cornell Lab of Ornithology.
28	Toner, M. 2005. Lynx Records 1996-2005. NB Dept of Natural Resources, 48 recs.
26	Nature Trust of New Brunswick. 2020. Nature Trust of New Brunswick 2020 staff observations of species occurence data. Nature Trust of New Brunswick, 133 records.
24	Hinds, H.R. 1999. Connell Herbarium Database. University New Brunswick, Fredericton, 131 recs.
23	Keppie, D.M. 2005. Rare Small Mammal Records in NB, PE. Pers. comm. to K. Bredin; PE 1 rec., NB 24 recs, 23 recs.
22	Klymko, J.J.D. 2018. 2017 field data. Atlantic Canada Conservation Data Centre.
22	Paquet, Julie. 2019. Atlantic Canada Shorebird Survey ACSS database for 2019. Environment Canada, Canadian Wildlife Service.
22	Thomas, A.W. 1996. A preliminary atlas of the butterflies of New Brunswick. New Brunswick Museum.
20	Klymko, J. Henry Hensel's Butterfly Collection Database. Atlantic Canada Conservation Data Centre. 2016.
20	Scott, Fred W. 1998. Updated Status Report on the Cougar (Puma Concolor couguar) [Eastern population]. Committee on the Status of Endangered Wildlife in Canada, 298 recs.
20	Shortt, R. UNB specimen data for various tracked species formerly considered secure. Connell Memorial Herbarium, UNB, Fredericton NB. 2019.
18	Bishop, G. 2002. A floristic survey of known & potential sites of Furbish's lousewort. , 18 recs.
18	Mills, E. Connell Herbarium Specimens, 1957-2009. University New Brunswick, Fredericton. 2012.
18	Toner, M. 2001. Lynx Records 1973-2000. NB Dept of Natural Resources, 29 recs.
16	Cronin, P. & Ayer, C.; Dubee, B.; Hooper, W.C.; LeBlanc, E.; Madden, A.; Pettigrew, T.; Seymour, P. 1998. Fish Species Management Plans (draft). NB DNRE Internal Report. Fredericton, 164pp.
15	Blaney, C.S.; Mazerolle, D.M. 2008. Fieldwork 2008. Atlantic Canada Conservation Data Centre. Sackville NB, 13343 recs.
15	Erskine, A.J. 1999. Maritime Nest Records Scheme (MNRS) 1937-1999. Canadian Wildlife Service, Sackville, 313 recs.
15	Manthorne, A. 2014. MaritimesSwiftwatch Project database 2013-2014. Bird Studies Canada, Sackville NB, 326 recs.
14	Dubé, Joanie. 2018. Wood Turtle and invasive species observations in the Madawaska River, NB. Société d'aménagement de la rivière Madawaska.
14	Klymko, J.J.D. 2016. 2014 field data. Atlantic Canada Conservation Data Centre.
13	Askanas, H. 2016. New Brunswick Wood Turtle Database. New Brunswick Department of Energy and Resource Development.
13	Blaney, C.S.; Mazerolle, D.M. 2010. Fieldwork 2010. Atlantic Canada Conservation Data Centre. Sackville NB, 15508 recs.
13	Jasmin, M.; Pelletier, S. 2017. Bas St. Laurent Wood Turtle Localization 2016-2017. MFFP, 13 records.
13	Shortt, R. Connell Herbarium Black Ash specimens. University New Brunswick, Fredericton. 2019.
12	Cowie, Faye. 2007. Surveyed Lakes in New Brunswick. Canadian Rivers Institute, 781 recs.
12	Nature Trust of New Brunswick. 2021. Nature Trust of New Brunswick site inventory data submitted in April 2021. Nature Trust of New Brunswick, 2189 records.
12	Sabine, M. 2016. NB DNR staff incidental Black Ash observations. New Brunswick Department of Natural Resources.
12	Speers, L. 2008. Butterflies of Canada database: New Brunswick 1897-1999. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 2048 recs.
11	Blaney, C.S. 2017. Atlantic Canada Conservation Data Centre Fieldwork 2017. Atlantic Canada Conservation Data Centre.
10	Benedict, B. Connell Herbarium Specimens. University New Brunswick, Fredericton. 2000.
10	Blaney, C.S.; Mazerolle, D.M. 2011. Fieldwork 2011. Atlantic Canada Conservation Data Centre. Sackville NB.
9	Bateman, M.C. 2000. Waterfowl Brood Surveys Database, 1990-2000 . Canadian Wildlife Service, Sackville, unpublished data. 149 recs.
9	Benedict, B. Connell Herbarium Specimens, Digital photos. University New Brunswick, Fredericton. 2005.
9	Klymko, John; Chapman-Lam, Colin J. 2021. Cryptogam specimens from Restigouche River, August 2020. Atlantic Canada Conservation Data Centre, 44 records.

# recs	CITATION
8	Daigle, C. 2008. Wood Turtle Survey in the Madawaska River region, spring 2007. Pers. comm. to M. Toner, NBDNR, Feb. 20, 2 maps, 8 recs.
8	McAlpine, D.F. 1998. NBM Science Collections databases to 1998. New Brunswick Museum, Saint John NB, 241 recs.
7	Downes, C. 1998-2000. Breeding Bird Survey Data. Canadian Wildlife Service, Ottawa, 111 recs.
7	Webster, R.P. 2006. Survey for Suitable Salt Marshes for the Maritime Ringlet, New Populations of the Cobblestone Tiger Beetle, & New Localities of Three Rare Butterfly Species. New Brunswick WTF Report, 28 recs.
6	Blaney, C.S. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre. Sackville NB, 1042 recs.
6	Dowding, A.; Mandula, M. 2017. Observation of Hepatica acutiloba in New Brunswick. Nature Trust New Brunswick.
6	Goltz, J.P. 2008. Email to Sean Blaney re: discovery of Cryptotaenia canadensis and other rare species at the mouth of the Salmon River, Victoria Co., NB. pers. comm.
6	Webster, R.P. Database of R.P. Webster butterfly collection. 2017.
6	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).
5	Edsall, J. 2007. Personal Butterfly Collection: specimens collected in the Canadian Maritimes, 1961-2007. J. Edsall, unpubl. report, 137 recs.
5	Klymko, J. Dataset of butterfly records at the New Brunswick Museum not yet accessioned by the museum. Atlantic Canada Conservation Data Centre. 2016.
5	Richardson, Leif. 2018. Maritimes Bombus records from various sources. Richardson, Leif.
5	Scott, F.W. 1988. Status Report on the Gaspé Shrew (Sorex gaspensis) in Canada. Committee on the Status of Endangered Wildlife in Canada, 12 recs.
4	Anon. 2017. Export of Maritimes Butterfly records. Global Biodiversity Information Facility (GBIF).
4	Beardmore, T. 2017. 2017 Butternut observations. Natural Resources Canada.
4	Blaney, C.S.; Mazerolle, D.M. 2012. Fieldwork 2012. Atlantic Canada Conservation Data Centre, 13,278 recs.
4	Dalton, M. & Saba, B.A. 1980. A preliminary report on the natural history of the Gaspé shrew. The Atlantic Center for the Environment, Ipwich, MA, 29 pp.
4	Fournier, R. 2010. Rare plant observation records in Baker Brook and Grew Island areas. Pers. comm., 4 recs.
4	iNaturalist. 2018. iNaturalist Data Export 2018. iNaturalist.org and iNaturalist.ca, Web site: 11700 recs.
4	Sabine, M. 2016. Black Ash records from NB DNR permanent forest sampling Plots. New Brunswick Department of Natural Resources, 39 recs.
3	Klymko, J. 2016. Atlantic Canada Conservation Data Centre Fieldwork 2016. Atlantic Canada Conservation Data Centre.
3	Sollows, M.C,. 2009. NBM Science Collections databases: molluscs. New Brunswick Museum, Saint John NB, download Jan. 2009, 6951 recs (2957 in Atlantic Canada).
3	Sollows, M.C. 2008. NBM Science Collections databases: herpetiles. New Brunswick Museum, Saint John NB, download Jan. 2008, 8636 recs.
3	Tingley, S. (compiler). 2001. Butterflies of New Brunswick. , Web site: www.geocities.com/Yosemite/8425/buttrfly. 142 recs.
3	Turgeon, M.N. 2009. Showy Lady-slipper & Round-leaved Orchis observed at Loon Lake, Madawaska Co., NB. Pers. comm. to D.M. Mazerolle, 3 recs.
3	Webster, R.P. 1999. Insects of the Stillwater Watershed, A Preliminary Study. , 11 recs.
2	Basquill, S.P. 2003. Fieldwork 2003. Atlantic Canada Conservation Data Centre, Sackville NB, 69 recs.
2	Blaney, C.S. Miscellaneous specimens received by ACCDC (botany). Various persons. 2001-08.
2	Chaput, G. 2002. Atlantic Salmon: Maritime Provinces Overview for 2001. Dept of Fisheries & Oceans, Atlantic Region, Science Stock Status Report D3-14. 39 recs.
2	Consortium of North American Lichen Herbaria. 2018. Cetraria ericetorum records from CNALH. CNALH, 3.
2	Edsall, J. 2001. Lepidopteran records in New Brunswick, 1997-99. , Pers. comm. to K.A. Bredin. 91 recs.
2	Goltz, J.P. 2001. Botany Ramblings April 29-June 30, 2001. N.B. Naturalist, 28 (2): 51-2. 8 recs.
2	Haughian, S.R. 2018. Description of Fuscopannaria leucosticta field work in 2017. New Brunswick Museum, 314 recs.
2	iNaturalist. 2020. iNaturalist butterfly records selected for the Maritimes Butterfly Atlas. iNaturalist.
2	Majka, C. 2009. Université de Moncton Insect Collection: Carabidae, Cerambycidae, Coccinellidae. Université de Moncton, 540 recs.
2	McAlpine, D.F. 1998. NBM Science Collections: Wood Turtle records. New Brunswick Museum, Saint John NB, 329 recs.
2	NatureServe Canada. 2019. iNaturalist Maritimes Butterfly Records. iNaturalist.org and iNaturalist.ca.
2	Newell, R.E. 2000. E.C. Smith Herbarium Database. Acadia University, Wolfville NS, 7139 recs.
2	Pike, E., Tingley, S. & Christie, D.S. 2000. Nature NB Listserve. University of New Brunswick, listserv.unb.ca/archives/naturenb. 68 recs.
2	Speers, L. 2001. Butterflies of Canada database. Agriculture & Agri-Food Canada, Biological Resources Program, Ottawa, 190 recs.
2	Webster, R.P. & Edsall, J. 2007. 2005 New Brunswick Rare Butterfly Survey. Environmental Trust Fund, unpublished report, 232 recs.
1	Bagnell, B.A. 2003. Update to New Brunswick Rare Bryophyte Occurrences. B&B Botanical, Sussex, 5 recs.
1	Bishop, G. 2012. Field data from September 2012 Anticosti Aster collection trip. , 135 rec.
1	Calhoun, J.C. Butterfly records databased at the McGuire Center for Lepidoptera and Biodiversity. Calhoun, J.C. 2020.
1	Doucet, D.A. & Edsall, J.; Brunelle, P.-M. 2007. Miramichi Watershed Rare Odonata Survey. New Brunswick ETF & WTF Report, 1211 recs.
1	Doucet, D.A. 2008. Fieldwork 2008: Odonata. ACCDC Staff, 625 recs.
1	Edsall, J. 1993. Spring 1993 Report. New Brunswick Bird Info Line, 3 recs.
1	Edsall, J. 1993. Summer 1993 Report. New Brunswick Bird Info Line, 2 recs.
1	Goltz, J.P. & Bishop, G. 2005. Confidential supplement to Status Report on Prototype Quillwort (Isoetes prototypus). Committee on the Status of Endangered Wildlife in Canada, 111 recs.
1	Goltz, J.P. 2002. Botany Ramblings: 1 July to 30 September, 2002. N.B. Naturalist, 29 (3):84-92. 7 recs.
1	Hinds, H.R. 2000. Flora of New Brunswick (2nd Ed.). University New Brunswick, 694 pp.
1	Madden, A. 1998. Wood Turtle records in northern NB. New Brunswick Dept of Natural Resources & Energy, Campbellton, Pers. comm. to S.H. Gerriets. 16 recs.
1	Mandula, M. 2017. Nature Trust of New Brunswick Site Report: Jackson Falls, NB – new rare plant station. Nature Trust of New Brunswick, 2 pp.
1	Munro, Marian K. Nova Scotia Provincial Museum of Natural History Herbarium Database. Nova Scotia Provincial Museum of Natural History, Halifax, Nova Scotia. 2013.
1	Norton, Barb. 2010. Personal communication concerning Botrychium oneidense near Ayers Lake, NB. , One record.
1	Parkinson, K. 2017. Wood Turtle record in the Meduxnekeag Valley Nature Preserve. Pers. comm. to AC CDC.
1	Sabine, D.L. 2005. 2001 Freshwater Mussel Surveys. New Brunswick Dept of Natural Resources & Energy, 590 recs.
1	Simpson, D. Collection sites for Black Ash seed lots preserved at the National Tree Seed Centre in Fredericton NB. National Tree Seed Centre, Canadian Forest Service. 2016.

# recs	CITATION
1	Sollows, M.C,. 2009. NBM Science Collections databases: Coccinellid & Cerambycid Beetles. New Brunswick Museum, Saint John NB, download Feb. 2009, 569 recs.
1	Turgeon, M.N. Database of Martin Turgeon's Butterfly Collection. Turgeon, M.N. 2012.
1	Webster, R.P. 2001. R.P. Webster Collection. R. P. Webster, 39 recs.
1	Webster, R.P. Reggie Webster's records of Encyclops caerulea . pers. collection. 2018.
1	Wilhelm, S.I. et al. 2019. Colonial Waterbird Database. Canadian Wildlife Service.

APPENDIX C

Archaeological Potential Mapping for Grand Falls, NB



Legend

Polylines

SymbolID

0
1
2
3
4

Multipatches
HistoricFeb2022
PreContactFeb2022
UndefinedSites
SuspectedShipwrecks
Shipwrecks
SuspectedPlaneCrash
RecordedPlaneCrash
ProtoHistoricSite
RecentFinds
Cemeteries
New Brunswick Portage Routes

waterbody

<all other values>

WATER_CODE

AQ
LK
ON
PN
RV
SL
WA
PIDs

Roads

<all other values>

TRANSPORTA

1
3
2
PreContactFeb2022_Buffer
HistoricFeb2022_Buffer
PortageBuffer4
PortageBuffer
wetland

watercourse

<all other values>

WATERCOURS

1
2
Predicted Flow Channel

Slope_demnb2

<VALUE>

0 - 25.36652904
25.36652905 - 60.23010614
60.23010615 - 72.92877099
72.928771 - 77.50883873
77.50883874 - 80.67965486
80.67965487 - 83.85047099
83.850471 - 89.83979034
High Potential1
Medium Potential1

MarinePaleoShoreline

VALUE

0 - 28
28.00000001 - 38
38.00000001 - 48
48.00000001 - 810
Alluvial Sediments

New Nouveau Brunswick

Time: 7:58:28 PM
Date: 2022-04-19

APPENDIX D

NB Power HSEE-02-p004: Environmental Incident Response, Clean-up and Reporting

Process Owner:	Heidi Northrup	**Final Approver:**	Chantal St-Pierre
Title:	EMS Specialist	**Title:**	Director, Environment
Signature:	APPROVED	**Signature:**	APPROVED

Purpose:

The purpose of this procedure is to:

- outline the Corporate directives for responding to environmental incidents including containing, reporting and cleaning-up of releases involving NB Power equipment and/or material whether the environmental incident occurs on or off NB Power property; and,
- provide guidance when reporting releases to air, water or land to ensure compliance with provincial and federal regulations and facility specific Approvals to Operate requirements.

Scope:

This procedure applies to all Divisions at NB Power, including employees, contractors and subcontractors' performing work for NB Power.

At the discretion of the EMS Coordinator(s) within each Division, additional information may be included in site specific documentation information such as internal contact list for notification. Given the regulatory oversight by the Canadian Nuclear Safety Commission, and associated requirements, Point Lepreau may have other documented procedures and/or processes above and beyond the requirements of this document.

Environmental incidents must be reported immediately in accordance with this procedure unless otherwise noted in site specific documentation. These unique situations must be reviewed internally and in consultation with Corporate Environment.

If a release occurs during transportation of dangerous goods or meets the criteria outlined in Environmental Emergency Plans (E2 plans), additional reporting may be required in accordance with the Transportation of Dangerous Goods (TDG) Act and Regulation or the E2 Regulations.

References:

- Environmental Incidents Report (e-form 590)
- Disposal of Contaminated Soil and Material (Procedure HSEE-02-P007)
- Soil sampling for Total Petroleum Hydrocarbons Following Spill Clean-up (Procedure HSEE-02-P013)
- Transportation of Dangerous Goods (TDG) Act & Regulations Clear Language Edition
- Clean Environment Act
- Clean Air Act
- Environmental Emergency Regulations (E2 Regulations)

Definitions:

The following are defined for the purposes of this procedure.

Contaminants are defined as; acids, including battery and alkalis; oils including hydraulic, transformer, turbine, heavy fuel and diesel; gasoline; chemicals; paint; fugitive dust, domestic sewage, discharge outside operating parameters as described within facility specific Approvals to Operate and any other material whose regulations status is unknown.

Environmental Emergency Incident is defined as an incident (i.e. release of a contaminant) that requires immediate reporting to external agencies (i.e. Department of Environmental and Local Government (DELG)) as described in facility specific Approvals to Operate or other environmental regulation.

Environmental Incident is defined as a release or, deviation from Approval to Operate parameters, or non-compliance to provincial or federal regulations (i.e. Clean Environment Act).

NB Power Site Contact is defined as a Supervisor or designate.

Secondary containment is defined as a barrier (i.e., berms, trays, dykes, tarps, absorbent pads, etc.) which prevents pollution of soil and water.

Release is defined any spilling, discharging, emitting, leaving, or depositing of a contaminant, waste or other matter which enters the environment or escapes secondary containment. Leaking is considered "spilling".

Responsibilities:

Employees and Contractors are responsible for:

- taking immediate action to contain, report and control a release, whether they caused the release or not;
- cleaning-up or assisting with clean-up of the site;
- and completing Environmental Incident Report (Form 0590); and
- replacing material used from spill kits.

The ***EMS Coordinator*** or ***NB Power Site Contact*** is responsible for:

- ensuring that employees have been properly trained on environment incidents, including Approval to Operate requirements;
- being a liaison with regulatory agencies and other interested parties (i.e. First Nations' contact(s)) following initial notification;
- reviewing and signing-off on the Environmental Incident Report (Form 0590);
- maintaining a spill log if applicable; and
- ensuring that the completed Environmental Incident Report is circulated to the proper personnel.

Corporate Environment is responsible for:

- updating procedures consistent with applicable federal and provincial legislative requirements;
- providing support and guidance to Divisions (including oversight of site professionals), as required; and
- reporting to federal agencies, when required.

Introduction:

If you are using, consuming, storing, transferring, or otherwise handling petroleum products (i.e., diesel, hydraulic etc.), chemicals or other substances, you will need to take appropriate actions to prevent releases, and be prepared to respond.

In the event of a release of a contaminant, the following general rules must be followed, where applicable:

- Always wear the required personal protective gear as applicable
- Minimize further release of contaminant if safe to do so (i.e. shut off pumps, adjust operation of equipment, install booms, pads etc.).
- Clear all non-essential personnel from there area and divert traffic where possible; this may require barricades and flaggers.
- Cordon off the affected area until the clean-up has been completed.
- Eliminate ignition sources until it has been determined that no fire hazard exists.
- Avoid prolonged exposure to vapors emanating from the release if applicable.

Approval(s) to Operate, specific to applicable facilities, detail operating parameters which provide regulatory requirements to meet provincial environmental guidelines.

This procedure has been divided in to two (2) sections: Environmental incidents (spill of petroleum/hydrocarbon) and Other Environmental Incidents (Outside Operating parameter, ODS release, chemical spill etc.)

A. Environmental Incident - (spill of petroleum/hydrocarbon)

Employees and Contractors

1. When a spill occurs, stop the source of the spill and contain it, if it is safe to do so, whether you caused the spill or not.

2. If the spill reaches a sensitive feature (i.e., watercourse, wetland, wellfield etc.), use floating booms or other available materials to minimize the spread of oil. If additional resources are required contact the Supervisor, the EMS Coordinator or NB Power site contact.

3. Immediately report the spill as previously discussed with the Supervisor, the EMS Coordinator or NB Power site contact and provide information on the spill as noted below:
   - Date and time of spill
   - Spill location (area of facility and/or civic address)
   - Type of material spilled (chemical, petroleum product, transformer oil, etc.)
   - Estimated quantity spilled
   - Type of equipment involved in spill
   - Cause of spill (i.e., equipment failure, vehicle accident, vandalism, weather, etc.)
   - Is spill near a sensitive feature? If YES, what is the name of the feature, and what type is it (i.e., brook, river, wetland, well, protected watershed, marine coastline)?
   - Is source of spill stopped? If NO, why not?
   - Is spill contained? If NO, why not?
   - Is spill cleaned-up? If NO, why not?
   - Identify if additional resources are required

4. Record spill information as outlined in step 3 and sequence of events on Environmental Incident Report e-form 0590 (regardless if it requires internal or external reporting).

EMS Coordinator or NB Power Site Contact

5. Contact regulatory agencies or other interested parties (i.e. First Nations' Contact (s)) as applicable:

   i. for spills during regular work hours, immediately contact the nearest Department of Environment office (do not leave a voice-mail message, personal contact must be made):

   - Fredericton - 444-5149
   - Miramichi - 778-6032
   - Saint John - 658-2558
   - Moncton - 856-2374
   - Bathurst - 547-2092
   - Grand Falls - 473-7744

   ii. for spills after regular work hours, on weekends, holidays, or as a reporting requirement under Permits or Approvals (i.e., spills enter water) notify using the 24-hour emergency number at 1-800-565-1633.

   iii. for all releases or the potential of a release of contaminants into water or other sensitive environmental features notify immediately using the 24-hour emergency number at 1-800-565-1633. It is recommended to follow up with local DELG the next business day.

6. Immediately contact Corporate Environment in any of the following situations:
   - if the spill will cause major environmental damage,
   - if the spill enters a watercourse/wetland,
   - if the spill is expected to result in "significant" clean-up costs or third-party liability
   - if the spill is greater than 200 liters,
   - if the spill involves PCBs in order to determine if additional reporting is required, or,
   - if the Department of Environment requests a Site Professional (Corporate Environment maintains current list).

7. Arrange for and/or participate in cleanup activities.

8. All spill clean-up material must be properly disposed of in accordance with the Disposal of Contaminated Soil and Material (Procedure HSEE-02-P007).

9. Once the site has been cleaned-up, where applicable, clean soil samples must be collected for analysis to ensure the site meets provincial guidelines. Refer to Soil Sampling for Total Petroleum Hydrocarbon (TPH) Following Spill Clean-up (Procedure HSEE-02-P013).

Corporate Environment

10. Contact, as required depending on the nature, location and extent of the spill, the following:

- Senior Management
- Corporate Public Relations and Communications
- Risk Manager
- Environment and Climate Change Canada
- Transport Canada

EMS Coordinator(s)

11. Ensure Spill Log is updated and circulated as required.

B. Environmental Incident - Other (Outside Operating parameter, ODS release, chemical releases etc.)

Employees and Contractors

1. When an environmental incident occurs stop the source of the release, if it is safe to do so.
2. Immediately report as outlined in Facility specific Approval to Operate, Environment Regulations or site procedures. Record details of the incident as previously discussed with the Supervisor, the EMS Coordinator or NB Power site contact and collect necessary information to be entered on the Environmental Incident Report (e-form 0590) as applicable:
   - Date and time of the incident
   - Location (area of facility and/or civic address)
   - Incident type (approval conditions, ODS, etc.)
   - Estimated quantity released
   - Type of equipment involved if applicable
   - Cause of release (i.e., equipment failure, vehicle accident, vandalism, weather, etc.)
   - Is release near a sensitive feature? If YES, what is the name of the feature, and what type is it (i.e., brook, river, wetland, well, protected watershed, marine coastline)?
   - Is source of release stopped? If NO, why not?
   - Is release contained? If NO, why not?
   - Is release cleaned-up or stopped? If NO, why not?
   - Identify if additional resources are required

EMS Coordinator or NB Power Site Contact

3. Record information and sequence of events on Environmental Incident Report e-form 0590 (regardless if it requires internal or external reporting.
4. Contact regulatory agencies or other interested parties (i.e., First Nations' Contact (s) as applicable:

   i. for environmental incidents during regular work hours, immediately contact the nearest Department of Environment office (do not leave a voice-mail message, personal contact must be made):

   - Fredericton - 444-5149
   - Miramichi - 778-6032
   - Saint John - 658-2558
   - Moncton - 856-2374
   - Bathurst - 547-2092
   - Grand Falls - 473-7744

ii. for environmental incidents after regular work hours, on weekends, holidays, or as a reporting requirement under Permits or Approvals notify using the 24-hour emergency number at 1-800-565-1633. It is recommended to follow up with local DELG the next business day.

iii. for all releases or the potential of a release of contaminants into water or other sensitive environmental features notify immediately using the 24-hour emergency number at 1-800-565-1633. It is recommended to follow up with local DELG the next business day.

5. Immediately contact appropriate Corporate Environment personnel in any of the following situations:
    - if the environmental incident will cause major environmental damage,
    - if the release enters a watercourse/wetland,
    - if the environmental incident is expected to result in "significant" clean-up costs or third-party liability
    - if the release is greater than 200 liters,
    - if the release involves PCBs in order to determine if additional reporting is required.

6. Arrange for and/or participate in environmental incident response and properly dispose of cleanup material as applicable

Corporate Environment

7. Contact, as required depending on the nature, location and extent of the environmental incident, the following:

    - Senior Management
    - Corporate Public Relations and Communications
    - Risk Manager
    - Environment and Climate Change Canada

EMS Coordinator(s)

8. Provide regular updates to management to ensure any outstanding action items are addressed.

Revision History:

Revision Number	Revised Section (s)	Revision Summary	Prepared / Revised by:	Effective Date: (YYYY/MM/DD)
00	New	New procedure	H. Northrup	2018/09/01
01	All except purpose and scope sections	Updated to reflect current practices	H. Northrup	2020/05/15
03	All including Title	Updated to include reporting of environmental incidents	H. Northrup	2022/04/01

APPENDIX E

Additional Information: Requirements of New Brunswick's EIA Guide

The Proponent

Name of Undertaking	69 kV Transmission Line Upgrade to 138 kV, Grand Falls, NB
Project Overview	Please refer to Section 0 of the EIA Registration Document
Purpose / Rationale / Need for Undertaking	Please refer to Section 1.1 of the EIA Registration Document
Project Location	The proposed Project is located in the Town of Grand Falls, NB. The Project begins at: Latitude: 47.05165 Longitude: -67.728764 The upgrade of new transmission line ends in Grand Falls, NB at: Latitude: 47.06296 Longitude: -67.752531 Parcel Identifiers (PIDs) of the Project are included in Table E.1 Please refer to Figure 1.1 of the EIA Registration Document for a site location map showing the location of the Project.
Siting Considerations	A description of the considerations that were taken into account in choosing the Project location is provided in Section 2.3
Physical Components and Dimensions of the Project	A description of the Project components and infrastructure is provided in Section 2.4 of the EIA Registration Document.
Construction Details	An overview of Project Construction activities is provided in Section 2.5.1 of the EIA Registration Document.
Operation and Maintenance Details	An overview of Project operation activities is provided in Section 2.5.2 of the EIA Registration Document.
Future Modifications, Extensions, or Abandonment	An overview of Project Decommissioning activities is provided in Section 2.5.3 of the EIA Registration Document.
Project-Related Documents	There are no other Project-related documents for this EIA; however, an addendum of planned field work will be provided in late summer 2022

Description of the Existing Environment

The description of relevant features that are found within the Project location and surrounding areas that could potentially be affected by the Project are provided in Section 3.0 and within the descriptions of the specific VCs, found in Section 5.0 of the EIA Registration Document.

Summary of Environmental Impacts

Potential interactions, or “impacts,” of the various Project phases are provided in Section 5.0 of the EIA Registration Document.

Summary of Proposed Mitigation

Mitigation by design in relation to the potential Project-related interactions is discussed in Section 6.0 of the EIA Registration Document.

Public Involvement

A summary of the Indigenous consultation and public engagement activities planned as part of the Project is provided in Section 7.0 and 8.0 of the EIA Registration Document.

Approval of the Undertaking

Permits, licenses, approvals, and other regulatory requirements and authorizations that may be required for the Project are discussed in Section 1.5 of the EIA Registration Document. A federal assessment under the *Impact Assessment Act* does not appear to be required, as it is not a designated project.

Signature

June 29, 2022

Signature

Date

Table E.1 Parcel Identifiers (PID) of Properties Crossed by the Upgraded Transmission Line RoW

3856523	5538058	280838	5143594	5605619	5554795
5741570	232330	286151	5143633	6162313	286973
4978140	277924	279536	272631	232275	279243
3589663	279138	5683104	229874	6275881	6107737
286371	279594	287050	65007940	6111029	286436
277738	3806536	6111011	286127	5837096	286274
6742016	279528				